SECTION / DESCRIPTION	MAWP	TEST PRESS	DESIGN TEMP	MDMT	ALTERNATE DESIGN	BUNDLE VOL	BUNDLE WT	LOUVER	HAILSCREENS
UNITS	PSIG	PSIG	DEG F	DEG F	CONDITION	CU FT	LBS		
18-XF-354 OFF SPEC PRODUCT COOLER	250	353	675	32	FV @ 525F	43	29987	MANUAL	NONE
STEAM COIL	232	302	430	32	FV @ 430F	5	6365	NONE	NONE

MOTOR HP:	25	**FAN MFGR:**	MOORE	**DIAM (FT):**	11
TYPE:	TEFC	**CLASS:**	10000	**ACFM/FAN:**	113939
RPM:	1800	**BLADES:**	4	**HP@ DES.:**	19.12
VAC:	460/3/60	**PITCH:**	5.27		
FRAME:	284T	**RPM:**	313	**DRIVE:**	HTD
SHAFT:	1.875	**SERIES:**	36	**RATIO:**	5.75:1
MOTOR WT:	445 lbs	**TYPE:**	EC	**DRIVE WIDTH:**	36
QTY:	2	**TIP:**	VE	**AIR BRAKE:**	YES
		QTY:	2		

SPECIFICATION NOTES:

VIBE SENSOR: WILCOXON

VIBE SENSOR MODEL NO.: 786A-D2

COOLER WT #: SEE TABLE

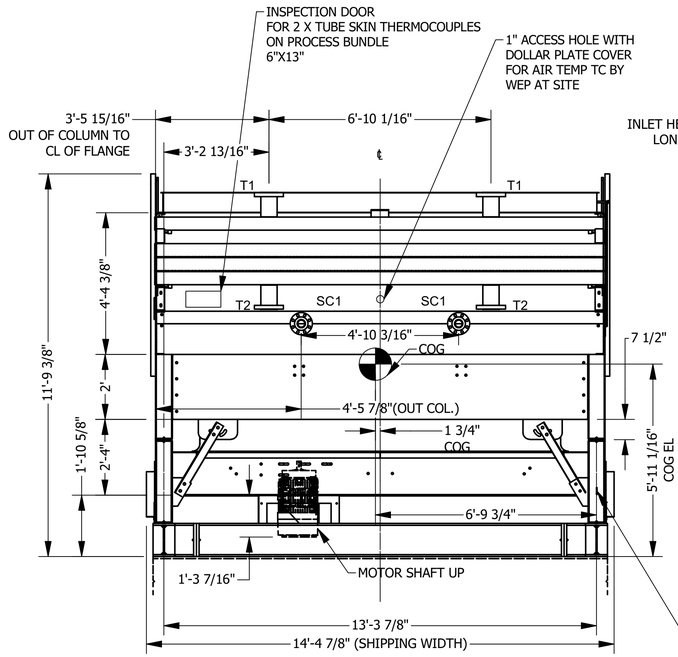
STRUCTURE FINISH: PER A8KM-PP-000-500540-A

NON FIREPROOFED STR TO BE GALVANIZED

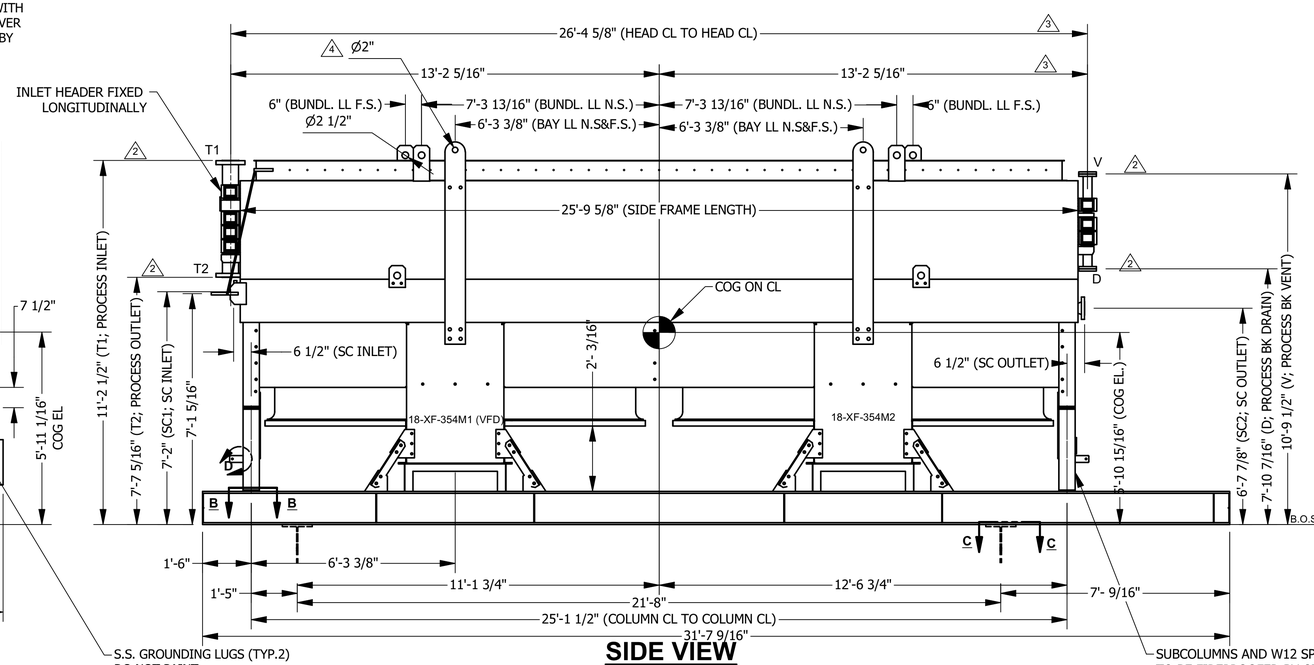
HEADER FINISH: PER A8KM-PP-000-500520-A

COATING SYSTEM 5 AFTER HYDROTEST

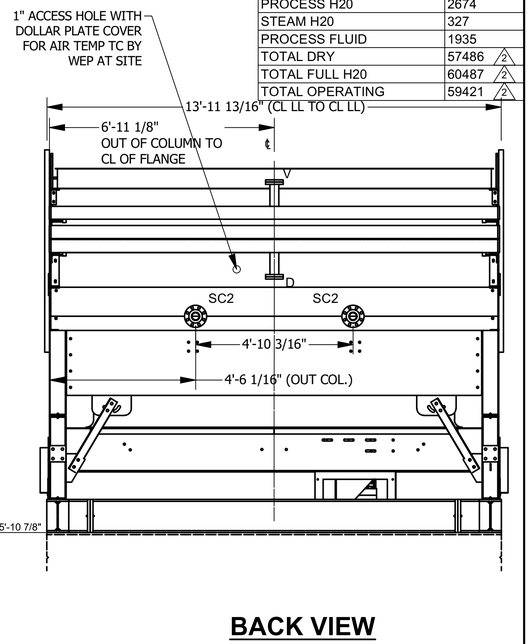
WEIGHTS PER BAY(LBS)	
ITEM	WEIGHT
COOLER	48551 ⚠2
SPAN BEAMS	3433 ⚠2
LOUVER	1042
WALKWAY	1751
PROCESS H20	2674
STEAM H20	327
PROCESS FLUID	1935
TOTAL DRY	57486 ⚠2
TOTAL FULL H20	60487 ⚠2
TOTAL OPERATING	59421 ⚠2



FRONT VIEW



SIDE VIEW

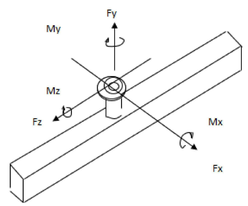


BACK VIEW

APPROVED BY: _____

DATE: _____

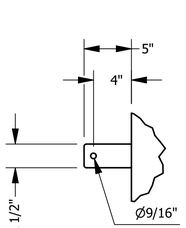
NOZZLE SCHEDULE ⚠2			
LABEL	ITEM	QTY	FLANGE
T1	PROCESS INLET	2	4" 600# RFLWN, 4" ID 6"OD
T2	PROCESS OUTLET	2	4" 600# RFLWN,4" ID 6"OD
V	PROCESS BK VENT	1	2" 300# RFLWN; BLIND
D	PROCESS BK DRAIN	1	2" 300# RFLWN; BLIND
SC1	STEAM INLET	2	3" 300# RFWN
SC2	STEAM OUTLET	2	3" 300# RFWN



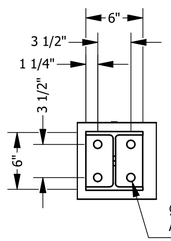
API 661 NOZZLE LOADS MULTIPLIER = 2.0

NOZZLE LOADS		QTY/HEAD	SIZE	CLASS, #		2 X API 661
FRONT HEAD		2	4	600		
SIZE	FX	FY	FZ	MX	MY	MZ
	LBS	LBS	LBS	FT LB	FT LB	FTLB
4	1500	1200	1500	1200	1800	1200
4	1500	1200	1500	1200	1800	1200
COMBINED	6000	4800	6000	4800	7200	4800
MAX API PER HEAD	2250	4500	3750	4500	6000	3000
STR DESIGN LOAD	6000	4800	6000	4800	7200	4800

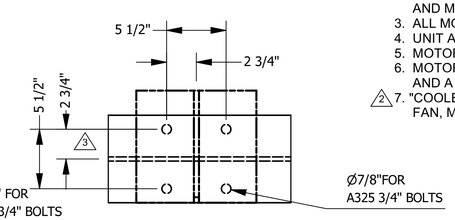
NOZZLE LOADS		QTY/HEAD	SIZE	CLASS, #		2 X API 661
STEAM COIL		2	3	300		
SIZE	FX	FY	FZ	MX	MY	MZ
	LBS	LBS	LBS	FT LB	FT LB	FTLB
3	900	760	900	600	900	600
COMBINED	1800	1520	1800	1200	1800	1200
MAX API	2250	4500	3750	4500	6000	3000
DESIGN LOAD	1800	1520	1800	1200	1800	1200



DETAIL D
SS GROUNDING LUG
DON'T PAINT



SECTION B-B
W6X20 TO SKID BEAM



SECTION C-C
W12X50 SKID BEAM TO
W18 PIPE RACK BEAM

NOTE: 1. (1) BAYS REQUIRED
2. SPANNING BEAMS, STUB COLUMNS, TRANSV & LONL DIAG BRACES, AND MANUAL LOUVER ROD REMOVED FOR SHIPPING.
3. ALL MOTORS ARE VFD COMPATIBLE, NO SPACE HEATER.
4. UNIT ADJACENT TO 18-XF-350 WITH CONNECTING HEADER WALKWAYS AND AIR SEALS
5. MOTOR REMOVAL BEAM PROVIDED
6. MOTORs SHALL BE RATED FOR CLASS 1, DIV. 2, GROUPS B,C,D AND A T3C TEMPERATURE CODE
⚠2 7. "COOLER WEIGHT" LISTED ABOVE INCLUDES BUNDLE, STEAM COIL FAN, MOTOR, STUB COLUMNS AND BRACES PER BAY.

