



Attached Document

## COMPLETE GROUP QUALITY DOSSIER

Flowserve Document Title: COMPLETE GROUP QUALITY DOSSIER

**Flowserve Document Number : COS-11-10P40213-3003-01**

**Project Name : KEMPER COUNTY IGCC**  
**Customer Name : MISSISSIPPI POWER COMPANY**  
  
**End User : KEMPER COUNTY IGCC GF**  
**Site/Location : KEMPER COUNTY IGCC**  
  
**Flowserve Order/Line : COS-11-10P40213**  
**Equipment Tag No. : MA-PU-3700 A/B**  
**Equipment Type : WXH**  
**Equipment Size : 4X12**  
**Flowserve serial no. : M-151457-58**  
**Quantity : 2**  
**Equipment Service : GI BOILER FEED**

**Please complete and return:**

|                                                                                                        |  |                                |  |
|--------------------------------------------------------------------------------------------------------|--|--------------------------------|--|
| <b>Document Reviewed by:</b>                                                                           |  | <b>Document Reviewed date:</b> |  |
| <input type="checkbox"/> APPROVED. NO ACTION REQUIRED                                                  |  |                                |  |
| <input type="checkbox"/> APPROVED. RE-SUBMIT AS FINAL.                                                 |  |                                |  |
| <input type="checkbox"/> APPROVED EXCEPT AS NOTED. DOCUMENT WILL BE MODIFIED AND RESUBMITTED AS FINAL. |  |                                |  |
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| vagarcia | vagarcia | vagarcia | 00           |             | 21/02/2012    |
| PREPARED | CHECKED  | APPROVED | Revision No. | Status/Desc | Date Approved |

**Southern Company Generation      Kemper County**  
**MM114286    0    Unit 1**

FLOWSERVE    PO: MPC17954-0001

COS-11-10P40213-3003-01    Rev: 0

THIS DOCUMENT IS MULTIPAGE - HRSG FEED WATER PUMPS & GASIFIER ISLA

Information Only

**QUALITY DOSSIER**

CUSTOMER : MISSISSIPPI POWER

CUSTOMER ORDER : CONTRACT Nº 17954

PROJECT : KEMPER COUNTRY IGCC

PUMP TYPE : 4X12 WXH-10

SERIAL Nº : M-151457 / 58

F.P.D. ORDER : COS-11-10P40213

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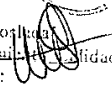
FLowsERVE

Planta Copla  
Aseguradora de Calidad  
Revisado:



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Revisado: 





# SECTION 1

|                                         |                                   |              |                                        |                                         |
|-----------------------------------------|-----------------------------------|--------------|----------------------------------------|-----------------------------------------|
| REFERENCE FPD : COS-11-10P40213         |                                   |              |                                        | <b><u>QCP N°</u></b><br><br><b>2244</b> |
| CUSTOMER : MISSISSIPPI POWER            |                                   |              |                                        |                                         |
| PROYECT : KEMPER COUNTY IGCC            |                                   |              |                                        | <b>N.C: B</b><br><b>DV:Y</b>            |
| PUMP TYPE : 4X12 WXH 10                 |                                   |              |                                        |                                         |
| QUANTITY : 2                            |                                   |              |                                        |                                         |
| SERVICE : BOILER FEED                   |                                   |              |                                        |                                         |
| PUMP LIQUID : FEED WATER                |                                   |              |                                        |                                         |
|                                         |                                   |              |                                        |                                         |
|                                         |                                   |              |                                        |                                         |
| 3                                       | 05/09/2011                        | A.CHINCHILLA | V.DOLS                                 | L.DE MIGUEL/ V.BAIZAN                   |
| 2                                       | 06/06/2011                        | A.CHINCHILLA | V.DOLS                                 | L.DE MIGUEL/ V.BAIZAN                   |
| 1                                       | 28/03/2011                        | A.CHINCHILLA | V.DOLS                                 | L.DE MIGUEL/ V.BAIZAN                   |
| 0                                       | 01/03/2011                        | A.CHINCHILLA | V.DOLS                                 | L.DE MIGUEL/ V.BAIZAN                   |
| DATE                                    |                                   | PREPARED     | REVISED AND APPROVED                   | APPROV. GA MNGR/ENG                     |
| DESCRIPTION                             |                                   |              | MATERIAL                               |                                         |
| 1                                       | SUCTION HEAD                      |              | ASTM A487, CA6NM ( ó IR805)            |                                         |
| 2                                       | DISCHARGE HEAD                    |              | ASTM A487, CA6NM ( ó IR805)            |                                         |
| 3                                       | STUFFING BOX                      |              | ASTM A487, CA6NM ( ó IR805)            |                                         |
| 4                                       | CHANNEL RINGS                     |              | ASTM A487, CA6NM( ó IR805)             |                                         |
| 5                                       | DIFUSERS                          |              | ASTM A487, CA6NM( ó IR805)             |                                         |
| 6                                       | IMPELLERS                         |              | ASTM A487, CA6NM( ó IR805)             |                                         |
| 7                                       | SHAFT                             |              | ASTM A276, Tp. 410, Cond. T            |                                         |
| 8                                       | BALANCING DRUM [R.1]              |              | IR-829X300 (ASTM A473 Tp416)           |                                         |
|                                         | BALANCING SLEEVE [R.1]            |              | IR-829X400 (ASTM A473 Tp416)           |                                         |
| 9                                       | CASING WEARING RINGS              |              | ASTM A473, Tp. 416 (ó IR 829x400)      |                                         |
|                                         | IMPELLER WEARING RINGS            |              | AISI 420 + Laser Hard. (ó IR 655))     |                                         |
| 10                                      | PRESSURE BOLTING                  |              | ASTM A193, Gr. B7<br>ASTM A194, Gr. 2H |                                         |
| 11                                      | BEARING HOUSING                   |              | ASTM A216, Gr. WCB                     |                                         |
| 12                                      | BASEPLATE                         |              | STRUCTURAL STEEL                       |                                         |
| 13                                      | OTHER RELEVANT PARTS              |              | ACC. BOM                               |                                         |
| 14                                      | MECHANICAL SEALS (SLEEVE & GLAND) |              | AS PER APPLICABLE RT                   |                                         |
| 15                                      | COUPLING                          |              | AS PER APPLICABLE RT                   |                                         |
| 16                                      | INSTRUMENTATION                   |              | AS PER APPLICABLE RT                   |                                         |
| 17                                      | ROTOR                             |              |                                        |                                         |
| 18                                      | COMPLETE PUMP                     |              |                                        |                                         |
| 19                                      | AUXILIARY PIPING                  |              |                                        |                                         |
| 20                                      | ELECTRIC MOTOR                    |              | AS PER SUPPLIER QCP                    |                                         |
| 21                                      | COMPLETE GROUP                    |              |                                        |                                         |
| <b>TYPE OF INSPECTION</b>               |                                   |              |                                        |                                         |
| ▲ Q. C. FPD TO REVIEW DOCUMENT          |                                   |              |                                        |                                         |
| 0 CUSTOMER / AGENT TO REVIEW DOCUMENT   |                                   |              |                                        |                                         |
| ♦ Q.C. FPD WITNESS                      |                                   |              |                                        |                                         |
| ● CUSTOMER / AGENT WITNESS (NOTIFY)     |                                   |              |                                        |                                         |
| ■ CUSTOMER / AGENT WITNESS (HOLD POINT) |                                   |              |                                        |                                         |

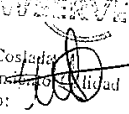
| QUALITY CONTROL PLAN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
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| LANGUAGE: ENGLISH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| COD.: COD.: COD.: 923                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| <div> <div> <div>MATERIAL CERTIFICATE ACC. TO EN 10204 STDs. CHEMICAL ANALYSIS. MECHANICAL PROPERTIES</div> <div>IDENTIFICATION AND STAMPING ACC. SUPPLIER STD. HEAT NO. DRAWING AND/OR SERIAL NO. PATTERN NO. &amp; MTL. SPEC.</div> <div>CALIBRATION CERTIFICATES</div> <div>CASTING UPGRADING PROC. AND RELATED WELD PROC. REQUIREMENTS (NOTE 1) WPS + PQR + WPO PER ASME IX RODS. MTL. CERT. TYPE 3.1 EN 10204 PER ASME II PART C. DEFECTS MAP AND NOTIFICATION OF MAJOR DEFECTS (NOTE 2) AND POST WELD HEAT TREAT. TIT CHART REQUIRED</div> <div>DIMENSIONAL INSPECTION ACC. MANUFACTURING DRAWINGS. IDENTIFICATION AND MARKING BEFORE DELIVERY</div> <div>VISUAL INSPECTION AT RECEPTION; CASTINGS AS PER MSS-SP-55 AND OTHERS ACCORDING MATERIAL SPEC. DIMENSIONAL INSPECTION AS PER MANUFACTURING DRAWINGS.</div> <div>IDENTIFICATION AND MARKING CONTROL &amp; PRESERVATION ACC. FPD. PROC. QESP-7.08 REV 7</div> <div>ULTRASONIC INSPECTION OF SHAFT FORGED PIECES IN ROUGH MACHINED CONDITION ACC. FPD. PROC. PLUS01 REV. 0</div> <div>DYE PENETRANT EXAMINATION ON CRITICAL AREAS ONLY AFTER PRE-MACHINING) AND AREAS EXCAVATED FOR UPGRADING ACC. FPD. PROC. PLUS01 REV 1 (MAJOR DEFECT MAPS ONLY FOR MAJOR DEFECTS) (NOTE 1)</div> <div>WELD REPAIRS (TO MATERIAL SPEC. ON CASTINGS) WPS + PQR + WQR PER ASME IX ROD. MATERIAL CERTIF. TYPE 3.1 EN 10204 PER ASME II PART C POST WELD HEAT TREATMENT (IF REQUIRED)</div> <div>DYE PENETRANT EXAMINATION ON CRITICAL REPAIRED AREAS ACC. FPD. PROC. PLUS01 REV 0 ONLY APPLIES TO MAJOR REPAIRS (NOTE 2)</div> <div>DYE PENETRANT INSPECTION ON CRITICAL MACHINED AREAS ACC. PROC. PLUS01 REV 0 AND SHAFTS (ONLY IN SECTION CHANGES)</div> <div>DYNAMIC BALANCING IMPELLERS ACC/ FPD. PROC. PED01, Rev. 2. ROTOR CHECK ACC. FPD. PROC. PED02, Rev. 0. (Rotor pump rotation speed: 3580 rpm) (NOTE 3) (NOTE 5)</div> <div>DIMENSIONAL INSPECTION AS PER MANUFACTURING DRAWINGS</div> <div>HYDROSTATIC TEST ACC. FPD. PROC. PLUS01 REV 3 (NOTE 3 and NOTE 6)</div> <div>PUMP PERFORMANCE TEST AND NPSH TEST ACC. FPD. PROC. PLUS01 REV 4 (NOTE 4)</div> <div>DISASSEMBLY AND CLEANING ACC. PROC. FPD. PLUS01, Rev. 2</div> <div>PAINTING ACCORDING FPD. PROC. PLUS02, Rev. 0.</div> <div>FINAL DIMENSIONAL INSPECTION: ONLY CUSTOMER INTERFACING ACC. GENERAL ARRANGEMENT DRAWING. NAMEPLATES AND IDENTIFICATION PLATES. GENERAL VIEW AND SCOPE COMPLETION CHECK</div> <div>SHIPPING PREPARATION, PACKING AND MARKING ACC. FPD. PROC. FE - 184 REV 2</div> <div>QUALITY DOSSIER REVISION</div> <div>SHIPPING RELEASE NOTE</div> </div> </div> |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2    | 3 | 4    | 5    | 6 | 7 | 8  | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
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| 3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Δ 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Δ ST |   | Δ TR | Δ ST | * | * | ST |   | *  | TR | *  | TR | *  | TR |    |    |    |    |    |    |    |
| 3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Δ 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Δ ST |   | Δ TR | Δ ST | * | * | ST |   | *  | TR | *  | TR | *  | TR |    |    |    |    |    |    |    |
| 3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Δ 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Δ ST |   | Δ TR | Δ ST | * | * | ST |   | *  | TR | *  | TR | *  | TR |    |    |    |    |    |    |    |
| 3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Δ 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Δ ST |   | Δ TR | Δ ST | * | * | ST |   | *  | TR | *  | TR | *  | TR |    |    |    |    |    |    |    |
| 3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |   |      |      |   |   |    |   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Δ 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Δ ST |   | Δ TR | Δ ST | * | * | ST |   | *  | TR | *  | TR | *  | TR |    |    |    |    |    |    |    |



# SECTION 2

## COMPONENTS LIST

CUSTOMER : MISSISSIPPI POWER  
 CUSTOMER REF. : CONTRACT N° 17954  
 PROJECT : KEMPER COUNTRY IGCC  
 PUMP TYPE : 4X12 WXH-10  
 SERIAL N°. : 151457  
 FPD REF. : COS-11-10P40213

**FLOWSERVE**  
 Planta Coslada  
 Aseguramiento de Calidad  
 Revisado: 

| NAME OF PART           | PART N° | SERIAL N° | HEAT   |
|------------------------|---------|-----------|--------|
| SUCTION HEAD           | 1130    | 01        | B17546 |
| DISCHARGE HEAD         | 1140    | 01        | B17409 |
| CHANNEL RING 1ST STG.  | 1150.1  | 01        | Y330   |
| CHANNEL RING 2ND STG.  | 1150.2  | 01        | Y330   |
| CHANNEL RING 3RD STG.  | 1150.2  | 02        | Y330   |
| CHANNEL RING 4TH STG.  | 1150.2  | 03        | Y330   |
| CHANNEL RING 5TH STG.  | 1150.2  | 04        | Y329   |
| CHANNEL RING 6TH STG.  | 1150.2  | 05        | Y329   |
| CHANNEL RING 7TH STG.  | 1150.2  | 06        | Y329   |
| CHANNEL RING 8TH STG.  | 1150.2  | 07        | Y330   |
| CHANNEL RING LAST STG. | 1150.9  | 01        | Y330   |
| DIFFUSER 1ST STG.      | 1410.1  | 01        | 14332  |
| DIFFUSER 2ND STG.      | 1410.1  | 02        | 14332  |
| DIFFUSER 3RD STG.      | 1410.1  | 03        | 14332  |
| DIFFUSER 4TH STG.      | 1410.1  | 04        | 14332  |
| DIFFUSER 5TH STG.      | 1410.1  | 05        | 14332  |
| DIFFUSER 6TH STG.      | 1410.1  | 06        | 14332  |
| DIFFUSER 7TH STG.      | 1410.1  | 07        | 14332  |
| DIFFUSER 8TH STG.      | 1410.1  | 08        | 14332  |
| DIFFUSER 9TH STG.      | 1410.1  | 09        | 14332  |
| DIFFUSER LAST STG.     | 1410.4  | 01        | 14332  |
| SHAFT                  | 2100    | 01        | 108045 |
| STUFFING BOX EXTENSION | 4110    | 01        | 14206  |
| BALANCING DRUM         | 6210    | 01        | 251546 |
| BALANCING SLEEVE       | 6220    | 01        | 251546 |
| IMPELLER 1ST STG.      | 2200.1  | 01        | 14330  |
| IMPELLER 2ND STG.      | 2200.2  | 01        | 14330  |
| IMPELLER 3RD STG.      | 2200.2  | 02        | 14330  |
| IMPELLER 4TH STG.      | 2200.2  | 03        | 14330  |
| IMPELLER 5TH STG.      | 2200.2  | 04        | 14323  |
| IMPELLER 6TH STG.      | 2200.2  | 05        | 14323  |
| IMPELLER 7TH STG.      | 2200.2  | 06        | 14330  |
| IMPELLER 8TH STG.      | 2200.2  | 07        | 14330  |
| IMPELLER 9TH STG.      | 2200.2  | 08        | 14330  |
| IMPELLER LAST STG.     | 2200.5  | 01        | 14330  |
|                        |         |           |        |



## COMPONENTS LIST

Planta Copeland  
 Aseguramiento de Calidad  
 Revisor:

|               |                       |
|---------------|-----------------------|
| CUSTOMER      | : MISSISSIPPI POWER   |
| CUSTOMER REF. | : CONTRACT N° 17954   |
| PROJECT       | : KEMPER COUNTRY IGCC |
| PUMP TYPE     | : 4X12 WXH-10         |
| SERIAL N°.    | : 151458              |
| FPD REF.      | : COS-11-10P40213     |

| NAME OF PART           | PART N° | SERIAL N° | HEAT   |
|------------------------|---------|-----------|--------|
| SUCTION HEAD           | 1130    | 02        | 18345  |
| DISCHARGE HEAD         | 1140    | 02        | 15310  |
| CHANNEL RING 1ST STG.  | 1150.1  | 02        | Y329   |
| CHANNEL RING 2ND STG.  | 1150.2  | 08        | Y329   |
| CHANNEL RING 3RD STG.  | 1150.2  | 09        | Y329   |
| CHANNEL RING 4TH STG.  | 1150.2  | 10        | Y330   |
| CHANNEL RING 5TH STG.  | 1150.2  | 11        | Y329   |
| CHANNEL RING 6TH STG.  | 1150.2  | 12        | Y329   |
| CHANNEL RING 7TH STG.  | 1150.2  | 13        | Y330   |
| CHANNEL RING 8TH STG.  | 1150.2  | 14        | Y330   |
| CHANNEL RING LAST STG. | 1150.9  | 02        | Y329   |
| DIFFUSER 1ST STG.      | 1410.1  | 10        | 14332  |
| DIFFUSER 2ND STG.      | 1410.1  | 11        | 14332  |
| DIFFUSER 3RD STG.      | 1410.1  | 12        | 14332  |
| DIFFUSER 4TH STG.      | 1410.1  | 13        | 14332  |
| DIFFUSER 5TH STG.      | 1410.1  | 14        | 14332  |
| DIFFUSER 6TH STG.      | 1410.1  | 15        | 14332  |
| DIFFUSER 7TH STG.      | 1410.1  | 16        | 14332  |
| DIFFUSER 8TH STG.      | 1410.1  | 17        | 14332  |
| DIFFUSER 9TH STG.      | 1410.1  | 18        | 14332  |
| DIFFUSER LAST STG.     | 1410.4  | 02        | 14416  |
| SHAFT                  | 2100    | 02        | 108045 |
| STUFFING BOX EXTENSION | 4110    | 02        | 14206  |
| BALANCING DRUM         | 6210    | 02        | 251546 |
| BALANCING SLEEVE       | 6220    | 02        | 251546 |
| IMPELLER 1ST STG.      | 2200.1  | 02        | 14323  |
| IMPELLER 2ND STG.      | 2200.2  | 09        | 14323  |
| IMPELLER 3RD STG.      | 2200.2  | 10        | 14323  |
| IMPELLER 4TH STG.      | 2200.2  | 11        | 14323  |
| IMPELLER 5TH STG.      | 2200.2  | 12        | 14323  |
| IMPELLER 6TH STG.      | 2200.2  | 13        | 14323  |
| IMPELLER 7TH STG.      | 2200.2  | 14        | 14323  |
| IMPELLER 8TH STG.      | 2200.2  | 15        | 14323  |
| IMPELLER 9TH STG.      | 2200.2  | 16        | 14330  |
| IMPELLER LAST STG.     | 2200.5  | 02        | 14330  |
|                        |         |           |        |



# SECTION 3



**JSONS FOUNDRY PVT. LTD.**

F/QA/13

G-2/B, G-12/1 & G-13, MIDC KUPWAD BLOCK, SANGLI - 416436 (INDIA)  
PHONE : (0233) 2644603/604 FAX : (0233) 2644605 E-mail : jsonsfoundry@gmail.com

(WELL KNOWN FOUNDRY Under Regulations 4C(2) Of Indian Boiler Regulations 1950)

**MATERIAL TEST CERTIFICATE**

Page 1 of 1

**3.1 AS PER EN 10204**

M/s. FLOWSERVE SPAIN S.L. (COSLADA)  
AV FUENTEMAR, 26-28,  
COSLADA 28823  
MADRID, SPAIN  
Pin

T.C. No. : 05903  
D.C. No. : 04846  
P.O. No. : 1) 56735/10  
2) 56735/2

Date : 25/07/2011  
Date : 25/07/2011  
Date : 15/03/2011

**Melting Process : Induction (Electric) Furnace Melting.**

Grade & Specification : IR-805 (AS PER SPECIFICATION ,FPD,Gr.IR-805.)

Heat Treatment : 1. HEATING TO (1060) DEG. CEL. SOAKING 3 HRS. AND AIR COOL TO 45 DEG. CEL.  
Process : 2. TEMPERING AT (620) DEG. CEL. SOAKING 3. HRS. AND AIR COOL.  
3. TEMPERING AT (610) DEG. CEL. SOAKING 3. HRS. AND AIR COOL.

**CHEMICAL ANALYSIS**

| HEAT # | C.%   | Mn.%  | Si.%  | S.%   | P.%   | Cr.%   | Ni.%  | Mo.%  | V.%   | Cu.%  | W.%   |  |  |
|--------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|--|--|
| MIN    |       |       |       |       |       | 11.500 | 3.500 | 0.400 |       |       |       |  |  |
| MAX    | 0.060 | 1.000 | 1.000 | 0.030 | 0.040 | 14.000 | 4.500 | 1.000 | 0.050 | 0.500 | 0.100 |  |  |
| B17409 | 0.052 | 0.910 | 0.336 | 0.008 | 0.032 | 12.740 | 3.860 | 0.590 | 0.043 | 0.256 | 0.005 |  |  |
| B17546 | 0.050 | 0.870 | 0.469 | 0.007 | 0.034 | 12.740 | 3.850 | 0.520 | 0.044 | 0.233 | 0.005 |  |  |

**MECHANICAL PROPERTIES**

| HEAT # | Y.S<br>(0.2%offset)<br>MPa | T.S<br>MPa | % Elong.<br>G.L. 2"<br>(50 mm) | % Red<br>In Area | Hardness<br>BHN | Bend<br>Test<br>D=90°/<br>120°<br>D=3t | Charpy " Notch Impact Test At °C Jou./Ft. Lbf. |    |     | AVG | % Shear<br>Area |
|--------|----------------------------|------------|--------------------------------|------------------|-----------------|----------------------------------------|------------------------------------------------|----|-----|-----|-----------------|
| MIN    | 550                        | 760        | 15                             | 35               |                 |                                        |                                                |    |     |     |                 |
| MAX    |                            | 930        |                                |                  | 285             |                                        | I                                              | II | III |     |                 |
| B17409 | 632                        | 844        | 18.00                          | 45.24            | 264             |                                        |                                                |    |     |     |                 |
| B17546 | 623                        | 834        | 18.40                          | 45.83            | 266             |                                        |                                                |    |     |     |                 |

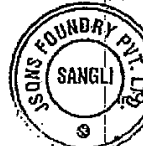
**DESPATCH DETAILS**

| HEAT # | PRODUCT | ITEM DESCRIPTION                                    | DRAWING NUMBER    | Qty. |
|--------|---------|-----------------------------------------------------|-------------------|------|
| B17409 | 920007  | CABEZA DESCARGA (DISCHARGE HEAD) M-14038            | 4X12WXH361A REV.H | 1    |
| B17546 | 920008  | CABEZA ASPIRACION (SUCTION HEAD) M14037 (7D4140370) | 4X12WXH360A REV.G | 1    |

WE HEREBY CERTIFY THAT THE ITEMS MENTIONED ABOVE HAVE BEEN TESTED. THEY ARE FOUND TO BE IN ACCORDANCE WITH THE SPECIFICATIONS AND SATISFY THE REQUIREMENT OF - AS PER SPECIFICATION ,FPD,Gr.IR-805.

( 1 ) Visual Inspection AS PER MSS SP-55, Found satisfactory.

For JSONS FOUNDRY PVT. LTD.



D.M. Patil  
Charge D.C. Dept.  
(LAB)

NASIR MD JAWAR  
(Works Inspector)

JF  
4

M.B. Chougule  
Tested By:

FLOWSERVE

Planta Coslada  
Aseguramiento Calidad



# JSONS FOUNDRY PVT. LTD.

G-13 & G-2/B, G-12/1, MIDC KUPWAD BLOCK, SANGLI - 416436 (INDIA)  
PHONE : (0233) 2644603/604 FAX : (0233) 2644605 E-mail : jsonsfoundry@gmail.com

F/QA/13

(WELL KNOWN FOUNDRY Under Regulations 4C(2) Of Indian Boiler Regulations 1950)

## MATERIAL TEST CERTIFICATE

Page 1 of 1

### 3.1 AS PER EN 10204

M/s. FLOWSERVE SPAIN S.L. [COSLADA]  
AV FUENTEMAR, 26-28,  
COSLADA 28823  
MADRID, SPAIN  
Pin

T.C. No. : 10085  
D.C. No. : 08338  
P.O. No. : I) 56735/2

Date : 10/10/2011  
Date : 10/10/2011  
Date : 15/03/2011

Melting Process : Induction (Electric) Furnace Melting.

Grade & Specification : IR-805 (AS PER SPECIFICATION ,FPD,Gr.IR-805.)

Heat Treatment : 1. HEATING TO (1060) DEG. CEL. SOAKING 3 HRS. AND AIR COOL TO 45 DEG. CEL.  
Process : 2. TEMPERING AT (620) DEG. CEL. SOAKING 3. HRS. AND AIR COOL.  
3. TEMPERING AT (610) DEG. CEL. SOAKING 3. HRS. AND AIR COOL.

### CHEMICAL ANALYSIS

| HEAT # | C.%   | Mn.%  | Si.%  | S.%   | P.%   | Cr.%   | Ni.%  | Mo.%  | V.%   | Cu.%  | W.%   |
|--------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|
| MIN    |       |       |       |       |       | 11.500 | 3.500 | 0.400 |       |       |       |
| MAX    | 0.080 | 1.000 | 1.000 | 0.030 | 0.040 | 14.000 | 4.500 | 1.000 | 0.050 | 0.500 | 0.100 |
| B18345 | 0.035 | 0.830 | 0.379 | 0.009 | 0.019 | 12.920 | 3.960 | 0.710 | 0.034 | 0.308 | 0.005 |

### MECHANICAL PROPERTIES

| HEAT # | Y.S<br>(0.2%offset)<br>MPa | T.S<br>MPa | % Elong.<br>G.L. 2"<br>(50 mm) | % Red<br>in Area | Hardness<br>BHN | Bend<br>Test<br>D-80°<br>120°<br>D=3t | Charpy " Notch Impact Test At °C Jou./Ft. Lbf. | % Shear<br>Area |
|--------|----------------------------|------------|--------------------------------|------------------|-----------------|---------------------------------------|------------------------------------------------|-----------------|
| MIN    | 550                        | 760        | 15                             | 35               |                 |                                       | AVG                                            |                 |
| MAX    |                            | 930        |                                |                  | 285             |                                       | I II III                                       |                 |
| B18345 | 656                        | 841        | 18.00                          | 43.14            | 260             |                                       |                                                |                 |

FLOWSERVE

Planta Coslada  
Aseguramiento Calidad  
Revisado

### DESPATCH DETAILS

| HEAT # | PRODUCT | ITEM DESCRIPTION                                    | DRAWING NUMBER    | Qty. |
|--------|---------|-----------------------------------------------------|-------------------|------|
| B18345 | 920008  | CABEZA ASPIRACION (SUCTION HEAD) M14037 [7D4140370] | 4X12WXH360A REV.G | 1    |

WE HEREBY CERTIFY THAT THE ITEMS MENTIONED ABOVE HAVE BEEN TESTED. THEY  
ARE FOUND TO BE IN ACCORDANCE WITH THE SPECIFICATIONS AND SATISFY THE REQUIREMENT  
OF - AS PER SPECIFICATION ,FPD,Gr.IR-805.

( 1 ) Visual Inspection AS PER MSS SP-55, Found satisfactory.

P.U.Kadam  
Tested By:



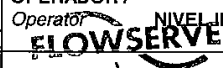
For JSONS FOUNDRY PVT. LTD.

Patil  
Q.C. Dept.  
(AB)

NASIR M. JAWAR  
(Works Inspector)

JF  
LA

|                                                                                                        |                                                                                     |                                                                                                                                    |                                                                                                         |
|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
|                       |                                                                                     | <b>Pump Division</b><br><b>Flowserve Spain, S.L.</b>                                                                               |                                                                                                         |
| <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                     |                                                                                     | <b>INFORME Nº / Report Nº</b><br><br><b>5152</b>                                                                                   |                                                                                                         |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                   | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>                               | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                                            |                                                                                                         |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                    | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>                              | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b>                                                                        |                                                                                                         |
| <b>OBJETO / Object</b><br><b>SUCTION HEAD</b><br><b>DISCHARGE HEAD</b>                                 | <b>DISEÑO/plano / Design</b><br><b>4X12WXH360AXE78</b><br><b>4X12WXH361AXE62</b>    | <b>Nº SERIE / Serial Nº</b><br><b>01 AND 02</b><br><b>01 AND 02</b>                                                                |                                                                                                         |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED % PREMACHINING</b>             |                                                                                     | <b>Q.C.P.</b><br><b>2244 R.3</b>                                                                                                   | <b>ESPECIFICACIÓN / Specification</b><br><b>PLP01 Rev.1</b>                                             |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br><b>ACCEPTABLE</b>                                  |                                                                                     | <input type="checkbox"/> <b>COMO SOLDADURA / As welded</b>                                                                         | <input checked="" type="checkbox"/> <b>MECANIZADO / Machined</b>                                        |
|                                                                                                        |                                                                                     | <input checked="" type="checkbox"/> <b>ESMERILADO / Ground</b>                                                                     | <input type="checkbox"/> <b>FORJADO / As Forged</b>                                                     |
| <b>METODO CONTROL / Control Method</b>                                                                 |                                                                                     |                                                                                                                                    |                                                                                                         |
|                                                                                                        | <input type="checkbox"/> <b>SOLUBLE EN AGUA / Water washable</b>                    | <input type="checkbox"/> <b>POR EMULSIFICADO / Post emulsifiable</b>                                                               | <input type="checkbox"/> <b>DISOLVENTE / Solvent removable</b>                                          |
|                                                                                                        | <input type="checkbox"/> <b>VISIBLE</b>                                             | <input type="checkbox"/> <b>FLUORESC.</b>                                                                                          | <input type="checkbox"/> <b>VISIBLE</b>                                                                 |
|                                                                                                        | <input type="checkbox"/> <b>FLUORESC.</b>                                           | <input type="checkbox"/> <b>VISIBLE</b>                                                                                            | <input type="checkbox"/> <b>FLUORESC.</b>                                                               |
| <b>LIMPIEZA / Cleaner</b>                                                                              |                                                                                     |                                                                                                                                    | <b>9PR-5</b>                                                                                            |
| <b>PENETRANTE / Penetrant</b>                                                                          |                                                                                     |                                                                                                                                    | <b>996-P</b>                                                                                            |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                      |                                                                                     |                                                                                                                                    |                                                                                                         |
| <b>DISOLVENTE / Remover</b>                                                                            |                                                                                     |                                                                                                                                    | <b>9PR-5</b>                                                                                            |
| <b>REVELADOR / Developer</b>                                                                           |                                                                                     |                                                                                                                                    | <b>9D1-B</b>                                                                                            |
| <b>MARCA / Trade mark</b>                                                                              |                                                                                     |                                                                                                                                    | <b>ARDROX</b>                                                                                           |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                              |                                                                                     |                                                                                                                                    |                                                                                                         |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                              |                                                                                     |                                                                                                                                    |                                                                                                         |
| <b>LIMPIEZA / Cleaning</b>                                                                             | <b>ELIMINADOR Y TPAPOS / REMOVER &amp; CLOTHES</b>                                  | <b>SECADO / Drying process</b>                                                                                                     | <b>TEMP.AMBIENTE 20° ATMOSPHERE TEMP.</b>                                                               |
| <b>APLIC. PENETRANTE / Penetrant application.</b>                                                      | <b>996-P SPRAY</b>                                                                  | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                                     | <b>15 MINUTOS</b>                                                                                       |
| <b>ELIMINACION PENET./ Penetrant removal</b>                                                           | <b>9PR-5</b>                                                                        | <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                                                |                                                                                                         |
| <b>APLIC. REVELADOR / Developer application</b>                                                        | <b>9D1-B SPRAY</b>                                                                  | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                                    | <b>7 MINUTOS</b>                                                                                        |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b><br><b>1 HORA</b>                                       |                                                                                     |                                                                                                                                    |                                                                                                         |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b><br><b>SI / YES</b>                 |                                                                                     | <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b><br><b>SI / YES</b>                                                 |                                                                                                         |
| <b>RESULTADO / Results</b>                                                                             | <b>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</b> |                                                                                                                                    |                                                                                                         |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/> | <b>FIRMADO / Signature</b>                                                          | <b>OPERADOR / Operator</b><br><b>NIVEL II</b><br><b>FLOWSERVE</b><br>Jose A. Prieto<br>Planta Costlada<br>Control Calidad<br>fdo.: | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br><br><b>FECHA / Date</b><br><b>07.10.2011</b> |

|                                                                                                                                                       |                                                                                   |                                                                                                                                                                                               |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                       |                                                                                   | Pump Division<br>Flowserve Spain, S.L.                                                                                                                                                        |  |
| AENOR<br><br>Empresa Registrada<br>ER-0008/1/90                      |  | <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                                                                                                            |  |
|                                                                                                                                                       |                                                                                   | <b>INFORME Nº / Report Nº</b><br><b>5153</b>                                                                                                                                                  |  |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                                                                  |                                                                                   | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>                                                                                                                                         |  |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                                                                   |                                                                                   | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                                                                                                       |  |
| <b>OBJETO / Object</b><br><b>SUCTION HEAD</b><br><b>DISCHARGE HEAD</b>                                                                                |                                                                                   | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>                                                                                                                                        |  |
|                                                                                                                                                       |                                                                                   | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b>                                                                                                                                   |  |
|                                                                                                                                                       |                                                                                   | <b>Nº SERIE / Serial Nº</b><br>01 AND 02<br>01 AND 02                                                                                                                                         |  |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED</b> % MACHINED                                                                |                                                                                   | <b>Q.C.P.</b><br>2244 R.3                                                                                                                                                                     |  |
|                                                                                                                                                       |                                                                                   | <b>ESPECIFICACIÓN / Specification</b><br>PLP01 Rev.1                                                                                                                                          |  |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br><b>ACCEPTABLE</b>                                                                                 |                                                                                   | <input type="checkbox"/> <b>COMO SOLDADURA / As welded</b><br><input checked="" type="checkbox"/> <b>ESMERILADO / Ground</b>                                                                  |  |
|                                                                                                                                                       |                                                                                   | <input checked="" type="checkbox"/> <b>MECANIZADO / Machined</b><br><input type="checkbox"/> <b>FORJADO / As Forged</b>                                                                       |  |
| <b>METODO CONTROL / Control Method</b>                                                                                                                |                                                                                   |                                                                                                                                                                                               |  |
| <input type="checkbox"/> <b>SOLUBLE EN AGUA / Water washable</b><br><input type="checkbox"/> <b>VISIBLE</b> <input type="checkbox"/> <b>FLUORESC.</b> |                                                                                   | <input type="checkbox"/> <b>POR EMULSIFICADO / Post emulsifiable</b><br><input type="checkbox"/> <b>VISIBLE</b> <input type="checkbox"/> <b>FLUORESC.</b>                                     |  |
|                                                                                                                                                       |                                                                                   | <input type="checkbox"/> <b>DISOLVENTE / Solvent removable</b><br><input type="checkbox"/> <b>VISIBLE</b> <input type="checkbox"/> <b>FLUORESC.</b>                                           |  |
| <b>LIMPIEZA / Cleaner</b>                                                                                                                             |                                                                                   | <b>9PR-5</b>                                                                                                                                                                                  |  |
| <b>PENETRANTE / Penetrant</b>                                                                                                                         |                                                                                   | <b>996-P</b>                                                                                                                                                                                  |  |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                                                     |                                                                                   |                                                                                                                                                                                               |  |
| <b>DISOLVENTE / Remover</b>                                                                                                                           |                                                                                   | <b>9PR-5</b>                                                                                                                                                                                  |  |
| <b>REVELADOR / Developer</b>                                                                                                                          |                                                                                   | <b>9D1-B</b>                                                                                                                                                                                  |  |
| <b>MARCA / Trade mark</b>                                                                                                                             |                                                                                   | <b>ARDROX</b>                                                                                                                                                                                 |  |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                                                             |                                                                                   |                                                                                                                                                                                               |  |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                                                             |                                                                                   |                                                                                                                                                                                               |  |
| <b>LIMPIEZA / Cleaning</b>                                                                                                                            |                                                                                   | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>                                                                                                                                            |  |
| <b>APLIC. PENETRANTE / Penetrant application</b>                                                                                                      |                                                                                   | <b>SECADO / Drying process</b>                                                                                                                                                                |  |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                                                         |                                                                                   | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                                                                                                |  |
| <b>APLIC. REVELADOR / Developer application</b>                                                                                                       |                                                                                   | <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                                                                                                           |  |
|                                                                                                                                                       |                                                                                   | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                                                                                               |  |
|                                                                                                                                                       |                                                                                   | <b>TEMP. AMBIENTE 20° / ATMOSPHERE TEMP.</b>                                                                                                                                                  |  |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b>                                                                                                       |                                                                                   | <b>1 HORA</b>                                                                                                                                                                                 |  |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b>                                                                                   |                                                                                   | <b>SI / YES</b>                                                                                                                                                                               |  |
| <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b>                                                                                       |                                                                                   | <b>SI / YES</b>                                                                                                                                                                               |  |
| <b>RESULTADO / Results</b>                                                                                                                            |                                                                                   | <b>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</b>                                                                                                           |  |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>                                                |                                                                                   | <b>FIRMADO / Signature</b>                                                                                                                                                                    |  |
|                                                                                                                                                       |                                                                                   | <b>OPERADOR / Operator</b><br>NIVEL II<br><br>Jose A. Prieto<br>Planta Coslada<br>Control Calidad<br>Fdo.: |  |
|                                                                                                                                                       |                                                                                   | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br><b>FECHA / Date</b><br>04.11.2011                                                                                                  |  |



# SECTION 4



FYSA, S.L.  
Fundición a precisión

Póligono Nicomedes García  
VALVERDE DEL MAJANO  
(SEGOVIA) ESPAÑA  
Teléfono 921 49 00 96  
Fax 921 49 01 74

CERTIFICADO DE MATERIAL  
METAL CERTIFICATION / MATERIALZEUGNIS

Nº 23.639

DIN 50049: EN 10204 3.1.

Documento Rev.- 2 Pág.- 1  
Fecha.- 15.05.98

Cliente / Customer / Kunde FLOWSERVE SPAIN S.L. Pedido de fecha / Date of order / Bestell-Datum 17/03/2011  
O.F. / Order Nº / Auftrag Nr 1522702 Su pedido Nº / Your order Nº / Bestell-Nr 56844

| Cantidad<br>Quantity / Menge | Pieza<br>Object / Gegenstand | Material<br>Material / Werkstoff | Fecha Colada<br>Prod-Day / Schmelze-Datum |
|------------------------------|------------------------------|----------------------------------|-------------------------------------------|
| 10,0                         | Impulsor 4X12WXH3B           | IR-805                           | 07/04/2011                                |

IMPELLER

ANÁLISIS QUÍMICO / CHEMICAL ANALYSIS / CHEMISCHE ANALYSE

COLADA / HEAT Nº / SCHMELZE-Nr: 14323

| C    | Mn   | Si   | P     | S     | Ni  | Cr   | Mo   | Cu   | W      | V    |
|------|------|------|-------|-------|-----|------|------|------|--------|------|
| 0.03 | 0.75 | 0.81 | 0.011 | 0.004 | 3.7 | 12.4 | 0.59 | 0.11 | < 0.10 | 0.03 |

TRATAMIENTO TÉRMICO / HEAT TREATMENT / WÄRMEBEHANDLUNG

Temple a 1050°C enfriamiento al aire. / Normalizing at 1050°C and air cool. / Normalgluhen 1050°C abkühlung luft.  
Revenido a 610°C enfriamiento al aire. / Tempering at 610°C and air cool. / Spannungsarmgluhen 610°C abkühlung luft.  
Revenido a 593°C enfriamiento al aire. / Tempering at 593°C and air cool. / Spannungsarmgluhen 593°C abkühlung luft.

PRUEBA DE RESISTENCIA / STRENGTH TEST / FESTIGKEITSPRÜFUNG

a) Ensayo de tracción / Tensile test / Zugversuch

Resistencia a la tracción / Tensile strength / Zugfestigkeit

Límite elástico / Yield strength / Streckgrenze

Alargamiento / Elongation / Bruchdehnung

Estricción / Reduction of area / Bruchseinschnürung

b) Resiliencia / Impact test / Kerbschlagbiegeversuch

c) Dureza / Hardness test / Härteprüfung

|     |  |  |  |  |  |  |  |  |  |      |
|-----|--|--|--|--|--|--|--|--|--|------|
| Mpa |  |  |  |  |  |  |  |  |  | 837  |
| Mpa |  |  |  |  |  |  |  |  |  | 716  |
| %   |  |  |  |  |  |  |  |  |  | 21.0 |
| %   |  |  |  |  |  |  |  |  |  | 64   |

Inspección visual según norma MSS.SP.55.

Inspección dimensional de acuerdo al plano de pieza.

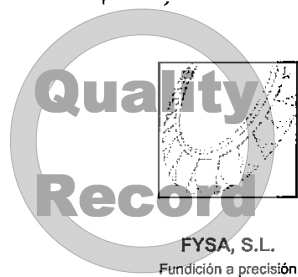
FYSA, S.L.  
Control de Calidad.

FLOWSERVE

Planta Costada  
Aseguramiento Calidad  
Fdo.:

J.R.C.

Fecha / Date / Datum  
03/05/2011



Polígono Nicomedes García  
VALVERDE DEL MAJANO  
(SEGOVIA) ESPAÑA  
Teléfono 921 49 00 96  
Fax 921 49 01 74

CERTIFICADO DE MATERIAL  
METAL CERTIFICATION / MATERIALZEUGNIS

Nº 23.640

DIN 50049: EN 10204 3.1.

Documento Rev.-2 Pág.- 1  
Fecha.- 15.05.98

Cliente / Customer / Kunde FLOWSERVE SPAIN S.L.

Pedido de fecha / Date of order / Bestell-Datum 17/03/2011

O.F. / Order Nº / Auftrag Nr 1522702

Su pedido Nº / Your order Nº / Bestell-Nr 56844

Cantidad  
Quantity / Menge

10,0

Pieza  
Object / Gegenstand

Impulsor 4X12WXH3B

Material  
Material / Werkstoff

IR-805

Fecha Colada  
Prod-Day / Schmelze-Datum

08/04/2011

IMPELLER

ANÁLISIS QUÍMICO / CHEMICAL ANALYSIS / CHEMISCHE ANALYSE

COLADA / HEAT Nº / SCHMELZE-Nr : 14330

| C    | Mn   | Si   | P     | S     | Ni  | Cr   | Mo   | Cu   | W      | V    |
|------|------|------|-------|-------|-----|------|------|------|--------|------|
| 0.03 | 0.75 | 0.74 | 0.012 | 0.005 | 3.8 | 12.5 | 0.52 | 0.10 | < 0.10 | 0.03 |

TRATAMIENTO TÉRMICO / HEAT TREATMENT / WÄRMEBEHANDLUNG

Temple a 1050°C enfriamiento al aire. / Normalizing at 1050°C and air cool. / Normalgluhen 1050°C abkühlung luft.  
Revenido a 610°C enfriamiento al aire. / Tempering at 610°C and air cool. / Spannungsarmgluhen 610°C abkühlung luft.  
Revenido a 593°C enfriamiento al aire. / Tempering at 593°C and air cool. / Spannungsarmgluhen 593°C abkühlung luft.

PRUEBA DE RESISTENCIA / STRENGTH TEST / FESTIGKEITSPRÜFUNG

a) Ensayo de tracción / Tensile test / Zugversuch

Resistencia a la tracción / Tensile strength / Zugfestigkeit

Límite elástico / Yield strength / Streckgrenze

Alargamiento / Elongation / Bruchdehnung

Estricción / Reduction of area / Bruchdehnung

b) Resiliencia / Impact test / Kerbschlagbiegeversuch

c) Dureza / Hardness test / Härteprüfung

|     |  |  |  |  |  |  |  |  |  |      |
|-----|--|--|--|--|--|--|--|--|--|------|
| Mpa |  |  |  |  |  |  |  |  |  | 845  |
| Mpa |  |  |  |  |  |  |  |  |  | 668  |
| %   |  |  |  |  |  |  |  |  |  | 22.6 |
| %   |  |  |  |  |  |  |  |  |  | 60   |

Inspección visual según norma MSS.SP.55.

Inspección dimensional de acuerdo al plano de pieza.

FYSA, S.L.  
Control de Calidad.

J.G.C.

FLOWSERVE

Planta Colada  
Asesoramiento Calidad  
Fdo.

Fecha / Date / Datum  
03/05/2011

|                                                                                                                                  |                                                                                                      |                                                                                                                                                                     |                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
|                                                 |                                                                                                      | Pump Division<br>Flowserve Spain, S.L.                                                                                                                              |                                                                                                         |
| AENOR<br><br>Empresa Registrada<br>ER-0008/1/90 |                     | <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                                                                                  | <b>INFORME Nº / Report Nº</b><br><br><b>5111</b>                                                        |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                                             | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>                                                | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                                                                             |                                                                                                         |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                                              | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>                                               | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b>                                                                                                         |                                                                                                         |
| <b>OBJETO / Object</b><br><b>IMPELLER 1º STAGE</b><br><b>IMPELLER 2º TO 9º STAGE</b><br><b>IMPELELR LAST STAGE</b>               | <b>DISEÑO/plano / Design</b><br><b>4X12WXH3BXE57</b><br><b>4X12WXH3BXE52</b><br><b>4X12WXH3BXE53</b> | <b>Nº SERIE / Serial Nº</b><br><b>01 AND 02</b><br><b>01 TO 16</b><br><b>01 AND 02</b>                                                                              |                                                                                                         |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED % PREMACHINING</b>                                       |                                                                                                      | <b>Q.C.P.</b><br><b>2244 R.3</b>                                                                                                                                    | <b>ESPECIFICACIÓN / Specification</b><br><b>PLP01 Rev.1</b>                                             |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br><b>ACEPTABLE</b>                                                             |                                                                                                      | <input type="checkbox"/> <b>COMO SOLDADURA / As welded</b>                                                                                                          | <input checked="" type="checkbox"/> <b>MECANIZADO / Machined</b>                                        |
|                                                                                                                                  |                                                                                                      | <input checked="" type="checkbox"/> <b>ESMERILADO / Ground</b>                                                                                                      | <input type="checkbox"/> <b>FORJADO / As Forged</b>                                                     |
| <b>METODO CONTROL / Control Method</b>                                                                                           |                                                                                                      |                                                                                                                                                                     |                                                                                                         |
| <input type="checkbox"/> <b>SOLUBLE EN AGUA / Water washable</b>                                                                 |                                                                                                      | <input type="checkbox"/> <b>POR EMULSIFICADO / Post emulsifiable</b>                                                                                                | <input checked="" type="checkbox"/> <b>DISOLVENTE / Solvent removable</b>                               |
| <input type="checkbox"/> <b>VISIBLE</b>                                                                                          | <input type="checkbox"/> <b>FLUORESC.</b>                                                            | <input type="checkbox"/> <b>VISIBLE</b>                                                                                                                             | <input type="checkbox"/> <b>FLUORESC.</b>                                                               |
| <input checked="" type="checkbox"/> <b>VISIBLE</b>                                                                               | <input type="checkbox"/> <b>FLUORESC.</b>                                                            | <input checked="" type="checkbox"/> <b>VISIBLE</b>                                                                                                                  | <input type="checkbox"/> <b>FLUORESC.</b>                                                               |
| <b>LIMPIEZA / Cleaner</b>                                                                                                        |                                                                                                      |                                                                                                                                                                     | <b>9PR-5</b>                                                                                            |
| <b>PENETRANTE / Penetrant</b>                                                                                                    |                                                                                                      |                                                                                                                                                                     | <b>996-P</b>                                                                                            |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                                |                                                                                                      |                                                                                                                                                                     |                                                                                                         |
| <b>DISOLVENTE / Remover</b>                                                                                                      |                                                                                                      |                                                                                                                                                                     | <b>9PR-5</b>                                                                                            |
| <b>REVELADOR / Developer</b>                                                                                                     |                                                                                                      |                                                                                                                                                                     | <b>9D1-B</b>                                                                                            |
| <b>MARCA / Trade mark</b>                                                                                                        |                                                                                                      |                                                                                                                                                                     | <b>ARDROX</b>                                                                                           |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                                        |                                                                                                      |                                                                                                                                                                     |                                                                                                         |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                                        |                                                                                                      |                                                                                                                                                                     |                                                                                                         |
| <b>LIMPIEZA / Cleaning</b>                                                                                                       | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>                                                   | <b>SECADO / Drying process</b>                                                                                                                                      | <b>TEMP.AMBIENTE 20° ATMOSPHERE TEMP.</b>                                                               |
| <b>APLIC. PENETRANTE / Penetrant application.</b>                                                                                | <b>996-P SPRAY</b>                                                                                   | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                                                                      | <b>15 MINUTOS</b>                                                                                       |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                                    | <b>9PR-5</b>                                                                                         | <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                                                                                 |                                                                                                         |
| <b>APLIC. REVELADOR / Developer application</b>                                                                                  | <b>9D1-B SPRAY</b>                                                                                   | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                                                                     | <b>7 MINUTOS</b>                                                                                        |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b><br><b>1 HORA</b>                                                                 |                                                                                                      |                                                                                                                                                                     |                                                                                                         |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b><br><b>SI / YES</b>                                           |                                                                                                      | <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b><br><b>SI / YES</b>                                                                                  |                                                                                                         |
| <b>RESULTADO / Results</b><br><b>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</b>                |                                                                                                      |                                                                                                                                                                     |                                                                                                         |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>                           | <b>FIRMADO / Signature</b>                                                                           | <b>OPERADOR / Operator</b><br><br>José María Goslada<br>Control Calidad<br>Fdo.: | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br><br><b>FECHA / Date</b><br><b>12.09.2011</b> |

|                                                                                                                                              |                                                                                   |                                                                                                                                                                                                                                                                                                                |  |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                             |                                                                                   | <p>Pump Division</p> <p>Flowserve Spain, S.L.</p>                                                                                                                                                                                                                                                              |  |
| <p>AENOR</p>  <p>ER-0008/1/90</p>                           |  | <p><b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br/><i>Penetrant Liquids Certificate</i></p>                                                                                                                                                                                                                     |  |
| <p>REF. FPD / FPD Ref.<br/><b>COS-11-10P40213</b></p>                                                                                        |                                                                                   | <p>CLIENTE / Customer<br/><b>MISSISSIPPI POWER</b></p>                                                                                                                                                                                                                                                         |  |
| <p>REF. CLIENTE / Customer Ref.</p>                                                                                                          |                                                                                   | <p>PROYECTO / Project<br/><b>KEMPER COUNTRY IGCC</b></p>                                                                                                                                                                                                                                                       |  |
| <p>OBJETO / Object<br/><b>IMPELLER 1º STAGE<br/>IMPELLER 2º TO 9º STAGE<br/>IMPELELR LAST STAGE</b></p>                                      |                                                                                   | <p>TIPO DE BOMBA / Pump Type<br/><b>4X12 WXH-10</b></p>                                                                                                                                                                                                                                                        |  |
| <p>DISEÑO/plano / Design<br/><b>4X12WXH3BXE57<br/>4X12WXH3BXE52<br/>4X12WXH3BXE53</b></p>                                                    |                                                                                   | <p>Nº SERIE / Serial Nº<br/><b>M-151457 AND M-151458</b></p>                                                                                                                                                                                                                                                   |  |
| <p>ESTADO DE FABRICACIÓN / Working step<br/><b>MECANIZADO / MACHINED % MACHINED</b></p>                                                      |                                                                                   | <p>Q.C.P.<br/><b>2244 R.3</b></p>                                                                                                                                                                                                                                                                              |  |
| <p>CONDICION SUPERFICIAL / Surface Condition<br/><b>ACEPTABLE</b></p>                                                                        |                                                                                   | <p><input type="checkbox"/> COMO SOLDADURA / As welded<br/><input checked="" type="checkbox"/> MECANIZADO / Machined<br/><input checked="" type="checkbox"/> ESMERILADO / Ground<br/><input type="checkbox"/> FORJADO / As Forged</p>                                                                          |  |
| <p><b>METODO CONTROL / Control Method</b></p>                                                                                                |                                                                                   |                                                                                                                                                                                                                                                                                                                |  |
| <p><input type="checkbox"/> SOLUBLE EN AGUA / Water washable<br/><input type="checkbox"/> VISIBLE<br/><input type="checkbox"/> FLUORESC.</p> |                                                                                   | <p><input type="checkbox"/> POR EMULSIFICADO / Post emulsifiable<br/><input type="checkbox"/> VISIBLE<br/><input type="checkbox"/> FLUORESC.<br/><input checked="" type="checkbox"/> DISOLVENTE / Solvent removable<br/><input checked="" type="checkbox"/> VISIBLE<br/><input type="checkbox"/> FLUORESC.</p> |  |
| <p>LIMPIEZA / Cleaner</p>                                                                                                                    |                                                                                   | <p>9PR-5</p>                                                                                                                                                                                                                                                                                                   |  |
| <p>PENETRANTE / Penetrant</p>                                                                                                                |                                                                                   | <p>996-P</p>                                                                                                                                                                                                                                                                                                   |  |
| <p>EMULSIFICADOR / Emulsifier</p>                                                                                                            |                                                                                   | <p></p>                                                                                                                                                                                                                                                                                                        |  |
| <p>DISOLVENTE / Remover</p>                                                                                                                  |                                                                                   | <p>9PR-5</p>                                                                                                                                                                                                                                                                                                   |  |
| <p>REVELADOR / Developer</p>                                                                                                                 |                                                                                   | <p>9D1-B</p>                                                                                                                                                                                                                                                                                                   |  |
| <p>MARCA / Trade mark</p>                                                                                                                    |                                                                                   | <p>ARDROX</p>                                                                                                                                                                                                                                                                                                  |  |
| <p>LONG. ONDA LUZ / Light wave length</p>                                                                                                    |                                                                                   | <p></p>                                                                                                                                                                                                                                                                                                        |  |
| <p><b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b></p>                                                                             |                                                                                   |                                                                                                                                                                                                                                                                                                                |  |
| <p>LIMPIEZA / Cleaning</p>                                                                                                                   |                                                                                   | <p>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</p>                                                                                                                                                                                                                                                             |  |
| <p>APLIC. PENETRANTE / Penetrant application</p>                                                                                             |                                                                                   | <p>SECADO / Drying process</p>                                                                                                                                                                                                                                                                                 |  |
| <p>ELIMINACION PENET. / Penetrant removal</p>                                                                                                |                                                                                   | <p>TIEM. MIN. PENETRANT / Penet. min. time</p>                                                                                                                                                                                                                                                                 |  |
| <p>APLIC. REVELADOR / Developer application</p>                                                                                              |                                                                                   | <p>APLIC. EMULSIFICAD. / Emulsifier application</p>                                                                                                                                                                                                                                                            |  |
| <p>TIEMPO MÁXIMO DE LECTURA / Checking time</p>                                                                                              |                                                                                   | <p>TIEM. MIN. REVELADO / Develop. min. time</p>                                                                                                                                                                                                                                                                |  |
| <p>1 HORA</p>                                                                                                                                |                                                                                   | <p>TEMP.AMBIENTE 20º ATMOSPHERE TEMP.</p>                                                                                                                                                                                                                                                                      |  |
| <p>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</p>                                                                          |                                                                                   | <p>SI / YES</p>                                                                                                                                                                                                                                                                                                |  |
| <p>RESULTADO / Results</p>                                                                                                                   |                                                                                   | <p>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</p>                                                                                                                                                                                                                            |  |
| <p>EL INSPECTOR DEL CLIENTE / Customer surveyor</p>                                                                                          |                                                                                   | <p>FIRMADO / Signature</p>                                                                                                                                                                                                                                                                                     |  |
| <p>Presenciada Inspección <input type="checkbox"/></p>                                                                                       |                                                                                   | <p>OPERADOR / Operator</p>                                                                                                                                                                                                                                                                                     |  |
| <p></p>                                                                                                                                      |                                                                                   | <p><br/>Jose A. Prieto<br/>Planta Control / Calidad<br/>Ido.:</p>                                                                                                                                                           |  |
| <p></p>                                                                                                                                      |                                                                                   | <p>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</p>                                                                                                                                                                                                                                                        |  |
| <p></p>                                                                                                                                      |                                                                                   | <p>FECHA / Date<br/>03.10.2011</p>                                                                                                                                                                                                                                                                             |  |

# FLOWERVE

Pump Division

Flowserve Spain S.L.

SCHENCK

## CERTIFICADO DE EQUILIBRADO DINÁMICO IMPULSORES

INFORME N°  
Report N°

35838

### Impellers Dynamic Balancing Certificate

REF. FPD / FPD Ref.  
COS-11-10P40213

CLIENTE / Customer  
MISSISSIPPI POWER

PROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10

N° SERIE / Serial N°  
M- 151457

PLANO IMPULSOR :

4X12WXH3BXE57

Impeller drawing

ETAPA :

1°

Stage

N° SERIE :

1

Serial n°

N° COLADA :

Heat n°

C-14330

EJE PROPIO N/S. :

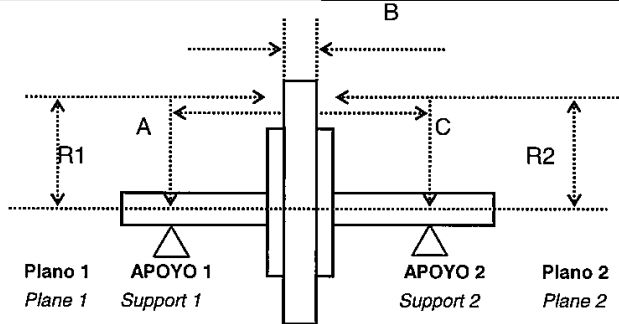
Proper shaft s/n°.

N.A.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

N.A.



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

### EQUILIBRADO

EN DOS PLANOS :

Balancing

In two planes



EN UN PLANO

In one plane



N1

N2

NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO :

Equipment speed

3580 r.p.m.

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass ( Including fixation )

3.1

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

3.76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO (g)

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

23

34

DISTANCIA AL PUNTO DE APOYO (mm.)

Support point distance

A

C

172

186

RADIO DE COMPENSACIÓN (mm.)

Compensation radius

R1

R2

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0.19

0.17

DESEQUILIBRIO RESIDUAL (g.mm./Kg.)

Residual unbalance

0.86

0.77

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

13-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWERVE

Planta Coslada  
Control Calidad  
Ido.:

# FLOWSERVE

Pump Division

Flowserve Spain S.L.

SCHENCK

## CERTIFICADO DE EQUILIBRADO DINAMICO IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35859

REF. FPD / FPD Ref.  
COS-11-10P40213

CLIENTE / Customer  
MISSISSIPPI POWER

PROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10

N° SERIE / Serial N°  
M- 151457

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

2°

Stage

N° SERIE :

1

Serial n°

N° COLADA :

Heat n°

C-14330

EJE PROPIO N/S. :

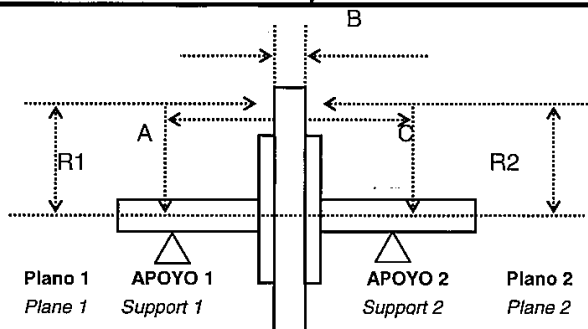
Proper shaft s/n°.

N.A

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

N-1-A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

EQUILIBRADO

EN DOS PLANOS :

EN UN PLANO

Balancing

In two planes



In one plane



N1

N2

NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass (Including fixation)

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE

EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at

Compensation radius

3.76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

37

A

33

C

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

172

R1

186

R2

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,16

0,14

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

0,72

0,63

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

10-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWSERVE

Planta Coslada  
Control Calidad  
Fdo.:

# FLOWERVE

Pump Division

Flowserve Spain S.L.

SCHENCK

## CERTIFICADO DE EQUILIBRADO DINAMICO IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35860

REF. FPD / FPD Ref.

COS-11-10P40213

CLIENTE / Customer

MISSISSIPPI POWER

PROYECTO / Project

KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type

4X12 WXH-10

N° SERIE / Serial N°

M- 151457

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

3°

Stage

N° SERIE :

2

Serial n°

N° COLADA :

Heat n°

C-14330

EJE PROPIO N/S. :

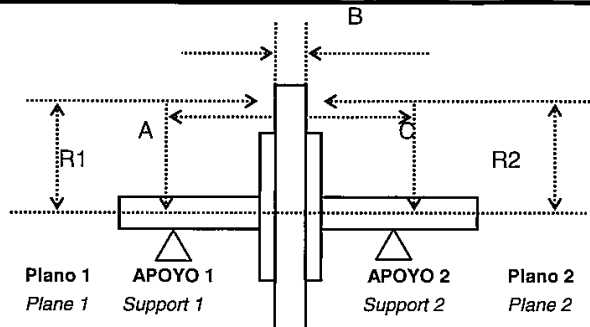
Proper shaft s/n°.

N.A.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

N.A.



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

EQUILIBRADO

EN DOS PLANOS :

Balancing

In two planes

EN UN PLANO

In one plane

N1

N2

NUMERO EQUILBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass (Including fixation)

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1

Plane 1

10

A

172

R1

140

0,17

0,77

PLANO 2

Plane 2

27

C

186

R2

140

0,13

0,59

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

INDICACIÓN RESIDUAL (g.)

Residual indication

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

10-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWERVE

Planta Costada  
Control Calidad  
Fdo.:

# FLOWERVE

Pump Division

Flowserve Spain S.L.

## CERTIFICADO DE EQUILIBRADO DINAMICO

### IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35861

SCHENCK

REF. FPD / FPD Ref.

COS-11-10P40213

CLIENTE / Customer

MISSISSIPPI POWER

PROYECTO / Project

KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type

4X12 WXH-10

N° SERIE / Serial N°

M- 151457

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

4°

Stage

N° SERIE :

3

Serial n°

N° COLADA :

Heat n°

EJE PROPIO N/S. :

Proper shaft s/n°.

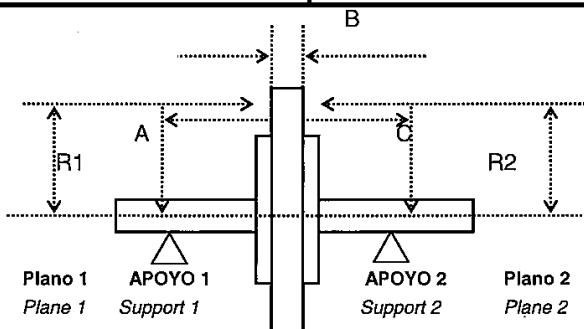
EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

C-14330

IX. A

IX. 1-A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

### EQUILIBRADO

EN DOS PLANOS :

Balancing

In two planes

EN UN PLANO

In one plane

N1

N2

NUMERO EQUILBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass (Including fixation)

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE

EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at

Compensation radius

376

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

23

6

A

C

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

172

186

R1

R2

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,16

0,18

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

0,72

0,8

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

D. J. [Signature]

10-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWERVE

Planta Coslada  
Control Calidad  
Fdo.:

# FLOWERVE

Pump Division

Flowserve Spain S.L.

SCHENCK

## CERTIFICADO DE EQUILIBRADO DINAMICO IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35862

REF. FPD / FPD Ref.  
COS-11-10P40213

CLIENTE / Customer  
MISSISSIPPI POWER

PROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10

N° SERIE / Serial N°  
M- 151457

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

5°

Stage

N° SERIE :

4

Serial n°

N° COLADA :

Heat n°

C-14323

EJE PROPIO N/S. :

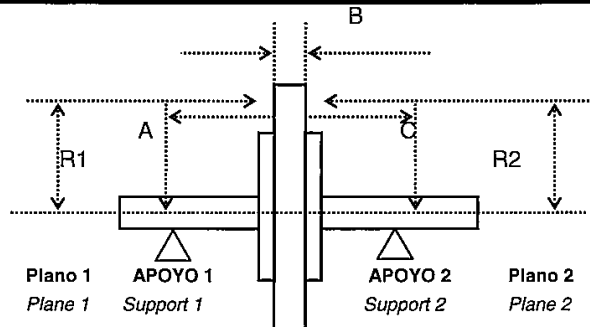
Proper shaft s/n°.

N.A.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

N.A.



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

EQUILIBRADO

EN DOS PLANOS :

EN UN PLANO

Balancing

In two planes



In one plane



N1



N2

NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass ( Including fixation )

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

24

36

A

C

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

172

186

R1

R2

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,17

0,21

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

0,77

0,95

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

10-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWERVE

Planta Coslada  
Control Calidad  
Fdo.:

SCHENCK

## CERTIFICADO DE EQUILIBRADO DINAMICO

### IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35863

REF. FPD / FPD Ref.  
COS-11-10P40213

CLIENTE / Customer  
MISSISSIPPI POWER

PROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10

N° SERIE / Serial N°  
M- 151457

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

6°

Stage

N° SERIE :

5

Serial n°

N° COLADA :

Heat n°

EJE PROPIO N/S. :

Proper shaft s/n°.

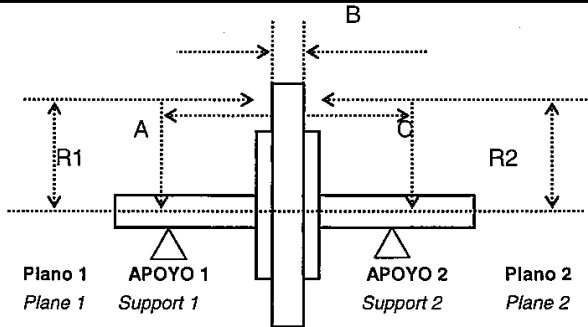
EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

C-14323

N.A.

N: 1 - A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

EQUILIBRADO

EN DOS PLANOS :

EN UN PLANO

Balancing

In two planes



In one plane



N1



N2

NUMERO EQUILBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass (Including fixation)

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

376

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

11

38

DISTANCIA AL PUNTO DE APOYO (mm.)

Support point distance

A

C

172

186

RADIO DE COMPENSACIÓN (mm.)

Compensation radius

R1

R2

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,15

0,14

DESEQUILIBRIO RESIDUAL (g.mm./Kg.)

Residual unbalance

0,68

0,63

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

D. I.



10-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWSERVE

Planta Costada  
Control Calidad  
Fdo.:



# FLOWERVE

Pump Division

Flowserve Spain S.L.

## CERTIFICADO DE EQUILIBRADO DINAMICO

### IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35864

SCHENCK

REF. FPD / FPD Ref.

COS-11-10P40213

CLIENTE / Customer

MISSISSIPPI POWER

PROYECTO / Project

KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type

4X12 WXH-10

N° SERIE / Serial N°

M- 151457

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

7°

Stage

N° SERIE :

6

Serial n°

N° COLADA :

Heat n°

C-14330

EJE PROPIO N/S. :

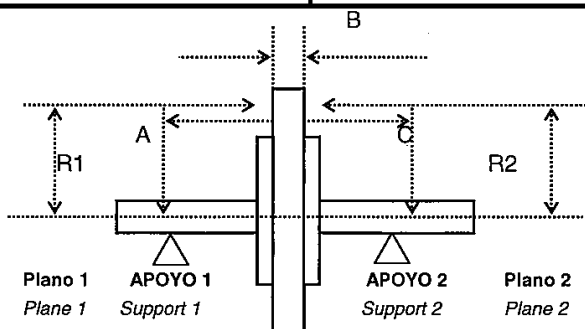
Proper shaft s/n°.

N.A.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

N. 1 - A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

EQUILIBRADO

EN DOS PLANOS :

EN UN PLANO

Balancing

In two planes



In one plane



N1



N2

NUMERO EQUILBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass ( Including fixation )

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE

EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1

Plane 1

50

PLANO 2

Plane 2

61

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

A

172

C

186

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

R1

140

R2

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,19

0,17

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

0,86

0,72

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

10-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWERVE

Planta Coslada  
Control Calidad  
Fdo.:

# FLOWERVE

Pump Division

Flowserve Spain S.L.

## CERTIFICADO DE EQUILIBRADO DINAMICO IMPULSORES

INFORME N°

Report N°

35865

SCHENCK

Impellers Dynamic Balancing Certificate

REF. FPD / FPD Ref.

