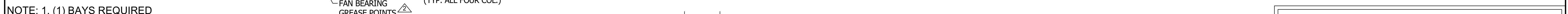


QTY: 2 PER BAY



$$M_u = \frac{F_y A_s d}{\phi} \quad \text{or} \quad F_y = \frac{\phi M_u}{A_s d}$$





DER WEIGHT



18-XF-18

REFERENCES

GENERAL ARRANGEMENT

DRAWING PROPRIETARY TO FABSCO, LLC AND IS NOT TO BE RELEASED TO ANY THIRD PARTY, EXCEPT WITH

NOTIFICATION AND APPROVAL IN WRITING OF FABSCO, LLC OFFICER.	

Energy Renewables Project

**FABSCO LLC.**

P.O. Box 988
2410 Industrial Rd.
Sapulpa, OK 74066
(918) 224-7550 Fax (918) 224-3564

AIR COOLED EXCHANGER SPECIFICATION SHEET

1	Equipment Owner	Air Products Manufacturing LLC	Customer/Client: World Energy Paramount	Date:	11/28/2023 Rev.	2
2	Plant Location	World Energy, Paramount, CA, USA	Fabsco Job No.: A22-13316	Item No.	18-XF-1801	
3	Service	Excess MP Steam Condenser	Project: World Energy Renewables Project	Proj No./Unit:	EN-20-7123 / Utilities	
4	Size and Type	13.938 x 24.000 ft	FORCED	No. Bays	1	
5	Surface/Unit - Finned Tube	43387 ft2	;Bare Tube	2060.9 ft2		
6	Heat Exchanged	24.36 MMBtu/h	MTD, Eff.	100.5 °F		
7	Transfer Rate-Finned Tube	6.095 ;Bare Tube, Service	128.32	Clean	141.92 Btu/h.ft2.F	

PERFORMANCE DATA - TUBE SIDE

10	Fluid Name	Excess Steam	Vapor Ref. Temp.	°F	318	
11	Total Fluid In	lb/h	25200	Specific Heat	Btu/lb.F	0.5037
12	Vapor	lb/h		Viscosity	cP	0.0145
13	Liquid	lb/h		Conductivity	Btu/h.ft.F	0.0175
14	Noncond	lb/h		Density	lb/ft3	0.0876
15	Steam	lb/h	25200	Liquid Ref. Temp.	°F	262.8
16	Water	lb/h	0	Specific Heat	Btu/lb.F	1.0185
17				Viscosity	cP	0.2161
18	Temperature In/Out	°F	318	Conductivity	Btu/h.ft.F	0.3946
19	Pressure In / Out	psia	39.70	Density	lb/ft3	58.453
20	Velocity	ft/s	46.01			
21	Press. Drop Allow/Calc	psi	2.5	1.987	Fouling resistance	h.ft2.F/Btu
					0.0005	tubeside / 0.002 airside

PERFORMANCE DATA - AIR SIDE (Air)

23	Std. air flow rate/item	(SCFM)	175481	Altitude above Sea Level	ft	69
24	Air Quantity/Fan	(ACFM)	91408	Temperature In (Dry Bulb)	°F	90
25	Actual Static Press	in H2O	0.445	Temperature Out	°F	217.86
26	Face Velocity	(SFPM)	530.16	Min. Design Ambient	°F	35
27	Max Mass Velocity	lb/h.ft2		Fan Air Temperature	°F	90

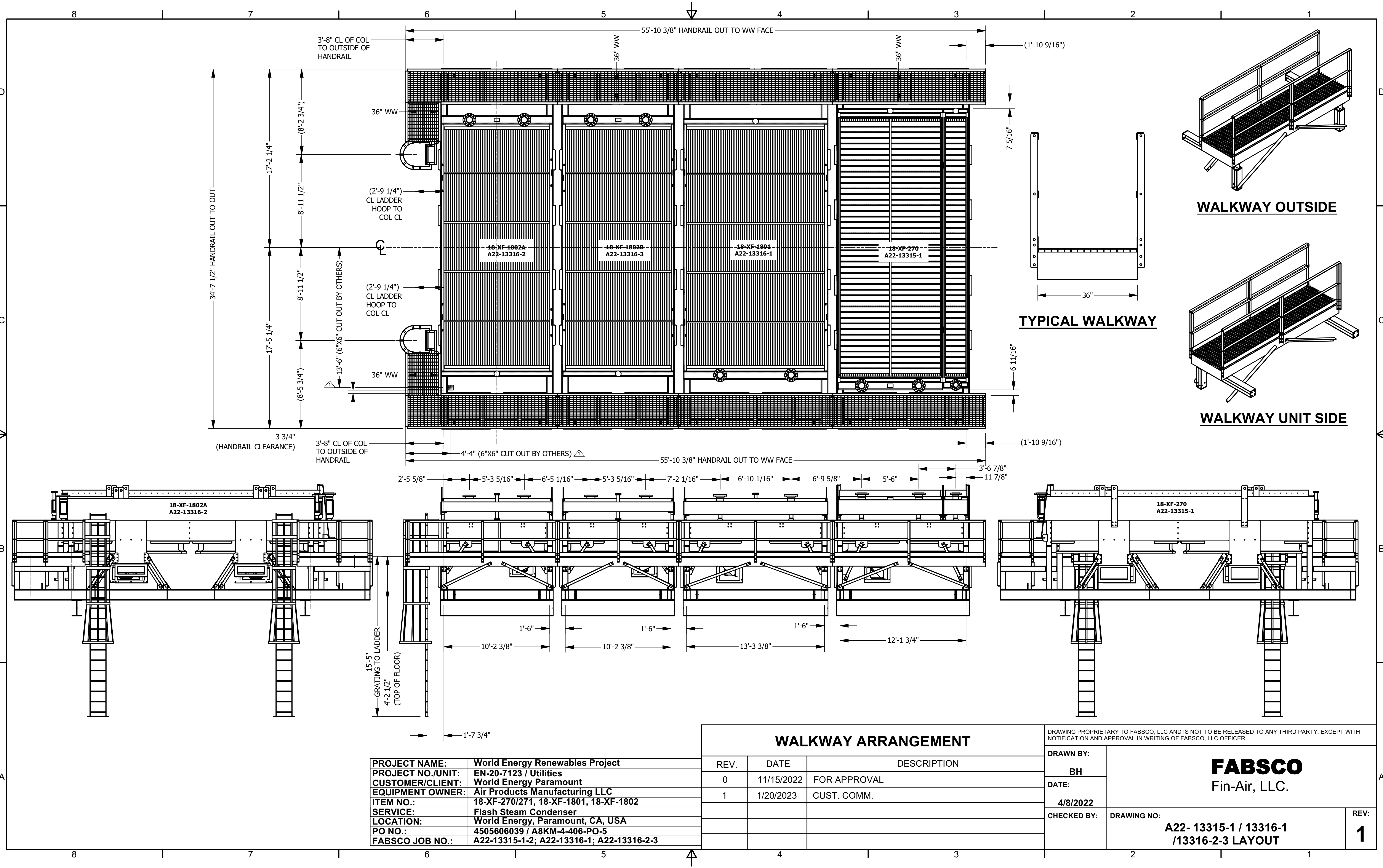
DESIGN - MATERIALS - CONSTRUCTION

29	Design Pressure psig	FV @ 430F	232	Test Pressure psig	302	Design Temperature	430.0	32	°F
30	TUBE BUNDLE			HEADER, Type	BOX	TUBE, Material	SA-179		
31	Size	13.792 x 24.000 FT		Material	SA-516-70N		Smls. tube		
32	No./Bay	1	No. Rows	5	No. Passes	2	OD	1	Thickness
33	Arrangement		Bundles in Series		Slope	0.125 in/ft last pass only	No./Bundle	328	MIN WALL
34	Bundles	1	Bundles in parallel		Plug Material	SA-350-LF2	Length	24	ft
35	Bays	1	Bays in parallel		Gasket Material	A1008 CS (ZP)	Pitch	2.5	in
36	Bundle Frame Finish	Note 9	Galvanized		Corr Allow	0.125 in	Fin, Type	EMBEDDED	
37	Header Finish	Note 10	System 2 after Hydro		In qty/in.	2	8	Material	ALUMINUM
38	Structure Finish	Note 9	Galvanized		Out qty/in.	2	4	OD	2.25 Thk. 0.016 in.
39	Mounting/C TO C	Piperack		Vent/Drain	2" 300# RFLWN w/ BLD (2)	No./in	10	Fin Design Temp	430.0
40	Surf Prep	SSPC SP 10		Rating/Facing	300# RFWN	Code -	ASME	Section VIII Div 1	
41	Louvres / Guards	NONE		TI	PI	Natl Board Stamp	YES		
42	Vibration Transmitter	WILCOXON 786A-D2		Flange Calc per UG44(b)	YES	SPECS.	API 661		