EQ. TAG #S ⚠2 ⚠4		
COOLER	EQUIPMENT	TAG #
18-XF-354	MOTOR	18-XF-354M1 (VFD)
18-XF-354	MOTOR	18-XF-354M2
18-XF-354	FAN	18-XF-354-F01
18-XF-354	FAN	18-XF-354-F02
18-XF-354	VIB SENSOR	18-VE-XF354A
18-XF-354	VIB SENSOR	18-VE-XF354B

REFERENCE DOCUMENTS ⚠2	
FABSCO DOC. #	APCI DOC. #
A22-13312-6A-300	EN207119-FAB-9V3-00044
A22-13312-6SC-300	EN207119-FAB-9V3-00045
A22-13312-6A-ASME	EN207119-FAB-9V3-00210
A22-13312-6SC-ASME	EN207119-FAB-9V3-00211
A22-13312-6 LL	EN207119-FAB-9V3-00048
A22-13312-1,6 LAYOUT	EN207119-FAB-9V3-00043
A22-13312-6 NOTES	EN207119-FAB-9V3-00285
A22-13312-6 STR	EN207119-FAB-9V3-00055

GENERAL ARRANGEMENT - 18-XF-354

REV.	DATE	DESCRIPTION
0	2/10/2022	FOR APPROVAL
1	7/11/2022	CUST. COMM.
2	12/8/2022	DESIGN CHANGE/ SPLIT EACH PASS
3	2/7/2023	CUST. COMM.
4	3/9/2023	CUST. COMM. / UPDATED LL. DIMS

PROJECT NAME:	**World Energy Renewables Project**
PROJECT NO./UNIT:	**EN-20-7119 / RFJU-B**
CUSTOMER/CLIENT:	**World Energy Paramount**
EQUIPMENT OWNER:	**Air Products Manufacturing LLC**
ITEM NO.:	**18-XF-354**
SERVICE:	**Off Spec Product Cooler**
LOCATION:	**World Energy, Paramount, CA, USA**
PO NO.:	**4505606036 / A8KM-4-406-PO-1**
FABSCO JOB NO.:	**A22-13312-6**

DRAWN BY: BH

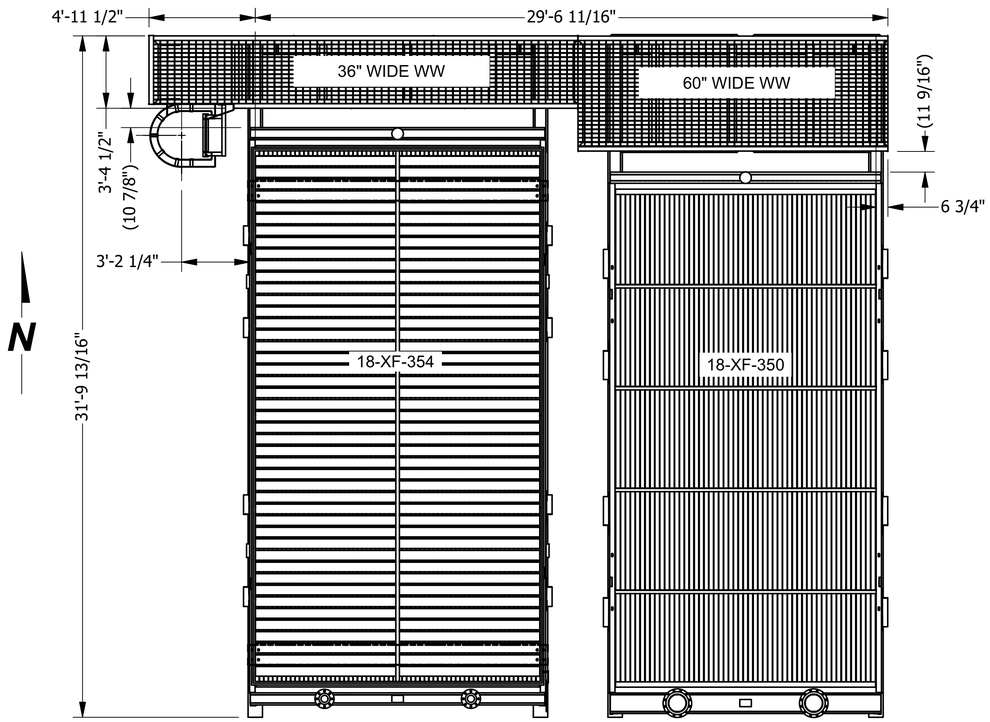
DATE: 2/10/2022

CHECKED BY:

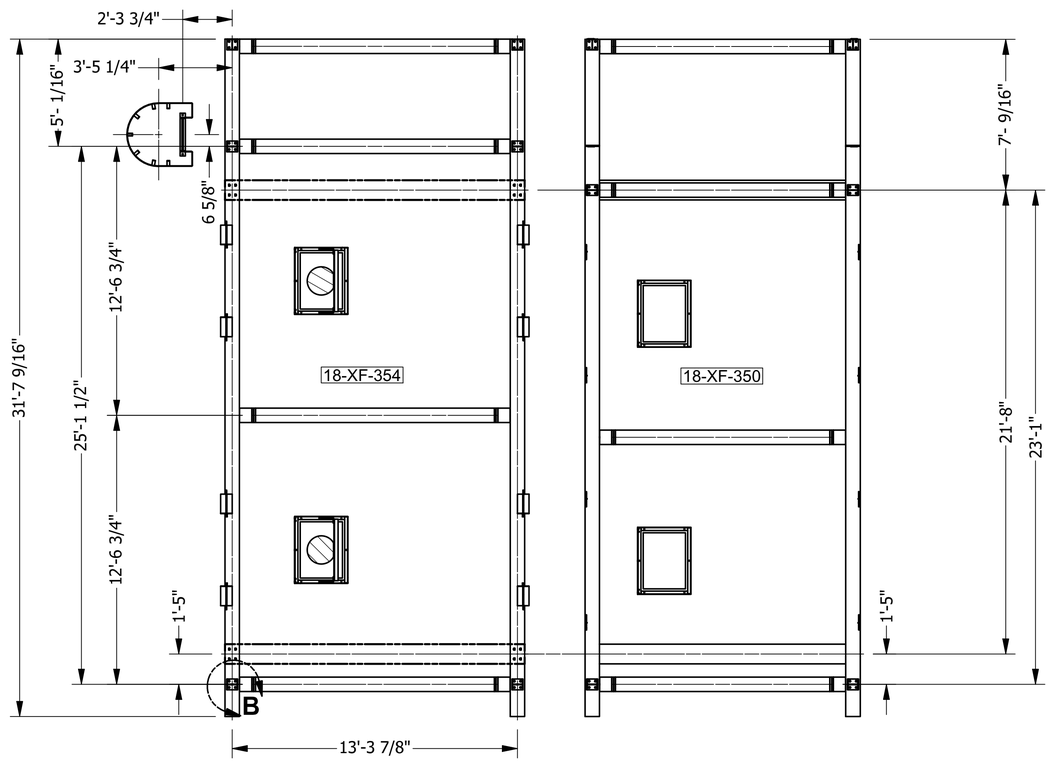
FABSCO Fin-Air, LLC.

DRAWING NO: A22-13312-6-100

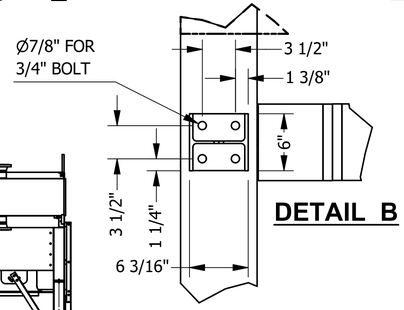
REV: 4



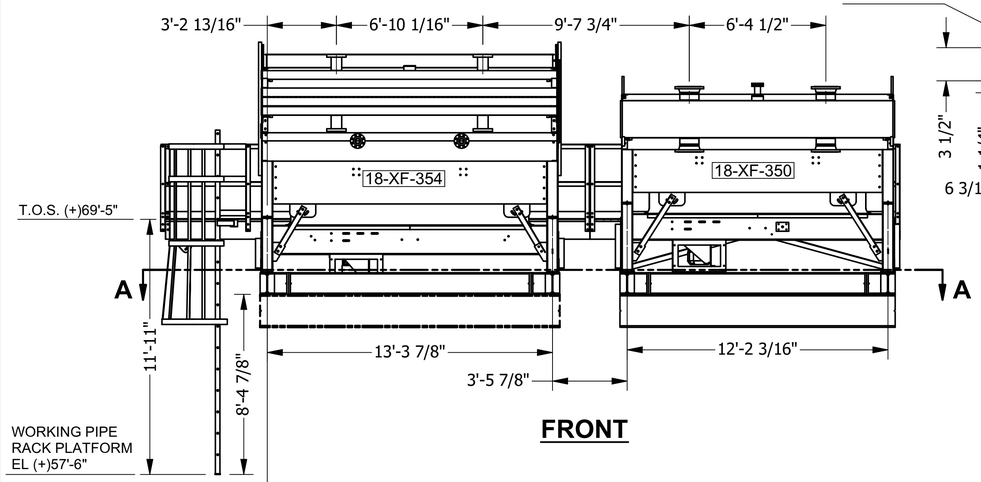
TOP



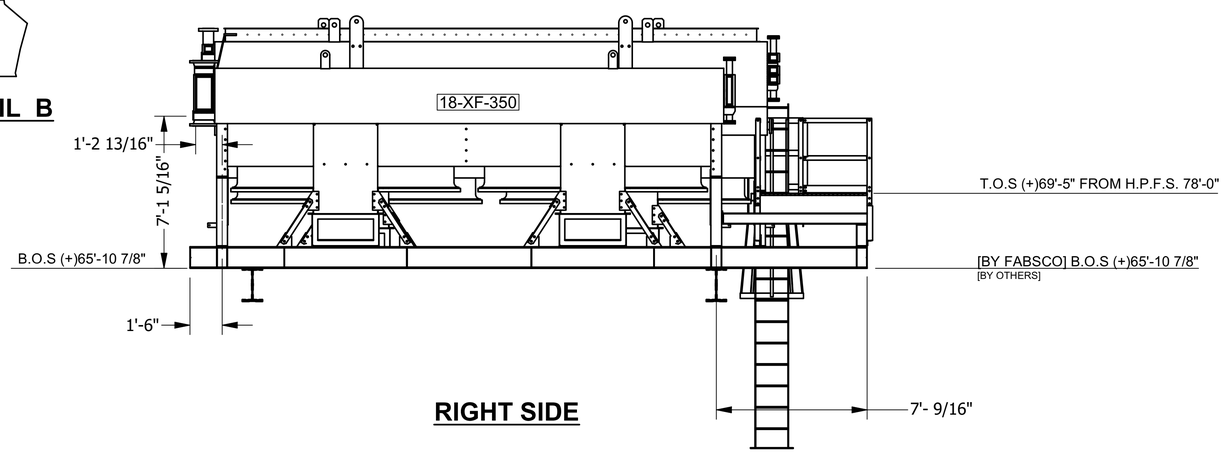
SECTION A-A



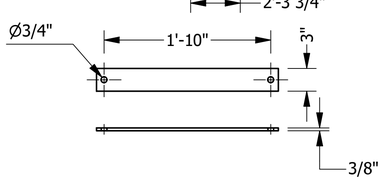
DETAIL B



FRONT



RIGHT SIDE



LADDER ANCHOR PLATE TYP

PROJECT NAME:	World Energy Renewables Project
PROJECT NO./UNIT:	EN-20-7119 / RFJU-B
CUSTOMER/CLIENT:	World Energy Paramount
EQUIPMENT OWNER:	Air Products Manufacturing LLC
ITEM NO.:	18-XF-350 / 18-XF-354 / STRIPPER OVERHEAD CONDENSER
SERVICE:	Off Spec Product Cooler
LOCATION:	World Energy, Paramount, CA, USA
PO NO.:	4505606036 / A8KM-4-406-PO-1
FABSCO JOB NO.:	A22-13312-1 / A22-13312-6

WALKWAY ARRANGEMENT

REV.	DATE	DESCRIPTION
0	3/11/2022	FOR APPROVAL
1	7/12/2022	CUST. COMM.
2	11/16/2022	CUST. COMM. / MEMBER CHANGES PER P.E.
3	12/13/2022	UPDATED 18-XF-354
4	04/27/2023	18-XF-350 WALKWAY

DRAWN BY: BH

DATE: 3/11/2022

CHECKED BY:

FABSCO Fin-Air, LLC.