COS-11-10P40213

CLIENTE / Customer

MISSISSIPPI POWER

PROYECTO / Project

KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type

4X12 WXH-10

N° SERIE / Serial N°

M- 151457

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

8°

Stage

N° SERIE :

7

Serial n°

N° COLADA :

Heat n°

C-14330

EJE PROPIO N/S. :

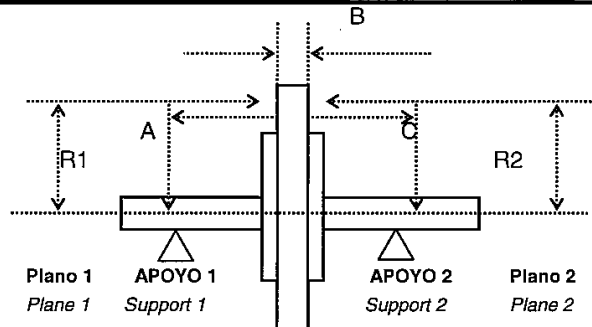
Proper shaft s/n°.

N.A.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

N-1-A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

EQUILIBRADO

EN DOS PLANOS :

EN UN PLANO

Balancing

In two planes

In one plane

N1

N2

NUMERO EQUILBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass ( Including fixation )

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

17

36

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

A

C

172

186

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

R1

R2

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,14

0,12

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

0,63

0,54

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

10-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWERVE

Planta Costada  
Control Calidad  
I'do.:

**FLOWSERVE**

Pump Division

Flowserve Spain S.L.

SCHENCK

**CERTIFICADO DE EQUILIBRADO DINAMICO  
IMPULSORES**

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35866

REF. FPD / FPD Ref.  
COS-11-10P40213CLIENTE / Customer  
MISSISSIPPI POWERPROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10N° SERIE / Serial N°  
M- 151457

PLANO IMPULSOR :

Impeller drawing

4X12WXH3BXE52

ETAPA :

Stage

9°

N° SERIE :

Serial n°

8

N° COLADA :

Heat n°

C-14330

EJE PROPIO N/S. :

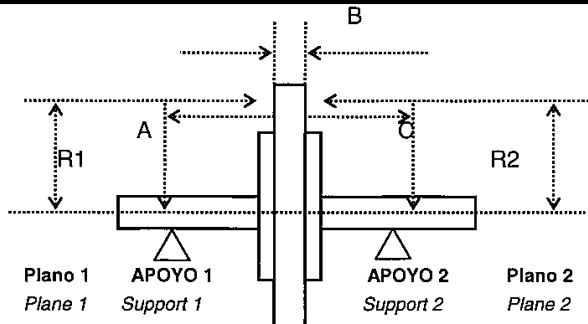
Proper shaft s/n°.

N: A

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

D: 1-A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

**EQUILIBRADO**

Balancing

EN DOS PLANOS :

In two planes



EN UN PLANO

In one plane



N1

N2

NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used - 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580 r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass (Including fixation)

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE  
EN EL RADIO DE COMPENSACIÓN (g.)Maximum admissible residual unbalance at  
Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

12

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1PLANO 2  
Plane 2

52 63

A C

DISTANCIA AL PUNTO DE APOYO (mm.)

Support point distance

172 186

R1 R2

RADIO DE COMPENSACIÓN (mm.)

Compensation radius

140 140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,15 0,19

DESEQUILIBRIO RESIDUAL (g.mm./Kg.)

Residual unbalance

0,68 0,86

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

10-10-11

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

**FLOWSERVE**Planta Coslada  
Control Calidad  
Ido.:

**FLOWSERVE**

Pump Division

Flowserve Spain S.L.

SCHENCK

**CERTIFICADO DE EQUILIBRADO DINAMICO  
IMPULSORES***Impellers Dynamic Balancing Certificate***INFORME N°**

Report N°

35867

REF. FPD / FPD Ref.

COS-11-10P40213

CLIENTE / Customer

MISSISSIPPI POWER

PROYECTO / Project

KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type

4X12 WXH-10

N° SERIE / Serial N°

M- 151457

PLANO IMPULSOR :

4X12WXH3BXE53

Impeller drawing

ETAPA :

10°

Stage

N° SERIE :

1

Serial n°

N° COLADA :

Heat n°

C-14330

EJE PROPIO N/S. :

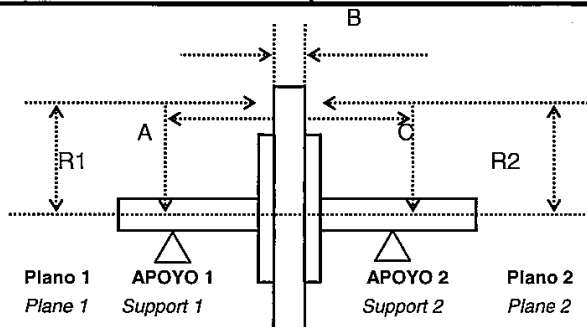
Proper shaft s/n°.

N.A.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

N° 1-A

**CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.***Impeller sketch showing the compensation planes and support during balancing.***EQUILIBRADO***Balancing*

EN DOS PLANOS :

*In two planes*

EN UN PLANO

*In one plane*

N1

N2

**NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used - 52**

MODO DE COMPENSACIÓN :

*Compensation mode*

ARRANQUE DE MATERIAL

*Removing material*

APORTACIÓN DE MATERIAL

*Adding material*

PROCEDIMIENTO APLICABLE :

*Applicable procedure*

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

*Equipment speed*

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

*Balancing speed*

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

*Impeller mass ( Including fixation )*

31

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

*Distance between compensation planes*

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE

*Maximum admissible residual unbalance at**Compensation radius*

3.76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

*Maximum specific admissible residual unbalance**Maximum specific admissible residual unbalance*

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

*Original unbalance*

PLANO 1

*Plane 1*

15

27

DISTANCIA AL PUNTO DE APOYO (mm)

*Support point distance*

A

C

172

186

RADIO DE COMPENSACIÓN (mm.)

*Compensation radius*

R1

R2

140

140

INDICACIÓN RESIDUAL (g.)

*Residual indication*

0.15

0.16

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

*Residual unbalance*

0.68

0.72

OPERARIO :

*Operator*

FIRMA :

*Signature*

FECHA :

*Date*

13-10-11

CLIENTE / I.A. :

*Customer / Inspection*

FIRMA :

*Signature*

FECHA :

*Date***FLOWSERVE**

Planta Coslada

Control Calidad

Fdo.:

**FLOWSERVE**

Pump Division

Flowserve Spain S.L.

SCHENCK

**CERTIFICADO DE EQUILIBRADO DINAMICO DE ROTORES***Rotors Dynamic Balancing Certificate***INFORME N°**

Report N°

35868

REF. FPD / FPD Ref.  
**COS-11-10P40213**CLIENTE / Customer  
**MISSISSIPPI POWER**PROYECTO / Project  
**KEMPER COUNTRY IGCC**

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
**4X12 WXH-10**N° SERIE / Serial N°  
**M- 151457**

PLANO DEL ROTOR :

**4X12WXH10XE85**

Rotor drawing

N° DE ETAPAS :

**10**

Stages n°

N° SERIE :

**1**

Serial n°

N° COLADA :

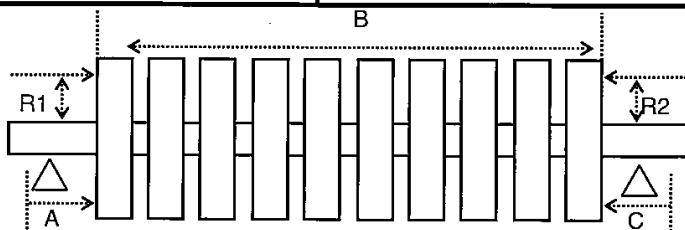
**108045**

Heat n°

EJE PROPIO N/S. :

**1**

Proper shaft s/n°.

APOYO 1  
Support 1Plano 1  
Plane 1Plano 2  
Plane 2APOYO 2  
Support 2

CROQUIS DEL ROTOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.  
*Rotor sketch showing the compensation planes and the support during balancing.*

**EQUILIBRADO DINÁMICO EN DOS PLANOS / Two planes dynamic balancing****NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used** 211

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED02 Rev.0

VELOCIDAD DEL EQUIPO

Equipment speed

**3580**

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

**1020**

MASA DEL ROTOR ( INCLUSO SUJECCIÓN ) (Kg.)

Rotor mass ( Including fixation )

**295**

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

**1001**

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

**35,8**

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

**17**

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1PLANO 2  
Plane 2**4****6**

DISTANCIA AL PUNTO DE APOYO (mm.)

Support point distance

**A****C****561****425**

RADIO DE COMPENSACIÓN (mm.)

Compensation radius

**R1****R2****140****140**

INDICACIÓN RESIDUAL (g.)

Residual indication

**1,70****0,726**

DESEQUILIBRIO RESIDUAL (g.mm./Kg.)

Residual unbalance

**0,81****0,34**

OPERARIO : J. ANIORTE

Operator

FIRMA :

Signature

FECHA :

Date

**17/10/2011**

CLIENTE / I.A. : J.P. AINSOUGH

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

**18-10-2011****FLOWSERVE**Planta Costada  
Control Calidad  
Ido.:

\*\*\*\*\*

FLOWERVE Pump Division  
Av. Fuentemar 26 - 28  
28820 Coslada / SPAIN

\*\*\*\*\*

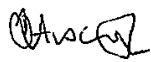
Operador :

18.10.11 11:17

| Datos rotor                                                                                                           |                         | Fijn.: $\frac{1}{2}$ $\frac{1}{2}$ |                                                                                               | Nom. arch.:                                                                                                              |  |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--|
| a: 561.0 mm                                                                                                           | b: 1001. mm             | c: 425.0 mm                        |                                                                                               |                                                                                                                          |  |
| r1: 140.0 mm                                                                                                          | Definicion : PI1/PI2    |                                    | r2: 140.0 mm                                                                                  |                                                                                                                          |  |
| m1:  polar                           | Vel. prev.: 1000. 0/min |                                    | m2:  polar |                                                                                                                          |  |
| Tol1: 0.000 gmm                                                                                                       | Vel. real : 1022. 0/min |                                    | Tol2: 0.000 gmm                                                                               |                                                                                                                          |  |
| Plano 1                                                                                                               |                         | Plano 2                            |                                                                                               |                                                                                                                          |  |
|  <b>1.70</b> g<br>en <b>352</b> grd |                         | Rotor: 4X12WXH10-N/S-01            |                                                                                               |  <b>726.</b> mg<br>en <b>358</b> grd |  |
|                                                                                                                       |                         | Crda. 6                            |                                                                                               |                                                                                                                          |  |
| AT                                                                                                                    |                         | E1                                 |                                                                                               |                                                                                                                          |  |

Witnessed Balancing

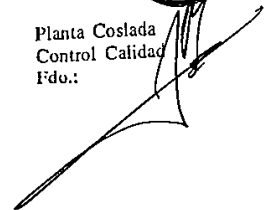
J.P. Ainscough

18.10.2011

**FLOWERVE**

Planta Coslada  
Control Calidad  
Fdo.:



SCHENCK

## CERTIFICADO DE EQUILIBRADO DINÁMICO IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35883

REF. FPD / FPD Ref.

COS-11-10P40213

CLIENTE / Customer

MISSISSIPPI POWER

PROYECTO / Project

KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type

4X12 WXH-10

N° SERIE / Serial N°

M- 151458

PLANO IMPULSOR :

Impeller drawing

4X12WXH3BXE57

ETAPA :

Stage

1°

N° SERIE :

Serial n°

2

N° COLADA :

Heat n°

c-14323

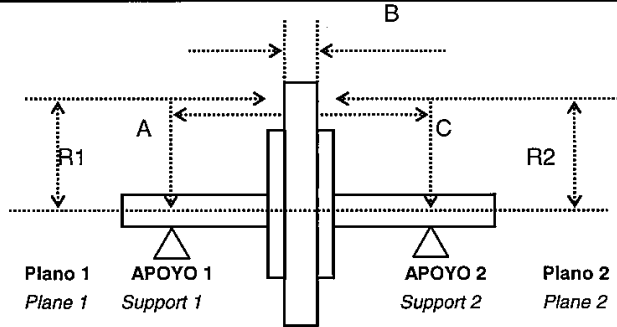
EJE PROPIO N/S. :

Proper shaft s/n°.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

utic N° 1-A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

EQUILIBRADO

Balancing

EN DOS PLANOS :

In two planes



EN UN PLANO

In one plane



N1

N2

NUMERO EQUILBRADORA UTILIZADA: / Balancing number used

52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO :

Equipment speed

3580 r.p.m.

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass ( Including fixation )

31

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO (g)

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

21

27

DISTANCIA AL PUNTO DE APOYO (mm.)

Support point distance

A  
171

C  
186

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

R1  
140

R2  
140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,17

0,19

DESEQUILIBRIO RESIDUAL (g.mm./Kg.)

Residual unbalance

0,77

0,86

OPERARIO :

Operator

D-I

FIRMA :

Signature

[Signature]

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FECHA :

Date

13-10-2011

FLOWSERVE

Planta Coslada  
Control Calidad  
Fdo.:

[Signature]

# FLOWSERVE

Pump Division

Flowserve Spain S.L.

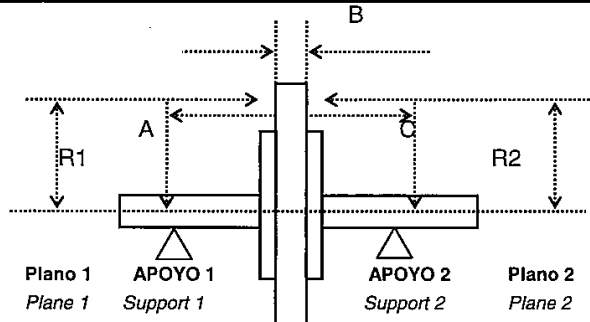
## CERTIFICADO DE EQUILIBRADO DINAMICO IMPULSORES Impellers Dynamic Balancing Certificate

SCHENCK

INFORME N°  
Report N°  
35884

|                                        |                                          |                                           |
|----------------------------------------|------------------------------------------|-------------------------------------------|
| REF. FPD / FPD Ref.<br>COS-11-10P40213 | CLIENTE / Customer<br>MISSISSIPPI POWER  | PROYECTO / Project<br>KEMPER COUNTRY IGCC |
| REF. CLIENTE / Customer Ref            | TIPO DE BOMBA / Pump Type<br>4X12 WXH-10 | N° SERIE / Serial N°<br>M- 151458         |

PLANO IMPULSOR : 4X12WXH3BXE52  
Impeller drawing  
ETAPA : 2°  
Stage  
N° SERIE : 9  
Serial n°  
N° COLADA :  
Heat n°  
EJE PROPIO N/S. :  
Proper shaft s/n°  
EJE AUXILIAR N/S. :  
Auxiliary shaft s/n°



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.  
Impeller sketch showing the compensation planes and support during balancing.

EQUILIBRADO EN DOS PLANOS : ☒ EN UN PLANO ☐  
Balancing In two planes In one plane N1 ☐ N2 ☐

NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used 52

MODO DE COMPENSACIÓN : ☒ ARRANQUE DE MATERIAL ☐ APORTACIÓN DE MATERIAL  
Compensation mode Removing material Adding material

PROCEDIMIENTO APLICABLE : PED01 Rev. 2. VELOCIDAD DEL EQUIPO 3580 r.p.m.  
Applicable procedure Equipment speed

| RÉGIMEN DE EQUILIBRADO (r.p.m.)<br>Balancing speed                                                                                       | PLANO 1<br>Plane 1 | PLANO 2<br>Plane 2 |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|
| INDICACIÓN DESEQUILIBRIO PRIMITIVO<br>Original unbalance                                                                                 | 15                 | 12                 |
| MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)<br>Impeller mass (Including fixation)                                                            | A                  | C                  |
| DISTANCIA AL PUNTO DE APOYO (mm.)<br>Support point distance                                                                              | 171                | 188                |
| DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)<br>Distance between compensation planes                                                     | R1                 | R2                 |
| RADIO DE COMPENSACIÓN (mm.)<br>Compensation radius                                                                                       | 140                | 140                |
| DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)<br>Maximum admissible residual unbalance at Compensation radius | 0,16               | 0,18               |
| DESEQUILIBRIO RESIDUAL (g.)<br>Residual indication                                                                                       | 0,16               | 0,18               |
| DESEQUILIBRIO ESPECÍFICO RESIDUAL MÁXIMO ADMISIBLE (g.mm./Kg.)<br>Maximum specific admissible residual unbalance                         | 0,72               | 0,81               |
| DESEQUILIBRIO RESIDUAL (g.mm./Kg.)<br>Residual unbalance                                                                                 | 0,72               | 0,81               |

|                             |                                           |                                                                      |
|-----------------------------|-------------------------------------------|----------------------------------------------------------------------|
| OPERARIO : J.A.<br>Operator | CLIENTE / I.A. :<br>Customer / Inspection | <p>FLOWSERVE</p> <p>Planta Coslada<br/>Control Calidad<br/>Fdo.:</p> |
| FIRMA :<br>Signature        | FIRMA :<br>Signature                      |                                                                      |
| FECHA : 13-10-2011<br>Date  | FECHA :<br>Date                           |                                                                      |

SCHENCK

## CERTIFICADO DE EQUILIBRADO DINAMICO

### IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35885

REF. FPD / FPD Ref.  
COS-11-10P40213

CLIENTE / Customer  
MISSISSIPPI POWER

PROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10

N° SERIE / Serial N°  
M- 151458

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

3°

Stage

N° SERIE :

10

Serial n°

N° COLADA :

Heat n°

EJE PROPIO N/S. :

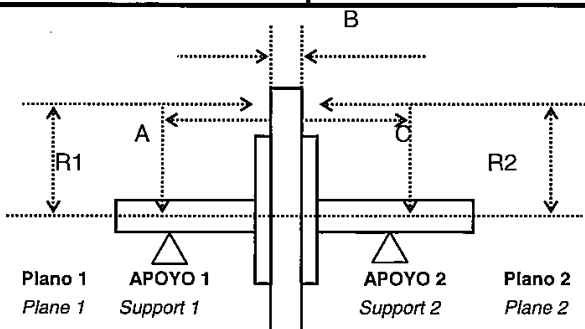
Proper shaft s/n°.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

C-14323

atc N° 1-A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

### EQUILIBRADO

EN DOS PLANOS :

Balancing

In two planes



EN UN PLANO

In one plane



N1



N2

NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass (Including fixation)

31

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE

EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at

Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

35

15

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

A

C

171

186

RADIO DE COMPENSACIÓN (mm.)

Compensation radius

R1

R2

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,16

0,21

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

0,72

0,95

OPERARIO :

Operator

J.A

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

[Signature]

FIRMA :

Signature

FECHA :

Date

14-10-2011

FECHA :

Date

FLOWSERVE

Planta Coslada  
Control Calidad  
Fdo.:

[Signature]

**FLOWSERVE**

Pump Division

Flowserve Spain S.L.

**CERTIFICADO DE EQUILIBRADO DINAMICO  
IMPULSORES****INFORME N°**

Report N°

**35886**

SCHENCK

*Impellers Dynamic Balancing Certificate*REF. FPD / FPD Ref.  
**COS-11-10P40213**CLIENTE / Customer  
**MISSISSIPPI POWER**PROYECTO / Project  
**KEMPER COUNTRY IGCC**

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
**4X12 WXH-10**N° SERIE / Serial N°  
**M- 151458**

PLANO IMPULSOR :

**4X12WXH3BXE52**

Impeller drawing

ETAPA :

**4°**

Stage

N° SERIE :

**11**

Serial n°

N° COLADA :

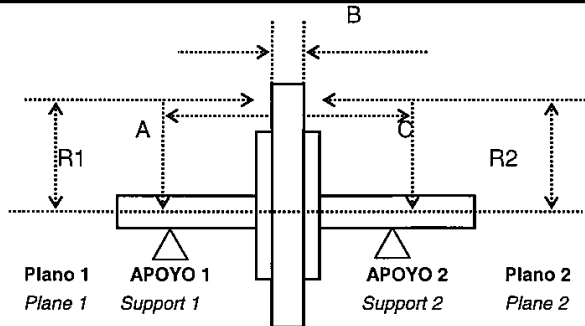
Heat n°

EJE PROPIO N/S. :

Proper shaft s/n°.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

**C-14323****util N° 1-A****CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.***Impeller sketch showing the compensation planes and support during balancing.***EQUILIBRADO**

EN DOS PLANOS :

*Balancing**In two planes*

EN UN PLANO

*In one plane*

N1



N2

**NUMERO EQUILBRADORA UTILIZADA: / Balancing number used** **52**

MODO DE COMPENSACIÓN :

*Compensation mode*

ARRANQUE DE MATERIAL

*Removing material*

APORTACIÓN DE MATERIAL

*Adding material*

PROCEDIMIENTO APLICABLE :

*Applicable procedure*

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

*Equipment speed***3580**

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

*Balancing speed***1500**

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

*Impeller mass (including fixation)***31**

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

*Distance between compensation planes***29**DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE  
EN EL RADIO DE COMPENSACIÓN (g.)*Maximum admissible residual unbalance at  
Compensation radius***3,76**

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

*Maximum specific admissible residual unbalance***17**

INDICACIÓN DESEQUILIBRIO PRIMITIVO

*Original unbalance*PLANO 1  
Plane 1PLANO 2  
Plane 2**27****30**

DISTANCIA AL PUNTO DE APOYO (mm.)

*Support point distance*

A

C

**171****186**

RADIO DE COMPENSACIÓN (mm.)

*Compensation radio*

R1

R2

**140****140**

INDICACIÓN RESIDUAL (g.)

*Residual indication***0,20****0,17**

DESEQUILIBRIO RESIDUAL (g.mm./Kg.)

*Residual unbalance***0,90****0,77**

OPERARIO :

*Operator***S.A**

FIRMA :

*Signature*

CLIENTE / I.A. :

*Customer / Inspection*

FIRMA :

*Signature*

FECHA :

*Date***13-10-2011**

FECHA :

*Date***FLOWSERVE**Planta Costada  
Control Calidad  
Fdo.:

# FLOWSERVE

Pump Division

Flowserve Spain S.L.

## CERTIFICADO DE EQUILIBRADO DINAMICO

### IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35887

SCHENCK

REF. FPD / FPD Ref.  
COS-11-10P40213

CLIENTE / Customer  
MISSISSIPPI POWER

PROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10

N° SERIE / Serial N°  
M- 151458

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

5°

Stage

N° SERIE :

12

Serial n°

N° COLADA :

Heat n°

EJE PROPIO N/S. :

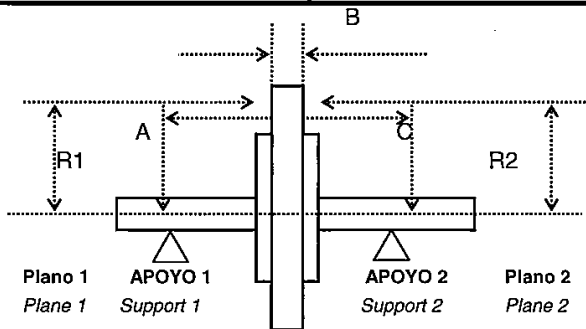
Proper shaft s/n°.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

C-14323

ufic N° 1-17



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

### EQUILIBRADO

EN DOS PLANOS :

Balancing

In two planes



EN UN PLANO

In one plane



N1



N2

NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580 r.p.m.

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass ( Including fixation )

31

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

26

30

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

A  
171

C  
186

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

R1  
140

R2  
140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,18

0,13

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

0,81

0,59

OPERARIO :

Operator

FIRMA :

Signature

FECHA :

Date

J.M

[Signature]

14-10-2011

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

FLOWSERVE

Planta Coslada  
Control Calidad  
Fdo.:

[Signature]

**FLOWSERVE**

Pump Division

Flowserve Spain S.L.

**CERTIFICADO DE EQUILIBRADO DINAMICO****IMPULSORES***Impellers Dynamic Balancing Certificate***INFORME N°**

Report N°

**35888**

SCHENCK

REF. FPD / FPD Ref.  
**COS-11-10P40213**CLIENTE / Customer  
**MISSISSIPPI POWER**PROYECTO / Project  
**KEMPER COUNTRY IGCC**

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
**4X12 WXH-10**N° SERIE / Serial N°  
**M- 151458**

PLANO IMPULSOR :

**4X12WXH3BXE52**

Impeller drawing

ETAPA :

**6°**

Stage

N° SERIE :

**13**

Serial n°

N° COLADA :

Heat n°

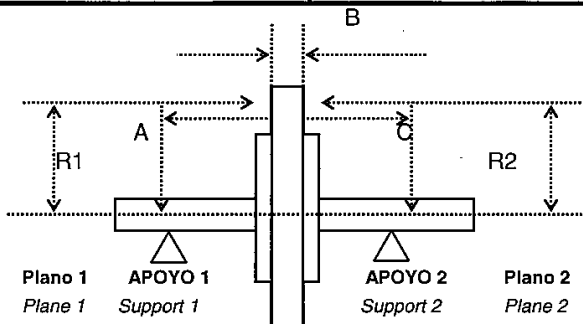
**C-14323**

EJE PROPIO N/S. :

Proper shaft s/n°.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

**util N° 1-A**

CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

**EQUILIBRADO**

EN DOS PLANOS :

Balancing

In two planes



EN UN PLANO

In one plane



N1



N2

**NUMERO EQUILBRADORA UTILIZADA: / Balancing number used 52**

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

**3580 r.p.m.**

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

Balancing speed

**1500**

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass ( Including fixation )

**31**

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

**29**

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

**3,76**

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

**17**

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1PLANO 2  
Plane 2**40****30**

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

**A****C****171****186**

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

**R1****R2****140****140**

INDICACIÓN RESIDUAL (g.)

Residual indication

**0,20****0,17**

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

**0,90****0,77**OPERARIO : **S. H**

Operator

FIRMA :

Signature

FECHA :

Date

**14-10-2011**

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

**FLOWSERVE**Planta Coslada  
Control Calidad  
Fdo.:

**FLOWERVE**

Pump Division

Flowserve Spain S.L.

**CERTIFICADO DE EQUILIBRADO DINAMICO  
IMPULSORES****INFORME N°**

Report N°

**35889**

SCHENCK

*Impellers Dynamic Balancing Certificate*

REF. FPD / FPD Ref.

**COS-11-10P40213**

CLIENTE / Customer

**MISSISSIPPI POWER**

PROYECTO / Project

**KEMPER COUNTRY IGCC**

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type

**4X12 WXH-10**

N° SERIE / Serial N°

**M- 151458**

PLANO IMPULSOR :

**4X12WXH3BXE52**

Impeller drawing

ETAPA :

**7°**

Stage

N° SERIE :

**14**

Serial n°

N° COLADA :

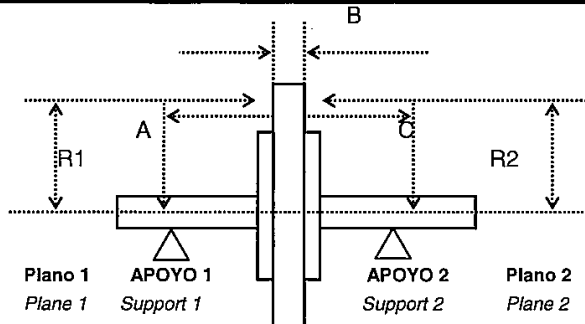
Heat n°

EJE PROPIO N/S. :

Proper shaft s/n°.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

**C-14323****UTCL N° 1-A****CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.***Impeller sketch showing the compensation planes and support during balancing.***EQUILIBRADO**

EN DOS PLANOS :

**Balancing***In two planes*

EN UN PLANO

*In one plane*

N1

N2

**NUMERO EQUILBRADORA UTILIZADA: / Balancing number used** **52**

MODO DE COMPENSACIÓN :

*Compensation mode*

ARRANQUE DE MATERIAL

*Removing material*

APORTACIÓN DE MATERIAL

*Adding material*

PROCEDIMIENTO APLICABLE :

*Applicable procedure*

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

*Equipment speed***3580****r.p.m.**

RÉGIMEN DE EQUILIBRADO (r.p.m.)

*Balancing speed***1500**

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

*Impeller mass (Including fixation)***31**

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

*Distance between compensation planes***29**

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

*Maximum admissible residual unbalance at Compensation radius***3,76**

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

*Maximum specific admissible residual unbalance***17**

INDICACIÓN DESEQUILIBRIO PRIMITIVO

*Original unbalance*PLANO 1  
Plane 1PLANO 2  
Plane 2**37****25**

DISTANCIA AL PUNTO DE APOYO (mm)

*Support point distance***A****C****171****186**

RADIO DE COMPENSACIÓN (mm.)

*Compensation radius***R1****R2****140****140**

INDICACIÓN RESIDUAL (g.)

*Residual indication***0,17****0,14**

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

*Residual unbalance***0,77****0,63**

OPERARIO :

*Operator*

FIRMA :

*Signature*

FECHA :

*Date***14-10-2011**

CLIENTE / I.A. :

*Customer / Inspection*

FIRMA :

*Signature*

FECHA :

*Date***FLOWERVE**Planta Coslada  
Control Calidad  
Fdo.:

# FLOWSERVE

Pump Division

Flowserve Spain S.L.

## CERTIFICADO DE EQUILIBRADO DINAMICO

### IMPULSORES

Impellers Dynamic Balancing Certificate

INFORME N°

Report N°

35890

SCHENCK

REF. FPD / FPD Ref.

COS-11-10P40213

CLIENTE / Customer

MISSISSIPPI POWER

PROYECTO / Project

KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type

4X12 WXH-10

N° SERIE / Serial N°

M- 151458

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

8°

Stage

N° SERIE :

15

Serial n°

N° COLADA :

Heat n°

EJE PROPIO N/S. :

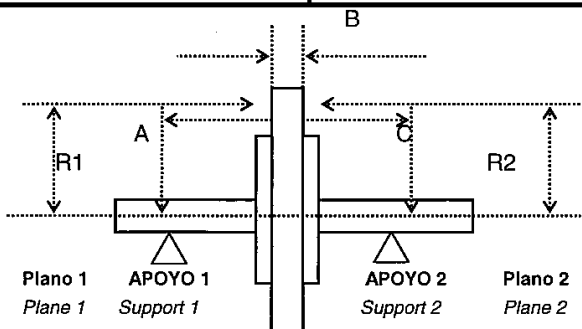
Proper shaft s/n°.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

C-14323

util N° 1-0



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

### EQUILIBRADO

EN DOS PLANOS :

EN UN PLANO

Balancing

In two planes

In one plane

N1

N2

NUMERO EQUILBRADORA UTILIZADA: / Balancing number used 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass ( Including fixation )

81

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE

EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at

Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1

PLANO 2  
Plane 2

57

58

DISTANCIA AL PUNTO DE APOYO (mm)

Support point distance

A

C

171

188

RADIO DE COMPENSACIÓN (mm.)

Compensation radio

R1

R2

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,17

0,16

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

Residual unbalance

0,77

0,72

OPERARIO :

Operator

D-I

FIRMA :

Signature

[Signature]

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

14-10-2011

FECHA :

Date

FLOWSERVE

Planta Coslada  
Control Calidad  
Fdo.:

[Signature]

**FLowsERVE**

Pump Division

Flowserve Spain S.L.

SCHENCK

**CERTIFICADO DE EQUILIBRADO DINAMICO****IMPULSORES**

Impellers Dynamic Balancing Certificate

**INFORME N°**

Report N°

35891

REF. FPD / FPD Ref.  
COS-11-10P40213CLIENTE / Customer  
MISSISSIPPI POWERPROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10N° SERIE / Serial N°  
M- 151458

PLANO IMPULSOR :

4X12WXH3BXE52

Impeller drawing

ETAPA :

9°

Stage

N° SERIE :

16

Serial n°

N° COLADA :

Heat n°

EJE PROPIO N/S. :

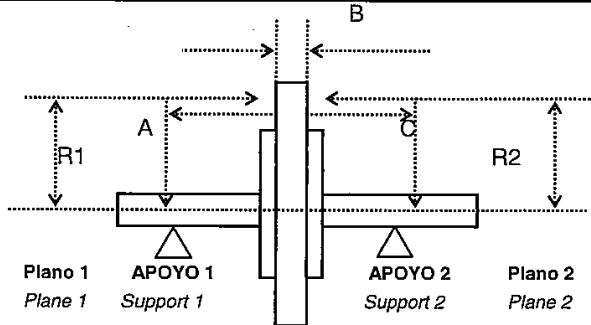
Proper shaft s/n°.

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°.

c-14330

Ofic N° 1-A



CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Impeller sketch showing the compensation planes and support during balancing.

**EQUILIBRADO**

Balancing

EN DOS PLANOS :

In two planes



EN UN PLANO

In one plane



N1



N2

NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used 52

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

1500

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

Impeller mass (Including fixation)

31

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

29

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE  
EN EL RADIO DE COMPENSACIÓN (g.)Maximum admissible residual unbalance at  
Compensation radius

3,76

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1PLANO 2  
Plane 2

39

54

DISTANCIA AL PUNTO DE APOYO (mm.)

Support point distance

A  
171C  
186

RADIO DE COMPENSACIÓN (mm.)

Compensation radius

R1  
140R2  
140

INDICACIÓN RESIDUAL (g.)

Residual indication

0,13

0,14

DESEQUILIBRIO RESIDUAL (g.mm./Kg.)

Residual unbalance

0,59

0,63

OPERARIO :

Operator

D.S

FIRMA :

Signature

FECHA :

Date

14-10-2011

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

**FLowsERVE**Planta Costada  
Control Calidad  
Fdo.:

**Flowserve**

Pump Division

Flowserve Spain S.L.

SCHENCK

**CERTIFICADO DE EQUILIBRADO DINAMICO****IMPULSORES***Impellers Dynamic Balancing Certificate***INFORME N°**

Report N°

**35892**REF. FPD / FPD Ref.  
**COS-11-10P40213**CLIENTE / Customer  
**MISSISSIPPI POWER**PROYECTO / Project  
**KEMPER COUNTRY IGCC**

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
**4X12 WXH-10**N° SERIE / Serial N°  
**M- 151458**

PLANO IMPULSOR :

**4X12WXH3BXE53**

Impeller drawing

ETAPA :

**10°**

Stage

N° SERIE :

**2**

Serial n°

N° COLADA :

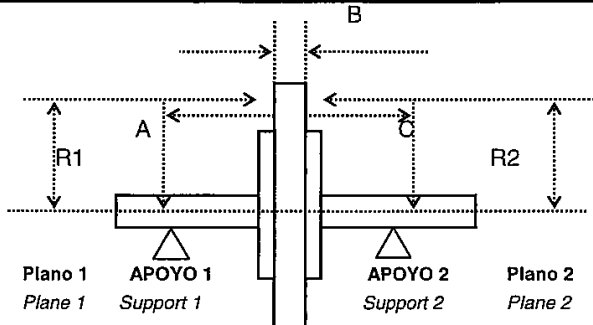
Heat n°

EJE PROPIO N/S. :

Proper shaft s/n°

EJE AUXILIAR N/S. :

Auxiliary shaft s/n°

**C-14330****util N° 1-A**

CROQUIS DEL IMPULSOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

*Impeller sketch showing the compensation planes and support during balancing.***EQUILIBRADO***Balancing*

EN DOS PLANOS :

*In two planes*

EN UN PLANO

*In one plane*

N1

N2

**NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used** **52**

MODO DE COMPENSACIÓN :

*Compensation mode*

ARRANQUE DE MATERIAL

*Removing material*

APORTACIÓN DE MATERIAL

*Adding material*

PROCEDIMIENTO APLICABLE :

*Applicable procedure*

PED01 Rev. 2.

VELOCIDAD DEL EQUIPO

*Equipment speed***3580****r.p.m.**

RÉGIMEN DE EQUILIBRADO ( r.p.m. )

*Balancing speed***1500**

MASA IMPULSOR (INCLUSO SUJECCIÓN) (Kg.)

*Impeller mass ( Including fixation )***31**

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

*Distance between compensation planes***29**

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

*Maximum admissible residual unbalance at Compensation radius***3,76**

DESEQUILIBRIO ESPECÍFICO RESIDUAL

*MÁXIMO.ADMISIBLE (g.mm./Kg.)**Maximum specific admissible residual unbalance***17**

INDICACIÓN DESEQUILIBRIO PRIMITIVO

*Original unbalance*PLANO 1  
Plane 1PLANO 2  
Plane 2**40****33**

DISTANCIA AL PUNTO DE APOYO (mm)

*Support point distance***171****186**

RADIO DE COMPENSACIÓN (mm.)

*Compensation radius***140****140**

INDICACIÓN RESIDUAL (g.)

*Residual indication***0,17****0,19**

DESEQUILIBRIO RESIDUAL (g.mm./Kg)

*Residual unbalance***0,77****0,86**OPERARIO : **D-I**

Operator

FIRMA :

Signature

FECHA :

Date

**13-10-2011**

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

**Flowserve**Planta Costada  
Control Calidad  
Fdo.:

**FLOWSERVE**

Pump Division

Flowserve Spain S.L.

**CERTIFICADO DE EQUILIBRADO DINAMICO DE ROTORES****INFORME N°**Report N°  
35967

SCHENCK

Rotors Dynamic Balancing Certificate

REF. FPD / FPD Ref.  
COS-11-10P40213CLIENTE / Customer  
MISSISSIPPI POWERPROYECTO / Project  
KEMPER COUNTRY IGCC

REF. CLIENTE / Customer Ref

TIPO DE BOMBA / Pump Type  
4X12 WXH-10N° SERIE / Serial N°  
M- 151458

PLANO DEL ROTOR :

4X12WXH10XE85

Rotor drawing

N° DE ETAPAS :

10

Stages n°

N° SERIE :

2

Serial n°

N° COLADA :

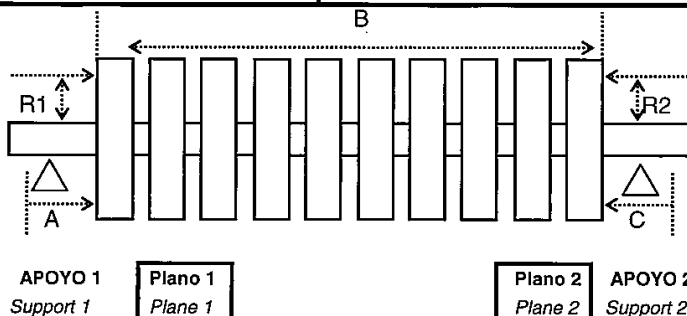
108045

Heat n°

EJE PROPIO N/S. :

2

Proper shaft s/n°.



CROQUIS DEL ROTOR CON LA POSICIÓN DE LOS PLANOS DE COMPENSACIÓN Y DE LOS APOYOS DURANTE EL EQUILIBRADO.

Rotor sketch showing the compensation planes and the support during balancing.

**EQUILIBRADO DINÁMICO EN DOS PLANOS / Two planes dynamic balancing****NUMERO EQUILIBRADORA UTILIZADA: / Balancing number used** 211

MODO DE COMPENSACIÓN :

Compensation mode



ARRANQUE DE MATERIAL

Removing material



APORTACIÓN DE MATERIAL

Adding material

PROCEDIMIENTO APLICABLE :

Applicable procedure

PED02 Rev.0

VELOCIDAD DEL EQUIPO

Equipment speed

3580

r.p.m.

RÉGIMEN DE EQUILIBRADO (r.p.m.)

Balancing speed

1013

MASA DEL ROTOR ( INCLUIDO SUJECCIÓN ) (Kg.)

Rotor mass ( Including fixation )

295

B

DISTANCIA ENTRE PLANOS DE COMPENSACIÓN (mm.)

Distance between compensation planes

1001

DESEQUILIBRIO RESIDUAL MÁXIMO ADMISIBLE EN EL RADIO DE COMPENSACIÓN (g.)

Maximum admissible residual unbalance at Compensation radius

35.8

DESEQUILIBRIO ESPECÍFICO RESIDUAL

MÁXIMO.ADMISIBLE (g.mm./Kg.)

Maximum specific admissible residual unbalance

17

INDICACIÓN DESEQUILIBRIO PRIMITIVO

Original unbalance

PLANO 1  
Plane 1PLANO 2  
Plane 2

3.35

1.60

DISTANCIA AL PUNTO DE APOYO (mm.)

Support point distance

A

C

385

340

RADIO DE COMPENSACIÓN (mm.)

Compensation radius

R1

R2

140

140

INDICACIÓN RESIDUAL (g.)

Residual indication

0.620

0.408

DESEQUILIBRIO RESIDUAL (g.mm./Kg.)

Residual unbalance

0.29

0.19

OPERARIO : J. DÍAZ

Operator

FIRMA :

Signature

FECHA :

Date

2.11.2011

CLIENTE / I.A. :

Customer / Inspection

FIRMA :

Signature

FECHA :

Date

**FLOWSERVE**Planta Coslada  
Control Calidad  
Ido.:

\*\*\*\*\*

FLOWERVE Pump Division  
Av. Fuentemar 26 - 28  
28820 Coslada / SPAIN

\*\*\*\*\*

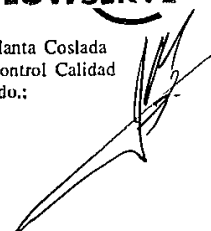
Operador : J A

02.11.11 20:52

| Datos rotor                                                                                                           |                         | Fijn.: $\Delta$ $\frac{1}{2}$ $\frac{1}{2}$                                                                             |                                                                                               | Nom. arch.: |  |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------|--|
| a: 385.0 mm                                                                                                           | b: 1001. mm             | c: 340.0 mm                                                                                                             |                                                                                               |             |  |
| r1: 140.0 mm                                                                                                          | Definicion : P11/P12    |                                                                                                                         | r2: 140.0 mm                                                                                  |             |  |
| m1:  polar                           | Vel. prev.: 1000. 0/min |                                                                                                                         | m2:  polar |             |  |
| Tol1: 0.000 gmm                                                                                                       | Vel. real : 1013. 0/min |                                                                                                                         | Tol2: 0.000 gmm                                                                               |             |  |
| Plano 1                                                                                                               |                         | Plano 2                                                                                                                 |                                                                                               |             |  |
|  <b>620.</b> mg<br>en <b>129</b> grd |                         | Rotor: 4X12WXH 02<br><br>Crda. 4                                                                                        |                                                                                               |             |  |
|                                                                                                                       |                         |  <b>408.</b> mg<br>en <b>118</b> grd |                                                                                               |             |  |
| AT                                                                                                                    |                         | E1                                                                                                                      |                                                                                               |             |  |

**FLOWERVE**

Planta Coslada  
Control Calidad  
Fdo.:





# SECTION 5

40213

| ACEROS MOLDEADOS DE LACUNZA, S.A.                                                                                                                                                |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       |                                                                        |                                    |                                                                           |                                                                       |                                                    |                                                                           |                                                          |     |           |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------|--------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------|-----|-----------|--|
| Certificado según<br>Certificate acc. to<br>Abnahmeprüfzeugnis nach                                                                                                              |                                       | DIN - EN 10204<br>3.1                                                                   |              | Certificado N°<br>Certificate Nr<br>APZ - Nr             |                                                          | 117023                                       |                                                   | Fecha<br>Date<br>Datum                                               |                                                       | 04/05/11                                                               |                                    | C/ABARRATEGUI S/N<br>31830 Lakuntza-NAVARRA<br>ESPAÑA                     |                                                                       |                                                    |                                                                           |                                                          |     |           |  |
| Cliente<br>Customer<br>Kunde                                                                                                                                                     |                                       |                                                                                         |              | FLOWERVE SPAIN, S.L.                                     |                                                          |                                              |                                                   | Sello de inspector<br>Inspector stamp<br>Stempel des Sachverständige |                                                       |                                                                        |                                    | Logotipo de fabricante<br>Brand of manufacturer<br>Hersteller Kennzeichen |                                                                       | A                                                  |                                                                           |                                                          |     |           |  |
| Pedido N°<br>Order Mr.<br>Bestell-Nr                                                                                                                                             |                                       |                                                                                         |              | 56785                                                    |                                                          |                                              |                                                   | Orden de fabricación N°<br>Works Nr.<br>Werk Nr.                     |                                                       |                                                                        |                                    | 37641                                                                     |                                                                       |                                                    |                                                                           | Proceso de Fusión<br>Melting Process<br>Erschmelzungsart |     | Inducción |  |
| Normas de Control/ especificaciones<br>Technical requirements/specifications<br>Prüfgrundlagen/Anforderungen                                                                     |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       | Material<br>Material<br>Werkstoff<br>IR-805                            |                                    |                                                                           | Según norma<br>According to<br>Entsprechend<br>INGERSOLL-<br>FLOWERVE |                                                    |                                                                           |                                                          |     |           |  |
| Marcado de Identificación : HEAT / MATERIAL<br>Marking / Kennzeichnung<br>Kennzeichnung                                                                                          |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       |                                                                        |                                    |                                                                           |                                                                       |                                                    |                                                                           |                                                          |     |           |  |
| N° piezas<br>Quantity<br>Stückzahl                                                                                                                                               | Pos.                                  | Designación del Artículo<br>Designation<br>Gegenstand                                   |              |                                                          |                                                          |                                              |                                                   |                                                                      | Colada N°<br>Heat Nr.<br>Schmelze Nr.                 |                                                                        | Probeta N°<br>Test N°<br>Probe Nr. |                                                                           | Peso(Kg).<br>Weight<br>Gewicht                                        |                                                    |                                                                           |                                                          |     |           |  |
| 9                                                                                                                                                                                | 3                                     | ANILLO ACAN. M-14305-4X12WXH60EH ;3 - 7D5143050 - 4X12WXH60EH - M-1430<br>CHANNEL RINGS |              |                                                          |                                                          |                                              |                                                   |                                                                      | Y329                                                  |                                                                        | 29                                 |                                                                           | 120                                                                   |                                                    |                                                                           |                                                          |     |           |  |
| Análisis químico / Chemical analysis / Chemische Analyse                                                                                                                         |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       |                                                                        |                                    |                                                                           |                                                                       |                                                    |                                                                           |                                                          |     |           |  |
| Colada N°<br>Heat Nr.<br>Schmelze Nr.                                                                                                                                            | C                                     | Mn                                                                                      | Si           | P                                                        | S                                                        | Cr                                           | Ni                                                | Mo                                                                   | Nb                                                    | Cu                                                                     | N                                  | V                                                                         | W                                                                     |                                                    |                                                                           |                                                          |     |           |  |
|                                                                                                                                                                                  | %                                     | %                                                                                       | %            | %                                                        | %                                                        | %                                            | %                                                 | %                                                                    | %                                                     | %                                                                      | %                                  | %                                                                         | %                                                                     | %                                                  |                                                                           |                                                          |     |           |  |
| Max.<br>Min.                                                                                                                                                                     | 0,06<br>0,055                         | 1,00<br>0,72                                                                            | 1,00<br>0,34 | 0,04<br>0,021                                            | 0,03<br>0,006                                            | 14,00<br>12,22                               | 4,50<br>3,77                                      | 1,00<br>0,59                                                         |                                                       | 0,50<br>0,16                                                           |                                    | 0,05<br>0,04                                                              | 0,10<br>0,01                                                          |                                                    |                                                                           |                                                          |     |           |  |
| Y329                                                                                                                                                                             |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       |                                                                        |                                    |                                                                           |                                                                       |                                                    |                                                                           |                                                          |     |           |  |
| Ensayos Mecánicos / Mechanical Test Results / Mechanische Prüfungen                                                                                                              |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       |                                                                        |                                    |                                                                           |                                                                       |                                                    |                                                                           |                                                          |     |           |  |
| Probeta<br>Test N°<br>Probe Nr.                                                                                                                                                  | Colada N°<br>Heat Nr.<br>Schmelze Nr. | Dimensión probeta<br>Dimension of specimen<br>Probeabmessungen                          |              | Temperatura ensayo<br>Test temperature<br>Prüftemperatur | Límite elástico<br>Yield point<br>Dehngrenze             | Límite elástico<br>Yield point<br>Dehngrenze | Carga Rotura<br>Tensile strength<br>Zugfestigkeit | Alargamiento<br>Elongation<br>Bruchdehnung                           | Estricción<br>Reduction of area<br>Bruchseinschnürung | ISO - V<br>(Joules)<br>Resiliencia<br>Energy of impact<br>Schlagarbeit |                                    |                                                                           |                                                                       | Expansión lateral<br>Lateral expansion<br>Breitung | Dureza<br>Hardness<br>Härte                                               |                                                          |     |           |  |
|                                                                                                                                                                                  |                                       | Espesor<br>Thickness<br>Dicke                                                           |              | Ancho, Ø<br>Width, Ø<br>Breite, Ø                        | Temperatura ensayo<br>Test temperature<br>Prüftemperatur | Límite elástico<br>Yield point<br>Dehngrenze | Límite elástico<br>Yield point<br>Dehngrenze      | Carga Rotura<br>Tensile strength<br>Zugfestigkeit                    | Alargamiento<br>Elongation<br>Bruchdehnung            | Estricción<br>Reduction of area<br>Bruchseinschnürung                  | Valores - Value - Werte            |                                                                           |                                                                       |                                                    | Expansión lateral<br>Lateral expansion<br>Breitung                        | Dureza<br>Hardness<br>Härte                              |     |           |  |
|                                                                                                                                                                                  |                                       | mm                                                                                      |              | mm                                                       | °C                                                       | 0.2%<br>N/mm²                                | 1.0%<br>N/mm²                                     | N/mm²                                                                | Lo= 4D<br>%                                           | %                                                                      | Temp<br>C°                         | 1                                                                         | 2                                                                     | 3                                                  | ≥/n                                                                       | mm x 10²                                                 | HB  |           |  |
| Max.<br>Min.                                                                                                                                                                     |                                       |                                                                                         |              | 20<br>20                                                 | 550<br>637                                               |                                              |                                                   | 930<br>760<br>788                                                    | 15<br>20                                              | 35<br>52                                                               |                                    |                                                                           |                                                                       |                                                    |                                                                           |                                                          | 237 |           |  |
| 29                                                                                                                                                                               | Y329                                  | 10<br>10                                                                                |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       |                                                                        |                                    |                                                                           |                                                                       |                                                    |                                                                           |                                                          |     |           |  |
| Tratamiento Térmico<br>Heat treatment<br>Wärmebehandlung<br>Temple .1050 °C / h./ Templado al AIRE * Revenido a 680 °C * Revenido a 620 °C *                                     |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       |                                                                        |                                    |                                                                           |                                                                       |                                                    |                                                                           |                                                          |     |           |  |
| Corrosión intercrisalina<br>Intergranular corrosion test<br>Interkristalline Korrosion                                                                                           |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       | Observaciones / Remarks / Bemerkungen                                  |                                    |                                                                           |                                                                       |                                                    | FLOWERVE                                                                  |                                                          |     |           |  |
| Control Visual<br>Visual Test<br>Besichtigung                                                                                                                                    |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       | Satisfactory according to MSS-SP-55                                    |                                    |                                                                           |                                                                       |                                                    | Planta, Colada<br>Aseguro la Calidad<br>Fdo.:                             |                                                          |     |           |  |
| Control Dimensional<br>Dimensional Test<br>Masskontrolle                                                                                                                         |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       |                                                                        |                                    |                                                                           |                                                                       |                                                    | Inspector del Cliente<br>Customer Inspector<br>Sachverständige des Kunden |                                                          |     |           |  |
| Homologado por / Certificates of / Zertifikate / Certifié par:<br>-TÜV SÜD Industrie Service GmbH<br>-Lloyd's Register of Shipping<br>-Germanischer Lloyd<br>-Det Norske Veritas |                                       |                                                                                         |              |                                                          |                                                          |                                              |                                                   |                                                                      |                                                       | - Bureau Veritas<br>- NKK - Nippon Kaiji Kyokai<br>- Korean Register   |                                    |                                                                           |                                                                       |                                                    | TÜV<br>CERT<br>DIN EN ISO 9001: 2000<br>Certificado nº 91 100 2140        |                                                          |     |           |  |

# ACEROS MOLDEADOS DE LACUNZA, S.A.

|                                                                                                                                                                                         |                                              |                                                                                            |                                                     |                                                                       |                                                                              |                                                                                     |                                                                                   |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------|--|
| <b>Certificado según</b><br>Certificate etc. to<br>Abnahmeprüfzeugnis nach                                                                                                              |                                              | <b>DIN - EN 10204</b><br>3.1                                                               | <b>Certificado N°</b><br>Certificate Nr<br>APZ - Nr | 117024                                                                | <b>Fecha</b><br>Date<br>Datum                                                | 04/05/11                                                                            | <b>C/ABARRATEGUI S/N</b><br>31830 Lakuntza-NAVARRA<br>ESPAÑA                      |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Cliente</b><br>Customer<br>Kunde                                                                                                                                                     |                                              |                                                                                            | <b>FLOWERVE SPAIN, S.L.</b>                         |                                                                       | <b>Sello de inspector</b><br>Inspector stamp<br>Stempel des Sachverständigen |                                                                                     | <b>Logotipo de fabricante</b><br>Brand of manufacturer<br>Hersteller Kennzeichnen |  |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Pedido N°</b><br>Order Mr.<br>Bestell-Nr                                                                                                                                             |                                              | 56785                                                                                      |                                                     | <b>Orden de fabricación N°</b><br>Works Nr.<br>Werk Nr.               |                                                                              | 37641                                                                               |                                                                                   | <b>Proceso de Fusión</b><br>Melting Process<br>Erschmelzungsart                     | Inducción                                                         |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Normas de Control/ especificaciones</b><br>Technical requirements/specifications<br>Prüfgrundlagen/Anforderungen                                                                     |                                              |                                                                                            |                                                     |                                                                       |                                                                              | <b>Material</b><br>Material<br>Werkstoff<br>IR-805                                  |                                                                                   | <b>Según norma</b><br>According to<br>Entsprechend<br>INGERSOLL-<br>FLOWERVE        |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Marcado de identificación</b> : HEAT / MATERIAL<br>Marking / Kennzeichnung<br>Kennzeichnung                                                                                          |                                              |                                                                                            |                                                     |                                                                       |                                                                              |                                                                                     |                                                                                   |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>N° piezas</b><br>Quantity<br>Stückzahl                                                                                                                                               | <b>Pos.</b>                                  | <b>Designación del Artículo</b><br>Designation<br>Gegenstand                               |                                                     |                                                                       |                                                                              | <b>Colada N°</b><br>Heat Nr.<br>Schmelze Nr.                                        | <b>Probeta N°</b><br>Test N°<br>Probe Nr.                                         | <b>Peso(Kg).</b><br>Weight<br>Gewicht                                               |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| 9                                                                                                                                                                                       | 3                                            | ANILLO ACAN. M-14305-4X12WXH60EH ;3 - 7D5143050 - 4X12WXH60EH - M-1430<br><br>CHANNEL RING |                                                     |                                                                       |                                                                              | Y330                                                                                | 30                                                                                | 120                                                                                 |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Análisis químico / Chemical analysis / Chemische Analyse</b>                                                                                                                         |                                              |                                                                                            |                                                     |                                                                       |                                                                              |                                                                                     |                                                                                   |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Colada N°</b><br>Heat Nr.<br>Schmelze Nr.                                                                                                                                            | C                                            | Mn                                                                                         | Si                                                  | P                                                                     | S                                                                            | Cr                                                                                  | Ni                                                                                | Mo                                                                                  | Nb                                                                | Cu                                                                            | N | V                                                                                    | W    |                                                                       |                                          |                                                                                  |  |
|                                                                                                                                                                                         | %                                            | %                                                                                          | %                                                   | %                                                                     | %                                                                            | %                                                                                   | %                                                                                 | %                                                                                   | %                                                                 | %                                                                             | % | %                                                                                    | %    |                                                                       |                                          |                                                                                  |  |
| Max.                                                                                                                                                                                    | 0,06                                         | 1,00                                                                                       | 1,00                                                | 0,04                                                                  | 0,03                                                                         | 14,00                                                                               | 4,50                                                                              | 1,00                                                                                |                                                                   | 0,50                                                                          |   | 0,05                                                                                 | 0,10 |                                                                       |                                          |                                                                                  |  |
| Min.                                                                                                                                                                                    |                                              |                                                                                            |                                                     |                                                                       |                                                                              | 11,50                                                                               | 3,50                                                                              | 0,40                                                                                |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| Y330                                                                                                                                                                                    | 0,052                                        | 0,69                                                                                       | 0,32                                                | 0,020                                                                 | 0,006                                                                        | 12,20                                                                               | 3,70                                                                              | 0,57                                                                                |                                                                   | 0,16                                                                          |   | 0,04                                                                                 | 0,01 |                                                                       |                                          |                                                                                  |  |
| <b>Ensayos Mecánicos / Mechanical Test Results / Mechanische Prüfungen</b>                                                                                                              |                                              |                                                                                            |                                                     |                                                                       |                                                                              |                                                                                     |                                                                                   |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Probeta</b><br>Test N°<br>Probe Nr.                                                                                                                                                  | <b>Colada N°</b><br>Heat Nr.<br>Schmelze Nr. | <b>Dimensión probeta</b><br>Dimension of specimen<br>Probeabmessungen                      |                                                     | <b>Temperatura ensayo</b><br>Test temperature<br>Prüftemperatur<br>°C | <b>Límite elástico</b><br>Yield point<br>Dehngrenze<br>0.2%<br>N/mm²         | <b>Límite elástico</b><br>Yield point<br>Dehngrenze<br>1.0%<br>N/mm²                | <b>Carga Rótura</b><br>Tensile strength<br>Zugfestigkeit<br>N/mm²                 | <b>Alargamiento</b><br>Elongation<br>Bruchdehnung<br>Lo= 4D<br>%                    | <b>Estricción</b><br>Reduction of area<br>Bruchseinschnürung<br>% | <b>ISO - V</b><br>(Joules)<br>Resiliencia<br>Energy of impact<br>Schlagarbeit |   |                                                                                      |      | <b>Expansión lateral</b><br>Lateral expansion<br>Breitung<br>mm x 10² | <b>Dureza</b><br>Hardness<br>Härte<br>HB |                                                                                  |  |
|                                                                                                                                                                                         |                                              | <b>Espesor</b><br>Thickness<br>Dicke<br>mm                                                 | <b>Ancho, Ø</b><br>Width, Ø<br>Breite, Ø<br>mm      |                                                                       |                                                                              |                                                                                     |                                                                                   |                                                                                     |                                                                   | <b>Valores - Value - Werte</b>                                                |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
|                                                                                                                                                                                         |                                              |                                                                                            |                                                     |                                                                       |                                                                              |                                                                                     |                                                                                   |                                                                                     |                                                                   | Temp °C                                                                       | 1 | 2                                                                                    | 3    |                                                                       |                                          | ≥/n                                                                              |  |
| Max.                                                                                                                                                                                    |                                              |                                                                                            |                                                     | 20                                                                    |                                                                              |                                                                                     | 930                                                                               |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| Min.                                                                                                                                                                                    |                                              |                                                                                            |                                                     |                                                                       | 550                                                                          |                                                                                     | 760                                                                               | 15                                                                                  | 35                                                                |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| 30                                                                                                                                                                                      | Y330                                         | 10                                                                                         | 12,5                                                | 20                                                                    | 630                                                                          |                                                                                     | 810                                                                               | 19                                                                                  | 58                                                                |                                                                               |   |                                                                                      |      |                                                                       |                                          | 245                                                                              |  |
| <b>Tratamiento Térmico</b><br>Heat treatment<br>Wärmebehandlung<br>Temple .1050 °C / h./ Templado al AIRE * Revenido a 680 °C * Revenido a 620 °C *                                     |                                              |                                                                                            |                                                     |                                                                       |                                                                              |                                                                                     |                                                                                   |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Corrosión intercrisitalina</b><br>Intergranular corrosion test<br>Interkristalline Korrosion                                                                                         |                                              |                                                                                            |                                                     |                                                                       |                                                                              | <b>Observaciones / Remarks / Bemerkungen</b>                                        |                                                                                   |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Control Visual</b><br>Visual Test<br>Besichtigung                                                                                                                                    |                                              |                                                                                            |                                                     |                                                                       |                                                                              | Satisfactory according to MSS-SP-55                                                 |                                                                                   |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Control Dimensional</b><br>Dimensional Test<br>Masskontrolle                                                                                                                         |                                              |                                                                                            |                                                     |                                                                       |                                                                              | Satisfactory according to MSS-SP-55                                                 |                                                                                   |                                                                                     |                                                                   |                                                                               |   |                                                                                      |      |                                                                       |                                          |                                                                                  |  |
| <b>Homologado por / Certificates of / Zertifikate / Certifié par:</b><br>-TÜV SÜD Industrie Service GmbH<br>-Lloyd's Register of Shipping<br>-Germanischer Lloyd<br>-Det Norske Veritas |                                              |                                                                                            |                                                     |                                                                       |                                                                              |  |                                                                                   |                                                                                     |                                                                   |                                                                               |   |  |      |                                                                       |                                          | <b>Inspector del Cliente</b><br>Customer inspector<br>Sachverständige des Kunden |  |



56844

40213

CERTIFICADO DE MATERIAL  
METAL CERTIFICATION / MATERIALZEUGNIS

Polígono Nicomedes García  
VALVERDE DEL MAJANO  
(SEGOVIA) ESPAÑA  
Teléfono 921 49 00 96  
Fax 921 49 01 74

Nº 23.648

DIN 50049: EN 10204 3.1.

Documento Rev.-2 Pág.- 1  
Fecha.- 15.05.98

Cliente / Customer / Kunde FLOWERVE SPAIN S.L. Pedido de fecha / Date of order / Bestell-Datum 17/03/2011  
O.F. / Order Nº / Auftrag Nr 1522701 Su pedido Nº / Your order Nº / Bestell-Nr 56844

| Cantidad<br>Quantity / Menge | Pieza<br>Object / Gegenstand | Material<br>Material / Werkstoff | Fecha Colada<br>Prod-Day / Schmelze-Datum |
|------------------------------|------------------------------|----------------------------------|-------------------------------------------|
| 1,0                          | Difusor 4X12WXH56A           | IR-805                           | 11/04/2011                                |

DIFFUSER

ANÁLISIS QUÍMICO / CHEMICAL ANALYSIS / CHEMISCHE ANALYSE

COLADA / HEAT Nº / SCHMELZE-Nr: 14332

| C    | Mn   | Si   | P     | S     | Ni  | Cr   | Mo   | Cu   | W      | V    |
|------|------|------|-------|-------|-----|------|------|------|--------|------|
| 0.05 | 0.60 | 0.59 | 0.012 | 0.006 | 3.9 | 12.3 | 0.58 | 0.11 | < 0.10 | 0.03 |

TRATAMIENTO TÉRMICO / HEAT TREATMENT / WÄRMEBEHANDLUNG

Temple a 1050°C enfriamiento al aire. / Normalizing at 1050°C and air cool. / Normalgluhen 1050°C abkühlung luft.  
Revenido a 610°C enfriamiento al aire. / Tempering at 610°C and air cool. / Spannungsarmgluhen 610°C abkühlung luft.  
Revenido a 593°C enfriamiento al aire. / Tempering at 593°C and air cool. / Spannungsarmgluhen 593°C abkühlung luft.

PRUEBA DE RESISTENCIA / STRENGTH TEST / FESTIGKEITSPRÜFUNG

a) Ensayo de tracción / Tensile test / Zugversuch

Resistencia a la tracción / Tensile strength / Zugfestigkeit

Límite elástico / Yield strength / Streckgrenze

Alargamiento / Elongation / Bruchdehnung

Estricción / Reduction of area / Brucheinschnürung

b) Resiliencia / Impact test / Kerbschlagbiegeversuch

c) Dureza / Hardness test / Härteprüfung

|     |      |
|-----|------|
| Mpa | 824  |
| Mpa | 608  |
| %   | 22.2 |
| %   | 63   |

Inspección visual según norma MSS.SP.55.

Inspección dimensional de acuerdo al plano de pieza.



FYSA, S.L.  
Control de Calidad.

J.R.  
J.G.C.

Fecha / Date / Datum  
05/05/2011



Polígono Nicomedes García  
VALVERDE DEL MAJANO  
(SEGOVIA) ESPAÑA  
Teléfono 921 49 00 96  
Fax 921 49 01 74

**CERTIFICADO DE MATERIAL  
METAL CERTIFICATION / MATERIALZEUGNIS**

Nº 23.680

DIN 50049: EN 10204 3.1.

Documento Rev.- 2 Pág.- 1  
Fecha.- 15.05.98

Cliente / Customer / Kunde FLOWERVE SPAIN S.L. Pedido de fecha / Date of order / Bestell-Datum 17/03/2011  
O.F. / Order Nº / Auftrag Nr 1522703 Su pedido Nº / Your order Nº / Bestell-Nr 56844

| Cantidad<br>Quantity / Menge | Pieza<br>Object / Gegenstand | Material<br>Material / Werkstoff | Fecha Colada<br>Prod-Day / Schmelze-Datum |
|------------------------------|------------------------------|----------------------------------|-------------------------------------------|
| 18,0                         | Difusor 4X12WXH56D           | IR-805                           | 11/04/2011                                |

**DIFFUSER**

**ANÁLISIS QUÍMICO / CHEMICAL ANALYSIS / CHEMISCHE ANALYSE**

COLADA / HEAT Nº / SCHMELZE-Nr: 14332

| C    | Mn   | Si   | P     | S     | Ni  | Cr   | Mo   | Cu   | W      | V    |
|------|------|------|-------|-------|-----|------|------|------|--------|------|
| 0.05 | 0.60 | 0.59 | 0.012 | 0.006 | 3.9 | 12.3 | 0.58 | 0.11 | < 0.10 | 0.03 |

**TRATAMIENTO TÉRMICO / HEAT TREATMENT / WÄRMEBEHANDLUNG**

Temple a 1050°C enfriamiento al aire. / Normalizing at 1050°C and air cool. / Normalgluhen 1050°C abkühlung luft.  
Revenido a 610°C enfriamiento al aire. / Tempering at 610°C and air cool. / Spannungsarmgluhen 610°C abkühlung luft.  
Revenido a 593°C enfriamiento al aire. / Tempering at 593°C and air cool. / Spannungsarmgluhen 593°C abkühlung luft.

**PRUEBA DE RESISTENCIA / STRENGTH TEST / FESTIGKEITSPRÜFUNG**

a) Ensayo de tracción / Tensile test / Zugversuch

Resistencia a la tracción / Tensile strength / Zugfestigkeit

límite elástico / Yield strength / Streckgrenze

Alargamiento / Elongation / Bruchdehnung

Estricción / Reduction of area / Bruchseinschnürung

b) Resiliencia / Impact test / Kerbschlagbiegeversuch

c) Dureza / Hardness test / Härteprüfung

|     |      |
|-----|------|
| Mpa | 824  |
| Mpa | 608  |
| %   | 22.2 |
| %   | 63   |

Inspección visual según norma MSS.SP.55.

Inspección dimensional de acuerdo al plano de pieza.

**FLOWERVE**

Planta 000004  
Asesorado Calidad  
Revisado:

**FYSA, S.L.**  
Control de Calidad.

*J.R.*  
J.R.C.

Fecha / Date / Datum  
06/05/2011

40213



Polígono Nicomedes García  
VALVERDE DEL MAJANO  
(SEGOVIA) ESPAÑA  
Teléfono 921 49 00 96  
Fax 921 49 01 74

**CERTIFICADO DE MATERIAL  
METAL CERTIFICATION / MATERIALZEUGNIS**

Nº 23.785

DIN 50049: EN 10204 3.1.

Documento Rev.- 2 Pág.- 1  
Fecha.- 15.05.98

Cliente / Customer / Kunde FLOWSERVE SPAIN S.L.

Pedido de fecha / Date of order / Bestell-Datum 17/03/2011

O.F. / Order Nº / Auftrag Nr 1522701

Su pedido Nº / Your order Nº / Bestell-Nr 56844

Cantidad  
Quantity / Menge

1,0

Pieza  
Object / Gegenstand

Difusor 4X12WXH56A

Material  
Material / Werkstoff

IR-805

Fecha Colada  
Prod-Day / Schmelze-Datum

09/05/2011

*DIFUSOR ULTIMO / LAST DIFFUSER*

**ANÁLISIS QUÍMICO / CHEMICAL ANALYSIS / CHEMISCHE ANALYSE**

COLADA / HEAT Nº / SCHMELZE-Nr: 14416

| C    | Mn   | Si   | P     | S     | Ni  | Cr   | Mo   | Cu   | W      | V    |
|------|------|------|-------|-------|-----|------|------|------|--------|------|
| 0.04 | 0.60 | 0.59 | 0.016 | 0.004 | 4.0 | 12.6 | 0.62 | 0.17 | < 0.10 | 0.04 |

**TRATAMIENTO TÉRMICO / HEAT TREATMENT / WÄRMEBEHANDLUNG**

Temple a 1050°C enfriamiento al aire. / Normalizing at 1050°C and air cool. / Normalgluhen 1050°C abkühlung luft.  
Revenido a 610°C enfriamiento al aire. / Tempering at 610°C and air cool. / Spannungsarmgluhen 610°C abkühlung luft.  
Revenido a 593°C enfriamiento al aire. / Tempering at 593°C and air cool. / Spannungsarmgluhen 593°C abkühlung luft.

**PRUEBA DE RESISTENCIA / STRENGTH TEST / FESTIGKEITSPRÜFUNG**

a) Ensayo de tracción / Tensile test / Zugversuch

Resistencia a la tracción / Tensile strength / Zugfestigkeit

Mpa

852

límite elástico / Yield strength / Streckgrenze

Mpa

606

Alargamiento / Elongation / Bruchdehnung

%

24.7

Estricción / Reduction of area / Bruchseinschnürung

%

61

b) Resiliencia / Impact test / Kerbschlagbiegeversuch

c) Dureza / Hardness test / Härteprüfung

Inspección visual según norma MSS.SP.55.