MECHANICAL EQUIPMENT

44	Fan Mfg		MOORE		Driver		Speed Reducer				
45	Model	VE	30	10000	Type	MOTOR	Type	HTD			
46	No./Bay	2	Rev./ Min	313	Mfg.	US MOTOR	Mfg.	GATES OR EQ			
47	Fan Diam. Ft	10	No. Blades	4	No/Bay	2	Model				
48	Manual Adjust	Pitch		3.8	hp /Driver	15	No/Bay	2			
49	Mat'l:Blade	ALUMINUM		Hub ALUM	Rev/Min	1800	AGMA Rating, hp	27			
50	hp/Fan, Design	10.27			Enclosure	TEFC	Ratio	5.75			
51	hp/Fan, Min Amb	11.41			Volt;Phase;Cycle	460/3/60	Support	STRUCTURE			
52	Plot Area	13.938 x 24.000		ft2	Bundle WT Dry lb	23333	Full H20 lb	25947	API Noz Mult.	2	
53	Weight per bay lbs.	29664			Motors VFD Compatible			Steam Coil	NO	Heat Treat	YES
54	Weight per unit lbs	29664			Class 1 Div 2 Gr BCD Temp Code T3C			Recirc	NO	NDE	API
55	dBA @ 3'	85			MOTOR TAG NUMBERS. 18-XF-1801M1; 18-XF-			Ladder	YES	Bugscreen	NO
56	Fan Wt Lbs	93			1801M2			End Walk	YES	Air Brake	YES
57								Side Walk	NO	N2 Purge	YES
58	Notes:							Drive Walk	NO	Turbulators	NO

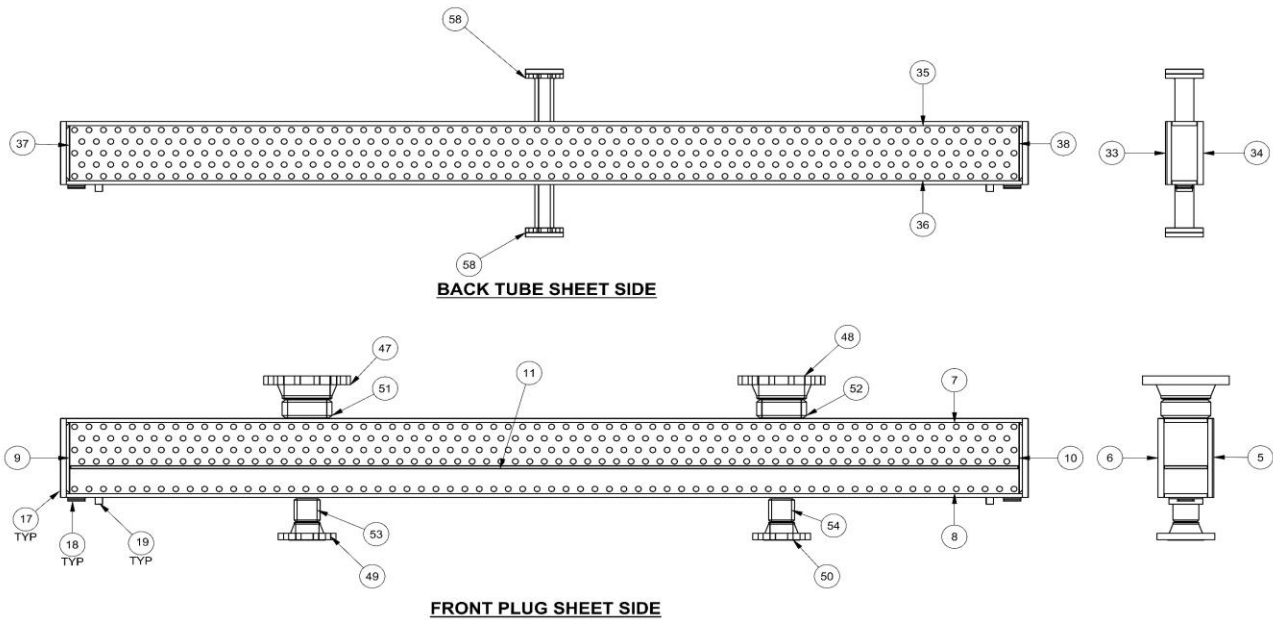
1. 10% plug & plug gasket included as spares
2. The motors will have a 1.15 SF on sine-wave power (constant frequency/speed) and will have a 1.0 SF at variable frequency.
3. Tube-tubesheet expanded only.
4. Spot RT per API 661 performed after PWHT.
5. Wall thk under fin = 0.083"
6. Special Service: None
7. 18-XF-270/271 & 18-XF-1801 & 18-XF-1802A/B set side-by-side with continuous walkways. Air seal provided between bays.
8. Exchanger designed with 20% margin added to flow and duty.
9. Galvanized per A8KM-PP-000-500540 except fireproofed Structural Steel
10. System 2 after Hydrotest per A8KM-PP-000-500520
11. Irregular pass arrangement: 4 rows 1 pass; 1 rows 1 pass



PROJECT NAME:	World Energy Renewables Project
PROJECT NO./UNIT:	EN-20-7123 / Utilities
CUSTOMER/CLIENT:	World Energy Paramount
EQUIPMENT OWNER:	Air Products Manufacturing LLC
ITEM NO.:	18-XF-270/271, 18-XF-1801, 18-XF-1802
SERVICE:	Flash Steam Condenser
LOCATION:	World Energy, Paramount, CA, USA
PO NO.:	4505606039 / A8KM-4-406-PO-5
FABSCO JOB NO.:	A22-13315-1-2; A22-13316-1; A22-13316-2-3

WALKWAY ARRANGEMENT			
REV.	DATE	DESCRIPTION	
0	11/15/2022	FOR APPROVAL	
1	1/20/2023	CUST. COMM.	

DRAWING PROPRIETARY TO FABSCO, LLC AND IS NOT TO BE RELEASED TO ANY THIRD PARTY, EXCEPT WITH NOTIFICATION AND APPROVAL IN WRITING OF FABSCO, LLC OFFICER.			
DRAWN BY:	FABSCO Fin-Air, LLC.		
BH			
DATE:			
4/8/2022			
CHECKED BY:	DRAWING NO:		REV:
	A22- 13315-1 / 13316-1 /13316-2-3 LAYOUT		1



Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
5	SSAB	W3A575	SA-516-70N
6	SSAB	W3A575	SA-516-70N
7	SSAB	W2K523	SA-516-70N
8	SSAB	W2K523	SA-516-70N
9	SSAB	W3A657	SA-516-70N
10	SSAB	W3A657	SA-516-70N
11	SSAB	W9E564	SA-516-70N
17	NUCOR	1200121	SA-516-70N
18	NUCOR	1200121	SA-516-70N
19	CLEVELAND CIFFS BUNRS HARBOR	822Y39620	SA-516-70N
33	SSAB	W3A575	SA-516-70N
34	SSAB	W3A575	SA-516-70N
35	SSAB	W2K523	SA-516-70N
36	SSAB	W2K523	SA-516-70N
37	SSAB	W3A657	SA-516-70N
38	SSAB	W3A657	SA-516-70N
47	PIPING PRODUCTS INC	CVRB	SA-350LF2
50	ULMA	43HC22	SA-350LF2
52	USS	MC3701	SA-106B
54	USS	MB2450	SA-106B
58	AMERIFORGE	CR3-KD	SA-350LF2
TUBES	MANNESMANN PRECISION TUBE	323095	SA-179

CUSTOMER: AIR PRODUCTS MANUFACTURING, LLC.		
PO NO: 4505606039/ A8KM-4-406-PO-5	DATE	
ITEM NO: 18-XF-1801	AC	DWG No. A22-13316-1A-HS 0

Certificate of Mill Test Result

TUL-000000-000

Pg 1/

PO/Rel

PART NO.