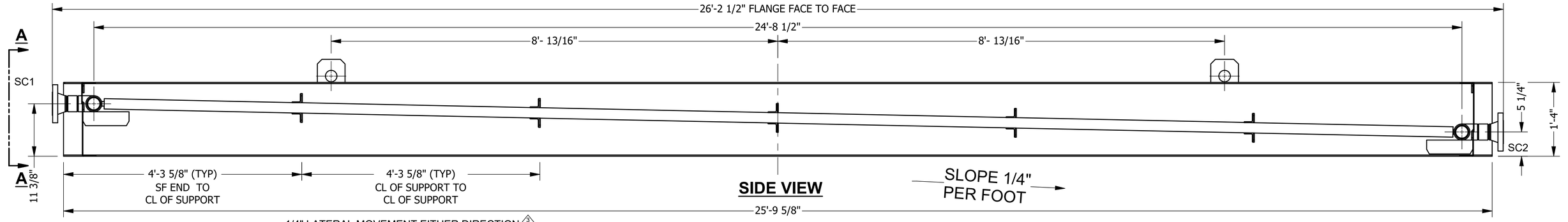
DRAWING NO: A22-13312-1-6 LAYOUT

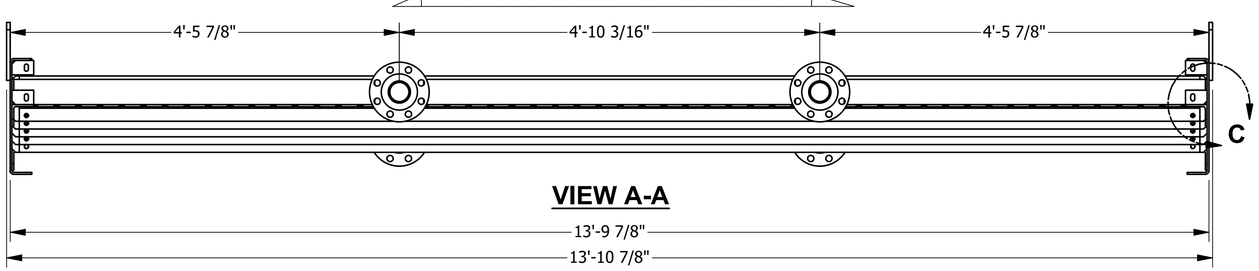
REV: 4

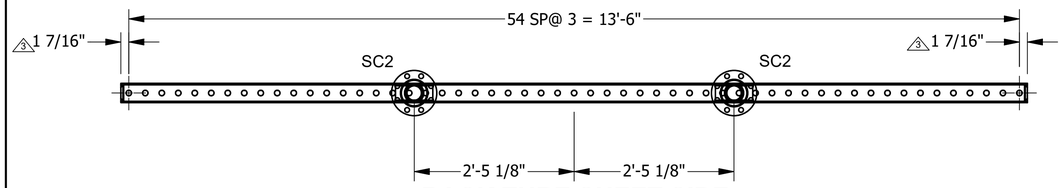
WORLD ENERGY RENEWABLE FUELS CONVERSION PROJECT
Project No: A8KM
Vendor Input to PCMS
Doc number: A8KM-PCMS-001, Rev. 0

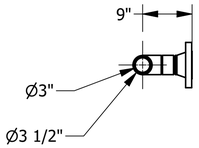
Vendor Doc Number: PCMS_PO Number Rev: 0
EN207119-FAB-9V3-00134 4505606036

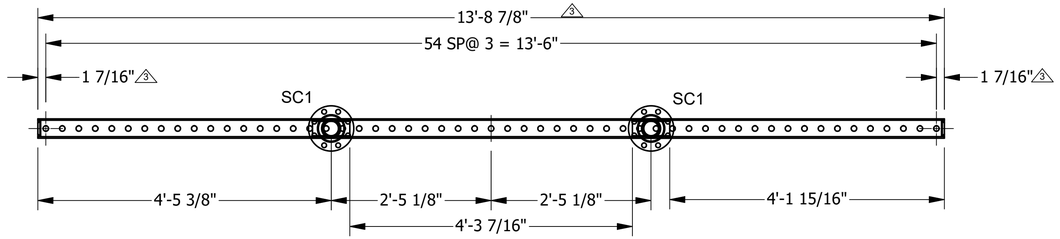
Identification					
1: Tag No.	18-XF-354				
2: Model No.	A22-13312-6				
3: Serial No.	there is a serial no. on nameplate				
4: Registration No.	add after Code stamp received				Code Vessels Only
5: Code Stamped	yes				Drop Down
General Design					
15: Build Date	2023				
17: Manufacturer	FABSCO FIN AIR				
19: General Material	CS				
20: Insulation Type	None				Drop Down
21: Support Type	Baseplate				Drop Down
22: External Coating	Epoxy				Drop Down
23: MAWP (psig)	250				
24: MAWT (F)	675				
25: Design Pressure (psig)	250				
26: Full Vacuum	yes				Drop Down
27: Design Temp (F)	675				
28: MDMT (F)	32				
29: Weight Empty (lbs)	57486				
30: Weight Full (lbs)	60487				
31: Equipment Length (inches)	31'-8"				
32: Orientation	Horizontal				Drop Down
33: Equipment Width (inches)	14'-5"				
34: Equipment Height (inches)	11'-10"				
35: Storage Volume (bbls)	NA				Vessels Only
36: Outer Diameter (inches)	NA				
37: PWHT	yes				
38: Fire Proofing	no		yes, by others		
39: Heat Tracing	None				
40: Test Medium	Water				Pressure Testing

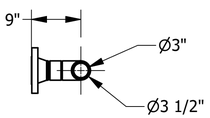


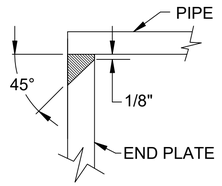




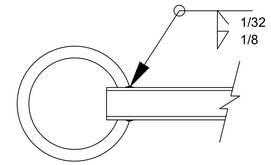






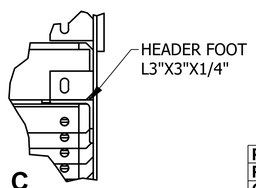


END PLATE WELD DETAIL



TUBE TO PIPE HEAD DETAIL

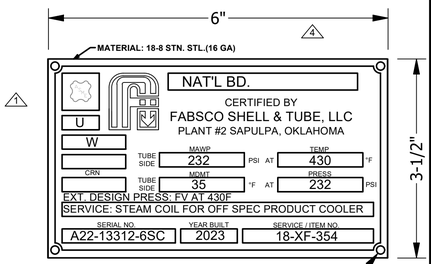
NOTE:
1) TUBES TO BE WELDED TO PIPE HEADER.



DETAIL C
HEADER SUPPORT
TYP. BOTH ENDS

DESIGN INFORMATION	
DESIGN PRESS. PSIG:	232 / FV
DESIGN TEMP. DEG F:	430 / 430
MDMT DEG F:	35 1
CORROSION ALLOW. IN.:	0.125
NDE: MT OR PT EDGES	
100% RT BUTT WELDS	
RT SPOT API 661	
HYDROTEST PSIG:	302
DESIGN & STAMP:	ASME
ASME SECT. VIII, DIV. 1 ED. 2021	
CHARPY EXEMPT UG20(f) AND/OR UCS 66	

TUBE HOLE INFORMATION	
PREDRILL DIAMETER	0.9688
TUBE REAM	1.01
TPI	12



REV:	DATE	COMMENT	BY
0	03-16-2022	FOR APPROVAL	BH
1	7/12/22	CUST. COMM.	BH
2	10/25/23	CUST. COMM.	BH
3	11/27/23	CUST. COMM.	BH
4	2/12/2024	CUST. COMM.	BH

CERTIFIED

BY:_____ DATE: _____

NOZZLE:	CONNECTIONS: 1
SC1 (INLET)	(2) 3" 300# - SCH XXH - RFWN
	3" PIPE - SCH XXH - 2.25" LG - BBE 4
	3" TEE - SCH XXH
SC2 (OUTLET)	(2) 3" 300# - SCH XXH - RFWN
	3" PIPE - SCH XXH - 2.25" LG - BBE 4
	3" TEE - SCH XXH

TUBES: (55) 1" OD 0.12" MW 294" 1
FIN: 0.625" HI 0.016" 11/FPI, EMBEDDED 1

3				BEVELS
FRONT HEAD (PIPE)	3" SCH XXH PIPE - 51.1875" (1)			BBE
	3" SCH XXH PIPE - 49.7500" (2)			BOE
BACK HEAD (PIPE)	3" SCH XXH PIPE - 51.1875" (1)			BBE
	3" SCH XXH PIPE - 49.7500" (2)			BOE
	THICK		DIA	
FRONT END	0.5000		2.0500	45 ALL
BACK END	0.5000		2.0500	45 ALL

MATERIALS:	
PLATE:	SA 516-70N
PIPE:	SA 106B
FLANGE:	SA-350-LF2
SIDE FRAME:	A36
TUBE:	SA-179
FIN:	ALUMINUM
TEE:	SA-350-LF2

STRUCTURAL:	
SIDEFRAME:	C 0.25" 16" 309.625
SUPPORT:	(5) - L 3 x 3 x .25
BINDER:	(5) - L 2 X 2 X .25
TP AIRSEAL:	L SHAPE
BTM AIRSEAL:	L SHAPE
LUG:	A36 603 BOLTED
HDR FINISH:	SSPC SP 10
	System 5 after hydro
	PER A8KM-PP-000-500520-A
SFR FINISH:	HAND TOOL CLEAN
	Galvanized
	PER A8KM-PP-000-500540-A

TUBE SPACERS:	
TUBE SPACERS REQD.:	52
SCALLOPED CHANNELS:	
1" X 1.5" PITCH	
ALUMINUM	
TOLERANCES:	
LENGTH:	± 0.125
WIDTH:	± 0.125
TUBE PROJECTION:	0.0625 ± 0.125
DRY WEIGHT LBS:	6365
HYDRO WEIGHT LBS:	6692