Inspección dimensional de acuerdo al plano de pieza.

**FLOWSERVE**

Planta Coslada  
Aseguramiento Calidad  
Edo.:

**FYSA, S.L.**  
Control de Calidad.

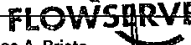
*[Signature]*  
J.G.C.

Fecha / Date / Datum  
20/05/2011

|                                                                                                                                  |                                                                                   |                                                                                                                                                                                               |  |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                 |                                                                                   | Pump Division<br>Flowserve Spain, S.L.                                                                                                                                                        |  |
| AENOR<br><br>Empresa Registrada<br>ER-0006/1/90 |  | <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                                                                                                            |  |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                                             |                                                                                   | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>                                                                                                                                         |  |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                                              |                                                                                   | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                                                                                                       |  |
| <b>OBJETO / Object</b><br>CHANEL RING 1º STAGE<br>CHANNEL RING 2º TO 8º STAGE<br>CHANNEL RING LAST STAGE                         |                                                                                   | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>                                                                                                                                        |  |
| <b>DISEÑO/plano / Design</b><br>4X12WXH60EHXE57<br>4X12WXH60EHXE50<br>4X12WXH60EHXE51                                            |                                                                                   | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b>                                                                                                                                   |  |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED</b> % PREMACHINING                                       |                                                                                   | <b>Q.C.P.</b><br><b>2244 R.3</b>                                                                                                                                                              |  |
| <b>ESPECIFICACIÓN / Specification</b><br><b>PLP01 Rev.1</b>                                                                      |                                                                                   | <b>CONDICION SUPERFICIAL / Surface Condition</b><br>ACEPTABLE                                                                                                                                 |  |
| <input type="checkbox"/> COMO SOLDADURA / As welded                                                                              |                                                                                   | <input checked="" type="checkbox"/> MECANIZADO / Machined                                                                                                                                     |  |
| <input checked="" type="checkbox"/> ESMERILADO / Ground                                                                          |                                                                                   | <input type="checkbox"/> FORJADO / As Forged                                                                                                                                                  |  |
| <b>METODO CONTROL / Control Method</b>                                                                                           |                                                                                   |                                                                                                                                                                                               |  |
| <input type="checkbox"/> SOLUBLE EN AGUA / Water washable                                                                        |                                                                                   | <input type="checkbox"/> POR EMULSIFICADO / Post emulsifiable                                                                                                                                 |  |
| <input checked="" type="checkbox"/> DISOLVENTE / Solvent removable                                                               |                                                                                   | <input type="checkbox"/> VISIBLE <input type="checkbox"/> FLUORESC.                                                                                                                           |  |
| <input type="checkbox"/> VISIBLE <input type="checkbox"/> FLUORESC.                                                              |                                                                                   | <input checked="" type="checkbox"/> VISIBLE <input type="checkbox"/> FLUORESC.                                                                                                                |  |
| <b>LIMPIEZA / Cleaner</b>                                                                                                        |                                                                                   | <b>9PR-5</b>                                                                                                                                                                                  |  |
| <b>PENETRANTE / Penetrant</b>                                                                                                    |                                                                                   | <b>996-P</b>                                                                                                                                                                                  |  |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                                |                                                                                   |                                                                                                                                                                                               |  |
| <b>DISOLVENTE / Remover</b>                                                                                                      |                                                                                   | <b>9PR-5</b>                                                                                                                                                                                  |  |
| <b>REVELADOR / Developer</b>                                                                                                     |                                                                                   | <b>9D1-B</b>                                                                                                                                                                                  |  |
| <b>MARCA / Trade mark</b>                                                                                                        |                                                                                   | <b>ARDROX</b>                                                                                                                                                                                 |  |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                                        |                                                                                   |                                                                                                                                                                                               |  |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                                        |                                                                                   |                                                                                                                                                                                               |  |
| <b>LIMPIEZA / Cleaning</b>                                                                                                       |                                                                                   | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>                                                                                                                                            |  |
| <b>APLIC. PENETRANTE / Penetrant application.</b>                                                                                |                                                                                   | <b>996-P SPRAY</b>                                                                                                                                                                            |  |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                                    |                                                                                   | <b>9PR-5</b>                                                                                                                                                                                  |  |
| <b>APLIC. REVELADOR / Developer application</b>                                                                                  |                                                                                   | <b>9D1-B SPRAY</b>                                                                                                                                                                            |  |
| <b>SECADO / Drying process</b>                                                                                                   |                                                                                   | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                                                                                                |  |
| <b>TEMP. AMBIENTE 20º / ATMOSPHERE TEMP.</b>                                                                                     |                                                                                   | <b>15 MINUTOS</b>                                                                                                                                                                             |  |
| <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                                              |                                                                                   | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                                                                                               |  |
| <b>7 MINUTOS</b>                                                                                                                 |                                                                                   |                                                                                                                                                                                               |  |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b><br>1 HORA                                                                        |                                                                                   |                                                                                                                                                                                               |  |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b>                                                              |                                                                                   | <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b>                                                                                                                               |  |
| SI / YES                                                                                                                         |                                                                                   | SI / YES                                                                                                                                                                                      |  |
| <b>RESULTADO / Results</b><br>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED                       |                                                                                   |                                                                                                                                                                                               |  |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>                           |                                                                                   | <b>FIRMADO / Signature</b>                                                                                                                                                                    |  |
|                                                                                                                                  |                                                                                   |                                                                                                                                                                                               |  |
|                                                                                                                                  |                                                                                   | <b>OPERADOR / Operator</b><br>NIVEL II<br><br>Jose A. Prieto<br>Planta Costada<br>Control Calidad<br>Fdo.: |  |
|                                                                                                                                  |                                                                                   | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br>FECHA / Date<br>06.09.2011                                                                                                         |  |

|                                                                                                                                                                                                                             |                                                                                   |                                                                                           |                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------|
|                                                                                                                                            |                                                                                   | Pump Division<br>Flowserve Spain, S.L.                                                    |                                                  |
| AENOR<br><br>Empresa Registrada<br>ER-0008/1/90                                                                                            |  | <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>        | <b>INFORME Nº / Report Nº</b><br><br><b>5113</b> |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                                                                                                                                        |                                                                                   | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>                                     |                                                  |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                                                                                                                                         |                                                                                   | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>                                    |                                                  |
| <b>OBJETO / Object</b><br>CHANEL RING 1º STAGE<br>CHANNEL RING 2º TO 8º STAGE<br>CHANNEL RING LAST STAGE                                                                                                                    |                                                                                   | <b>DISEÑO/plano / Design</b><br>4X12WXH60EHXE57<br>4X12WXH60EHXE50<br>4X12WXH60EHXE51     |                                                  |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED</b> % MACHINED                                                                                                                                      |                                                                                   | <b>Q.C.P.</b><br>2244 R.3                                                                 |                                                  |
| <b>ESPECIFICACIÓN / Specification</b><br>PLP01 Rev.1                                                                                                                                                                        |                                                                                   |                                                                                           |                                                  |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br>ACCEPTABLE                                                                                                                                                              |                                                                                   |                                                                                           |                                                  |
| <input type="checkbox"/> COMO SOLDADURA / As welded<br><input checked="" type="checkbox"/> MECANIZADO / Machined<br><input checked="" type="checkbox"/> ESMERILADO / Ground<br><input type="checkbox"/> FORJADO / As Forged |                                                                                   |                                                                                           |                                                  |
| <b>METODO CONTROL / Control Method</b>                                                                                                                                                                                      |                                                                                   |                                                                                           |                                                  |
| <input type="checkbox"/> SOLUBLE EN AGUA / Water washable<br><input type="checkbox"/> POR EMULSIFICADO / Post emulsifiable<br><input checked="" type="checkbox"/> DISOLVENTE / Solvent removable                            |                                                                                   |                                                                                           |                                                  |
| <input type="checkbox"/> VISIBLE <input type="checkbox"/> FLUORESC. <input type="checkbox"/> VISIBLE <input type="checkbox"/> FLUORESC. <input checked="" type="checkbox"/> VISIBLE <input type="checkbox"/> FLUORESC.      |                                                                                   |                                                                                           |                                                  |
| <b>LIMPIEZA / Cleaner</b>                                                                                                                                                                                                   |                                                                                   | 9PR-5                                                                                     |                                                  |
| <b>PENETRANTE / Penetrant</b>                                                                                                                                                                                               |                                                                                   | 996-P                                                                                     |                                                  |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                                                                                                                           |                                                                                   |                                                                                           |                                                  |
| <b>DISOLVENTE / Remover</b>                                                                                                                                                                                                 |                                                                                   | 9PR-5                                                                                     |                                                  |
| <b>REVELADOR / Developer</b>                                                                                                                                                                                                |                                                                                   | 9D1-B                                                                                     |                                                  |
| <b>MARCA / Trade mark</b>                                                                                                                                                                                                   |                                                                                   | ARDROX                                                                                    |                                                  |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                                                                                                                                   |                                                                                   |                                                                                           |                                                  |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                                                                                                                                   |                                                                                   |                                                                                           |                                                  |
| <b>LIMPIEZA / Cleaning</b>                                                                                                                                                                                                  |                                                                                   | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>                                        |                                                  |
| <b>APLIC. PENETRANTE / Penetrant application.</b>                                                                                                                                                                           |                                                                                   | 996-P SPRAY                                                                               |                                                  |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                                                                                                                               |                                                                                   | 9PR-5                                                                                     |                                                  |
| <b>APLIC. REVELADOR / Developer application</b>                                                                                                                                                                             |                                                                                   | 9D1-B SPRAY                                                                               |                                                  |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b>                                                                                                                                                                             |                                                                                   | 1 HORA                                                                                    |                                                  |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b>                                                                                                                                                         |                                                                                   | SI / YES                                                                                  |                                                  |
| <b>RESULTADO / Results</b>                                                                                                                                                                                                  |                                                                                   | NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED              |                                                  |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>                                                                                                                      |                                                                                   | <b>FIRMADO / Signature</b>                                                                |                                                  |
|                                                                                                                                                                                                                             |                                                                                   |                                                                                           |                                                  |
|                                                                                                                                                                                                                             |                                                                                   | <b>OPERADOR / Operator</b><br>José María Cosío<br>Control Calidad<br>Fdo.:                |                                                  |
|                                                                                                                                                                                                                             |                                                                                   | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br><br>FECHA / Date<br>18.10.2011 |                                                  |

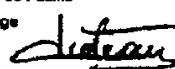
|                                                                                                                                                                           |                                                                                |                                                                                                                                                                                                      |                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|         |                                                                                | <b>Pump Division</b><br><b>Flowserve Spain, S.L.</b>                                                                                                                                                 |                                                                                                                         |
| <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                                                                                        |                                                                                |                                                                                                                                                                                                      | <b>INFORME Nº / Report Nº</b><br><br><b>5121</b>                                                                        |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                                                                                      | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>                          | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                                                                                                              |                                                                                                                         |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                                                                                       | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>                         | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b>                                                                                                                                          |                                                                                                                         |
| <b>OBJETO / Object</b><br><b>DIFUSERS 1º TO 9º STAGE</b><br><b>DIFUSERS LAST STAGE</b>                                                                                    | <b>DISEÑO/plano / Design</b><br><b>4X12WXH56DXE52</b><br><b>4X12WXH56AXE50</b> | <b>Nº SERIE / Serial Nº</b><br><b>01 TO 18</b><br><b>01 AND 02</b>                                                                                                                                   |                                                                                                                         |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED % PREMACHINING</b>                                                                                |                                                                                | <b>Q.C.P.</b><br><b>2244 R.3</b>                                                                                                                                                                     | <b>ESPECIFICACIÓN / Specification</b><br><b>PLP01 Rev.1</b>                                                             |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br><b>ACEPTABLE</b>                                                                                                      |                                                                                | <input type="checkbox"/> <b>COMO SOLDADURA / As welded</b><br><input checked="" type="checkbox"/> <b>ESMERILADO / Ground</b>                                                                         | <input checked="" type="checkbox"/> <b>MECANIZADO / Machined</b><br><input type="checkbox"/> <b>FORJADO / As Forged</b> |
| <b>METODO CONTROL / Control Method</b>                                                                                                                                    |                                                                                |                                                                                                                                                                                                      |                                                                                                                         |
| <input type="checkbox"/> <b>SOLUBLE EN AGUA / Water washable</b><br><input type="checkbox"/> <b>VISIBLE</b> <input type="checkbox"/> <b>FLUORESC.</b>                     |                                                                                | <input type="checkbox"/> <b>POR EMULSIFICADO / Post emulsifiable</b><br><input type="checkbox"/> <b>VISIBLE</b> <input type="checkbox"/> <b>FLUORESC.</b>                                            |                                                                                                                         |
| <input checked="" type="checkbox"/> <b>DISOLVENTE / Solvent removable</b><br><input checked="" type="checkbox"/> <b>VISIBLE</b> <input type="checkbox"/> <b>FLUORESC.</b> |                                                                                |                                                                                                                                                                                                      |                                                                                                                         |
| <b>LIMPIEZA / Cleaner</b>                                                                                                                                                 |                                                                                |                                                                                                                                                                                                      | <b>9PR-5</b>                                                                                                            |
| <b>PENETRANTE / Penetrant</b>                                                                                                                                             |                                                                                |                                                                                                                                                                                                      | <b>996-P</b>                                                                                                            |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                                                                         |                                                                                |                                                                                                                                                                                                      |                                                                                                                         |
| <b>DISOLVENTE / Remover</b>                                                                                                                                               |                                                                                |                                                                                                                                                                                                      | <b>9PR-5</b>                                                                                                            |
| <b>REVELADOR / Developer</b>                                                                                                                                              |                                                                                |                                                                                                                                                                                                      | <b>9D1-B</b>                                                                                                            |
| <b>MARCA / Trade mark</b>                                                                                                                                                 |                                                                                |                                                                                                                                                                                                      | <b>ARDROX</b>                                                                                                           |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                                                                                 |                                                                                |                                                                                                                                                                                                      |                                                                                                                         |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                                                                                 |                                                                                |                                                                                                                                                                                                      |                                                                                                                         |
| <b>LIMPIEZA / Cleaning</b>                                                                                                                                                | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>                             | <b>SECADO / Drying process</b>                                                                                                                                                                       | <b>TEMP. AMBIENTE 20° ATMOSPHERE TEMP.</b>                                                                              |
| <b>APLIC. PENETRANTE / Penetrant application</b>                                                                                                                          | <b>996-P SPRAY</b>                                                             | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                                                                                                       | <b>15 MINUTOS</b>                                                                                                       |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                                                                             | <b>9PR-5</b>                                                                   | <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                                                                                                                  |                                                                                                                         |
| <b>APLIC. REVELADOR / Developer application</b>                                                                                                                           | <b>9D1-B SPRAY</b>                                                             | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                                                                                                      | <b>7 MINUTOS</b>                                                                                                        |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b><br><b>1 HORA</b>                                                                                                          |                                                                                |                                                                                                                                                                                                      |                                                                                                                         |
| <b>ACEPTACIÓN LÍQUIDO DE ENSAYOS / Acceptance of testing liquid</b><br><b>SI / YES</b>                                                                                    |                                                                                | <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b><br><b>SI / YES</b>                                                                                                                   |                                                                                                                         |
| <b>RESULTADO / Results</b><br><b>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</b>                                                         |                                                                                |                                                                                                                                                                                                      |                                                                                                                         |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>                                                                    | <b>FIRMADO / Signature</b>                                                     | <b>OPERADOR / Operator</b><br><br><b>NIVEL II</b><br>Jose A. Prieto<br>Planta Coslada<br>Control Calidad<br>Fdo.: | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br><br><b>FECHA / Date</b><br><b>07.10.2011</b>                 |

|                                                                                                                                  |                                                                                     |                                                                                                                                                                                                      |                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|                                                  |                                                                                     | Pump Division<br>Flowserve Spain, S.L.                                                                                                                                                               |                                                                                                                                 |
| AENOR<br><br>Empresa Registrada<br>ER-0008/1/90 |    | <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                                                                                                                   | <b>INFORME Nº / Report Nº</b><br><br><b>5125</b>                                                                                |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                                             | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>                               | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                                                                                                              |                                                                                                                                 |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                                              | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>                              | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b>                                                                                                                                          |                                                                                                                                 |
| <b>OBJETO / Object</b><br><b>DIFUSERS 1º TO 9º STAGE</b><br><b>DIFUSERS LAST STAGE</b>                                           | <b>DISEÑO/plano / Design</b><br><b>4X12WXH56DXE52</b><br><b>4X12WXH56AXE50</b>      | <b>Nº SERIE / Serial Nº</b><br><b>01 TO 18</b><br><b>01 AND 02</b>                                                                                                                                   |                                                                                                                                 |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED % MACHINED</b>                                           |                                                                                     | <b>Q.C.P.</b><br><b>2244 R.3</b>                                                                                                                                                                     | <b>ESPECIFICACIÓN / Specification</b><br><b>PLP01 Rev.1</b>                                                                     |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br><b>ACEPTABLE</b>                                                             |                                                                                     | <input type="checkbox"/> <b>COMO SOLDADURA / As welded</b><br><input checked="" type="checkbox"/> <b>ESMERILADO / Ground</b>                                                                         | <input checked="" type="checkbox"/> <b>MECANIZADO / Machined</b><br><input type="checkbox"/> <b>FORJADO / As Forged</b>         |
| <b>METODO CONTROL / Control Method</b>                                                                                           |                                                                                     |                                                                                                                                                                                                      |                                                                                                                                 |
| <input type="checkbox"/> <b>SOLUBLE EN AGUA / Water washable</b><br><input type="checkbox"/> <b>VISIBLE</b>                      |                                                                                     | <input type="checkbox"/> <b>POR EMULSIFICADO / Post emulsifiable</b><br><input type="checkbox"/> <b>FLUORESC.</b>                                                                                    | <input checked="" type="checkbox"/> <b>DISOLVENTE / Solvent removable</b><br><input checked="" type="checkbox"/> <b>VISIBLE</b> |
| <input type="checkbox"/> <b>FLUORESC.</b>                                                                                        |                                                                                     | <input type="checkbox"/> <b>VISIBLE</b>                                                                                                                                                              | <input type="checkbox"/> <b>FLUORESC.</b>                                                                                       |
| <b>LIMPIEZA / Cleaner</b>                                                                                                        |                                                                                     |                                                                                                                                                                                                      | <b>9PR-5</b>                                                                                                                    |
| <b>PENETRANTE / Penetrant</b>                                                                                                    |                                                                                     |                                                                                                                                                                                                      | <b>996-P</b>                                                                                                                    |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                                |                                                                                     |                                                                                                                                                                                                      |                                                                                                                                 |
| <b>DISOLVENTE / Remover</b>                                                                                                      |                                                                                     |                                                                                                                                                                                                      | <b>9PR-5</b>                                                                                                                    |
| <b>REVELADOR / Developer</b>                                                                                                     |                                                                                     |                                                                                                                                                                                                      | <b>9D1-B</b>                                                                                                                    |
| <b>MARCA / Trade mark</b>                                                                                                        |                                                                                     |                                                                                                                                                                                                      | <b>ARDROX</b>                                                                                                                   |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                                        |                                                                                     |                                                                                                                                                                                                      |                                                                                                                                 |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                                        |                                                                                     |                                                                                                                                                                                                      |                                                                                                                                 |
| <b>LIMPIEZA / Cleaning</b>                                                                                                       | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>                                  | <b>SECADO / Drying process</b>                                                                                                                                                                       | <b>TEMP. AMBIENTE 20° ATMOSPHERE TEMP.</b>                                                                                      |
| <b>APLIC. PENETRANTE / Penetrant application.</b>                                                                                | <b>996-P SPRAY</b>                                                                  | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                                                                                                       | <b>15 MINUTOS</b>                                                                                                               |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                                    | <b>9PR-5</b>                                                                        | <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                                                                                                                  |                                                                                                                                 |
| <b>APLIC. REVELADOR / Developer application</b>                                                                                  | <b>9D1-B SPRAY</b>                                                                  | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                                                                                                      | <b>7 MINUTOS</b>                                                                                                                |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b><br><b>1 HORA</b>                                                                 |                                                                                     |                                                                                                                                                                                                      |                                                                                                                                 |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b><br><b>SI / YES</b>                                           |                                                                                     | <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b><br><b>SI / YES</b>                                                                                                                   |                                                                                                                                 |
| <b>RESULTADO / Results</b>                                                                                                       | <b>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</b> |                                                                                                                                                                                                      |                                                                                                                                 |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>                           | <b>FIRMADO / Signature</b>                                                          | <b>OPERADOR / Operator</b><br><b>NIVEL II</b><br><br>Jose A. Prieto<br>Planta Coslada<br>Control Calidad<br>Fdo.: | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br><br><b>FECHA / Date</b><br><b>04.11.2011</b>                         |



# SECTION 6



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |                                                                                                                                        |  |                                                                                                                                                                                                                                               |  |                                                                                     |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| Usine productrice<br>Hersteller<br>Manufacturer<br><b>Ugine</b><br>Avenue Paul<br>Girod<br>73403 Ugine<br>Frankreich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  | <b>ABNAHMEPRUEFZEUGNIS 3.1</b><br><b>CERTIFICAT DE RECEPTION 3.1</b><br><b>INSPECTION CERTIFICATE 3.1</b><br><br><b>EN 10204 / 3.1</b> |  | <b>UGITECH</b><br>Providing special steel solutions                                                                                                                                                                                           |  |  |  |
| Numero / Nummer / Number<br><b>80953452 000020</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | Ordre de fab. / Auftrag / Prod. Order<br><b>A1115GC86000</b>                                                                           |  | N° soude / Schmelz Nr / Heat N°<br><b>108045</b>                                                                                                                                                                                              |  | N° lot MM / Chargen / Batch<br><b>1115GC8600</b>                                    |  |
| Certification - Werkzeugeignis - Certificate<br><b>AD 2000-MERKBLATT W0/TRD100</b><br><b>Pressure Equipment Directive 97/23/EC</b><br><b>ISO 9001</b><br><b>ISO/TS 16949</b><br><b>ISO 14001</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | ISO 9100<br>ISO 9120                                                                                                                   |  | Marque d'usine<br>Herstellerzeichen<br>Supplier's Mark<br>                                                                                                 |  | Poinçon de l'expert<br>Prüfstempel<br>Inspector's stamp<br><b>IQ</b>                |  |
| UGI 4006 STAB GEWALZT ENTZUNDERT/ÜBERORIENT VERGÜTET QT650 K13RUND 110,000MM LONG. 4,0<br>00M + 2000,000MM -0,000MM<br>Produkt<br>UGI 4006 BARRE LAMINÉE DÉCALAMINÉE TRAITÉE QT650 K13ROND 110,000MM LONG. 4,000M + 2000,<br>Erzeugnisform<br>UGI 4006 STAB GEWALZT ENTZUNDERT/ÜBERORIENT VERGÜTET QT650 K13RUND 110,000MM LONG. 4,000M + 2000,<br>Product<br>UGI 4006 BAR ROLLED DESCALED QUENCHED AND TEMPERED QT650 K13ROUND 110,000MM LONG. 4,000M + 2000,                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                                                                                                        |  |                                                                                                                                                                                                                                               |  |                                                                                     |  |
| Client et/ou destinataire - Besteller / Lieferant / Empfänger - Customer - Lieferant / Consignor<br><b>15046</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                        |  | N° de commande client - Kundenbestellnummer - Purchase order number<br><b>110-124231/W</b>                                                                                                                                                    |  |                                                                                     |  |
| Norme de référence / Bezeugnorm / Standard for reference<br><b>EN 10272 ED08 1.4006 ;</b><br><b>EN 10088-3 ED 2005 1.4006 ;</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |                                                                                                                                        |  |                                                                                                                                                                                                                                               |  |                                                                                     |  |
| Spécification client / Kundenspezifikation / Customer's specification<br><b>TL 112 / BR 4006 X12CR13 2 03.2010</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                                                                        |  |                                                                                                                                                                                                                                               |  |                                                                                     |  |
| Nombre<br>Stückzahl<br>Pieces Nbr<br><b>6</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Profil<br>Profile<br>Shape<br><b>RO</b>                                                                                                |  | Dimension<br>Ausmessung<br>Dimension<br><b>110,000</b>                                                                                                                                                                                        |  | Longueur<br>Länge<br>Length<br><b>4,000</b>                                         |  |
| Poids<br>Gewicht<br>Weight<br><b>1980 KG</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                                                                                                                        |  |                                                                                                                                                                                                                                               |  |                                                                                     |  |
| Mode<br>d'élaboration<br>Erstellungszugart<br>Melting process<br><b>AOD</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  | N° prélèvement<br>Probennummer<br>Test number<br><b>1BJ6</b>                                                                           |  | Demandé / Verschrift / Required<br><b>MM 42 43 44 45 46 47 48 49</b><br><b>% C % Si % Mn % Ni % Cr % S % P</b><br><b>0,0800 0,1800 1,0000 1,5000 0,7600 13,5000 0,0300 0,0400</b><br><b>0,1140 0,3640 0,6020 0,4270 12,1760 0,0072 0,0184</b> |  |                                                                                     |  |
| Demandé / Verschrift / Required<br><b>50 51 52 53 54 55 56 57</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Produit / Erzeugnisform / Product<br><b>39A</b>                                                                                        |  |                                                                                                                                                                                                                                               |  |                                                                                     |  |
| Demandé / Verschrift / Required<br><b>76 77 78 79 80 81 82 83 84 85 87</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | Produit / Erzeugnisform / Product<br><b>39A</b>                                                                                        |  |                                                                                                                                                                                                                                               |  |                                                                                     |  |
| <p>Hiermit erkläre ich, dass das zitierte Produkt mit den Anforderungen des Vertrags konform ist und den Anforderungen sowie den geltenden Normen und Vorschriften nach den durchgeführten Kontrollen und Prüfungen PSEACH-Verordnung, in jeder Hinsicht entspricht, vorbehaltlich gelisteter Ausnahmen oder Befreiungen von dieser Konformitätsklärung. Dieses Dokument ist durch eine digitale Unterschrift gültig. Produkt hergestellt gemäß.</p> <p>We declare that the mentioned product is in compliance with the requirements of the contract and that, after checks and tests, it meets in all respects the specified requirements and applicable standards and regulations, except reservations or exceptions as listed in this declaration of conformity. Documents validated by electronic signature. Material manufactured in the PSEACH regulation respect.</p> |  |                                                                                                                                        |  |                                                                                                                                                                                                                                               |  |                                                                                     |  |
| Ugine le 22.03.2011<br>L'agent Réceptionnaire de l'usine<br>Der Werksachverständige<br>The work inspector<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                                                                        |  | 65-1<br><b>040000460132</b> Page 1/2 63                                                                                                                                                                                                       |  |                                                                                     |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Usine productrice<br>Hersteller<br>Manufacturer                                                                                                                                                                                                                                                                                                                                                                                                   |  | Ugine<br>Avenue Paul<br>Girod<br>73403 Ugine<br>Frankreich                                                                                                                                                                                                                                                                                                                                                                                        |  | ABNAHMEPRUEFZEUGNIS 3.1<br>CERTIFICAT DE RECEPTION 3.1<br>INSPECTION CERTIFICATE 3.1<br>EN 10204 / 3.1                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | UGITECH<br>Providing special steel solutions                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| N° lot MM / Chargen / Batch                                                                                                                                                                                                                                                                                                                                                                                                                       |  | 1115GC8600                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | N° coule / Schmelzen Nr / Heat N°                                                                                                                                                                                                                                                                                                                                                                                                                 |  | 108045                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | N° lot MM / Chargen / Batch                                                                                                                                                                                                                                                                                                                                                                                                                       |  | 1115GC8600                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
| N° prélevement<br>Probennummer<br>Test number                                                                                                                                                                                                                                                                                                                                                                                                     |  | 1BJ6                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | N° prélevement<br>Probennummer<br>Test number                                                                                                                                                                                                                                                                                                                                                                                                     |  | 1BJ6                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | N° prélevement<br>Probennummer<br>Test number                                                                                                                                                                                                                                                                                                                                                                                                     |  | 1BJ6                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| A l'état de Référence / treatment on test<br>sample / Probestraffenbehandlung                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | A l'état de Référence / treatment on test<br>sample / Probestraffenbehandlung                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | A l'état de Référence / treatment on test<br>sample / Probestraffenbehandlung                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| Taux de corroyage<br>orging ratio<br>Verschmiedungsgrad                                                                                                                                                                                                                                                                                                                                                                                           |  | 4,0                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Taux de corroyage<br>orging ratio<br>Verschmiedungsgrad                                                                                                                                                                                                                                                                                                                                                                                           |  | 4,0                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Taux de corroyage<br>orging ratio<br>Verschmiedungsgrad                                                                                                                                                                                                                                                                                                                                                                                           |  | 4,0                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| A l'état de livraison / Lieferzustand / As<br>delivered                                                                                                                                                                                                                                                                                                                                                                                           |  | AB.980° LUFT+ R 2BL. 730° LUFT                                                                                                                                                                                                                                                                                                                                                                                                                    |  | A l'état de livraison / Lieferzustand / As<br>delivered                                                                                                                                                                                                                                                                                                                                                                                           |  | AB.980° LUFT+ R 2BL. 730° LUFT                                                                                                                                                                                                                                                                                                                                                                                                                    |  | A l'état de livraison / Lieferzustand / As<br>delivered                                                                                                                                                                                                                                                                                                                                                                                           |  | AB.980° LUFT+ R 2BL. 730° LUFT                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| A l'état de Référence / treatment on test<br>sample / Probestraffenbehandlung                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | A l'état de Référence / treatment on test<br>sample / Probestraffenbehandlung                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | A l'état de Référence / treatment on test<br>sample / Probestraffenbehandlung                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| DIN EN 10060                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | GEFÜGE MARTENSITISCH                                                                                                                                                                                                                                                                                                                                                                                                                              |  | DIN EN 10060                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | GEFÜGE MARTENSITISCH                                                                                                                                                                                                                                                                                                                                                                                                                              |  | DIN EN 10060                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | GEFÜGE MARTENSITISCH                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| SPEKTROSKOPISCH VERWECHSLUNGSPRÜFUNG IN ORDNUNG                                                                                                                                                                                                                                                                                                                                                                                                   |  | SPEKTROSKOPISCH VERWECHSLUNGSPRÜFUNG IN ORDNUNG                                                                                                                                                                                                                                                                                                                                                                                                   |  | SPEKTROSKOPISCH VERWECHSLUNGSPRÜFUNG IN ORDNUNG                                                                                                                                                                                                                                                                                                                                                                                                   |  | SPEKTROSKOPISCH VERWECHSLUNGSPRÜFUNG IN ORDNUNG                                                                                                                                                                                                                                                                                                                                                                                                   |  | SPEKTROSKOPISCH VERWECHSLUNGSPRÜFUNG IN ORDNUNG                                                                                                                                                                                                                                                                                                                                                                                                   |  | SPEKTROSKOPISCH VERWECHSLUNGSPRÜFUNG IN ORDNUNG                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| BESICHTIGUNG UND MASSKONTROLLE : I.O.                                                                                                                                                                                                                                                                                                                                                                                                             |  | BESICHTIGUNG UND MASSKONTROLLE : I.O.                                                                                                                                                                                                                                                                                                                                                                                                             |  | BESICHTIGUNG UND MASSKONTROLLE : I.O.                                                                                                                                                                                                                                                                                                                                                                                                             |  | BESICHTIGUNG UND MASSKONTROLLE : I.O.                                                                                                                                                                                                                                                                                                                                                                                                             |  | BESICHTIGUNG UND MASSKONTROLLE : I.O.                                                                                                                                                                                                                                                                                                                                                                                                             |  | BESICHTIGUNG UND MASSKONTROLLE : I.O.                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| ANTIMIXING TEST PERFORMED : CONFORM.                                                                                                                                                                                                                                                                                                                                                                                                              |  | ANTIMIXING TEST PERFORMED : CONFORM.                                                                                                                                                                                                                                                                                                                                                                                                              |  | ANTIMIXING TEST PERFORMED : CONFORM.                                                                                                                                                                                                                                                                                                                                                                                                              |  | ANTIMIXING TEST PERFORMED : CONFORM.                                                                                                                                                                                                                                                                                                                                                                                                              |  | ANTIMIXING TEST PERFORMED : CONFORM.                                                                                                                                                                                                                                                                                                                                                                                                              |  | ANTIMIXING TEST PERFORMED : CONFORM.                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| SURFACE AND DIMENSIONS ARE CONTROLLED                                                                                                                                                                                                                                                                                                                                                                                                             |  | SURFACE AND DIMENSIONS ARE CONTROLLED                                                                                                                                                                                                                                                                                                                                                                                                             |  | SURFACE AND DIMENSIONS ARE CONTROLLED                                                                                                                                                                                                                                                                                                                                                                                                             |  | SURFACE AND DIMENSIONS ARE CONTROLLED                                                                                                                                                                                                                                                                                                                                                                                                             |  | SURFACE AND DIMENSIONS ARE CONTROLLED                                                                                                                                                                                                                                                                                                                                                                                                             |  | SURFACE AND DIMENSIONS ARE CONTROLLED                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| Quantité livrée / delivered quantity / gelieferte Quantität                                                                                                                                                                                                                                                                                                                                                                                       |  | 92                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Quantité livrée / delivered quantity / gelieferte Quantität                                                                                                                                                                                                                                                                                                                                                                                       |  | 92                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Quantité livrée / delivered quantity / gelieferte Quantität                                                                                                                                                                                                                                                                                                                                                                                       |  | 92                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| Hautik erklären wir, dass das zitierte Produkt mit den Anforderungen des Vertrags konform ist und den Anforderungen sowie<br>den geltenden Normen und Vorschriften nach den durchgeführten Kontrollen und Prüfungen REACH-Verordnung in jeder Hinsicht<br>entspricht, vorbehaltlich geplanter Ausnahmen oder Änderungen von dieser Konformitätsklärung: Dieses Dokument ist durch eine<br>digitale Unterschrift gültig. Produkt hergestellt gemäß |  | Hautik erklären wir, dass das zitierte Produkt mit den Anforderungen des Vertrags konform ist und den Anforderungen sowie<br>den geltenden Normen und Vorschriften nach den durchgeführten Kontrollen und Prüfungen REACH-Verordnung in jeder Hinsicht<br>entspricht, vorbehaltlich geplanter Ausnahmen oder Änderungen von dieser Konformitätsklärung: Dieses Dokument ist durch eine<br>digitale Unterschrift gültig. Produkt hergestellt gemäß |  | Hautik erklären wir, dass das zitierte Produkt mit den Anforderungen des Vertrags konform ist und den Anforderungen sowie<br>den geltenden Normen und Vorschriften nach den durchgeführten Kontrollen und Prüfungen REACH-Verordnung in jeder Hinsicht<br>entspricht, vorbehaltlich geplanter Ausnahmen oder Änderungen von dieser Konformitätsklärung: Dieses Dokument ist durch eine<br>digitale Unterschrift gültig. Produkt hergestellt gemäß |  | Hautik erklären wir, dass das zitierte Produkt mit den Anforderungen des Vertrags konform ist und den Anforderungen sowie<br>den geltenden Normen und Vorschriften nach den durchgeführten Kontrollen und Prüfungen REACH-Verordnung in jeder Hinsicht<br>entspricht, vorbehaltlich geplanter Ausnahmen oder Änderungen von dieser Konformitätsklärung: Dieses Dokument ist durch eine<br>digitale Unterschrift gültig. Produkt hergestellt gemäß |  | Hautik erklären wir, dass das zitierte Produkt mit den Anforderungen des Vertrags konform ist und den Anforderungen sowie<br>den geltenden Normen und Vorschriften nach den durchgeführten Kontrollen und Prüfungen REACH-Verordnung in jeder Hinsicht<br>entspricht, vorbehaltlich geplanter Ausnahmen oder Änderungen von dieser Konformitätsklärung: Dieses Dokument ist durch eine<br>digitale Unterschrift gültig. Produkt hergestellt gemäß |  | Hautik erklären wir, dass das zitierte Produkt mit den Anforderungen des Vertrags konform ist und den Anforderungen sowie<br>den geltenden Normen und Vorschriften nach den durchgeführten Kontrollen und Prüfungen REACH-Verordnung in jeder Hinsicht<br>entspricht, vorbehaltlich geplanter Ausnahmen oder Änderungen von dieser Konformitätsklärung: Dieses Dokument ist durch eine<br>digitale Unterschrift gültig. Produkt hergestellt gemäß |  |
| We declare that the mentioned product is in compliance with the requirements of the contract and that, after checks and tests,<br>it meets in all respects the specified requirements and applicable standards and regulations, except reservations or exceptions as listed<br>in this declaration of conformity; Document validated by electronic signature. Material manufactured in the REACH regulation respect.                              |  | We declare that the mentioned product is in compliance with the requirements of the contract and that, after checks and tests,<br>it meets in all respects the specified requirements and applicable standards and regulations, except reservations or exceptions as listed<br>in this declaration of conformity; Document validated by electronic signature. Material manufactured in the REACH regulation respect.                              |  | We declare that the mentioned product is in compliance with the requirements of the contract and that, after checks and tests,<br>it meets in all respects the specified requirements and applicable standards and regulations, except reservations or exceptions as listed<br>in this declaration of conformity; Document validated by electronic signature. Material manufactured in the REACH regulation respect.                              |  | We declare that the mentioned product is in compliance with the requirements of the contract and that, after checks and tests,<br>it meets in all respects the specified requirements and applicable standards and regulations, except reservations or exceptions as listed<br>in this declaration of conformity; Document validated by electronic signature. Material manufactured in the REACH regulation respect.                              |  | We declare that the mentioned product is in compliance with the requirements of the contract and that, after checks and tests,<br>it meets in all respects the specified requirements and applicable standards and regulations, except reservations or exceptions as listed<br>in this declaration of conformity; Document validated by electronic signature. Material manufactured in the REACH regulation respect.                              |  | We declare that the mentioned product is in compliance with the requirements of the contract and that, after checks and tests,<br>it meets in all respects the specified requirements and applicable standards and regulations, except reservations or exceptions as listed<br>in this declaration of conformity; Document validated by electronic signature. Material manufactured in the REACH regulation respect.                              |  |
| Ugine le 22.03.2011                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Ugine le 22.03.2011                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Ugine le 22.03.2011                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Ugine le 22.03.2011                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Ugine le 22.03.2011                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Ugine le 22.03.2011                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| L'agent Réceptionnaire de l'usine                                                                                                                                                                                                                                                                                                                                                                                                                 |  | L'agent Réceptionnaire de l'usine                                                                                                                                                                                                                                                                                                                                                                                                                 |  | L'agent Réceptionnaire de l'usine                                                                                                                                                                                                                                                                                                                                                                                                                 |  | L'agent Réceptionnaire de l'usine                                                                                                                                                                                                                                                                                                                                                                                                                 |  | L'agent Réceptionnaire de l'usine                                                                                                                                                                                                                                                                                                                                                                                                                 |  | L'agent Réceptionnaire de l'usine                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| Der Werkachverständige                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Der Werkachverständige                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Der Werkachverständige                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Der Werkachverständige                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Der Werkachverständige                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Der Werkachverständige                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| The work inspector                                                                                                                                                                                                                                                                                                                                                                                                                                |  | The work inspector                                                                                                                                                                                                                                                                                                                                                                                                                                |  | The work inspector                                                                                                                                                                                                                                                                                                                                                                                                                                |  | The work inspector                                                                                                                                                                                                                                                                                                                                                                                                                                |  | The work inspector                                                                                                                                                                                                                                                                                                                                                                                                                                |  | The work inspector                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| 04000D460132 Page 2/2                                                                                                                                                                                                                                                                                                                                                                                                                             |  | 04000D460132 Page 2/2                                                                                                                                                                                                                                                                                                                                                                                                                             |  | 04000D460132 Page 2/2                                                                                                                                                                                                                                                                                                                                                                                                                             |  | 04000D460132 Page 2/2                                                                                                                                                                                                                                                                                                                                                                                                                             |  | 04000D460132 Page 2/2                                                                                                                                                                                                                                                                                                                                                                                                                             |  | 04000D460132 Page 2/2                                                                                                                                                                                                                                                                                                                                                                                                                             |  |

FLOWERVE  
Plantaf Gellada  
Asociación Calidad  
Revisado.

|                                                                                                                                                                                                                                                                                                               |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------|--------------------------|
|                                                                                                                                                                                                                              |                                                                                           |                                                    |                                                               | <b>Pump Division</b><br><b>Flowserve Spain, S.L.</b>                                                             |                                                                 |                                                             |                          |
| <b>CERTIFICADO DE EXAMEN CON ULTRASONIDOS</b><br><i>Ultrasonic Test Certificate</i>                                                                                                                                                                                                                           |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 | <b>INFORME Nº / Report Nº</b><br><b>1604</b>                |                          |
| <b>REF. FDP / FDP Ref.</b><br><b>COS-11-10P40213</b>                                                                                                                                                                                                                                                          |                                                                                           |                                                    | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>         |                                                                                                                  |                                                                 | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>     |                          |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                                                                                                                                                                                                                           |                                                                                           |                                                    | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>        |                                                                                                                  |                                                                 | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b> |                          |
| <b>PIEZA / Part</b><br><b>SHAFT</b>                                                                                                                                                                                                                                                                           |                                                                                           |                                                    | <b>PLANO / Drawing</b><br><b>4X12WXH10XE85</b>                |                                                                                                                  |                                                                 | <b>Nº SERIE / Serial Nº</b><br><b>01 AND 02</b>             |                          |
| <b>MATERIAL / Material</b><br><b>ASTM A276 T410 CONDIC.T</b>                                                                                                                                                                                                                                                  |                                                                                           |                                                    |                                                               | <b>DIMENSIONES / Dimensions</b><br><b>Ø 110 x 2520 mm</b>                                                        |                                                                 |                                                             |                          |
| <b>PROCEDIMIENTO DE SOLDADURA / Welding procedure</b>                                                                                                                                                                                                                                                         |                                                                                           |                                                    |                                                               | <b>EXTENSION DEL ENSAYO / Extent of test</b><br><b>100%</b>                                                      |                                                                 |                                                             |                          |
| <b>DATOS TECNICOS DEL ENSAYO / Technical test data</b>                                                                                                                                                                                                                                                        |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>EQUIPO / Equipment</b><br><b>USIP-11</b>                                                                                                                                                                                                                                                                   |                                                                                           |                                                    | <b>PALPADOR / Probes</b><br><b>B2SN</b>                       |                                                                                                                  |                                                                 | <b>ACOPLANTE / Coupling</b><br><b>ACEITE / OIL</b>          |                          |
| <b>SUPERFICIE DEL CORDON / Surface of weld</b><br><b>N/A</b>                                                                                                                                                                                                                                                  |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>ESTADO DE LA SUPERFICIE DE ENSAYO / Condition of test surface</b><br><b>MECANIZADO / MACHINED</b>                                                                                                                                                                                                          |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>NIVEL DE REFERENCIA / Reference level</b><br><b>80%</b>                                                                                                                                                                                                                                                    |                                                                                           |                                                    | <b>NIVEL DE REGISTRO / Recording threshold</b><br><b>+6db</b> |                                                                                                                  |                                                                 | <b>PROCEDIMIENTO / Procedure</b><br><b>PUS01 Rev.0</b>      |                          |
| <b>EL ENSAYO SE EFECTUO ANTES / DESPUES DEL TRATAMIENTO TERMICO / The test was carried out before / after heat treatment</b><br><b>AFTER</b>                                                                                                                                                                  |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>LUGAR Y FECHA DEL ENSAYO / Place and date of test</b><br><b>COSLADA, 26 MAY, 2011</b>                                                                                                                                                                                                                      |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>REQUERIMIENTOS SEGUN / Requirements according to</b><br><b>PROCEDIMIENTO / PROCEDURE</b>                                                                                                                                                                                                                   |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>RESULTADOS / Results</b><br><b>SATISFACTORIO / SATISFACTORY</b>                                                                                                                                                                                                                                            |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>ZONA EXAMINADA / Tested section</b>                                                                                                                                                                                                                                                                        | <b>DISTANCIA AL PUNTO DE (1) REFERENCIA / Distance from reference point</b><br><b>mm.</b> | <b>NIVEL DEL (2) ECO / Echo level</b><br><b>db</b> | <b>PROFUNDIDAD / Depth</b><br><b>mm.</b>                      | <b>LONGITUD DE LA INDICACION / Length of indications</b><br><b>mm.</b>                                           | <b>LONGITUDINAL O TRANSVERSAL / Longitudinal or Transversal</b> | <b>RESULTADOS / Results (3)</b>                             | <b>OBSERV. / Remarks</b> |
| 100%                                                                                                                                                                                                                                                                                                          | --                                                                                        | --                                                 | --                                                            | --                                                                                                               | --                                                              | 1                                                           | NONE                     |
| 1) PUNTO DE REFERENCIA Y SENTIDO / Point of reference and direction<br>2) EN EXCESO SOBRE EL NIVEL DE REGISTRO / Exceeding the recording threshold<br>3) 1 = SIN DEFECTOS ; 2 = DEFECTOS ACEPTABLES ; 3 = DEFECTOS NO ACEPTABLES /<br>3) 1 = Without faults ; 2 = Acceptable faults ; 3 = Unacceptable faults |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>OBSERVACIONES / Remarks</b>                                                                                                                                                                                                                                                                                |                                                                                           |                                                    |                                                               |                                                                                                                  |                                                                 |                                                             |                          |
| <b>Vº Bº</b> Presenciada Inspección <input type="checkbox"/>                                                                                                                                                                                                                                                  |                                                                                           |                                                    |                                                               | <b>EL OPERADOR / FLOWSERVE LEVEL II</b><br><b>J.ANTONIO PRIETO</b><br>Planta Coslada<br>Control Calidad<br>fdo.: |                                                                 |                                                             |                          |

|                                                                                                                   |                                                        |                                                                                                                   |                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|                                  |                                                        | <b>Pump Division</b><br><b>Flowserve Spain, S.L.</b>                                                              |                                                                                                                                 |
| <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                                |                                                        | <b>INFORME Nº / Report Nº</b><br><b>5122</b>                                                                      |                                                                                                                                 |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                              | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>  | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                           |                                                                                                                                 |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                               | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b> | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b>                                                       |                                                                                                                                 |
| <b>OBJETO / Object</b><br><b>SHAFT</b>                                                                            | <b>DISEÑO/plano / Design</b><br><b>4X12WXH10XE85</b>   | <b>Nº SERIE / Serial Nº</b><br><b>01 AND 02</b>                                                                   |                                                                                                                                 |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED % MACHINED</b>                            |                                                        | <b>Q.C.P.</b><br><b>2244 R.3</b>                                                                                  | <b>ESPECIFICACIÓN / Specification</b><br><b>PLP01 Rev.1</b>                                                                     |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br><b>ACCEPTABLE</b>                                             |                                                        | <input type="checkbox"/> <b>COMO SOLDADURA / As welded</b><br><input type="checkbox"/> <b>ESMERILADO / Ground</b> | <input checked="" type="checkbox"/> <b>MECANIZADO / Machined</b><br><input type="checkbox"/> <b>FORJADO / As Forged</b>         |
| <b>METODO CONTROL / Control Method</b>                                                                            |                                                        |                                                                                                                   |                                                                                                                                 |
| <input type="checkbox"/> <b>SOLUBLE EN AGUA / Water washable</b><br><input type="checkbox"/> <b>VISIBLE</b>       |                                                        | <input type="checkbox"/> <b>POR EMULSIFICADO / Post emulsifiable</b><br><input type="checkbox"/> <b>FLUORESC.</b> | <input checked="" type="checkbox"/> <b>DISOLVENTE / Solvent removable</b><br><input checked="" type="checkbox"/> <b>VISIBLE</b> |
| <b>LIMPIEZA / Cleaner</b>                                                                                         |                                                        | <b>9PR-5</b>                                                                                                      |                                                                                                                                 |
| <b>PENETRANTE / Penetrant</b>                                                                                     |                                                        | <b>996-P</b>                                                                                                      |                                                                                                                                 |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                 |                                                        |                                                                                                                   |                                                                                                                                 |
| <b>DISOLVENTE / Remover</b>                                                                                       |                                                        | <b>9PR-5</b>                                                                                                      |                                                                                                                                 |
| <b>REVELADOR / Developer</b>                                                                                      |                                                        | <b>9D1-B</b>                                                                                                      |                                                                                                                                 |
| <b>MARCA / Trade mark</b>                                                                                         |                                                        | <b>ARDROX</b>                                                                                                     |                                                                                                                                 |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                         |                                                        |                                                                                                                   |                                                                                                                                 |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                         |                                                        |                                                                                                                   |                                                                                                                                 |
| <b>LIMPIEZA / Cleaning</b>                                                                                        | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>     | <b>SECADO / Drying process</b>                                                                                    | <b>TEMP. AMBIENTE 20° ATMOSPHERE TEMP.</b>                                                                                      |
| <b>APLIC. PENETRANTE / Penetrant application.</b>                                                                 | <b>996-P SPRAY</b>                                     | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                    | <b>15 MINUTOS</b>                                                                                                               |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                     | <b>9PR-5</b>                                           | <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                               |                                                                                                                                 |
| <b>APLIC. REVELADOR / Developer application</b>                                                                   | <b>9D1-B SPRAY</b>                                     | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                   | <b>7 MINUTOS</b>                                                                                                                |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b><br><b>1 HORA</b>                                                  |                                                        |                                                                                                                   |                                                                                                                                 |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b><br><b>SI / YES</b>                            |                                                        | <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b><br><b>SI / YES</b>                                |                                                                                                                                 |
| <b>RESULTADO / Results</b><br><b>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</b> |                                                        |                                                                                                                   |                                                                                                                                 |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>            | <b>FIRMADO / Signature</b>                             | <b>OPERADOR / Operator</b><br> | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b>                                                                         |
|                                                                                                                   |                                                        | <b>Fecha / Date</b><br><b>11.10.2011</b>                                                                          |                                                                                                                                 |



# SECTION 7

**LOVERE Bilbao I.S.L.**

Pol. Ugaldeguren, 3 -P 20 - Nave 3  
48.170 ZAMUDIO (Bizkaia)  
Tel: 94 454 51 30 - 94 454 51 31  
Fax: 94 454 51 00

40213

CERTIFICADO  
CERTIFICATE

UNE-EN-ISO 9001



Nº  
074523

Hoja  
1

Fecha (Date):  
19/05/2011

|                                                   |                                           |                                                                |
|---------------------------------------------------|-------------------------------------------|----------------------------------------------------------------|
| <b>Cliente (Customer):</b><br>FLOWERVE SPAIN S.L. | <b>Pedido (Order):</b><br>57940           | <b>Tipo Certificado (Certificate Acc. To):</b><br>EN 10204 3.1 |
|                                                   | <b>Material (Material):</b><br>IR 829X400 | <b>Estado (Condition):</b><br>Normalizado y Revenido           |

**COMPOSICION QUIMICA (Chemical Analysis) %**

| Colada (Heat): | C    | S     | P     | Mn   | Si   | Cr    | Mo | Ni | Cu | V | Nb | N | Ta |
|----------------|------|-------|-------|------|------|-------|----|----|----|---|----|---|----|
| 251546         | 0.13 | 0.235 | 0.018 | 1.10 | 0.55 | 12.10 |    |    |    |   |    |   |    |

**ENSAYOS MECANICOS REQUERIDOS (Mechanical Requirements)**

| Rt (Ts) | Le (Yp)<br>0,2% | Le (Yp)<br>1% | A (E) % | E (Ra) % | Dureza (Hardness) | Resiliencia (I.Test)<br>+20°C |
|---------|-----------------|---------------|---------|----------|-------------------|-------------------------------|
|         |                 |               |         |          | 248/302 HB        |                               |

**ENSAYOS MECANICOS OBTENIDOS (Mechanical Results)**

| Rt (Ts) | Le (Yp)<br>0,2% | Le (Yp)<br>1% | A (E) % | E (Ra) % | Dureza (Hardness) | Resiliencia (I.Test)<br>+20°C |
|---------|-----------------|---------------|---------|----------|-------------------|-------------------------------|
|         |                 |               |         |          | 283 HB            |                               |

| ITEM | CANT. (Qty) | DIMENSIONES (Sizes)                                             | PLANO(Drawing) |
|------|-------------|-----------------------------------------------------------------|----------------|
| 1    | 2           | CAMISA EQUILIBRIO S/PLANO M-99043 (10P402)<br>BALANCING SLEEVES |                |

**OTROS ENSAYOS (Other tests):**

FLOWERVE

**OBSERVACIONES (Remarks):**

- Probetas s/ASTM // Test Bars as ASTM

Planta / Planta  
Asesor / Asesor  
Fdo.:

**Responsable de C. Calidad (Quality Department)**
**Otras Inspecciones (Other Inspections)**

**LOVERE BILBAO I. S.L.**  
Pol. Ugaldeguren 3 - Parcela nº 20 - Nave 3  
Tel: 94 454 51 30  
Fax: 94 454 51 00  
48170 ZAMUDIO (Bizkaia)

F-PG-06-03

36100 VICENZA (Italia) - Viale della scienza, 25 z.i.

Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4

**Cliente / Endorser/Purchaser/Client**

**CERTIFICATO DI COLLAUDO  
ABNAHMEPRUEFZEUGNIS  
INSPECTION CERTIFICATE  
CERTIFICAT DE RECEPTION  
EN 10204 (2005) , 3.1**

Avviso di Spedizione: A-VI10018730.  
Lieferanzeige/Packing list/8.1.

Certificato nr: MEST888685/2010/  
Prüfung/Test/Essai

Conferma ordine nr: IT10001306  
Work/Our OrderRef nr.

**Marchio di Fabbrica:**  
Zeichen des Lieferwerkes  
Trade mark  
Sigla de fusine producătoare

**Punzone del Collaudatore:**  
Stempel des Werkachverständigen  
Inspector's stamp/Pointon de l'assureur



Produttore: **ACCIAIERIE VALBRUNA S.P.A.**  
Nastro/linea/Unione produttiva

Ordine nr: AP10000542 22-3-10  
Bestel/Your order/Commande

Oggetto Prove: - Bonificato Pelato  
Prüfgegenstand/Item Inspected/Finissage

**Tipo di Elaborazione:** E+AOD  
Erhmelzungsart/Meing process/Mode d'elaboration

**Specifiche:**  
Anforderungen / Requirements / Exigences

LOVERE 2009 416 HB262-290 HT

**AISI 416**

ASTM A582 2005 S41600 T

Qualità: 416  
Terminato/Grade Nuance

Marca: VALIZ

Punzonatura: 416

Markenbezeichnung/Brand/Marca

Kennzeichnung: Marking: Markierung:

| Pos. nr.<br>Pos. nr.<br>Item nr.<br>Nr. de pozitie | Oggetto<br>Gegenstand<br>Product description<br>Descrip. du produit | Dimensioni - mm<br>Abmessungen<br>Dimension<br>Dimension | Tolleranza<br>Tolleranz.<br>Allowance<br>Tolerance | Lunghezza - mm<br>Länge<br>Length<br>Longueur | Colata<br>Schmelze<br>Melt<br>Coulée | Pazzi<br>Stückzahl<br>Pieces<br>Pièces | Peso - KG<br>Gewicht<br>Weight<br>Poids | Lotto nr.<br>Lose.<br>Lot nr.<br>Lot nr. |
|----------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------|-----------------------------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|------------------------------------------|
| 0010                                               | Tondo                                                               | 265,000                                                  | k13                                                | 6941 / 7207                                   | 251546                               | 3                                      | 8954,0                                  | 108904510                                |

Sono state soddisfatte tutte le condizioni richieste  
Die gestellten Anforderungen sind 2. Anlage erfüllt  
The material has been furnished in accordance with the requirements  
Le matériel a été trouvé conforme aux exigences

Controllo antimesciolanza: OK  
Verwechslungsprüfung: spectralanalytisch durchgeführt  
Antimixing testing performed: OK  
Contrôle antimélanges fait: r.a.s.

**Controllo visivo e dimensionale: soddisfa le esigenze:**  
 Besichtigung und Ausmessung: ohne Beanstandung  
 Visual inspection and dimensional checks: satisfactory  
 Contrôle visuel et dimensionnel: satisfaisant

| TEST ALLO STATO DI FORNITURA                                                                                                                           |                                                                                                                                    |            |                                            |                                                                                |                                                           |                                                                                     |                                                                       |                                                                    |                                          |                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------|-------------------------------------|
| Test on delivery condition    Prüfung auf Lieferbereitschaft des produkt    test a l'état de fourniture    Prueba sobre el material así como entregado |                                                                                                                                    |            |                                            |                                                                                |                                                           |                                                                                     |                                                                       |                                                                    |                                          |                                     |
| TEST                                                                                                                                                   | Provetta / Probe<br>Specimen / Epreuve<br>Larg. x Sp. x S.<br>Semi-Cor. Dicks.<br>Width Dim. Thickness<br>Larg. épais. épais<br>mm | °C         | Prova<br>Saggio<br>Probes<br>Epreuve<br>1) | Sneramento<br>Sneratura<br>Tens Stress<br>Limite elastiche<br>Rp 0,2%<br>N/mm2 | Sneramento<br>Sneratura<br>Tens Stress<br>Limite plastico | Resistenza<br>Resistenza<br>Tensile strength<br>Resistance à l'éclat<br>Rm<br>N/mm2 | Afflungimento<br>Zugdehnung<br>Elongation<br>Allongement<br>E 4d<br>% | Strizione<br>Encolement<br>Reduction of Area<br>Evision<br>RA<br>% | Resilienza<br>Impact Value<br>Resilience | Durezza<br>Hardness<br>Dureté<br>HB |
| Valori richiesti 1<br>Indication / Requisite Value<br>Valeur demandée                                                                                  |                                                                                                                                    | min<br>max |                                            |                                                                                |                                                           |                                                                                     |                                                                       |                                                                    |                                          | 262<br>290                          |
| A                                                                                                                                                      | 12,5                                                                                                                               | 20         | L                                          | 776                                                                            |                                                           | 913                                                                                 | 20                                                                    | 46                                                                 |                                          | 283                                 |

1) L=longitudinale/diagon., T=transversale/bour., Q=Tangenziale/tangentiale

## Analisi chimica

Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

| Plata / Heat<br>Schmelze / Coudée | min -<br>max 0,15 | -<br>1,00 | -<br>1,25 | 12,00<br>14,00 | -<br>0,060 | 0,150 | - | - | - | - | - | - | - | - |
|-----------------------------------|-------------------|-----------|-----------|----------------|------------|-------|---|---|---|---|---|---|---|---|
|                                   | C %               | Si %      | Mn %      | Cr %           | P %        | S %   |   |   |   |   |   |   |   |   |
| 251546                            | 0,13              | 0,55      | 1,10      | 12,10          | 0,018      | 0,235 |   |   |   |   |   |   |   |   |

**ALLEGATI** Anlagen Enclosure P.i. :

UT10004144

Melted and manufactured in Italy      No welding or weld repair      Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination through Portal System when it leaves the production plant.

The Quality Management System is Certified acc. Pressure Equipment Directive [97/23/EC] Annex 1, 4.3 by TÜV and LLOYD'S

**FLOWSERVE**

Planta: ~~Ciudad~~  
Aseguramiento: ~~Calidad~~  
Revisado:

Vicenza, 25/06/10  
VCD010  
(Mod. MCER)

*Il collaudatore di stabilimento / der Werkssachverständige / Works inspector / L'agent d'usine*

M. Rizzotta *RW*

Pagina - 1 di 1

40213

Quality

Record

**LOVERE Bilbao I.S.L.**

Pol. Ugaldeguren, 3 -P 20 - Nave 3  
48.170 ZAMUDIO (Bizkaia)  
Tel: 94 454 51 30 - 94 454 51 31  
Fax: 94 454 51 00

CERTIFICADO  
CERTIFICATE

UNE-EN-ISO 9001



INSPECCIÓN, AUDITORÍA Y CERTIFICACIÓN  
SISTEMA DE GESTIÓN  
DE CALIDAD CERTIFICADO

Nº SCC-04-0262

Nº 074704 Hoja 1 Fecha (Date): 09/06/2011

|                                            |                                    |                                                         |
|--------------------------------------------|------------------------------------|---------------------------------------------------------|
| Cliente (Customer):<br>FLOWERVE SPAIN S.L. | Pedido (Order):<br>57937           | Tipo Certificado (Certificate Acc. To):<br>EN 10204 3.1 |
|                                            | Material (Material):<br>IR 829X300 | Estado (Condition):<br>Normalizado y Revenido           |

## COMPOSICION QUIMICA (Chemical Analysis) %

| Colada (Heat): | C    | S     | P     | Mn   | Si   | Cr    | Mo | Ni | Cu | V | Nb | N | Ta |
|----------------|------|-------|-------|------|------|-------|----|----|----|---|----|---|----|
| 251546         | 0.13 | 0.235 | 0.018 | 1.10 | 0.55 | 12.10 |    |    |    |   |    |   |    |

## ENSAYOS MECANICOS REQUERIDOS (Mechanical Requirements)

| Rt (Ts)      | Le (Yp)<br>0,2% | Le (Yp)<br>1% | A (E) % | E (Ra) % | Dureza<br>(Hardness) | Resiliencia (I.Test)<br>+20°C |
|--------------|-----------------|---------------|---------|----------|----------------------|-------------------------------|
| >= 825 N/mm2 | >= 620 N/mm2    |               | > 12 %  | > 40 %   | 262/302 HB           |                               |

## ENSAYOS MECANICOS OBTENIDOS (Mechanical Results)

| Rt (Ts)   | Le (Yp)<br>0,2% | Le (Yp)<br>1% | A (E) % | E (Ra) % | Dureza<br>(Hardness) | Resiliencia (I.Test)<br>+20°C |
|-----------|-----------------|---------------|---------|----------|----------------------|-------------------------------|
| 913 N/mm2 | 776 N/mm2       |               | 20 %    | 46 %     | 283 HB               |                               |

| ITEM | CANT.<br>(Qty) | DIMENSIONES (Sizes)                                          | PLANO(Drawing) |
|------|----------------|--------------------------------------------------------------|----------------|
| 1    | 2              | TAMBOR EQUILIBRIO S/PLANO M-99042 (10P40)<br>BALANCING DRUMS |                |

## OTROS ENSAYOS (Other tests):

- Ultrasonidos s/ASTM A 388 B 16.34 Anexo E.OK

FLOWERVE

## OBSERVACIONES (Remarks):

- Probetas s/ASTM // Test Bars as ASTM.

Planta Controlada  
Asegurado Calidad  
Revisado:

## Responsable de C. Calidad (Quality Department)

## Otras Inspecciones (Other Inspections)

**LOVERE BILBAO I. S.L.**  
Polig. Ugaldeguren 3 - Parcela nº 20 - Nave 3  
Tel: 94 454 51 30  
Fax: 94 454 51 00  
48170 ZAMUDIO (Bizkaia)

F-PG-06-03

Cliente / **Nome e Indirizzo**



|                                                                                                                                                        |                                          |           |                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LOVERE Bilbao I.S.L.</b><br>Pol. Ugaldeguren, 3 -P 20 - Nave 3<br>48.170 ZAMUDIO (Bizkaia)<br>Tel: 94 454 51 30 - 94 454 51 31<br>Fax: 94 454 51 00 | <b>CERTIFICADO</b><br><b>CERTIFICATE</b> |           | <b>UNE-EN-ISO 9001</b><br><b>IAC</b><br>INSPECCIÓN, AUDITORIA Y CERTIFICACIÓN<br>SISTEMA DE GESTIÓN<br>DE CALIDAD CERTIFICADO<br>Nº SCC-04-0262 |
|                                                                                                                                                        | Nº<br>074460                             | Hoja<br>1 | Fecha (Date):<br>12/05/2011                                                                                                                     |

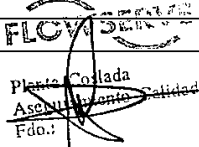
|                                                   |                                                      |                                                                |
|---------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------|
| <b>Cliente (Customer):</b><br>FLOWERVE SPAIN S.L. | <b>Pedido (Order):</b><br>57951                      | <b>Tipo Certificado (Certificate Acc. To):</b><br>EN 10204 3.1 |
|                                                   | <b>Material (Material):</b><br>ASTM A 473 T416 Ed.02 | <b>Estado (Condition):</b><br>Normalizado y revenido           |

| COMPOSICION QUIMICA (Chemical Analysis) % |      |      |       |      |      |       |      |      |    |   |    |   |    |
|-------------------------------------------|------|------|-------|------|------|-------|------|------|----|---|----|---|----|
| Colada (Heat):                            | C    | S    | P     | Mn   | Si   | Cr    | Mo   | Ni   | Cu | V | Nb | N | Ta |
| 002069                                    | 0.15 | 0.22 | 0.022 | 1.21 | 0.40 | 12.06 | 0.06 | 0.60 |    |   |    |   |    |

| ENSAYOS MECANICOS REQUERIDOS (Mechanical Requirements) |              |            |         |          |                   |                            |
|--------------------------------------------------------|--------------|------------|---------|----------|-------------------|----------------------------|
| Rt (Ts)                                                | Le (Yp) 0,2% | Le (Yp) 1% | A (E) % | E (Ra) % | Dureza (Hardness) | Resiliencia (I.Test) +20°C |
| >= 795 N/mm2                                           | >= 620 N/mm2 |            | <= 14 % | 45 %     | <= 321 HB         |                            |

| ENSAYOS MECANICOS OBTENIDOS (Mechanical Results) |              |            |         |          |                   |                            |
|--------------------------------------------------|--------------|------------|---------|----------|-------------------|----------------------------|
| Rt (Ts)                                          | Le (Yp) 0,2% | Le (Yp) 1% | A (E) % | E (Ra) % | Dureza (Hardness) | Resiliencia (I.Test) +20°C |
| 910 N/mm2                                        | 736 N/mm2    |            | 12.5 %  | 42 %     | 269 HB            |                            |

| ITEM | CANT. (Qty) | DIMENSIONES (Sizes)                                                          | PLANO(Drawing) |
|------|-------------|------------------------------------------------------------------------------|----------------|
| 1    | 1           | BARRA Ø 220/185X35 MM<br>ARO CUERPO/ANILLO ACANALADO<br>(1) CASING WEAR RING |                |

|                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OTROS ENSAYOS (Other tests):</b>                                                                                                              |
| <br>Planta Colada<br>Asesoría y Control de Calidad<br>Fdo.: |

|                                                                           |
|---------------------------------------------------------------------------|
| <b>OBSERVACIONES (Remarks):</b><br>- Probetas s/ASTM // Test Bars as ASTM |
|---------------------------------------------------------------------------|

|                                                                                                                                              |                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Responsable de C. Calidad (Quality Department)</b><br> | <b>Otras Inspecciones (Other Inspections)</b><br><b>LOVERE BILBAO I. S.L.</b><br>Polg. Ugaldeguren 3 - Parcela nº 20 - Nave 3<br>Tfno. 94 454 51 30<br>Fax. 94 454 51 00<br>48170 ZAMUDIO (Bizkaia) |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

F-PG-06-03



COGNE ACCIAI SPECIALI S.p.A.  
11100 AOSTA - VIA PARAVERA, 16  
TEL +39.0165.30231 - FAX +39.0165.302296  
CAP. SOC. 130.000.000 EUR INT. VERS.  
C.F. E ISCRIZIONE REG. IMPRESE 02187360987  
VAT: IT00971320078 - REA 50474



INSPECTION CERTIFICATE 3.1 (EN 10204:2004)  
(A03) DOCUMENT NUMBER 2011009523  
PAGE 1/2

(A06) CUSTOMER :  
(A07) CUSTOMER'S ORDER :  
(A01) MANUFACTURER'S WORKS :  
(A05) PRODUCER OF THE DOC :  
(A08) MANUFACTURER'S WORKS ORDER NO : 25120882 /10 (A04) MARK OF THE MANUFACTURER : COGNE

LOVERE BILBAO I.S.L.  
10.696/10  
AOSTA, VIA PARAVERA 16 - ITALY  
QUALITY DEPARTMENT

#### SPECIFICATION :

(B01) PRODUCT : 416LOVEREBILBAO  
(B03) SURFACE FINISH : 36724 SPE ROUGHPEELED  
(B04) PRODUCT DELIVERY CONDITION : 1X Hot Finished  
(B09) PRODUCT DIMENSIONS (mm) : BN QUENCHED AND TEMPERED  
(B02) GRADE : 220,000  
(B07) IDENTIFICATION HEAT NO : AISI 416 IMCO 416  
(B06) MARKING OF THE PRODUCT : 002069  
TECHNICAL RULE :  
ROUND BARS TOLERANCE : + 2,000 - 0,0000  
(B10) LENGTH (mm) : 04000 /06000  
INTERNAL GRADE : 416 L  
(B07) IDENTIFICATION LOT NO. : 847590  
TEST PIECE N. : 759

REFERENCE NORMS: EN 10088-3, ASTM A582.