Attn:

SSAB

12400 Highway 43 North, Axis, Alabama 36505, US

Test Certificate

⚠ WARNING: This product can expose you to chemicals including nickel and nickel compounds, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Form TC1: Revision 5: Date 22 Aug 2022

Customer: CHAPEL STEEL CORPORATION PO BOX 1000 SPRING HOUSE PA 19477	Customer P.O.No.:TUL-412 Product Description:ASME SA516-70/SA516-65/SA516-60(21) ASTM A516-70/A516-65/A516-60(17) VACUUM DEGAS; C.23%.S.015% MAX;ELG 2" LCVN 20 FT.LBS. @ -50F/A673-P Size: 1.000 X 96.00 X 480.0 (IN)	Mill Order No. 41-696883-03 Shipping Manifest: AR371319 Ship Date: 16 Jan 23 Cert Date: 16 Jan 23 Heat Treat Type: NORMALIZED
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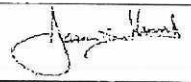
Tested Pieces:				Tensiles:					Charpy Impact Tests												BDWTT	
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB)				% Shear				Tst Tmp	Tst Dir	Tst Siz (mm)		
										1	2	3	Avg	1	2	3	Avg					
W3A575	E52	1.008 (DISCRT)	C	52	75		50	T		188	122	126	145					-50F	L	10.		

Chemical Analysis																	ORGN
Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	IIW	USA
W3A575	.19	1.03	.010	.003	.24	.025	.024	.27	.14	.15	.02	.004	.002	.007	.0001	.43	

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
CEV (IIW) = C + MN/6 + (CR+MO+V)/5 + (NI+CU)/15
NACE MR0175/ISO15156-2:2015 ANNEX A2.1.2 COMPLIANT
NACE MR0103/ISO 17495-1:2015 13.1.1(A) AND 13.1.1(C) COMPLIANT
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
100% MELTED, POURED, AND ROLLED IN THE USA
NO WELD REPAIR HAS BEEN PERFORMED ON THIS MATERIAL.
NORMALIZED PLATES. HEATED AT 1665F FOR 44 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
W3A575 E52 40100312 PCES: 1, LBS: 13068 W3A575 E52 40100313 PCES: 1, LBS: 13068
W3A575 E52 40100311 PCES: 1, LBS: 13068

ANTHONY CARDWELL
4/25/2023

Q.A. APPROVED
By  Date 2/18/2023

(P) Cust Part #:	WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION	 Jason Thomas Director Technical Services
------------------	--	--

Certificate of Mill Test Result

HOU-000000-000

Pg 1/1

PO/Rel

PART NO.

Attn:

SSAB

Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

WARNING: This product can expose you to chemicals including nickel and nickel compounds, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Form TC1: Revision 5: Date 22 Aug 2022

Customer: CHAPEL STEEL CORPORATION PO BOX 1000 SPRING HOUSE PA 19477				Customer P.O.No.: HOU-10692				Mill Order No.: 41-890174-07				Shipping Manifest: AR368214			
				Product Description: ASME SA516-70/SA516-65/SA516-60(21) ASTM A516-70/A516-65/A516-60(17) VACUUM DEGAS; C.23%, S.015% MAX; ELG 2" LCVN 20 FT. LBS. @ -50F/A673-P				Ship Date: 22 Nov 22				Cert No: 081080380			
								Cert Date: 22 Nov 22				(Page 1 of 1)			
								Heat Treat Type: NORMALIZED							
				Size: 0.750 X 120.0 X 480.0 (IN)											

Tested Pieces:				Tensiles:				Charpy Impact Tests													
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in Bin	Tst Dir	Hardness	Abs. Energy (FTLB)				% Shear				Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
										1	2	3	Avg	1	2	3	Avg				
W2K523	A31	0.752 (DISCRT)	C 53	76		44	T			112	93	82	96					-50F	L	10.	

Chemical Analysis																	ORGN
Heat Id	C	Mn	P	S	SI	Tot Al	So Al	Cu	NI	Cr	Mo	Ch	V	Ti	B	IIW	
W2K523	.19	1.02	.007	<.001	.23	.027	.026	.31	.17	.12	.03	.003	.003	.008	.0003	.42	USA

KILLED STEEL
MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
CEV (11W) = C + MN/6 + (CR+MO+V)/5 + (NI+CU)/15
NACE MRO175/ISO15156-2:2015 ANNEX A2.1.2 COMPLIANT
NACE MRO103/ISO 17495-1:2015 13.1.1(A) AND 13.1.1(C) COMPLIANT
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
100% MELTED, POURED, AND ROLLED IN THE USA
NO WELD REPAIR HAS BEEN PERFORMED ON THIS MATERIAL.
NORMALIZED PLATES. HEATED AT 1665F FOR 31 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
W2K523 A31 40096435 PCES: 1, LBS: 12252
W2K523 A31 40096434 PCES: 1, LBS: 12252
W2K523 A31 40096433 PCES: 1, LBS: 12252

ANTHONY CARDWELL
4/25/2023

Q.A. APPROVED

By Date 4/25/2023

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Jason Thomas

Director Technical Services

Certificate of Mill Test Result

TUL-000000-000

PO/Rel

PART NO.

Attn:



Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

⚠ WARNING: This product can expose you to chemicals including nickel and nickel compounds, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Form TC-1: Revision 5: Date 22 Aug 2022

Customer: CHAPEL STEEL CORPORATION PO BOX 1000 SPRING HOUSE PA 19477				Customer P.O.No.:TUL-412				Mill Order No. 41-596883-07				Shipping Manifest: AR372083									
Product Description: ASME SA516-70/SA516-65/SA516-80(21) ASTM A516-70/A516-65/A516-60(17) VACUUM DEGAS: C.23%.S.015% MAX;ELG 2" LCVN 20 FT.LBS. @ -50F/A573-P								Ship Date: 27 Jan 23 Cert Date: 27 Jan 23				Cert No: 081091595 (Page 1 of 1)									
Size: 0.625 X 120.0 X 480.0 (IN)								Heat Treat Type: NORMALIZED													
Tested Pieces:				Tensiles:				Charpy Impact Tests													
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB)				% Shear				Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W3A657	B32	0.625 (DISCRT)	C 52	76			37	T		103	63	92	93					-50F	L	10.	
Chemical Analysis																					
Heat Id	G	Mn	P	S	Si	TotAl	SolAl	Cu	Ni	Cr	Mo	Cb	V	Ti	B	IIW	ORGN USA				
W3A657	.19	1.02	.009	.002	.23	.033	.032	.25	.14	.12	.03	.004	.003	.008	.0001	.42					

KILLED STEEL
MERCURY IS NOT A METALLOGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.
KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE
CEV (IIW) - C + MN/6 + (CR+MO+V)/5 + (NI+CU)/15
NACE MR0175/ISO15156-2:2015 ANNEX A2.1.2 COMPLIANT
NACE MR0103/ISO 17495-1:2015 13.1.1(A) AND 13.1.1(C) COMPLIANT
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
100% MELTED, Poured, AND ROLLED IN THE USA
NO WELD REPAIR HAS BEEN PERFORMED ON THIS MATERIAL.
NORMALIZED PLATES. HEATED AT 1665F FOR 25 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
W3A657 B32 40100568 PCES: 1, LBS: 10210 W3A657 B32 40100569 PCES: 1, LBS: 10210
W3A657 B32 40100570 PCES: 1, LBS: 10210 W3A657 B32 40100571 PCES: 1, LBS: 10210

ANTHONY CARDWELL
4/25/2023

Q.A. APPROVED

By Jason Thomas Date 3/6/2023

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Jason Thomas
Director Technical Services

SSAB**Test Certificate**

12400 Highway 43 North, Axis, Alabama 36505, US

⚠ WARNING: This product can expose you to chemicals including nickel and nickel compounds, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Form TC1: Revision 4: Date 6 Feb 2019

Customer:
DELTA STEEL, INC.
5599 SAN FELIPE-STE 600
P.O BOX 2289
HOUSTON
TX 77252

Customer P.O.No.: DFT-39460

Mill Order No. 41-570738-02

Shipping Manifest: AR288592

Product Description: ASME SA516-70/SA516-65/SA516-60(17)
ASTM A516-70/A516-65/A516-60(17)
2"ELG;LCVN 15/12FT.LBS @ -60F/A673-P
MAX 0.010% S, 0.020% P, 0.43% CEV

Ship Date: 17 May 19
Cert Date: 17 May 19
Cert No: 081723154
(Page 1 of 1)

Heat Treat Type: NORMALIZED

Size: 0.500 X 120.0 X 382.0 (IN)

Tested Pieces:				Tensiles:					Charpy Impact Tests											
Heat Id	Piece Id	Piece Dimensions	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg				% Shear 1 2 3 Avg			Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W9E564	F31	0.502 (DISCRT)	C 52	74		42		T	153 HBW	138	93	113	115				-60F	L	10.	

Heat Id	Chemical Analysis																	ORGN
	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	INW		
W9E564	.18	1.05	.011	.001	.25	.029	.029	.21	.12	.14	.03	.002	.004	.010	.0001	.41		

USA

KILLED STEEL

MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT.