PROJECT NAME:	World Energy Renewables Project
PROJECT NO./UNIT:	EN-20-7119 / RFJU-B
CUSTOMER/CLIENT:	World Energy Paramount
EQUIPMENT OWNER:	Air Products Manufacturing LLC
ITEM NO.:	18-XF-354
SERVICE:	STEAM COIL FOR OFF SPEC PRODUCT COOLER
LOCATION:	World Energy, Paramount, CA, USA
PO NO.:	4505606036 / A8KM-4-406-PO-1
FABSCO JOB NO.:	A22-13312-6SC

DRAWN BY: BH

DATE: 03-16-2022

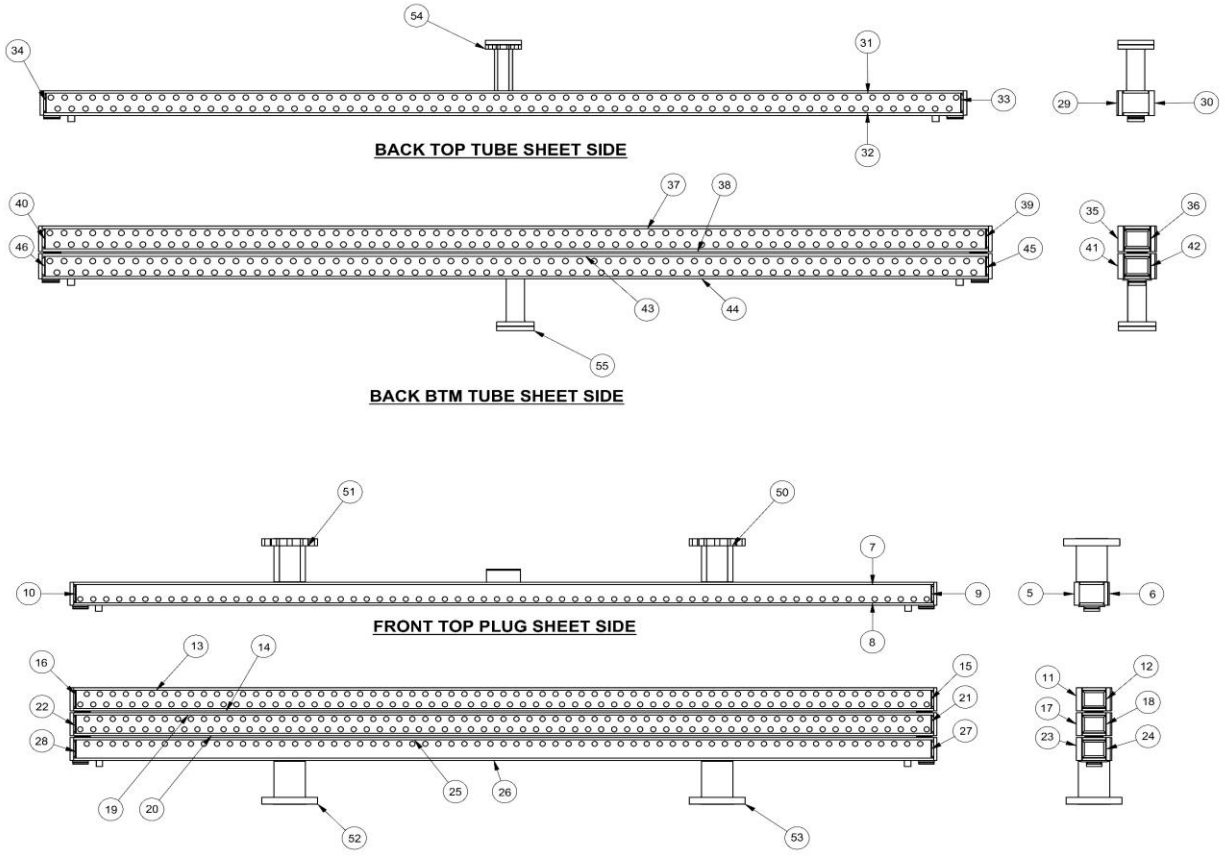
CHECKED BY:

FABSCO, LLC

BUNDLE DETAIL - 18-XF-354 STEAM COIL

DRAWING NO: A22-13312-6SC-300

REV: 4



Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
5/6/11/12	SSAB	W3B536	SA-516-70N
7/8/13/14	CLEVELAND CLIFFS	823C61510	SA-516-70N
9/10	NUCOR	3604954	SA-516-70N
15/16	NUCOR	3604954	SA-516-70N
17/18	SSAB	W3B536	SA-516-70N
19/20	CLEVELAND CLIFFS	823C61510	SA-516-70N
21/22	NUCOR	3604954	SA-516-70N
23/24	SSAB	W3B536	SA-516-70N
25/26	CLEVELAND CLIFFS	823C61510	SA-516-70N
27/28	NUCOR	3604954	SA-516-70N
29/30	SSAB	W3B536	SA-516-70N
31/32	CLEVELAND CLIFFS	823C61510	SA-516-70N
33/34	NUCOR	3604954	SA-516-70N
35/36	SSAB	W3B536	SA-516-70N
37/38	CLEVELAND CLIFFS	823C61510	SA-516-70N
39/40	NUCOR	3604954	SA-516-70N
41/42	SSAB	W3B536	SA-516-70N
43/44	CLEVELAND CLIFFS	823C61510	SA-516-70N
45/46	NUCOR	3604954	SA-516-70N
50/51	GIBSON PRODUCTS	ZX50	SA-350LF2
54/55	GIBSON PRODUCTS	ZP44	SA-350LF2
TUBES	MANNESMANN	323090	SA-179

CUSTOMER:	AIR PRODUCT MANUFACTURING LLC.		FABSCO SHELL & TUBE, LLC
PO NO:	4505606036 / A8KM-4-406-PO-1	DATE	
ITEM NO:	18-XF-354	AC	DWG No A22-13312-6A-HS 0

SSAB

MTR 9423

Test Certificate

12400 Highway 43 North, Axis, Alabama 36505, US

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

Form TC1: Revision 5: Date 22 Aug 2022

Customer:
LEECO STEEL PRODUCTS, INC.
1011 WARRENVILLE ROAD
SUITE 500
LISLE
IL 60532

Customer P.O.No.: V29753 | **Mill Order No.** 41-698510-01 | **Shipping Manifest:** AR374997

Product Description: ASME SA516-70/SA516-65/SA516-60(21)
ASTM A516-70/A516-65/A516-60(17)
LCVN 20/15 FT.LBS @ -50F/A673-P
CEV .43% MAX

Ship Date: 08 Mar 23
Cert Date: 08 Mar 23
Cert No: 081099417
(Page 1 of 1)

Heat Treat Type: NORMALIZED

Size: 1.000 X 96.00 X 480.0 (IN)

Tested Pieces:

Heat Id	Piece Id	Tested Thickness	Tst Loc
W3B536	D26	1.008 (DISCRT)	C

Tensiles:

YS (KSI)	UTS (KSI)	%RA	Elong % 2in	Elong % 8in	Tst Dir
52	76		47		T

Hardness:

Charpy Impact Tests

Abs. Energy(FTLB) 1	2	3	Avg	% Shear 1	2	3	Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
37	85	66	63					-50F	L	10.	

Chemical Analysis

Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	IIW	
W3B536	.19	1.00	.010	.001	.23	.032	.031	.33	.17	.12	.03	.005	.003	.010	.0003	.42	ORGN
																	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 (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 45 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
W3B536 D26 40103304 PCES: 1, LBS: 13068

CEQ=.42

ANTHONY CARDWELL
02/28/2024

(P) Cust Part #:100096480A516-70N

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

Jason Thomas
Director Technical Services

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MTR 9376

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Cleveland-Cliffs Burns Harbor LLC

QUALITY ASSURANCE REPORT OF TEST AND ANALYSIS

US HWY 12 Burns Harbor, Indiana

SHIPMENT NO. 802-40363 | DATE SHIPPED 08-10-23 | CAR OR VEHICLE NO. CN-CHGO-BNSF CN 622239

SOLD TO: AMERICAN ALLOY STEEL INC
PO BOX 40469
HOUSTON TX 77240

SHIP TO: AMERICAN ALLOY STEEL INC
C/O SKOL TRACK #21
6350 N ERIE AVE
OWASSO, OK 74055

SERIAL NUMBER	PAT NO.	HEAT NUMBER	NO. PCS.	SIZE AND QUANTITY: THICKNESS	WIDTH OR DIA.	LENGTH	WEIGHT	YIELD POINT	TENSILE STRENGTH	AF FRAC. ELONG.	RED.
				INCHES	INCHES	INCHES	POUNDS	PSI	PSI	IN	% %

QUALITY STEEL MELTED & MANUFACTURED IN THE U. S. A.
PLATES - ASTM A516-17 Grade 70; PVQ Killed Fine Grain Practice; Plate: NORMALIZED & COOLED IN STILL AIR; VACUUM DEGASSED; CH-V SA2085 PLT L 15/12 FTLBS AT -50F ; ASTM A516-17 Grade 65; ASTM A516-17 Grade 60; ASME SA516 21ED Grade 70; A SME 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# 135379-OK GH 391-1366C
PLATES HEAT TREATED - TEST SPECIMENS ATTACHED & YIELD STRENGTH @ .5% EUL
MERCURY IN ANY FORM HAS NOT BEEN USED IN THE PRODUCTION OF THIS ORDER

C730043	823C61510	3	1/2	96	480	19602	52300	75500	B	25		
			N	1650 DEG F -	24 MIN							
(M55) MFST REF#: (PART #)												
→ C730044	823C61510	3	1/2	96	480	19602	53500	75800	B	26		
			N	1650 DEG F -	24 MIN							
(M55) MFST REF#: (PART #)												
C730045	823C61510	2	1/2	96	480	13068	53000	75700	B	25		
			N	1650 DEG F -	24 MIN							
(M55) MFST REF#: (PART #)												

Q-QUENCH TEMPERATURE T-TEMPER TEMPERATURE N-NORMALIZE TEMPERATURE

Certified true copy of the original, retained in our file.
AMERICAN ALLOY STEEL
Reviewed By:
09.26.23

SERIAL NUMBER	PAT NO.	HEAT NUMBER	HARD BHN	BEND	THICKNESS INCHES	TYPE	SIZE	DIR	TEST TEMP F	CHARPY IMPACT ENERGY FT LBS 1	2	3	SHEAR(%) 1	2	3	LAT. EXP MILS 1	2	3
C730043		823C61510			.500	V	FULL	L	-50	50	87	56						
→ C730044		823C61510			.500	V	FULL	L	-50	108	130	121						
C730045		823C61510			.500	V	FULL	L	-50	61	114	89						

HEAT NUMBER	CHEMICAL ANALYSIS C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	Al	B	Cb	N	Sn	AVG/ASTD GRAIN SIZE
823C61510	.16	1.02	.018	.004	.32	9.220	.17	.03	.004	.001	.002	.029	.0002	.002	.004	.001	

CEQ=.43

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 transmitted intact with any subsequent third party test reports, if required.