STEELMAKING EAF + AOD  
HOT FORGED  
REDUCTION RATIO 8,4

(C71) CHEMICAL COMPOSITION - LADLE ANALYSIS ACCORDING ASTM E1019-E1086-E415  
Control lot No. - Weight : 020000391412 - 91.000 KG  
ELEMENTS C Si Mn P S N Cr Mo Ni Cu  
OBTAINED 0,15 0,40 1,21 0,022 0,22 0,020 12,06 0,06 0,60 0,08  
ELEMENTS  
OBTAINED

HARDNESS TEST IN AS DELIVERED CONDITION  
Control lot No. - Weight : 020000391755  
SPECIFICATION EN ISO 6506  
OBTAINED 269 HARDNESS TEST HB TESTING METHOD : 10/3000

TENSILE TEST IN AS DELIVERY CONDITION  
Control lot No. - Weight : 020000391755  
SPECIFICATION EN-ISO 6892-1

MEASUREMENT UNIT  
OBTAINED

Rm Rp02% A Z  
MPA %  
910 736 5,0 D 42,0  
12,5

(C02) DIRECTION OF THE TEST PIECE: T

MATERIAL IS FREE FROM MERCURY CONTAMINATION  
100% ANTIMONY TEST CARRIED OUT  
VISUAL INSPECTION OF SURFACE AND MEASURE OF DIMENSIONS: O.K.  
NO WELDING REPAIR ON THE MATERIAL

THE MATERIAL MEETS THE REQUIREMENTS OF THE ORDER SPECIFICATION  
THE PRODUCT SATISFIES CE DIRECTIVES: 2000/53 2002/95 2003/11 - 2005/618 AND PED 97/23/CE.  
QUALITY SYSTEM CERTIFIED BY I.G.Q. ACCORDING TO UNI EN ISO

FLOWSERVE  
Planta Cogne  
Aseguramiento de Calidad  
Revisado:



COGNE ACCIAI SPECIALI S.p.A.  
"Socio Unico"  
11100 - 0316 - VIA PAPAVEA, 16  
TEL. 031 620000 FAX 031 620001  
CAP. SOC. 120.000.000 EUR  
C.F. E ISCRIZIONE REG. IMPRESSE 02187360967  
VAT: IT00571320076 - REA 50474



INSPECTION CERTIFICATE 3.1 (EN 10204:2004)  
(A03) DOCUMENT NUMBER 2011009523  
PAGE 2/2

9001:2008 - ISO/TS 16949:2009 (THE LAST ONE ONLY FOR HOT ROLLED-PEELED-GROUND, STAINLESS STEEL BARS AND ATOMIZED METALLIC POWDERS).

FLOWSERVE  
Pianta Collaudata  
Aseguramiento de Calidad  
Revisado:

(Z01) DATE 09.02.2011

POLLASTRELLI ANDREA FC (QUALITY CERTIFICATOR) - ELECTRONICALLY GENERATED CERTIFICATE



40213

|                                                                                                                                                        |                                          |           |                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LOVERE Bilbao I.S.L.</b><br>Pol. Ugaldeguren, 3 -P 20 - Nave 3<br>48.170 ZAMUDIO (Bizkaia)<br>Tel: 94 454 51 30 - 94 454 51 31<br>Fax: 94 454 51 00 | <b>CERTIFICADO</b><br><b>CERTIFICATE</b> |           | <b>UNE-EN-ISO 9001</b><br><b>IAC</b><br><small>INSPECCIÓN, AUDITORIA Y CERTIFICACIÓN</small><br><b>SISTEMA DE GESTIÓN</b><br><b>DE CALIDAD CERTIFICADO</b><br>Nº SCC-04-0262 |
|                                                                                                                                                        | Nº<br>074453                             | Hoja<br>1 | Fecha (Date):<br>11/05/2011                                                                                                                                                  |

|                                                   |                                                      |                                                                |
|---------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------|
| <b>Cliente (Customer):</b><br>FLOWERVE SPAIN S.L. | <b>Pedido (Order):</b><br>57950                      | <b>Tipo Certificado (Certificate Acc. To):</b><br>EN 10204 3.1 |
|                                                   | <b>Material (Material):</b><br>ASTM A 582 T416 ED.02 | <b>Estado (Condition):</b><br>Templado y Revenido              |

| COMPOSICION QUIMICA (Chemical Analysis) % |      |      |       |      |      |       |      |    |    |   |    |   |    |
|-------------------------------------------|------|------|-------|------|------|-------|------|----|----|---|----|---|----|
| Colada (Heat):                            | C    | S    | P     | Mn   | Si   | Cr    | Ni   | Mo | Cu | V | Nb | N | Ta |
| 002252                                    | 0.13 | 0.22 | 0.023 | 1.18 | 0.35 | 12.39 | 0.33 |    |    |   |    |   |    |

| ENSAYOS MECANICOS REQUERIDOS (Mechanical Requirements) |                 |               |         |          |                      |                               |
|--------------------------------------------------------|-----------------|---------------|---------|----------|----------------------|-------------------------------|
| Rt (Ts)                                                | Le (Yp)<br>0,2% | Le (Yp)<br>1% | A (E) % | E (Ra) % | Dureza<br>(Hardness) | Resiliencia (I.Test)<br>+20°C |
|                                                        |                 |               |         |          | 248/302 HB           |                               |

| ENSAYOS MECANICOS OBTENIDOS (Mechanical Results) |                 |               |         |          |                      |                               |
|--------------------------------------------------|-----------------|---------------|---------|----------|----------------------|-------------------------------|
| Rt (Ts)                                          | Le (Yp)<br>0,2% | Le (Yp)<br>1% | A (E) % | E (Ra) % | Dureza<br>(Hardness) | Resiliencia (I.Test)<br>+20°C |
|                                                  |                 |               |         |          | 295 HB               |                               |

| ITEM | CANT.<br>(Qty) | DIMENSIONES (Sizes)                                                                    | PLANO(Drawing) |
|------|----------------|----------------------------------------------------------------------------------------|----------------|
| 1    | 1<br>19        | BARRA Ø 220/185X665 MM (10P40213)<br>ARO CUERPO / ANILLO ACANALADO<br>CASING WEAR RING |                |

|                                                                                       |
|---------------------------------------------------------------------------------------|
| <b>OTROS ENSAYOS (Other tests):</b><br>- Ultrasonidos s/ASTM A 388 B 16.34 Anexo E.OK |
|---------------------------------------------------------------------------------------|

**FLOWERVE**

|                                                                           |                                          |
|---------------------------------------------------------------------------|------------------------------------------|
| <b>OBSERVACIONES (Remarks):</b><br>- Probetas s/ASTM // Test Bars as ASTM | Plant. Control<br>Acreditado Calidad<br> |
|---------------------------------------------------------------------------|------------------------------------------|

|                                                           |                                                                                                                                                                                                   |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Responsable de C. Calidad (Quality Department)</b><br> | <b>Otras Inspecciones (Other Inspections)</b><br><b>LOVERE BILBAO I, S.L.</b><br>Pol. Ugaldeguren 3 - Parcela nº 20 - Nave 3<br>Tel: 94 454 51 30<br>Fax: 94 454 51 00<br>48170 ZAMUDIO (Bizkaia) |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

F-PG-06-03



COGNÉ ACCIAI SPECIALI S.p.A.  
"Sede Unico"  
11100 AOSTA - VIA PARAVERA, 16  
TEL. +39 0165 3022 FAX +39 0165 302296  
C.F. 016530201155 - PARTITA IVA 016530201155  
C.F. E SCANDONE REG. IMPRESA 02187360067  
VAT: IT00871320076 - REA 50474



INSPECTION CERTIFICATE 3.1 (EN 10204:2004)  
(A03) DOCUMENT NUMBER 2011025625  
PAGE 1/2

(A06) CUSTOMER : LOVERE BILBAO I.S.L.  
(A07) CUSTOMER'S ORDER : 10980/11  
(A01) MANUFACTURER'S WORKS : AOSTA, VIA PARAVERA 16 - ITALY  
(A05) PRODUCER OF THE DOC : QUALITY DEPARTMENT  
(A08) MANUFACTURER'S WORKS ORDER NO: 25136441 / 10 (A04) MARK OF THE MANUFACTURER : COGNÉ

INTERNAL SPEC. :  
(B01) PRODUCT : STOCKUSA  
(B03) SURFACE FINISH : 38713 SPE ROUGHPEELED  
(B04) PRODUCT DELIVERY CONDITION: 1X  
(B09) PRODUCT DIMENSIONS (mm): RL ANNEALED  
(B02) GRADE : A18 218,700  
(B07) IDENTIFICATION HEAT NO: A181 416 UNSS41600  
(B06) MARKING OF THE PRODUCT : 002252  
(B10) LENGTH (mm): 06706 / 07315  
(B07) IDENTIFICATION LOT NO.: 416 1 IMCO  
TEST PIECE N. : 745600 560

REFERENCE NORMS: ASTM A582, ASTM A484, AMS 5610 TYPE 2.  
STEELMARKING EAF + AOD  
HOT FORGED  
REDUCTION RATIO 6,5

(C71) CHEMICAL COMPOSITION - TABLE ANALYSIS ACCORDING ASTM E1019-E1086-E415  
Control lot No. - Weight : 020000394346  
ELEMENTS OBTAINED  
C 0,13  
Si 0,35  
Mn 1,18  
P 0,023  
S 0,22  
N 0,027  
Cr 12,39  
Mo 0,05  
Ni 0,33  
Cu 0,10

HARDNESS TEST IN AS DELIVERED CONDITION  
Control lot No. - Weight : 020000394791  
SPECIFICATION OBTAINED  
163  
ASTMA370-E18 5.540 KG  
HARDNESS TEST HB TESTING METHOD : 10/3000

TENSILE TEST IN AS DELIVERY CONDITION  
Control lot No. - Weight : 020000394791  
SPECIFICATION OBTAINED  
ASTMA370-E8 5.540 KG  
(C02) DIRECTION OF THE TEST PIECE: T

MEASUREMENT UNIT  
TS  
NMM  
550

VISUAL INSPECTION OF SURFACE: SATISFACTORY.

DIMENSIONAL CONTROL ACCORDING TO EN 10278 AND ASTM A484: SATISFACTORY.  
ULTRASONIC TEST ACCORDING TO EN 10228-3 class 3, equivalent to SEP 1920 group 3 class C and ASTM A388 FBH 5 for sizes <= 200 mm and to EN 10308, EN 10228 class 2, equivalent to ASTM A388 FBH7 for sizes > 200 mm: SATISFACTORY.  
NO WELDING REPAIR ON THE MATERIAL  
100% ANTITWIST TEST CARRIED OUT.  
HEAT TREATMENT PERFORMED IN CALIBRATED FURNACES ACCORDING TO INTERNAL PROCEDURE PR-GDQ.ITT.  
ON PROLONGATION OF BARS TESTS AT MID RADIUS (CENTER POS. FOR SIZES < 2 INCHES).  
THE MATERIAL IS FREE OF ANY MERCURY, MERCURY COMPOUNDS AND OR RADIUM CONTAMINATION AT TIME OF SHIPMENT AND WAS PRODUCED WITHOUT



FLOWSEAL  
Plant  
Asse  
Ceslada  
Asse  
Ceslada

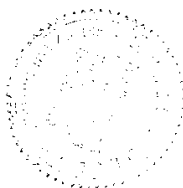


COGNE ACCIAI SPECIALI S.p.A.  
VIA S. VINCENZO 100 - PARAVERA, 16  
11100 AOSTA (A.O.)  
TEL. +39.0165.3021 - FAX +39.0165.302296  
C.F. SOC. 130.000.000 EUR INT. VERS.  
C.F. E ISCRIZIONE REG. IMPRESE 02187360987  
VAT: IT00571320076 - REA 50474



INSPECTION CERTIFICATE 3.1 (EN 10204:2004)  
(A03) DOCUMENT NUMBER 2011025625  
PAGE 2/2

USING OZONE DEPLETING SUBSTANCES OF CLASS I AND II.  
THE PRODUCT SATISFIES CE DIRECTIVES: 2000/53 2002/95 2003/11 - 2005/618  
MARKING: PRODUCER LOGO MATERIAL NO. HEAT NO. LOT NR.  
QUALITY SYSTEM CERTIFIED BY I.G.Q. ACCORDING TO UNI EN ISO  
9001:2008 - ISO/TS 16949:2009 (THE LAST ONE ONLY FOR HOT ROLLED-PEELED-GROUND, STAINLESS STEEL BARS AND ATOMIZED METALLIC POWDERS).  
ALL THE NORMS MENTIONED ARE INTENDED IN THEIR LATEST REVISION AT THE DATE OF ISSUE OF THIS DOCUMENT.  
COUNTRY OF ORIGIN: ITALY, THE MATERIAL COMPLETS WITH DEARS.  
THE ABOVE ARE TRUE AND CORRECT RESULTS OF TESTS ON SAMPLES OF THE MATERIAL. RESULTS ARE CONFORM TO THE SPECIFICATION(S) APPLICABLE  
AND ARE RECORDED.  
THE RECORDING OF FALSE, FICTIOUS OR FRAUDULENT STATEMENTS OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER U.S.  
FEDERAL STATUTES.



FLOWSERVÉ  
Plant: Abilada  
Accredited: 2010  
Fid.: 2010  
Accredited: 2010  
Fid.: 2010

Quality  
Record

(201) DATE 15.02.2011

POLLASTRE ANDREA FC (QUALITY CERTIFICATOR) - ELECTRONICALLY GENERATED CERTIFICATE

40213

Quality

Recor

**LOVERE Bilbao I.S.L.**

Pol. Ugaldeguren, 3 -P 20 - Nave 3  
48.170 ZAMUDIO (Bizkaia)  
Tel: 94 454 51 30 - 94 454 51 31  
Fax: 94 454 51 00

CERTIFICADO  
CERTIFICATE

UNE-EN-ISO 9001



Nº SCC-04-0262

Nº  
074372

Hoja  
1

Fecha (Date):  
29/04/2011

|                                                   |                                                      |                                                                |
|---------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------|
| <b>Cliente (Customer):</b><br>FLOWERVE SPAIN S.L. | <b>Pedido (Order):</b><br>57950                      | <b>Tipo Certificado (Certificate Acc. To):</b><br>EN 10204 3.1 |
|                                                   | <b>Material (Material):</b><br>ASTM A 582 T416 ED.02 | <b>Estado (Condition):</b><br>Templado y Revenido              |

**COMPOSICION QUIMICA (Chemical Analysis) %**

| Colada (Heat): | C     | S     | P    | Mn    | Si    | Cr     | Mo | Ni | Cu | V | Nb | N | Ta |
|----------------|-------|-------|------|-------|-------|--------|----|----|----|---|----|---|----|
| F7923          | 0,136 | 0,185 | 0,02 | 0,595 | 0,312 | 12,533 |    |    |    |   |    |   |    |

**ENSAYOS MECANICOS REQUERIDOS (Mechanical Requirements)**

| Rt (Ts) | Le (Yp)<br>0,2% | Le (Yp)<br>1% | A (E) % | E (Ra) % | Dureza<br>(Hardness) | Resiliencia (I.Test)<br>+20°C |
|---------|-----------------|---------------|---------|----------|----------------------|-------------------------------|
|         |                 |               |         |          | 248/302 HB           |                               |

**ENSAYOS MECANICOS OBTENIDOS (Mechanical Results)**

| Rt (Ts)   | Le (Yp)<br>0,2% | Le (Yp)<br>1% | A (E) % | E (Ra) % | Dureza<br>(Hardness) | Resiliencia (I.Test)<br>+20°C |
|-----------|-----------------|---------------|---------|----------|----------------------|-------------------------------|
| 850 N/mm2 | 726 N/mm2       |               | 13.8 %  | 51 %     | 283 HB               |                               |

| ITEM | CANT.<br>(Qty) | DIMENSIONES (Sizes)                                                                        | PLANO(Drawing) |
|------|----------------|--------------------------------------------------------------------------------------------|----------------|
| 1    | 1<br>18        | BARRA Ø 145/115X540 MM (10P40213)<br>CASQUILLO (CUERPO / ANILLO ACAN)<br>BUSHING WEAR RING |                |

**OTROS ENSAYOS (Other tests):**

- Ultrasonidos s/ASTM A 388 B 16.34 Anexo E.OK

FLOWERVE

Planta, Cielada  
Asesoramiento Calidad  
Fdo.:

**OBSERVACIONES (Remarks):**

- Probetas s/ASTM // Test Bars as ASTM

**Responsable de C. Calidad (Quality Department)**
**Otras Inspecciones (Other Inspections)**

**LOVERE BILBAO I. S.L.**  
Pol. Ugaldeguren 3 - Parcela nº 20 - Nave 3  
Tfno. 94 454 51 30  
Fax. 94 454 51 00  
48170 ZAMUDIO (Bizkaia)

F-PG-06-03

Certificat de réception 3.1  
NFEN 10204 / DIN EN 10204 : ISO R 404  
2004 2004 2004

N° : 03000049935  
I.S. int. : 0080102263/000001  
V/REF : 8282/06.....  
YOUR ORDER / IHRE ZEICHNUNG

DATE : 06.03.2007 DATE EDITION : 06.03.2007  
DU : 16.10.2006  
DATE / DATUM

ORDRE DE FABRICATION: F7923-AJ  
WORKS ORDER NUMBER / WERKBESTELLUNG  
AFFAIRE SUIVIE PAR : M.LLORENS  
YOUR CONTACT IS / BEARBEITER  
N/REFERENCE : 222430510 / 000010 (70023288)  
ASCOMETAL ORDER / WERKBESTELLUNG

COULEE F7923  
CAST / SCHÜBZE

DESTINATAIRE DOCUMENT :  
DOCUMENT FOR / EMPFÄNGER  
Société  
LOVERE BILBAO I.S.L.  
BARRIO SAN ANTONIO, 21 BIS  
POLIGONO UGALDEGUREN, 3  
48170 ZAMUDIO (VIZCAYA)  
ESPAGNE

QUANTITE : 9.970 NUANCE : N12CRS13  
QUANTITY / MENGE : GRADE / WERKSTOFF  
PRODUIT : N12CRS13 BARR. LAM DESCORRE 275.000 MM TEMP REV  
PRODUCT DESCRIPTION / BESCHREIBUNG  
SPECIFICATION CLIENT : HOERBIGER HN292+DIN EN 10088-3(12/2001)  
SPECIFICATION / SPEZIFIKATION  
IND : SANS DATE : 00.01.2000 CCU : D000003445  
REF. EN TÊTE / DATE / DATUM  
SPECIFICATION SUPP : SANS

ANALYSE CHIMIQUE DE COULEE / LADLE ANALYSIS / SCHMELZEANALYSE

| Élément (%) | ELEMENT  | TEIL  | C     | Mn    | Si    | Cr     | Ni    | Mo    | Cu    | P     | S     | Al    | Sn    |
|-------------|----------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| MINI        | SPEC MIN | MINI  | 0,080 |       |       | 12,000 |       |       |       |       | 0,150 |       |       |
| VALEUR      | ACTUAL   | WERTE | 0,136 | 0,595 | 0,312 | 12,533 | 0,176 | 0,030 | 0,169 | 0,020 | 0,185 | 0,013 | 0,009 |
| MAXI        | SPEC MAX | MAXI  | 0,150 | 1,500 | 1,000 | 13,000 |       | 0,600 |       | 0,040 | 0,250 |       |       |

CARACTERISTIQUES MECANQUES / MECHANICAL PROPERTIES / MECHANISCHE KENNWERTE

Traction / Tensile test / Zugversuch  
Nappe / Batch number / Los Nummer : 7021 / \*  
Diamètre de l'éprouvette (mm) 10 Distance prélèvement (mm) 12,50  
l'éprouvette sens long Température essai traction °C 20

| ELEMENT | ELEMENT  | TEIL  | Rp0.2% Mpa | Rm Mpa | A%   | Z% |
|---------|----------|-------|------------|--------|------|----|
| MINI    | SPEC MIN | MINI  | 1,0        | 1,0    | 1,0  | 1  |
| VALEUR  | ACTUAL   | WERTE | 726,6      | 850,0  | 13,8 | 51 |
| MAXI    | SPEC MAX | MAXI  |            |        |      |    |

TRAITEMENT THERMIQUE / HEAT TREATMENT / WÄRMEBEHANDLUNG

Refroidissement Austénitisation FAU  
Température d'austénitisation °C Val 0

DURETE SURFACE / SURFACE HARDNESS / RANDHÄRTE

| ELEMENT | ELEMENT  | TEIL  | HB tête |
|---------|----------|-------|---------|
| MINI    | SPEC MIN | MINI  | 248     |
| VALEUR  | ACTUAL   | WERTE | 283     |
| MAXI    | SPEC MAX | MAXI  | 290     |

AUTRES RESULTATS / OTHER RESULTS / ANDERE PRÜFERGEBNISSE

Structure conforme au cahier des charges  
Micro-inclusions selon DIN 50602  
Elaboration électrique voie lingot  
Filière lingot / Ingot cast / Blockguss

Visa du chef de service  
Stamp of inspection supervisor  
Der Werkssachverständige  
P. Dierickx

FLWSEVA  
Plant: Alcala  
Asociación Calidos  
Fdo.:

Nous certifions que les produits ci-dessus sont conformes aux prescriptions de la commande, respectent la directive européenne 2000/53/CE du 18 septembre 2000 et présentent un niveau de radioactivité au plus égal à la radioactivité ambiante

We hereby certify the above mentioned products are complying with the order requirements, are respectful of the September, 18th 2000 - 2000/53/CE - European directive, and have a radioactivity level which does not exceed that present in the environment

Wir bestätigen hiermit dass die obengenannten Erzeugnisse den Bestellschreiben, der EU-Richtlinie 2000/53/CE von 18 September 2000 entsprechen und die gelieferten Produkte keine Radioaktivität, die höher ist als natürliche Strahlung der Umwelt, aufweisen

Ascometal  
SA à directoire et conseil de surveillance  
au capital de 65 285 430 euros  
RCS Nanterre - B 331 048 132

Siège social : Immeuble LE COLISEE, 10 Avenue de l'Arche, Faubourg de l'Arche, 92419 Courbevoie Cedex

PAGE - SETTE 1 / 1



APORTACIONES  
ESPECIALES, S.A.



Calle Caucho, 12  
Teléf.: 91 675 18 43 - Fax: 91 675 76 90  
28850 TORREJON DE ARDOZ (Madrid)  
aes@aportaciones-especiales.com  
www.aportaciones-especiales.com

## CERTIFICADO DE CALIDAD QUALITY CERTIFICATE

40213

EN 10204-3.1

|                                                                                                          |                                                                                                                              |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>CLIENTE / CUSTOMER</b><br><br>FLOWSERVE SPAIN, S.L.<br>AVDA. FUENTEMAR, 26-28<br>28820-COSLADA-MADRID | <b>EXPEDICION / EXPEDITION</b><br><br>ALBARAN/DELIVERY NOTE 49318<br><br>Nº PEDIDO/ORDER Nº 58384<br><br>FECHA/DATE 27/04/11 |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|

|                                                       |                           |
|-------------------------------------------------------|---------------------------|
| <b>PRODUCTO SOLICITADO/REQUIRED PRODUCT</b>           |                           |
| CALIDAD/GRADE 1.4028 X30Cr13                          | COLADA/HEAT 777192        |
| ESTADO/DELIVERY COND. T                               | Nº PIEZAS/Nº OF PIECES 20 |
| MEDIDA/SIZE 200                                       | LONGITUD/LENGTH 600 MM    |
| DESCRIPCION/DESCRIPTION AROS IMPULSOR / IMPELLER RING |                           |

|                                                              |      |       |       |       |        |    |    |   |    |   |
|--------------------------------------------------------------|------|-------|-------|-------|--------|----|----|---|----|---|
| <b>COMPOSICION QUIMICA DE LA COLADA/CHEMICAL COMPOSITION</b> |      |       |       |       |        |    |    |   |    |   |
| C                                                            | MN   | SI    | P     | S     | CR     | MO | NI | N | CU | V |
| 0.310                                                        | 0,91 | 0.390 | 0.019 | 0.024 | 12.250 |    |    |   |    |   |

|                                                        |                |       |       |     |     |           |
|--------------------------------------------------------|----------------|-------|-------|-----|-----|-----------|
| <b>CARACTERISTICAS MECANICAS/MECHANICAL PROPERTIES</b> |                |       |       |     |     |           |
| TRATAMIENTO TERMICO                                    | ESPECIFICACION | RM    | RE    | A   | Z   | DUREZA HB |
|                                                        |                | N/mm2 | N/mm2 | (%) | (%) |           |
| T                                                      | RESULTADOS     | 877   | 669   | 18  | 51  | 268       |

OBSERVACIONES

**ENSAYOS NO DESTRUCTIVOS/OTHER TESTS**

CONTROL ULTRASONIDOS / ULTRASONIC TEST  
CONTROL ANTIMEZCLAS / ANTIMIXING CONTROL  
CONTROL DEFECTOS SUPERFICIALES / SURFACE DEFECT CONTROL

**OBSERVACIONES**

FLOWSERVE  
Niente Cos...  
Asseguram...  
Aprobat...

Seite 1 / 2  
Page



BGH Edelmetall Slogon GmbH

BGH Edelmetall Slogon GmbH Industriest. 9 57078 Slogon

International Metal Service

France (Mecacler)

Chemin du Jactoret

95820 Bruyeres sur Oise

FRANCE

Zertifikats-Nr. 259063

Certificate no.

No. de certificat

Beschreibung über Werkstoffprüfung nach DIN EN 10204  
Certificate of material tests according to DIN EN 10204 3,1  
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.  
Delivery in accordance with the agreed terms of delivery.  
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferanten Trade mark  
Stempel des Werkstoffprüfenden Inspector's stamp  
Signe du fournisseur Poinçon de l'inspecteur

Runden-Bestell-Nr. 194104  
Customer order no.  
Cde. no du client

BGH-Auftrags-Nr. 857846-002-01  
BGH works no.  
BGH référence



|                                                                                                                                                                                                                                                                        |                    |                                                                                                          |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------|---------|--------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|--|--|
| Rezeugungsform<br>Product                                                                                                                                                                                                                                              |                    | Stab, rund, geschmiedet, geschält<br>Round bars, forged, peeled<br>Barres rondes, forgé(e)s, écaoulé(e)s |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Werkstoff / Quality                                                                                                                                                                                                                                                    |                    | 1.4028 X30Cr13                                                                                           |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Anforderungen<br>Requirements                                                                                                                                                                                                                                          |                    | No 17007 Ind. 7 - 04/06                                                                                  |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Condition requise                                                                                                                                                                                                                                                      |                    | 1.4028 X30 Cr 13 ,NF EN 10088-3 09/05<br>1.4028 X30Cr13 ,IT-PR-AA 02-01 Edition 1 04/06                  |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Besichtigung und Maßnachprüfung<br>Inspection and dimensional control<br>Inspection et contrôle de dimension<br>ohne Beanstandung<br>without objection<br>sans objection                                                                                               |                    |                                                                                                          |                | Einschmelzung/Hartbebehandlung<br>Melting/secondary refining<br>Mode d'élaboration/réaffinage<br>E ACD LF |         |        |                                       | Verwechslungsprüfung (spektroskopisch)<br>Identification test (spectroscopically)<br>examen d'identification/analyse spectrale<br>ohne Beanstandung<br>without objection<br>sans objection |                         |                         |  |  |
| Pos.<br>Item                                                                                                                                                                                                                                                           | Anzahl<br>Quantity | Abmessung<br>Dimension                                                                                   |                |                                                                                                           |         |        |                                       | Gewicht<br>Weight                                                                                                                                                                          | kg                      | Schmelz-Nr.<br>Heat No. |  |  |
| 2                                                                                                                                                                                                                                                                      | 1                  | 200 mm dia. x 6215 mm                                                                                    |                |                                                                                                           |         |        |                                       | 1514                                                                                                                                                                                       |                         | 777192                  |  |  |
| Schmelz-Nr.<br>Heat No.                                                                                                                                                                                                                                                |                    | C                                                                                                        | Si             | Mn                                                                                                        | P       | S      | Cr                                    |                                                                                                                                                                                            |                         |                         |  |  |
| 777192                                                                                                                                                                                                                                                                 |                    | 0,310                                                                                                    | 0,39           | 0,91                                                                                                      | 0,019   | 0,0240 | 12,25                                 |                                                                                                                                                                                            |                         |                         |  |  |
| Wärmebehandlungsart<br>Condition of heat treatment                                                                                                                                                                                                                     |                    | vergütet<br>quenched and tempered - 980°C 5h Öl/oil/huile, 645°C 7h Luft/air/air                         |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Traitement thermique                                                                                                                                                                                                                                                   |                    | trempé et revenu                                                                                         |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Probe-Nr.<br>Test-No.<br>Échant.                                                                                                                                                                                                                                       | Lage<br>Loc.       | Temp.<br>°C                                                                                              | Rp0,2<br>N/mm² | Rm<br>N/mm²                                                                                               | A5<br>% | Z<br>% | Kerbschlagarbeit<br>Impact value<br>J | Probenform<br>Shape of test piece<br>Charpy-V                                                                                                                                              | Härte<br>Hardness<br>HB |                         |  |  |
| Soll/Req.                                                                                                                                                                                                                                                              | L                  | RT                                                                                                       | >=650          | >=850<br><=1000                                                                                           | >=10    |        | >=15                                  | RT                                                                                                                                                                                         |                         |                         |  |  |
| 173L1                                                                                                                                                                                                                                                                  | L                  | RT                                                                                                       | 669            | 877                                                                                                       | 18      | 51     | 17 16 17                              | RT                                                                                                                                                                                         |                         | 268                     |  |  |
| Reinheitsgrad nach DIN 50602 : K4 = 2<br>Degree of purity acc. DIN 50602:<br>Degré de pureté selon DIN 50602:                                                                                                                                                          |                    |                                                                                                          |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Reinheitsgrad nach NFA 04-106, Methode A :<br>Degree of purity acc. NFA 04-106, method A :<br>Niveau de pureté selon NFA 04 106, méthode A.                                                                                                                            |                    |                                                                                                          |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Type                                                                                                                                                                                                                                                                   |                    | A                                                                                                        | B              | C                                                                                                         | D       |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| dünn/thin/fine                                                                                                                                                                                                                                                         |                    | 1.0                                                                                                      | 1.3            | 0.3                                                                                                       | 0.5     |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| dick/thick/épaisse                                                                                                                                                                                                                                                     |                    | 1.0                                                                                                      | 1.0            | 0.3                                                                                                       | 0.3     |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |
| Anlagen<br>End.<br>Appareil                                                                                                                                                                                                                                            |                    |                                                                                                          |                | Stempel, den<br>Place and date<br>Lieu et date<br>25.06.2010                                              |         |        |                                       | Abnahmebeauftragter<br>Inspector representative<br>Inspecteur de réception<br>M. Mertens                                                                                                   |                         |                         |  |  |
| Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.<br>This certificate was generated by data system and must not be signed for validity as well.<br>Ce certificat a été établi par système informatique et est valable sans signature aussi. |                    |                                                                                                          |                |                                                                                                           |         |        |                                       |                                                                                                                                                                                            |                         |                         |  |  |

PLATE COPY  
Assurance  
Approbé



BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH, Industriest. 8 57375 Siegen

International Metal Service  
France (Mecaciel)  
Chemin du Jacloret  
95620 Bruyeres sur Oise  
FRANCE

Zeugnis-Nr.  
Certificate no.  
N° de certificat 259063

Beschreibung über Werkstoffprüfung nach DIN EN 10204  
Certificate of material tests according to DIN EN 10204 3.1  
Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.  
Delivery in accordance with the agreed terms of delivery.  
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferwerkes  
Trade mark  
Signe du fournisseur

Stempel des Werkstoffverständigen  
Inspector's stamp  
Poinçon de l'inspecteur



Kunden-Bestell-Nr. 194104  
Customer order no.  
Cde. no. du client

BGH-Auftrags-Nr.  
BGH work no.  
BGH référence 857846-002-01

Restmagnetismus : < 8 A/cm  
Residual magnetism :  
Magnétisme résiduel:

Kontrolle auf Radioaktivität ohne Defund, der Messwert liegt unter der  
Nachweisgrenze von 0,1 Bq/g.  
Radioactivity inspection without objection, the measured value is below the  
detection limit of 0.1 Bq/g.  
Contrôle radioactivité satisfaisant. La valeur mesurée est sous la  
limite de détection de 0,1 Bq/g.

Ursprungsland: DEUTSCHLAND  
Country of origin: GERMANY  
Pays d'origine: ALLEMAGNE

US-Prüfung / UT examination / L'examen aux Ultra-sons:  
DIN EN 10228-3 07/98, Tab.3 Type 1a (100%) + Tab.5 QK/quality class/classe de qualité 2  
DIN EN 10308 - 03/02, Tab.1 (100%) + Tab.2 QK/quality class/classe de qualité 2  
ohne Beanstandung / without objection / sans objections

Florian  
Platz  
Inspector  
Inspector  
Inspector

Anlagen  
Entf.  
Date

Siegen, den  
Place and date  
Made on date  
25.09.2010

Abnahmebeauftragter  
Inspector representative  
Inspecteur de réception  
M. Mortens

Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.

This certificate was generated by data system it must not be signed for validity as well.  
Ce certificat a été établi aux systèmes informatiques et est valable sans signature aussi.



**APORTACIONES  
ESPECIALES, S.A.**



Calle Caucho, 12  
Teléf.: 91 675 18 43 - Fax: 91 675 76 90  
28850 TORREJON DE ARDOZ (Madrid)  
aes@aportaciones-especiales.com  
www.aportaciones-especiales.com

## **CERTIFICADO DE CALIDAD QUALITY CERTIFICATE**

40213

**EN 10204-3.1**

|                                                                                                                                               |                |                                                                                              |       |        |       |           |    |   |    |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------|-------|--------|-------|-----------|----|---|----|---|
| <b>CLIENTE / CUSTOMER</b>                                                                                                                     |                | <b>EXPEDICION / EXPEDITION</b>                                                               |       |        |       |           |    |   |    |   |
| FLOWSERVE SPAIN, S.L.<br>AVDA. FUENTEMAR, 26-28<br>28820-COSLADA-MADRID                                                                       |                | ALBARAN/DELIVERY NOTE 49359/49314<br><br>Nº PEDIDO/ORDER Nº 58384<br><br>FECHA/DATE 25/08/11 |       |        |       |           |    |   |    |   |
| <b>PRODUCTO SOLICITADO / REQUIRED PRODUCT</b>                                                                                                 |                |                                                                                              |       |        |       |           |    |   |    |   |
| CALIDAD/GRADE 1 4028 X30Cr13                                                                                                                  |                | COLADA/HEAT 303006                                                                           |       |        |       |           |    |   |    |   |
| ESTADO/DELIVERY COND. T                                                                                                                       |                | Nº PIEZAS/Nº OF PIECES 18                                                                    |       |        |       |           |    |   |    |   |
| MEDIDA/SIZE 130                                                                                                                               |                | LONGITUD/LENGTH 225 MM                                                                       |       |        |       |           |    |   |    |   |
| DESCRIPCION/DESCRIPTION CASQUILLOS IMPULSOR / IMPELLER BOSTING                                                                                |                |                                                                                              |       |        |       |           |    |   |    |   |
| <b>COMPOSICION QUIMICA DE LA COLADA / CHEMICAL COMPOSITION</b>                                                                                |                |                                                                                              |       |        |       |           |    |   |    |   |
| C                                                                                                                                             | MN             | SI                                                                                           | P     | S      | CR    | MO        | NI | N | CU | V |
| 0.297                                                                                                                                         | 0.91           | 0.42                                                                                         | 0.020 | 0.0157 | 12.13 |           |    |   |    |   |
| <b>CARACTERISTICAS MECANICAS / MECHANICAL PROPERTIES</b>                                                                                      |                |                                                                                              |       |        |       |           |    |   |    |   |
| TRATAMIENTO TERMICO                                                                                                                           | ESPECIFICACION | RM                                                                                           | RE    | A      | Z     | DUREZA HB |    |   |    |   |
|                                                                                                                                               |                | N/mm2                                                                                        | N/mm2 | (%)    | (%)   |           |    |   |    |   |
| T                                                                                                                                             | RESULTADOS     | 699                                                                                          | 687   | 19     | 54    | 271       |    |   |    |   |
| OBSERVACIONES                                                                                                                                 |                |                                                                                              |       |        |       |           |    |   |    |   |
| <b>ENSAYOS NO DESTRUCTIVOS / OTHER TESTS</b>                                                                                                  |                |                                                                                              |       |        |       |           |    |   |    |   |
| CONTROL ULTRASONIDOS / ULTRASONIC TEST<br>CONTROL ANTIMEZCLAS / ANTIMIXING CONTROL<br>CONTROL DEFECTOS SUPERFICIALES / SURFACE DEFECT CONTROL |                |                                                                                              |       |        |       |           |    |   |    |   |
| <b>OBSERVACIONES</b>                                                                                                                          |                |                                                                                              |       |        |       |           |    |   |    |   |

PLANTA COSLADA  
Aprobador

Seite 1 12  
Page

BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriest. 9 57076 Siegen

International Metal Service  
France  
Chemin du Jacloret  
95820 Bruyères sur Oise  
FRANCE

Zeugnis-Nr. 268009

Certificat no.

No. de certificat

Bescheinigung über Werkstoffprüfung nach DIN EN 10204

Certificate of material tests according to DIN EN 10204 3.1

Certificat des essais des matériaux selon DIN EN 10204

Die Lieferung entspricht den vereinbarten Lieferbedingungen.

Delivery in accordance with the agreed terms of delivery.

La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferanten

Trade mark

Sigle du fournisseur

Stempel des Werkstoffverständigen

Inspector's stamp

Papillon de l'inspecteur

Kunden-Bestell-Nr. 187394

Customer order no.

Cdt. no. du client

BGH-Werkst.-Nr. 656403-001-01

BGH works no.

BGH référence

|                                                                                                                                                                                                                                                                          |                    |                                                                                                                                     |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|---------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------|-------------------|----|-------------------------|
| Erzeugnisform<br>Product                                                                                                                                                                                                                                                 |                    | Stab, rund, geschmiedet, geschält<br>Round bars, forged, peeled                                                                     |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| Werkstoff / Quality                                                                                                                                                                                                                                                      |                    | 1.4028 X30Cr13                                                                                                                      |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| Anforderungen<br>Requirements                                                                                                                                                                                                                                            |                    | No 17007 Ind. 7 - 04/06<br>1.4028 X 30 Cr 13 NF EN 10088-3 09/05<br>Condition requise 1.4028 X30Cr13 IT-PR-AA 02-01 Edition 1 04/06 |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| Bescheinigung und Materialprüfung<br>Inspection and material testing<br>Inspection et essai des matériaux<br>ohne Beanstandung<br>without objection<br>sans objection                                                                                                    |                    | Erzeugung/Nachbehandlung<br>Manufacturing and treatment<br>Mode d'élaboration et traitement<br>E - VOD                              |                |                |         |        | Verweilungsprüfung (metallanalytisch)<br>Verification (metallanalytical)<br>vérification (métallanalytique)<br>ohne Beanstandung<br>without objection<br>sans objection |                                               |                         |                   |    |                         |
| Per.<br>Item                                                                                                                                                                                                                                                             | Amount<br>Quantity | Abmessung<br>Dimension                                                                                                              |                |                |         |        |                                                                                                                                                                         |                                               |                         | Gewicht<br>Weight | kg | Stempel-Nr.<br>Mark No. |
| 1                                                                                                                                                                                                                                                                        | 2                  | 130 mm dia. x 7208 + 7617 mm                                                                                                        |                |                |         |        |                                                                                                                                                                         |                                               |                         | 1528              |    | 303008                  |
| Schein-Nr.<br>Heat No.                                                                                                                                                                                                                                                   |                    | C                                                                                                                                   | Si             | Mn             | P       | S      | Cr                                                                                                                                                                      |                                               |                         |                   |    |                         |
| 303006                                                                                                                                                                                                                                                                   |                    | 0,297                                                                                                                               | 0,42           | 0,91           | 0,020   | 0,0157 | 12,13                                                                                                                                                                   |                                               |                         |                   |    |                         |
| Wärmebehandlungszustand<br>Condition of heat treatment                                                                                                                                                                                                                   |                    | vergdübt<br>quenched and tempered - 985°C 4h Öl/oil/huile, 635°C 5h Luft/air/air                                                    |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| Traitement thermique                                                                                                                                                                                                                                                     |                    | trempé et revenu                                                                                                                    |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| Probe-Nr.<br>Test-No.<br>Échant.                                                                                                                                                                                                                                         | Lage<br>Loc.       | Temp.<br>°C                                                                                                                         | Rp0,2<br>N/mm² | Rm<br>N/mm²    | A5<br>% | A<br>% | Kerbschlagenergie<br>Impact value<br>J                                                                                                                                  | Probenform<br>Shape of test piece<br>Charpy-V | Härte<br>Hardness<br>HB |                   |    |                         |
| Soll/Req.                                                                                                                                                                                                                                                                | L                  | RT                                                                                                                                  | >=650          | >=850<br>≤1000 | >=10    |        | >=15                                                                                                                                                                    | RT                                            | HB                      |                   |    |                         |
| 994X2                                                                                                                                                                                                                                                                    | L                  | RT                                                                                                                                  | 687            | 899            | 19      | 54     | 19 17 19                                                                                                                                                                | RT                                            | 271                     |                   |    |                         |
| Reinheitsgrad nach DIN 50602 : K4 = 3<br>Degree of purity acc. DIN 50602:<br>Degré de pureté selon DIN 50602:                                                                                                                                                            |                    |                                                                                                                                     |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| Reinheitsgrad nach NFA 04-106, Methode A :<br>Degree of purity acc. NFA 04-106, method A :<br>Degré de pureté selon NFA 04-106, méthode A:                                                                                                                               |                    |                                                                                                                                     |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| Type                                                                                                                                                                                                                                                                     | A                  | B                                                                                                                                   | C              | U              |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| dünn/thin/fine                                                                                                                                                                                                                                                           | 1.0                | 1.5                                                                                                                                 | 0.5            | 0.5            |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| dick/thick/épaisse                                                                                                                                                                                                                                                       | 1.5                | 1.0                                                                                                                                 | 0.5            | 0.5            |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |
| Anlagen<br>Endr.<br>Arrivo                                                                                                                                                                                                                                               |                    | Siegen/Endr.<br>Place and date<br>Lieu et date<br>05.12.2010                                                                        |                |                |         |        | Abnahme/Offener<br>Inspected/Inspected after<br>Inspection de réception<br>M. Mertens                                                                                   |                                               |                         |                   |    |                         |
| Das Zeugnis wurde maschinell erstellt und ist auch ohne Unterschrift gültig.<br>This certificate was generated by data system and must not be signed for validity as well.<br>Ce certificat a été établi par système informatique et est valide sans signature manuelle. |                    |                                                                                                                                     |                |                |         |        |                                                                                                                                                                         |                                               |                         |                   |    |                         |



Etablissement Principal : Z.I. Chemin du Jacloret - 95820 Bruyères sur Oise - France  
S.A.S. au capital de 5 010 000 € - 524 450 749 R.C.S. Lyon - Code d'identification Communautaire FR 37 524 450 749  
Siège Social : 7, rue Michel Jacquet - 69800 Saint-Jean  
VOIR NOS CONDITIONS GÉNÉRALES DE VENTE  
(comportant l'application de la clause de réserve de propriété de l'article 1792 du 12 mai 1980).



BGH Edelstahl Siegen GmbH

BGH Edelstahl Siegen GmbH Industriestr. 9 67014 Siegen  
International Metal Service  
France  
Chemin du Jacloret  
95820 Bruyères sur Oise  
FRANCE

Zertifikat-Nr. 266009  
Certificate no.  
No. de certificat  
Beschreibung über Materialprüfung nach DIN EN 10204  
Certificate of material tests according to DIN EN 10204 3.1  
Certificat des essais des matériaux selon DIN EN 10204  
Die Lieferung entspricht den vereinbarten Lieferbedingungen.  
Delivery in accordance with the agreed terms of delivery.  
La livraison correspond aux conditions de livraison convenues.

Zeichen des Lieferanten BGH mark Trade mark  
Signature du fournisseur Inspection des Warenschwendungen Inspection stamp  
Signature du fournisseur

Kunden-Bestell-Nr. 197394  
Customer order no.  
Cde. no. du client

BGH-Auftrag-Nr. 858403-001-01  
BGH work no.  
BGH référence



Restmagnetismus : < 8 A/cm  
Residual magnetism :  
Magnétisme résiduel :

Visuelle Oberflächenkontrolle wurde durchgeführt: ohne Beanstandung  
Visual surface control was done : without objection  
Contrôle visuel de la surface a été réalisé : sans objection

Kontrolle auf Radioaktivität ohne Befund, der Messwert liegt unter der  
Nachweisgrenze von 0,1 Bq/g.  
Radioactivity inspection without objection, the measured value is below the  
detection limit of 0.1 Bq/g.  
Contrôle radioactivité satisfaisant. La valeur mesurée est sous la  
limite de détection de 0,1 Bq/g.

Ursprungsland: DEUTSCHLAND  
Country of origin: GERMANY  
Pays d'origine: ALLEMAGNE

US-Prüfung / UT examination / L'examen aux Ultra-sons:  
DIN EN 10228-3 07/98, Tab.3 Type 3a (100%) + Tab.5 QK/quality class/classe de qualité 3  
DIN EN 10308 - 03/02, Tab.1 (100%) + Tab.2 QK/quality class/classe de qualité 3  
ohne Beanstandung / without objection / sans objections

RECEIVED  
THANKS TO  
ACCEPTED  
APPROVED

|                             |                                                           |                                                                                  |
|-----------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------|
| Anlagen<br>Zust.<br>Anmerk. | Siegeplan<br>Date and time<br>Date and time<br>03.12.2010 | Abteilungsleiter<br>Inspector (signature)<br>Inspector (signature)<br>M. Möntgen |
|-----------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------|

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Ce certificat a été créé par système informatique et est valable sans signature aussi.



Etablissement Principal : Z.I. Chemin du Jacloret - 95820 Bruyères sur Oise - France  
S.A.S. au capital de 5 010 000 € - 524 450 749 R.C.S. Lyon - Code d'identification Communautaire FR 37 524 450 749  
Siège Social : Z.I. des Miroirs - 69900 Saint Priest - France  
VOIR NOS CONDITIONS DE VENTE AU VERSO  
(comportant l'attestation de réserve de propriété selon la loi n° 80-335 du 12 mai 1980)



# SECTION 8

**CERTIFICADO DE CALIDAD / QUALITY CERTIFICATE**

**EN-10204 3.1**

|                                                                     |                                        |                                  |                                             |                              |                                           |                         |                       |                                      |       |       |
|---------------------------------------------------------------------|----------------------------------------|----------------------------------|---------------------------------------------|------------------------------|-------------------------------------------|-------------------------|-----------------------|--------------------------------------|-------|-------|
| Certificado n°<br>Certificate nr.                                   | Fecha<br>Date                          | Albaran n°<br>Delivery note      |                                             |                              |                                           |                         |                       |                                      |       |       |
| 31.942                                                              | 27/06/2011                             | 23.957                           |                                             |                              |                                           |                         |                       |                                      |       |       |
| Pedido n°<br>Order nr.                                              | Cantidad<br>Quantity                   | Plano<br>Drawing                 |                                             |                              |                                           |                         |                       |                                      |       |       |
| 58024                                                               | 2                                      | 4X12 WXH264A CAJA EMPAQ. M-14180 |                                             |                              |                                           |                         |                       |                                      |       |       |
| N° Colada<br>Heat nr.                                               | N° Identificación<br>Marking           | Material<br>Material             |                                             |                              |                                           | Norma<br>According to   |                       |                                      |       |       |
| 14.206                                                              |                                        | CA-6-NM A                        |                                             |                              |                                           | ASTM-A-487              |                       |                                      |       |       |
| <b>ANALISIS QUIMICO / CHEMICAL ANALYSIS</b>                         |                                        |                                  |                                             |                              |                                           |                         |                       |                                      |       |       |
| % C                                                                 | % Si                                   | % S                              | % P                                         | % Mn                         | % Ni                                      | % Cr                    | % Mo                  | % V                                  | % Cu  | % W   |
| 0,025                                                               | 0,752                                  | 0,005                            | 0,026                                       | 0,781                        | 3,795                                     | 13,823                  | 0,522                 | 0,040                                | 0,168 | 0,084 |
| % Ti                                                                | % Sn                                   | % Co                             | % Al                                        | % Pb                         | % B                                       | % Nb                    | % -                   | % -                                  | % -   | % -   |
| 0,008                                                               | 0,009                                  | 0,000                            | 0,016                                       | 0,000                        | 0,000                                     | 0,018                   | 0,000                 | 0,000                                | 0,000 | 0,000 |
| % -                                                                 | % -                                    | % -                              | % -                                         | % -                          | % -                                       | % -                     | % -                   | % Fe                                 | % Ceq |       |
| 0,000                                                               | 0,000                                  | 0,000                            | 0,000                                       | 0,000                        | 0,000                                     | 0,000                   | 0,000                 | 79,880                               | 3,296 |       |
| <b>PROPIEDADES MECANICAS / MECHANICAL TEST RESULTS</b>              |                                        |                                  |                                             |                              |                                           |                         |                       |                                      |       |       |
| Temp. Ensayo<br>Test Temp<br>°C                                     | Resistencia<br>Tensile Strength<br>MPa |                                  | Límite Elástico<br>Yield Point<br>MPa 0,2 % |                              | Alargamiento<br>Elongation<br>% Lo = 4 do |                         |                       | Extricción<br>Reduction of Area<br>% |       |       |
| 20                                                                  | 871                                    |                                  | 645                                         |                              | 21                                        |                         |                       | 53,4                                 |       |       |
| <b>Resiliencia ISO V (Julios) / Energy of impact ISO V (Joules)</b> |                                        |                                  |                                             |                              |                                           |                         |                       |                                      |       |       |
| Temp Ensayo °C<br>Test Temp °C                                      | 1<br>Julios/Joules                     | 2<br>Julios/Joules               | 3<br>Julios/Joules                          | Media J<br>Average           |                                           |                         | Dureza HB<br>Hardness |                                      |       |       |
| -                                                                   | -                                      | -                                | -                                           | -                            |                                           |                         | -                     |                                      |       |       |
| <b>TRATAMIENTO TERMICO / HEAT TREATMENT</b>                         |                                        |                                  |                                             |                              |                                           |                         |                       |                                      |       |       |
| Tipo<br>Type                                                        |                                        | Temperatura °C<br>Temperature °C |                                             | Mantenimiento<br>Maintenance |                                           | Enfriamiento<br>Cooling |                       |                                      |       |       |
| NORMALIZADO                                                         |                                        | 1020                             |                                             | 06:00                        |                                           | AIRE                    |                       |                                      |       |       |
| REVENIDO                                                            |                                        | 680                              |                                             | 06:00                        |                                           | AIRE                    |                       |                                      |       |       |
| REVENIDO 2                                                          |                                        | 620                              |                                             | 06:00                        |                                           | AIRE                    |                       |                                      |       |       |
| <b>OBSERVACIONES / REMARKS</b>                                      |                                        |                                  |                                             |                              |                                           |                         |                       |                                      |       |       |
| STUFFING BOXES                                                      |                                        |                                  |                                             |                              |                                           |                         |                       |                                      |       |       |

**FLOWERVE**

Planta Coslada  
Asesoramiento Calidad  
Fdo.:

FECHA/DATE:  
Inspector del Cliente/Customer inspector:

FECHA/DATE: 20/07/2011  
Inspector de Fábrica/Inspector:

*[Signature]*

|                                                                                                                                                                     |                                                                                     |                                                                                                                                                                 |                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|   |                                                                                     | <b>Pump Division</b><br><b>Flowserve Spain, S.L.</b>                                                                                                            |                                                                                                                         |
| <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                                                                                  |                                                                                     |                                                                                                                                                                 | <b>INFORME Nº / Report Nº</b><br><br><b>5123</b>                                                                        |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                                                                                | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>                               | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                                                                         |                                                                                                                         |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                                                                                 | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b>                              | <b>Nº SERIE / Serial Nº</b><br><b>M-151457 AND M-151458</b>                                                                                                     |                                                                                                                         |
| <b>OBJETO / Object</b><br><b>STUFING BOX EXTENSION</b>                                                                                                              | <b>DISEÑO/plano / Design</b><br><b>4X12WXH264AXE55</b>                              | <b>Nº SERIE / Serial Nº</b><br><b>01 AND 02</b>                                                                                                                 |                                                                                                                         |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED % PREMACHINING</b>                                                                          |                                                                                     | <b>Q.C.P.</b><br><b>2244 R.3</b>                                                                                                                                | <b>ESPECIFICACIÓN / Specification</b><br><b>PLP01 Rev.1</b>                                                             |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br><b>ACCEPTABLE</b>                                                                                               |                                                                                     | <input type="checkbox"/> <b>COMO SOLDADURA / As welded</b><br><input type="checkbox"/> <b>ESMERILADO / Ground</b>                                               | <input checked="" type="checkbox"/> <b>MECANIZADO / Machined</b><br><input type="checkbox"/> <b>FORJADO / As Forged</b> |
| <b>METODO CONTROL / Control Method</b>                                                                                                                              |                                                                                     |                                                                                                                                                                 |                                                                                                                         |
| <input type="checkbox"/> <b>SOLUBLE EN AGUA / Water washable</b><br><input type="checkbox"/> <b>VISIBLE</b>                                                         |                                                                                     | <input type="checkbox"/> <b>POR EMULSIFICADO / Post emulsifiable</b><br><input type="checkbox"/> <b>FLUORESC.</b>                                               | <input type="checkbox"/> <b>DISOLVENTE / Solvent removable</b><br><input type="checkbox"/> <b>VISIBLE</b>               |
| <input type="checkbox"/> <b>FLUORESC.</b>                                                                                                                           |                                                                                     | <input type="checkbox"/> <b>VISIBLE</b>                                                                                                                         | <input type="checkbox"/> <b>FLUORESC.</b>                                                                               |
| <b>LIMPIEZA / Cleaner</b>                                                                                                                                           |                                                                                     |                                                                                                                                                                 | <b>9PR-5</b>                                                                                                            |
| <b>PENETRANTE / Penetrant</b>                                                                                                                                       |                                                                                     |                                                                                                                                                                 | <b>996-P</b>                                                                                                            |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                                                                   |                                                                                     |                                                                                                                                                                 |                                                                                                                         |
| <b>DISOLVENTE / Remover</b>                                                                                                                                         |                                                                                     |                                                                                                                                                                 | <b>9PR-5</b>                                                                                                            |
| <b>REVELADOR / Developer</b>                                                                                                                                        |                                                                                     |                                                                                                                                                                 | <b>9D1-B</b>                                                                                                            |
| <b>MARCA / Trade mark</b>                                                                                                                                           |                                                                                     |                                                                                                                                                                 | <b>ARDROX</b>                                                                                                           |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                                                                           |                                                                                     |                                                                                                                                                                 |                                                                                                                         |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                                                                           |                                                                                     |                                                                                                                                                                 |                                                                                                                         |
| <b>LIMPIEZA / Cleaning</b>                                                                                                                                          | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>                                  | <b>SECADO / Drying process</b>                                                                                                                                  | <b>TEMP.AMBIENTE 20º ATMOSPHERE TEMP.</b>                                                                               |
| <b>APLIC. PENETRANTE / Penetrant application.</b>                                                                                                                   | <b>996-P SPRAY</b>                                                                  | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                                                                  | <b>15 MINUTOS</b>                                                                                                       |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                                                                       | <b>9PR-5</b>                                                                        | <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                                                                             |                                                                                                                         |
| <b>APLIC. REVELADOR / Developer application</b>                                                                                                                     | <b>9D1-B SPRAY</b>                                                                  | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                                                                 | <b>7 MINUTOS</b>                                                                                                        |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b><br><b>1 HORA</b>                                                                                                    |                                                                                     |                                                                                                                                                                 |                                                                                                                         |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b><br><b>SI / YES</b>                                                                              |                                                                                     | <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b><br><b>SI / YES</b>                                                                              |                                                                                                                         |
| <b>RESULTADO / Results</b>                                                                                                                                          | <b>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</b> |                                                                                                                                                                 |                                                                                                                         |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>                                                              | <b>FIRMADO / Signature</b>                                                          | <b>OPERADOR / Operator</b><br><br>Jose A. Rietz<br>Control Calidad<br>Fdo.: | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br><br><b>FECHA / Date</b><br><b>18.10.2011</b>                 |

|                                                                                                                   |                                                        |                                                                                                                                   |                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|                                  |                                                        | <b>Pump Division</b><br><b>Flowserve Spain, S.L.</b>                                                                              |                                                                                                                                 |
| <b>CERTIFICADO DE LÍQUIDOS PENETRANTES</b><br><i>Penetrant Liquids Certificate</i>                                |                                                        | <b>INFORME N° / Report N°</b><br><b>5124</b>                                                                                      |                                                                                                                                 |
| <b>REF. FPD / FPD Ref.</b><br><b>COS-11-10P40213</b>                                                              | <b>CLIENTE / Customer</b><br><b>MISSISSIPPI POWER</b>  | <b>PROYECTO / Project</b><br><b>KEMPER COUNTRY IGCC</b>                                                                           |                                                                                                                                 |
| <b>REF. CLIENTE / Customer Ref.</b>                                                                               | <b>TIPO DE BOMBA / Pump Type</b><br><b>4X12 WXH-10</b> | <b>N° SERIE / Serial N°</b><br><b>M-151457 AND M-151458</b>                                                                       |                                                                                                                                 |
| <b>OBJETO / Object</b><br><b>STUFING BOX EXTENSION</b>                                                            | <b>DISEÑO/plano / Design</b><br><b>4X12WXH264AXE55</b> | <b>N° SERIE / Serial N°</b><br><b>01 AND 02</b>                                                                                   |                                                                                                                                 |
| <b>ESTADO DE FABRICACIÓN / Working step</b><br><b>MECANIZADO / MACHINED % MACHINED</b>                            |                                                        | <b>Q.C.P.</b><br><b>2244 R.3</b>                                                                                                  | <b>ESPECIFICACIÓN / Specification</b><br><b>PLP01 Rev.1</b>                                                                     |
| <b>CONDICION SUPERFICIAL / Surface Condition</b><br><b>ACEPTABLE</b>                                              |                                                        | <input type="checkbox"/> <b>COMO SOLDADURA / As welded</b><br><input type="checkbox"/> <b>ESMERILADO / Ground</b>                 | <input checked="" type="checkbox"/> <b>MECANIZADO / Machined</b><br><input type="checkbox"/> <b>FORJADO / As Forged</b>         |
| <b>METODO CONTROL / Control Method</b>                                                                            |                                                        |                                                                                                                                   |                                                                                                                                 |
| <input type="checkbox"/> <b>SOLUBLE EN AGUA / Water washable</b><br><input type="checkbox"/> <b>VISIBLE</b>       |                                                        | <input type="checkbox"/> <b>POR EMULSIFICADO / Post emulsifiable</b><br><input type="checkbox"/> <b>FLUORESC.</b>                 | <input checked="" type="checkbox"/> <b>DISOLVENTE / Solvent removable</b><br><input checked="" type="checkbox"/> <b>VISIBLE</b> |
| <input type="checkbox"/> <b>FLUORESC.</b>                                                                         |                                                        | <input type="checkbox"/> <b>VISIBLE</b>                                                                                           | <input type="checkbox"/> <b>FLUORESC.</b>                                                                                       |
| <b>LIMPIEZA / Cleaner</b>                                                                                         |                                                        |                                                                                                                                   | <b>9PR-5</b>                                                                                                                    |
| <b>PENETRANTE / Penetrant</b>                                                                                     |                                                        |                                                                                                                                   | <b>996-P</b>                                                                                                                    |
| <b>EMULSIFICADOR / Emulsifier</b>                                                                                 |                                                        |                                                                                                                                   |                                                                                                                                 |
| <b>DISOLVENTE / Remover</b>                                                                                       |                                                        |                                                                                                                                   | <b>9PR-5</b>                                                                                                                    |
| <b>REVELADOR / Developer</b>                                                                                      |                                                        |                                                                                                                                   | <b>9D1-B</b>                                                                                                                    |
| <b>MARCA / Trade mark</b>                                                                                         |                                                        |                                                                                                                                   | <b>ARDROX</b>                                                                                                                   |
| <b>LONG. ONDA LUZ / Light wave length</b>                                                                         |                                                        |                                                                                                                                   |                                                                                                                                 |
| <b>PROCEDIMIENTO DE INSPECCIÓN / Inspection Procedure</b>                                                         |                                                        |                                                                                                                                   |                                                                                                                                 |
| <b>LIMPIEZA / Cleaning</b>                                                                                        | <b>ELIMINADOR Y TRAPOS / REMOVER &amp; CLOTHES</b>     | <b>SECADO / Drying process</b>                                                                                                    | <b>TEMP.AMBIENTE 20° ATMOSPHERE TEMP.</b>                                                                                       |
| <b>APLIC. PENETRANTE / Penetrant application</b>                                                                  | <b>996-P SPRAY</b>                                     | <b>TIEM. MIN. PENETRANT / Penet. min. time</b>                                                                                    | <b>15 MINUTOS</b>                                                                                                               |
| <b>ELIMINACION PENET. / Penetrant removal</b>                                                                     | <b>9PR-5</b>                                           | <b>APLIC. EMULSIFICAD. / Emulsifier application</b>                                                                               |                                                                                                                                 |
| <b>APLIC. REVELADOR / Developer application</b>                                                                   | <b>9D1-B SPRAY</b>                                     | <b>TIEM. MIN. REVELADO / Develop. min. time</b>                                                                                   | <b>7 MINUTOS</b>                                                                                                                |
| <b>TIEMPO MÁXIMO DE LECTURA / Checking time</b><br><b>1 HORA</b>                                                  |                                                        |                                                                                                                                   |                                                                                                                                 |
| <b>ACEPTACIÓN LIQUIDO DE ENSAYOS / Acceptance of testing liquid</b><br><b>SI / YES</b>                            |                                                        | <b>LIMPIEZA DESPUES DEL CONTROL / Cleaning after inspection</b><br><b>SI / YES</b>                                                |                                                                                                                                 |
| <b>RESULTADO / Results</b><br><b>NO SE OBSERVAN INDICACIONES RELEVANTES / NO REVELANT INDICATION ARE OBSERVED</b> |                                                        |                                                                                                                                   |                                                                                                                                 |
| <b>EL INSPECTOR DEL CLIENTE / Customer surveyor</b><br>Presenciada Inspección <input type="checkbox"/>            | <b>FIRMADO / Signature</b>                             | <b>OPERADOR / Operator</b><br><b>NIVEL II</b><br><b>FLOWSERVE</b><br>Jose A. Prieto<br>Planta Coslada<br>Control Calidad<br>Fdo.: | <b>EL JEFE DE CONTROL DE CALIDAD / FPD, Q.C. Chief.</b><br><b>FECHA / Date</b><br><b>04.11.2011</b>                             |



# SECTION 9

40212 / 40213

7.5.1/8 - Rev. 0

FUNDICIONES AL HORNO  
ELECTRICO DE ACERO  
MOLDEADO**electroaceros s.a.**

C.I.F.:A-31072911

Polígono Agustinos, Calle G, Parcela B-9  
Teléfono: 948 30 91 08 Fax: 948 30 91 72  
E-mail: fundicion@electroaceros.com

31013 PAMPLONA - NAVARRA

CORREO

27 MAYO 2011

FLOWERVE

FLOWERVE SPAIN, S.L.