KILLED STEEL, PRODUCED TO A FINE GRAIN PRACTICE

CEV (IIR) = C + MN/6 + (CR+MO+V)/5 + (NI+CU)/15

NACE MR0175/ISO15156-2:2015 ANNEX A2.1.2 COMPLIANT

NACE MR0103/ISO 17495-1:2016 13.1.1(A) AND 13.1.1(C) COMPLIANT

HARDNESS RESULT LABEL HBW = HBW 10MM/3000KG

MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT

100% MELTED AND MANUFACTURED IN THE USA.

NO WELD REPAIR HAS BEEN PERFORMED ON THIS MATERIAL.

NORMALIZED PLATES. HEATED AT 1665F FOR 21 MINUTES.

TEST COUPONS TAKEN FROM HEAT TREATED PLATE.

PRODUCTS SHIPPED:

W9E564 F31	40011667	PCES:	1, LBS:	6500	W9E564 F31	40011663	PCES:	1, LBS:	6500
W9E564 F31	40011662	PCES:	1, LBS:	6500	W9E564 F31	40011668	PCES:	1, LBS:	6500
W9E564 F31	40011665	PCES:	1, LBS:	6500	W9E564 F31	40011666	PCES:	1, LBS:	6500
W9E564 F31	40011664	PCES:	1, LBS:	6500					

(P) Cust Part #:

WE HEREBY CERTIFY THAT THIS MATERIAL WAS
TESTED IN ACCORDANCE WITH, AND MEETS THE
REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION

Justin Ward
SENIOR METALLURGIST - PRODUCT

Customer Name
PORT CITY PLATE, INC. DIV. MET/Customer PO#
123828Shipper No
276949Heat Number
W9E564 F31

ANTHONY CARDWELL
4/25/2023

Q.A. APPROVED
By W9E Date 10/5/2021

05/24/2021 FROM: AMERICAN ALLOY STEEL, INC. S.O.#: 684780
P.O.#: 122943
Item: 2 (1 PC) 1/4" X 96 X 480 EXISTING

NUCOR
PLATE MILL

P.O. Box 279
Winston, NC 27986
(252) 358-3700

Mill Test Report

AMERICAN ALLOY
PLATE # 5240202

1505 River Rd
Cofield, NC 27822
(252) 358-3700

NUCOR
It's Our Nature.

Issuing Date: 04/25/2021 B/L No.: 588753 Load No.: 603322 Our Order No.: 186276/1 Cust. Order No.: 126624-OK
Vehicle No: LW 82044 Sold To: AMERICAN ALLOY STEEL INC 6230 N HOUSTON ROSSLYN RD PO BOX 40469 NORTH HOUSTON, TX 77091 Ship To: AMERICAN ALLOY STEEL 6350 N ERIE AVE C/O SKOL TRACK #21 OWASSO, OK 74055
Specification: 0.2500" x 96.000" x 480.000"
ASTM A516 70/65/60/485-17/ASME SA516-70/65/60/485 PVQ 2010/2017
Normalized Plate NACE MR0175 Annex 2.1.2 (2015), MR0103 (2010)
Section 2.1.2 (2015) 13.1.1, 13.1.2 Compliant
Marking: 126624-OK

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	Ceq	Pcm	
1200121	0.18	0.90	0.010	0.000	0.20	0.20	0.08	0.06	0.02	0.032	0.004	0.001	0.002		0.0028	0.0001	0.000	0.36	0.26	
Tensile Test										Heat Treat										
Plate Serial No	Pieces	Tens	Dir.	Yield (ksi)	Tensile (ksi)	Elong. % in 2"	Elong. % in 8"	Norm (°F)		Time (min)	Temper (°F)	Time (min)								
1200121-01	4	6.53	H-T	50,800	72,500	38.1		1850		14										
1200121-02 →	3	4.90	H-T	51,000	72,400	39.4		1650		14										
Charpy Impacts																				
Plate Serial No	Pieces	Tens	Dir.	Absorbed Energy (Ft-lbs)				Min	Lateral Expansion (in.)				Min	Shear (%)				Min	Temp (°F)	Size
				(ft-lbs) 1	(ft-lbs) 2	(ft-lbs) 3	(ft-lbs) Ave		(in.) 1	(in.) 2	(in.) 3	(in.) Ave		(in.) Min	(%) 1	(%) 2	(%) 3			
1200121-01	4	6.53	H-L	45.0	34.2	53.6	44.3	15											-50	10mm
1200121-02	3	4.90	H-L	34.7	53.2	49.7	45.9	15											-50	5mm

Certified a true copy of the
original, retained in our file.
AMERICAN ALLOY STEEL, INC.

Reviewed By:

VB 5/24/2021

HOT ROLLED CARBON STEEL PLATE
TEST COUPONS TAKEN FROM HEAT TREATED PLATE
Piece frequency Charpy:

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material.
Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate, unless otherwise noted
in Specification. For Mexico shipments: rho-Sales@nuccor.com
Yield by 0.5%ELI method unless otherwise specified. Ceq = C+(Mn/16)+(Cr+Mo+V/5)+((Cu+Ni)/15)
Pcm = C+(Si/20)+(Mn/20)+(Cu/20)+(Ni/50)+(Cr/20)+(Mo/15)+(V/10)+68
Milled and Manufactured in the USA. ISO 9001:2015 certified. PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant.
DIN 50048 3.1, EN 10204 3.1B (2004), DIN EN 10204 3.1 (2005) compliant. For ABS guidelines only. Quality Assurance certificate QA-3824369

We hereby certify that the contents of this report are accurate and correct. All test results and
operations performed by the material manufacturer are in compliance with the applicable
specifications, including customer specifications.

T. A. Depressio
T. A. Depressio, Metallurgist

4/25/2021 7:56:41 AM

Q.A. APPROVED

By VB Date 5/25/2021

01/30/2023 From: AMERICAN ALLOY STEEL, INC.		TO: PORT CITY METAL SERVICES	
P.O.# 129659	S.O.# 732355	AA PL# 5268653	
Item 1 (1 PC) 1-1/4" X 96 X 480 EXISTING			

SHIPMENT NO.				DATE SHIPPED		CARGO VEHICLE NO.					
803-94244				01-06-23		AREA TRANSPORTATION TRLR 27					
AMERICAN ALLOY STEEL INC				AMERICAN ALLOY STEEL INC							
PO BOX 40469				6350 N ERIE AVE							
HOUSTON TX 77240				6350 N ERIE AVE							
				TULSA, OK 74117							
SERIAL NUMBER	PAT NO.	HEAT NUMBER	NO. PCS.	THICKNESS	WIDTH OR DIA.	LENGTH	WEIGHT	YIELD POINT	TENSILE STRENGTH	AF FRAC. ELONG.	RED.

QUALITY STEEL MELTED & MANUFACTURED IN THE U. S. A.

PLATES - ASTM A516-17 Grade 70; FVQ Killed Fine Grain Practice; Plate:
 NORMALIZED & COOLED IN STILL AIR; VACUUM DEGASSED; CH-V SA2085 PLT
 L 15/12 FT LBS AT -50F; ASTM A516-17 Grade 65; ASTM A516-17 Grade
 60; ASME SA516 21ED Grade 70; ASME SA516 21ED Grade 65; ASME SA516
 21ED Grade 60; TEST CERTS ARE PREPARED IN ACCORD WITH PROCEDURES
 OUTLINED IN EN; 10204:2004 TYPE 3.1
 NO WELD REPAIR WAS PERFORMED ON BELOW PLATE(S)

CO# 133005-OK GH 391-1038

PLATES HEAT TREATED - TEST SPECIMENS ATTACHED & YIELD STRENGTH @ .5% EUL
 MERCURY IN ANY FORM HAS NOT BEEN USED IN THE PRODUCTION OF THIS ORDER

→ A030863 822Y39620 1 1 1/4 96 480 16335 49000 75900 8 30
 N 1650 DEG F - 60 MIN

(M55)MFST REF#: (PART #)

A030834 823Y69560 1 1 1/4 96 480 16335 55800 74200 8 33
 N 1650 DEG F - 60 MIN

(M55)MFST REF#: (PART #)

Q-QUENCH TEMPERATURE T-TEMPERATURE N-NORMALIZE TEMPERATURE

SERIAL NUMBER	PAT NO.	HEAT NUMBER	HARD BHN	BEND	THICKNESS	TYPE	SIZE	D I R	TEST TEMP	CHARPY IMPACT									
										ENERGY	FT LBS			SHEAR(%)			LAT. EXP		
A030863		822Y39620			1.250	V FULL	L	-50	31	77	92								
A030834		823Y69560			1.250	V FULL	L	-50	111	128	140								

Certified a true copy of the
 original, retained in our file.
 AMERICAN ALLOY STEEL

Jk 1/30/2023

HEAT NUMBER	CHEMICAL ANALYSIS															MOQD GRAIN SIZE
	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	Al	B	Co	N	Sn

822Y39620 .20 1.07 .017 .003 .339.217 .18 .04.038.002.002.035.0002 .002.005.001
 823Y69560 .17 1.17 .012 .004 .342.012 .01 .13.039.002.002.042.0002 .002.004.001

I certify that the above results are a true and correct copy of actual results contained in records maintained by Cleveland-Cliffs Burns Harbor LLC and are in full compliance with the requirements of the specification cited above. This test report cannot be altered and must be transcribed (issued) with any subsequent third party test reports, if required.