SUPV. QUALITY ASSURANCE
Form BHPLTRPT.TIF

MATERIAL CONFORMS TO
NACE MR0175
BHN 148 TO 156
CERTIFIED BY
AMERICAN ALLOY STEEL
BY [signature] DATE 11/9/23

MICHAEL KAPUSTYN MNT

AMERICAN ALLOY PLATE # 527487

ANTHONY CARDWELL
02/28/2024

MTR 9377

NUCOR
PLATE MILL GROUP
P.O.Box 279
Winton, NC 27986
(252) 356-3700

Mill Test Report

1505 River Rd
Cofield, NC 27922
(252) 356-3700

AMERICAN ALLOY
PLATE #5282896

Issuing Date : 09/17/2023 B/L No. : 857561 Load No. : 876694 Our Order No. : 208197/2 Cust. Order No. : 136394-OK

Vehicle No: SNC 62533

Specification: 0.5000" x 120.000" x 480.000"
ASTM A516 70/65/60-17/ASME SA516-70/65/60 PVQ 2019/2021
Normalized Plate NACE MR0175 Annex 2.1.2 (2015), MR0103 (2010)
Section 2.1.2 Compliant (2015) 13.1.1, 13.1.2/Vacuum Degassed

Marking : 136394-OK

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

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	Ceq	Pcm
3604954	0.20	1.01	0.011	0.001	0.19	0.28	0.10	0.11	0.02	0.031	0.004	0.005	0.002	0.0074	0.0008	0.0002	0.009	0.42	0.26

Plate Serial No	Pieces	Tons	Tensile Test Dir.	Yield (psi)	Tensile (psi)	Elong. % in 2"	Elong. % in 8"	Heat Treat Norm (°F)	Norm Time (min)	Temper (°F)	Temper Time (min)
3604954-05	2	8.16	H-T	52,000	75,900	44.5		1650	23		
3604954-06	4	16.33	H-T	49,400	73,300	41.7		1650	23		

Plate Serial No	Pieces	Tons	Charpy Impacts Dir.	Absorbed Energy (ft-lbs) 1	2	3	Ave	Min	Lateral Expansion (in.) 1	2	3	Ave	Min	Shear (%) 1	2	3	Ave	Min	Temp (°F)	Size
3604954-05	2	8.16	H-L	81.9	110.7	91.9	74.8	15											-50	10mm
3604954-06	4	16.33	H-L	130.6	167.5	122.8	140.3	15											-50	10mm

MATERIAL CONFORMS TO
NACE MR0175
HN 140 TO 146
CERTIFIED BY
AMERICAN ALLOY STEEL
BY PC DATE 11/9/23

Certified a true copy of the original, retained in our file.
AMERICAN ALLOY STEEL, INC.
Reviewed By:
PC 11/9/23

CEQ=.42

HOT ROLLED CARBON STEEL PLATE
TEST COUPONS TAKEN FROM HEAT TREATED PLATE
Piece frequency charpy;

ANTHONY CARDWELL
02/28/2024

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:nhc-SalesMX@nucor.com
Yield by 0.5EUL *method unless otherwise specified.* Ceq = C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)
Pcm = C+(Si/30)+(Mn/20)+(Cu/20)+(Ni/60)+(Cr/20)+(Mo/15)+(V/10)+5B
Melted and Manufactured in the USA. ISO 9001:2015 certified; PED 2014/68/EU, 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. API Q1-1851 DIN 50049-3.1.B/EN 10204 3.1(2004) 3.1B(1993)/ DIN EN 10204 3.1(2005) compliant. ABS QA-2824368

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.

C.L. Cooper

C. L. Cooper, Metallurgist

9/18/2023 11:27:54 AM

GIBSON PRODUCTS

Gibson Products, Inc.
5691 SURREY SQUARE STREET
HOUSTON, TX 77017
Phone: (713) 941-4890

Material Test Report

SOLD TO: I.P.S.
P.O. BOX 581270
TULSA, OK 74158

SHIP TO: I.P.S.
606 NORTH 145TH EAST AVE.
TULSA, OK 74116

DATE	SALES ORDER #	CUST P.O. #	TAG NUMBER	
02/19/24	296886	TP842961X		

ITEM#	ITEM DESCRIPTION	SPEC/GRADE	QTY	HEAT CODE	HEAT NUMBER	STARTING MATERIAL
1	4" 600# RF LWN FLG X 9" LG	ASTM/ASME A/SA350 LF2 CL1	2	ZX50	281439	ASTM/ASME A/SA350 LF2/A/SA105 2021 ED.

CHEMICAL ANALYSIS

C	SI	MN	P	S	CR	NI	MO	CU	V	NB	CE	TI
.204	.19	.98	.011	.002	.08	.07	.02	.09	.004	.001	.399	.002

PHYSICAL PROPERTIES

Tensile (PSI)	Yield (PSI)	Elongation (2" or 4D)	Reduction of Area %	Hardness *BHN unless noted	Hardness 2
74,000	46,000	29.8	70	187 HB	152 HB

IMPACT TESTING

TYPE	TEMP	SMPL# 1	# 2	# 3	AVG	% SHEAR	LAT EXP
CHARPY1	-50 Deg. F	20 FT. LBS.	54 FT. LBS.	60 FT. LBS.	45 FT. LBS.	43-50-53	.033-.045-.050

SUPPLEMENTAL INFORMATION

NORMALIZED @ 890°C X 300' AIR. FINE GRAIN STEEL. FULLY KILLED Country of Origin: ITALY. IN ACCORDANCE WITH EN 10204 3.1.

WE CERTIFY THAT THE MATERIAL FURNISHED ON THIS ORDER COMPLIES WITH THE SPECIFICATIONS AS STATED. IAW GIBSON PRODUCTS Q.A. PROGRAM AND QUALITY MANUAL. COMPLYING WITH ISO 9001 AND PRESSURE EQUIPMENT DIRECTIVE (PED) REQUIREMENTS. THE ISSUE YEAR & ADDENDA FOR THE ABOVE DESCRIBED MATERIAL IS THE SAME AS THE STARTING MATERIAL UNLESS OTHERWISE NOTED.

Dawn Sexton
QUALITY ASSURANCE

ANTHONY CARDWELL
03/04/2024

GIBSON PRODUCTS

Gibson Products, Inc.
5691 SURREY SQUARE STREET
HOUSTON, TX 77017
Phone: (713) 941-4890

Material Test Report

SOLD TO: I.P.S.
P.O. BOX 581270
TULSA, OK 74158

SHIP TO: I.P.S.
606 NORTH 145TH EAST AVE.
TULSA, OK 74116

DATE	SALES ORDER #	CUST P.O. #	TAG NUMBER	
02/19/24	296886	TP842961X		

ITEM#	ITEM DESCRIPTION	SPEC/GRADE	QTY	HEAT CODE	HEAT NUMBER	STARTING MATERIAL
3	2" 300# RF LWN FLG X 9" LG	ASTM/ASME A/SA350 LF2 CL1	2	ZP44	65809	ASTM/ASME A/SA350 LF2/A/SA105 2019 ED.

CHEMICAL ANALYSIS

C	SI	MN	P	S	CR	NI	MO	CU	V	NB	CE	TI
.190	.26	1.00	.009	.005	.07	.11	.03	.18	.002	.001	.40	.001

PHYSICAL PROPERTIES

Tensile (PSI)	Yield (PSI)	Elongation (2" or 4D)	Reduction of Area %	Hardness *BHN unless noted	Hardness 2
70,778	45,686	33.6	70	145 HB	156 HB

IMPACT TESTING

TYPE	TEMP	SMPL# 1	# 2	# 3	AVG	% SHEAR	LAT EXP
CHARPY1	-50 Deg. F	27 FT. LBS.	40 FT. LBS.	60 FT. LBS.	43 FT. LBS.	---	.024-.033-.048

SUPPLEMENTAL INFORMATION

NORMALIZED 1650°F HELD 4.0 HRS, AIR COOLED. Grain size 6-8 (fine grain) IN ACCORDANCE WITH EN 10204 3.1.

ANTHONY CARDWELL
03/04/2024

WE CERTIFY THAT THE MATERIAL FURNISHED ON THIS ORDER COMPLIES WITH THE SPECIFICATIONS AS STATED. IAW GIBSON PRODUCTS Q.A. PROGRAM AND QUALITY MANUAL. COMPLYING WITH ISO 9001 AND PRESSURE EQUIPMENT DIRECTIVE (PED) REQUIREMENTS. THE ISSUE YEAR & ADDENDA FOR THE ABOVE DESCRIBED MATERIAL IS THE SAME AS THE STARTING MATERIAL UNLESS OTHERWISE NOTED.

Dawn Sexton
QUALITY ASSURANCE

MANNESMANN PRECISION TUBES

Inspection Certificate

acc to EN 10204/3.1

Page 1 of: 2 Pages

Certificate no.: 9220350

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 SA 179	acc. to norm:	A179 SA179	Edition:	2021 2021

Marking: On tubes / On tags

Manufacturer's mark: MPT-HE

Process: Basic oxygen steel

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

Steelmarks: (S)A 179 + N

Extent of the delivery:

Shipping no.: 4400608
Our shipping date: 01-06-2022

Item	Numbers	Dimension			Heat no	Sample no.
30	405	1,000" OD x 0,109" MW x 26'0"	3209,64 m	5293 kg	323090	1-2

Shipping marks:
PO : 10075464
Item : 00003
Mat : A320100010908
Quantity : 405pcs
Tag Nr. : PO# A22-13312 T-6
ASTM/ASME A/SA 179 SMLS
Grade 1010
OD: 1,0000" Inches
Wall: 0.1090 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 (%)	0,15	0,51	0,011	0,001	0,04		323090

	Mo	V	Cu	Ni	Sn		Heat no
Requirements							
Heat analysis (%)	0,01	0,001	0,02	0,03	0,001		323090

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.) : 30-06-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022

MANNESMANN
PRECISION TUBES

Test results

Certificate no.: 9220350

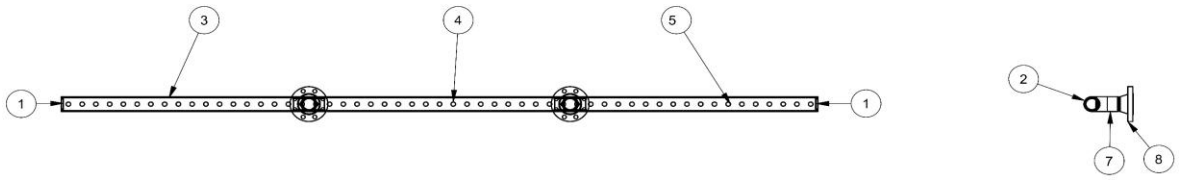
1. Visual inspection and control of dimensions: OK
2. Eddy current test acc. to: E309: OK
3. Flattening test: OK
   Flaring test: OK
4. Hardness test: OK

Mechanical data	Dimensions of the test tube mm	Hardness HRB
Requirements:		*Max 72*
1 2	25,40 x 2,95	68 67