AV. FUENTEMAR, 26-28

28820 COSLADA

Madrid

ELECTROACEROS, S.A. 31013 PAMPLONA-NAVARRA

EN-10204 3.1

## CERTIFICADO DE CALIDAD / QUALITY CERTIFICATE

|                                                              |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
|--------------------------------------------------------------|----------------------------------------|---------------------------------------------|-------------------------------------------|--------------------|--------------------------------------|-----------------------|-------|--------|-------|-------|
| Certificado n°<br>Certificate nr.                            | Fecha<br>Date                          | Albaran n°<br>Delivery note                 |                                           |                    |                                      |                       |       |        |       |       |
| 31.723                                                       | 16/05/2011                             | 23.843                                      |                                           |                    |                                      |                       |       |        |       |       |
| Pedido n°<br>Order nr.                                       | Cantidad<br>Quantity                   | Plano<br>Drawing                            |                                           |                    |                                      |                       |       |        |       |       |
| 56760                                                        | 3                                      | 350B21BT/1 CUERPO (14085)                   |                                           |                    |                                      |                       |       |        |       |       |
| N° Colada<br>Heat nr.                                        | N° Identificación<br>Marking           | Material<br>Material                        | Norma<br>According to                     |                    |                                      |                       |       |        |       |       |
| 15.079                                                       |                                        | WCB                                         | ASTM-A-216                                |                    |                                      |                       |       |        |       |       |
| ANALISIS QUIMICO / CHEMICAL ANALYSIS                         |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| % C                                                          | % Si                                   | % S                                         | % P                                       | % Mn               | % Ni                                 | % Cr                  | % Mo  | % V    | % Cu  | % W   |
| 0,211                                                        | 0,396                                  | 0,008                                       | 0,015                                     | 0,856              | 0,033                                | 0,107                 | 0,046 | 0,012  | 0,041 | 0,005 |
| % Ti                                                         | % Sn                                   | % Co                                        | % Al                                      | % Pb               | % B                                  | % Nb                  | % As  | % Zr   | % Bi  | % Ca  |
| 0,000                                                        | 0,005                                  | 0,001                                       | 0,004                                     | 0,002              | 0,000                                | 0,003                 | 0,008 | 0,001  | 0,010 | 0,000 |
| % Ce                                                         | % Sb                                   | % Te                                        | % Se                                      | % Ta               | % Zn                                 | % La                  | % N   | % Fe   | % Ceq |       |
| 0,002                                                        | 0,001                                  | 0,001                                       | 0,002                                     | 0,007              | 0,001                                | 0,000                 | 0,014 | 98,200 | 0,392 |       |
| PROPIEDADES MECANICAS / MECHANICAL TEST RESULTS              |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| Temp. Ensayo<br>Test Temp<br>°C                              | Resistencia<br>Tensile Strength<br>MPa | Límite Elástico<br>Yield Point<br>MPa 0,2 % | Alargamiento<br>Elongation<br>% Lo = 4 do |                    | Extracción<br>Reduction of Area<br>% |                       |       |        |       |       |
| 20                                                           | 498                                    | 299                                         | 30                                        |                    | 54                                   |                       |       |        |       |       |
| Resistencia ISO V (Julios) / Energy of impact ISO V (Joules) |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| Temp Ensayo °C<br>Test Tempe °C                              | 1<br>Julios/Joules                     | 2<br>Julios/Joules                          | 3<br>Julios/Joules                        | Media J<br>Average |                                      | Dureza HB<br>Hardness |       |        |       |       |
| -                                                            | -                                      | -                                           | -                                         | -                  |                                      | -                     |       |        |       |       |
| TRATAMIENTO TERMICO / HEAT TREATMENT                         |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| Tipo<br>Type                                                 | Temperatura °C<br>Temperature °C       | Mantenimiento<br>Maintenance                | Enfriamiento<br>Cooling                   |                    |                                      |                       |       |        |       |       |
| NORMALIZADO                                                  | 920                                    | 04:00                                       | AIRE CALMADO                              |                    |                                      |                       |       |        |       |       |
| OBSERVACIONES / REMARKS                                      |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| CUERPO CATA COTINETE / BEARING HOUSING CASING                |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
|                                                              |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
|                                                              |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |

**FLOWERVE**  
Plant: Fuentemara  
Aseguramiento Calidad  
Revisión:

FECHA/DATE:  
Inspector del Cliente/Customer inspector:

FECHA/DATE: 16/05/2011  
Inspector de Fábrica/Inspector:

**electroaceros, s.a.**  
Pol. Agustinos, C/ G, Parcela B9  
Tfno.: 948 309 108 - 31013 PAMPLONA



**electroaceros s.a.**

C.I.F.:A-31072911

Poligono Agustinos, Calle G, Parcela B-9  
Teléfono: 948 30 91 08 Fax: 948 30 91 72  
E-mail: fundicion@electroaceros.com

31013 PAMPLONA - NAVARRA

7.5.1/8 - Rev. 0  
FUNDICIONES AL HORNO  
ELECTRICO DE ACERO  
MOLDEADO

**FLOWERVE SPAIN, S.L.**  
AV. FUENTEMAR, 26-28  
28820 COSLADA  
Madrid

ELECTROACEROS, S.A. 31013 PAMPLONA-NAVARRA

**CERTIFICADO DE CALIDAD / QUALITY CERTIFICATE**

**EN-10204 3.1**

|                                                                     |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |
|---------------------------------------------------------------------|----------------------------------------|-----------------------------|---------------------------------------------|--------------------|-------------------------------------------|-----------------------|-----------------------|--------------------------------------|-------|-------|
| Certificado nº<br>Certificate nr.                                   | Fecha<br>Date                          | Albaran nº<br>Delivery note |                                             |                    |                                           |                       |                       |                                      |       |       |
| 31.724                                                              | 16/05/2011                             | 23.843                      |                                             |                    |                                           |                       |                       |                                      |       |       |
| Pedido nº<br>Order nr.                                              | Cantidad<br>Quantity                   | Plano<br>Drawing            |                                             |                    |                                           |                       |                       |                                      |       |       |
| 56760                                                               | 3                                      | 350B21BT/1 CUERPO (14085)   |                                             |                    |                                           |                       |                       |                                      |       |       |
| Nº Colada<br>Heat nr.                                               | Nº Identificación<br>Marking           | Material<br>Material        |                                             |                    |                                           | Norma<br>According to |                       |                                      |       |       |
| 15.129                                                              |                                        | WCB                         |                                             |                    |                                           | ASTM-A-216            |                       |                                      |       |       |
| <b>ANALISIS QUIMICO / CHEMICAL ANALYSIS</b>                         |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |
| % C                                                                 | % Si                                   | % S                         | % P                                         | % Mn               | % Ni                                      | % Cr                  | % Mo                  | % V                                  | % Cu  | % W   |
| 0,213                                                               | 0,380                                  | 0,007                       | 0,016                                       | 0,885              | 0,072                                     | 0,201                 | 0,029                 | 0,007                                | 0,057 | 0,005 |
| % Ti                                                                | % Sn                                   | % Co                        | % Al                                        | % Pb               | % B                                       | % Nb                  | % As                  | % Zr                                 | % Bi  | % Ca  |
| 0,001                                                               | 0,006                                  | 0,001                       | 0,004                                       | 0,002              | 0,000                                     | 0,007                 | 0,009                 | 0,001                                | 0,008 | 0,000 |
| % Ce                                                                | % Sb                                   | % Te                        | % Se                                        | % Ta               | % Zn                                      | % La                  | % N                   | % Fe                                 | % Ceq |       |
| 0,002                                                               | 0,001                                  | 0,002                       | 0,002                                       | 0,007              | 0,001                                     | 0,000                 | 0,014                 | 98,000                               | 0,417 |       |
| <b>PROPIEDADES MECANICAS / MECHANICAL TEST RESULTS</b>              |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |
| Temp. Ensayo<br>Test Temp<br>°C                                     | Resistencia<br>Tensile Strength<br>MPa |                             | Limite Elástico<br>Yield Point<br>MPa 0,2 % |                    | Alargamiento<br>Elongation<br>% Lo = 4 do |                       |                       | Extracción<br>Reduction of Area<br>% |       |       |
| 20                                                                  | 523                                    |                             | 303                                         |                    | 29,4                                      |                       |                       | 51,9                                 |       |       |
| <b>Resistencia ISO V (Julios) / Energy of impact ISO V (Joules)</b> |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |
| Temp Ensayo °C<br>Test Tempe °C                                     | 1<br>Julios/Joules                     | 2<br>Julios/Joules          | 3<br>Julios/Joules                          | Media J<br>Average |                                           |                       | Dureza HB<br>Hardness |                                      |       |       |
| -                                                                   | -                                      | -                           | -                                           | -                  |                                           |                       | -                     |                                      |       |       |
| <b>TRATAMIENTO TERMICO / HEAT TREATMENT</b>                         |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |
| Tipo<br>Type                                                        | Temperatura °C<br>Temperature °C       |                             | Mantenimiento<br>Maintenance                |                    | Enfriamiento<br>Cooling                   |                       |                       |                                      |       |       |
| NORMALIZADO                                                         | 920                                    |                             | 04:00                                       |                    | AIRE CALMADO                              |                       |                       |                                      |       |       |
| <b>OBSERVACIONES / REMARKS</b>                                      |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |
| CUERPO CATA COJINETE / BEARING HOUSING CASING                       |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |
|                                                                     |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |
|                                                                     |                                        |                             |                                             |                    |                                           |                       |                       |                                      |       |       |

**FLOWERVE**  
Planta Coslada  
Aseguramiento Calidad  
Revisado

FECHA/DATE:  
Inspector del Cliente/Customer inspector:

FECHA/DATE: 16/05/2011  
Inspector de Fábrica/Inspector:

**electroaceros, s.a.**  
Pol. Agustinos, C/ G, Parcela B9  
Tfno.: 948 309 108 - 31013 PAMPLONA

**FLOWERVE SPAIN, S.L.**  
AV. FUENTEMAR, 26-28  
28820 COSLADA  
Madrid

ELECTROACEROS, S.A. 31013 PAMPLONA-NAVARRA

**CERTIFICADO DE CALIDAD / QUALITY CERTIFICATE**

**EN-10204 3.1**

|                                                                     |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
|---------------------------------------------------------------------|----------------------------------------|---------------------------------------------|-------------------------------------------|--------------------|--------------------------------------|-----------------------|-------|--------|-------|-------|
| Certificado nº<br>Certificate nr.                                   | Fecha<br>Date                          | Albaran nº<br>Delivery note                 |                                           |                    |                                      |                       |       |        |       |       |
| 31.727                                                              | 16/05/2011                             | 23.843                                      |                                           |                    |                                      |                       |       |        |       |       |
| Pedido nº<br>Order nr.                                              | Cantidad<br>Quantity                   | Plano<br>Drawing                            |                                           |                    |                                      |                       |       |        |       |       |
| 56760                                                               | 3                                      | 350B21BL CUERPO 711140840                   |                                           |                    |                                      |                       |       |        |       |       |
| Nº Colada<br>Heat nr.                                               | Nº Identificación<br>Marking           | Material<br>Material                        | Norma<br>According to                     |                    |                                      |                       |       |        |       |       |
| 15.079                                                              |                                        | WCB                                         | ASTM-A-216                                |                    |                                      |                       |       |        |       |       |
| <b>ANALISIS QUIMICO / CHEMICAL ANALYSIS</b>                         |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| % C                                                                 | % Si                                   | % S                                         | % P                                       | % Mn               | % Ni                                 | % Cr                  | % Mo  | % V    | % Cu  | % W   |
| 0,211                                                               | 0,396                                  | 0,008                                       | 0,015                                     | 0,856              | 0,033                                | 0,107                 | 0,046 | 0,012  | 0,041 | 0,005 |
| % Ti                                                                | % Sn                                   | % Co                                        | % Al                                      | % Pb               | % B                                  | % Nb                  | % As  | % Zr   | % Bi  | % Ca  |
| 0,000                                                               | 0,005                                  | 0,001                                       | 0,004                                     | 0,002              | 0,000                                | 0,003                 | 0,008 | 0,001  | 0,010 | 0,000 |
| % Ce                                                                | % Sb                                   | % Te                                        | % Se                                      | % Ta               | % Zn                                 | % La                  | % N   | % Fe   | % Ceq |       |
| 0,002                                                               | 0,001                                  | 0,001                                       | 0,002                                     | 0,007              | 0,001                                | 0,000                 | 0,014 | 98,200 | 0,392 |       |
| <b>PROPIEDADES MECANICAS / MECHANICAL TEST RESULTS</b>              |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| Temp. Ensayo<br>Test Temp<br>°C                                     | Resistencia<br>Tensile Strength<br>MPa | Límite Elástico<br>Yield Point<br>MPa 0,2 % | Alargamiento<br>Elongation<br>% Lo = 4 do |                    | Extracción<br>Reduction of Area<br>% |                       |       |        |       |       |
| 20                                                                  | 498                                    | 299                                         | 30                                        |                    | 54                                   |                       |       |        |       |       |
| <b>Resiliencia ISO V (Julios) / Energy of impact ISO V (Joules)</b> |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| Temp Ensayo °C<br>Test Tempe °C                                     | 1<br>Julios/Joules                     | 2<br>Julios/Joules                          | 3<br>Julios/Joules                        | Media J<br>Average |                                      | Dureza HB<br>Hardness |       |        |       |       |
| -                                                                   | -                                      | -                                           | -                                         | -                  |                                      | -                     |       |        |       |       |
| <b>TRATAMIENTO TERMICO / HEAT TREATMENT</b>                         |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| Tipo<br>Type                                                        | Temperatura °C<br>Temperature °C       | Mantenimiento<br>Maintenance                | Enfriamiento<br>Cooling                   |                    |                                      |                       |       |        |       |       |
| NORMALIZADO                                                         | 920                                    | 04:00                                       | AIRE CALMADO                              |                    |                                      |                       |       |        |       |       |
| <b>OBSERVACIONES / REMARKS</b>                                      |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
| CUERPO CASA COJINETE / BEARING HOUSING CASING                       |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
|                                                                     |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |
|                                                                     |                                        |                                             |                                           |                    |                                      |                       |       |        |       |       |

**FLOWERVE**

Planta Coslada  
Aseguramiento Calidad  
Revisado

FECHA/DATE:  
Inspector del Cliente/Customer inspector:

FECHA/DATE: 16/05/2011  
Inspector de Fábrica/Inspector:

**FA electroaceros, s.a.**  
Pol. Agustinos, C/ G. Parcela B9  
Tfno.: 948 309 108 - 31013 PAMPLONA

**CERTIFICADO DE CALIDAD / QUALITY CERTIFICATE**

**EN-10204 3.1**

|                                                                     |                                        |                                  |                                             |                              |                                           |                       |                         |                                      |       |       |
|---------------------------------------------------------------------|----------------------------------------|----------------------------------|---------------------------------------------|------------------------------|-------------------------------------------|-----------------------|-------------------------|--------------------------------------|-------|-------|
| Certificado nº<br>Certificate nr.                                   | Fecha<br>Date                          | Albaran nº<br>Delivery note      |                                             |                              |                                           |                       |                         |                                      |       |       |
| 31.728                                                              | 16/05/2011                             | 23.843                           |                                             |                              |                                           |                       |                         |                                      |       |       |
| Pedido nº<br>Order nr.                                              | Cantidad<br>Quantity                   | Plano<br>Drawing                 |                                             |                              |                                           |                       |                         |                                      |       |       |
| 56760                                                               | 3                                      | 350B21BL CUERPO 711140840        |                                             |                              |                                           |                       |                         |                                      |       |       |
| Nº Colada<br>Heat nr.                                               | Nº Identificación<br>Marking           | Material<br>Material             |                                             |                              |                                           | Norma<br>According to |                         |                                      |       |       |
| 15.129                                                              |                                        | WCB                              |                                             |                              |                                           | ASTM-A-216            |                         |                                      |       |       |
| <b>ANALISIS QUIMICO / CHEMICAL ANALYSIS</b>                         |                                        |                                  |                                             |                              |                                           |                       |                         |                                      |       |       |
| % C                                                                 | % Si                                   | % S                              | % P                                         | % Mn                         | % Ni                                      | % Cr                  | % Mo                    | % V                                  | % Cu  | % W   |
| 0,213                                                               | 0,380                                  | 0,007                            | 0,016                                       | 0,885                        | 0,072                                     | 0,201                 | 0,029                   | 0,007                                | 0,057 | 0,005 |
| % Ti                                                                | % Sn                                   | % Co                             | % Al                                        | % Pb                         | % B                                       | % Nb                  | % As                    | % Zr                                 | % Bi  | % Ca  |
| 0,001                                                               | 0,006                                  | 0,001                            | 0,004                                       | 0,002                        | 0,000                                     | 0,007                 | 0,009                   | 0,001                                | 0,008 | 0,000 |
| % Ce                                                                | % Sb                                   | % Te                             | % Se                                        | % Ta                         | % Zn                                      | % La                  | % N                     | % Fe                                 | % Ceq |       |
| 0,002                                                               | 0,001                                  | 0,002                            | 0,002                                       | 0,007                        | 0,001                                     | 0,000                 | 0,014                   | 98,000                               | 0,417 |       |
| <b>PROPIEDADES MECANICAS / MECHANICAL TEST RESULTS</b>              |                                        |                                  |                                             |                              |                                           |                       |                         |                                      |       |       |
| Temp. Ensayo<br>Test Temp<br>°C                                     | Resistencia<br>Tensile Strength<br>MPa |                                  | Límite Elástico<br>Yield Point<br>MPa 0,2 % |                              | Alargamiento<br>Elongation<br>% Lo = 4 do |                       |                         | Extricción<br>Reduction of Area<br>% |       |       |
| 20                                                                  | 523                                    |                                  | 303                                         |                              | 29,4                                      |                       |                         | 51,9                                 |       |       |
| <b>Resistencia ISO V (Julios) / Energy of impact ISO V (Joules)</b> |                                        |                                  |                                             |                              |                                           |                       |                         |                                      |       |       |
| Temp Ensayo °C<br>Test Tempe °C                                     | 1<br>Julios/Joules                     | 2<br>Julios/Joules               | 3<br>Julios/Joules                          | Media J<br>Average           |                                           |                       | Dureza HB<br>Hardness   |                                      |       |       |
|                                                                     | -                                      | -                                | -                                           | -                            |                                           |                       | -                       |                                      |       |       |
| <b>TRATAMIENTO TERMICO / HEAT TREATMENT</b>                         |                                        |                                  |                                             |                              |                                           |                       |                         |                                      |       |       |
| Tipo<br>Type                                                        |                                        | Temperatura °C<br>Temperature °C |                                             | Mantenimiento<br>Maintenance |                                           |                       | Enfriamiento<br>Cooling |                                      |       |       |
| NORMALIZADO                                                         |                                        | 920                              |                                             | 04:00                        |                                           |                       | AIRE CALMADO            |                                      |       |       |
| <b>OBSERVACIONES / REMARKS</b>                                      |                                        |                                  |                                             |                              |                                           |                       |                         |                                      |       |       |
| CUERPO CATA COTINETE / BEARING HOUSING CASING                       |                                        |                                  |                                             |                              |                                           |                       |                         |                                      |       |       |

**FLOWERVE**

Planta Coslada  
Aseguramiento Calidad  
Revisado:

FECHA/DATE:  
Inspector del Cliente/Customer inspector:

FECHA/DATE: 16/05/2011  
Inspector de Fábrica/Inspector:

**electroaceros, s.a.**

Pol. Agustinos, C.I. G, Parcela B9  
Tfno.: 948 309 108 - 31013 PAMPLONA

**CERTIFICADO DE CALIDAD / QUALITY CERTIFICATE**

**EN-10204 3.1**

|                                                                     |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |
|---------------------------------------------------------------------|----------------------------------------|---------------------------------------------|-------------------------------------------|--------------------|--------------------------------------|-------|-------|--------|-------|-------|
| Certificado n°<br>Certificate nr.                                   | Fecha<br>Date                          | Albaran n°<br>Delivery note                 |                                           |                    |                                      |       |       |        |       |       |
| 31.614                                                              | 27/04/2011                             | 23.794                                      |                                           |                    |                                      |       |       |        |       |       |
| Pedido n°<br>Order nr.                                              | Cantidad<br>Quantity                   | Plano<br>Drawing                            |                                           |                    |                                      |       |       |        |       |       |
| 56760                                                               | 1                                      | 350B23S TAPA (711140490)                    |                                           |                    |                                      |       |       |        |       |       |
| N° Colada<br>Heat nr.                                               | N° Identificación<br>Marking           | Material<br>Material                        | Norma<br>According to                     |                    |                                      |       |       |        |       |       |
| 14.940                                                              |                                        | WCB                                         | ASTM-A-216                                |                    |                                      |       |       |        |       |       |
| <b>ANALISIS QUIMICO / CHEMICAL ANALYSIS</b>                         |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |
| % C                                                                 | % Si                                   | % S                                         | % P                                       | % Mn               | % Ni                                 | % Cr  | % Mo  | % V    | % Cu  | % W   |
| 0,210                                                               | 0,395                                  | 0,007                                       | 0,019                                     | 0,841              | 0,034                                | 0,151 | 0,017 | 0,005  | 0,042 | 0,005 |
| % Ti                                                                | % Sn                                   | % Co                                        | % Al                                      | % Pb               | % B                                  | % Nb  | % As  | % Zr   | % Bi  | % Ca  |
| 0,000                                                               | 0,005                                  | 0,001                                       | 0,005                                     | 0,003              | 0,000                                | 0,006 | 0,008 | 0,001  | 0,009 | 0,000 |
| % Ce                                                                | % Sb                                   | % Te                                        | % Se                                      | % Ta               | % Zn                                 | % La  | % N   | % Fe   | % Ceq |       |
| 0,002                                                               | 0,001                                  | 0,001                                       | 0,002                                     | 0,007              | 0,002                                | 0,000 | 0,006 | 98,200 | 0,390 |       |
| <b>PROPIEDADES MECANICAS / MECHANICAL TEST RESULTS</b>              |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |
| Temp. Ensayo<br>Test Temp<br>°C                                     | Resistencia<br>Tensile Strength<br>MPa | Límite Elástico<br>Yield Point<br>MPa 0,2 % | Alargamiento<br>Elongation<br>% Lo = 4 do |                    | Extricción<br>Reduction of Area<br>% |       |       |        |       |       |
| 20                                                                  | 528                                    | 309                                         | 28,4                                      |                    | 51,9                                 |       |       |        |       |       |
| <b>Resistencia ISO V (Julios) / Energy of impact ISO V (Joules)</b> |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |
| Temp Ensayo °C<br>Test Tempe °C                                     | 1<br>Julios/Joules                     | 2<br>Julios/Joules                          | 3<br>Julios/Joules                        | Media J<br>Average | Dureza HB<br>Hardness                |       |       |        |       |       |
| -                                                                   | -                                      | -                                           | -                                         | -                  | -                                    |       |       |        |       |       |
| <b>TRATAMIENTO TERMICO / HEAT TREATMENT</b>                         |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |
| Tipo<br>Type                                                        | Temperatura °C<br>Temperature °C       | Mantenimiento<br>Maintenance                | Enfriamiento<br>Cooling                   |                    |                                      |       |       |        |       |       |
| NORMALIZADO                                                         | 920                                    | 04:00                                       | AIRE CALMADO                              |                    |                                      |       |       |        |       |       |
| <b>OBSERVACIONES / REMARKS</b>                                      |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |
| TAPA CATA COTINETE / BEARING HOUSING COVER                          |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |
|                                                                     |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |
|                                                                     |                                        |                                             |                                           |                    |                                      |       |       |        |       |       |

**FLOWERVE**

Planta Coslada  
Aseguramiento Calidad  
Revisado:

FECHA/DATE:  
Inspector del Cliente/Customer inspector:

FECHA/DATE: 27/04/2011  
Inspector de Fábrica/Inspector:

**electroaceros, s.a.**

Pol. Agustinos, C/ G, Parcela B9  
Tfno.: 948 309 108 - 31013 PAMPLONA



**FA electroaceros s.a.**

C.I.F.:A-31072911

Polígono Agustinos, Calle G, Parcela B-9  
Teléfono: 948 30 91 08 Fax: 948 30 91 72  
E-mail: fundicion@electroaceros.com

31013 PAMPLONA - NAVARRA

7.5.1/8 - Rev. 0  
FUNDICIONES AL HORNO  
ELECTRICO DE ACERO  
MOLDEADO

**FLOWERVE SPAIN, S.L.**  
AV. FUENTEMAR, 26-28  
28820 COSLADA  
Madrid

ELECTROACEROS, S.A. 31013 PAMPLONA-NAVARRA

**CERTIFICADO DE CALIDAD / QUALITY CERTIFICATE**

**EN-10204 3.1**

|                                                                     |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
|---------------------------------------------------------------------|----------------------------------------|-----------------------------|---------------------------------------------|--------------------|-------------------------------------------|-------------------------|-----------------------|--------------------------------------|-------|-------|
| Certificado nº<br>Certificate nr.                                   | Fecha<br>Date                          | Albaran nº<br>Delivery note |                                             |                    |                                           |                         |                       |                                      |       |       |
| 31.725                                                              | 16/05/2011                             | 23.843                      |                                             |                    |                                           |                         |                       |                                      |       |       |
| Pedido nº<br>Order nr.                                              | Cantidad<br>Quantity                   | Plano<br>Drawing            |                                             |                    |                                           |                         |                       |                                      |       |       |
| 56760                                                               | 6                                      | 350B23V TAPA 711140860      |                                             |                    |                                           |                         |                       |                                      |       |       |
| Nº Colada<br>Heat nr.                                               | Nº Identificación<br>Marking           | Material<br>Material        |                                             |                    | Norma<br>According to                     |                         |                       |                                      |       |       |
| 15.129                                                              |                                        | WCB                         |                                             |                    | ASTM-A-216                                |                         |                       |                                      |       |       |
| <b>ANALISIS QUIMICO / CHEMICAL ANALYSIS</b>                         |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
| % C                                                                 | % Si                                   | % S                         | % P                                         | % Mn               | % Ni                                      | % Cr                    | % Mo                  | % V                                  | % Cu  | % W   |
| 0,213                                                               | 0,380                                  | 0,007                       | 0,016                                       | 0,885              | 0,072                                     | 0,201                   | 0,029                 | 0,007                                | 0,057 | 0,005 |
| % Ti                                                                | % Sn                                   | % Co                        | % Al                                        | % Pb               | % B                                       | % Nb                    | % As                  | % Zr                                 | % Bi  | % Ca  |
| 0,001                                                               | 0,006                                  | 0,001                       | 0,004                                       | 0,002              | 0,000                                     | 0,007                   | 0,009                 | 0,001                                | 0,008 | 0,000 |
| % Ce                                                                | % Sb                                   | % Te                        | % Se                                        | % Ta               | % Zn                                      | % La                    | % N                   | % Fe                                 | % Ceq |       |
| 0,002                                                               | 0,001                                  | 0,002                       | 0,002                                       | 0,007              | 0,001                                     | 0,000                   | 0,014                 | 98,000                               | 0,417 |       |
| <b>PROPIEDADES MECANICAS / MECHANICAL TEST RESULTS</b>              |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
| Temp. Ensayo<br>Test Temp<br>°C                                     | Resistencia<br>Tensile Strength<br>MPa |                             | Límite Elástico<br>Yield Point<br>MPa 0,2 % |                    | Alargamiento<br>Elongation<br>% Lo = 4 do |                         |                       | Extracción<br>Reduction of Area<br>% |       |       |
| 20                                                                  | 523                                    |                             | 303                                         |                    | 29,4                                      |                         |                       | 51,9                                 |       |       |
| <b>Resistencia ISO V (Julios) / Energy of impact ISO V (Joules)</b> |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
| Temp Ensayo °C<br>Test Tempe °C                                     | 1<br>Julios/Joules                     | 2<br>Julios/Joules          | 3<br>Julios/Joules                          | Media J<br>Average |                                           |                         | Dureza HB<br>Hardness |                                      |       |       |
| -                                                                   | -                                      | -                           | -                                           | -                  |                                           |                         | -                     |                                      |       |       |
| <b>TRATAMIENTO TERMICO / HEAT TREATMENT</b>                         |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
| Tipo<br>Type                                                        | Temperatura °C<br>Temperature °C       |                             | Mantenimiento<br>Maintenance                |                    |                                           | Enfriamiento<br>Cooling |                       |                                      |       |       |
| NORMALIZADO                                                         | 920                                    |                             | 04:00                                       |                    |                                           | AIRE CALMADO            |                       |                                      |       |       |
|                                                                     |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
|                                                                     |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
| <b>OBSERVACIONES / REMARKS</b>                                      |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
| TAPA CAJA COJINETE / BEARING HOUSING COVER                          |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
|                                                                     |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
|                                                                     |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |
|                                                                     |                                        |                             |                                             |                    |                                           |                         |                       |                                      |       |       |

**FLOWERVE**

Planta Coslada  
Aseguramiento de Calidad  
Revisado:

FECHA/DATE:  
Inspector del Cliente/Customer inspector:

FECHA/DATE: 16/05/2011  
Inspector de Fábrica/Inspector:

**FA electroaceros s.a.**  
Pol. Agustinos, C/ G, Parcela B9  
Tfno.: 948 309108 - 31013 PAMPLONA

**CERTIFICADO DE CALIDAD / QUALITY CERTIFICATE**

**EN-10204 3.1**

|                                                                     |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
|---------------------------------------------------------------------|--------------------|----------------------------------------|----------------------|---------------------------------------------|--------------------------|-------------------------------------------|-----------------------|--------------------------------------|-----------------------|-------|--|
| Certificado nº<br>Certificate nr.                                   |                    | Fecha<br>Date                          |                      | Albaran nº<br>Delivery note                 |                          |                                           |                       |                                      |                       |       |  |
| 31.726                                                              |                    | 16/05/2011                             |                      | 23.843                                      |                          |                                           |                       |                                      |                       |       |  |
| Pedido nº<br>Order nr.                                              |                    |                                        | Cantidad<br>Quantity |                                             | Plano<br>Drawing         |                                           |                       |                                      |                       |       |  |
| 56760                                                               |                    |                                        | 5                    |                                             | 350B23S TAPA (711140490) |                                           |                       |                                      |                       |       |  |
| Nº Colada<br>Heat nr.                                               |                    | Nº Identificación<br>Marking           |                      | Material<br>Material                        |                          |                                           | Norma<br>According to |                                      |                       |       |  |
| 15.129                                                              |                    |                                        |                      | WCB                                         |                          |                                           | ASTM-A-216            |                                      |                       |       |  |
| <b>ANALISIS QUIMICO / CHEMICAL ANALYSIS</b>                         |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
| % C                                                                 | % Si               | % S                                    | % P                  | % Mn                                        | % Ni                     | % Cr                                      | % Mo                  | % V                                  | % Cu                  | % W   |  |
| 0,213                                                               | 0,380              | 0,007                                  | 0,016                | 0,885                                       | 0,072                    | 0,201                                     | 0,029                 | 0,007                                | 0,057                 | 0,005 |  |
| % Ti                                                                | % Sn               | % Co                                   | % Al                 | % Pb                                        | % B                      | % Nb                                      | % As                  | % Zr                                 | % Bi                  | % Ca  |  |
| 0,001                                                               | 0,006              | 0,001                                  | 0,004                | 0,002                                       | 0,000                    | 0,007                                     | 0,009                 | 0,001                                | 0,008                 | 0,000 |  |
| % Ce                                                                | % Sb               | % Te                                   | % Se                 | % Ta                                        | % Zn                     | % La                                      | % N                   | % Fe                                 | % Ceq                 |       |  |
| 0,002                                                               | 0,001              | 0,002                                  | 0,002                | 0,007                                       | 0,001                    | 0,000                                     | 0,014                 | 98,000                               | 0,417                 |       |  |
| <b>PROPIEDADES MECANICAS / MECHANICAL TEST RESULTS</b>              |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
| Temp. Ensayo<br>Test Temp<br>°C                                     |                    | Resistencia<br>Tensile Strength<br>MPa |                      | Límite Elástico<br>Yield Point<br>MPa 0,2 % |                          | Alargamiento<br>Elongation<br>% Lo = 4 do |                       | Extracción<br>Reduction of Area<br>% |                       |       |  |
| 20                                                                  |                    | 523                                    |                      | 303                                         |                          | 29,4                                      |                       | 51,9                                 |                       |       |  |
| <b>Resiliencia ISO V (Julios) / Energy of impact ISO V (Joules)</b> |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
| Temp Ensayo °C<br>Test Tempe °C                                     | 1<br>Julios/Joules |                                        | 2<br>Julios/Joules   |                                             | 3<br>Julios/Joules       |                                           | Media J<br>Average    |                                      | Dureza HB<br>Hardness |       |  |
| -                                                                   | -                  |                                        | -                    |                                             | -                        |                                           | -                     |                                      | -                     |       |  |
| <b>TRATAMIENTO TERMICO / HEAT TREATMENT</b>                         |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
| Tipo<br>Type                                                        |                    | Temperatura °C<br>Temperature °C       |                      | Mantenimiento<br>Maintenance                |                          | Enfriamiento<br>Cooling                   |                       |                                      |                       |       |  |
| NORMALIZADO                                                         |                    | 920                                    |                      | 04:00                                       |                          | AIRE CALMADO                              |                       |                                      |                       |       |  |
|                                                                     |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
|                                                                     |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
| <b>OBSERVACIONES / REMARKS</b>                                      |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
| TAPA CATA COJINETES / BEARING HOUSING COVER                         |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
|                                                                     |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |
|                                                                     |                    |                                        |                      |                                             |                          |                                           |                       |                                      |                       |       |  |

**FLOWERVE**

Planta Coslada  
Aseguramiento de Calidad  
Revisado:

FECHA/DATE:  
Inspector del Cliente/Customer inspector:

FECHA/DATE: 16/05/2011  
Inspector de Fábrica/Inspector:

**electroaceros, s.a.**  
Pol. Agustinos, C/ G, Parcela B9  
Tfno.: 948 309 108 31013 PAMPLONA



# SECTION 10

**Certificado de Material N°.**  
**Quality Certificate No.**  
**S/EN10204 3.1**

15744

**DATOS DE CONTROL / CONTROL DATA****Fecha / Date**

1 DE SEPTIEMBRE DE 2011

|                                 |                    |                                                 |                 |
|---------------------------------|--------------------|-------------------------------------------------|-----------------|
| <b>Cliente</b><br>Customer      | FLOWERVE SPAIN S.L | <b>N° Orden de Compra</b><br>Purchase Order No. | 57964           |
| <b>Albaran</b><br>Delivery Note | 11-835             | <b>Requisición</b><br>Requisition               | COS-10-10P40213 |

**ESPECIFICACIÓN DEL MATERIAL / MATERIAL SPECIFICATIONS**

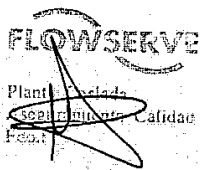
| Item | Pieza / Objet                     | Material Material | Medida Measures | Cantidad Quantity | Colada Heat No. |
|------|-----------------------------------|-------------------|-----------------|-------------------|-----------------|
| 1    | TUERCA PPAL / NUT 200B179XE60     | A194 GR 2H        | 2" 8N           | 56                | 55728           |
| 2    | ESPARRAGO PPAL / STUD 200D178XE68 | A193 GR B7        | 2"8N 3AX1590    | 28                | 1031902         |
| 3    |                                   |                   |                 |                   |                 |
| 4    |                                   |                   |                 |                   |                 |

**COMPOSICION QUÍMICA / CHEMICAL COMPOSITION**

| Colada Heat No. | ITEM | C     | Si    | Mn    | P     | S     | Cr    | Mo    | Ni | Co | V | Fe | Ti |
|-----------------|------|-------|-------|-------|-------|-------|-------|-------|----|----|---|----|----|
| 55278           | 1    | 0.410 | 0.330 | 0.850 | 0.010 | 0.026 |       |       |    |    |   |    |    |
| 1031902         | 2    | 0.395 | 0.200 | 0.730 | 0.015 | 0.022 | 1.040 | 0.190 |    |    |   |    |    |
|                 |      |       |       |       |       |       |       |       |    |    |   |    |    |
|                 |      |       |       |       |       |       |       |       |    |    |   |    |    |

**CARACTERISTICAS MECÁNICAS / MECHANICAL FEATURES**

| Colada Heat No. | ITEM | Resistencia Resistance N/MM2 | Limite elástico Elastic limit N/MM2 | Alargamiento o Stretching % | Estricción Striction | Resiliencia kg/cm2 | T.Térmico Thermic Processing | Dureza Hardness |
|-----------------|------|------------------------------|-------------------------------------|-----------------------------|----------------------|--------------------|------------------------------|-----------------|
| 55278           | 1    |                              |                                     |                             |                      |                    | T Y R                        | 296HB           |
| 103902          | 2    | 945                          | 803                                 | 19.9                        | 59.9                 |                    | T Y R                        | 286HB           |
|                 |      |                              |                                     |                             |                      |                    |                              |                 |
|                 |      |                              |                                     |                             |                      |                    |                              |                 |

|                                                                                                                                                   |                                                                                                                                                                           |                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Plantilla Colada<br/>separadamente Calidades<br/>Firma</p> | <p><b>Sello y Firma Inspección /</b><br/><b>Seal and Signature for Inspection</b></p>  | <p><b>Firma y sello Empresa /</b><br/><b>Seal and Signature for the Company</b></p>  |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



PEDIDO/ORDER: 41058  
CLIENTE/CUSTOMER: SUM. AUÑON

Sistema de calidad certificado

PRESSURE BOLTING

**CERTIFICADO DE MATERIAL/ MATERIAL CERTIFICATION S/EN-10204 3.1**  
**COMPOSICION QUIMICA Y ENSAYOS MECANICOS/HEAT ANALYSIS AND MECHANICAL TESTS**

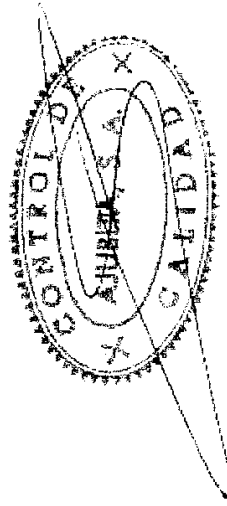
| COLADA/<br>HEAT | CLAVE/<br>KEY | DIAM | PIEZA/<br>PART       | (C) | (MN) | (SD) | (P)  | (S)  | (CR) | (MO) | RE/TE<br>MPa | LE/YE<br>MPa | AL/LO<br>NG% | E%   | DUR/<br>HARD<br>NESS | DUR-<br>ANT/<br>DNES | DUR-<br>POST/<br>AGING | PROOF<br>LOAD   | TRAYT<br>REATM<br>ENT   | TEMPTR<br>AT/HT<br>EMP | TIEMTR<br>AT/TIM<br>E/HT    | ENFR/AM<br>TO/COOL<br>NG | ENVE/EA<br>GINGTRE<br>AT |      |
|-----------------|---------------|------|----------------------|-----|------|------|------|------|------|------|--------------|--------------|--------------|------|----------------------|----------------------|------------------------|-----------------|-------------------------|------------------------|-----------------------------|--------------------------|--------------------------|------|
| 21115           | VE            | 1/2  | TCAN<br>UT           | .49 | .75  | .18  | .026 | .030 | ---- | ---  | ----         | ----         | ---          | ---  | ----                 | 289HB                | 282HB                  | 24830L<br>BF OK | TEM-<br>REV/QU<br>ENCH- | 860-<br>580°C*         | 1HORA/<br>1HOUR             | ACET/OI                  | 540°C24H                 | L*   |
| 30780           | TD            | 5/8  | ESP/ST<br>UDBO<br>LT | .40 | .76  | .25  | .015 | .021 | 1.03 | .19  | 1047         | 795          | 17,9         | 58,3 | 320HB                | ----                 | ----                   | -----           | TEM-<br>REV/QU<br>ENCH- | 840-<br>620°C*         | 2-<br>4HOUR/<br>2-<br>4HOUR | ACET/OI                  | ----                     | ---- |
| 38167           | AK            | 5/8  | TCAN<br>UT           | .43 | .72  | .28  | .014 | .015 | ---  | ---- | ----         | ---          | ---          | ---  | ----                 | 290HB                | 284HB                  | 39550L<br>BF OK | TEM-<br>REV/QU<br>ENCH- | 860-<br>580°C*         | 1HORA/<br>1HOUR             | ACET/OI                  | 540°C24H                 | L*   |
| 404812          | QM            | M20  | ESP/ST<br>UDBO<br>LT | .43 | .85  | .25  | .013 | .022 | 1,04 | .17  | 1008         | 877          | 18           | 59,3 | 309HB                | ----                 | ----                   | -----           | TEM-<br>REV/QU<br>ENCH- | 840-<br>620°C*         | 2-<br>4HOUR/<br>2-<br>4HOUR | ACET/OI                  | ----                     | ---- |

VALORES ORIENTATIVOS/ORIENTATIVES VALUES

CLASE DE MATERIAL/MATERIAL SPECIFICATION: A-193-B7/A-194-2H 2010

COMPRENDE DEL PEDIDO CITADO:

TUERCAS DE 5/8 300 - 1/2 200 - NUTS 5/8  
ESPRAGOS DE 5/8X90 80 - 5/8X80 16 - 5/8X100 9 - M20X170 9 - STUDS 5/8X90



FLOWSERVE

Planta Costada  
Aseguramiento Calidad  
Pdo.:



# SECTION 11



BARZAL  
METALICAS, S.L.

800.024.04

CERTIFICADO DE CONFORMIDAD

CERTIFICATE OF COMPLIANCE

CLIENTE: FLOWSERVE

Customer:

Nº PEDIDO: 60845

Order number:

FECHA DE CONTROL : 30/9/2011

Control date:

LOTE DE CONTROL: V-719

Lot control :

Nº DE BULTOS: 2

Number of packages:

BANCADA Nº 1 / BASEPLATE Nº 1

| Nº ALBARAN<br>Delivery note | DESCRIPCION<br>Description | CANTIDAD<br>Quantity |
|-----------------------------|----------------------------|----------------------|
|-----------------------------|----------------------------|----------------------|

A24456/30-9/2011 BANCADA 4X12WXH87XE97

1

A24456/30-9/2011 PEDESTAL 4X12WXH188XE142

1

Las piezas que constituyen estas partidas **están fabricadas en conformidad** según la norma UNE-EN-ISO 9001:2008 y siguiendo las especificaciones del plano y pedido de cliente arriba indicado.

*The pieces of these items are in conformity UNE-EN-ISO 9001:2008 and required specifications by the sales order level indicated.*

La pintura es conforme según procedimiento Nº PP02\_40213\_REV.0 y QCP Nº 2243 REV.3 requerido por el cliente.

*The painting is in conformity as procedure Nº PP02\_40213\_REV.0 y QCP Nº 2243 REV.3 requested by customer.*

En Serranillos del Valle, a 30 de Septiembre 2011

FLOWSERVE

Planta Coslada  
Aseguramiento Calidad  
Fdo.:





CLIENTE: FLOWSERVE

Customer::

Nº PEDIDO: 60845

Order number:

FECHA DE CONTROL : 6/10/2011

Control date:

LOTE DE CONTROL: V-719

Lot control :

Nº DE BULTOS: 2

Number of packages:

BANCADA Nº1 / BASEPLATE Nº2

| Nº ALBARAN<br>Delivery note | DESCRIPCION<br>Description      | CANTIDAD<br>Quantity |
|-----------------------------|---------------------------------|----------------------|
| A24462/6-10/2011            | BANCADA 4X12WXH87XE97           | 1                    |
| A24462/6-10/2011            | PEDESTAL 4X12WXH188XE142        | 1                    |
| A24462/6-10/2011            | TENSOR MK-94200 1"8UNC 50X90X25 | 16                   |

Las piezas que constituyen estas partidas **están fabricadas en conformidad** según la norma UNE-EN-ISO 9001:2008 y siguiendo las especificaciones del plano y pedido de cliente arriba indicado.

*The pieces of these items are in conformity UNE-EN-ISO 9001:2008 and required specifications by the sales order level indicated.*

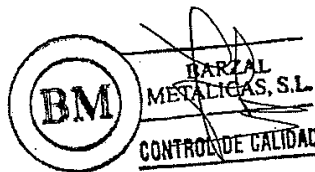
La pintura es conforme según procedimiento Nº PP02\_40213\_REV.0 y QCP Nº 2243 REV.3 requerido por el cliente.

*The painting is in conformity as procedure Nº PP02\_40213\_REV.0 y QCP Nº 2243 REV.3 requested by customer.*

En Serranillos del Valle, a 6 de Octubre 2011

FLOWSERVE

Planta Coslada  
Aseguramiento Calidad  
Fdo:





# SECTION 12

|                                                                                                                                  |                                                                                   |                                                                           |  |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------|--|
|                                                 |                                                                                   | Pump Division<br>Flowserve Spain, S.L.                                    |  |
| AENOR<br><br>Empresa Registrada<br>ER-0008/1/90 |  | <b>CERTIFICADO DE PRUEBA HIDROSTÁTICA</b><br>HYDROSTATIC TEST CERTIFICATE |  |
| <b>INFORME Nº /</b><br><b>REPORT Nº</b><br><b>3485</b>                                                                           |                                                                                   |                                                                           |  |
| <b>REFª. FDP / FDP REFª.</b><br>COS-11-10P40213                                                                                  | <b>CLIENTE / CUSTOMER</b><br>MISSISSIPPI                                          | <b>PROYECTO / PROJECT</b><br>KEMPER COUNTRY IGCC                          |  |
| <b>REFª. CLIENTE / CUSTOMER REFª.</b><br>CONTRACT Nº 17954                                                                       | <b>TIPO DE BOMBA / PUMP TYPE</b><br>4X12 WXH-10                                   | <b>Nº DE SERIE / SERIAL Nº</b><br>M-151457 AND M-151458                   |  |
| <b>PIEZA / PART</b><br>AUXILIARY PIPING                                                                                          | <b>PLANO / DRAWING</b><br>4X12WXH321XE328                                         | <b>Nº DE SERIE / SERIAL Nº</b><br>01 AND 02                               |  |
| <b>PRUEBA SEGÚN ESPECIFICACIÓN / ES : /.</b><br>PROCEDURE AS PER SPECIFICATION                                                   |                                                                                   |                                                                           |  |
| <b>PRESIÓN ESPECIFICADA : /</b><br>SPECIFIED PRESSURE                                                                            |                                                                                   | <b>PRESIÓN LEIDA : /</b><br>READING PRESSURE                              |  |
| <b>LÍQUIDO DE PRUEBA : /</b><br>TESTING FLUIDE                                                                                   |                                                                                   | <b>TIEMPO DE PERMANENCIA : /</b><br>OPERATING TIME                        |  |
| <b>OBSERVACIONES : /</b><br>NOTES                                                                                                |                                                                                   |                                                                           |  |
| NO SE OBSERVAN FUGAS-NO LEAKS ARE OBSERVED                                                                                       |                                                                                   |                                                                           |  |
| MANOMETRO USADO / PRESSURE GAGE USED Nº 417                                                                                      |                                                                                   |                                                                           |  |
| <b>PRUEBA REALIZADA EN</b> COSLADA <b>A 1 DE DECEMBER DE 2012</b><br>TEST MADE IN AT OF OF                                       |                                                                                   |                                                                           |  |
| <b>FIRMA REPRESENTANTE CLIENTE : /</b><br>CUSTOMER INSPECTOR                                                                     | <b>FIRMA INSPECTOR AUTORIZADO : /</b><br>AUTHORIZED INSPECTOR                     | <b>CONTROL DE CALIDAD</b><br><b>FLOWSERVE</b>                             |  |
| Presenciada Inspección <input type="checkbox"/>                                                                                  |                                                                                   |                                                                           |  |



**CERTIFICADO DE PRUEBA HIDROSTÁTICA**  
HYDROSTATIC TEST CERTIFICATE

**INFORME Nº /**  
**REPORT Nº**  
**3484**

|                                                                                |                                                               |                                                          |
|--------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------|
| <b>REFª. FDP / FDP REFª.</b><br>COS-11-10P40213                                | <b>CLIENTE / CUSTOMER</b><br>MISSISSIPPI                      | <b>PROYECTO / PROJECT</b><br>KEMPER COUNTRY IGCC         |
| <b>REFª. CLIENTE / CUSTOMER REFª.</b><br>CONTRACT Nº 17954                     | <b>TIPO DE BOMBA / PUMP TYPE</b><br>4X12 WXH-10               | <b>Nº DE SERIE / SERIAL Nº</b><br>M-151457 AND M-151458  |
| <b>PIEZA / PART</b><br>AUXILIARY PIPING                                        | <b>PLANO / DRAWING</b><br>4X12WXH321XE330<br>4X12WXH321XE331  | <b>Nº DE SERIE / SERIAL Nº</b><br>01 AND 02<br>01 AND 02 |
| <b>PRUEBA SEGÚN ESPECIFICACIÓN / ES : /.</b><br>PROCEDURE AS PER SPECIFICATION |                                                               |                                                          |
| <b>PPH01 Rev.3</b>                                                             |                                                               |                                                          |
| <b>PRESIÓN ESPECIFICADA : /</b><br>SPECIFIED PRESSURE                          | 10 barg                                                       | <b>PRESIÓN LEIDA : /</b><br>READING PRESSURE             |
| 10 barg                                                                        |                                                               |                                                          |
| <b>LÍQUIDO DE PRUEBA : /</b><br>TESTING FLUIDE                                 | WATER                                                         | <b>TIEMPO DE PERMANENCIA : /</b><br>OPERATING TIME       |
| 30 MINUTES                                                                     |                                                               |                                                          |
| <b>OBSERVACIONES : /</b><br>NOTES                                              |                                                               |                                                          |
| NO SE OBSERVAN FUGAS-NO LEAKS ARE OBSERVED                                     |                                                               |                                                          |
| MANOMETRO USADO / PRESSURE GAGE USED Nº 801                                    |                                                               |                                                          |
| <b>PRUEBA REALIZADA EN</b> COSLADA <b>A 1 DE</b> DECEMBER <b>DE</b> 2012       |                                                               |                                                          |
| <b>TEST MADE IN</b> AT <b>OF</b> OF                                            |                                                               |                                                          |
| <b>FIRMA REPRESENTANTE CLIENTE : /</b><br>CUSTOMER INSPECTOR                   | <b>FIRMA INSPECTOR AUTORIZADO : /</b><br>AUTHORIZED INSPECTOR | <b>CONTROL DE CALIDAD</b><br><b>FLOWERVE</b>             |
| Presenciada Inspección <input type="checkbox"/>                                |                                                               |                                                          |

|                                                                                                                                  |                                                                                   |                                                                           |                                                        |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------|
|                                                 |                                                                                   | Pump Division<br>Flowserve Spain, S.L.                                    |                                                        |
| AENOR<br><br>Empresa Registrada<br>ER-0008/1/90 |  | <b>CERTIFICADO DE PRUEBA HIDROSTÁTICA</b><br>HYDROSTATIC TEST CERTIFICATE | <b>INFORME Nº /</b><br><b>REPORT Nº</b><br><b>3483</b> |
| <b>REFª. FDP / FDP REFª.</b><br>COS-11-10P40213                                                                                  | <b>CLIENTE / CUSTOMER</b><br>MISSISSIPPI                                          | <b>PROYECTO / PROJECT</b><br>KEMPER COUNTRY IGCC                          |                                                        |
| <b>REFª. CLIENTE / CUSTOMER REFª.</b><br>CONTRACT Nº 17954                                                                       | <b>TIPO DE BOMBA / PUMP TYPE</b><br>4X12 WXH-10                                   | <b>Nº DE SERIE / SERIAL Nº</b><br>M-151457 AND M-151458                   |                                                        |
| <b>PIEZA / PART</b><br>AUXILIARY PIPING                                                                                          | <b>PLANO / DRAWING</b><br>4X12WXH321XE327                                         | <b>Nº DE SERIE / SERIAL Nº</b><br>01 AND 02                               |                                                        |
| <b>PRUEBA SEGÚN ESPECIFICACIÓN / ES : /.</b><br>PROCEDURE AS PER SPECIFICATION                                                   |                                                                                   | <b>PPH01 Rev.3</b>                                                        |                                                        |
| <b>PRESIÓN ESPECIFICADA : /</b> 6.5 barg<br>SPECIFIED PRESSURE                                                                   |                                                                                   | <b>PRESIÓN LEIDA : /</b> 7 barg<br>READING PRESSURE                       |                                                        |
| <b>LÍQUIDO DE PRUEBA : /</b> WATER<br>TESTING FLUIDE                                                                             |                                                                                   | <b>TIEMPO DE PERMANENCIA : /</b> 30 MINUTES<br>OPERATING TIME             |                                                        |
| <b>OBSERVACIONES : /</b><br>NOTES                                                                                                |                                                                                   |                                                                           |                                                        |
| NO SE OBSERVAN FUGAS-NO LEAKS ARE OBSERVED                                                                                       |                                                                                   |                                                                           |                                                        |
| MANOMETRO USADO /PRESSURE GAGE USED Nº 801                                                                                       |                                                                                   |                                                                           |                                                        |
| <b>PRUEBA REALIZADA EN</b> COSLADA <b>A 1 DE</b> DECEMBER <b>DE</b> 2012<br>TEST MADE IN AT OF OF                                |                                                                                   |                                                                           |                                                        |
| <b>FIRMA REPRESENTANTE CLIENTE : /</b><br>CUSTOMER INSPECTOR                                                                     | <b>FIRMA INSPECTOR AUTORIZADO : /</b><br>AUTHORIZED INSPECTOR                     | <b>CONTROL DE CALIDAD</b><br><b>FLOWSERVE</b>                             |                                                        |
| Presenciada Inspección <input type="checkbox"/>                                                                                  |                                                                                   |                                                                           |                                                        |

|                                                                                                                                  |                                                                           |                                                               |                                                        |
|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------|
|                                                 |                                                                           | Pump Division<br>Flowserve Spain, S.L.                        |                                                        |
| AENOR<br><br>Empresa Registrada<br>ER-0008/1/90 | <b>CERTIFICADO DE PRUEBA HIDROSTÁTICA</b><br>HYDROSTATIC TEST CERTIFICATE |                                                               | <b>INFORME Nº /</b><br><b>REPORT Nº</b><br><b>3482</b> |
| <b>REFª. FDP / FDP REFª.</b><br>COS-11-10P40213                                                                                  | <b>CLIENTE / CUSTOMER</b><br>MISSISSIPPI                                  | <b>PROYECTO / PROJECT</b><br>KEMPER COUNTRY IGCC              |                                                        |
| <b>REFª. CLIENTE / CUSTOMER REFª.</b><br>CONTRACT Nº 17954                                                                       | <b>TIPO DE BOMBA / PUMP TYPE</b><br>4X12 WXH-10                           | <b>Nº DE SERIE / SERIAL Nº</b><br>M-151457 AND M-151458       |                                                        |
| <b>PIEZA / PART</b><br>AUXILIARY PIPING                                                                                          | <b>PLANO / DRAWING</b><br>4X12WXH321XE309<br>4X12WXH321XE329              | <b>Nº DE SERIE / SERIAL Nº</b><br>01 AND 02<br>01 AND 02      |                                                        |
| <b>PRUEBA SEGÚN ESPECIFICACIÓN / ES : /.</b><br>PROCEDURE AS PER SPECIFICATION                                                   |                                                                           | <b>PPH01 Rev.3</b>                                            |                                                        |
| <b>PRESIÓN ESPECIFICADA : /</b> 15 barg<br>SPECIFIED PRESSURE                                                                    |                                                                           | <b>PRESIÓN LEIDA : /</b> 15 barg<br>READING PRESSURE          |                                                        |
| <b>LÍQUIDO DE PRUEBA : /</b> WATER<br>TESTING FLUIDE                                                                             |                                                                           | <b>TIEMPO DE PERMANENCIA : /</b> 30 MINUTES<br>OPERATING TIME |                                                        |
| <b>OBSERVACIONES : /</b><br>NOTES                                                                                                |                                                                           |                                                               |                                                        |
| NO SE OBSERVAN FUGAS-NO LEAKS ARE OBSERVED                                                                                       |                                                                           |                                                               |                                                        |
| MANOMETRO USADO / PRESSURE GAGE USED Nº 801                                                                                      |                                                                           |                                                               |                                                        |
| <b>PRUEBA REALIZADA EN</b> COSLADA <b>A 1 DE</b> DECEMBER <b>DE</b> 2012<br>TEST MADE IN AT OF OF                                |                                                                           |                                                               |                                                        |
| <b>FIRMA REPRESENTANTE CLIENTE : /</b><br>CUSTOMER INSPECTOR                                                                     | <b>FIRMA INSPECTOR AUTORIZADO : /</b><br>AUTHORIZED INSPECTOR             |                                                               | <b>CONTROL DE CALIDAD</b><br><b>FLOWSERVE</b>          |
| Presenciada Inspección <input type="checkbox"/>                                                                                  |                                                                           |                                                               |                                                        |



# SECTION 13

P.O. 60363  
40213

Quality  
Record



## Certificate of Compliance

Rexnord Industries Inc  
Coupling Operation  
1600 Pumphrey Avenue  
Auburn, AL 36832

DATE: August 30, 2011  
CUSTOMER: REXNORD NV  
CUSTOMERS ORDER NO: P12000867  
REXNORD ORDER NO: 22216T-003  
REXNORD PART NO : 612517  
QUANTITY: 375.S71-8.CPLG ES  
COMMENT : COUPLING

We certify that parts manufactured or supplied by Rexnord Industries, LLC. on above purchase order are of commercial quality, are manufactured under a controlled quality assurance program and are in accordance with applicable Rexnord drawings, specifications, and industry standards.

*Matt Hatchett*

Quality Assurance Authorized Signature  
August 30, 2011

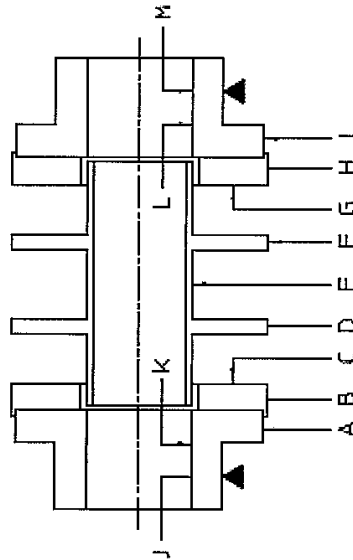
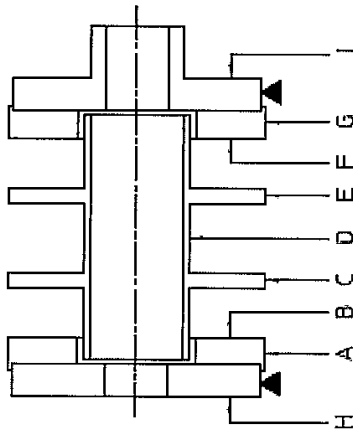


FLOWSERVE

Blanca Cuelada  
Asesoramiento Calidad  
Revisado:

## Series 71 COUPLING

FLOWSERVE  
Planta Costada  
Asealamiento Calidad  
Revisado:



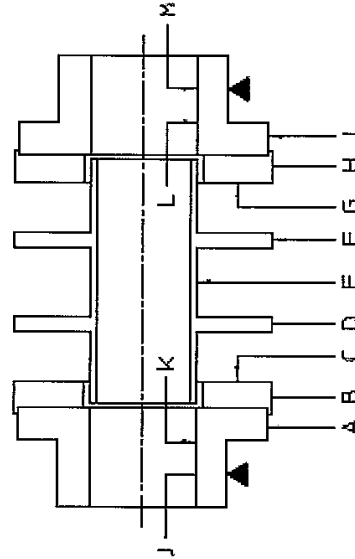
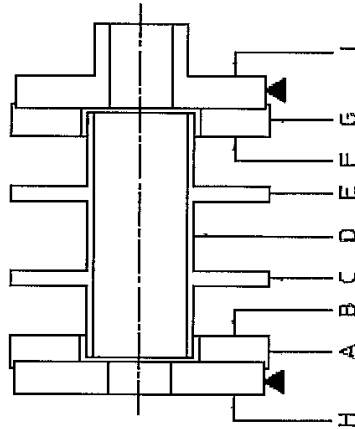
## COUPLING ASSEMBLY BALANCE

[illegible]

## **ARBORLESS BALANCE DATA SHEET**

## Series 71 COUPLING

(Enter) Balance Record Number = 12189



FLOWSEN

~~Planta Costada~~  
Aseguramiento Calidad  
Revisado:

CENTER MEMBER ASSEMBLY BALANCE ONLY

[illegible]



# SECTION 14

## **Certificate of Compliance with the Order** **according EN 10204 2.1**

We hereby certify to:

FLOWSERVE SPAIN, SL (PUMP COSLADA)  
CL  
Avda. Fuentemar 26-28  
Coslada, Madrid, 28823  
SPAIN

re customer order number 57606 and Flowserve order number RSD-1019383

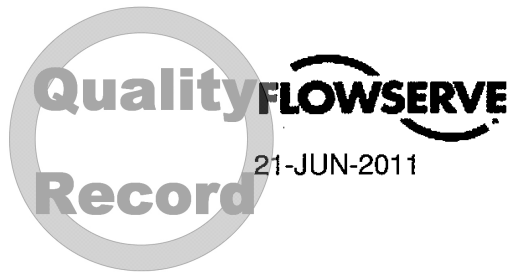
| Item | Part / Description             | Qty |
|------|--------------------------------|-----|
| 1.1  | 963390-001-C<br>COMPL SEAL     | 2   |
| 2.1  | 963390-002-C<br>COMPL SEAL     | 2   |
| 3.1  | MS0750DJ<br>MAGNETIC SEPARATOR | 4   |
| 4.1  | NX0500FW<br>X\HEAT EXCHANGER   | 4   |

that the goods described hereon have been inspected and tested in accordance with the conditions and requirements of the contract or purchase order, and unless otherwise noted below, conform in all respects to the specification(s), drawing(s) relevant thereto.

M. van Loon  
Quality Assurance Department

QA010001EU





21-JUN-2011

## Certificate

We hereby certify to:

FLOWSERVE SPAIN, SL (PUMP COSLADA)  
CL  
Avda.Fuentemar 26-28  
Coslada, Madrid, 28823  
SPAIN

re customer order number 57606 and Flowserve order number RSD-1019383, line 1.1

Assembly : 963390-001-C | COMPL SEAL  
Quantity : 2  
Seal Marking : 775086  
Pump item no :

that attached is(are) the material certificate(s) for:

| Description | Part number | Marked with | Heat number | Page |
|-------------|-------------|-------------|-------------|------|
| GLAND 316   | 1N81617DB   | 5428027     | 528027      | 2-3  |
| SLEEVE      | 3N66380DB   | 251979      | 251979      | 4-5  |

M. van Loon  
Quality Assurance Department

QA030003RD

Page 1 of 1

This certificate is prepared by a data-processing system and need not to be signed for validity. This is in accordance with EN-10204 and ISO-10474.

Trade Register: 20052878  
Flowserve B.V.  
Flow Solutions Group

Borchwerf 20, 4704 RG  
P.O. Box 1300, 4700 BH  
Roosendaal, The Netherlands

Tel.: +31- 165 581400  
Fax: +31- 165 552622  
[www.flowserve.com](http://www.flowserve.com)





245/11



## CERTIFICATE

No. A/11-138801 Rev 00  
Date 2011-02-16 Page 1/2INSPECTION CERTIFICATE acc to  
EN 10 204 3.1CIMEX STEEL a.s.  
Potstatska 613  
753 01 Hranice  
Czech RepublicINSPECTION STAMP  
SVQ

| Customer References  |                              | Sandvik References  |                        |
|----------------------|------------------------------|---------------------|------------------------|
| V100 001195          | Customer order<br>2011-02-14 | Order No. 232649    | Subs No. 100906        |
| 332-00991 CIMEX STEE |                              | ABSMT No. 284-81462 | Dispatch note 25992/53 |
|                      |                              | C.Code 78           |                        |

| Material description                                                             | Steel/material Designations                                                                                          |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| HOT WORKED STAINLESS BAR STEEL<br>FORGED<br>ANNEALED<br>PEEL TURNED AND POLISHED | Sandvik<br>SANMAC 316/SANMAC 316L<br>AISI UNS<br>316/316L S31600/S31603<br>W.nr EN no<br>1.4401/1.4404 1.4401/1.4404 |
| Steel making process<br>E+AOD+LRF                                                |                                                                                                                      |

**Technical requirements**  
EN 10088-3:-2005, EN10272:-2007, NACE MR 0175/ISO 15156-3:2009  
ASTM A-182-09A, (Chemical composition and mechanical properties only)  
ASTM A-276-08A, A-479-08, ASME SA-479-ED-10 SEC II PART A  
AD-2000-W2/W10

## EXTENT OF DELIVERY

| It    | Product designation | Heat   | Lot   | Pieces | Kg     |
|-------|---------------------|--------|-------|--------|--------|
| 02    | MBR-SANMAC316L-250  | 528027 | 00442 | 1      | 2071.0 |
| Total |                     |        |       | 1      | 2071.0 |

## TEST RESULTS

## Chemical composition (weight%)

| Heat   | C     | Si   | Mn   | P     | S     | Cr    | Ni    | Mo   |
|--------|-------|------|------|-------|-------|-------|-------|------|
| 528027 | 0.016 | 0.25 | 1.82 | 0.027 | 0.026 | 16.82 | 10.19 | 2.01 |
| N      |       |      |      |       |       |       |       |      |
| 528027 | 0.029 |      |      |       |       |       |       |      |

## Tensile test at room temperature

|       |         | Yield strength |       | Tensile strength | Elongation |    | Red. of Area |
|-------|---------|----------------|-------|------------------|------------|----|--------------|
|       |         | MPa            | MPa   | MPa              | %          | %  | %            |
| Lot   | Test No | Rp0.2          | Rp1.0 | Rm               | A          | 2" | Z            |
| 00442 | 02765   | 244            | 296   | 537              | 59         | 59 | 69           |
|       | 02766   | 251            | 298   | 538              | 59         | 59 | 70           |

## Hardness test

| Lot   | HB  | HB  |
|-------|-----|-----|
| 00442 | 152 | 155 |

Quality assurance - Helena Högblad/QA-manager Primary Products  
MTC Service / CertificatesAB SANDVIK MATERIALS TECHNOLOGY Reg No. 556234-6832 VAT No. SE663000-060901  
SE-81181 SANDVIKEN SWEDEN www.smt.sandvik.com mtc\_service.smt@sandvik.com

00030702001 REV: 0 CERTIFICATES RLOON JUN-22-2011 08:05:45 (Page 1 of 2)



**CERTIFICATE**

No. A/11-138801 Rev 00  
Date 2011-02-16 Page 2/2

**Grain size**

Lot  
00442 4.0

**Impact test, J, 20 degrees C**

|       |         | Single values |     |     | Average |
|-------|---------|---------------|-----|-----|---------|
| Lot   | Test No | Joule         |     |     | Joule   |
| 00442 | 02765   | 158           | 209 | 164 | 177     |
|       | 02766   | 215           | 174 | 176 | 188     |

**Following controls/tests have been satisfactorily performed:**

- Intergranular corrosion test acc to ASTM A-262 PR.E
- Material Identification.
- Ultrasonic test acc to EN 10228-4, Scan coverage 1, Quality Class 3, Tab 4. AD2000 - A4-2003, 6.3. 1 F.
- Visual inspection and dimensional control.

**Heat Treatment:**

Solution annealed and quenched.

**Marking:**

SANDVIK, W.NR, HEAT, LOT, INSPECTION STAMP.

Intergranular corrosion test acc to EN ISO 3651-2 Method A.

The raw material is free from radioactive contamination.

Material free from mercury contamination.

No welding or weld repair.

This is to certify that the contents of this certified material test report are correct and accurate and that all test results and operations are in compliance with the material specification.

Approved acc. AD 2000-Merkblatt W0 and certified acc. to Pressure Equipment Directive (97/23/EC) by TUEV NORD GmbH; notified body, reg.no. 0045.

The delivered products comply with the specifications and requirements of the order.

The material is manufactured according to a Quality system, approved and registered to ISO 9001.

The certificate is produced with EDP and valid without signature.

AB SANDVIK MATERIALS TECHNOLOGY Reg No. 556234-6832 VAT No. SE663000-060901  
SE-81181 SANDVIKEN SWEDEN [www.smt.sandvik.com](http://www.smt.sandvik.com) [mtc\\_service.smt@sandvik.com](mailto:mtc_service.smt@sandvik.com)

00030702001 REV: 0 CERTIFICATES RLOON JUN-22-2011 08:05:49 (Page 2 of 2)

# Acciaierie Valbruna S.p.A.

36100 VICENZA (Italia) - Viale della scienza, 25 z.l.  
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4  
Cliente / Customer: *Flowserve*



CERTIFICATO DI COLLAUDO  
ABNAHMEPRUEFZEUGNIS  
INSPECTION CERTIFICATE  
CERTIFICAT DE RECEPTION  
EN 10204 (2005) , 3.1

Produzione: ACCIAIERIE VALBRUNA S.P.A.  
Herstell: an/line produce

Avviso di Spedizione: D-VI10035540  
Lieferungs-Packing List

Certificato nr: MEST952054/2010/  
Prüfung/Inspection

Conferma ordine nr: EH0009506  
Werk-Order/Ref no.

Marchio di Fabbrica:  
Zeichen des Werks/  
Trade mark  
Sigle de l'usine / produce



Oggetto Prove: - Annealed Peeled  
Prüfungstand/Item inspected/Peeling

Tipo di Elaborazione: E+AOD  
Erbschneidung/Alasing process/Alasing elaboration

Funzione del Collaudatore:  
Stempel des Werksachverständigen  
Inspector's stamp/Person of the Inspector



## Specifiche:

Anforderungen / Requirements / Exigences

VAL AD-W2 2007 1.4401/1.4404 A  
AD 2000-M, W 2 2006 1.4404 A (1)  
ASME SA182 2007 S31600 A (2)  
ASME SA479 2007 S31603 A (5)  
ASTM A276 2010 S31600 A  
ASTM A479 2010A S31603 A  
EN 10088-3 2005 1.4401 A  
EN 10272 2007 1.4404 A

AD 2000-M, W 10 2003  
AISI 316  
ASME SA182 2007 S31603 A (3)  
ASTM A182 2010 S31600 A (6)  
ASTM A276 2010 S31603 A  
DIN 17440 96 1.4401 A  
EN 10088-3 2005 1.4404 A  
NACE MR0175 2003 S31600 (8)

AD 2000-M, W 2 2006 1.4401 A (9)  
AISI 316L  
ASME SA479 2007 S31600 A (4)  
ASTM A182 2010 S31603 (7)  
ASTM A479 2010A S31600 A  
DIN 17440 96 1.4404 A  
EN 10272 2007 1.4401 A  
NACE MR0175 2003 S31603 (9)

- (1) ACCORDING TO EN 10272:2000
- (2) SEC.II PTA 2007 EDITION ADD. 2009b.
- (3) SEC.II PTA 2007 EDITION ADD. 2009b
- (4) SEC.II PTA 2007 EDITION ADD. 2009b
- (5) For products machined directly from bar refer to ASTM A479.
- (6) \* ISO 15156-3

- (1) ACCORDING TO EN 10272:2000
- (2) For products machined directly from bar refer to ASME SA479.
- (3) For products machined directly from bar refer to ASME SA479.
- (5) SEC.II PTA 2007 EDITION ADD. 2009b
- (7) For products machined directly from bar refer to ASTM A479.
- (9) \* ISO 15156-3

Qualità: 1.4401/1.4404  
Werkstoff/Grade/Alloy

Marca: MVAPML MAXIVAL  
Markenbezeichnung/Brand/Alloy

Punzonatura: 1.4401/1.4404  
Markierung/Stamping/Marking

| Pos. nr.<br>Item nr.<br>No. de poste | Oggetto<br>Gegenstand<br>Product description<br>Design. di produtt. | Dimensioni - mm<br>Abmessungen<br>Dimension | Tolleranza<br>Toleranz<br>Allowance<br>Tolerance | Lunghezza - mm<br>Länge<br>Length<br>Longueur | Colata<br>Guss<br>Heat<br>Casting | Pezzi<br>Stückzahl<br>Pieces<br>Pièces | Peso - KG<br>Gewicht<br>Weight<br>Poids | Lotto nr.<br>Losn.<br>Lot no.<br>Lot n° |
|--------------------------------------|---------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------|-----------------------------------------------|-----------------------------------|----------------------------------------|-----------------------------------------|-----------------------------------------|
| 0050                                 | Round                                                               | 110,000                                     | K12                                              | 4130 / 5980                                   | 251979                            | 3                                      | 1076,0                                  | 125300530                               |

| TEST ALLO STATO DI FORNITURA                                                                                                     |                                                                                                                                                    |    |                                     |                                                                         |                                                                       |                                                                   |                                                         |                                                                  |                                                  |                                           |     |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----|-------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------|-----|
| Test on delivery condition Prüfung auf Lieferbereitschaft test à l'état de livraison Prueba sobre el material así como entregado |                                                                                                                                                    |    |                                     |                                                                         |                                                                       |                                                                   |                                                         |                                                                  |                                                  |                                           |     |
| TEST                                                                                                                             | Proveita/verifica<br>Lieferung/Bereitstellung<br>Longueur/Break<br>Guss/Break, Tolleranz<br>Long. Break, Tolleranz<br>Long. Break, Tolleranz<br>mm | °C | Prova<br>Saggio<br>Essai<br>Prüfung | Snervamento<br>Tensile Strength<br>Tensile Strength<br>Rp 0,2%<br>N/mm2 | Snervamento<br>Tensile Strength<br>Tensile Strength<br>Rp 1%<br>N/mm2 | Resistenza<br>Tensile Strength<br>Tensile Strength<br>Rm<br>N/mm2 | Allungamento<br>Elongation<br>Elongation<br>Allongement | Strizione<br>Reduction of Area<br>Reduction of Area<br>Striction | Resistenza<br>Impact Value<br>Impact Value<br>KV | Durezza<br>Hardness<br>Hardness<br>Dureté | HB  |
| Valori richiesti<br>Anforderung/Required value<br>Value/Requirement                                                              | min<br>max                                                                                                                                         |    |                                     | 205                                                                     | 240                                                                   | 515<br>690                                                        | 40<br>40                                                |                                                                  | 50                                               | 100                                       | 215 |
| A                                                                                                                                | 10                                                                                                                                                 | 20 | L                                   | 262                                                                     | 314                                                                   | 568                                                               | 58<br>61                                                | 70<br>70                                                         | 266<br>262<br>269<br>166                         |                                           |     |

| TEST                       | min | max |
|----------------------------|-----|-----|
| A Grain size for ASTM E112 |     | 5   |

1) K=longitudinale; 2) K=transversale; 3) K=transversale; 4) K=transversale

## Analisi chimica

Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

| Colata/Heat<br>Schmelze/Casting | min -<br>max 0,030 | 1,00 | 2,00 | 16,50<br>18,00 | 2,00<br>2,50 | 10,00<br>13,00 | 0,045 | 0,030 | 0,100 | - | - | - | - | - | - |
|---------------------------------|--------------------|------|------|----------------|--------------|----------------|-------|-------|-------|---|---|---|---|---|---|
|                                 | C %                | Si % | Mn % | Cr %           | Mo %         | Ni %           | P %   | S %   | N %   |   |   |   |   |   |   |
| 251979                          | 0,016              | 0,57 | 1,47 | 16,85          | 2,04         | 10,10          | 0,027 | 0,030 | 0,054 |   |   |   |   |   |   |

I. Korrosion nach EN ISO 3651-2A Sensibilisierung: T1: OK  
Corrosion test per EN ISO 3651-2A sensitized T1: OK  
Annealed 1060°C/H2O.