SUPV. QUALITY ASSURANCE
 Form BHP/TPPT.TIF

FARID HASSANI PER MWT

ANTHONY CARDWELL
 4/25/2023

Q.A. APPROVED
 By W Date 2/2/2023

AMERICAN ALLOY
 PLATE # 5268653

To: FABSCO SHELL & TUBE, LLC

From: MATISCO SUPPLY COMPANY

Piping Products, Inc.

FORGED STEEL FLANGES AND SPECIAL FITTINGS

1681 Kress St., Houston, Texas 77020

Phone: 713-675-5374, 800-775-5374, Fax: 713-675-7910

*** MILL TEST REPORT ***

S. MATISCO
O. 1111 N. 161st E. AVE
L.
D. TULSA

OK 74116

CUST #: MAT01

CUST PO:

DATE: 12/05/13

PPI S/O #:

Country of Manuf: USA

ITEM	DESCRIPTION	ITEMS
8 300	RF WN 160	SA350LF2-CL1

ITEM	HEAT NO.	CHEMICAL PROPERTIES														
CVRB		C	SIL	MN	PHOS	SUL	CR	NI	MO	N	CO	CU	V	AL	NB	C/EQ
		0.180	0.240	1.030	0.011	0.021	0.100	0.100	0.040	0.000	0.000	0.260	0.001	0.000	0.002	0.404

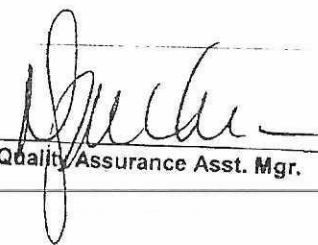
ITEM	YIELD	TENSILE	ELONG.	RED.	BHN	PHYSICAL PROPERTIES	
	STRENGTH	STRENGTH	% IN 2"	AREA	HARDNESS	CHARPY	Forge Country
	58,088	83,883	23.55	34.22	156-156	TEST	Of Origin
						V. NOTCH -50F 20/18/18	USA

ITEM NOTES
HARD @ 1650F 2 HRS WATER QUENCH, TEMP @ 1150F 3 HRS A/C.

ORDER NOTES

Additional Notes or Comments:

We hereby certify that all test results and process information contained herein are correct and true as contained in the records of the company.


 Quality Assurance Asst. Mgr.
ANTHONY CARDWELL
4/25/2023

03/28/2023

CLIENTE / Customer / Client
TEXAS PIPE&SUPPLY
TEXAS PIPE&SUPPLY
2330 HOLMES ROAD
TX 77051
USA

CERTIFICADO DE INSPECCION

Inspection Certificate - Certificat de Réception

FECHA:
Date:

07/11/2022

N.º
No.

222411

HOJA:
Page:

1

Company management certifications:

ISO 9001: 2015
ISO 14001: 2015
ISO 45001: 2018



ULMA FORJA, S.COOP.

Management Systems certified by LRQAE

Certified acc. PED 2014/68/UE+AD2000-WO
by TÜV Rheinland
N.º 01 202 E/Q 02 7443

UNE EN 10204:06 / 3.1
ISO 10474:13 / 3.1

Bº Zubillaga, 3 - Apdo. 14
20560 ONATI (Gipuzkoa) SPAIN
Tel.: 34 - 943 780552
Fax: 34 - 943 781808
E-mail: ulma@ulmaforge.com

MARCA DEL FABRICANTE

Mark of factory
Marque du fabricant



Packing List: 172593
Expedition: 415341

DEPARTAMENTO

Section
Département

QUALITY ASSURANCE

PRODUCTO
Article - Produit

FLANGES

SU PEDIDO N.º

Your Order No. 329437

Votre Cde. N.º

DE

of. - de 31/08/2022

NORMAS APLICABLES
Requirements - Normes Applicables

ASME B16.5-17

MATERIAL CORRESPONDIENTE

Material Correspondent - Qualité

MODO DE FUSION (*)

Steel Making - Elaboration de l'acier

E = Elec. Y = Oxígeno básico

ASME SA350LF2CL1-2-21, ASTM A350LF2CL1-2-18

ASME SA105N-17, ASTM A105N-18

NACE MR0175/ISO15156-02/03-15 & NACE MR0103/ISO17945-15

PARTIDA Item Poste	CANTIDAD Quantity Quantité	DESCRIPCION Description Description	OBSERVACIONES Remarks Observations (*)	COLADA N.º Heat No N.º Coulée	RESISTENCIA T.Strength Resist Rupt N/mm2	LIMITE ELAST Y.Strength 0.2 % N/mm2	ALARGAM. Elongation Allongement Lo:50mm/40 %	ESTRICCION Red. Area Striction %	RESILIENCIA Impact test Résilience Joules	CHARPY V 10x10min MEDIA Average Moyenne °C	DUREZA Hardness Dureté HBS
7	12	WN 8 150LB S120 RF A350LF2	05F212 NE	B09A1	525	319	36,80	73,73	43 42 92	59	149 152
8	10	WN 8 150LB S160 RF A350LF2	05F212 NE	B09A1	525	319	36,80	73,73	43 42 92	59	149 152
9	2	WN 12 150LB S160 RF A350LF2	20L218 NE	038A22	536	329	36,48	72,41	92 84 94	90	140 141
14	22	WN 4 300LB S160 RF A350LF2	27L216 NE	43HC22	524	347	35,60	72,33	110 104 103	106	146 149

COMPOSICION QUIMICA - STEEL MAKER'S LADLE ANALYSIS - ANALYSE CHIMIQUE																	
COLADA N.º Heat No Ladle Prod. P	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Nb %	V %	Cu %	Al %	Ti %	Ca %	B %	CEq %	Origin of Steel
B09A1 L	0,180	0,200	1,130	0,011	0,004	0,080	0,090	0,012	0,001	0,003	0,270	0,028	0,001	0,003	0,0001	0,41	France
038A22 L	0,176	0,270	1,120	0,013	0,004	0,090	0,100	0,011	0,001	0,004	0,200	0,028	0,002	0,003	0,0003	0,40	France
43HC22 L	0,180	0,230	1,160	0,007	0,002	0,070	0,070	0,008	0,001	0,002	0,120	0,029	0,002	0,002	0,0003	0,40	France

- Las dimensiones y la condición superficial se hallaron.
- Dimension and surface condition were found acceptable.
- Les dimensions et états de surface sont satisfaisants.

- Los materiales citados cumplen las normas aplicables.
- Manufacturing requirements are satisfied.
- Les normes applicables sont respectées.

EL INSPECTOR
Works Inspector - L'Inspecteur

ULMA FORJA, S.COOP.
Certified by LRQAE
Quality Management Dept.

(*) OBSERVACIONES:

Remarks
Observations

ALL FLANGES MANUFACTURED IN ULMA, SPAIN.
N_NORMALIZED ABOVE 900°C AND COOLED IN AIR.