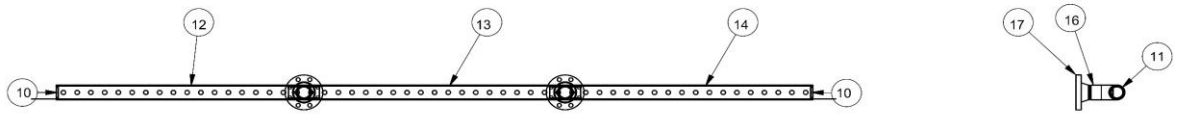
Helmond: 30-06-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022



BACK TUBE SHEET SIDE



FRONT PLUG SHEET SIDE

Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
1	NUCOR	3602357	SA-516-70N
2	EMPRESAS RIGA	CP5	SA-106B
3	BENTELTER	316423	SA-106B
4	BENTELTER	309901	SA-106B
5	BENTELTER	316423	SA-106B
7	BENTELTER	302142	SA-106B
8	ULMA	18EE22	SA-350LF2
10	BENTELTER	3602357	SA-106B
11	EMPRESAS RIGA	CP5	SA-106B
12	BENTELTER	316423	SA-106B
13	BENTELTER	309901	SA-106B
14	BENTELTER	316423	SA-106B
16	BENTELTER	302142	SA-106B
17	ULMA	18EE22	SA-350LF2
TUBES	MANNESMANN	323090	SA-179

CUSTOMER:	AIR PRODUCT MANUFACTURING LLC.		FABSCO SHELL & TUBE, LLC
PO NO:	4505606036 / A8KM-4-406-PO-1	DATE	
ITEM NO:	18-XF-354	AC	DWG No A22-13312-6SC-HS 0

NUCOR
PLATE MILL GROUP
P.O.Box 279
Winton, NC 27986
(252) 356-3700

MTR 9574

Mill Test Report

Page 1

1505 River Rd
Cofield, NC 27922
(252) 356-3700

Issuing Date : 05/05/2023 **B/L No. :** 648011 **Load No. :** 666573 **Our Order No. :** 204829/1 **Cust. Order No. :** V30717

Vehicle No: NOKL 725084

Sold To: LEECO STEEL PRODUCTS
1011 WARRENVILLE RD STE 500
LISLE,IL 60532

Ship To: LEECO STEEL, LLC
8655 GOLDEN SPIKE LN
HUDSON,TX 77064

Specification: 0.5000" x 96.000" x 480.000"
ASTM A516 70/65/60/485-17/ASME SA516-70/65/60/485 PVQ 2019/2021
Normalized Plate NACE MR0175 Annex 2.1.2 (2015), MR0103 (2010)
Section 2.1.2 (2015) 13.1.1, 13.1.2)Compliant

Plate Serial No: 3602357-04-1-01

Marking : V30717

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	Ceq	Pcm
3602357	0.19	1.06	0.008	0.001	0.18	0.13	0.07	0.13	0.02	0.036	0.003	0.001	0.002	0.0050	0.0027	0.0002	0.008	0.41	0.27

			Tensile Test					Heat Treat			
Plate Serial No	Pieces	Tons	Dir.	Yield (psi)	Tensile (psi)	Elong. % in 2"	Elong. % in 8"	Norm (°F)	Time (min)	Temper (°F)	Time (min)
3602357-04	1	3.26	H-T	49,600	74,300	44.7		1650	23		

			Charpy Impacts															
			--------Absorbed Energy (Ft-lbs)--------					--------Lateral Expansion (in.)---------					----------Shear (%)----------						
Plate Serial No	Pieces	Tons	Dir.	(ft-lbs) 1	(ft-lbs) 2	(ft-lbs) 3	(ft-lbs) Ave	Min	(in.) 1	(in.) 2	(in.) 3	(in.) Ave	(in.) Min	(%) 1	(%) 2	(%) 3	(%) Ave	Min	Temp (°F)	Size
3602357-04	1	3.26	H-L	69.5	74.1	105.6	83.1	20											-50	10mm

ANTHONY CARDWELL
03/04/2024

CEQ=.41

HOT ROLLED 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:nhc-SalesMX@nucor.com
Yield by 0.5EUL method unless otherwise specified. Ceq = C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)
Pcm = C+(Si/30)+(Mn/20)+(Cu/20)+(Ni/60)+(Cr/20)+(Mo/15)+(V/10)+5B
Melted and Manufactured in the USA. ISO 9001:2015 certified. PED 2014/68/EU, 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. API Q1-1851
DIN 50049 3.1.B/EN 10204 3.1(2004) 3.1B(1993)/ DIN EN 10204 3.1(2005) compliant. ABS QA-3624366

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.

C. L. Cooper, Metallurgist

5/8/2023 8:17:25 AM

EMPRESAS RIGA, S.A de C.V.

CONEXIÓN SOLDABLE
CARR. MTY-LAREDO KM. 24.2
APARTADO POSTAL 43 C.P. 65550 CIÉNEGA DE FLORES, N.L., MÉXICO
TELS.- (8) 344-84-83, 344-84-45, 344-88-60
FAX:(8) 344-88-01

Certificate Q5377

CERTIFICADO DE CALIDAD No.: 8905 CERTIFIED TEST REPORT:	LISTA DE EMPAQUE : 5349 PACKING LIST:	FECHA: JULIO 10 de 2002 DATE:	
VENDIDO A: SOLD TO:		PEDIDO DEL CLIENTE No. CUSTOMERS ORDER No.	EMBARCADO A: SHIP TO:

PRUEBAS MECÁNICAS

CANT.	COLADA HEAT CODE	DESCRIPTION	ESF. DE CEDENCIA YIELD STRENGTH (PSI)	ESF. RUPTURA TENSILE STRENGTH (PSI)	ELONGACION ELONGATION % 2"	DUREZA HARDNESS HB
6	FA5	CODO R.L. 3 X 90 CED XS	54356	70659	40	131
100	EK5	CODO R.L. 3 X 90 CED STD	52535	74785	36	129
25	CP5	CODO R.L. 3 1/2 X 90 CED XS	49576	68511	42	124
102	EG5	CODO 4 X 45 CED STD	52322	72423	41	131
1	VS4	CODO 4 X 45 CED STD	47501	76367	30	133
177	ZF4	CODO 4 X 45 CED STD	57165	81017	30	141
59	SU3	CODO 4 X 45 CED XS	47456	74394	35	120
42	YV4	CODO 4 X 45 CED XS	53957	72621	34	136
19	BQ5	CODO 4 X 45 CED XS	47856	72240	33	139
43	TU4	CODO 5 X 45 CED STD	58488	76958	30	139
7	BP5	CODO 5 X 45 CED STD	52668	80933	31	132

ANALISIS QUÍMICO

COLADA HEAT CODE	C.E.	C	Mn	P	S	Si	Cr	Cu	Mo	Ni	V	Nb
FA5	0.302	0.170	0.660	0.008	0.003	0.280	0.050	0.076	0.023	0.040	0.000	0.000
EK5	0.336	0.190	0.710	0.008	0.003	0.280	0.060	0.064	0.042	0.040	0.000	0.000
CP5	0.305	0.170	0.670	0.007	0.003	0.270	0.050	0.066	0.029	0.040	0.000	0.000
EG5	0.316	0.180	0.660	0.006	0.002	0.290	0.050	0.079	0.042	0.040	0.000	0.000
VS4	0.354	0.185	0.793	0.011	0.001	0.339	0.055	0.058	0.050	0.169	0.004	0.000
ZF4	0.327	0.185	0.768	0.007	0.000	0.338	0.034	0.032	0.019	0.020	0.002	0.000
SU3	0.297	0.178	0.664	0.014	0.000	0.264	0.026	0.040	0.002	0.001	0.002	0.000
YV4	0.299	0.155	0.727	0.003	0.002	0.358	0.044	0.096	0.021	0.040	0.006	0.000
BQ5	0.298	0.170	0.660	0.008	0.004	0.270	0.040	0.052	0.021	0.030	0.000	0.000
TU4	0.343	0.190	0.786	0.006	0.000	0.344	0.036	0.048	0.011	0.128	0.002	0.000
BP5	0.325	0.180	0.770	0.010	0.002	0.290	0.030	0.076	0.020	0.026	0.001	0.001

LOS PRODUCTOS MANUFACTURADOS POR EMPRESAS RIGA, S.A. de C.V. ESTAN CONFORME A LAS SIGUIENTES ESPECIFICACIONES:

CC-008

PRODUCTS MANUFACTURED BY EMPRESAS RIGA, S.A. de C.V. ARE CONFORMING TO FOLLOWING SPECIFICATIONS:

STARTING MATERIAL SEAMLESS PIPE ASTM A 106 GRADE B. ACORDING TO DIN 50049/3.1. B / EN 10204/3.1. B

ASTM A 234 / ASME SA 234 WPB, ASME B16.9, ASME B16.28 AND NACE MR 0175.

CONEXIONES SIN COSTURA, FORJADO EN CALIENTE Y NORMALIZADO
SEAMLESS FITTINGS, HOT FORMED AND NORMALIZED

GERENTE DE ASEGURAMIENTO DE CALIDAD:
QUALITY ASSURANCE MANAGER:

ING. JOSE MARTINEZ MACIAS.
e-mail jmartinez@empresasriga.com

ANTHONY CARDWELL
03/04/2024

Benteler Stahl/Rohr GmbH
Postfach 13 40
33043 Paderborn
Deutschland
Tel.: +49.5254.81-0 Fax: +49.5254.13666

BENTELER Steel/Tube

3
5
12
14

INSPECTION CERTIFICATE EN 10204-3.1

EN 10204:2005-01

Benteler Stahl/Rohr GmbH - Postfach 1340 - 33043 Paderborn - Deutschland

Document No.:	465-1416815/001/E	**Inspection No.:**	**Page:** 1 / 3
Purchase Order No.:	10P42267	**Manufacturer:**	BSTMC Shreveport USA
Benteler Order No.:	48010036	**Manufacturer's brand:**	
Dispatch Note No.:		**Stamp of the inspection representative:**	MI
Product:	SEAMLESS STEEL TUBES	**Steelmaking process:**	ELECTRIC FURNACE

Terms of delivery:	ASTM-A 53-2020, ASME SA-53, ASME BPVC.II.A-2021, ASTM-A 106-19a, ASME SA-106, ASME BPVC.II.A-2021, API Specification 5L Forty-Sixth Edition April 2018 incl. Errata 1, May 2018, PSL 2, ANSI/NACE MR0175/ISO 15156-1: 2020, ANSI/NACE MR0175/ISO 15156-2: 2020, ANSI/NACE MR0103/ISO 17945:2015
Dimensions-tolerances:	ASTM-A 106-19a, ASME SA-106, ASME BPVC.II.A-2021, ASTM-A 53-2020, ASME SA-53, ASME BPVC.II.A-2021, API Specification 5L Forty-Sixth Edition April 2018 incl. Errata 1, May 2018
Steel grade:	GRADE B, GRADE C, GRADE BN, GRADE X42N
Delivery condition:	N
Product marking:	FS: BENTELER BENTELER-Sign API 5L-1072 API-Sign Month/Year Conditions Dimension: O.D. * t inch Steel Grade PSL2 SMLS Heat No. Tube length feet Test Pressure PSI Production No. Customer's material no.