Im Einvernehmen mit TÜV BAYERN (Juli 1972).  
Gegenzeichnungsverzicht durch TÜV BAYERN (21.05.1979).

|                                            |                                                                                                              |                 |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------|
| Vicenza, 07/12/10<br>VCC006<br>(Mod. MCEB) | Il collaudatore di stabilimento / der Werksachverständige / Works Inspector / L'agent d'usine<br>M. Rizzotto | Pagina - 1 di 2 |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------|

# Acciaierie Valbruna S.p.A.



36100 VICENZA (Italia) - Viale della scienza, 25 z.l.  
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4.  
Cliente / besucher/visitee Client

Produttore: ACCIAIERIE VALBRUNA S.P.A.  
Hersteller/Hersteller producer

Oggetto Prove: - Annealed Peeled  
Prüfungsschritt/nam Inspected/Treatment

Aviso di Spedizione: D-VI10035540  
Lieferung/Packung/EU/EL

Ordine nr: 11003166  
Bestell/Your order/Commande

Tipo di Elaborazione: E+AOD  
Erweiterungsanfertigung process/Mode of elaboration

CERTIFICATO DI COLLAUDO  
ABNAHMEPRUEFZEUGNIS  
INSPECTION CERTIFICATE  
CERTIFICAT DE RECEPTION  
EN 10204 (2005) , 3.1

Certificato nr: MEST952054/2010/  
Prüfung/Test/Ess

Confirma ordine nr: E110009506  
Werk/Our Order/Ref. nr.

Marchio di Fabbrica:  
Zeichen des Lieferanten  
Trade mark  
Logo de l'usine - producer

Funzione del Collaudatore:  
Stempel des Werksachverständigen  
Inspector's stamp/Fonction de l'analyseur



Sono state soddisfatte tutte le condizioni richieste  
Die gestellten Anforderungen sind erfüllt  
The material has been finished in accordance with the requirements  
Le matériel a été fourni conforme aux exigences

Controllo antimescolanza: OK  
Verwechslungsprüfung: operationenlos durchgeföhrt  
Anti-clogging testing performed: OK  
Controlle antimesclage satisfaisant

Controllo visivo e dimensionale: soddisfa le esigenze  
Sichtprüfung und Ausmessung: ohne Beanstandung  
Visual inspection and dimensional check/satisfactory  
Contrôle Visuel et dimensionnel: satisfaisant

Melted and manufactured in Italy No welding or weld repair Material free from Mercury contamination

We declare that the finished product is checked for radioactive contamination through Portal System when it leaves the production plant.

The Quality Management System is Certified acc. Pressure Equipment Directive [97/23/EC] Annex 1, s. 4.3 by TÜV and LLOYD'S

Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.

Maximal and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.

The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

00031306001 REV: 0 CERTIFICATES RLOON JUN-22-2011 08:06:18 (Page 2 of 2)

|                                            |                                                                                                                  |                 |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------|
| Vicenza, 07/12/10<br>VCO008<br>(Mod. MCEP) | Il collaudatore di stabilimento / der Werkssachverständiger / Works Inspector / L' agent d' usine<br>M. Rizzotto | Pagina - 2 di 2 |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------|



21-JUN-2011

## **Certificate of Compliance with the Order** **according EN 10204 2.1**

We hereby certify to:

FLOWSERVE SPAIN, SL (PUMP COSLADA)  
CL  
Avda.Fuentemar 26-28  
Coslada, Madrid, 28823  
SPAIN

re customer order number 57606 and Flowserve order number RSD-1019383

| Item | Part / Description             | Qty |
|------|--------------------------------|-----|
| 1.1  | 963390-001-C<br>COMPL SEAL     | 2   |
| 2.1  | 963390-002-C<br>COMPL SEAL     | 2   |
| 3.1  | MS0750DJ<br>MAGNETIC SEPARATOR | 4   |
| 4.1  | NX0500FW<br>X\HEAT EXCHANGER   | 4   |

that the goods described hereon have been inspected and tested in accordance with the conditions and requirements of the contract or purchase order, and unless otherwise noted below, conform in all respects to the specification(s), drawing(s) relevant thereto.

M. van Loon  
Quality Assurance Department

QA010001EU

Page 1 of 1

This certificate is prepared by a data-processing system and need not to be signed for validity. This is in accordance with EN-10204 and ISO-10474.

Trade Register: 20052878  
Flowserve B.V.  
Flow Solutions Group

Borchwerf 20, 4704 RG  
P.O. Box 1300, 4700 BH  
Roosendaal, The Netherlands

Tel.: +31- 165 581400  
Fax: +31- 165 552622  
www.flowserve.com



21-JUN-2011

**Certificate**

We hereby certify to:

FLOWSERVE SPAIN, SL (PUMP COSLADA)  
CL  
Avda.Fuentemar 26-28  
Coslada, Madrid, 28823  
SPAIN

re customer order number 57606 and Flowserve order number RSD-1019383, line  
2.1

Assembly : 963390-002-C | COMPL SEAL  
Quantity : 2  
Seal Marking : 775087  
Pump item no :

that attached is(are) the material certificate(s) for:

| Description | Part number | Marked with | Heat number | Page |
|-------------|-------------|-------------|-------------|------|
| GLAND 316   | 1N81619DB   | 528027      | 528027      | 2-3  |
| SLEEVE      | 3N66380DB   | 251979      | 251979      | 4-5  |

M. van Loon  
Quality Assurance Department

QA030003RD

Page 1 of 1

This certificate is prepared by a data-processing system and need not to be signed for validity. This is in accordance with EN-10204 and ISO-10474.

Trade Register: 20052878  
Flowserve B.V.  
Flow Solutions Group

Borchwerf 20, 4704 RG  
P.O. Box 1300, 4700 BH  
Roosendaal, The Netherlands

Tel.: +31- 165 581400  
Fax: +31- 165 552622  
www.flowserve.com



245/11



**CERTIFICATE**

**No. A/11-138801 Rev 00**  
**Date 2011-02-16 Page 1/2**

INSPECTION CERTIFICATE acc to  
EN 10 204 3.1

CIMEX STEEL a.s.  
Potstatska 613  
753 01 Hranice  
Czech Republic

INSPECTION STAMP  
SVQ

| Customer References  |                              | Sandvik References  |                              |
|----------------------|------------------------------|---------------------|------------------------------|
| V100 001195          | Customer order<br>2011-02-14 | Order No. 232649    | Subs No. 100906              |
| 332-00991 CIMEX STEE |                              | ABSMT No. 284-81462 | ABSMT Dispatch note 25992/53 |
|                      |                              | C.Code 78           |                              |

| Material description                                                             | Steel/material Designations                                                                                          |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| HOT WORKED STAINLESS BAR STEEL<br>FORGED<br>ANNEALED<br>PEEL TURNED AND POLISHED | Sandvik<br>SANMAC 316/SANMAC 316L<br>AISI UNS<br>316/316L S31600/S31603<br>W.nr EN no<br>1.4401/1.4404 1.4401/1.4404 |
| Steel making process<br>E+AOD+LRF                                                |                                                                                                                      |

**Technical requirements**  
EN 10088-3:-2005, EN10272:-2007, NACE MR 0175/ISO 15156-3:2009  
ASTM A-182-09A, (Chemical composition and mechanical properties only)  
ASTM A-276-08A, A-479-08, ASME SA-479-ED-10 SEC II PART A  
AD-2000-W2/W10

| EXTENT OF DELIVERY                                             |                     |                |       |                  |       |            |        |              |  |
|----------------------------------------------------------------|---------------------|----------------|-------|------------------|-------|------------|--------|--------------|--|
| It                                                             | Product designation |                |       | Heat             | Lot   | Pieces     | Kg     |              |  |
| 02                                                             | MBR-SANMAC316L-250  |                |       | 528027           | 00442 | 1          | 2071.0 |              |  |
|                                                                |                     |                |       |                  |       | Total      | 1      | 2071.0       |  |
| TEST RESULTS                                                   |                     |                |       |                  |       |            |        |              |  |
| Chemical composition (weight%)                                 |                     |                |       |                  |       |            |        |              |  |
| Heat                                                           | C                   | Si             | Mn    | P                | S     | Cr         | Ni     | Mo           |  |
| 528027                                                         | 0.016               | 0.25           | 1.82  | 0.027            | 0.026 | 16.82      | 10.19  | 2.01         |  |
|                                                                | N                   |                |       |                  |       |            |        |              |  |
| 528027                                                         | 0.029               |                |       |                  |       |            |        |              |  |
| Tensile test at room temperature                               |                     |                |       |                  |       |            |        |              |  |
|                                                                |                     | Yield strength |       | Tensile strength |       | Elongation |        | Red. of Area |  |
|                                                                |                     | MPa            | MPa   | MPa              |       | %          | %      | %            |  |
| Lot                                                            | Test No             | Rp0.2          | Rpl.0 | Rm               |       | A          | 2"     | Z            |  |
| 00442                                                          | 02765               | 244            | 296   | 537              |       | 59         | 59     | 69           |  |
|                                                                | 02766               | 251            | 298   | 538              |       | 59         | 59     | 70           |  |
| Hardness test                                                  |                     |                |       |                  |       |            |        |              |  |
| Lot                                                            |                     | HB             | HB    |                  |       |            |        |              |  |
| 00442                                                          |                     | 152            | 155   |                  |       |            |        |              |  |
| Quality assurance - Helena Högblad/QA-manager Primary Products |                     |                |       |                  |       |            |        |              |  |
| MTC Service / Certificates                                     |                     |                |       |                  |       |            |        |              |  |

AB SANDVIK MATERIALS TECHNOLOGY Reg No. 556234-6832 VAT No. SE663000-060901  
SE-81181 SANDVIKEN SWEDEN www.smt.sandvik.com mtc\_service.smt@sandvik.com

00030701002 EV: 0 CERTIFICATES RLOON JUN-22-2011 08:10:26 (Pa of 2)

**Grain size**

**Lot**  
00442 4.0

**Impact test, J, 20 degrees C**

| Lot   | Test No | Single values |     |     | Average |
|-------|---------|---------------|-----|-----|---------|
|       |         | Joule         |     |     | Joule   |
| 00442 | 02765   | 158           | 209 | 164 | 177     |
|       | 02766   | 215           | 174 | 176 | 188     |

**Following controls/tests have been satisfactorily performed:**

- Intergranular corrosion test acc to ASTM A-262 PR.E
- Material Identification.
- Ultrasonic test acc to EN 10228-4, Scan coverage 1, Quality Class 3, Tab 4. AD2000 - A4-2003, 6.3. 1 F.
- Visual inspection and dimensional control.

**Heat Treatment:**

Solution annealed and quenched.

**Marking:**

SANDVIK, W.NR, HEAT, LOT, INSPECTION STAMP.

Intergranular corrosion test acc to EN ISO 3651-2 Method A.

The raw material is free from radioactive contamination.

Material free from mercury contamination.

No welding or weld repair.

This is to certify that the contents of this certified material test report are correct and accurate and that all test results and operations are in compliance with the material specification.

Approved acc. AD 2000-Merkblatt W0 and certified acc. to Pressure Equipment Directive (97/23/EC) by TUEV NORD GmbH; notified body, reg.no. 0045.

The delivered products comply with the specifications and requirements of the order.

The material is manufactured according to a Quality system, approved and registered to ISO 9001.

The certificate is produced with EDP and valid without signature.

AB SANDVIK MATERIALS TECHNOLOGY Reg No. 556234-6832 VAT No. SE663000-060901  
SE-81181 SANDVIKEN SWEDEN [www.smt.sandvik.com](http://www.smt.sandvik.com) [mtc\\_service.smt@sandvik.com](mailto:mtc_service.smt@sandvik.com)

36100 VICENZA (Italia) - Viale della scienza, 25 z.l.  
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4  
Cliente / Bestell-/Purchase/Client



**CERTIFICATO DI COLLAUDO**  
**ABNAHMEPRUEFZEUGNIS**  
**INSPECTION CERTIFICATE**  
**CERTIFICAT DE RECEPTION**  
**EN 10204 (2005) , 3.1**

Avviso di Spedizione: D-VI10035540  
Lieferanfrage/Packing List

Certificato nr: MEST952054/2010/  
Prüfung/Tests

Produttore: **ACCIAIERIE VALBRUNA S.P.A.**  
Hersteller/Produktions

Ordine nr: 11003166  
Bestell-/Your order/Commande

Conferma ordine nr: EH0009506  
Werk/Our Order/Ref.

Marchio di Fabbrica:  
Zeichen des Unternehmens  
Trade mark:  
Style de fusine: producteur



Oggetto Prove: - Annealed Peeled  
Prüfung/Land/Item: Inspected/Finishing

Tipo di Elaborazione: E+AOD  
Erschmelzungs-/Melting process/Mode of elaboration

Punzone del Collaudatore:  
Stempel des Werkstoffverständigen  
Inspector's stamp/Portion de l'inspecteur



Specifiche:  
Anforderungen / Requirements / Exigences

VAL AD-W2 2007 1.4401/1.4404 A  
AD 2000-M. W 2 2006 1.4404 A (1)  
ASME SA182 2007 S31600 A (2)  
ASME SA479 2007 S31603 A (5)  
ASTM A276 2010 S31600 A  
ASTM A479 2010A S31603 A  
EN 10088-3 2005 1.4401 A  
EN 10272 2007 1.4404 A

AD 2000-M. W 10 2003 .  
AISI 316  
ASME SA182 2007 S31603 A (3)  
ASTM A182 2010 S31600 A (6)  
ASTM A276 2010 S31603 A  
DIN 17440 96 1.4401 A  
EN 10088-3 2005 1.4404 A  
NACE MR0175\* 2003 S31600 (8)

AD 2000-M. W 2 2006 1.4401 A (0)  
AISI 316L  
ASME SA479 2007 S31600 A (4)  
ASTM A182 2010 S31603 (7)  
ASTM A479 2010A S31600 A  
DIN 17440 96 1.4404 A  
EN 10272 2007 1.4401 A  
NACE MR0175\* 2003 S31603 (9)

(0) ACCORDING TO EN 10272:2000  
(2) SEC.II P.T.A 2007 EDITION ADD. 2009b  
(3) SEC.II P.T.A 2007 EDITION ADD. 2009b  
(4) SEC.II P.T.A 2007 EDITION ADD. 2009b  
(5) For products machined directly from bar refer to ASTM A479.  
(6) \* ISO 15156-3

(1) ACCORDING TO EN 10272:2000  
(2) For products machined directly from bar refer to ASME SA479.  
(3) For products machined directly from bar refer to ASME SA479.  
(5) SEC.II P.T.A 2007 EDITION ADD. 2009b  
(7) For products machined directly from bar refer to ASTM A479.  
(9) \* ISO 15156-3

Qualità: 1.4401/1.4404  
Werkstoff/Grade/Qualité

Marca: MVAPML MAXIVAL  
Markenbezeichnung/Brand/Marken

Punzonatura: 1.4401/1.4404  
Kennzeichnung/Marking/Markage

| Pos. nr.<br>Pos. Nr.<br>Item nr.<br>No. de pose | Oggetto<br>Gegenstand<br>Product description<br>Descript. du produit | Dimensioni - mm<br>Abmessungen<br>Dimension<br>Dimension | Tolleranza<br>Toleranz<br>Allowance<br>Tolerance | Lunghezza - mm<br>Länge<br>Length<br>Longueur | Colata<br>Schmelze<br>Heat<br>Coulée | Pezzi<br>Stückzahl<br>Pieces<br>Pièces | Peso - KG<br>Gewicht<br>Weight<br>Poids | Lotto nr.<br>Losnr.<br>Lot nr.<br>Lot nr. |
|-------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------|-----------------------------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------------|
| 0050                                            | Round                                                                | 110,000                                                  | k12                                              | 4130 / 5980                                   | 251979                               | 3                                      | 1076,0                                  | 125300530                                 |

| TEST ALLO STATO DI FORNITURA<br>Test on delivery condition Prüfung auf Lieferzustand test à l'état de livraison Prueba sobre el material así como entregado |                                                                                                                |            |                                    |                                                                                   |                                                                                 |                                                                                          |                                                                               |                                                                                |                                                                          |                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------|------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------|
| TEST                                                                                                                                                        | Provetta/<br>System/<br>Liegende Probe<br>Dübel, Draht, Rohr<br>Mark. Draht, Draht<br>Lieg. Draht, Rohr<br>RHT | °C         | Prova<br>Saggio<br>Proben<br>Essai | Snervamento<br>Streckgrenze<br>Yield Stress<br>Lieg. elástico<br>Rp 0,2%<br>N/mm2 | Snervamento<br>Streckgrenze<br>Yield Stress<br>Lieg. elástico<br>Rp 1%<br>N/mm2 | Resistenza<br>Zugfestigkeit<br>Tensile strength<br>Resistencia a tracción<br>Rm<br>N/mm2 | Allungamento<br>Bruchdehnung<br>Elongation<br>Allongement<br>A5<br>% E4d<br>% | Stirazione<br>Bruchdehnung<br>Reduction of area<br>Striction<br>Z<br>% RA<br>% | Resistenza<br>Kerbschlagenergie<br>Impact Value<br>Resilience<br>KV<br>J | Durezza<br>Brinell<br>Hardeness<br>Dureza<br>HB |
| Valori richiesti<br>Anforderungen<br>Required values<br>Valores requeridos                                                                                  |                                                                                                                | min<br>max |                                    | 205                                                                               | 240                                                                             | 515<br>690                                                                               | 40<br>61                                                                      | 50                                                                             | 100                                                                      | 215                                             |
| A                                                                                                                                                           | 10                                                                                                             | 20 L       |                                    | 262                                                                               | 314                                                                             | 568                                                                                      | 58 61                                                                         | 70 70                                                                          | 266 262 269 166                                                          |                                                 |
| TEST                                                                                                                                                        |                                                                                                                |            |                                    |                                                                                   |                                                                                 | min max                                                                                  |                                                                               |                                                                                |                                                                          |                                                 |
| A                                                                                                                                                           | Grain size for ASTM E112                                                                                       |            |                                    |                                                                                   |                                                                                 |                                                                                          | 5                                                                             |                                                                                |                                                                          |                                                 |

(1) = longitudinal; (2) = transverse; (3) = tangential

## Analisi chimica

Chemische Zusammensetzung/Chemical Analysis/Analyse chimique

| Colata/Heat<br>Schmelze/Heat | min<br>max | 0,030 | 1,00 | 2,00  | 16,50<br>18,00 | 2,00<br>2,50 | 10,00<br>13,00 | 0,045 | 0,030 | 0,100 | - | - | - | - | - |
|------------------------------|------------|-------|------|-------|----------------|--------------|----------------|-------|-------|-------|---|---|---|---|---|
| 251979                       | C %        | Si %  | Mn % | Cr %  | Mo %           | Ni %         | P %            | S %   | N %   |       |   |   |   |   |   |
|                              | 0,016      | 0,57  | 1,47 | 16,85 | 2,04           | 10,10        | 0,027          | 0,030 | 0,054 |       |   |   |   |   |   |

L.Korrosion nach EN ISO 3651-2A Sensibilisierung : T1 : OK

Corrosion test per EN ISO 3651-2A sensitized T1 : OK

Annealed 1060°C/H2O.

Im Einvernehmen mit TUV BAYERN (Juli 1972).

Gegenzeichnungsverzicht durch TUV BAYERN (21.05.1979).

|                                            |                                                                                                                |                 |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------|
| Vicenza, 07/12/10<br>VCC/05<br>(Mod. MCER) | il collaudatore di stabilimento / der Werkstoffverständiger / Works inspector / L'agent d'usine<br>M. Rizzotto | Pagina - 1 di 2 |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------|



36100 VICENZA (Italia) - Viale della scienza, 25 z.i.  
Stab.: 39100 BOLZANO (Italia) - Via A. Volta, 4.  
Cliente / Besondere/Purchaser/Clien

Avviso di Spedizione: D-VI10035540  
Lieferung/Transport/Expédition

Certificato nr: MEST952054/2010/  
Prüfung/Test/Ess

Produttore: ACCIAIERIE VALBRUNA S.P.A.  
Hersteller/Hersteller/producer

Ordine nr: 11003166  
Bestell/Your order/Commande

Conferma ordine nr: E110009506  
Werk/Dat Order/Nr.

Marchio di Fabbrica:  
Zeichen des Lieferanten  
Trade mark  
Signe de l'usine/producer



Oggetto Prove: - Annealed Peeled  
Prüfgegenstand/Item inspected/Prüfgegen

Tipo di Elaborazione: E+AOD  
Erzeugungsart/Manufacturing process/Mode of elaboration

Purzone del Collaudatore:  
Stempel des Werkssachverständigen  
Inspector's stamp/Prüfer des F. abgezeichnet



Sono state soddisfatte tutte le condizioni richieste  
Die gestellten Anforderungen sind in der Anlage erfüllt.  
The material has been furnished in accordance with the requirements.  
Le matériel a été fourni conforme aux exigences

Controllo antimescolanza: OK  
Verwechslungsprüfung: spezialanalytisch durchgeführt  
Anti-mixing testing performed: OK  
Contrôle antimesclage fait: r.s.s.

Controllo visivo e dimensionale: soddisfa le esigenze  
Sichtprüfung und Ausmessung: ohne Beanstandung  
Visual inspection and dimensional check/satisfactory  
Contrôle visuel et dimensionnel: satisfaisant

Melted and manufactured in Italy No welding or weld repair Material free from Mercury contamination  
We declare that the finished product is checked for radioactive contamination through Portal System when it leaves the production plant.  
The Quality Management System is Certified acc. Pressure Equipment Directive [97/23/EC] Annex 1, s. 4.3 by TÜEV and LLOYD'S  
Any act of tampering, modification, alteration, counterfeiting and/or falsification and/or any other action which modifies the contents of this test certificate shall constitute a violation of applicable civil and criminal laws. Acciaierie Valbruna shall protect its rights and interests before any competent court, authority and jurisdiction.  
Maximal and/or Valplus grades/products are manufactured with ladle techniques to control composition, distribution, size and shape of non-metallic inclusions for improved machinability.  
The supplied product conforms to requirements expressly requested by the purchaser and conforms to requirements specified by certified norms and standards. Should the product be used for more severe, critical and/or in any case different applications than those the material is generally intended for, any different and/or supplementary requirements shall be specifically demanded, at least, upon order of the Product by the Purchaser. Acciaierie Valbruna SpA shall not be responsible for any improper use of the Products.

Vicenza, 07/12/10  
V00008  
(Mod. MCER)

Il collaudatore di stabilimento / der Werkssachverständige / Works Inspector / L' agent d' usine

M. Rizzotto

Pagina - 2 di 2



# SECTION 15

**CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1**  
**INSPECTION CERTIFICATE according to EN 10204 – 3.1**

**Cliente:** FLOWSERVE SPAIN, S.L.  
**Customer:** Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

**Nº Certificado:** 5637379583-1043  
**certificate No.:**

**Página:** 1 de 1 **página(s)**  
**Page:** of page(s)

**Pedido Nº:** 60741  
**Order No.:**

**Fecha:** 20/06/2011  
**Order date:**

**WIKAI Nº de pedido:** PDC11009733  
**WIKAI commission:**

**Pos.:** 2,00 **Código :** 45361509  
**Pos.:** Ident. No.:

**Descripción:** 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*  
**Description :**

**Cantidad:** 4,00 **Tipo:** S.5413/4.DN160  
**Quantity:** **Type:**

**Diámetro:** J. **Rango:** 0...120°C  
**Diameter:** J. **Range:**

**Nº de serie :** BT0682  
**Serial No.:**

**Nº de Tag:** J.  
**Tag-No.:**

**Procedimiento de calibración / Calibration procedure:**

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
*The calibration has been carried out by comparison measurement against a calibrated standard thermometer.*

**Resultado de la calibración / Calibration results:**

| Temperature<br>in °C | Display<br>in °C | Error<br>in K | Uncertainty<br>in K (k=2) |
|----------------------|------------------|---------------|---------------------------|
| 9,84                 | 10,00            | 0,16          | 0,5                       |
| 60,08                | 59,00            | -1,08         | 0,5                       |
| 109,88               | 109,00           | -0,88         | 0,5                       |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
*Object keeps the specifications*

**Equipo de medición utilizado / Measurement-Equipment in use :**

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

**Medios isoterms / Heat sources in use:**

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | J.       | J.            | J.               |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | J.               |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | J.               |
| Dry Well Calibrator                  | CTD9300  | 5407113       | J.               |

**Condiciones ambientales / Environmental conditions:**

**Temperatura ambiente:** 22°C ± 2 °C  
**Ambient temperature:**

**Humedad relativa:** 50% ± 20 %  
**Relative humidity:**

**Instrumentos WIKAI, S.A.**

Sabadell, 22.09.2011

**Experto técnico:** Carles Soler  
**Company expert:**

**Comprobado por:** R.S  
**Tested by:**

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWSERVE  
Planta Costada  
Aseguramiento Calidad  
Revisado:

**CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1**  
**INSPECTION CERTIFICATE according to EN 10204 – 3.1**

**Cliente:** FLOWSERVE SPAIN, S.L.  
**Customer:** Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

**Nº Certificado:** 5637379583-1044  
**certificate No.:**

**Página:** 1 de 1 **página(s)**  
**Page:** of page(s)

**Pedido Nº:** 60741  
**Order No.:**

**Fecha:** 20/06/2011  
**Order date:**

**WIKAI Nº de pedido:** PDC11009733  
**WIKAI commission:**

**Pos.:** 2,00 **Código :** 45361509  
**Pos.:** Ident. No.:

**Descripción:** 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*  
**Description :**

**Cantidad:** 4,00 **Tipo:** S.5413/4.DN160  
**Quantity:** **Type:**

**Diámetro:** J. **Rango:** 0...120°C  
**Diameter:** J. **Range:**

**Nº de serie :** BT0683  
**Serial No.:**

**Nº de Tag:** J.  
**Tag-No.:**

**Procedimiento de calibración / Calibration procedure:**

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
*The calibration has been carried out by comparison measurement against a calibrated standard thermometer.*

**Resultado de la calibración / Calibration results:**

| Temperature | Display | Error | Uncertainty |
|-------------|---------|-------|-------------|
| in °C       | in °C   | in K  | in K (k=2)  |
| 9,84        | 10,00   | 0,16  | 0,5         |
| 60,08       | 60,00   | -0,08 | 0,5         |
| 109,89      | 110,00  | 0,11  | 0,5         |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
*Object keeps the specifications*

**Equipo de medición utilizado / Measurement-Equipment in use:**

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

**Medios isoterms / Heat sources in use:**

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | J.       | J.            | J.               |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | J.               |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | J.               |
| Dry Well Calibrator                  | CTD9300  | 5407113       | J.               |

**Condiciones ambientales / Environmental conditions:**

**Temperatura ambiente:** 22°C ± 2 °C  
**Ambient temperature:**

**Humedad relativa:** 50% ± 20 %  
**Relative humidity:**

**Instrumentos WIKAI, S.A.**

Sabadell, 22.09.2011

**Experto técnico:** Carles Soler  
**Company expert:**

**Comprobado por:** R.S  
**Tested by:**

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWSERVE  
Planta Coslada  
Aseguramiento Calidad  
Revisado:

**CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1**  
**INSPECTION CERTIFICATE according to EN 10204 – 3.1**

**Cliente:** FLOWSERVE SPAIN, S.L.  
**Customer:** Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

**Nº Certificado:** 5637379583-1048  
**certificate No.:**

**Página:** 1 de 1 **página(s)**  
**Page:** of page(s)

**Pedido Nº:** 60741  
**Order No.:**

**Fecha:** 20/06/2011  
**Order date:**

**WIKA Nº de pedido:** PDC11009733  
**WIKA commission:**

**Pos.:** 2,00 **Código :** 45361509  
**Pos.:** Ident. No.:

**Descripción:** 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*  
**Description :**

**Cantidad:** 4,00 **Tipo:** S.5413/4.DN160  
**Quantity:** **Type:**

**Diámetro:** J. **Rango:** 0...120°C  
**Diameter:** J. **Range:**

**Nº de serie :** BT0684  
**Serial No.:**

**Nº de Tag:** J.  
**Tag-No.:**

**Procedimiento de calibración / Calibration procedure:**

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
*The calibration has been carried out by comparison measurement against a calibrated standard thermometer.*

**Resultado de la calibración / Calibration results:**

| Temperature | Display | Error | Uncertainty |
|-------------|---------|-------|-------------|
| in °C       | in °C   | in K  | in K (k=2)  |
| 9,84        | 10,00   | 0,16  | 0,5         |
| 60,08       | 60,00   | -0,08 | 0,5         |
| 109,88      | 109,00  | -0,88 | 0,5         |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
*Object keeps the specifications*

**Equipo de medición utilizado / Measurement-Equipment in use:**

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

**Medios isoterms / Heat sources in use:**

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | J.       | J.            | J.               |
| Calibration bath with glycol / water | CTB 9441 | 1200404135001 | J.               |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | J.               |
| Dry Well Calibrator                  | CTD9300  | 5407113       | J.               |

**Condiciones ambientales / Environmental conditions:**

**Temperatura ambiente:** 22°C ± 2 °C  
**Ambient temperature:**

**Humedad relativa:** 50% ± 20 %  
**Relative humidity:**

**Instrumentos WIKA, S.A.**

Sabadell, 22.09.2011

**Experto técnico:** Carles Soler  
**Company expert:**

**Comprobado por:** R.S  
**Tested by:**

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWSERVE  
Coslada  
Coslada  
Coslada

CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1  
INSPECTION CERTIFICATE according to EN 10204 – 3.1

Cliente:  
Customer: FLOWERVE SPAIN, S.L.  
Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

Nº Certificado:  
certificate No.: 5637379583-1050

Página:  
Page: 1 de 1 página(s)  
of page(s)

Pedido Nº:  
Order No.: 60741

Fecha:  
Order date: 20/06/2011

WIKAI Nº de pedido:  
WIKAI commission: PDC11009733

Pos.:  
Pos.: 2,00 Código :  
Ident. No.: 45361509

Descripción:  
Description: 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

Cantidad:  
Quantity: 4,00 Tipo:  
Type: S.5413/4.DN160

Diámetro:  
Diameter: ./ Rango:  
Range: 0...120°C

Nº de serie:  
Serial No.: BT0685

Nº de Tag:  
Tag-No.: ./

Procedimiento de calibración / Calibration procedure:

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
The calibration has been carried out by comparison measurement against a calibrated standard thermometer.

Resultado de la calibración / Calibration results:

| Temperature<br>in °C | Display<br>in °C | Error<br>in K | Uncertainty<br>in K (k=2) |
|----------------------|------------------|---------------|---------------------------|
| 9,84                 | 11,00            | 1,16          | 0,5                       |
| 60,08                | 61,00            | 0,92          | 0,5                       |
| 109,88               | 110,00           | 0,12          | 0,5                       |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
Object keeps the specifications

Equipo de medición utilizado / Measurement-Equipment in use:

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

Medios isoterms / Heat sources in use:

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | ./       | ./            | ./               |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | ./               |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | ./               |
| Dry Well Calibrator                  | CTD9300  | 5407113       | ./               |

Condiciones ambientales / Environmental conditions:

Temperatura ambiente: 22°C ± 2 °C  
Ambient temperature:

Humedad relativa: 50% ± 20 %  
Relative humidity:

Instrumentos WIKAI, S.A.

Sabadell, 22.09.2011

Experto técnico: Carles Soler  
Company expert:

Comprobado por: R.S  
Tested by:

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWERVE  
Planta Coslada  
Aseguramiento Calidad  
Revisado:

40212/13



# CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1 INSPECTION CERTIFICATE according to EN 10204 – 3.1

Cliente: FLOWERVE SPAIN, S.L.  
Customer: Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

Nº Certificado: 5637379562-1013  
certificate No.:

Página: 1 de 1 página(s)  
Page: of page(s)

Pedido Nº: 60741  
Order No.:

Fecha: 20/06/2011  
Order date:

WIKA Nº de pedido: PDC11009733  
WIKA commission:

Pos.: 1,00 Código: 45361509  
Pos.: Ident. No.:

Descripción: 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

Cantidad: 8,00 Tipo: S.5413/4.DN160  
Quantity: Type:

Diámetro: ./. Rango: 0...120°C  
Diameter: Range:

Nº de serie: BT0686  
Serial No.:

Nº de Tag: ./.  
Tag-No.:

## Procedimiento de calibración / Calibration procedure:

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.

The calibration has been carried out by comparison measurement against a calibrated standard thermometer.

## Resultado de la calibración / Calibration results:

| Temperature<br>in °C | Display<br>in °C | Error<br>in K | Uncertainty<br>in K (k=2) |
|----------------------|------------------|---------------|---------------------------|
| 9,84                 | 11,00            | 1,16          | 0,5                       |
| 60,08                | 60,00            | -0,08         | 0,5                       |
| 109,88               | 111,00           | 1,12          | 0,5                       |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
Object keeps the specifications

## Equipo de medición utilizado / Measurement-Equipment in use:

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

## Medios isotermos / Heat sources in use:

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | ./.      | ./.           | ./.              |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | ./.              |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | ./.              |
| Dry Well Calibrator                  | CTD9300  | 5407113       | ./.              |

## Condiciones ambientales / Environmental conditions:

Temperatura ambiente: 22°C ± 2 °C  
Ambient temperature:

Humedad relativa: 50% ± 20 %  
Relative humidity:

Instrumentos WIKA, S.A.

Sabadell, 22.09.2011

Experto técnico: Carles Soler  
Company expert:

Comprobado por: R.S  
Tested by:

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWERVE

Planta Coslada  
Aseguramiento Calidad  
Revisado:

Instrumentos WIKA, S.A.  
c/ Josep Carner 11-17  
E-08205 SABADELL (Barcelona)  
Tel. (+34) 902 902 577 - Fax (+34) 933 938 666  
www.wika.es · info@wika.es

Inscrita en el Registro Mercantil de Barcelona  
en la Hoja nº 8949, Folio 21, Tomo 1280,  
Libro 734, Sección 2ª en fecha 2.4.1964  
NIF: A-08143.497

**CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1**  
**INSPECTION CERTIFICATE according to EN 10204 – 3.1**

Cliente: FLOWERVE SPAIN, S.L.  
Customer: Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

Nº Certificado: 5637379562-1017  
certificate No.:

Página: 1 de 1  
Page: of página(s)  
page(s)

Pedido Nº: 60741  
Order No.:

Fecha: 20/06/2011  
Order date:

WIKAI Nº de pedido: PDC11009733  
WIKAI commission:

Pos.: 1,00 Código: 45361509  
Pos.: Ident. No.:

Descripción: 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

Cantidad: 8,00 Tipo: S.5413/4.DN160  
Quantity: Type:

Diámetro: J. Rango: 0...120°C  
Diameter: Range:

Nº de serie: BT0687  
Serial No.:

Nº de Tag: J.  
Tag-No.:

**Procedimiento de calibración / Calibration procedure:**

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
The calibration has been carried out by comparison measurement against a calibrated standard thermometer.

**Resultado de la calibración / Calibration results:**

| Temperature<br>in °C | Display<br>in °C | Error<br>in K | Uncertainty<br>in K (k=2) |
|----------------------|------------------|---------------|---------------------------|
| 9,84                 | 10,00            | 0,16          | 0,5                       |
| 60,08                | 59,00            | -1,08         | 0,5                       |
| 109,88               | 110,00           | 0,12          | 0,5                       |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
Object keeps the specifications

**Equipo de medición utilizado / Measurement-Equipment in use:**

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

**Medios isotermos / Heat sources in use:**

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | J.       | J.            | J.               |
| Calibration bath with glycol / water | CTB 9441 | 1200404135001 | J.               |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | J.               |
| Dry Well Calibrator                  | CTD9300  | 5407113       | J.               |

**Condiciones ambientales / Environmental conditions:**

Temperatura ambiente: 22°C ± 2 °C  
Ambient temperature:

Humedad relativa: 50% ± 20 %  
Relative humidity:

Instrumentos WIKAI, S.A.

Sabadell, 22.09.2011

Experto técnico: Carles Soler  
Company expert:

Comprobado por: R.S.  
Tested by:

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWERVE  
Planta Coslada  
Aseguramiento Calidad  
Registrado

Instrumentos WIKAI, S.A.  
c/ Josep Carner 11-17  
E-08205 SABADELL (Barcelona)  
Tel. (+34) 902 902 577 - Fax (+34) 933 938 666  
www.wika.es · info@wika.es

Inscrita en el Registro Mercantil de Barcelona  
en la Hoja nº 8949, Folio 21, Tomo 1280,  
Libro 734, Sección 2ª en fecha 2.4.1964  
NIF: A-08143.497

**CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1**  
**INSPECTION CERTIFICATE according to EN 10204 – 3.1**

**Cliete:** FLOWSERVE SPAIN, S.L.  
**Customer:** Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

**Nº Certificado:** 5637379562-1019  
**certificate No.:**

**Página:** 1 de 1 **página(s)**  
**Page:** of page(s)

**Pedido Nº:** 60741  
**Order No.:**

**Fecha:** 20/06/2011  
**Order date:**

**WIKA Nº de pedido:** PDC11009733  
**WIKA commission:**

**Pos.:** 1,00 **Código :** 45361509  
**Pos.:** Ident. No.:

**Descripción:** 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

**Cantidad:** 8,00 **Tipo:** S.5413/4.DN160  
**Quantity:** **Type:**

**Diámetro:** ./. **Rango:** 0...120°C  
**Diameter:** **Range:**

**Nº de serie:** BT0688  
**Serial No.:**

**Nº de Tag:** ./.  
**Tag-No.:**

**Procedimiento de calibración / Calibration procedure:**

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
*The calibration has been carried out by comparison measurement against a calibrated standard thermometer.*

**Resultado de la calibración / Calibration results:**

| Temperature<br>in °C | Display<br>in °C | Error<br>in K | Uncertainty<br>in K (k=2) |
|----------------------|------------------|---------------|---------------------------|
| 9,84                 | 10,00            | 0,16          | 0,5                       |
| 60,07                | 61,20            | 1,13          | 0,5                       |
| 109,89               | 110,00           | 0,11          | 0,5                       |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
*Object keeps the specifications*

**Equipo de medición utilizado / Measurement-Equipment in use:**

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

**Medios isotermos / Heat sources in use:**

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | ./.      | ./.           | ./.              |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | ./.              |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | ./.              |
| Dry Well Calibrator                  | CTD9300  | 5407113       | ./.              |

**Condiciones ambientales / Environmental conditions:**

**Temperatura ambiente:** 22°C ± 2 °C  
**Ambient temperature:**

**Humedad relativa:** 50% ± 20 %  
**Relative humidity:**

**Instrumentos WIKA, S.A.**

Sabadell, 22.09.2011

**Experto técnico:** Carles Soler  
**Company expert:**

**Comprobado por:** R.S  
**Tested by:**

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWSERVE

Planta Coslada  
Aseguramiento Calidad  
Reticado

Instrumentos WIKA, S.A.  
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Inscrita en el Registro Mercantil de Barcelona  
en la Hoja nº 8949, Folio 21, Tomo 1280,  
Libro 734, Sección 2ª en fecha 2.4.1964  
NIF: A-08143.497

CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1  
INSPECTION CERTIFICATE according to EN 10204 – 3.1

Ciente: FLOWSERVE SPAIN, S.L.  
Customer: Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

Nº Certificado: 5637379562-1021  
certificate No.:

Página: 1 de 1 página(s)  
Page: of page(s)

Pedido Nº: 60741  
Order No.:

Fecha: 20/06/2011  
Order date:

WIKAI Nº de pedido: PDC11009733  
WIKAI commission:

Pos.: 1,00 Código : 45361509  
Pos.: Ident. No.:

Descripción: 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

Cantidad: 8,00 Tipo: S.5413/4.DN160  
Quantity: Type:

Diámetro: /.  
Diameter: Range: 0...120°C

Nº de serie: BT0689  
Serial No.:

Nº de Tag: /.  
Tag-No.:

Procedimiento de calibración / Calibration procedure:

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
The calibration has been carried out by comparison measurement against a calibrated standard thermometer.

Resultado de la calibración / Calibration results:

| Temperature | Display | Error | Uncertainty |
|-------------|---------|-------|-------------|
| in °C       | in °C   | in K  | in K (k=2)  |
| 9,84        | 10,00   | 0,16  | 0,5         |
| 60,07       | 61,00   | 0,93  | 0,5         |
| 109,89      | 109,00  | -0,89 | 0,5         |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
Object keeps the specifications

Equipo de medición utilizado / Measurement-Equipment in use:

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

Medios isoterms / Heat sources in use:

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | /.       | /.            | /.               |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | /.               |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | /.               |
| Dry Well Calibrator                  | CTD9300  | 5407113       | /.               |

Condiciones ambientales / Environmental conditions:

Temperatura ambiente: 22°C ± 2 °C  
Ambient temperature:

Humedad relativa: 50% ± 20 %  
Relative humidity:

Instrumentos WIKAI, S.A.

Sabadell, 22.09.2011

Experto técnico: Carles Soler  
Company expert:

Comprobado por: R.S  
Tested by:

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWSERVE

Agente Costado  
aseguramiento - Calidad  
Revisado:

Instrumentos WIKAI, S.A.  
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Inscrita en el Registro Mercantil de Barcelona  
en la Hoja nº 8949, Folio 21, Tomo 1280,  
Libro 734, Sección 2ª en fecha 2.4.1964  
NIF: A-08143.497

**CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1**  
**INSPECTION CERTIFICATE according to EN 10204 – 3.1**

Cliente:  
Customer: FLOWERVE SPAIN, S.L.  
Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

Nº Certificado:  
certificate No.: 5637379562-1024

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Page: 1 de 1 página(s)  
of page(s)

Pedido Nº:  
Order No.: 60741

Fecha:  
Order date: 20/06/2011

WIKAI Nº de pedido:  
WIKAI commission: PDC11009733

Pos.:  
Pos.: 1,00 Código :  
Ident. No.: 45361509

Descripción:  
Description: 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

Cantidad:  
Quantity: 8,00 Tipo:  
Type: S.5413/4.DN160

Diámetro:  
Diameter: /./ Rango:  
Range: 0...120°C

Nº de serie:  
Serial No.: BT0690

Nº de Tag:  
Tag-No.: /./

**Procedimiento de calibración / Calibration procedure:**

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
The calibration has been carried out by comparison measurement against a calibrated standard thermometer.

**Resultado de la calibración / Calibration results:**

| Temperature<br>in °C | Display<br>in °C | Error<br>in K | Uncertainty<br>in K (k=2) |
|----------------------|------------------|---------------|---------------------------|
| 9,85                 | 10,00            | 0,15          | 0,5                       |
| 60,07                | 61,40            | 1,33          | 0,5                       |
| 109,89               | 110,00           | 0,11          | 0,5                       |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
Object keeps the specifications

**Equipo de medición utilizado / Measurement-Equipment in use:**

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

**Medios isotermos / Heat sources in use:**

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | /./      | /./           | /./              |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | /./              |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | /./              |
| Dry Well Calibrator                  | CTD9300  | 5407113       | /./              |

**Condiciones ambientales / Environmental conditions:**

Temperatura ambiente: 22°C ± 2 °C  
Ambient temperature:

Humedad relativa: 50% ± 20 %  
Relative humidity:

**Instrumentos WIKAI, S.A.**

Sabadell, 22.09.2011

Experto técnico: Carles Soler  
Company expert:

Comprobado por: R.S  
Tested by:

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWERVE

Planta Coslada  
Aseguramiento Calib.  
Revisado:

Instrumentos WIKAI, S.A.  
c/ Josep Carner 11-17  
E-08205 SABADELL (Barcelona)  
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www.wika.es - info@wika.es

Inscrita en el Registro Mercantil de Barcelona  
en la Hoja nº 8949, Folio 21, Tomo 1280,  
Libro 734, Sección 2ª en fecha 2.4.1964  
NIF: A-08143.497

CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1  
INSPECTION CERTIFICATE according to EN 10204 – 3.1

Cliente:  
Customer: FLOWSERVE SPAIN, S.L.  
Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

Nº Certificado:  
certificate No.: 5637379562-1033

Página:  
Page: 1 de 1 página(s)  
of page(s)

Pedido Nº:  
Order No.: 60741

Fecha:  
Order date: 20/06/2011

WIKAI Nº de pedido:  
WIKAI commission: PDC11009733

Pos.:  
Pos.: 1,00 Código :  
Ident. No.: 45361509

Descripción:  
Description: 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

Cantidad:  
Quantity: 8,00 Tipo:  
Type: S.5413/4.DN160

Diámetro:  
Diameter: ./ Rango:  
Range: 0...120°C

Nº de serie:  
Serial No.: BT0691

Nº de Tag:  
Tag-No.: ./

Procedimiento de calibración / Calibration procedure:

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
The calibration has been carried out by comparison measurement against a calibrated standard thermometer.

Resultado de la calibración / Calibration results:

| Temperature<br>in °C | Display<br>in °C | Error<br>in K | Uncertainty<br>in K (k=2) |
|----------------------|------------------|---------------|---------------------------|
| 9,85                 | 11,00            | 1,15          | 0,5                       |
| 60,07                | 61,40            | 1,33          | 0,5                       |
| 109,99               | 110,00           | 0,02          | 0,5                       |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
Object keeps the specifications

Equipo de medición utilizado / Measurement-Equipment in use:

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Kelthley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

Medios isoterms / Heat sources in use:

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | ./       | ./            | ./               |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | ./               |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | ./               |
| Dry Well Calibrator                  | CTD9300  | 5407113       | ./               |

Condiciones ambientales / Environmental conditions:

Temperatura ambiente: 22°C ± 2 °C  
Ambient temperature:

Humedad relativa: 50% ± 20 %  
Relative humidity:

Instrumentos WIKAI, S.A.

Sabadell, 22.09.2011

Experto técnico: Carles Soler  
Company expert:

Comprobado por: R.S  
Tested by:

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWSERVE  
Planta Costada  
Asesoramiento Calibración  
Revisado

Instrumentos WIKAI, S.A.  
c/ Josep Carner 11-17  
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Tel. (+34) 902 902 577 - Fax (+34) 933 938 666  
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Inscrita en el Registro Mercantil de Barcelona  
en la Hoja nº 8949, Folio 21, Tomo 1280,  
Libro 734, Sección 2ª en fecha 2.4.1964  
NIF: A-08143.497

CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1  
INSPECTION CERTIFICATE according to EN 10204 – 3.1

Cliente:  
Customer: FLOWSERVE SPAIN, S.L.  
Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

Nº Certificado:  
certificate No.: 5637379562-1035

Página:  
Page: 1 de 1 página(s)  
of page(s)

Pedido Nº:  
Order No.: 60741

Fecha:  
Order date: 20/06/2011

WIKAI Nº de pedido:  
WIKAI commission: PDC11009733

Pos.:  
Pos.: 1,00 Código :  
Ident. No.: 45361509

Descripción:  
Description: 0..120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

Cantidad:  
Quantity: 8,00 Tipo:  
Type: S.5413/4.DN160

Diámetro:  
Diameter: ./.. Rango:  
Range: 0...120°C

Nº de serie:  
Serial No.: BT0692

Nº de Tag:  
Tag-No.: ./..

Procedimiento de calibración / Calibration procedure:

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
The calibration has been carried out by comparison measurement against a calibrated standard thermometer.

Resultado de la calibración / Calibration results:

| Temperature | Display | Error | Uncertainty |
|-------------|---------|-------|-------------|
| in °C       | in °C   | in K  | in K (k=2)  |
| 9,85        | 11,40   | 1,55  | 0,5         |
| 60,07       | 61,00   | 0,93  | 0,5         |
| 109,99      | 109,00  | -0,98 | 0,5         |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
Object keeps the specifications

Equipo de medición utilizado / Measurement-Equipment in use:

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 27570/1    | 1559-DKD-K-19001 2011-02 |

Medios isoterms / Heat sources in use:

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | ./..     | ./..          | ./..             |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | ./..             |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | ./..             |
| Dry Well Calibrator                  | CTD9300  | 5407113       | ./..             |

Condiciones ambientales / Environmental conditions:

Temperatura ambiente: 22°C ± 2 °C  
Ambient temperature:

Humedad relativa: 50% ± 20 %  
Relative humidity:

Instrumentos WIKAI, S.A.

Sabadell, 22.09.2011

Experto técnico: Carles Soler  
Company expert:

Comprobado por: R.S.  
Tested by:

Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWSERVE  
Comanda Coslada  
Aseguramiento Calidad  
Revisado

CERTIFICADO DE INSPECCIÓN según EN 10204 – 3.1  
INSPECTION CERTIFICATE according to EN 10204 – 3.1

Cliente:  
Customer: FLOWSERVE SPAIN, S.L.  
Av. Fuentemar, 26-28  
28823 COSLADA  
MADRID

Nº Certificado:  
certificate No.: 5637379562-1040

Página:  
Page: 1 de 1 página(s)  
of page(s)

Pedido Nº:  
Order No.: 60741

Fecha:  
Order date: 20/06/2011

WIKA Nº de pedido:  
WIKA commission: PDC11009733

Pos.:  
Pos.: 1,00 Código :  
Ident. No.: 45361509

Descripción:  
Description: 0...120°C 1/2NPT L1= 87 X 6 MM \*Silicona\*

Cantidad:  
Quantity: 8,00 Tipo:  
Type: S.5413/4.DN160

Diámetro:  
Diameter: ./ Rango:  
Range: 0...120°C

Nº de serie:  
Serial No.: BT0693

Nº de Tag:  
Tag-No.: ./

Procedimiento de calibración / Calibration procedure:

La calibración se ha llevado a cabo mediante comparación con una sonda patrón calibrada.  
The calibration has been carried out by comparison measurement against a calibrated standard thermometer.

Resultado de la calibración / Calibration results:

| Temperature<br>in °C | Display<br>in °C | Error<br>in K | Uncertainty<br>in K (k=2) |
|----------------------|------------------|---------------|---------------------------|
| 9,85                 | 10,00            | 0,15          | 0,5                       |
| 60,07                | 60,00            | -0,07         | 0,5                       |
| 109,99               | 109,00           | -0,98         | 0,5                       |

El objeto de calibración está cumpliendo los datos técnicos proporcionados por el fabricante  
Object keeps the specifications

Equipo de medición utilizado / Measurement-Equipment in use:

| Testing device                   | Type          | Serial no. | Calibration mark         |
|----------------------------------|---------------|------------|--------------------------|
| Multímetro                       | Keithley 2002 | 1128174    | 26268                    |
| Termómetro de resistencia patrón | PT 100/4h     | 1195472    | 26291                    |
| Termómetro de resistencia patrón | PT 100/4h     | 2757011    | 1559-DKD-K-19001 2011-02 |

Medios isoterms / Heat sources in use:

| Heat source                          | Type     | Serial no.    | Calibration mark |
|--------------------------------------|----------|---------------|------------------|
| Ice point                            | ./       | ./            | ./               |
| Calibration bath with glicol / water | CTB 9441 | 1200404135001 | ./               |
| Calibration bath with silicone oil   | CTB 9220 | 1200404134001 | ./               |
| Dry Well Calibrator                  | CTD9300  | 5407113       | ./               |

Condiciones ambientales / Environmental conditions:

Temperatura ambiente: 22°C ± 2 °C  
Ambient temperature:

Humedad relativa: 50% ± 20 %  
Relative humidity:

Instrumentos WIKA, S.A.

Sabadell, 22.09.2011

Experto técnico: Carles Soler  
Company expert:

Comprobado por: R.S  
Tested by:

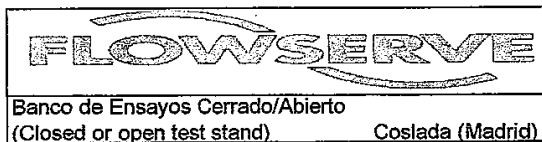
Fue realizado automáticamente, no necesita firma/Was created automatically, needs no signature (EN10204/5).

FLOWSERVE

Planta Coslada  
Aseguramiento QMS  
Revisado: [Signature]

Instrumentos WIKA, S.A.  
c/ Josep Carner 11-17  
E-08205 SABADELL (Barcelona)  
Tel. (+34) 902 902 577 - Fax (+34) 933 938 666  
www.wika.es · info@wika.es

Inscrita en el Registro Mercantil de Barcelona  
en la Hoja nº 8949, Folio 21, Tomo 1280,  
Libro 734, Sección 2ª en fecha 2.4.1964  
NIF: A-08143.497



## CERTIFICADO DE CALIBRACIÓN/CALIBRATION CERTIFICATE

Nº/No.: 10

INSTRUMENTO/INTRUMENT : SONÓMETRO RION Mod. NL-31 (SOUNDMETER Model RION NL-31)

Nº DE SERIE/SERIAL No 341517 & MICROFONO RION MOD. UC-53A Nº DE SERIE/SERIAL No.: 308360

FLOWSERVE S.L.

### CERTIFICA/CERTIFY

Que el Sonómetro RION modelo NL-31 n/s. 341517, ha pasado la prueba de calibración que avala el correcto funcionamiento del instrumento dentro de su campo de medida.

Dicha calibración se realizó con el Calibrador RION modelo NC-74 n/s. 50441093 que emite una señal de **94.06 dB/1000Hz**, siendo la lectura obtenida de:

That RION Soundmeter model NL-31 s/no. 341517 has passed the calibration test that states the correct operation of this instrument within its measure range.

This calibration was carried out with RION NC-74 calibrator s/no. 50441093 that gives a 94.06 **dB/1000Hz**, getting a reading of:

**94.1 dB(A)**

Fecha de calibración:

Calibration data:

14/05/2009

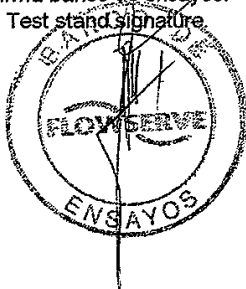
Válido hasta

Available to:

14/05/2014

Firma banco de ensayos.

Test stand signature



Firma garantía de calidad

Quality control signature.

FLOWSERVE

Planta Coslada  
Aseguramiento Calidad  
Revisado: *[Signature]*



Nº 20/LC076

# CERTIFICADO DE CALIBRACIÓN

Certificate of Calibration

Número 19832  
Number

SMC.860023/02

Página 1 de 3 páginas  
Page 1 of 3 pages

155

## LABORATORIO DE CALIBRACION DE SGS TECNOS S.A.

C/ Trespaderne, 29 - 28042 MADRID  
Edf. Barajas 1 (Barrio del Aeropuerto)  
Tlf: 91 313 80 00 / 81 64  
Fax: 91 313 80 93  
e-mail: es.calibracion.lab@sgs.com

**SGS**

OBJETO TERMÓMETRO DE RADIACIÓN  
Item

ACCESORIOS:

MARCA FLUKE  
Mark

MODELO 66  
Model

IDENTIFICACION 2538096001-0029  
Identification

ITEM: 155

SOLICITANTE FLOWSERVE SPAIN, S.L.  
Applicant Avda. Fuentemar, 26-28  
Polígono Industrial  
28823 Coslada (MADRID)

**FLOWSERVE**  
Planta Coslada  
Aseguramiento Calidad  
Revisado:

VÁLIDO HASTA 04-2015

FECHA/S DE CALIBRACION 16 de abril de 2010  
Date/s of Calibration

Signatario/s autorizado/s  
Authorised Signatory/ies

SGS Tecnos, S.A.

Fecha de Emisión  
Date of issue  
20 de abril de 2010

JOSE L. LUCENA PEDRAZA  
Director Técnico Laboratorio de Calibración

Este certificado se expide de acuerdo con las condiciones de la acreditación concedida por ENAC, que ha comprobado las capacidades de medida del Laboratorio y su trazabilidad a patrones nacionales o internacionales.  
Este certificado no podrá ser reproducido parcialmente sin la aprobación por escrito del laboratorio que lo emite.

This certificate is issued in accordance with the conditions of accreditation granted by ENAC which has assessed the measurement capability of the laboratory and its traceability to national or international standards.  
This certificate may not be partially reproduced, except with the prior written permission of the issuing laboratory.

**1.-CARACTERÍSTICAS DEL INSTRUMENTO:**

|                          |                |
|--------------------------|----------------|
| Campo de medida nominal  | -32 a 600 °C   |
| Campo/Puntos solicitados | -25 a 300 °C   |
| Resolución               | 0,1 °C         |
| Campo espectral          | 8 a 14 $\mu$ m |

**2.-PROCEDIMIENTO DE CALIBRACION: PE.T-LC-41.**

Calibración efectuada por comparación con termómetro de radiación patrón y fuentes de radiación de emisividad conocida, alta estabilidad y apertura citada en el punto 6. Las medidas se han realizado a una distancia de 200 mm., realizando un ajuste de emisividad en el equipo de 1,00.

**3.-PATRONES UTILIZADOS:**

|            |            |
|------------|------------|
| 043.860001 | 043.560001 |
|------------|------------|

**4.-CONDICIONES AMBIENTALES DE REFERENCIA:**

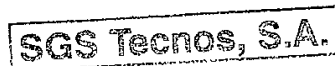
|                  |               |
|------------------|---------------|
| Temperatura      | 23 $\pm$ 5 °C |
| Humedad relativa | < 70%         |

**5.-TRAZABILIDAD E INCERTIDUMBRES:**

La trazabilidad de las medidas está referida a los patrones de referencia del laboratorio, de acuerdo a la Escala Internacional de Temperatura (EIT-90), siendo calibrados periódicamente, en laboratorios nacionales e internacionales, en laboratorios acreditados por ENAC o por cualquier otra entidad firmante del Acuerdo Multilateral de la EA para el reconocimiento mutuo de certificados

La incertidumbre expandida de medida se ha obtenido multiplicando la incertidumbre típica de medición por el factor de cobertura  $k=2$  que, para una distribución normal, corresponde a una probabilidad de cobertura de aproximadamente el 95 %. La incertidumbre típica de medida se ha determinado conforme al documento EA-4/02.

Los valores e incertidumbres asignados corresponden al momento y a las condiciones en las que se realizaron las medidas, no considerándose la estabilidad del instrumento a largo plazo.



## 6.- RESULTADOS OBTENIDOS:

| PATRON<br>( $t_{90}$ )<br>°C | INSTRUMENTO<br>°C | DESVIACION<br>°C | INCERTID.<br>ASOCIADA<br>± °C | OBSERVAC. |
|------------------------------|-------------------|------------------|-------------------------------|-----------|
| -23,9                        | -23,6             | 0,3              | 2,3                           | (1)       |
| 67,4                         | 67,3              | -0,1             | 2,3                           | (1)       |
| 134,6                        | 134,1             | -0,5             | 2,3                           | (1)       |
| 302,2                        | 299,8             | -2,4             | 3,9                           | (2)       |
| 301,9                        | 298,7             | -3,2             | 3,9                           | (2)       |

(1) Medida realizada con una fuente de radiación de 57 mm. de apertura.

(2) Medida realizada con una fuente de radiación de 45 mm. de apertura.

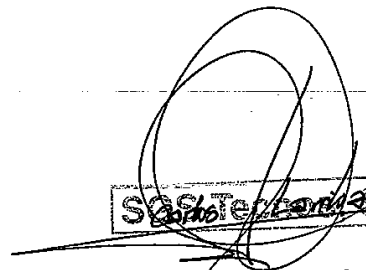
La estabilidad del instrumento durante la calibración se comprobó con una segunda medida al final de la calibración.

CONCLUSIONES: Incertidumbre asociada a la calibración:

De  $\pm 2,3$  a  $\pm 3,9$  °C ( $k=2$ )

Considerando las desviaciones encontradas como contribuciones y adicionándolas a la incertidumbre asociada, la incertidumbre de calibración del instrumento es de:

De  $\pm 2,4$  a  $\pm 6,3$  °C




CARLOS LARRIBA SÁNCHEZ

Realizado

**1.- INSTRUMENT FEATURES:**

|                           |               |
|---------------------------|---------------|
| NOMINAL MEASUREMENT RANGE | -32 to 600 °C |
| REQUESTED RANGE           | -25 to 300 °C |
| RESOLUTION                | 0.1 °C        |
| SPECTRAL RANGE            | 8 to 14 µm    |

**2.- CALIBRATION PROCEDURE: PE.T-LC-41.**

Calibration made by comparison with a standard radiation thermometer and radiation sources with known emissivity, high stability and opening mentioned in point 6. Measures were made at a distance of 200 mm., adjusting equipment emissivity to 1.00.

**3.- PATTERNS USED:**

|            |            |
|------------|------------|
| 043.860001 | 043.560001 |
|------------|------------|

**4.- REFERENCE ENVIRONMENTAL CONDITIONS:**

|                   |           |
|-------------------|-----------|
| Temperature       | 23 ± 5 °C |
| Relative humidity | < 70%     |

**5.- TRACEABILITY AND UNCERTAINTY:**

Measures traceability is referred to laboratory patterns, according to the International Temperature Scale (ITS-90), being calibrated regularly in national and international laboratories, in ENAC certified laboratories or by any other entity that is a co-signatory to the European co-operation for Accreditation (EA's) multilateral agreement on mutual recognition.

The expanded uncertainty of the measure has been obtained by multiplying the standard uncertainty of measurement by coverage factor  $k=2$  that, for a normal distribution, corresponds to a coverage probability of approximately 95%. The standard uncertainty of the measure has been determined according to the document EA-4/02.

The values and uncertainties assigned are referred to the moment and conditions under which measurements were made, not considering the long term equipment stability.



**6.- RESULTS:**

| PATTERN<br>( $t_{90}$ )<br>°C | INSTRUMENT<br>°C | DEVIATION<br>°C | ASSOCIATED<br>UNCERTAINTY<br>±°C | COMMENTS |
|-------------------------------|------------------|-----------------|----------------------------------|----------|
| -23.9                         | -23.6            | 0.3             | 2.3                              | (1)      |
| 67.4                          | 67.3             | -0.1            | 2.3                              | (1)      |
| 134.6                         | 134.1            | -0.5            | 2.3                              | (1)      |
| 302.2                         | 299.8            | -2.4            | 3.9                              | (2)      |
|                               |                  |                 |                                  |          |
| 301.9                         | 298.7            | -3.2            | 3.9                              | (2)      |

(1) Measure made with a radiation source with 57 mm of opening.

(2) Measure made with a radiation source with 45 mm of opening.

Instrument stability during calibration was checked with a second measure at the end of the calibration process.

**CONCLUSIONS:** Uncertainty associated to the calibration:

From  $\pm 2.3$  to  $\pm 3.9$  °C ( $k=2$ )

Considering founded deviations as contributions and adding them to de associated uncertainty, the instrument's calibration uncertainty is:

From:  $\pm 2.4$  to  $\pm 6.3$  °C

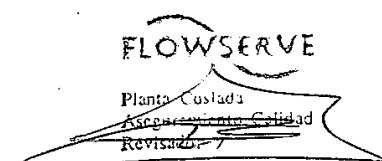
Prepared for:

Flowserve Pump Division

Spain

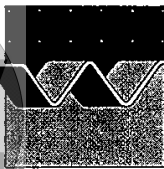
Calibration of a 100mm Flow Nozzle

August 2004



VALIDO HASTA 201408

**WL | delft hydraulics**



## CALIBRATION CERTIFICATE

certificate number 1481

page 1 of 5

applicant : Flowserve Pump Division  
Spain

instrument :  
manufacturer : Flowserve Pump Division  
type : Venturi  
serial number : ----  
diameter : 100.146 mm  
max. flow : 60.051 l/s  
calibration method : see page 2

environmental conditions : see page 3

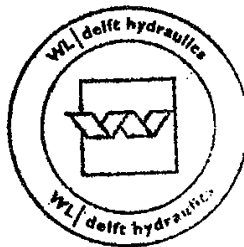
date of calibration : August 3, 2004

results : see page 3 and 4

uncertainty : conform EA-4/02, see page 2 and 3

traceability : The measurements have been executed using standards for which the traceability to (inter)national standards has been demonstrated towards the RvA conform the ISO/IEC 17025.

The Raad voor Accreditatie is one of the signatories of the Multilateral Agreement of the European Cooperation for Accreditation of Laboratories for the mutual recognition of calibration certificates.



Delft, August 5, 2004

C.L. Lubbers  
Specialist Components  
Industrial Flow Technology

WL | DELFT HYDRAULICS  
p.o. box 177  
2600 mh delft  
the netherlands

This certificate is issued provided that  
WL | DELFT HYDRAULICS does not assume any liability

Reproduction of the complete certificate is allowed. Parts of the certificate may only be reproduced with written approval of the calibration laboratory.

This certificate is issued provided that the Raad voor Accreditatie does not assume any liability.

## 1 Order and specifications

In May 2004, Flowserve Pump Division Spain commissioned WL|DELFT HYDRAULICS to calibrate a Venturi nozzle.

### Specifications:

|                              |                                   |
|------------------------------|-----------------------------------|
| Manufacturer                 | : Flowserve Pump Division         |
| Type                         | : Venturi Nozzle                  |
| Serial number                | : ----                            |
| Max. flow                    | : 60.051 l/s (without cavitation) |
| Upstream diameter D          | : 100.146 mm                      |
| Throat diameter d            | : 65.050 mm                       |
| Diameter ratio $\beta = d/D$ | : 0.649552                        |

## 2 Calibration rig

The tests were carried out with the 8 tons calibration rig of WL|DELFT HYDRAULICS.

Figure 1 (page 5) gives the lay-out of the test set-up.

The differential pressure was measured with a Honeywell Smart Differential Pressure Transmitter (ST 3000).

The internal diameter of the upstream pipe connection to the venturi is  $D_i = 100.0$  mm

The internal diameter of the downstream pipe connection to the venturi is  $D_i = 67.0$  mm

The internal diameter of the inlet of the venturi  $D_i = 100.1$  mm.

The internal diameter of the outlet of the venturi  $D_i = 63.7$  mm.

## 3 Calibration boundary conditions

The maximum flowrate without cavitation is 60,051 l/s. The flow medium is water with a temperature between 21.9 °C and 22.1 °C.

The maximum Reynolds number  $RE_D = 0.795 \cdot 10^6$

## 4 Flow and discharge coefficients

According to ISO standard 5167 the general equation for the flow rate  $q_v$  of a venturi is:

$$q_v = C \cdot \varepsilon \cdot \frac{1}{\sqrt{1-\beta^4}} \cdot \frac{\pi}{4} \cdot d^2 \sqrt{\frac{2\Delta p}{\rho}}$$

|           |               |   |                           |                      |
|-----------|---------------|---|---------------------------|----------------------|
| in which: | $q_v$         | = | volume rate of flow       | (m <sup>3</sup> /s)  |
|           | $C$           | = | coefficient of discharge  | (-)                  |
|           | $\varepsilon$ | = | expansibility factor      | (-)                  |
|           | $\Delta p$    | = | differential pressure     | (Pa)                 |
|           | $\beta$       | = | diameter ratio $d/D$      | (-)                  |
|           | $\rho$        | = | mass density of the fluid | (kg/m <sup>3</sup> ) |

For incompressible fluids  $\varepsilon = 1$ .

The flow coefficient  $\alpha$  is related to the coefficient of discharge  $C$  as:

$$\alpha = \frac{C}{\sqrt{1-\beta^4}}$$

A circular logo with the words "Quality" and "Record" stacked vertically in a bold, sans-serif font. The logo is partially obscured by a large, faint, circular watermark in the background.

## 5 Results

The results of the calibration are gathered in table 1 (page 4).

## 6 Uncertainty

The uncertainty of the test rig and its instruments is better than

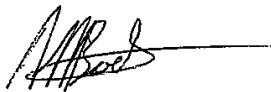
- 0,3% for the range of 2 to 10 kPa,
- 0,2% for the range of 10 to 20 kPa and
- 0,1% for the range of 20 to 200 kPa.

The uncertainty of the given discharge coefficient  $C$  is based on the uncertainty of the test rig including its instruments and on the uncertainty of the pressure difference measurement.

The expanded uncertainty of the given discharge coefficients  $C$  are not higher than:

- 0,30 % in the range of 2 to 10 kPa,
- 0,11 % in the range of 20 to 200 kPa.

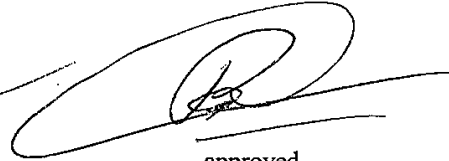
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA-4/02.