A. ASTIGARRAGA/QA MANAGER

ANTHONY CARDWELL
4/25/2023

To: FABSCO SHELL & TUBE, LLC



U.S.S. SEAMLESS TUBULAR OPS

FAIRFIELD TUBULAR OPERATIONS

CERTIFIED TEST REPORT

(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 08/31/21

TIME: 21:15:51

SERIAL NO: F0131147

EBS NO: 2004170108 1

41760
1 of 5

MILL ORDER/ITEM NO DRI2843 01		SHIPPERS NO N/A		P.O. NUMBER 10964		VEHICLE ID N/A												
SOLD TO ADDRESS				MAIL TO ADDRESS														
VENDOR U.S.S. SEAMLESS TUBULAR OPS FAIRFIELD TUBULAR OPERATIONS 5700 VALLEY ROAD FAIRFIELD, AL 35064																		
SPECIFICATION AND GRADE SMLS STANDARD AND LINE PIPE API 5L 46TH EDITION DATED 4/1/18 GRADE B/X42 R N OR Q PSL-2, ASTM A106-19 GRADE B/C, ASTM A53-18 GRADE B, ASME SA106-2019 GRADE B/C, ASME SA53-2019 GRADE B REG MILL COAT PE BEV 30 DEGREE APPLICABLE REQUIREMENTS OF NACE MR0103/ISO 17945-2015 ED AND NACE MR0175/ISO 15156-2 2015 ED																		
MATERIAL COND: AS-ROLLED				O.D.: 8.625 (219.075)		WALL: 0.906 (23.012)												
PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH	YIELD	EXT %	TENSILE	Y/T	ELONG %	HARDNESS	MIN HYDRO	DWELL (SEC)							
				PSI	.50	PSI		(IN 2")	SCALE: HRB	PSI								
MC3701 *NOTE A	STRIP/L/B	AR	1.5	MIN: 42,100	.50	MIN: 70,000	MAX	MIN: 29.0	MIN:	2970	5							
				MAX: 71,800		MAX: 95,000						MAX:						
				44,800		79,000	0.57	47.0	80.3	2970	5							
** END OF DATA THIS SHEET **																		
LEGEND: L - LONGITUDINAL U - UPSET T - TRANSVERSE NM - NORMALIZED QT - QUENCH & TEMPERED SR - STRESS RELIEVED AR - AS ROLLED TR - THERMOMECHANICAL ROLLED B - BODY W - WELD																		
PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO	CE*
MC3701	HEAT	19	91	005	002	22	13	05	06	02	023		02	0002	002	003		MAX
MC3701	PROD	21	94	005	003	21	12	05	06	01	025		03	0001	002	001		.43
MC3701	PROD	19	93	005	003	20	12	05	06	01	024		03	0001	002	001		.37
** END OF DATA THIS SHEET **																		
*C.E. IS BASED ON THE FOLLOWING EQUATION(S): $C+MN/6+CR/5+MO/5+V/5+NI/15+CU/15$ (EUROPEAN CEV)																		

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT. ELEMENTS REPORTED IN MASS FRACTION (%)

000000000 TQ476V40 2338310151 0-0-0 PAGE 1 OF 2

ANTHONY CARDWELL
4/25/2023

From: MATTSO SUPPLY COMPANY

03/28/2023

To: FABSCO SHELL & TUBE, LLC

From: MATTSO SUPPLY COMPANY

03/28/2023



U.S.S. SEAMLESS TUBULAR OPS

FAIRFIELD TUBULAR OPERATIONS

CERTIFIED TEST REPORT
(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

41760
2 OF 5

DATE: 08/31/21
TIME: 21:15:51

SERIAL NO: F0131147

EBS NO: 2004170108 1

MILL ORDER/ITEM NO DR12843 01		SHIPPERS NO. N/A		P.O. NUMBER 10964																																															
MATERIAL COND. AS-ROLLED		O.D. 8.625 (219.075)		WALL 0.906 (23.012)																																															
PRODUCT IDENTIFICATION MC3701		FLAT OK	BEND	GRAIN SIZE	MIN COLLAPSE	DIR		TEST LOC	TEMP	SIZE	TEST COND	CHARTER V-NOTCH IMPACT TESTING FT-LBS				% SHEAR																																			
												1	2	3	AVG	1	2	3	AVG																																
												*NOTE B																																							
** END OF DATA THIS SHEET **																																																			
LEGEND L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE <table border="1"> <thead> <tr> <th>TEST / INSPECTION</th> <th>YES</th> <th>TESTING / INSPECTION INFORMATION</th> <th>RESULTS / COMMENTS</th> </tr> </thead> <tbody> <tr> <td>FULL LENGTH VISUAL</td> <td>X</td> <td></td> <td></td> </tr> <tr> <td>FULL LENGTH EMI</td> <td>X</td> <td>OD <u>X</u> OD/ID <u> </u> L <u> </u> LT <u>X</u> 10.0% NOTCH</td> <td></td> </tr> <tr> <td>FULL LENGTH MPI</td> <td></td> <td>ID <u>X</u> OD/ID <u> </u> L <u> </u> LT <u>X</u> 10.0% NOTCH</td> <td></td> </tr> <tr> <td>FULL LENGTH UT</td> <td>X</td> <td>MPI <u>X</u> UT <u> </u></td> <td></td> </tr> <tr> <td>END AREA INSPECTION (PLAIN END)</td> <td>X</td> <td>MPI <u> </u> UT <u> </u></td> <td></td> </tr> <tr> <td>SPECIAL END AREA (SEA) INSP</td> <td></td> <td>DRIFT MANDREL SIZE: <u> </u></td> <td></td> </tr> <tr> <td>FULL LENGTH DRIFT</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>																				TEST / INSPECTION	YES	TESTING / INSPECTION INFORMATION	RESULTS / COMMENTS	FULL LENGTH VISUAL	X			FULL LENGTH EMI	X	OD <u>X</u> OD/ID <u> </u> L <u> </u> LT <u>X</u> 10.0% NOTCH		FULL LENGTH MPI		ID <u>X</u> OD/ID <u> </u> L <u> </u> LT <u>X</u> 10.0% NOTCH		FULL LENGTH UT	X	MPI <u>X</u> UT <u> </u>		END AREA INSPECTION (PLAIN END)	X	MPI <u> </u> UT <u> </u>		SPECIAL END AREA (SEA) INSP		DRIFT MANDREL SIZE: <u> </u>		FULL LENGTH DRIFT			
TEST / INSPECTION	YES	TESTING / INSPECTION INFORMATION	RESULTS / COMMENTS																																																
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FULL LENGTH UT	X	MPI <u>X</u> UT <u> </u>																																																	
END AREA INSPECTION (PLAIN END)	X	MPI <u> </u> UT <u> </u>																																																	
SPECIAL END AREA (SEA) INSP		DRIFT MANDREL SIZE: <u> </u>																																																	
FULL LENGTH DRIFT																																																			
ADDITIONAL NOTES/COMMENTS ALL MANUFACTURING TOOK PLACE IN THE USA. MANUFACTURED IN AN ISO 9001 CERTIFIED FACILITY - CERTIFICATE #30727. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT. IMPACT STRIKER RADIUS 8MM. *NOTE A SEE ATTACHED REPORT FOR TENSILE RESULTS. *NOTE B SEE ATTACHED REPORT FOR IMPACT RESULTS. ** END OF DATA **																																																			

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF:

MICHAEL HENRY -MANAGER, Q.A.
FAIRFIELD TUBULAR OPERATIONS

DATE 08/31/21

000000000

TQ476V40

2338310151

0-0-0

PAGE 2 OF 2

**

ANTHONY CARDWELL
4/25/2023



U.S.S. SEAMLESS TUBULAR OPS

TUBULAR PRODUCTS
TENSILE TEST REPORT

41760
3 of 5

DATE: 08/31/21
TIME: 21:15:57
PAGE: 1

MILL ORDER/ITEM NO DR12843 01	SHIPPERS NO N/A	P.O NUMBER 10964	HEAT MC3701	SERIAL NUMBER: F0131147
MAIL TO ADDRESS				VENDOR U.S.S. SEAMLESS TUBULAR OPS FAIRFIELD TUBULAR OPERATIONS 5700 VALLEY ROAD FAIRFIELD ALABAMA 35064

HEAT	LOT	PIPE	TYPE/ DIR/ LOC/SAMPLE END	TEST COND	YIELD	EXT%	TENSILE	Y/T	ELONG %	REDUC AREA
MC3701		6109	STRIP/L/B/N	AR	44,800	0.50	79,000	0.57	47.0	
MC3701		6108	STRIP/L/B/N	AR	50,500	0.50	76,500	0.66	46.5	

To: FABSCO SHELL & TUBE, LLC

From: MATISCO SUPPLY COMPANY

03/28/2023

ANTHONY CARDWELL
4/25/2023

03/28/2023



U.S.S. SEAMLESS TUBULAR OPS

TUBULAR PRODUCTS
IMPACT TEST REPORT

41760
4 of 5

DATE: 08/31/21
TIME: 21:15:58
PAGE: 1

MILL ORDER/ITEM NO DR12843 01		SHIPPERS NO. N/A	P.O. NUMBER 10964	HEAT MC3701	PAGE: 1
SO: N TO ADDRESS		MAIL TO ADDRESS			SERIAL NUMBER: F0131147
					VENDOR U.S.S. SEAMLESS TUBULAR OPS FAIRFIELD TUBULAR OPERATIONS 5700 VALLEY ROAD FAIRFIELD ALABAMA 35064

HEAT /	TEST	FT	%	LAT	FT	FT	SAMPLE
LOT /	TYPE/	LBS.	SHR.	EXP.	LBS.	LBS.	END
MC3701							
000000	TCVN	48	10				
	FULL	46	10				
B AR		44	10				
	AVG.	46	10				