AEZ = Etching ink marking FK = color marking FS = paint stenciling FSD = Color jet printer FSI = Color jet printer inside LK = Laser marking PKE = tag marking PS = die stamp TS = Ink jet spray marking

Item	Dimensions	Heat No.	Test pressure PSI	Test pressure sec
0005	3 NPS - XXS 35,000 FT - 45,000 FT	316423	2970	5

Country of melt and pour

Melted & Manufactured in USA
Nucor, Jewett, TX, US

Heat analysis [%]

Item	Heat No.	C	SI	MN	P	S	CR	MO	NI	CU	V	NB	TI	B
0005	316423	0.180	0.254	1.00	0.012	0.005	0.15	0.04	0.09	0.18	0.004	0.001	0.002	0.0003

1. Formula: CE IIW=C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)<=0,43 %
2. Formula: Cr+Cu+Mo+Ni+V<=1.00 %
3. Formula: Nb+V<=0.06 %
4. Formula: Nb+Ti+V<=0.15 %

ANTHONY CARDWELL
03/04/2024

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BENTELER Steel/Tube

INSPECTION CERTIFICATE EN 10204-3.1

Document No.: 465-1416815/001/E **Inspection No.:**

Formula results

Item	Heat No.	1. Formula	2. Formula	3. Formula	4. Formula
0005	316423	0,403	0,464	0,005	0,007

Product analysis [%]

Item	Heat No.	C	SI	MN	P	S	CR	MO	NI	CU	V	NB	TI	B
0005	316423	0.150	0.260	0.96	0.012	0.003	0.13	0.04	0.09	0.18	0.004	0.001	0.003	0.0002
0005	316423	0.160	0.260	0.96	0.012	0.004	0.14	0.04	0.08	0.18	0.004	0.001	0.003	0.0002

1. Formula: CE IIW=C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)<=0,43 %
2. Formula: Cr+Cu+Mo+Ni+V<=1.00 %
3. Formula: Nb+V<=0.06 %
4. Formula: Nb+Ti+V<=0.15 %

Formula results

Item	Heat No.	1. Formula	2. Formula	3. Formula	4. Formula
0005	316423	0,363	0,444	0,005	0,008
0005	316423	0,374	0,444	0,005	0,008

Test results

The tubes have been submitted to a leak tightness test by:	Hydrostatic test: acc. to API 5L, Test pressure/Time-record, the test records/charts shall be available for examination by the inspector		PASSED
The tubes are non destructive tested:	ET - Test standard: acc. to API 5L; ET - Test method: acc. to ASTM-E 309; ET - Test drilled hole: 0,125 IN.; ET - Notch shape/hole: drilled hole		PASSED
Visual inspection:	PASSED	**Dimensions examination:**	PASSED

Results of mechanical testing

Tensile test longitudinal at RT, Strip test specimen

Item	Specimen No.	Heat No.	Specimen dimensions	Yield strength	Tensile strength	Elongation		
Requirements				RT 0,5 %	Rm	A2"	**1. Formula**	Rt 0,5/Rm
			IN	PSI	PSI	%		
				42100-71800	70000-95000			MAX 0,93
0005	000011	316423	0,750 X 0,585	48153	75565	44,00	37,00	0,64

Elongation formula

1. Formula AF=625000 * AXC^0,2 / U^0,9

ANTHONY CARDWELL
03/04/2024

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BENTELER Steel/Tube

INSPECTION CERTIFICATE EN 10204-3.1

Document No.: 465-1416815/001/E **Inspection No.:**

Protection

outside surface varnished

Item	Heat No.	Production No.
0005	316423	15030660

Remark

NACE Standard: Hardness acc. to ANSI/NACE MR0175/ISO 15156: HRC max 22 as per ASTM A370 table 2&3., Hardness acc. to ANSI/NACE MR0103/ISO 17945: HRC max. 22 as per ASTM A370 table 2&3.; Certificate remarks: material free from mercury contamination, Data converted from SI units, No weld repair has been carried out;
Certificate-Remark: LONGHORN

Plant 465, 1 BENTELER DRIVE, LA 71115 Shreveport, 14.09.2023, TEL.: 678-386-3371

Inspection representative
PIDICHETI / AM

We certify that the supplied product has been processed, sampled, tested, and inspected in accordance with the agreed specifications and/or references mentioned herein and meet the requirements for the grade indicated. This document was prepared by means of electronic data processing and is valid without signature.

ANTHONY CARDWELL
03/04/2024

1 of 3

BENTELER Steel/Tube
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BENTELER Steel/Tube

INSPECTION CERTIFICATE EN 10204-3.1

EN 10204:2005-01

Document No.:	465-1270937/001/P	**Inspection No.:**	**Page:** 1 / 3
Purchase Order No.:	10965	**Manufacturer:**	BSTMC Shreveport USA
Benteler Order No.:	48002112	**Manufacturer's brand:**	
Dispatch Note No.:		**Stamp of the inspection representative:**	MI
Product:	SEAMLESS STEEL TUBES	**Steelmaking process:**	ELECTRIC FURNACE

Terms of delivery:	ASTM-A 53-2018, ASME SA-53, ASME BPVC.II.A-2019, ASTM-A 106-19a, ASME SA-106, ASME BPVC.II.A-2019, API Specification 5L Forty-Sixth Edition April 2018 incl. Errata 1, May 2018, PSL 2, ANSI/NACE MR0175/ISO 15156-1 2015, ANSI/NACE MR0175/ISO 15156-2 2015, ANSI/NACE MR0103/ISO 17945:2015
Dimensions-tolerances:	ASTM-A 106-19a, ASME SA-106, ASME BPVC.II.A-2019, ASTM-A 53-2018, ASME SA-53, ASME BPVC.II.A-2019, API Specification 5L Forty-Sixth Edition April 2018 incl. Errata 1, May 2018
Steel grade:	GRADE B, GRADE C, GRADE BN, GRADE X42N
Delivery condition:	N
Product marking:	FS: BENTELER BENTELER-Sign API 5L-1072 API-Sign Month/Year Conditions Dimension: O.D. * t inch Steel Grade PSL2 SMLS Inspector's sign Heat No. Tube length feet Test Pressure PSI Production No. Customer's material no.

AEZ = Etching ink marking FK = color marking FS = paint stenciling FSD = Color jet printer FSI = Color jet printer inside LK = Laser marking PKE = tag marking PS = die stamp TS = Ink jet spray marking

Item	Number	Dimensions	Length total feet	Weight lbs	Heat No.	Test pressure PSI	sec
0007	52	3 NPS - XXS 35 FT - 45 FT	2134.62	40082	309901	2970	5

Country of melt and pour

Melted & Manufactured in USA
Nucor, Jewett, TX, US

Heat analysis [%]

Item	Heat No.	C	SI	MN	P	S	CR	MO	NI	CU	V	NB	TI	B
0007	309901	0.160	0.262	0.98	0.007	0.007	0.10	0.02	0.06	0.17	0.005	0.0000	0.002	0.0002

1. Formula: CE IIW=C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)<=0,43 %
2. Formula: Cr+Cu+Mo+Ni+V<=1.00 %
3. Formula: Nb+V<=0.06 %
4. Formula: Nb+Ti+V<=0.15 %

BEN|188 / 309901 / 3.0A106XXHD / 3 XXH A106B SMLS PIPE

ANTHONY CARDWELL
12/13/2022

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BENTELER Steel/Tube

BEN188 / 309901 / 3.0A106XXHD / 3 XXH A106B SMLS PIPE

INSPECTION CERTIFICATE EN 10204-3.1

Document No.: 465-1270937/001/P Inspection No.:

Formula results

Item	Heat No.	1. Formula	2. Formula	3. Formula	4. Formula
0007	309901	0.364	0.338	0.005	0.007

Product analysis [%]

Item	Heat No.	C	SI	MN	P	S	CR	MO	NI	CU	V	NB	TI	B
0007	309901	0.170	0.280	0.96	0.009	0.007	0.10	0.02	0.06	0.16	0.004	0.001	0.002	0.0001
0007	309901	0.170	0.280	0.96	0.009	0.008	0.10	0.02	0.06	0.16	0.004	0.001	0.002	0.0001

1. Formula: CE IIW=C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)<=0,43 %
2. Formula: Cr+Cu+Mo+Ni+V<=1,00 %
3. Formula: Nb+V<=0.06 %
4. Formula: Nb+Ti+V<=0.15 %

Formula results

Item	Heat No.	1. Formula	2. Formula	3. Formula	4. Formula
0007	309901	0.369	0.344	0.005	0.007
0007	309901	0.369	0.344	0.005	0.007

Test results

The tubes have been submitted to a leak tightness test by:	Hydrostatic test: acc. to API 5L, Test pressure/Time-record, the test records/charts shall be available for examination by the inspector	PASSED
The tubes are non destructive tested:	ET - Test standard: acc. to API 5L; ET - Test method: acc. to ASTM-E 309; ET - Test drilled hole 0.125 IN.; ET - Notch shape/hole: drilled hole	PASSED

Visual inspection: PASSED Dimensions examination: PASSED

Results of mechanical testing

Tensile test longitudinal at RT, Strip test specimen

Item	Specimen No.	Heat No.	Specimen dimensions	Yield strength	Tensile strength	Elongation		
Requirements			IN	RT 0,5 % PSI 42100-71800	Rm PSI 70000-95000	A2" %	1. Formula	Rt 0,5/Rm MAX 0.93
0007	000011	309901	0.749 X 0.615	48733	75565	41.00	23.00	0.64

Elongation formula

1. Formula: AF=625000 * AXC^0,2 / U^0,9

ANTHONY CARDWELL
12/13/2022

~~BENTELER Steel/Tube~~
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BENTELER
Steel/Tube

INSPECTION CERTIFICATE EN 10204-3.1 **Document No.:** 465-1270937/001/P **Inspection No.:** **Page:** 3 / 3

Protection

outside surface varnished

Item	Heat No.	Production No.
0007	309901	15019710

Remark

NACE Standard: Hardness acc. to ANSI/NACE MR0175/ISO 15156: HRC max 22., Hardness acc. to ANSI/NACE MR0103/ISO 17945: HRC max. 22., Certificate remarks: material free from mercury contamination, Data converted from SI units, No weld repair has been carried out; Certificate-Remark: LONGHORN

Mill Test Reports
For PO# _____
Dixie Pipe Sales, Inc.

Plant 465, 1 BENTELER DRIVE, LA 71115 Shreveport, 08/02/2021, TEL.: 0318-216-4149

Inspection representative
Pidicheti / KM

We certify that the supplied product has been processed, sampled, tested, and inspected in accordance with the agreed specifications and/or references mentioned herein and meet the requirements for the grade indicated. This document was prepared by means of electronic data processing and is valid without signature.