A handwritten signature in black ink, appearing to read "A.M. Boele".

projectleader  
A.M.Boele

A handwritten signature in black ink, appearing to read "C.L. Lubbers".

review  
C.L. Lubbers

A large, stylized handwritten signature in black ink, appearing to read "R.P.M. Lemmens".

approved  
R.P.M. Lemmens

**Quality  
Record**

Date : August 3, 2004

Client Name : Flowserve Pump Division  
Spain

Instrument Manufacturer : Flowserve Pump Division  
Type : Venturi Nozzle  
Serial no : —  
Tappings : A  
Upstream diameter D [mm] : 100.146  
Throat diameter d [mm] : 65.050

Diameter ratio d/D : 0.650

Table 1:

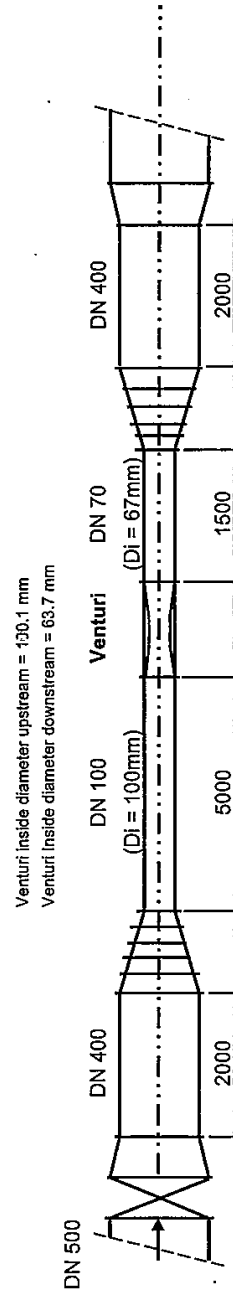
| nr. | Temperature<br>water<br>[°C] | Density<br>[kg/m <sup>3</sup> ] | Volume<br>flow<br>[m <sup>3</sup> /s] | diff.<br>pressure<br>[kPa] | Velocity<br>pipe<br>[m/s] | Reynolds<br>pipe<br>*10 <sup>6</sup> | Flow coeff<br>Alpha | Discharge<br>coeff. C |
|-----|------------------------------|---------------------------------|---------------------------------------|----------------------------|---------------------------|--------------------------------------|---------------------|-----------------------|
| 1   | 21.9                         | 998.20                          | 0.060051                              | 139.88                     | 7.624                     | 0.795                                | 1.0793              | 0.9785                |
| 2   | 21.9                         | 998.20                          | 0.059970                              | 139.47                     | 7.613                     | 0.794                                | 1.0795              | 0.9787                |
| 3   | 21.9                         | 998.20                          | 0.053531                              | 111.14                     | 6.796                     | 0.709                                | 1.0794              | 0.9786                |
| 4   | 21.9                         | 998.20                          | 0.053440                              | 110.70                     | 6.784                     | 0.708                                | 1.0797              | 0.9789                |
| 5   | 21.9                         | 998.20                          | 0.046223                              | 82.87                      | 5.868                     | 0.613                                | 1.0794              | 0.9786                |
| 6   | 21.9                         | 998.20                          | 0.046298                              | 83.16                      | 5.878                     | 0.614                                | 1.0793              | 0.9785                |
| 7   | 22.0                         | 998.20                          | 0.037847                              | 55.60                      | 4.805                     | 0.502                                | 1.0790              | 0.9782                |
| 8   | 22.0                         | 998.17                          | 0.037773                              | 55.37                      | 4.795                     | 0.501                                | 1.0790              | 0.9783                |
| 9   | 22.0                         | 998.18                          | 0.027163                              | 28.67                      | 3.448                     | 0.361                                | 1.0784              | 0.9777                |
| 10  | 22.0                         | 998.20                          | 0.027189                              | 28.72                      | 3.452                     | 0.361                                | 1.0785              | 0.9778                |
| 11  | 22.0                         | 998.19                          | 0.011399                              | 5.02                       | 1.447                     | 0.152                                | 1.0811              | 0.9802                |
| 12  | 22.1                         | 998.18                          | 0.011366                              | 4.99                       | 1.443                     | 0.151                                | 1.0812              | 0.9802                |

Flow calibration rig uncertainty 0.05 %

Environmental temperature ( 20 ± 4 )°C



page 5 of 5



certificate number 1481

Fig.No.1



493



**Kalibrierschein in Anlehnung an DIN EN ISO 10012**  
*Calibration Certificate with reference to ISO 10012*

(Werkskalibrierschein / Working standard calibration certificate)

|         |
|---------|
| MM522   |
| HBM     |
| 2010-11 |

Gegenstand  
*Object* **Drehmomentaufnehmer**

Hersteller  
*Manufacturer* **Hottinger Baldwin Messtechnik GmbH, Darmstadt**

Typ  
*Type* **T32FNA/25kN·m**

Fabrikate/Serien-Nr.  
*Serial number* **031830023**

Auftraggeber  
*Customer* **FLOWERVE SPAIN S.A.; ES - 28823 COSLADA**

Auftragsnummer  
*Order No.* **3109000757A**

Anzahl der Seiten des Kalibrierscheines  
*Number of pages of the certificate* **3**

FLOWERVE  
Planta Coslada  
Avenida Madrid  
Edificio

Valido hasta 11-2015

Die Kalibrierung erfolgte unter Berücksichtigung der Anforderungen der DIN EN ISO/IEC 17025 mit Messmitteln, die im Sinne der DIN EN ISO 9001 und DIN EN ISO 10012 auf Nationale Normale rückführbar sind.

*The calibration was performed respecting the requirements of ISO/IEC 17025 using calibration equipment traceable to National Standards according to ISO 9001 and ISO 10012.*

Prüfer  
*Tester* **Kropatsch**

Datum  
*Date* **2010-11-06**



Abnahme  
*Release*

*[Signature]*

WKS\_Drehmo\_1 - 09/2008

QV1061F1.06 - 11/07

Seite / page **1**

Hottinger Baldwin Messtechnik GmbH

Im Tiefen See 45 · D-64293 Darmstadt · Germany · Tel. +49 6151 803 436 · Fax +49 6151 803 590 · Email: dkdcal@hbm.com · www.hbm.com

Zertifiziert nach ISO 9001 und ISO 14001 (DQS-000001)  
Certified acc. to ISO 9001 and ISO 14001 by DQS

Akkreditiert als DKD-Kalibrierlab. (DKD-K-00101)  
Accredited as calibration laboratory by DKD

Akkreditiert als EMV-Prüflab. (DAT-P-012/ DAT-P-006)  
Accredited as EMC testing laboratory by DATech



|         |
|---------|
| MM522   |
| HBM     |
| 2010-11 |

Kalibrierung vom / Calibration dated 2010-11-06

In case of doubts the German text of this Certificate is valid.

**Kalibriereinrichtung** 25 kN·m Drehmomentmesseinrichtung

*Torque calibration equipment*

**Anlagenmeßunsicherheit**  $\pm 0,008\%$  ( siehe DKD-Akkreditierungsurkunde vom 2009-07-10 )  
*Best measurement capability*

#### Angaben zur Kalibrierung

*Calibration conditions*

Umgebungstemperatur:  $23 \pm 1$  °C Umgebungsfeuchte: 43% rel.  
*Ambient temperature* *Environmental humidity*

Umgebungsluftdruck: 1000 hPa  
*Atmospheric pressure*

Die Kalibrierung ist nur gültig bei Verwendung des unten beschriebenen Ausgeber-Typs.  
*The calibration is only valid if a signal conditioner of the same type as described below is used.*

#### Angaben zum Aufnehmer

*Transducer data*

Nullsignal: 9995,3 Hz  
*Zero signal*

Kalibrierzubehör: HBM-Standard  
*Calibration accessories* *HBM-owned extension cable*

#### Angaben zum Kabel

*Cable data*

Länge (fest verbunden): \*\*\*\* Verlängerung: 6 m  
*Length (fixed)* *Extension*

Ausführung: 6 - adrig Ausführung-Anschluß: Standard  
*Version* *..-core* *Connection of amplifier* *..-lead*

#### Angaben zum Ausgeber

*Signal conditioner data*

(Eigentum des Kalibrierlaboratoriums)  
*(owned by the calibration laboratory)*

Verstärkertyp: HBM-ML60B  
*Amplifier type*

Anschlußart: Standard  
*Type of connection* *..-lead*

Serien-Nr.: DKD118  
*Serial no.*

Meßstelle: Channel 1  
*Measuring channel*

Brückenspeisespannung: 5 VDC  
*Bridge excitation voltage*

Filter: 0,1 Hz Bessel  
*Filter*

Kalibriersignal: 2322,9 Hz  
*Check signal*

Meßbereich: 20000,0 Hz  
*Measuring range*

#### Angaben zum Anzeiger

*Indicator data*

(Eigentum des Kalibrierlaboratoriums)  
*(owned by the calibration laboratory)*

Anzeigertyp: HBM-AB22A  
*Indicator type*

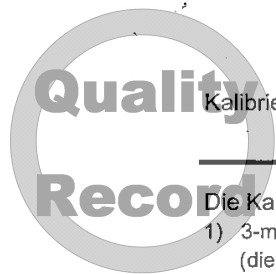
Serien-Nr.: 500000579  
*Serial no.*

Anzeigeranpassung: \*\*\*\*  
*Indicator matching*

#### Sonstiges

*Other data*

\*\*\*\*



Die Kalibrierung wurde in einer Einbaulage durchgeführt:

- 1) 3-malige Vorbelastung vor Kalibrierung in der jeweiligen Drehmomentrichtung mit 100% der Nennkraft (diese Vorbelastung ist vor jeder Benutzung zu wiederholen!)
- 2) Anzeigewerte bei zunehmenden [abnehmenden] Drehmoment: Meßreihen R1, [R2'], S1, [S2']

The calibration was performed in one mounting position:

- 1) 3 times loading with 100% of nominal torque in the torque direction concerned prior to calibration (this kind of loading has to be repeated each time the transducer is used!)
- 2) Indication at increasing [decreasing] torque: measuring runs R1, [R2'], S1, [S2']

**Tabelle 1**

table 1

**Anzeigewerte Hz**

Indication

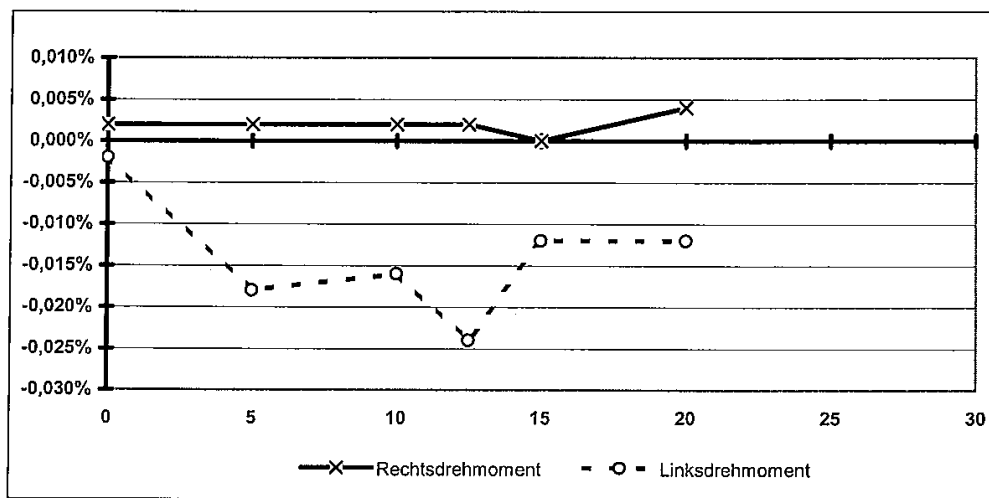
| Drehmoment [kN·m]<br>torque | Rechtsdrehmoment<br>clockwise torque |        | Linksdrehmoment<br>anticlockwise torque |         |
|-----------------------------|--------------------------------------|--------|-----------------------------------------|---------|
|                             | R1                                   | R2'    | S1                                      | S2'     |
| 0,0                         | 0,0                                  | -0,1   | 0,0                                     | -0,1    |
| 5,0                         | 1001,4                               | 1001,3 | -1001,8                                 | -1002,7 |
| 10,0                        | 2002,2                               | 2002,1 | -2002,8                                 | -2003,6 |
| 12,5                        | 2502,5                               | 2502,4 | -2502,8                                 | -2504,0 |
| 15,0                        | 3002,7                               | 3002,7 | -3003,8                                 | -3004,4 |
| 20,0                        | 4003,2                               | 4003,4 | -4004,9                                 | -4005,5 |
| 25,0                        | 5003,7                               | 5003,7 | -5006,0                                 | -5006,0 |

**Diagramm**

diagram

**Rel. Umkehrspanne (bezogen auf den Kalibrier-Endwert)**

Rel. hysteresis (relative to the calibration maximum load)



Die Null-Anzeige wurde rechnerisch von allen Anzeigewerten subtrahiert.

The indication at zero loading was subtracted from all indication values.



Nº: 539

**CERTIFICADO DE CALIBRACIÓN/CERTIFICATE OF CALIBRATION**

|                               |                     |                                  |
|-------------------------------|---------------------|----------------------------------|
| <b>Instrumento/Instrument</b> | <b>Tipo/Type</b>    | <b>Nº de serie/Serial number</b> |
| Transductor/Transducer        | 8891.74.3315        | 829520.0.00.05-002               |
| <b>Rango/Range</b>            | <b>Escala/Scale</b> | <b>Marca/Manuf.</b>              |
| 0 ÷ + 250 b                   | -                   | TRAFAG                           |
|                               |                     | <b>Proced. &amp; Rev.</b>        |
|                               |                     | PI-006 Rev. 3                    |

|                              |                       |                                      |                                  |                                     |                               |                              |
|------------------------------|-----------------------|--------------------------------------|----------------------------------|-------------------------------------|-------------------------------|------------------------------|
| <b>Patrón/Pattern</b>        | <b>Certif. Nº/No.</b> | <b>Tipo/Type</b>                     | <b>Nº de serie Serial No.</b>    | <b>Calibrado por Calibration by</b> | <b>Instrumento Instrument</b> | <b>Nº Informe Inform No.</b> |
| Balanza de pesas/Dead weight | 6                     | L-1000-1                             | 59275                            | PRESSUREMENTS                       | PRESSUREMENTS                 | 50459275                     |
|                              |                       | <b>Fecha calib. Calibration data</b> | <b>Válido hasta Available to</b> |                                     |                               |                              |
|                              |                       | may-09                               | may-14                           |                                     |                               |                              |

| Lectura ascendente/Up readings (m) |                     |                         |                              | Lectura descendente/Down readings (m) |                     |                         |                              |
|------------------------------------|---------------------|-------------------------|------------------------------|---------------------------------------|---------------------|-------------------------|------------------------------|
| Carga/Load Xci                     | Lectura/Reading Xli | Desv./Desv. Sdi=Xli-Xci | Correc./Correct. Cci=Xci-Xli | Carga/Load Xci                        | Lectura/Reading Xli | Desv./Desv. Sdi=Xli-Xci | Correc./Correct. Cci=Xci-Xli |
| 51,0                               | 53,0                | 2,000                   | -2,00                        | 2550,0                                | 2548,0              | -2,000                  | 2,000                        |
| 204,0                              | 207,0               | 3,000                   | -3,00                        | 2040,0                                | 2038,0              | -2,000                  | 2,000                        |
| 510,0                              | 512,0               | 2,000                   | -2,00                        | 1785,0                                | 1783,0              | -2,000                  | 2,000                        |
| 765,0                              | 766,0               | 1,000                   | -1,00                        | 1530,0                                | 1529,0              | -1,000                  | 1,000                        |
| 1020,0                             | 1017,0              | -3,000                  | 3,00                         | 1275,0                                | 1274,0              | -1,000                  | 1,000                        |
| 1275,0                             | 1274,0              | -1,000                  | 1,00                         | 1020,0                                | 1018,0              | -2,000                  | 2,000                        |
| 1530,0                             | 1529,0              | -1,000                  | 1,00                         | 765,0                                 | 767,0               | 2,000                   | -2,000                       |
| 1785,0                             | 1783,0              | -2,000                  | 2,00                         | 510,0                                 | 513,0               | 3,000                   | -3,000                       |
| 2040,0                             | 2038,0              | -2,000                  | 2,00                         | 204,0                                 | 207,0               | 3,000                   | -3,000                       |
| 2550,0                             | 2548,0              | -2,000                  | 2,00                         | 51,0                                  | 53,0                | 2,000                   | -2,000                       |

Valor medio/Medium value Sdi = -0,30 m.

Valor medio/Medium value Cci = 0,30 m.

Incertidumbre de medición del aparato calibrado/Fluctuation of measurement instrument: 9,2620 m.c.a.

Incertidumbre del patrón/Pattern fluctuation Ip = 0,0525 gramos/grams

División escala o precisión/Scale division or accuracy: ± 0,2 %

Certificado calibración patrón por Laboratorio/Calibration certificate of pattern by Laboratory:

ENAC 14/LC104A

Situación del instrumento/Instrument situation:

B.E.C.

| CONDICIONES AMBIENTALES/AMBIENT CONDITIONS                                    |              |
|-------------------------------------------------------------------------------|--------------|
| Temperatura ambiente para la calibración/Ambient temperature for calibration: | 20 °C ± 3 °C |
| Humedad relativa /Relative Humidity:                                          | 60 % ± 10 %  |

**Resultado de la calibración**

Válido/Conform ☒

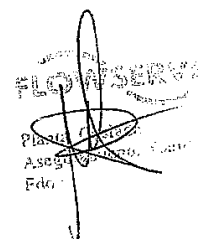
No válido/No conform ☐

Firma Banco de Ensayos



|                                       |                                  |
|---------------------------------------|----------------------------------|
| <b>Fecha calibr. Calibration data</b> | <b>Válido hasta Available to</b> |
| 19-01-2011                            | 19-01-2012                       |

Firma Garantía Calidad





Nº: **551**

**CERTIFICADO DE CALIBRACIÓN/CERTIFICATE OF CALIBRATION**

|                               |                     |                                  |
|-------------------------------|---------------------|----------------------------------|
| <b>Instrumento/Instrument</b> | <b>Tipo/Type</b>    | <b>Nº de serie/Serial number</b> |
| Transductor/Transducer        | 8891.23.3315        | 292031-001                       |
| <b>Rango/Range</b>            | <b>Escala/Scale</b> | <b>Marca/Manuf.</b>              |
| -1 ÷ + 3b                     | -                   | TRAFAG                           |
|                               |                     | <b>Proced. &amp; Rev.</b>        |
|                               |                     | PI-006 Rev. 6                    |

|                       |                       |                  |                               |                                     |                                          |                              |
|-----------------------|-----------------------|------------------|-------------------------------|-------------------------------------|------------------------------------------|------------------------------|
| <b>Patrón/Pattern</b> | <b>Certif. Nº/No.</b> | <b>Tipo/Type</b> | <b>Nº de serie Serial No.</b> | <b>Calibrado por Calibration by</b> | <b>Instrumento marca Instrument mark</b> | <b>Nº Informe Inform No.</b> |
| Balanza de pesas      |                       |                  |                               |                                     |                                          |                              |
| Dead weight           | 7                     | 35261-81         | 59114-0                       | SIEMSA                              | DEWIT                                    | 37823                        |
| Vacuóm./Vacuometer    | 37                    | 1333             | 6 75                          | SIEMSA                              | ASHCROFT                                 | 59248                        |

|                     |                     |
|---------------------|---------------------|
| <b>Fecha calib.</b> | <b>Válido hasta</b> |
| Calibration data    | Available to        |
| 30-11-06 & 12-4-10  | 30-11-11 & 12-4-15  |

| Lecturas ascendentes (m.)/Up readings (m.) |          |             |             |                | Lecturas descendentes (m.)/Down readings (m.) |          |             |             |                |
|--------------------------------------------|----------|-------------|-------------|----------------|-----------------------------------------------|----------|-------------|-------------|----------------|
| Carga/Load                                 |          | Lect./Read. | Desv./Desv. | Corr./Correct. | Carga/Load                                    |          | Lect./Read. | Desv./Desv. | Corr./Correct. |
| Xci (cmH2O)                                | Xci (m.) | Xli (m.)    | Sdi=Xli-Xci | Cci=Xci-Xli    | Xci (cmH2O)                                   | Xci (m.) | Xli (m.)    | Sdi=Xli-Xci | Cci=Xci-Xli    |
| -63,0                                      | -8,56    | -8,61       | -0,05       | 0,05           |                                               | 30,0     | 30,30       | 0,30        | -0,300         |
| -60,0                                      | -8,16    | -8,19       | -0,03       | 0,03           |                                               | 25,0     | 25,30       | 0,30        | -0,300         |
| -40,0                                      | -5,44    | -5,47       | -0,03       | 0,03           |                                               | 20,0     | 20,20       | 0,20        | -0,200         |
| -20,0                                      | -2,72    | -2,74       | -0,02       | 0,02           |                                               | 10,0     | 10,10       | 0,10        | -0,100         |
| -10,0                                      | -1,36    | -1,35       | 0,09        | -0,01          | 0,0                                           | 0,0      | 0,11        | 0,11        | -0,110         |
| 0,0                                        | 0,0      | 0,12        | 0,16        | -0,12          | -10,0                                         | -1,36    | -1,37       | -0,01       | 0,010          |
|                                            | 10,0     | 10,20       | 0,20        | -0,20          | -20,0                                         | -2,72    | -2,73       | -0,01       | 0,010          |
|                                            | 20,0     | 20,20       | 0,20        | -0,20          | -40,0                                         | -5,44    | -5,46       | -0,02       | 0,020          |
|                                            | 25,0     | 25,30       | 0,30        | -0,30          | -60,0                                         | -8,16    | -8,18       | -0,02       | 0,020          |
|                                            | 30,0     | 30,30       | 0,30        | -0,30          | -63,0                                         | -8,56    | -8,60       | -0,04       | 0,040          |

Valor medio/Medium value Sdi = 0,20 m.

Valor medio/Medium value Cci = -0,19 m.

Incertidumbre de medición del aparato calibrado/Fluctuation of measurement instrument: 0,0375 m.c.a.

Incertidumbre del patrón/Pattern fluctuation Ip = 0,0360 gramos/grames

División escala o precisión/Scale division or accuracy: ± 0,2 %

Certificado calibración patrón por Laboratorio/Calibration certificate of pattern by Laboratory:

ENAC 14901

Situación del instrumento/Instrument situation: B.E.C.

| CONDICIONES AMBIENTALES/AMBIENT CONDITIONS                                    |              |
|-------------------------------------------------------------------------------|--------------|
| Temperatura ambiente para la calibración/Ambient temperature for calibration: | 20 °C ± 3 °C |
| Humedad relativa /Relative Humidity:                                          | 60 % ± 10 %  |

**Resultado de la calibración**

Válido/Conform

No válido/No conform

X

|                          |                     |
|--------------------------|---------------------|
| <b>Fecha calibración</b> | <b>Válido hasta</b> |
| Calibration data         | Available to        |
| 21-11-2010               | 21-11-2011          |

Firma Garantía Calidad

Firma Banco de Ensayos





# SECTION 16

Quality  
Record

# TECO Westinghouse

## Certificate of Conformance

TECO Electric & Machinery Co., LTD.  
Quality Assurance  
5F, No. 19-2 San Chong Road  
Nan-Kang, Taipei 115, Taiwan  
Tel.: 886-2-2655-2227  
Fax : 886-2-2655-2230

Customer: TNL

Engineering Order No.: FD118208

TNL Order No.: P11-0014-ES

TNL General Order No.:

| <u>P.O.No.Item No.</u> | <u>Qty.</u> | <u>Serial No.</u> | <u>Description of Motors</u> |
|------------------------|-------------|-------------------|------------------------------|
| P11-0014-ES            | 2           | D118208-1         | ANZK-S2, 2 Pole 2100 HP      |
|                        |             | D118208-2         | 60HZ 4000 Volt               |

We certify that the above is in compliance with the requirements of the general order and purchase order identified above. We further certify that the above listed item is in compliance with all applicable specifications and standards, and all required tests and inspections have been performed and the results accepted. Documentation supporting this certification is maintained on file and is available for review.

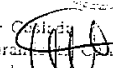
*Mac Chan*

Quality Assurance Manager

SEP.-15-2011

DATE

FLOWSEV

Plant:   
Asegurado:   
Revisado: 



# TECO Westinghouse

## TEST REPORT FOR INDUCTION MOTOR

Test Code : IEC 60034

Serial No : D118208-1

Date of Test : Aug-31-2011

### Nameplate Rating

| Rated HP(kW) | Service Factor | Pole | Rated Speed r/Min. | Phase | Frequency Hz | Volts | Amperes | Type    | Frame |
|--------------|----------------|------|--------------------|-------|--------------|-------|---------|---------|-------|
| 2100HP       | 1.00           | 2    | 3571               | 3     | 60           | 4000  | 263     | ANZK-S2 | 400D  |

### \*\* Temperature Rise

| Condition of Test |            |              |                | Stator Windings          |                         | Rotor Windings          | Bearing                  |               |
|-------------------|------------|--------------|----------------|--------------------------|-------------------------|-------------------------|--------------------------|---------------|
| Hours run         | Line Volts | Line Amperes | Cooling Air °C | By Thermometer Method °C | By Resistance Method °C | By Resistance Method °C | By Thermometer Method °C |               |
|                   |            |              |                |                          |                         |                         | Drive end                | Non-Drive end |
| 4                 | 4000       | 263.0        | 29.8           | -----                    | 68.7                    | ----                    | 38.9                     | 40.1          |

### \*\* Characteristics

| Rated Slip Percent (%) | No Load Line' Current Amperes | Secondary Volts at Standstill | Secondary Amperes per Ring at Rated Load | Insulation Resistance MΩ / 5000 Vdc | Resistance at 31.2 °C (between lines) Ω |
|------------------------|-------------------------------|-------------------------------|------------------------------------------|-------------------------------------|-----------------------------------------|
| 0.81                   | 46.8                          | ----                          | -----                                    | S: 24K                              | S: 0.1156                               |

### \*\* Torque and Starting Current

| Break Down Torque Percent (%) | Locked Rotor Torque With 100% Volts Applied Percent (%) | Starting Current Amperes With 100% Volts Applied |
|-------------------------------|---------------------------------------------------------|--------------------------------------------------|
| 235.0                         | 77.0                                                    | 1494                                             |

### High Potential

| Volts AC for 60 Sec. |       |
|----------------------|-------|
| Stator               | Rotor |
| 9000                 | ----- |

### \*\* Efficiency and Power Factor

| Efficiency, Percent (%) |                 |                 | Power Factor, Percent (%) |                 |                 |
|-------------------------|-----------------|-----------------|---------------------------|-----------------|-----------------|
| Rated Load              | 75 Percent Load | 50 Percent Load | Rated Load                | 75 Percent Load | 50 Percent Load |
| 96.2                    | 96.2            | 96.0            | 91.0                      | 90.0            | 87.8            |

Approved by

Mac Chan

Tested by

SAR Y. NONG

Date

Sep-15-2011



# TECO Westinghouse

## TEST REPORT FOR INDUCTION MOTOR

Test Code: IEC 60034

Order No: **D118208**

Date of Test: Aug-31-2011

### Nameplate Rating

| Rated HP(kW) | Service Factor | Rated Speed r/Min. | Phase | Frequency | Volts | Amperes | Insulation Class |
|--------------|----------------|--------------------|-------|-----------|-------|---------|------------------|
| 2100HP       | 1.00           | 3571               | 3     | 60        | 4000  | 263     | F                |

| Type    | Frame | Temperature Rise by Resistance Method | Ambient Temp. °C | Time Rating | Code Letter for Locked KVA/HP |
|---------|-------|---------------------------------------|------------------|-------------|-------------------------------|
| ANZK-S2 | 400D  | ----                                  | 40.0             | Cont.       | ----                          |

### Test Characteristics

| Serial No | No Load |    |      |            | Locked Rotor |    |       |            | Wound Rotor Open Circuit Voltage | High Potential Test Voltage S/R | Stator Winding Resistance Between Terminals |                |
|-----------|---------|----|------|------------|--------------|----|-------|------------|----------------------------------|---------------------------------|---------------------------------------------|----------------|
|           | Volt    | Hz | Amps | Kilo watts | Volt         | Hz | Amps  | Kilo watts |                                  |                                 | Ohms                                        | Temperature °C |
| D118208-2 | 4000    | 60 | 46.2 | 15.12      | 864.0        | 60 | 263.0 | 58.40      | E2: -----<br>I2: -----           | S: 9000<br>R: -----             | 0.1156                                      | 31.2           |
|           |         |    |      |            |              |    |       |            |                                  |                                 |                                             |                |
|           |         |    |      |            |              |    |       |            |                                  |                                 |                                             |                |
|           |         |    |      |            |              |    |       |            |                                  |                                 |                                             |                |
|           |         |    |      |            |              |    |       |            |                                  |                                 |                                             |                |
|           |         |    |      |            |              |    |       |            |                                  |                                 |                                             |                |
|           |         |    |      |            |              |    |       |            |                                  |                                 |                                             |                |
|           |         |    |      |            |              |    |       |            |                                  |                                 |                                             |                |
|           |         |    |      |            |              |    |       |            |                                  |                                 |                                             |                |

Approved by

**Mac Chan**

Tested by

*SRK Y. name*

Date

Sep-15-2011

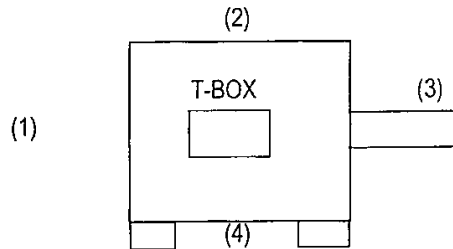
**API 541 VIBRATION AND NOISE TEST REPORT**

|               |         |                |                           |
|---------------|---------|----------------|---------------------------|
| TYPE: ANZK-S2 | POLE: 2 | OUTPUT: 2100HP | ORDER NO: D118208-1       |
| VOLTS: 4000   | HZ: 60  | FRAME: 400D    | Date of Test: Aug-31-2011 |

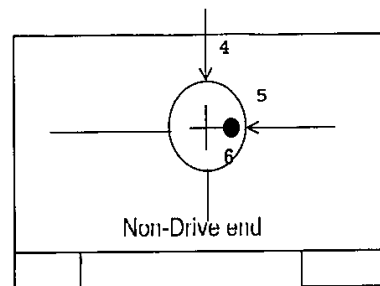
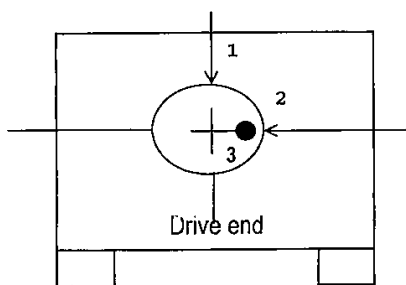
1. NOISE :

(\*\*) HORIZONTAL MACHINE

| Noise dB-A/1.0 M<br>Under No Load |      |      |      |
|-----------------------------------|------|------|------|
| Environment Noise                 |      | 73   | dB-A |
| 1                                 | 2    | 3    | 4    |
| 83.8                              | 83.9 | 84.2 | 83.9 |



2. VIBRATION MEASURING POINT: ( Micron )



VIBRATION TEST READING:

| Measuring Point mm/s(0-Peak)<br>Vibration |                  |                |        |        |        |        |        |         |                       |
|-------------------------------------------|------------------|----------------|--------|--------|--------|--------|--------|---------|-----------------------|
|                                           | Housing          |                |        |        |        |        |        |         | Shaft                 |
|                                           | spec.<br>2.0mm/s | spec 2.5 mm /s |        |        |        |        |        |         | spec.<br>38.1 $\mu$ m |
|                                           | 0.5X             | 1X             | 2X     | 60HZ   | 120HZ  | 180HZ  | 240HZ  | Overall | Overall               |
| DE.V                                      | 0.0255           | 0.5530         | 0.8010 | 0.5530 | 0.8010 | 0.0759 | 0.0386 | 1.0284  | 34.0                  |
| DE.H                                      | 0.0258           | 0.3040         | 0.4440 | 0.3040 | 0.4440 | 0.0229 | 0.0275 | 0.5567  | 33.0                  |
| DE.A                                      | 0.0014           | 0.4280         | 0.7320 | 0.4280 | 0.7320 | 0.1630 | 0.0449 | 0.9247  |                       |
| NDE.V                                     | 0.0191           | 0.2730         | 0.7510 | 0.2730 | 0.7510 | 0.0809 | 0.0217 | 0.8309  |                       |
| NDE.H                                     | 0.0221           | 0.4150         | 0.2290 | 0.4150 | 0.2290 | 0.0131 | 0.0295 | 0.4962  |                       |
| NDE.A                                     | 0.0071           | 0.0993         | 0.1790 | 0.0993 | 0.1790 | 0.0700 | 0.0093 | 0.3469  |                       |

Approved by

Mac Chan

Tested by

Shih Yi Wang

Date:

Sep-15-2011

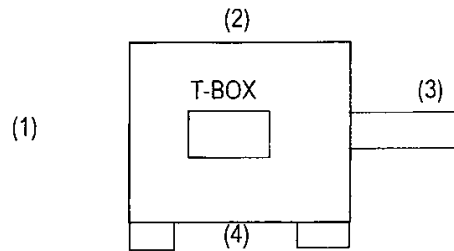
**API 541 VIBRATION AND NOISE TEST REPORT**

|               |         |                |                           |
|---------------|---------|----------------|---------------------------|
| TYPE: ANZK-S2 | POLE: 2 | OUTPUT: 2100HP | ORDER NO: D118208-2       |
| VOLTS: 4000   | HZ: 60  | FRAME: 400D    | Date of Test: Aug-31-2011 |

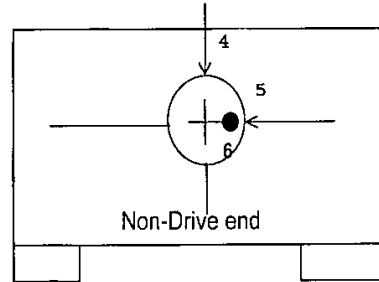
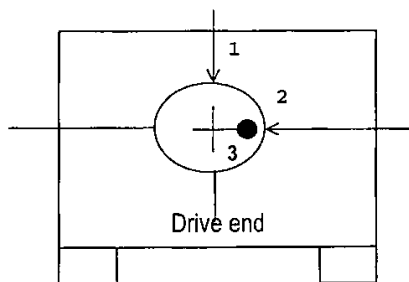
**1. NOISE:**

(\*\*) HORIZONTAL MACHINE

| Noise dB-A/1.0 M<br>Under No Load |      |      |      |
|-----------------------------------|------|------|------|
| Environment Noise                 |      | 73   | dB-A |
| 1                                 | 2    | 3    | 4    |
| 83.2                              | 84.1 | 83.9 | 83.7 |



**2. VIBRATION MEASURING POINT: ( Micron )**



**VIBRATION TEST READING:**

| Measuring Point mm/s(0-Peak)<br>Vibration |                  |                |        |        |        |        |        |         |                       |
|-------------------------------------------|------------------|----------------|--------|--------|--------|--------|--------|---------|-----------------------|
|                                           | Housing          |                |        |        |        |        |        |         | Shaft                 |
|                                           | spec.<br>2.0mm/s | spec 2.5 mm /s |        |        |        |        |        |         | spec.<br>38.1 $\mu$ m |
|                                           | 0.5X             | 1X             | 2X     | 60HZ   | 120HZ  | 180HZ  | 240HZ  | Overall | Overall               |
| DE.V                                      | 0.0016           | 0.9390         | 0.7490 | 0.9390 | 0.7490 | 0.1850 | 0.0540 | 1.2358  | 27.0                  |
| DE.H                                      | 0.0026           | 1.3110         | 0.3380 | 1.3110 | 0.3380 | 0.0444 | 0.0433 | 1.3748  | 30.0                  |
| DE.A                                      | 0.0069           | 0.5380         | 0.7610 | 0.5380 | 0.7610 | 0.2980 | 0.0162 | 1.0294  |                       |
| NDE.V                                     | 0.0033           | 1.2030         | 0.2310 | 1.2030 | 0.2310 | 0.2980 | 0.0256 | 1.3064  |                       |
| NDE.H                                     | 0.0044           | 0.0908         | 0.5700 | 0.0908 | 0.5700 | 0.0041 | 0.0321 | 0.6170  |                       |
| NDE.A                                     | 0.0037           | 0.9530         | 1.4060 | 0.9530 | 1.4060 | 0.6120 | 0.0139 | 1.8381  |                       |

Approved by

Mac Chan

Tested by

Jack Y. Wang

Date: Sep-15-2011

# POLARIZATION INDEX DATA

Form #T-312

Sub :04

| Shop Order No.: | D118208-1                                                 | Customer :                                    | TNL        | Date : | Aug/19/2011                  |
|-----------------|-----------------------------------------------------------|-----------------------------------------------|------------|--------|------------------------------|
| Applied Volts : | 5000VDC                                                   | Equipment Model No. :                         | HIOKI 3455 |        |                              |
| Temperature :   | Dry Bulb :                                                | 33.5 °C                                       | Wet Bulb : | --- °C | Relative Humidity : 49.5 %RH |
| Winding Temp. : | 33.5 °C                                                   | By :                                          | ✓ R.T.D,   | T.C.   | Bulb                         |
| Item            | Time                                                      | Phase: 3<br>Term : U-V-W<br>Microamps/Megohms |            |        | Remarks                      |
| 01              | 15 Seconds                                                | 13.40 K                                       |            |        | Multipiler X 1               |
| 02              | 30 Seconds                                                | 23.70 K                                       |            |        |                              |
| 03              | 45 Seconds                                                | 35.70 K                                       |            |        |                              |
| 04              | 1.0 Minute                                                | 42.30 K                                       |            |        |                              |
| 05              | 1.5 Minutes                                               | 58.50 K                                       |            |        |                              |
| 06              | 2.0 Minutes                                               | 69.50 K                                       |            |        |                              |
| 07              | 3.0 Minutes                                               | 85.50 K                                       |            |        |                              |
| 08              | 4.0 Minutes                                               | 95.70 K                                       |            |        |                              |
| 09              | 5.0 Minutes                                               | 110.00 K                                      |            |        |                              |
| 10              | 6.0 Minutes                                               | 123.00 K                                      |            |        |                              |
| 11              | 7.0 Minutes                                               | 138.00 K                                      |            |        |                              |
| 12              | 8.0 Minutes                                               | 150.00 K                                      |            |        |                              |
| 13              | 9.0 Minutes                                               | 162.00 K                                      |            |        |                              |
| 14              | 10.0 Minutes                                              | 172.00 K                                      |            |        |                              |
| 15              | 1.0 Minute<br>( Conver the<br>Winding Temp.<br>to 40 °C ) | 27.0 K                                        |            |        |                              |
| 16              | P.I.                                                      | 4.07                                          |            |        |                              |

Note : Test and Calculate According to DWG # 8655A16 , Also Refer to IEEE 43

Approved by :

Mac Chan

Test by :

Sub Yi Wang

TECO ELECTRIC & MACHINERY CO., LTD

TITLE : P.I. TEST RECORD

REV.01

DWG No. 4W8655A16

5/5

# POLARIZATION INDEX DATA

Form #T-312

Sub :04

|                 |                                                           |                                               |            |        |                            |
|-----------------|-----------------------------------------------------------|-----------------------------------------------|------------|--------|----------------------------|
| Shop Order No:  | D118208-2                                                 | Customer :                                    | TNL        | Date : | Aug/23/2011                |
| Applied Volts : | 5000VDC                                                   | Equipment Model No. :                         | HIOKI 3455 |        |                            |
| Temperature :   | Dry Bulb :                                                | 32.2 °C                                       | Wet Bulb : | --- °C | Relative Humidity : 53 %RH |
| Winding Temp. : | 32.2 °C                                                   | By :                                          | ✓ R.T.D,   | T.C.   | Bulb                       |
| Item            | Time                                                      | Phase: 3<br>Term : U-V-W<br>Microamps/Megohms |            |        | Remarks<br>Multipiler X 1  |
| 01              | 15 Seconds                                                | 16.40 K                                       |            |        |                            |
| 02              | 30 Seconds                                                | 29.50 K                                       |            |        |                            |
| 03              | 45 Seconds                                                | 46.10 K                                       |            |        |                            |
| 04              | 1.0 Minute                                                | 61.80 K                                       |            |        |                            |
| 05              | 1.5 Minutes                                               | 87.00 K                                       |            |        |                            |
| 06              | 2.0 Minutes                                               | 115.00 K                                      |            |        |                            |
| 07              | 3.0 Minutes                                               | 151.00 K                                      |            |        |                            |
| 08              | 4.0 Minutes                                               | 184.00 K                                      |            |        |                            |
| 09              | 5.0 Minutes                                               | 225.00 K                                      |            |        |                            |
| 10              | 6.0 Minutes                                               | 253.00 K                                      |            |        |                            |
| 11              | 7.0 Minutes                                               | 287.00 K                                      |            |        |                            |
| 12              | 8.0 Minutes                                               | 309.00 K                                      |            |        |                            |
| 13              | 9.0 Minutes                                               | 326.00 K                                      |            |        |                            |
| 14              | 10.0 Minutes                                              | 347.00 K                                      |            |        |                            |
| 15              | 1.0 Minute<br>( Conver the<br>Winding Temp.<br>to 40 °C ) | 36.0 K                                        |            |        |                            |
| 16              | P.I.                                                      | 5.61                                          |            |        |                            |

Note : Test and Calculate According to DWG # 8655A16 , Also Refer to IEEE 43

Approved by :

Mac Chan

Test by :

Shir Y. Wang

TECO ELECTRIC & MACHINERY CO., LTD  
TITLE : P.I. TEST RECORD

DWG No. 4W8655A16

REV.01  
5/5



# SECTION 17

Quality  
Record

**FLOWSERVE**

Pump Division  
Flowserve Spain, S.L.



**CERTIFICADO DE PRUEBA HIDROSTÁTICA**  
HYDROSTATIC TEST CERTIFICATE

INFORME Nº /  
REPORT Nº  
**3420**

|                                                                                                                                                                         |                                                        |                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------|
| REFª. FDP / FDP REFª.<br><b>COS-11-10P40213</b>                                                                                                                         | CLIENTE / CUSTOMER<br><b>MISSISSIPPI</b>               | PROYECTO / PROJECT<br><b>KEMPER COUNTRY IGCC</b>               |
| REFª. CLIENTE / CUSTOMER REFª.                                                                                                                                          | TIPO DE BOMBA / PUMP TYPE<br><b>4X12 WXH-10</b>        | Nº DE SERIE / SERIAL Nº<br><b>M-151457</b>                     |
| PIEZA / PART<br><b>COMPLETE PUMP</b>                                                                                                                                    | PLANO / DRAWING<br><b>UP-11024</b>                     | Nº DE SERIE / SERIAL Nº<br><b>01</b>                           |
| PRUEBA SEGUN ESPECIFICACIÓN / ES : /.<br>PROCEDURE AS PER SPECIFICATION                                                                                                 |                                                        |                                                                |
| PPH01 Rev.3                                                                                                                                                             |                                                        |                                                                |
| PRESIÓN ESPECIFICADA : /<br>SPECIFIED PRESSURE                                                                                                                          | HIGH PRESSURE 337.3 barg<br>LOW PRESSURE 6.5 barg      | PRESIÓN LEIDA : /<br>READING PRESSURE                          |
|                                                                                                                                                                         |                                                        | HIGH PRESSURE 337.3 barg<br>LOW PRESSURE 6.5 barg              |
| LIQUIDO DE PRUEBA : /<br>TESTING FLUIDE                                                                                                                                 | <b>WATER</b>                                           | TIEMPO DE PERMANENCIA : /<br>OPERATING TIME                    |
| <b>1 HOUR</b>                                                                                                                                                           |                                                        |                                                                |
| OBSERVACIONES : /<br>NOTES                                                                                                                                              |                                                        |                                                                |
| HEAT SUCTION HEAD <del>B17409</del> B17546                                                                                                                              |                                                        |                                                                |
| HEAT DISCHARGE HEAD <del>B17546</del> B17409                                                                                                                            |                                                        |                                                                |
| NO SE OBSERVAN FUGAS-NO LEAKS ARE OBSERVED                                                                                                                              |                                                        |                                                                |
| MANOMETRO USADO / PRESSURE GAGE USED Nº 417 AND Nº 801                                                                                                                  |                                                        |                                                                |
| PRUEBA REALIZADA EN COSLADA A 8 DE NOVEMBER DE 2011<br>TEST MADE IN AT OF OF                                                                                            |                                                        |                                                                |
| FIRMA REPRESENTANTE CLIENTE : /<br>CUSTOMER INSPECTOR<br>Jason Ainscough<br>08.11.2011<br>WITNESSED BY PB<br>Presenciada Inspección <input checked="" type="checkbox"/> | FIRMA INSPECTOR AUTORIZADO : /<br>AUTHORIZED INSPECTOR | <b>FLOWSERVE</b><br>Planta Coslada<br>Control Calidad<br>Pdo.: |



**CERTIFICADO DE PRUEBA HIDROSTÁTICA**  
**HYDROSTATIC TEST CERTIFICATE**

**INFORME Nº /**  
**REPORT Nº**  
**3437**

|                                                                                |                                                               |                                                                |
|--------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------|
| <b>REFª. FDP / FDP REFª.</b><br><b>COS-11-10P40213</b>                         | <b>CLIENTE / CUSTOMER</b><br><b>MISSISSIPPI</b>               | <b>PROYECTO / PROJECT</b><br><b>KEMPER COUNTRY IGCC</b>        |
| <b>REFª. CLIENTE / CUSTOMER REFª.</b><br><b>CONTRACT Nº 17954</b>              | <b>TIPO DE BOMBA / PUMP TYPE</b><br><b>4X12 WXH-10</b>        | <b>Nº DE SERIE / SERIAL Nº</b><br><b>M-151458</b>              |
| <b>PIEZA / PART</b><br><b>COMPLETE PUMP</b>                                    | <b>PLANO / DRAWING</b><br><b>UP-11024</b>                     | <b>Nº DE SERIE / SERIAL Nº</b><br><b>02</b>                    |
| <b>PRUEBA SEGÚN ESPECIFICACIÓN / ES : /.</b><br>PROCEDURE AS PER SPECIFICATION |                                                               |                                                                |
| <b>PRESIÓN ESPECIFICADA : /</b><br>SPECIFIED PRESSURE                          |                                                               | <b>PRESIÓN LEIDA : /</b><br>READING PRESSURE                   |
| HIGH PRESSURE 337.3 barg<br>LOW PRESSURE 6.5 barg                              |                                                               | HIGH PRESSURE 337.3 barg<br>LOW PRESSURE 6.5 barg              |
| <b>LÍQUIDO DE PRUEBA : /</b><br>TESTING FLUIDE                                 |                                                               | <b>TIEMPO DE PERMANENCIA : /</b><br>OPERATING TIME             |
| WATER                                                                          |                                                               | 1 HOUR                                                         |
| <b>OBSERVACIONES : /</b><br>NOTES                                              |                                                               |                                                                |
| HEAT SUCTION HEAD 18345<br>HEAT DISCHARGE HEAD 15310                           |                                                               |                                                                |
| NO SE OBSERVAN FUGAS-NO LEAKS ARE OBSERVED                                     |                                                               |                                                                |
| MANOMETRO USADO /PRESSURE GAGE USED Nº 417 AND Nº 801                          |                                                               |                                                                |
| <b>PRUEBA REALIZADA EN</b> COSLADA <b>A 9 DE</b> DECEMBER <b>DE</b> 2011       |                                                               |                                                                |
| TEST MADE IN AT OF OF                                                          |                                                               |                                                                |
| <b>FIRMA REPRESENTANTE CLIENTE : /</b><br>CUSTOMER INSPECTOR                   | <b>FIRMA INSPECTOR AUTORIZADO : /</b><br>AUTHORICED INSPECTOR | <b>FLowsERVE</b><br>Planta Coslada<br>Control Calidad<br>Fdo.: |
| Presenciada Inspección <input type="checkbox"/>                                |                                                               |                                                                |

Banco de Ensayos Cerrado/Closed test stand

## **ENSAYO DE FUNCIONAMIENTO DE BOMBA CENTRIFUGA** (PERFORMANCE TEST FOR CENTRIFUGAL PUMP)

NÚMERO DE TEST/TEST NUMBER..... T2328 C-1

CLIENTE/CUSTOMER..... MISSISSIPI POWER  
 PROYECTO/PROJECT..... KEMPER COUNTY IGCC  
 TAMAÑO BOMBA/PUMP SIZE..... 4x12WXH-10  
 NÚMERO DE SERIE/SERIAL NUMBER..... M-151457  
 ITEM.....  
 REFERENCIA/REFERENCE..... COS-11-10P40213  
 MOTOR..... HELMKE 1LA7 802-4 HF 60-Z N° 99-4754/PO382 6000V.- 2100 Kw.- 1491 RPM.- 232 /  
 ACOPLAMIENTO/COUPLING..... TORSIÓMETRO HBM T32N/25KNm  
 TRANSDUCTOR DESCARGA/DISCHARGE TRANSDUCER..... TRAFAG 8891 250 Bares  
 TRANSDUCTOR ASPIRACIÓN/SUCTION TRANSDUCER..... TRAFAG 8891 -1/3 Bares  
 VENTURI O PLACA ORIFICIO/ORIFICE PLATE OR VENTURI..... VENTURI 4"  
 MEDIDOR CAUDAL/FLOWMETER..... VENTURI 4"  
 MULTIPLICADOR/GEARBOX..... 1500/3000  
 Elevación transductor de descarga (m)..... 1,07  
 (Elevation of discharge transducer)  
 Elevación transductor de aspiración (m)..... 1,05  
 (Elevation of suction transducer)  
 Datum (m)..... 1,10  
 Diámetro tubería de descarga (In)..... 3,624  
 (Discharge pipe diameter)  
 Diámetro tubería de aspiración (In)..... 6,065  
 (Suction pipe diameter)  
 Velocidad de operación (RPM)..... 3580  
 (Operating speed)  
 Corrección Rendimiento por temperatura..... SI  
 (Efficiency correction by temperature)  
 Constante watímetros..... 1 Exponente de corrección..... 0,075  
 (Wattmeter constant) (Correction exponent)  
 Densidad (lbm/ft^3)..... 59,06 Temperatura-corrección (°C)..... 115,2 239,4 °F  
 (Density) (Correction temperature)  
 Viscosidad (cst)..... 0,25 Peso específico (g/cm^3)..... 0,946  
 (Viscosity) (Specific Gravity)  
 Medida Watímetros..... NO Medida Torsiómetro..... SI  
 (Wattmeter) (Torquemeter)

H.I..... SI  
 KARASSIK..... NO  
 OPTIMIZACIÓN.... NO

Multiplicador o  
 Varlador..... SI

| PIUNTO<br>Point | CAUDAL<br>Flow<br>Q (m³/h) | Tb (°C) | PRES. ASP<br>Suc. pres.<br>Ps (mca) | PRES. DES.<br>Dis. pres.<br>Pd (mca) | R.P.M. | POTENCIA<br>Power<br>(kW) |
|-----------------|----------------------------|---------|-------------------------------------|--------------------------------------|--------|---------------------------|
| 1               | 0,0                        | 24,0    | 24,0                                | 1630,0                               | 2965   | 433,80                    |
| 2               | 50,8                       | 24,0    | 23,8                                | 1608,0                               | 2964   | 517,60                    |
| 3               | 87,8                       | 24,0    | 23,8                                | 1572,0                               | 2963   | 620,85                    |
| 4               | 118,2                      | 24,0    | 23,6                                | 1518,0                               | 2963   | 708,48                    |
| 5               | 157,0                      | 24,0    | 23,2                                | 1407,0                               | 2962   | 806,06                    |
| 6               | 181,2                      | 23,6    | 23,3                                | 1309,0                               | 2962   | 857,44                    |
| 7               | 216,8                      | 23,7    | 22,6                                | 1154,0                               | 2961   | 915,95                    |

| TORSIÓ<br>Torque<br>KNm | REN. MOT<br>Eff. driver<br>% | REN. TOR<br>Torq. eff.<br>% |
|-------------------------|------------------------------|-----------------------------|
| 1,400                   |                              |                             |
| 1,671                   |                              |                             |
| 2,005                   |                              |                             |
| 2,288                   |                              |                             |
| 2,604                   |                              |                             |
| 2,770                   |                              |                             |
| 2,960                   |                              |                             |

FIRMA BANCO DE ENSAYOS  
 TEST STAND SIGNATURE  
**FLOWSERVE**  
 Banco de Ensayos  
 Fdo.:

FECHA/DATE  
 17-11-2011

T. L. DA  
 SOUTH EDUCO  
 17.11.11

FIRMA INSPECCIÓN  
 INSPECTION SIGNATURE

WITNESSED BY PB

J.P. AINSWORTH  
 17-11-2011

**Quality FLOWSERVE**

Banco de Ensayos Cerrado/Closed test stand

VALORES CORREGIDOS A (VALUES CORRECTED TO)

20°C

HOJA DE CÁLCULOS/COMPUTATION SHEET ENSAYO/TEST

T2328 C-1

| PUNTO<br>Point | Caudal<br>Flow<br>Q (m³/h) | P. ASPIR.<br>Suc. pres.<br>(m.c.a.) | P. DESC.<br>Disch. pres.<br>(m.c.a.) | TDH (m)<br>(m.c.a.) | POTENCIA<br>Power<br>KW | EFF (%)<br>% | R.P.M. | Tb (°C) |
|----------------|----------------------------|-------------------------------------|--------------------------------------|---------------------|-------------------------|--------------|--------|---------|
| 1              | 0,0                        | 24,0                                | 1631,5                               | 1607,5              | 433,80                  | 0,00         | 2965   | 24,0    |
| 2              | 50,8                       | 23,8                                | 1609,4                               | 1585,8              | 517,60                  | 42,28        | 2964   | 24,0    |
| 3              | 87,8                       | 23,8                                | 1573,4                               | 1550,2              | 620,85                  | 59,55        | 2963   | 24,0    |
| 4              | 118,2                      | 23,6                                | 1519,4                               | 1496,9              | 708,48                  | 67,84        | 2963   | 24,0    |
| 5              | 157,0                      | 23,2                                | 1408,3                               | 1387,0              | 806,06                  | 73,38        | 2962   | 24,0    |
| 6              | 181,2                      | 23,3                                | 1310,0                               | 1289,3              | 857,44                  | 74,02        | 2962   | 23,6    |
| 7              | 216,8                      | 22,6                                | 1154,9                               | 1136,0              | 915,95                  | 73,05        | 2961   | 23,7    |

VALORES CORREGIDOS A (VALUES CORRECTED TO)

115,2 °C

Y (AND)

3580 r.p.m.

DENSIDAD (115,2 °C)  
(DENSITY)

59,0572 lbm/ft³

VISCOSIDAD (115,2 °C)  
(VISCOSITY)

0,2500 cst

| Punto<br>Point | Caudal<br>Flow<br>Q (m³/h) | TDH (m) | Potencia<br>Power<br>KW | Rendim.<br>Efficiency<br>% |
|----------------|----------------------------|---------|-------------------------|----------------------------|
| 1              | 0,0                        | 2343,5  | 724,21                  | 9,01                       |
| 2              | 61,4                       | 2313,4  | 769,46                  | 47,48                      |
| 3              | 106,1                      | 2263,0  | 978,59                  | 63,20                      |
| 4              | 142,8                      | 2185,2  | 1136,57                 | 70,74                      |
| 5              | 189,8                      | 2026,2  | 1307,00                 | 75,78                      |
| 6              | 219,0                      | 1883,4  | 1391,30                 | 76,38                      |
| 7              | 262,1                      | 1660,6  | 1485,58                 | 75,49                      |

PESO ESPECÍFICO (SPECIFIC GRAVITY) (115,2 °C)

0,9460 g/cm³

| Punto<br>Point | Caudal<br>Flow<br>Q (m³/h) | TDH (m) | Potencia<br>Power<br>KW | Rendim.<br>Efficiency<br>% |
|----------------|----------------------------|---------|-------------------------|----------------------------|
| 1              | 0,0                        | 2343,5  | 724,21                  | 9,01                       |
| 2              | 61,4                       | 2313,4  | 769,46                  | 47,48                      |
| 3              | 106,1                      | 2263,0  | 978,59                  | 63,20                      |
| 4              | 142,8                      | 2185,2  | 1136,57                 | 70,74                      |
| 5              | 189,8                      | 2026,2  | 1307,00                 | 75,78                      |
| 6              | 219,0                      | 1883,4  | 1391,30                 | 76,38                      |
| 7              | 262,1                      | 1660,6  | 1485,58                 | 75,49                      |

DISEÑO

FIRMA/BANCO DE ENSAYOS  
TEST STAND SIGNATURE

Fdo.:

FECHA/DATE

17-11-2011

*TLR*  
SOUTHERNCO  
12/11

FIRMA INSPECTOR/CLIENTE

INSPECTOR/CUSTOMER SIGNATURE

WITNESSED BY PB

Witnessed J.P. Amador

Quality  
Record

**FLOWSERVE**

Banco de Ensayos Cerrado/Closed test stand

**Test No.** T2328 C-1

**Final values in american units**

| Punto<br>Point | Caudal<br>Flow<br>Q (G.P.M.) | TDH<br>(feet) | Ptencia<br>Power<br>(BHP) | Rendim.<br>Efficiency<br>(%) |
|----------------|------------------------------|---------------|---------------------------|------------------------------|
| 1              | 0,0                          | 7688,8        | 970,44                    | 9,01                         |
| 2              | 270,3                        | 7590,0        | 1031,08                   | 47,48                        |
| 3              | 467,2                        | 7424,7        | 1311,31                   | 63,20                        |
| 4              | 628,7                        | 7169,4        | 1523,00                   | 70,74                        |
| 5              | 835,7                        | 6647,8        | 1751,38                   | 75,78                        |
| 6              | 964,3                        | 6179,2        | 1864,34                   | 76,38                        |
| 7              | 1154,0                       | 5448,3        | 1990,68                   | 75,49                        |

**Rated**

FIRMA BANCO DE ENSAYOS  
TEST STAND SIGNATURE

FLOWSERVE

Banco de Ensayos

Fdo.: \_\_\_\_\_

FECHA/DATE  
17-11-2011

*T-12*  
SOUTHERNCO  
17.11.11

FIRMA INSPECTOR/CLIENTE  
INSPECTOR/CUSTOMER SIGNATURE

WITNESSED BY PB

*Michael J. P. AINSWORTH*  
17-11-2011

# FLOWSERVE

Banco de Ensayos Cerrado/Closed test stand

## ENSAYO DE NPSH DE BOMBA CENTRIFUGA (NPSH TEST FOR CENTRIFUGAL PUMP)

NUMERO DE TEST..... N2328 C-1

CLIENTE/CUSTOMER..... MISSISSIPI POWER  
 PROYECTO/PROJECT..... KEMPER COUNTY IGCC  
 TAMAÑO BOMBA/PUMP SIZE..... 4x12WXH-10  
 NÚMERO DE SERIE/SERIAL NUMBER..... M-151457  
 ITEM.....  
 REFERENCIA/REFERENCE..... COS-11-10P40213  
 MOTOR..... HELMKE 1LA7 802-4 HF 60-Z N° 99-4754/PO382 6000V.- 2100 Kw.- 1491 RPM.- 232 A  
 ACOPLAMIENTO/COUPLING..... Torsiómetro HBM 25 Knw.  
 TRANSDUCTOR DESCARGA/DISCHARGE TRANSDUCER..... TRAFAG 8891 250 Bar  
 TRANSDUCTOR ASPIRACIÓN/SUCTION TRANSDUCER..... TRAFAG 8891-1/3 Bar  
 VENTURI O PLACA ORIFICIO/ORIFICE PLATE OR VENTURI..... VENTURI 4"  
 MEDIDOR CAUDAL/FLOW METER..... VENTURI 4"  
 MULTIPLICADOR/GEARBOX..... 1500/3000  
 Elevación transductor de descarga (m)..... 1,07  
 (Elevation of discharge transducer)  
 Elevación transductor de aspiración (m)..... 1,07  
 (Elevation of suction transducer)  
 Datum (m)..... 1,1  
 Diámetro tubería de descarga (m)..... 0,092  
 (Discharge pipe diameter)  
 Diámetro tubería de aspiración (m)..... 0,154  
 (Suction pipe diameter)  
 Presión atmosférica (m)..... 9,54  
 (Atmospheric pressure)  
 Caudal de ensayo (m³/h)..... 181  
 (Test flow)  
 Velocidad de ensayo (RPM)..... 2962  
 (Test speed)  
 Velocidad de operación (RPM)..... 3580  
 (Operating speed)  
 Número de etapas..... 10  
 (Stages N°)

| Patm<br>(mwc)                              | Pvap<br>(mwc) | Ps<br>(mwc) | Pd<br>(mwc) | Tdh<br>(mwc) | T (°C)               | NPSH<br>(mwc) | Po (%)<br>1st stg. |
|--------------------------------------------|---------------|-------------|-------------|--------------|----------------------|---------------|--------------------|
| 9,54                                       | 0,3           | 22,3        | 1306        | 1286,3       | 24,2                 | 31,88         | 0                  |
| 9,54                                       | 0,3           | 15          | 1299        | 1286,6       | 24,2                 | 24,58         | -0,23              |
| 9,54                                       | 0,3           | 10          | 1295        | 1287,6       | 24,2                 | 19,58         | -1,01              |
| 9,54                                       | 0,3           | 5           | 1289        | 1286,6       | 24,2                 | 14,58         | -0,23              |
| 9,54                                       | 0,31          | 1,8         | 1286        | 1286,8       | 24,3                 | 11,37         | -0,39              |
| 9,54                                       | 0,31          | -0,6        | 1284        | 1287,2       | 24,3                 | 8,97          | -0,7               |
| 9,54                                       | 0,31          | -2          | 1280        | 1284,6       | 24,3                 | 7,57          | 1,32               |
| 9,54                                       | 0,31          | -3,6        | 1277        | 1283,2       | 24,3                 | 5,97          | 2,41               |
| 9,54                                       | 0,31          | -4          | 1270        | 1276,6       | 24,3                 | 5,57          | 7,54               |
|                                            |               |             |             |              |                      |               |                    |
|                                            |               |             |             |              |                      |               |                    |
|                                            |               |             |             |              |                      |               |                    |
| El NPSHr con caída TDH del 3% (1ª etapa) a |               |             |             | 218,8        | m³/h y 3580 rpm es   |               | 8,72 m             |
| NPSHr with 3% drop of TDH (1st stg.) to    |               |             |             | 963,4        | G.P.M. & 3580 rpm is |               | 28,61 ft           |

FIRMA INGENIERO ENSAYO  
 TEST ENGINEER SIGNATURE  
 Banco de Ensayos  
 Fdo.: \_\_\_\_\_

FECHA/DATE  
 17-11-2011  
 T. L. D. A.  
 SOUTHERN

FIRMA INSPECTOR/CLIENTE  
 INSPECTOR/CUSTOMER SIGNATURE  
 WITNESSED BY, PS  
 J. P. AINSWORTH



Folio:

Banco de ensayos/  
Test Stand  
FLOW-SERVE  
Danco de Ensayos

Fecha/Date  
17-11-2011

Inspección/Inspection

CAUDAL/FLOW (GPM)

WITNESSED BY DB

Witnessed by J.P. Alvarado

Signature  
17.11.11

VALORES DE ENSAYO CORREGIDOS A  
(TEST VALUES CORRECTED TO

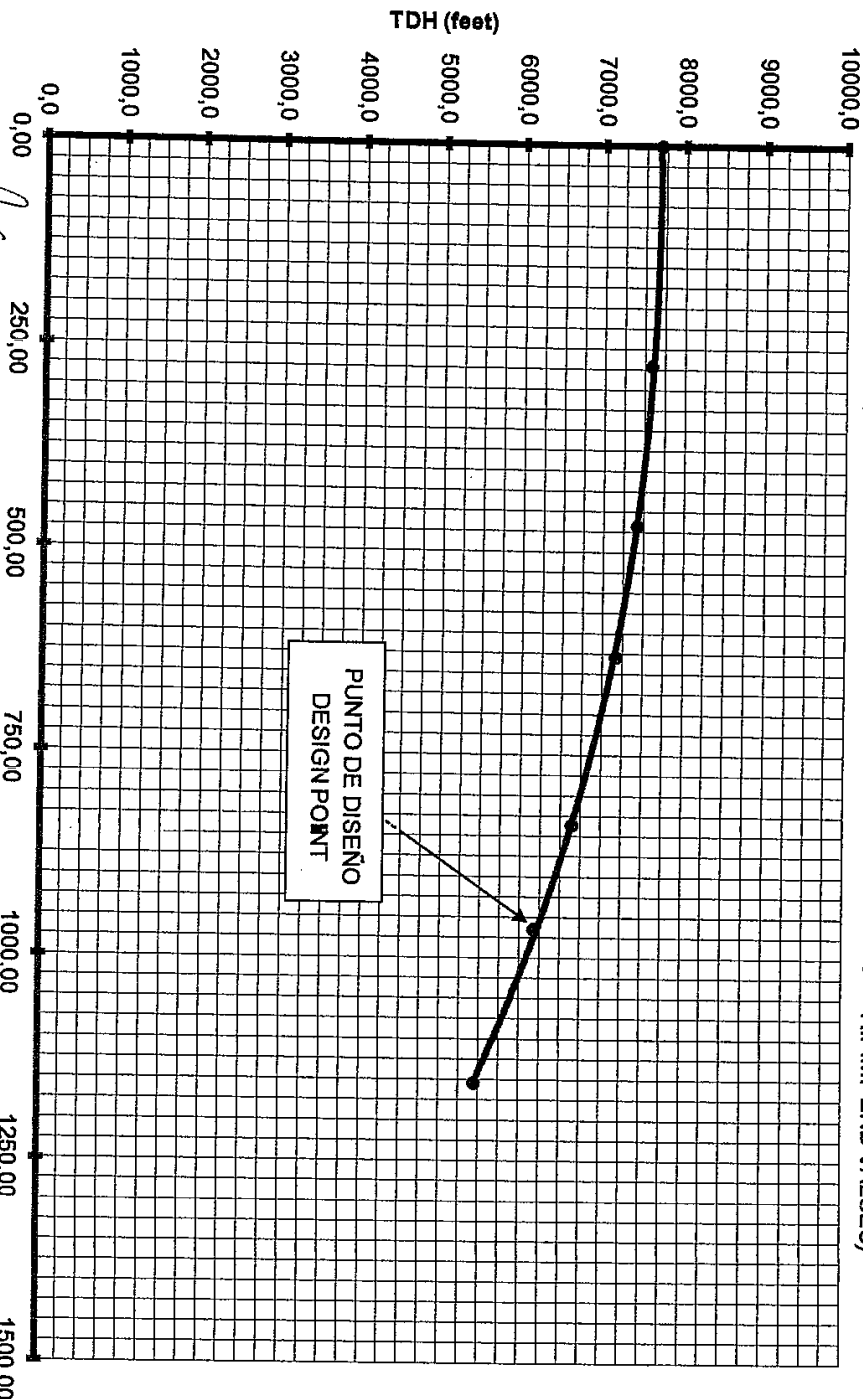
3580

R.P.M. (FINALES)  
R.P.M. END VALUES)

(FLOW-T.D.H.)