ANTHONY CARDWELL
4/25/2023

03/28/2023 From: MATSCO SUPPLY COMPANY To: FABSCO SHELL & TUBE, LLC



U.S.S. SEAMLESS TUBULAR OPS
FAIRFIELD TUBULAR OPERATIONS

TUBULAR PRODUCTS
ADDITIONAL COMMENTS SHEET

41760
5 of 5

DATE: 08/31/21
TIME: 21:15:58
PAGE: 1 OF 1

MILL ORDER/ITEM NO DR12843 01	SHIPPERS NO. N/A	P.O. NUMBER 10964	HEAT MC3701	SERIAL NUMBER: F0131147
SOLD TO ADDRESS		MAIL TO ADDRESS		VENDOR U.S.S. SEAMLESS TUBULAR OPS FAIRFIELD TUBULAR OPERATIONS 5700 VALLEY ROAD FAIRFIELD ALABAMA 35064
HEAT MC3701 - MELTED AT: NUCOR STEEL MEMPHIS, MEMPHIS, TN 38109 END OF DATA				

FAIRFIELD TUBULAR OPERATIONS
5700 VALLEY ROAD
FAIRFIELD, AL 35064

ANTHONY CARDWELL
4/25/2023



U.S.S. SEAMLESS TUBULAR OPS

 FAIRFIELD TUBULAR OPERATIONS
 CERTIFIED TEST REPORT

DATE: 05/31/17

TIME: 04:27:04

SERIAL NO: F0105045

(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

EBS NO: 2002136884 1

MILL ORDER/ITEM NO DR95874 01		SHIPPERS NO.		P.O. NUMBER 565-S-17		VEHICLE ID																
SOLD TO ADDRESS MATTSO SUPPLY CO 1111 N 161ST EAST AVE TULSA OK 74116-4035				MAIL TO ADDRESS MATTSO SUPPLY CO 1111 N 161ST EAST AVE TULSA OK 74116-4035				VENDOR U.S.S. SEAMLESS TUBULAR OPS FAIRFIELD TUBULAR OPERATIONS 5700 VALLEY ROAD P.O. BOX 599 FAIRFIELD, AL 35064														
SPECIFICATION AND GRADE SMLS STANDARD AND LINE PIPE API 5L 45TH EDITION DATED 12/1/12 GRADE B/X42 R N OR Q PSL-2, ASTM A106-15 GRADE B/C, ASTM A53-12 GRADE B, ASME SA106-2015 GRADE B/C, ASME SA53-2015 GRADE B REG MILL COAT PE BEV 30 DEGREE APPLICABLE REQUIREMENTS OF NACE MR0103-2012 ED AND NACE MR0175/ISO 15156-2 2015 ED																						
MATERIAL COND: AS-ROLLED				O.D.: 4.500 (114.300) In (mm)				WALL: 0.531 (13.487) In (mm)														
PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD	EXT %	TENSILE	Y/T	ELONG %	HARDNESS	MIN HYDRO	DWELL(SEC)											
				PSI	.50	PSI		(IN 2")	SCALE:	PSI												
MB2450	STRIP/L/B	AR	1.5	MIN: 42,100 MAX: 71,800	.50	MIN: 70,000 MAX: 95,000	MAX:	MIN: 29.0 MAX: 39.3		2970	5											
MB2450	STRIP/L/B	AR	1.5	48,700 49,800	.50	76,000 75,500	0.64 0.56	49.2		2970	5											
** END OF DATA THIS SHEET **																						
LEGEND: L - LONGITUDINAL U - UPSET T - TRANSVERSE NM - NORMALIZED QT - QUENCH & TEMPERED SR - STRESS RELIEVED AR - AS ROLLED TR - THERMOMECHANICAL ROLLED B - BODY W - WELD																						
PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.*
																						MAX
MB2450	HEAT		.20	1.10	0.08	0.06	.25	.11	.03	.05	.01	.030		.00	.0001	.002	.005					.43
MB2450	PROD		.21	1.08	0.08	0.05	.24	.09	.03	.06	.01	.032		.00	.0000	.002	.001					.40
MB2450	PROD		.21	1.08	0.08	0.05	.24	.09	.03	.06	.01	.031		.00	.0001	.002	.001					.41
** END OF DATA THIS SHEET **																						
*C.E. IS BASED ON THE FOLLOWING EQUATION(S):												C+MN/6+CR/5+MO/5+V/5+NI/15+CU/15 (EUROPEAN CEV)										

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT. ELEMENTS REPORTED IN MASS FRACTION (%)

000000000

FQ270B53

0158554030

0-0-0

PAGE 1 OF 2



U.S.S. SEAMLESS TUBULAR OPS

FAIRFIELD TUBULAR OPERATIONS

DATE: 05/31/17

TIME: 04:27:04

CERTIFIED TEST REPORT
(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

SERIAL NO: F0105045

EBS NO: 2002136884 1

MILL ORDER/ITEM NO DR95874 01		SHIPPERS NO.		P.O. NUMBER 565-S-17															
MATERIAL COND: AS-ROLLED					O.D.: 4.500 (114.300) in (mm)					WALL: 0.531 (13.487) in (mm)									
PRODUCT IDENTIFICATION MB2450	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING														
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS				% SHEAR					
												1	2	3	AVG	1	2	3	AVG
								DEG F				15	15	15	20	1			
	OK			** END OF DATA THIS SHEET **	T	B	+ 32	FULL	AR			47	47	49	47	30	35	35	33

LEGEND L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TEST / INSPECTION		YES	RESULTS / COMMENTS	
FULL LENGTH VISUAL		X		
FULL LENGTH EMI		X	OD <u>X</u> OD/ID <u> </u> L <u> </u> L/T <u>X</u> 10.0% NOTCH	
FULL LENGTH MPI				
FULL LENGTH UT		X	ID <u>X</u> OD/ID <u> </u> L <u> </u> L/T <u>X</u> 10.0% NOTCH	
END AREA INSPECTION (PLAIN END)		X	MPI <u>X</u> UT <u> </u>	
SPECIAL END AREA (SEA) INSP			MPI <u> </u> UT <u> </u>	
FULL LENGTH DRIFT			DRIFT MANDREL SIZE: <u> </u>	

ADDITIONAL NOTES/COMMENTS

ALL MELTING AND MANUFACTURING TOOK PLACE IN THE USA.
MANUFACTURED IN AN ISO 9001 CERTIFIED FACILITY - CERTIFICATE #30727.
NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.
** END OF DATA **

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED,
SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION
AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: MICHAEL HENRY -MANAGER, Q.A.
FAIRFIELD TUBULAR OPERATIONS

DATE 05/31/17

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FQ270B53

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0-0-0

PAGE 2 OF 2

**

ANTHONY CARDWELL
4/25/2023



U.S.S. SEAMLESS TUBULAR OPS
FAIRFIELD TUBULAR OPERATIONS

TUBULAR PRODUCTS
ADDITIONAL COMMENTS SHEET

DATE: 05/31/17

TIME: 04:27:07

PAGE: 1 OF 1

MILL ORDER/ITEM NO DR95874 01	SHIPPERS NO.	P.O. NUMBER 565-S-17	HEAT	SERIAL NUMBER: F0105045
SOLD TO ADDRESS MATTSO SUPPLY CO 1111 N 161ST EAST AVE TULSA OK 74116-4035		MAIL TO ADDRESS		VENDOR U.S.S. SEAMLESS TUBULAR OPS FAIRFIELD TUBULAR OPERATIONS P.O. BOX 599 FAIRFIELD ALABAMA 35064
HEAT MB2450 - MELTED AT:NUCOR STEEL MEMPHIS, MEMPHIS, TN 38109 END OF DATA				

ANTHONY CARDWELL
4/25/2023

Ameriforge

An AFG Holdings Company

Material Test Report

Heat Code: CR3-KD

Forged Vessel Connections (FVC)

13770 Industrial Rd. Houston, TX 77015

Sales: (713) 393-4200

ISO 9001:2015 Certified

Mattesco Supply Co. 00011508		PO: 414-S-22	Sales Order: 186302S	Line: 2
1111 N. 161st Avenue		Item Code: LWN020300090A002A1	Qty Shipped: 124	
Tulsa, OK 74116		Item Desc: 2 X 300 X 9 LWN RF SA105N		
		Mill Heat: C206734		
Spec: ASTM A350(18)/ASME SA350(21)- LF2 CL1 & ASTM A105/A105M(21)/ASME SA105/SA105M(21)				
Element	(%wt)	Grade	Product	Product