BEN188 / 309901 / 3.0A106XXHD / 3 XXH A106B SMLS PIPE

ANTHONY CARDWELL
12/13/2022

BENTELER Steel/Tube
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BENTELER Steel/Tube

INSPECTION CERTIFICATE EN 10204-3.1

EN 10204:2005-01

Document No.:	465-1020339/001/P	**Inspection No.:**	**Page:** 1 /3
Purchase Order No.:	1284-00	**Manufacturer:**	BSTMC Shreveport USA
Benteler Order No.:	48000372	**Manufacturer's brand:**	
Dispatch Note No.:		**Stamp of the inspection representative:**	MI
Product:	SEAMLESS STEEL TUBES	**Steelmaking process:**	ELECTRIC FURNACE

Terms of delivery: ASTM-A 53-2012, ASME SA-53, ASME BPVC.II.A-2015, ASTM-A 106-2015, ASME SA-106, ASME BPVC.II.A-2015, API Specification 5L Forty-Fifth Edition, December 2012 incl. Errata (2015), PSL 2, ANSI/NACE MR0175/ISO 15156-1: 2015, ANSI/NACE MR0175/ISO 15156-2: 2015, NACE Standard MR0103-2010

Dimensions-tolerances: ASTM-A 106-2015, ASME SA-106, ASME BPVC.II.A-2015, ASTM-A 53-2012, ASME SA-53, ASME BPVC.II.A-2015, API Specification 5L Forty-Fifth Edition, December 2012 incl. Errata (2015)

Steel grade: GRADE B, GRADE C, GRADE BN, GRADE X42N

Delivery condition: N

Product marking: FS: BENTELER BENTELER-Sign API 5L-1072 API-Sign Month/Year Conditions Dimension: O.D. * t inch Steel Grade PSL2 SMLS Inspector's sign Heat No. Tube length feet Test Pressure PSI Customer's material no. Dimension: NPS inch Weight Class Productio No.

AEZ = Etching ink marking FK = color marking FS = paint stenciling FSD = Color jet printer LK = Laser marking PKE = tag marking PS = die stamp TS = Ink jet spray marking

Item	Number	Dimensions	Length total feet	Weight lbs	Heat No.	Test pressure PSI	sec
0017	201	3 NPS - XXS 38 FT - 42 FT	8028.45	148955	302142	2970	5

Heat analysis [%]

Item	Heat No.	C	SI	MN	P	S	CR	MO	NI	CU	V	NB	TI	B
0017	302142	0.170	0.260	0.98	0.010	0.003	0.06	0.01	0.04	0.09	0.005	0.003	0.002	0.0004

1. Formula: CE IIW=C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)<=0,43 %
2. Formula: Cr+Cu+Mo+Ni+V<=1.00 %
3. Formula: Nb+V<=0.06 %
4. Formula: Nb+Ti+V<=0.15 %

Formula results

Item	Heat No.	1. Formula	2. Formula	3. Formula	4. Formula
0017	302142	0.357	0.205	0.008	0.010

ANTHONY CARDWELL
12/13/2022

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BENTELER Steel/Tube

INSPECTION CERTIFICATE EN 10204-3.1 **Document No.:** 465-1020339/001/P **Inspection No.:**

Product analysis [%]

Item	Heat No.	C	SI	MN	P	S	CR	MO	NI	CU	V	NB	TI	B
0017	302142	0.170	0.260	0.92	0.010	0.004	0.06	0.01	0.04	0.09	0.004	0.001	0.003	0.0003
0017	302142	0.170	0.260	0.92	0.010	0.004	0.06	0.01	0.04	0.09	0.004	0.001	0.003	0.0003

1. Formula: CE IIW=C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)<=0,43 %
2. Formula: Cr+Cu+Mo+Ni+V<=1.00 %
3. Formula: Nb+V<=0.06 %
4. Formula: Nb+Ti+V<=0.15 %

Formula results

Item	Heat No.	1. Formula	2. Formula	3. Formula	4. Formula
0017	302142	0.347	0.204	0.005	0.008
0017	302142	0.347	0.204	0.005	0.008

Test results

The tubes have been submitted to a leak tightness test by: Hydrostatic test: acc. to API 5L, Test pressure/Time-record, the test records/charts shall be available for examination by the inspector — PASSED

The tubes are non destructive tested: UT-Test standard: acc. to API 5L; longitudinal testing; UT-Test method: acc. to ASTM-E 213; UT-Outside notch depth: 12.5 %; UT-Inside notch depth: 12.5 %; UT-Notch length max: 2.000 IN.; UT-Notch width max: 0.040 IN. — PASSED

Visual inspection: PASSED **Dimensions examination:** PASSED

Results of mechanical testing

Tensile test longitudinal at RT, Strip test specimen

Item	Specimen No.	Heat No.	Specimen dimensions	Yield strength	Tensile strength	Elongation		
Requirements				RT 0,5 %	Rm	A2"	1. Formula	Rt 0,5/Rm
			in	PSI	PSI	%		
				42100-71800	70000-95000			MAX 0.93
0017	00001N	302142	0.75 X 0.61	44817	70198	42.00	23.00	0.64

Elongation formula

1. Formula AF=625000 * AXC^0,2 / U^0,9

Protection

outside surface varnished

ANTHONY CARDWELL
12/13/2022

BEN21/Z / 302142 / 3.0A106XXHD / 3 XXH A106B SMLS PIPE

BENTELER Steel/Tube
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BENTELER Steel/Tube

INSPECTION CERTIFICATE EN 10204-3.1 **Document No.:** 465-1020339/001/P **Inspection No.:** **Page:** 3 /3

Item	Heat No.	Production No.
0017	302142	15004195

Remark

NACE Standard: Hardness acc. to ANSI/NACE MR0175/ISO 15156: HRC max 22., Hardness acc. to Standard MR0103 HRC max. 22.; Certificate remarks: Data converted from SI units Steel Mill Nucor – Jewett, Texas USA; Melted and Manufactured in the USA; Of Domestic Origin-USA

Shreveport, 08-01-2017, TEL.: PROGRAMME SUPPORT/SERVICE

Inspection representative
Pidicheti /Hudson

We certify that the supplied products comply with the order specification.This document was prepared by means of electronic data processing and is valid without signature.

ANTHONY CARDWELL
12/13/2022

CLIENTE / Customer / Client

CERTIFICADO DE INSPECCION

Inspection Certificate - Certificat de Réception

FECHA / Date: 09/06/2023 | N.º / No. 225662 | HOJA / Page: 1

Company management certifications:
ISO 9001: 2015
ISO 14001: 2015
ISO 45001: 2018

Management Systems certified by LRQAE

Certified acc. PED 2014/68/EU+AD2000-W0 by TÜV Rheinland N.º 01 202 E/Q 02 7443

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

MARCA DEL FABRICANTE / Mark of factory / Marque du fabricant

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

Packing List: 176871
Expedition: 430334

PRODUCTO / Article - Produit: **FLANGES**

SU PEDIDO N.º / Your Order No. / Votre Cde. N.º: **338406-408**

DE / of. - de: **12/12/2022**

NORMAS APLICABLES / Requirements - Normes Applicables: **ASME B16.5-20**

MATERIAL CORRESPONDIENTE / Material Correspondent - Qualité: **ASME SA350LF2CL1-2-21, ASTM A350LF2CL1-2-23**
ASME SA105N-17, ASTM A105N-18

MODO DE FUSION (*) / Steel Making - Elaboration de l'acier: **ANSI/NACE MR0175-2021/ISO 15156:2020 & ANSI/NACE MR0103/ISO 17495:2015**

E = Elec. Y = Oxigeno básico

DEPARTAMENTO / Section / Département: **QUALITY ASSURANCE**

PARTIDA / Item / Poste	CANTIDAD / Quantity / Quantité	DESCRIPCION / Description / Description		OBSERVACIONES / Remarks / Observations (*)	COLADA N.º / Heat No / N.ºCoulée	RESISTENCIA T.Strength Resist Rupt N/mm2	LIMITE ELAST. Y.Strength 0,2 % N/mm2	ALARGAM. Elongation Allongement Lo:50mm/4d %	ESTRICCION Red. Area Striction %	RESILIENCIA Impact test Résilience Joules			MEDIA Average Moyenne	PROBETA / SPECIMEN °C	DUREZA Hardness Dureté HBW
1 1-M----FF721AAA	60	WN 1 150LB XS/80 RF A350LF2	05Y315	NE	M2AV22	519	319	37,20	78,99	86	73	75	78	-50	146 149
16 6-I----FF723AAA	271	WN 6 300LB STD/40 RF A350LF2	20M322	NE	006A23	523	328	36,93	71,20	86	84	73	81	-50	143 144
16 6-I----FF723AAA	137	WN 6 300LB STD/40 RF A350LF2	17M303	NE	05HC23	511	320	35,61	74,31	78	89	84	84	-50	142 146
55	1	WN 3 300LB XXS RF A350LF2	15N226	NE	18EE22	506	318	40,48	68,45	39	45	34	39	-50	140 141

COMPOSICION QUIMICA - STEEL MAKER'S LADLE ANALYSIS - ANALYSE CHIMIQUE

COLADA N.º Heat No Ladle: L Product: P	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Nb %	V %	Cu %	Al %	Ti %	Ca %	B %	CEq %	Origin of Steel
M2AV22 L	0,185	0,230	1,080	0,007	0,003	0,140	0,120	0,040	0,001	0,003	0,160	0,029	0,002	0,002	0,0001	0,42	Italy
006A23 L	0,190	0,198	1,203	0,011	0,002	0,066	0,061	0,016	0,001	0,002	0,091	0,032	0,001	0,002	0,0002	0,42	Germany
05HC23 L	0,184	0,227	1,199	0,009	0,008	0,073	0,067	0,013	0,001	0,002	0,092	0,023	0,001	0,002	0,0003	0,41	Germany
18EE22 L	0,182	0,240	1,073	0,010	0,006	0,054	0,074	0,030	0,003	0,000	0,149	0,022	0,001	0,001	0,0001	0,39	Italy

- Las dimensiones y la condición superficial se hallaron satisfactorias.
- 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.
Dpto. de Garantía de calidad
Quality Assurance Dept.

A. ASTIGARRAGA/QA MANAGER

(*) OBSERVACIONES: / Remarks / Observations

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

ANTHONY CARDWELL
03/04/2024

MANNESMANN PRECISION TUBES

Inspection Certificate

acc to EN 10204/3.1

Page 1 of: 2 Pages

Certificate no.: 9220350

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 SA 179	acc. to norm:	A179 SA179	Edition:	2021 2021

Marking: On tubes / On tags

Manufacturer's mark: MPT-HE

Process: Basic oxygen steel

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

Steelmarks: (S)A 179 + N

Extent of the delivery:

Shipping no.: 4400608
Our shipping date: 01-06-2022

Item	Numbers	Dimension			Heat no	Sample no.
30	405	1,000" OD x 0,109" MW x 26'0"	3209,64 m	5293 kg	323090	1-2

Shipping marks:
PO : 10075464
Item : 00003
Mat : A320100010908
Quantity : 405pcs
Tag Nr. : PO# A22-13312 T-6
ASTM/ASME A/SA 179 SMLS
Grade 1010
OD: 1,0000" Inches
Wall: 0.1090 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 (%)	0,15	0,51	0,011	0,001	0,04		323090

	Mo	V	Cu	Ni	Sn		Heat no
Requirements							
Heat analysis (%)	0,01	0,001	0,02	0,03	0,001		323090

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.) : 30-06-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022

MANNESMANN
PRECISION TUBES

Test results

Certificate no.: 9220350

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 2	25,40 x 2,95	68 67

Helmond: 30-06-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022