BOMBA 4x12W/XH-10 N/S M-151457

## CAUDAL-TDH





Fdo.:

Banco de El Estero  
Banco de El Estero

Fecha/Date

17-11-2011

Página/Sheet 6 de/of 9

Inspección/Inspection CAUDAL/FLOW (GPM)

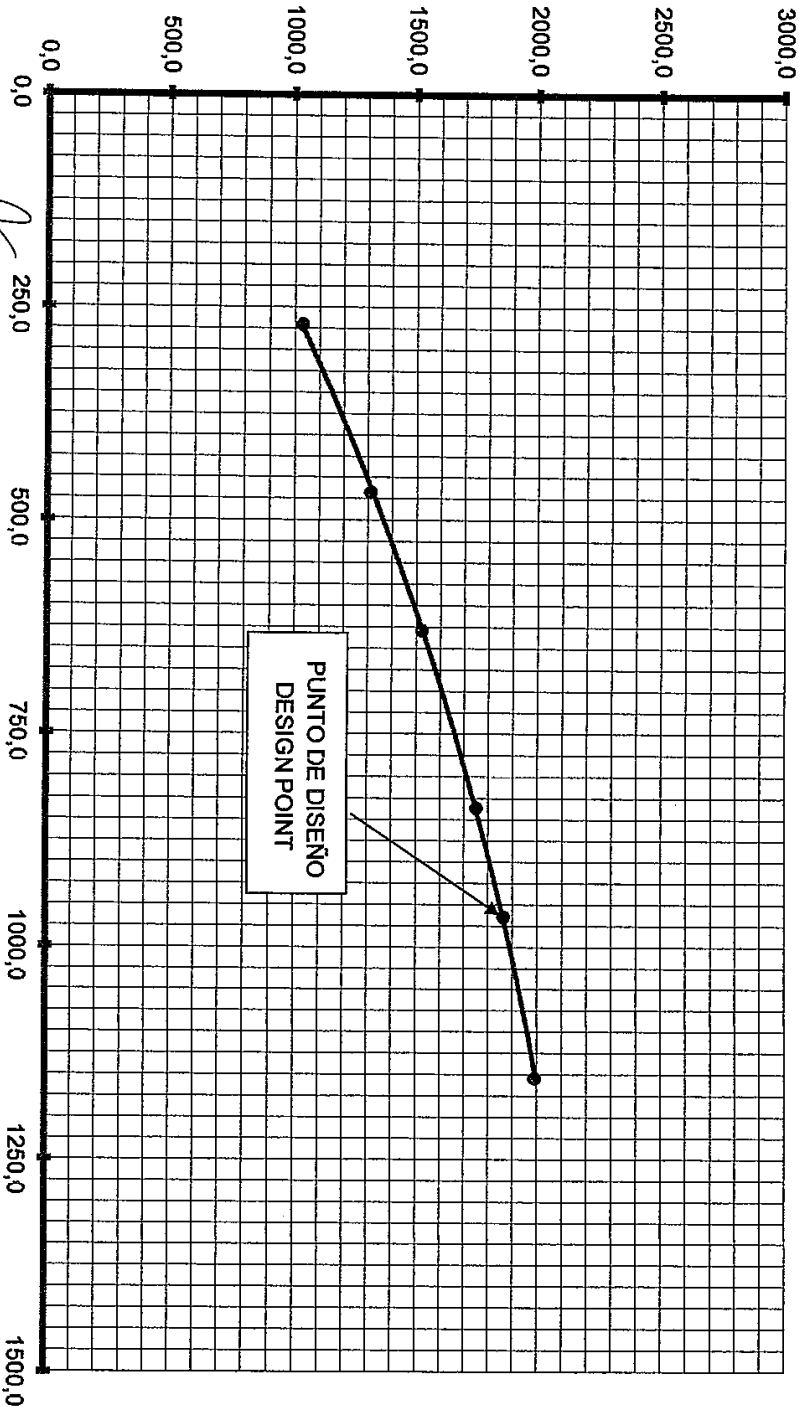
WITNESSED BY PB

Attest J.P. Amador

17.11.2011

Y. L. D.  
S. J. P. A. Amador  
12.11.11

POTENCIA (BHP)  
POWER



CAUDAL-POTENCIA  
(FLOW-POWER)

BOMBA 4x12W/XH-10 N/S M-151457

VALORES DE ENSAYO CORREGIDOS A  
(TEST VALUES CORRECTED TO

3580

R.P.M. (FINALES)  
R.P.M. END VALUES)



Banco de ensayos/  
Test stand  
FLOWSERVE  
Banco de ensayos

Página/Sheet 7 de/of 9

Fecha/Date  
17-11-2011

Inspección/Inspection CAUDAL/FLOW (GPM)  
WITNESSED BY PB  
J.F. AINSWORTH  
17-11-2011  
T-124  
SUTHERLAND  
17-11-11

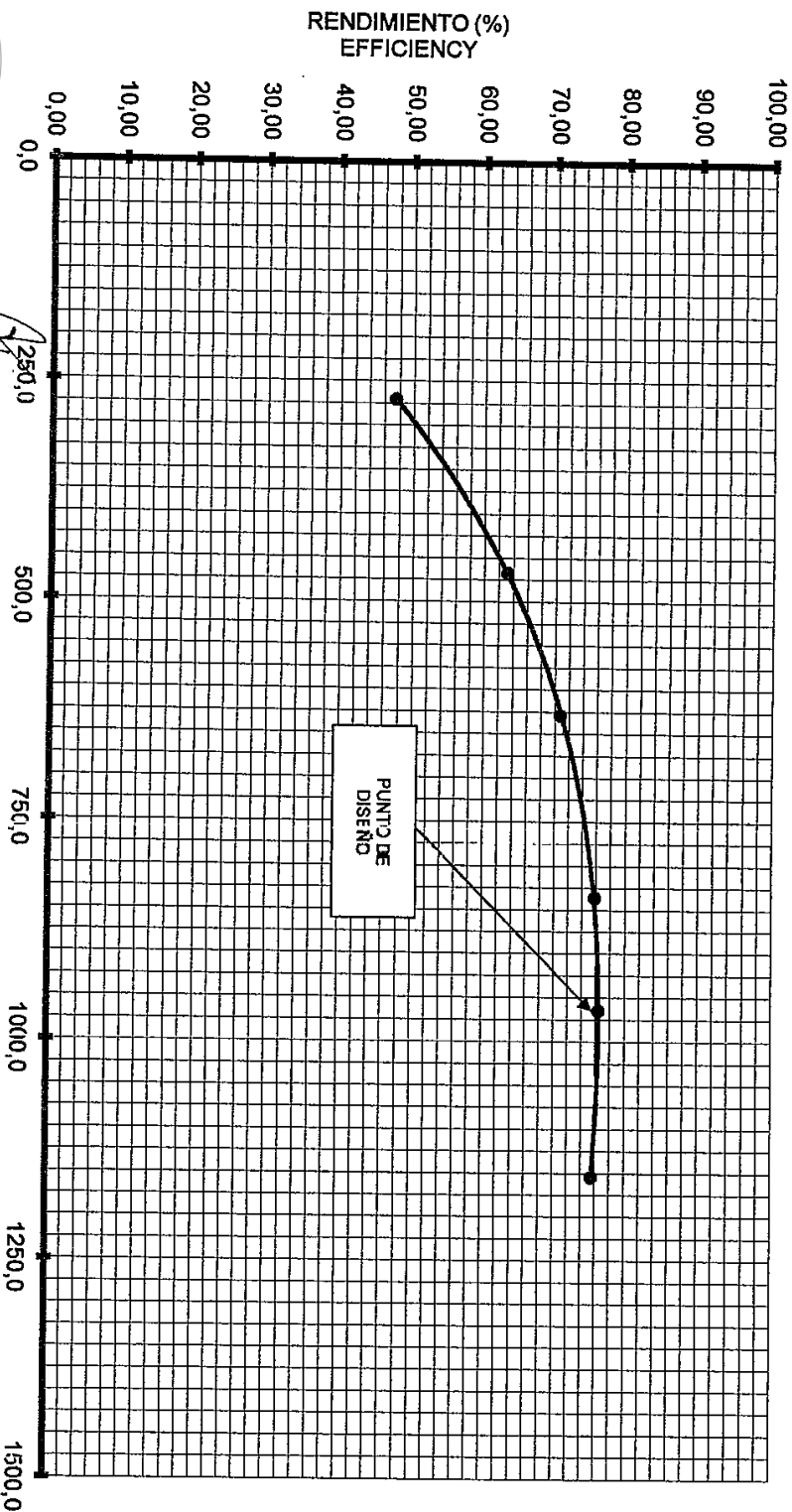
# CAUDAL-RENDIMIENTO (FLOW-EFFICIENCY)

BOMBA 4x12W/XH-10 N/S M-151457

VALORES DE ENSAYO CORREGIDOS A  
(TEST VALUES CORRECTED TO

3580

R.P.M. (FINALES)  
R.P.M. (END VALUES)



Quality

RecoFLOWSERVE

Banco de Ensayos Cerrado/Closed test stand

Hoja/Sheet 8 de/of 9

# ENSAYO DE VIBRACIONES PARA BOMBAS CENTRÍFUGAS

VIBRATIONS TEST FOR CENTRIFUGAL PUMPS

Cliente/Customer:  
Proyecto/Project:  
Tipo de bomba/Pump type:  
Nº serie bomba/Serial No. pump:  
Referencia/Reference:  
Item:  
Nº ensayo/Test No.:

MISSISSIPPI POWER  
KEMPER COUNTY IGCC  
4x12WXH-10  
M-151457  
COS-11-10P40213

T 2328 C-1

| BOMBA/PUMP                      | Coj. contr. acopl./Thrust brg. |      |      | Coj. acoplamiento./Coupling brg. |      |                  |
|---------------------------------|--------------------------------|------|------|----------------------------------|------|------------------|
| CAUDAL/Flow (m <sup>3</sup> /h) | H                              | V    | A    | H                                | V    |                  |
| 48 m3/h. @ 2964 R.P.M.          | 2,80                           | 1,55 | 0,88 | 2,10                             | 1,70 | m.m./seg. R.M.S. |
| 182 m3/h. @ 2962 R.P.M.         | 2,00                           | 0,90 | 0,36 | 1,81                             | 1,57 | m.m./seg. R.M.S. |
| 216 m3/h. @ 2962 R.P.M.         | 2,12                           | 1,16 | 0,60 | 1,88                             | 1,68 | m.m./seg. R.M.S. |

(\*) Vibrómetro utilizado/Vibrometer used:  
C.S.I. 1900 s/n 1733

Valores obtenidos sin filtrar/Non filtered values → Velocidad/Velocity mm./seg./mm./sec. (R.M.S.)  
Desplazamiento P-P/Displacement P-P (MILS OVERALL AVERAGE)

Temperatura ambiente/Ambient temperature  
Temperat. coj. empuje/Thrust brg. temperature  
Temperat. coj. liso lado empuje/Sleeve brg.  
Temperat. coj. acopl./Coupling brg. temperature

| BOMBA/PUMP |       |
|------------|-------|
| °C         | °F    |
| 23         | 73,4  |
| 41         | 105,8 |
| 41         | 105,8 |
| 38         | 100,4 |

BANCO DE ENSAYOS/  
TEST STAND

RecoFLOWSERVE  
Banco de Ensayos

FECHA/DATE  
17-11-2011

INSPECCIÓN/INSPECTION

WITNESSED BY PB  
J.P. Ainsworth  
17-11-2011  
Tm to Rest  
SOUTHERN CO  
17.11.11

**ENSAYO DE RUIDO/NOISE TEST**  
**Ensayo N°/Test No.: R2328C-1**

| Cliente/Customer<br>Proyecto/Project<br>Bomba/Pump<br>N° serie/Serial number<br>Item<br>Referencia/Reference<br>Sonómetro/Noisemeter<br>N° serie/Serial number | <b>MISSISSIPPI POWER</b><br><b>KEMPER COUNTY IGCC</b><br><b>4X12WXH-10</b><br><b>M-151457</b><br><br><b>COS-11-10P40213</b><br><b>RION NL31</b><br><b>000341517</b> |                                                                              |                  |                      |                       |                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------|----------------------|-----------------------|------------------|
| Caudal/Flow                                                                                                                                                    | Q = 182 m³/h a/to 2962 R.P.M.                                                                                                                                       | Distancia sonómetro al suelo 1,5 m.<br>(Noisemeter distance to floor 1,5 m.) |                  |                      |                       |                  |
| Nivel de ruido<br>(Noise level)<br>dB(A)                                                                                                                       | Punto/Point 1                                                                                                                                                       |                                                                              |                  | Punto/Point 2        |                       |                  |
|                                                                                                                                                                | Máquina<br>(Machine)                                                                                                                                                | Ambiente<br>(Ambient)                                                        | Total<br>(Total) | Máquina<br>(Machine) | Ambiente<br>(Ambient) | Total<br>(Total) |
| <b>dB(A) TOTAL</b>                                                                                                                                             | <b>1</b>                                                                                                                                                            |                                                                              |                  |                      |                       |                  |
| <b>(Hz)</b>                                                                                                                                                    |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 20                                                                                                                                                             |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 25                                                                                                                                                             |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 31,5                                                                                                                                                           |                                                                                                                                                                     |                                                                              | 37               |                      |                       | 41               |
| 40                                                                                                                                                             |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 50                                                                                                                                                             |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 63                                                                                                                                                             |                                                                                                                                                                     |                                                                              | 42               |                      |                       | 47               |
| 80                                                                                                                                                             |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 100                                                                                                                                                            |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 125                                                                                                                                                            |                                                                                                                                                                     |                                                                              | 55               |                      |                       | 53               |
| 160                                                                                                                                                            |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 200                                                                                                                                                            |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 250                                                                                                                                                            |                                                                                                                                                                     |                                                                              | 60               |                      |                       | 63               |
| 315                                                                                                                                                            |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 400                                                                                                                                                            |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 500                                                                                                                                                            |                                                                                                                                                                     |                                                                              | 74               |                      |                       | 82               |
| 630                                                                                                                                                            |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 800                                                                                                                                                            |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 1.000                                                                                                                                                          |                                                                                                                                                                     |                                                                              | 75               |                      |                       | 77               |
| 1.250                                                                                                                                                          |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 1.600                                                                                                                                                          |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 2.000                                                                                                                                                          |                                                                                                                                                                     |                                                                              | 77               |                      |                       | 78               |
| 2.500                                                                                                                                                          |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 3.150                                                                                                                                                          |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 4.000                                                                                                                                                          |                                                                                                                                                                     |                                                                              | 73               |                      |                       | 74               |
| 5.000                                                                                                                                                          |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 6.300                                                                                                                                                          |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 8.000                                                                                                                                                          |                                                                                                                                                                     |                                                                              | 64               |                      |                       | 63               |
| 10.000                                                                                                                                                         |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 12.500                                                                                                                                                         |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |
| 16.000                                                                                                                                                         |                                                                                                                                                                     |                                                                              | 46               |                      |                       | 48               |
| 20.000                                                                                                                                                         |                                                                                                                                                                     |                                                                              |                  |                      |                       |                  |

Banco de Ensayos/Test Stand

Inspección/Inspection

EXCEL:EMPLOS\Ruido1521  
Banco de Ensayos  
Fdo.: \_\_\_\_\_

*Tom R*  
SOUTHERN  
12.11.11

WITNESSED BY PB  
*DAVID* J.P. AINSWORTH  
17.11.2011



## INSTRUMENTACIÓN UTILIZADA EN ENSAYO BOMBA

## Proyecto/Referencia

## Caudal/Flow:

|                                            |     |                                     |
|--------------------------------------------|-----|-------------------------------------|
| Venturi de 14" número                      | 153 | <input type="checkbox"/>            |
| Venturi de 8" número                       | 210 | <input type="checkbox"/>            |
| Venturi de 4" número                       | 214 | <input checked="" type="checkbox"/> |
| Caudalímetro electromagnético de 3" número | 400 | <input type="checkbox"/>            |
| Caudalímetro electromagnético de 3" número | 213 | <input type="checkbox"/>            |
| Caudalímetro electromagnético de 4" número | 219 | <input type="checkbox"/>            |

## Presión/Pressure:

## Transductor de descarga/discharge

|                |     |                                     |                |     |                          |
|----------------|-----|-------------------------------------|----------------|-----|--------------------------|
| De 4080 m.w.c. | 540 | <input type="checkbox"/>            | De 4080 m.w.c. | 541 | <input type="checkbox"/> |
| De 2550 m.w.c. | 539 | <input checked="" type="checkbox"/> | De 2550 m.w.c. | 539 | <input type="checkbox"/> |
| De 1020 m.w.c. | 536 | <input type="checkbox"/>            | De 1020 m.w.c. | 537 | <input type="checkbox"/> |
| De 612 m.w.c.  | 534 | <input type="checkbox"/>            | De 612 m.w.c.  | 535 | <input type="checkbox"/> |
| De 255 m.w.c.  | 532 | <input type="checkbox"/>            | De 255 m.w.c.  |     | <input type="checkbox"/> |

## Transductor de aspiración/suction

|                    |    |                          |                    |     |                                     |
|--------------------|----|--------------------------|--------------------|-----|-------------------------------------|
| De 30 a -10 m.w.c. | 69 | <input type="checkbox"/> | De 30 a -10 m.w.c. | 551 | <input checked="" type="checkbox"/> |
|--------------------|----|--------------------------|--------------------|-----|-------------------------------------|

## Potencia/Power:

|                         |     |                                     |                        |     |                          |
|-------------------------|-----|-------------------------------------|------------------------|-----|--------------------------|
| Torsiómetro HBM 25 Knw. | 482 | <input type="checkbox"/>            | Torsiómetro HBM 5 Knw. | 484 | <input type="checkbox"/> |
| Torsiómetro HBM 25 Knw. | 483 | <input checked="" type="checkbox"/> | Convertidor Potencia   | 573 | <input type="checkbox"/> |

## Ensayo de ruido/Noise:

|                       |    |                                     |
|-----------------------|----|-------------------------------------|
| Sonómetro Rion número | 10 | <input checked="" type="checkbox"/> |
|-----------------------|----|-------------------------------------|

## Ensayo de vibraciones/Vibration:

|                           |     |                                     |
|---------------------------|-----|-------------------------------------|
| Vibrómetro CSI número     | 518 | <input type="checkbox"/>            |
| Vibrómetro X-VIBER número | 822 | <input checked="" type="checkbox"/> |

## Ensayo de temperatura/Temperature:

|                              |     |                                     |
|------------------------------|-----|-------------------------------------|
| Aparato de infrarrojos Fluke | 155 | <input checked="" type="checkbox"/> |
|------------------------------|-----|-------------------------------------|

## Otros:

## ENSAYO DE FUNCIONAMIENTO DE BOMBA CENTRIFUGA (PERFORMANCE TEST FOR CENTRIFUGAL PUMP)

NUMERO DE TEST/TEST NUMBER..... T2329 C-1

|                                                                                          |                                        |                            |                  |
|------------------------------------------------------------------------------------------|----------------------------------------|----------------------------|------------------|
| CLIENTE/CUSTOMER.....                                                                    |                                        | MISSISSIPI POWER           |                  |
| PROYECTO/PROJECT.....                                                                    |                                        | KEMPER COUNTY IGCC         |                  |
| TAMAÑO BOMBA/PUMP SIZE.....                                                              |                                        | 4x12WXH-10                 |                  |
| NÚMERO DE SERIE/SERIAL NUMBER.....                                                       |                                        | M-151458                   |                  |
| ITEM.....                                                                                |                                        |                            |                  |
| REFERENCIA/REFERENCE.....                                                                |                                        | COS-11-10P40213            |                  |
| MOTOR..... HELMKE 1LA7 802-4 HF 60-Z Nº 99-4754/PO382 6000V.- 2100 Kw.- 1491 RPM.- 232 / |                                        |                            |                  |
| ACOPLAMIENTO/COUPLING.....                                                               |                                        | TORSIÓMETRO HBM T32N/25KNm |                  |
| TRANSDUCTOR DESCARGA/DISCHARGE TRANSDUCER.....                                           |                                        | TRAFAG 8891 250 Bares      |                  |
| TRANSDUCTOR ASPIRACIÓN/SUCTION TRANSDUCER.....                                           |                                        | TRAFAG 8891 -1/3 Bares     |                  |
| VENTURI O PLACA ORIFICIO/ORIFICE PLATE OR VENTURI.....                                   |                                        | VENTURI 4"                 |                  |
| MEDIDOR CAUDAL/FLOWMETER.....                                                            |                                        | VENTURI 4"                 |                  |
| MULTIPLICADOR/GEARBOX.....                                                               |                                        | 1500/3000                  |                  |
| Elevación transductor de descarga (m).....                                               |                                        | 1,07                       |                  |
| (Elevation of discharge transducer)                                                      |                                        |                            |                  |
| Elevación transductor de aspiración (m).....                                             |                                        | 1,05                       |                  |
| (Elevation of suction transducer)                                                        |                                        |                            |                  |
| Datum (m).....                                                                           |                                        | 1,10                       |                  |
| Diámetro tubería de descarga (in).....                                                   |                                        | 3,624                      |                  |
| (Discharge pipe diameter)                                                                |                                        |                            |                  |
| Diámetro tubería de aspiración (in).....                                                 |                                        | 6,065                      |                  |
| (Suction pipe diameter)                                                                  |                                        |                            |                  |
| Velocidad de operación (RPM).....                                                        |                                        | 3580                       |                  |
| (Operating speed)                                                                        |                                        |                            |                  |
| Corrección Rendimiento por temperatura.....                                              |                                        | SI                         | H.I.....         |
| (Efficiency correction by temperature)                                                   |                                        | NO                         | KARASSIK.....    |
|                                                                                          |                                        | NO                         | OPTIMIZACIÓN.... |
| Constante watímetros..... 1                                                              | Exponente de corrección..... 0,075     |                            |                  |
| (Wattmeter constant)                                                                     | (Correction exponent)                  |                            |                  |
| Densidad (lbm/ft^3)..... 59,06                                                           | Temperatura-corrección (°C)..... 115,2 | 239,4 °F                   |                  |
| (Density)                                                                                | (Correction temperature)               |                            |                  |
| Viscosidad (cst)..... 0,25                                                               | Peso específico (g/cm^3)..... 0,946    |                            |                  |
| (Viscosity)                                                                              | (Specific Gravity)                     |                            |                  |
| Medida Watímetros..... NO                                                                | Medida Torsiómetro..... SI             | Multiplicador o            |                  |
| (Wattmeter)                                                                              | (Torquemeter)                          | Variador..... SI           |                  |

| PUNTO<br>Point | CAUDAL           | Tb (°C) | PRES. ASP              | PRES. DES.             | R.P.M. | POTENCIA      |
|----------------|------------------|---------|------------------------|------------------------|--------|---------------|
|                | Flow<br>Q (m³/h) |         | Suc. pres.<br>Ps (mca) | Dis. pres.<br>Pd (mca) |        | Power<br>(kW) |
| 1              | 0,0              | 22,3    | 27,1                   | 1625,0                 | 2965   | 431,33        |
| 2              | 49,3             | 22,3    | 26,8                   | 1610,0                 | 2964   | 508,93        |
| 3              | 85,6             | 22,2    | 26,4                   | 1581,0                 | 2963   | 611,56        |
| 4              | 116,7            | 22,2    | 26,0                   | 1524,0                 | 2962   | 700,19        |
| 5              | 155,4            | 22,2    | 25,7                   | 1413,0                 | 2962   | 800,80        |
| 6              | 180,8            | 22,1    | 25,3                   | 1312,0                 | 2961   | 855,61        |
| 7              | 217,0            | 22,2    | 25,0                   | 1148,0                 | 2961   | 916,57        |

| TORSJÖ | REN. MOT    | REN. TOR.  |
|--------|-------------|------------|
| Torque | Eff. driver | Torq. eff. |
| kNm    | %           | %          |
| 1,392  |             |            |
| 1,643  |             |            |
| 1,975  |             |            |
| 2,262  |             |            |
| 2,587  |             |            |
| 2,765  |             |            |
| 2,962  |             |            |

FIRMA BANCO DE ENSAYOS

TEST STAND SIGNATURE  
FLOWSERVE

Banco de Ensayos

FECHA/DATE

15-12-2011

FIRMA INSPECCIÓN

INSPECTION SIGNATURE

Quality  
Record

**FLOWSERVE**

Banco de Ensayos Cerrado/Closed test stand

VALORES CORREGIDOS A (VALUES CORRECTED TO) 20°C  
HOJA DE CÁLCULOS/COMPUTATION SHEET ENSAYO/TEST

T2329 C-1

| PUNTO<br>Point | Caudal<br>Flow<br>Q (m³/h) | P. ASPIR.<br>Suc. pres.<br>(m.c.a.) | P. DESC.<br>Disch. pres.<br>(m.c.a.) | TDH (m)<br>(m.c.a.) | POTENCIA<br>Power<br>KW | EFF (%)<br>% | R.P.M. | Tb (°C) |
|----------------|----------------------------|-------------------------------------|--------------------------------------|---------------------|-------------------------|--------------|--------|---------|
| 1              | 0,0                        | 27,1                                | 1625,8                               | 1598,7              | 431,33                  | 0,00         | 2965   | 22,3    |
| 2              | 49,3                       | 26,8                                | 1610,8                               | 1584,2              | 508,93                  | 41,70        | 2964   | 22,3    |
| 3              | 85,6                       | 26,4                                | 1581,7                               | 1555,9              | 611,56                  | 59,18        | 2963   | 22,2    |
| 4              | 116,7                      | 26,0                                | 1524,7                               | 1499,8              | 700,19                  | 67,93        | 2962   | 22,2    |
| 5              | 155,4                      | 25,7                                | 1413,7                               | 1389,9              | 800,80                  | 73,30        | 2962   | 22,2    |
| 6              | 180,8                      | 25,3                                | 1312,6                               | 1289,8              | 855,61                  | 74,07        | 2961   | 22,1    |
| 7              | 217,0                      | 25,0                                | 1148,5                               | 1127,2              | 916,57                  | 72,52        | 2961   | 22,2    |

VALORES CORREGIDOS A (VALUES CORRECTED TO)

115,2 °C

Y (AND)

3580 r.p.m.

DENSIDAD (115,2 °C)  
(DENSITY)

59,0572 lbm/ft³

VISCOSIDAD (115,2 °C)  
(VISCOSITY)

0,2500 cst

| Punto<br>Point | Caudal<br>Flow<br>Q (m³/h) | TDH (m) | Potencia<br>Power<br>KW | Rendim.<br>Efficiency<br>% |
|----------------|----------------------------|---------|-------------------------|----------------------------|
| 1              | 0,0                        | 2330,7  | 719,78                  | 9,27                       |
| 2              | 59,5                       | 2311,1  | 751,91                  | 47,10                      |
| 3              | 103,4                      | 2271,4  | 961,05                  | 62,97                      |
| 4              | 141,0                      | 2190,9  | 1122,73                 | 70,91                      |
| 5              | 187,8                      | 2030,4  | 1296,51                 | 75,78                      |
| 6              | 218,6                      | 1885,4  | 1388,36                 | 76,48                      |
| 7              | 262,4                      | 1647,7  | 1483,54                 | 75,07                      |

PESO ESPECÍFICO (SPECIFIC GRAVITY) (115,2 °C)

0,9460 g/cm³

| Punto<br>Point | Caudal<br>Flow<br>Q (m³/h) | TDH (m) | Potencia<br>Power<br>KW | Rendim.<br>Efficiency<br>% |
|----------------|----------------------------|---------|-------------------------|----------------------------|
| 1              | 0,0                        | 2330,7  | 719,78                  | 9,27                       |
| 2              | 59,5                       | 2311,1  | 751,91                  | 47,10                      |
| 3              | 103,4                      | 2271,4  | 961,05                  | 62,97                      |
| 4              | 141,0                      | 2190,9  | 1122,73                 | 70,91                      |
| 5              | 187,8                      | 2030,4  | 1296,51                 | 75,78                      |
| 6              | 218,6                      | 1885,4  | 1388,36                 | 76,48                      |
| 7              | 262,4                      | 1647,7  | 1483,54                 | 75,07                      |

DISEÑO

FIRMA BANCO DE ENSAYOS

FECHA/DATE

FIRMA INSPECTOR/CLIENTE

T-3

15-12-2011

CUSTOMER SIGNATURE

Quality  
Record

**FLOWSERVE**

Banco de Ensayos Cerrado/Closed test stand

**Test No.** T2329 C-1

**Final values in american units**

| Punto<br>Point | Caudal<br>Flow<br>Q (G.P.M.) | TDH<br>(feet) | Ptencia<br>Power<br>(BHP) | Rendim.<br>Efficiency<br>(%) |
|----------------|------------------------------|---------------|---------------------------|------------------------------|
| 1              | 0,0                          | 7646,8        | 964,51                    | 9,27                         |
| 2              | 262,0                        | 7582,5        | 1007,56                   | 47,10                        |
| 3              | 455,3                        | 7452,2        | 1287,81                   | 62,97                        |
| 4              | 620,8                        | 7188,1        | 1504,46                   | 70,91                        |
| 5              | 826,9                        | 6661,5        | 1737,32                   | 75,78                        |
| 6              | 962,5                        | 6185,8        | 1860,40                   | 76,48                        |
| 7              | 1155,3                       | 5405,9        | 1987,94                   | 75,07                        |

**Rated**

FIRMA BANCO DE ENSAYOS  
TEST STAND SIGNATURE

FLOWSERVE

Banco de Ensayos

Fdo.: \_\_\_\_\_

FECHA/DATE  
15-12-2011

FIRMA INSPECTOR/CLIENTE  
INSPECTOR/CUSTOMER SIGNATURE

Quality  
Record

**FLowsERVE**

Banco de Ensayos Cerrado/Closed test stand

**ENSAYO DE NPSHr DE BOMBA CENTRIFUGA**  
(NPSHr TEST FOR CENTRIFUGAL PUMP)

NUMERO DE TEST..... N2329 C-1

CLIENTE/CUSTOMER..... MISSISSIPPI POWER  
 PROYECTO/PROJECT..... KEMPER COUNTY IGCC  
 TAMAÑO BOMBA/PUMP SIZE..... 4x12WXH-10  
 NÚMERO DE SERIE/SERIAL NUMBER..... M-151458  
 ITEM.....  
 REFERENCIA/REFERENCE..... COS-11-10P40213  
 MOTOR..... HELMKE 1LA7 802-4 HF 60-Z N° 99-4754/PO382 6000V.- 2100 Kw.- 1491 RPM.- 232 A  
 ACOPLAMIENTO/COUPLING..... Torsiómetro HBM 25 Knw.  
 TRANSDUCTOR DESCARGA/DISCHARGE TRANSDUCER..... TRAFAG 8891 250 Bar  
 TRANSDUCTOR ASPIRACIÓN/SUCTION TRANSDUCER..... TRAFAG 8891-1/3 Bar  
 VENTURI O PLACA ORIFICIO/ORIFICE PLATE OR VENTURI..... VENTURI 4"  
 MEDIDOR CAUDAL/FLOW METER..... VENTURI 4"  
 MULTIPLICADOR/GEARBOX..... 1500/3000  
 Elevación transductor de descarga (m)..... 1,07  
 (Elevation of discharge transducer)  
 Elevación transductor de aspiración (m)..... 1,07  
 (Elevation of suction transducer)  
 Datum (m)..... 1,1  
 Diámetro tubería de descarga (m)..... 0,092  
 (Discharge pipe diameter)  
 Diámetro tubería de aspiración (m)..... 0,154  
 (Suction pipe diameter)  
 Presión atmosférica (m)..... 9,57  
 (Atmospheric pressure)  
 Caudal de ensayo (m<sup>3</sup>/h)..... 180,5  
 (Test flow)  
 Velocidad de ensayo (RPM)..... 2962  
 (Test speed)  
 Velocidad de operación (RPM)..... 3580  
 (Operating speed)  
 Número de etapas..... 10  
 (Stages N°)

| Patm<br>(mwc)                              | Pvap<br>(mwc) | Ps<br>(mwc) | Pd<br>(mwc) | Tdh<br>(mwc) | T (°C)                          | NPSH<br>(mwc) | Po (%)<br>1st stg. |
|--------------------------------------------|---------------|-------------|-------------|--------------|---------------------------------|---------------|--------------------|
| 9,57                                       | 0,28          | 24,8        | 1310        | 1287,7       | 22,5                            | 34,43         | 0                  |
| 9,57                                       | 0,28          | 15          | 1301        | 1288,5       | 22,5                            | 24,63         | -0,62              |
| 9,57                                       | 0,28          | 10          | 1297        | 1289,5       | 22,5                            | 19,63         | -1,4               |
| 9,57                                       | 0,28          | 5           | 1290        | 1287,5       | 22,6                            | 14,63         | 0,16               |
| 9,57                                       | 0,28          | 0,6         | 1286        | 1287,9       | 22,6                            | 10,23         | -0,16              |
| 9,57                                       | 0,28          | -2,5        | 1281        | 1286         | 22,7                            | 7,13          | 1,32               |
| 9,57                                       | 0,28          | -3,8        | 1278        | 1284,3       | 22,7                            | 5,83          | 2,64               |
| 9,57                                       | 0,28          | -4,1        | 1271        | 1277,6       | 22,7                            | 5,53          | 7,84               |
|                                            |               |             |             |              |                                 |               |                    |
|                                            |               |             |             |              |                                 |               |                    |
|                                            |               |             |             |              |                                 |               |                    |
| El NPSHr con caída TDH del 3% (1ª etapa) a |               |             |             | 218,2        | m <sup>3</sup> /h y 3580 rpm es |               | 8,52 m             |
| NPSHr with 3% drop of TDH (1st stg.) to    |               |             |             | 960,7        | G.P.M. & 3580 rpm is            |               | 27,94 ft           |

FIRMA INGENIERO ENSAYO  
TEST ENGINEER SIGNATURE

FECHA/DATE  
15-12-2011

FIRMA INSPECTOR/CLIENTE  
INSPECTOR/CUSTOMER SIGNATURE

**CAUDAL-TDH**

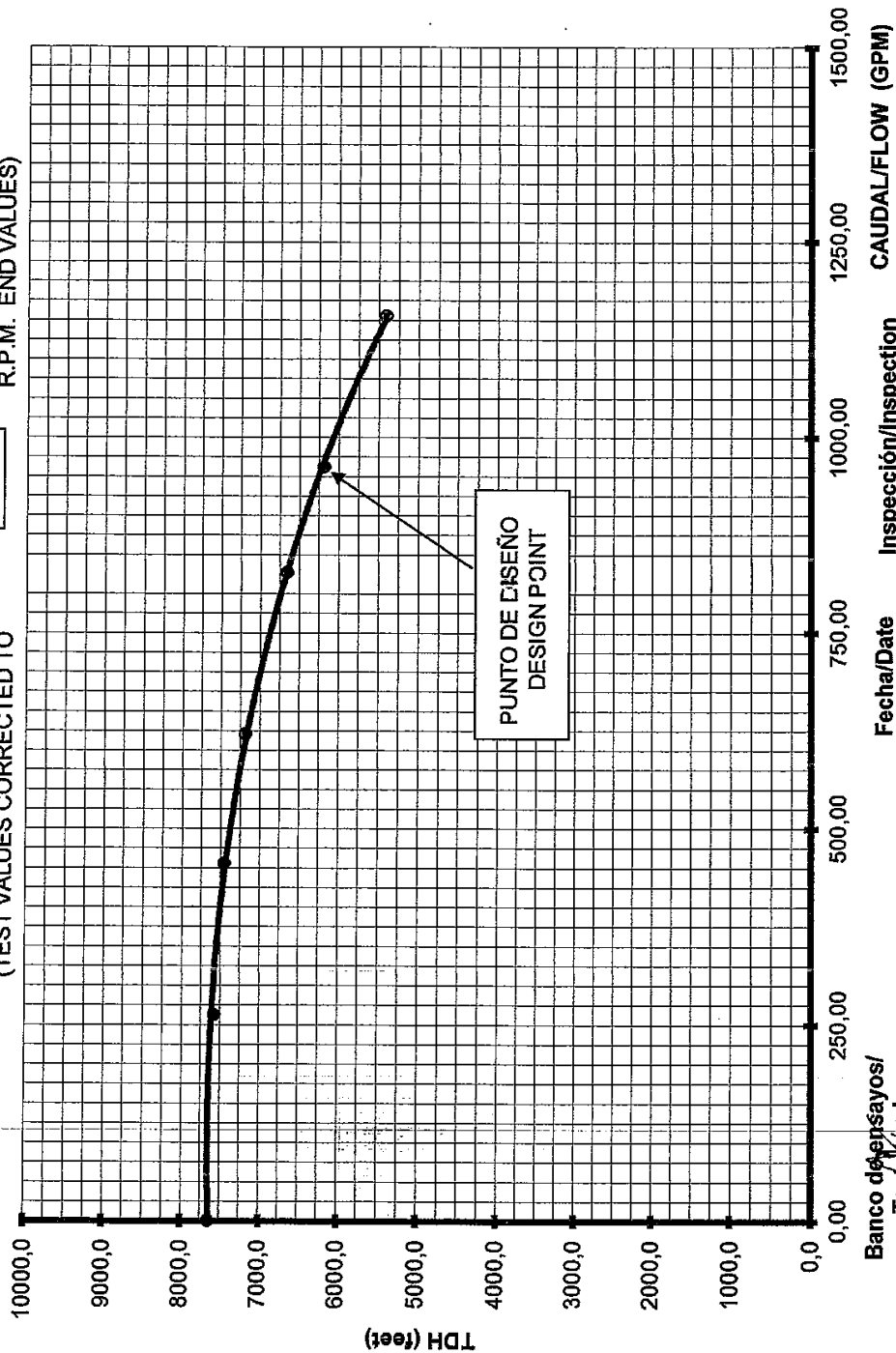
(FLOW-T.D.H.)

BOMBA 4x12WXH-10 N/S M-151458

VALORES DE ENSAYO CORREGIDOS A  
(TEST VALUES CORRECTED TO

3580

R.P.M. (FINALES)  
R.P.M. END VALUES)



Banco de ensayos/  
Test and

FLOW CURVE

Banco de Ensayos

Fecha/Date

15-12-2011

Inspección/Inspection

Página/Sheet 5 de/of 9

Pdo.



# CAUDAL-POTENCIA

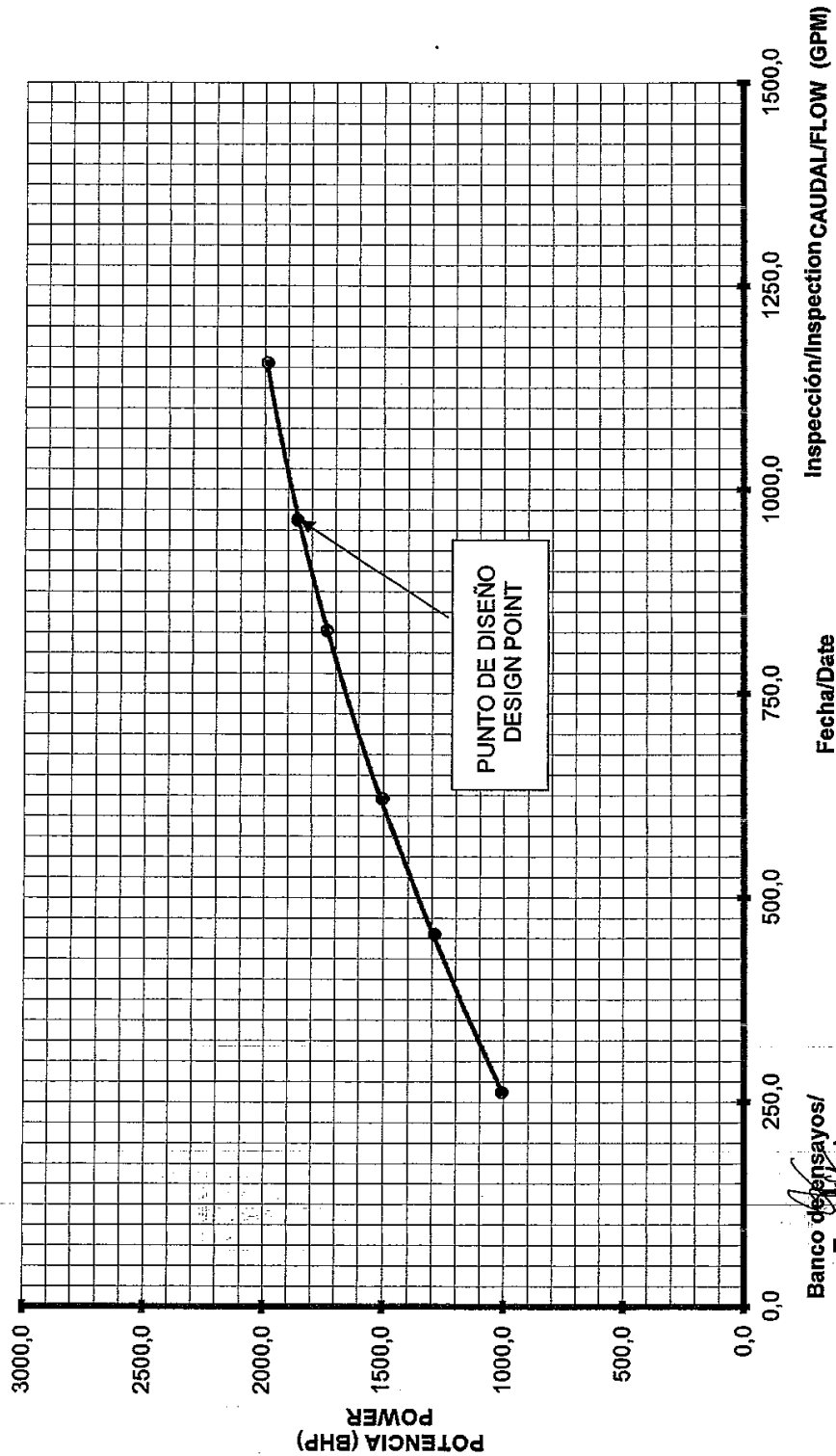
(FLOW-POWER)

BOMBA 4x12WXH-10 N/S M-151458

VALORES DE ENSAYO CORREGIDOS A  
(TEST VALUES CORRECTED TO

R.P.M. (FINALES)  
R.P.M. END VALUES)

3580



Banco de Ensayos/  
Test Stand

FLOWSEAVE

Banco de Ensayos

Fdo.:

Fecha/Date

15-12-2011

Página/Sheet 6 de/of 9



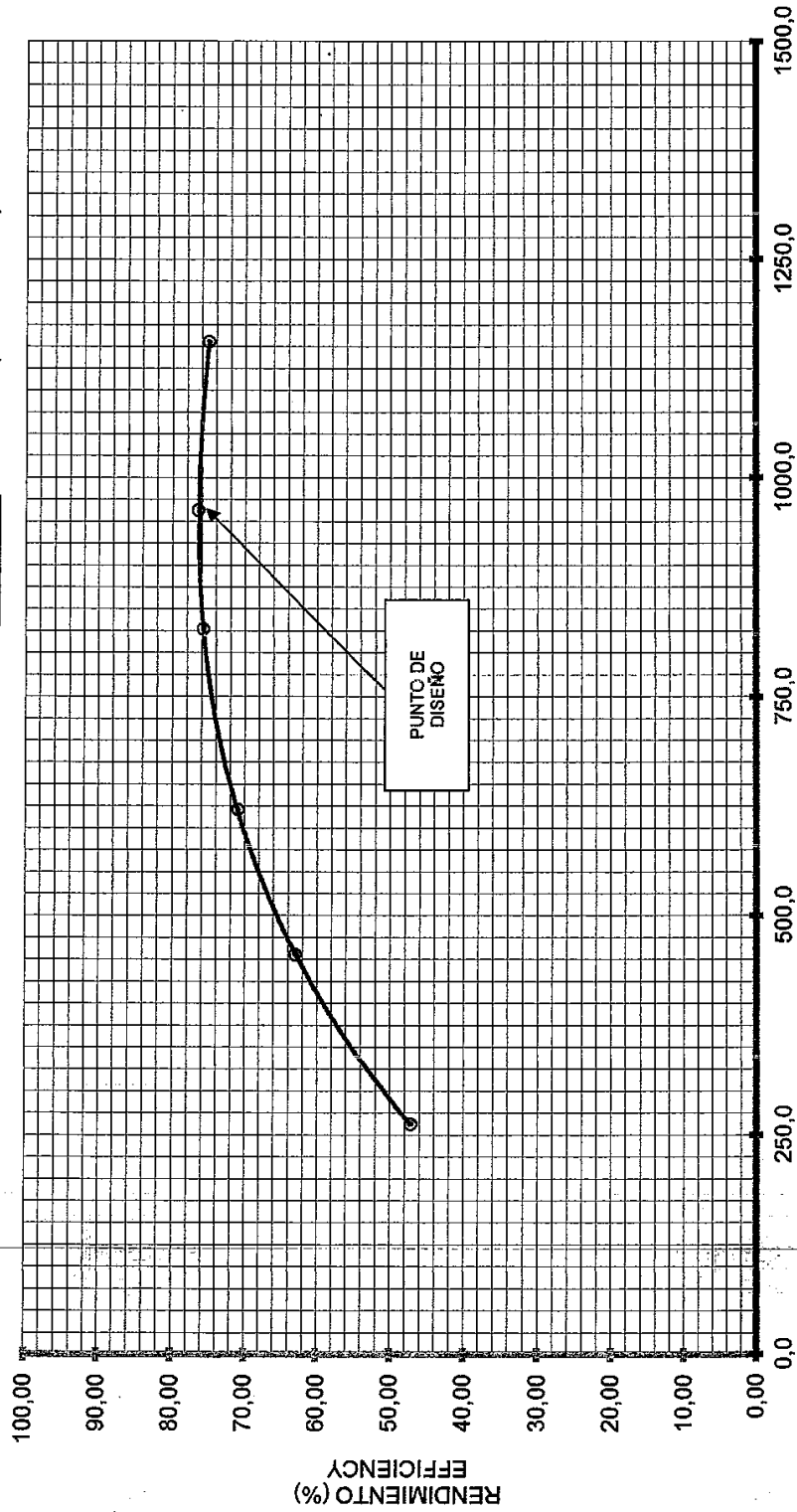
**CAUDAL-RENDIMIENTO**  
(FLOW-EFFICIENCY)

BOMBA 4x12WXH-10 N/S M-151458

VALORES DE ENSAYO CORREGIDOS A  
(TEST VALUES CORRECTED TO

3580

R.P.M. (FINALES)  
R.P.M. (END VALUES)



Banco de ensayos/  
Test stand  
FLOWSERVE  
Banco de Ensayos

Fecha/Date

15-12-2011

Página/Sheet 7 de/of 9

Inspección/Inspection CAUDAL/FLOW (GPM)

Quality

RecoFLOWSERVE

Banco de Ensayos Cerrado/Closed test stand

Hoja/Sheet 8 de/of 9

## ENSAYO DE VIBRACIONES PARA BOMBAS CENTRÍFUGAS

VIBRATIONS TEST FOR CENTRIFUGAL PUMPS

Cliente/Customer:  
Proyecto/Project:  
Tipo de bomba/Pump type:  
Nº serie bomba/Serial No. pump:  
Referencia/Reference:  
Item:  
Nº ensayo/Test No.:

MISSISSIPPI POWER  
KEMPER COUNTY IGCC  
4x12WXH-10  
M-151458  
COS-11-10P40213

T 2329 C-1

| BOMBA/PUMP              | Coj. contr. acopl./Thrust brg. |      |      | Coj. acoplamiento./Coupling brg. |      |                  |
|-------------------------|--------------------------------|------|------|----------------------------------|------|------------------|
| CAUDAL/FLOW (m³/h)      | H                              | V    | A    | H                                | V    |                  |
| 49 m³/h. @ 2964 R.P.M.  | 2,63                           | 1,63 | 0,93 | 2,25                             | 1,85 | m.m./seg. R.M.S. |
| 180 m³/h. @ 2961 R.P.M. | 1,98                           | 1,26 | 0,58 | 1,93                             | 1,46 | m.m./seg. R.M.S. |
| 217 m³/h. @ 2961 R.P.M. | 2,11                           | 1,17 | 0,52 | 1,90                             | 1,25 | m.m./seg. R.M.S. |

(\*) Vibrómetro utilizado/Vibrometer used:  
C.S.I. 1900 s/n 1733

Valores obtenidos sin filtrar/Non filtered values

Velocidad/Velocity mm./seg./mm./sec. (R.M.S.)

Desplazamiento P-P/Displacement P-P (MILS OVERALL AVERAGE)

Temperatura ambiente/Ambient temperature  
Temperat. coj. empuje/Thrust brg. temperature  
Temperat. coj. liso lado empuje/Sleeve brg.  
Temperat. coj. acopl./Coupling brg. temperature

| BOMBA/PUMP |        |
|------------|--------|
| °C         | °F     |
| 21,7       | 71,06  |
| 39,8       | 103,64 |
| 39,8       | 103,64 |
| 36,5       | 97,7   |

BANCO DE ENSAYOS/  
TEST STAND  
FLOW SERVE  
Banco de Ensayos

INSPECCIÓN/INSPECTION

FECHA/DATE  
15-12-2011

## ENSAYO DE RUIDO/NOISE TEST

Ensayo N°/Test No.: R2329C-1

|                                                                                                                                                               |       |                                                                                                                |                       |                                                                              |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------------------|----|
| Cliente/Customer<br>Proyecto/Projet<br>Bomba/Pump<br>N° serie/Serial number<br>Item<br>Referencia/Reference<br>Sonómetro/Noisemeter<br>N° serie/Serial number |       | MISSISSIPPI POWER<br>KEMPER COUNTY IGCC<br>4X12WXH-10<br>M-151458<br>COS-11-10P40213<br>RION NL31<br>000341517 |                       |                                                                              |    |
| Caudal/Flow                                                                                                                                                   |       | Q = 180 m³/h a/to 2961 R.P.M.                                                                                  |                       | Distancia sonómetro al suelo 1,5 m.<br>(Noisemeter distance to floor 1,5 m.) |    |
| Nivel de ruido<br>(Noise level)<br>dB(A)                                                                                                                      |       | Punto/Point 1                                                                                                  |                       | Punto/Point 2                                                                |    |
|                                                                                                                                                               |       | Máquina<br>(Machine)                                                                                           | Ambiente<br>(Ambient) | Total<br>(Total)                                                             |    |
| dB(A) TOTAL                                                                                                                                                   |       |                                                                                                                |                       |                                                                              |    |
| F R E C U E N C I A S / F R E Q U E N C I E S<br>(Hz)                                                                                                         | 20    |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 25    |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 31,5  |                                                                                                                |                       | 40                                                                           | 42 |
|                                                                                                                                                               | 40    |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 50    |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 63    |                                                                                                                |                       | 49                                                                           | 48 |
|                                                                                                                                                               | 80    |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 100   |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 125   |                                                                                                                |                       | 58                                                                           | 55 |
|                                                                                                                                                               | 160   |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 200   |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 250   |                                                                                                                |                       | 66                                                                           | 65 |
|                                                                                                                                                               | 315   |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 400   |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 500   |                                                                                                                |                       | 77                                                                           | 79 |
|                                                                                                                                                               | 630   |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 800   |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 1.000 |                                                                                                                |                       | 79                                                                           | 80 |
|                                                                                                                                                               | 1.250 |                                                                                                                |                       |                                                                              |    |
|                                                                                                                                                               | 1.600 |                                                                                                                |                       |                                                                              |    |
| 2.000                                                                                                                                                         |       |                                                                                                                | 76                    | 77                                                                           |    |
| 2.500                                                                                                                                                         |       |                                                                                                                |                       |                                                                              |    |
| 3.150                                                                                                                                                         |       |                                                                                                                |                       |                                                                              |    |
| 4.000                                                                                                                                                         |       |                                                                                                                | 69                    | 72                                                                           |    |
| 5.000                                                                                                                                                         |       |                                                                                                                |                       |                                                                              |    |
| 6.300                                                                                                                                                         |       |                                                                                                                |                       |                                                                              |    |
| 8.000                                                                                                                                                         |       |                                                                                                                | 62                    | 61                                                                           |    |
| 10.000                                                                                                                                                        |       |                                                                                                                |                       |                                                                              |    |
| 12.500                                                                                                                                                        |       |                                                                                                                |                       |                                                                              |    |
| 16.000                                                                                                                                                        |       |                                                                                                                | 45                    | 45                                                                           |    |
| 20.000                                                                                                                                                        |       |                                                                                                                |                       |                                                                              |    |

Banco de Ensayos/Test Stand

Inspección/Inspection

EXCEL-VEJEMPLOS\Ruido1521

**FLOWSERVE**

Banco de Ensayos

AENOR



Empresa Registrada

ER-0008/1/90



**INFORME DE LIMPIEZA**  
*Cleaning Report*

**INFORME N°/**  
*Report N°*

**1852**

**REF. FDP / FDP Ref.**

**COS-11-10P40213**

**CLIENTE / Customer**

**MISSISSIPPI POWER**

**PROYECTO / Project**

**KEMPER COUNTY IGCC**

**REF. CLIENTE / Customer Ref.**

**CONTRACT N° 17954**

**TIPO DE BOMBA / Pump Type**

**4X12 WXH-10**

**N° SERIE / Serial N°**

**M-151457**

Se ha realizado la inspección de limpieza en las bombas de referencia después de la prueba de funcionamiento de acuerdo al procedimiento FL-124 Rev.2 con resultados satisfactorios.

*[The inspection of the cleaning status of the referenced pumps has been performed after the performance test according the procedure FL-124 Rev.2 The result is satisfactory]*

**CONTROL DE CALIDAD**  
**FLowsERVE**

**INSPECTOR F.D.P.**  
**F.D.P. Inspector**

COSLADA, 21/NOVEMBER/2011

AENOR



Empresa  
Registrada  
ER-0008/1/90



**INFORME DE LIMPIEZA**  
*Cleaning Report*

**INFORME Nº/**  
*Report Nº*

**1853**

**REF. FDP / FDP Ref.**

**COS-11-10P40213**

**CLIENTE / Customer**

**MISSISSIPPI POWER**

**PROYECTO / Project**

**KEMPER COUNTY IGCC**

**REF. CLIENTE / Customer Ref.**

**CONTRACT Nº 17954**

**TIPO DE BOMBA / Pump Type**

**4X12 WXH-10**

**Nº SERIE / Serial Nº**

**M-151458**

Se ha realizado la inspección de limpieza en las bombas de referencia después de la prueba de funcionamiento de acuerdo al procedimiento FL-124 Rev.2 con resultados satisfactorios.

*[The inspection of the cleaning status of the referenced pumps has been performed after the performance test according the procedure FL-124 Rev.2 The result is satisfactory]*

**CONTROL DE CALIDAD**  
**FLowsERVE**

**INSPECTOR F.D.P.**  
F.D.P. Inspector

COSLADA, 19/DECEMBER/2011



Pump Division  
Flowserve Spain S.L.

|                                     |                                                                                        |                                                         |                                                       |
|-------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------|
| <br><br>ER-0008/1/90                | <b>INFORME CONTROL DIMENSIONAL FINAL</b><br><i>Final Dimensional Inspection Report</i> |                                                         | <b>INFORME N°/</b><br><i>Report N°</i><br><b>5024</b> |
|                                     | <b>REF. FPD / FPD Ref.</b><br>COS-11-10P40213                                          | <b>CLIENTE / Customer</b><br>MISSISSIPPI POWER          | <b>PROYECTO / Project</b><br>KEMPER COUNTY IGCC       |
| <b>REF. CLIENTE / Customer Ref.</b> | <b>TIPO DE BOMBA / Pump Type</b><br>4X12WXH-10                                         | <b>N° SERIE / Serial N°</b><br>M-151457<br>MA-PU-3700 A |                                                       |

SE HA REALIZADO EL CONTROL DIMENSIONAL FINAL EN LA BOMBA

INDICADA CONFORME AL PLANO DE DISPOSICIÓN GENERAL

N° 4X12WXH86XE108 REV.A

CON RESULTADO SATISFACTORIO.

Final dimensional inspection has been made after reassembling to the pump

indicated in accordance with general arrangement drawing

n° 4X12WXH86XE108 REV.A

With satisfactory results.

PB 021 20/1/12  
 SAMPLE INSPECTION  
 INTERFACE AREAS ONLY

CONTROL DE CALIDAD  
 FLOWSERVE

COSLADA, 20 JANUARY 2012



Pump Division  
Flowserve Spain S.L.

|                                                        |                                                    |                                                                                        |                                                           |
|--------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------|
| <b>AENOR</b><br><br>Empresa Registrada<br>ER-0008/1/90 |                                                    | <b>INFORME CONTROL DIMENSIONAL FINAL</b><br><i>Final Dimensional Inspection Report</i> | <b>INFORME N°/</b><br><i>Report N°</i><br><br><b>5025</b> |
| <b>REF. FPD / FPD Ref.</b><br><br>COS-11-10P40213      | <b>CLIENTE / Customer</b><br><br>MISSISSIPPI POWER | <b>PROYECTO / Project</b><br><br>KEMPER COUNTY IGCC                                    |                                                           |
| <b>REF. CLIENTE / Customer Ref.</b>                    | <b>TIPO DE BOMBA / Pump Type</b><br><br>4X12WXH-10 | <b>N° SERIE / Serial N°</b><br><br>M-151458<br>MA-PU-3700 B                            |                                                           |

SE HA REALIZADO EL CONTROL DIMENSIONAL FINAL EN LA BOMBA

INDICADA CONFORME AL PLANO DE DISPOSICIÓN GENERAL

N° 4X12WXH86XE108 REV.A

CON RESULTADO SATISFACTORIO.

Final dimensional inspection has been made after reassembling to the pump

indicated in accordance with general arrangement drawing

n° 4X12WXH86XE108 REV.A

With satisfactory results.

PB  
 021  
 20/1/12  
 SAMPLE INSPECTION  
 INTERFACE AREAS ONLY

**CONTROL DE CALIDAD**  
**FLOWSERVE**

COSLADA, 20 JANUARY 2012



Pump Division  
Flowserve Spain, S.L.



**CERTIFICADO INSPECCIÓN PINTURA**  
*Paint Inspection Report*

**INFORME N°/**  
*Report n°*

**862**

**REF. FDP / FDP Ref.**

**COS-11-10P40213**

**CLIENTE / Customer**

**MISSISSIPPI POWER**

**PROYECTO / Project**

**KEMPER COUNTY IGCC**

**REF. CLIENTE / Customer Ref.**

**TIPO DE BOMBA / Pump Type**

**4X12WXH-10**

**N° SERIE / Serial N°**

**M-151457  
MA-PU-3700 A**

**SE HAN REALIZADO TODAS LAS INSPECCIONES REFERENTES A LA  
PINTURA DE LAS BOMBAS INDICADAS CON RESULTADOS SATISFACTORIOS  
CONFORME AL PROCEDIMIENTO: PP02\_40213\_REV.0**

*[All inspections related to painting have been carried out for above referenced  
pumps with satisfactory results according to the procedure : PP02\_40213\_REV.0*

**CONTROL DE CALIDAD  
FLOWSERVE**

**COSLADA, 20 / JANUARY / 2012**



Pump Division  
Flowserve Spain, S.L.



**CERTIFICADO INSPECCIÓN PINTURA**  
*Paint Inspection Report*

**INFORME N°/**  
*Report n°*

**863**

**REF. FDP / FDP Ref.**

**COS-11-10P40213**

**CLIENTE / Customer**

**MISSISSIPPI POWER**

**PROYECTO / Project**

**KEMPER COUNTY IGCC**

**REF. CLIENTE / Customer Ref.**

**TIPO DE BOMBA / Pump Type**

**4X12WXH-10**

**N° SERIE / Serial N°**

**M-151458  
MA-PU-3700 B**

**SE HAN REALIZADO TODAS LAS INSPECCIONES REFERENTES A LA  
PINTURA DE LAS BOMBAS INDICADAS CON RESULTADOS SATISFACTORIOS  
CONFORME AL PROCEDIMIENTO: PP02\_40213\_REV.0**

*[All inspections related to painting have been carried out for above referenced  
pumps with satisfactory results according to the procedure : PP02\_40213\_REV.0*

**CONTROL DE CALIDAD  
FLOWSERVE**

**COSLADA, 20 / JANUARY / 2012**

AENOR



Empresa  
Registrada

ER-0008/1/90



**CERTIFICADO INSPECCION EMBALAJE**  
*Package Inspection Certificate*

**INFORME N° /**  
*Report N°*

**626**

**REF. FDP / FDP Ref.**

**COS-11-10P40213**

**CLIENTE / Customer**

**MISSISSIPPI POWER**

**PROYECTO / Project**

**KEMPER COUNTY IGCC**

**REF. CLIENTE / Customer Ref.**

**CONTRACT N° 17954**

**TIPO DE BOMBA / Pump Type**

**4X12WXH-10**

**N° SERIE / Serial N°**

**M-151457**

Se han realizado todas las inspecciones referentes al embalaje  
de las bombas indicadas con resultados satisfactorios conforme al  
procedimiento: FE-184 Rev.2

*[The package of the reference equipment have been verified with satisfactory  
results of according to specification: FE-184 Rev.2]*

**CONTROL DE CALIDAD**  
**FLOWSERVE**

COSLADA, 25/JANUARY/2012

AENOR



Empresa Registrada

ER-0008/1/90



**CERTIFICADO INSPECCION EMBALAJE**  
*Package Inspection Certificate*

**INFORME N° /**  
*Report N°*

**627**

REF. FDP / FDP Ref.

COS-11-10P40213

CLIENTE / Customer

MISSISSIPPI POWER

PROYECTO / Project

KEMPER COUNTY IGCC

REF. CLIENTE / Customer Ref.

CONTRACT N° 17954

TIPO DE BOMBA / Pump Type

4X12WXH-10

N° SERIE / Serial N°

M-151458

Se han realizado todas las inspecciones referentes al embalaje de las bombas indicadas con resultados satisfactorios conforme al procedimiento: FE-184 Rev.2

*[The package of the reference equipment have been verified with satisfactory results of according to specification: FE-184 Rev.2]*

**CONTROL DE CALIDAD**  
**FLowsERVE**

COSLADA, 25/JANUARY/2012



## VENDOR DEVIATION REQUEST

Instructions for preparing the form are on the next page.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |                          |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------|
| VDR No.<br>01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SCS P.O. Number<br>17954 | Job No.<br>17954         | Sheet 1 of 1 |
| Project<br>KEMPER COUNTY IGCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                          | To<br>GREGORY MANN       |              |
| Supplier Address<br>FUENTEMAR 26-28 28820 COSLADA (SPAIN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                          |                          |              |
| Description of Deviation<br><br>During Final inspection the following issues were found: <ul style="list-style-type: none"><li>• Missing identification plates for valves.</li><li>• The nameplates of the GI pumps had a mistake in the KKS (3007A/B is written instead of 3700A/B even though the nameplate drawing had been approved with 3007A/B)</li><li>• There is a deviation of around 9-10mm of the drain connection of the HRSR pumps compared to the general arrangement.</li><li>• There is a deviation of around 8mm of the Howden cooler nozzle in height compared to the general arrangement.</li></ul> |                          |                          |              |
| Proposed Disposition and Rationale<br>The tag identification plates and the nameplates are being manufactured and will be sent directly to site. Regarding the positioning deviation of the drain nozzle and the Howden cooler nozzle Flowserve considers acceptable this deviation that can easily be absorbed at site.                                                                                                                                                                                                                                                                                               |                          |                          |              |
| Supplier Documents to be revised:<br><br>____ No ____ x ____ Yes, as noted: Pump nameplate drawing for the GI pump will be modified and submitted as-built with the right pump tag number MA-PU 3700A/B                                                                                                                                                                                                                                                                                                                                                                                                                |                          |                          |              |
| Requested By: ALBERTO CHINCHILLA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          | Date: 23/01/2012         |              |
| <b>RESPONSE FROM SOUTHERN COMPANY SERVICES, INC.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |                          |              |
| To<br>Alberto Chinchilla                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |                          |              |
| Your request for the above is:<br><br>____ X ____ Approved ____ Not Approved ____ X ____ As Noted Below: <u>Revise nameplate drawing</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |                          |              |
| Design Documents to be revised:<br><br>____ No ____ X ____ Yes, as noted: <u>Revise the GI pump nameplate drawing as noted above</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |                          |              |
| Responsible Engineer<br>Gregory A. Mann                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                          | Date<br>January 24, 2012 |              |

cc: \_\_\_\_ X \_\_\_\_ Mgr, SCM Sourcing Major Equip \_\_\_\_ X \_\_\_\_ Project Const. Mgr  
\_\_\_\_ X \_\_\_\_ ES - Insp Svcs-Vendor Quality \_\_\_\_ Mgr., Expediting



UPPER PORTION OF FORM COMPLETED BY VENDOR

VDR NO. A sequential number for each Vendor Deviation Request on a P. O. No.

SCS P.O. NO. SCS purchase order number.

JOB NO. Vendor's in-house control number for a given P.O. No. (optional).

SHEET 1 OF \_\_\_\_ Attach any additional sheets, figures, etc., and number sequentially. Place total number submitted in this blank.

PROJECT The name of the generating plant and unit number(s).

TO: The individual designated in the procurement document to receive the VDR.

SUPPLIER Name of company submitting request.

ADDRESS Address of company submitting request.

DESCRIPTION OF DEVIATION Describe deviating characteristics and define extent of defect for the attached item.

PROPOSED DISPOSITION AND RATIONALE: Describe correction action, including rationale, to resolve the deviation. Attach any repair procedures or sketches.

SUPPLIER DOCUMENTS TO BE REVISED List all supplier-originated documents that will be revised if the proposed disposition is accepted.

REQUESTED BY: Name of authorized representative.

LOWER PORTION OF FORM COMPLETED BY SCS

TO: Designated vendor contact for resolving the VDR.

APPROVED, NOT APPROVED, AS NOTED BELOW Acceptance, rejection, or comments on the VDR and proposed disposition.

DESIGN DOCUMENTS TO BE REVISED List all SCS-originated documents that will be revised as a result of the VDR.

RESPONSIBLE ENGINEER The individual designated in the procurement documents, or his designee, as the contact for receiving and coordinating the SCS response to the VDR.

CC: Check the appropriate blocks and add additional names as required.

## DECLARATION OF CONFORMITY

### Section 1.0 MACHINE DESCRIPTION

|                                     |                             |
|-------------------------------------|-----------------------------|
| Serial No                           | M-151457/ M-151458          |
| Equipment/Item                      | MA-PU-3007 A/ MA-PU-3007B   |
| Purchase Order                      | 281000351                   |
| Model / Type                        | 4X12 WXH-10                 |
| Size                                | 10                          |
| <b>CE</b> <b>Ex</b>                 |                             |
| ATEX Compliant Ancillary Equipment  |                             |
| Hydro. Pressure                     |                             |
| Material                            | ASTM A487, CA6NM ( 6 IR805) |
| Date DD/MM/YY                       | 07/11/2011                  |
| Liquid Temperature                  | 115.22 °C                   |
| Flow                                | 218.04 m3/h                 |
| Head                                | 1844.04 m                   |
| Speed Min-1 / RPM                   | 3580 RPM                    |
| Motor Kw                            | 1565.97 KW                  |
| Hz                                  | 60 Hz                       |
| Volts                               | 4000 V                      |
| Amps                                | 226 A                       |
| Language of User/ Final Destination | English                     |

### Section 2.0 APPLICABLE DIRECTIVES / REGULATIONS

- Machinery Directive, 98/37/EC Annex IIA up to Dec 28<sup>th</sup> 2009, 2006/42/EC Annex IIA from Dec 29<sup>th</sup> 2009
  - EMC Directive 2004/108/EC
  - Low Voltage Directive 2006/95/EC (73/23/EEC text identical). Only applicable to products with electrical devices with voltage input 50-1000 VAC and not applicable to hazardous areas to 94/9/EC (ATEX).
  - Explosive Atmospheres Directive 94/9/EC (ATEX). Only applicable when the **Ex** marking appears in section 1.0
- Equipment without the **Ex** marking must not be used in potentially explosive atmospheres.

### Section 3.0 APPLICABLE STANDARDS / SPECIFICATIONS

- EN809:1998

### Section 4.0 DECLARATION

We, **Flowserve Spain, S.L.**, at the above address, declare that under our sole responsibility for the supply of the machinery defined in **SECTION 1.0** above, the said machinery complies with all the applicable Directives and Regulations set out in **SECTION 2.0** above and with all the essential health and safety requirements applying to it when installed, operated and maintained in accordance with the applicable User Instruction manual(s).

Signed: Verónica Dolz Technical Responsible  
(Authorised / Responsible Person)

Signed: [Signature] General Manager  
(Authorised / Responsible Person)

October 4, 2011

**To:** All Vendors  
**Subj:** Equipment Deliveries for Kemper County IGCC

Here is the ship to address and shipping information for the plant site:

**Mississippi Power Company – IGCC Facility**  
**5835 Highway 493**  
**Dekalb, MS. 39328**

Receiving hours:

**Monday – Friday (No deliveries on Saturday or Sunday)**  
07:00 - 15:00 (7am – 3pm Central Time)

\*\*\* Minimum of 48 hours notice required prior to delivery \*\*\*

The primary point of contact for the truck drivers to call for directions and the 48 hour verbal notice will be Loyd Young or Mike Gregory, but other Southern Company contacts (Site Management Team) should be added to email notifications so they can have an indication of what is in transit.

Please notify "site management personnel" based on the "AREA" of the plant that the equipment is assigned to (see contact list below).

**The Kemper County – IGCC Project Contacts:**

**Primary: Loyd Young**  
[x2leyoun@southernco.com](mailto:x2leyoun@southernco.com)  
205-257-0215 office  
601-409-0180 cell  
1\*15\*2176 Southern Linc

**Mike Gregory**  
205-257-0323 office  
601-409-0180 cell  
1\*15\*2176 Southern Linc

**Gavin Tolbert**  
[igtolber@southernco.com](mailto:igtolber@southernco.com)  
205-257-0514 office  
601-409-0143 cell

**Southern Company (Site Management Contacts)**

**Kelli Williams**      **Combined Cycle / BOP Site Manager**

[kelliwil@southernco.com](mailto:kelliwil@southernco.com)

**Brent Collins**      **Combined Cycle Assistant Site Manager**

[bwcollin@southernco.com](mailto:bwcollin@southernco.com)

Area 510, 520, 530, 540, and 550

**Anthony DeMonia**      **BOP Assistant Site Manager**

[apdemoni@southernco.com](mailto:apdemoni@southernco.com)

Area 200, 560, 570, 580, 590, 600, 700, 800, and 900

Dan Yates

**Gasification Site Manager**

[dcyates@southernco.com](mailto:dcyates@southernco.com)

Coy Graham

Gasifier Assistant Site Manager

[colgraha@southernco.com](mailto:colgraha@southernco.com)

Area 150, 150A, 250, and 250A

John Cieutat

Gas Cleanup & By-Products  
Assistant Site Manager

[jcieutat@southernco.com](mailto:jcieutat@southernco.com)

Area 105, 110, 120, 130, 140, 160, 170, 180, 190, 210, 220, 230, and 260

If you have any questions, please feel free to contact me.

Regards,

***Jerry Pyle***

Southern Company Service

205-992-7001 Office

205-382-0374 Cell

[pyle@southernco.com](mailto:pyle@southernco.com)

(10-04-11 rev 2)