Element	(%wt)	Ladle	Product	EPCRA	CAS#	Element	(%wt)	Ladle	Product	EPCRA	CAS#
C Carbon	0.17					Cr Chromium	0.13				
Mn Manganese	1.13			Y	7439-96-5	Mo Molybdenum	0.02			Y	7440-47-3
Mn:C	6.6					V Vanadium	0.03				
P Phosphorous	0.013					Cb Columbium	0.001				
S Sulphur	0.004					B Boron	0.0004				
Si Silicon	0.24					*T Titanium	0.001			Y	7440-02-0
Cu Copper	0.16			Y	7440-50-8	Al Aluminum	0.024				
Ni Nickel	0.05			Y	7440-02-0	C.E.	0.41				

Mechanical Testing					Heat Treat	
Test Lab	GOOLSBY GT:22-2403				Norm. Temp. (F)	1676
Test Bar Size	3x3x11				Norm. (Hrs)	4
HBW	156 - 156				Norm. Cooling Type	AIR
Elg (%)	36.5				Other	
RA (%)	68				Country of Melt	USA
Tensile Specimen Size (in)	.500				Country of Finish Machining	USA
Tensile (ksi)	76.6				Country of Forging	USA
Yield (ksi)	49.5				Gr.Sz	13.5
Gauge Length (in)	2					
Charpy Orientation	LONGITUDINAL					
Charpy Temp(F)	-50					
Charpy Specimen Size (mm)	10X10					
Charpy (ft lbs)	68 - 50 - 55					
Avg Energy 3 Specimens (ft-lbs)	58					
Min Energy 1 Specimens (ft-lbs)	50					
% Shear	20 - 20 - 20					
Lat. Exp. (in)	.056 - .043 - .062					

The recording of false, fictitious, or fraudulent statement or entries on this document may be punishable as a felony under federal statute.

EPCRA Supplier Notification: This product may contain one or more toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act (Title III of the Superfund Amendments and Reauthorization Act of 1986) and 40 C.F.R. Part 372. Potentially reportable chemicals are indicated with a checkmark in the "EPCRA" column and a Chemical Abstract Services (CAS) registry number is provided for each such chemical in addition to the percent by weight of the chemical present in this product. It is your responsibility alone to determine whether your facility is required to submit a Toxic Release Inventory Report under EPCRA Section 313.

Certification No.: 1594621-REV01

Certification Date: 2/1/2023

Issued By: Michelle Simien

This report is issued in compliance with the requirements of EN10204 3.1 / ISO 10474 3.1.b

Page 1 of 2

ANTHONY CARDWELL
4/25/2023

Material Test Report

Heat Code: CR3-KD

Forged Vessel Connections (FVC)

13770 Industrial Rd. Houston, TX 77015

ISO 9001:2015 Certified

Sales: (713) 393-4200

ISO 9001:2015 Certified

Sales: (713) 393-4200

MattSCO Supply Co. 00011508	PO: 414-S-22	Sales Order: 186302S	Line: 2
1111 N. 161st Avenue	Item Code: LWN020300090A002A1	Qty Shipped: 124	
Tulsa, OK 74116	Item Desc: 2 X 300 X 9 LWN RF SA105N		
	Mill Heat: C206734		
Spec: ASTM A350(18)/ASME SA350(21)- LF2 CL1 & ASTM A105/A105M(21)/ASME SA105/SA105M(21)			

Material is Fully Killed; Fine Grain Practice

Product compliant with NACE MR0175/ISO 15156-2:2015, Annex A (A.2.1.2, A2.1.3).
 Product compliant with NACE MR0103/ISO 17945:2015, Section 13.1.1 and 13.1.3.

**NECK / BARREL PORTION DIMENSIONS COMPLY WITH ASME CODE PART UG-44(J) (1) & (2).A **

We hereby certify that the material represented by this document has been tested and is in conformance with the Purchase Order and Specification Requirements.

- * No Weld repair performed.
- * Ladle Chemical Analysis results are reported from the raw material suppliers MTR.
- * Tensile taken from a round specimen. Measurement of elongation after fracture.
- * Yield strength was determined using the .2% offset method, unless specified.
- * All material supplied under this order is certified to be free of mercury contamination and no mercury bearing equipment was used in manufacturing, fabrication or testing.
- * When reported on MTR: Tensile Testing Per ASTM E8; Brinell Hardness Per ASTM E10; Charpy Testing Per ASTM E23
- * AF Global manufactures materials according to a certified Quality Management System conforming to ISO 9001:2015 and PED certified to 2014/68/EU, Annex 1, Section 4.3.
- Unless otherwise noted on PO, Dimensions of all standard pipe flanges and flange fittings (NPS 1/2 to NPS 24) per ASME B16.5-2020, large diameter steel flanges (NPS 26 to 60) per ASME B16.47-2020, Orifice flanges per ASME B16.36-2020.
- * AFGlobal uses the latest edition of ASTM E29 (Standard practice for using significant digits in test data to determine conformance with specifications), to claim conformance or nonconformance to a specification. When a accept/reject determination is required AFGlobal uses a test uncertainty ratio (TUR) of 1:1 or higher as acceptable.
- * DNV-GL PED Certificate No 10000425664-PA-ACCREDIA-USA Valid thru December 03, 2023.

The recording of false, fictitious, or fraudulent statement or entries on this document may be punishable as a felony under federal statute.

EPCRA Supplier Notification: This product may contain one or more toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act (Title III of the Superfund Amendments and Reauthorization Act of 1986) and 40 C.F.R. Part 372. Potentially reportable chemicals are indicated with a checkmark in the "EPCRA" column and a Chemical Abstract Services (CAS) registry number is provided for each such chemical in addition to the percent by weight of the chemical present in this product. It is your responsibility alone to determine whether your facility is required to submit a Toxic Release Inventory Report under EPCRA Section 313.

Certification No.: 1594621-REV01

Certification Date: 2/1/2023

Issued By: Michelle Simien

This report is issued in compliance with the requirements of EN10204 3.1 / ISO 10474 3.1.b


 Dusty Bannon - Quality Analyst

ANTHONY CARDWELL
 4/25/2023



MANNESMANN
PRECISION TUBES
A Member of the Salzgitter Group

Inspection Certificate

Page 1 of:

2 Pages

acc to EN 10204/3.1

Certificate no.:

9220353

Purchaser: Webco Industries, Inc
74063 Sand Springs OK
Your order no.: 10075464
Manufacturer: Mannesmann Precision Tubes Netherlands B.V.
NL-Helmond
Our order no.: 3400033
Product: Seamless cold drawn low-carbon steel heat exchanger and condenser tubes.
Specification: (S)A 179 / (S)A 450 / NACE MR0103-05 / NACE MR0175
Steelgrade: A 179 acc. to norm: A179 Edition: 2021
SA 179 SA179 2021
Marking: On tubes / On tags

Manufacturer's mark: MPT-HE

Process: Basic oxygen steel

Stamp of the mill's inspector: (Q-MPT-NL)

Steelmarks: (S)A 179 + N

Shipping no.: 4400548

Our shipping date: 19-05-2022

Extent of the delivery:

Item	Numbers	Dimension	Heat no.	Sample no.
------	---------	-----------	----------	------------

51	331	1,000" OD x 0,095" MW x 24'0"	2421,28 m	3536 kg	323095	1-2
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Shipping marks:

PO : 10075464
Item : 00005 Line 2
Mat. : A32010000950B
Quantity : 331 pcs.
Tag Nr. : PO# A22-13316 T-1
ASTM/ASME A/SA 179 SMLS
Grade 1010
OD: 1,0000" inches
Wall: 0,0950 Inches MW Wall
Melting Western Europe
Hot finished tube fabrication in Germany
Cold drawn in The Netherlands
Max. 1 heat per bundle – Max 1 heat per box

	C	Mn	P	S	Cr	Heat no.
Requirements:	0,06-0,18	0,27-0,63	≤0,035	≤0,035		
Heat analysis (%)	0,16	0,51	0,016	0,002	0,04	323095

	Mo	V	Cu	Ni	Sn	Heat no.
Requirements:						
Heat analysis (%)	0,01	0,001	0,02	0,03	0,001	323095

Heat treatment: Normalized at 920 °C

Remarks: It is certified that the products have been tested in accordance to purchase specifications and found satisfactory

Helmond(NL.) : 31-05-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022



**MANNESMANN
PRECISION TUBES**
A Member of the Berggrün Group

Test results

Page 2 of:

2 Pages

Certificate no.:

9220353

1. Visual inspection and control of dimensions: OK
2. Eddy current test acc. to: E309: OK
3. Flattening test: OK
Flaring test: OK
4. Hardness test: OK

Mechanical data	Dimensions of the test tube mm	Hardness HRB
Requirements:		Max 72
1	25,40 x 2,58	69
2		70

Helmond: 31-05-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier