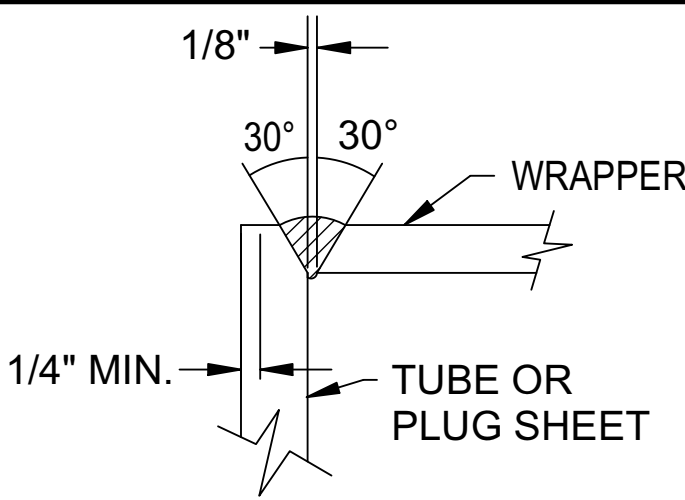
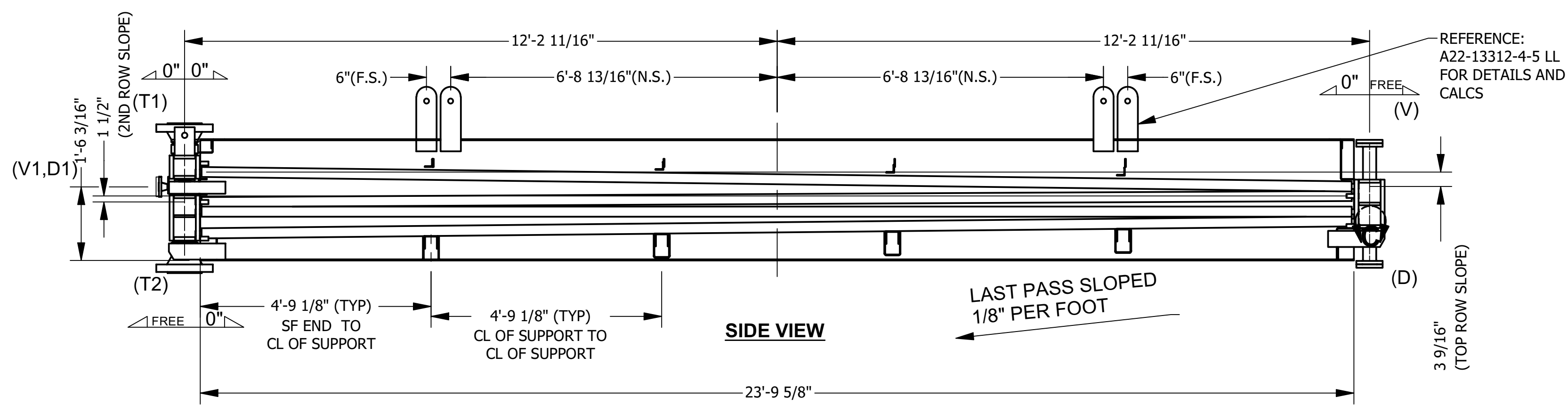
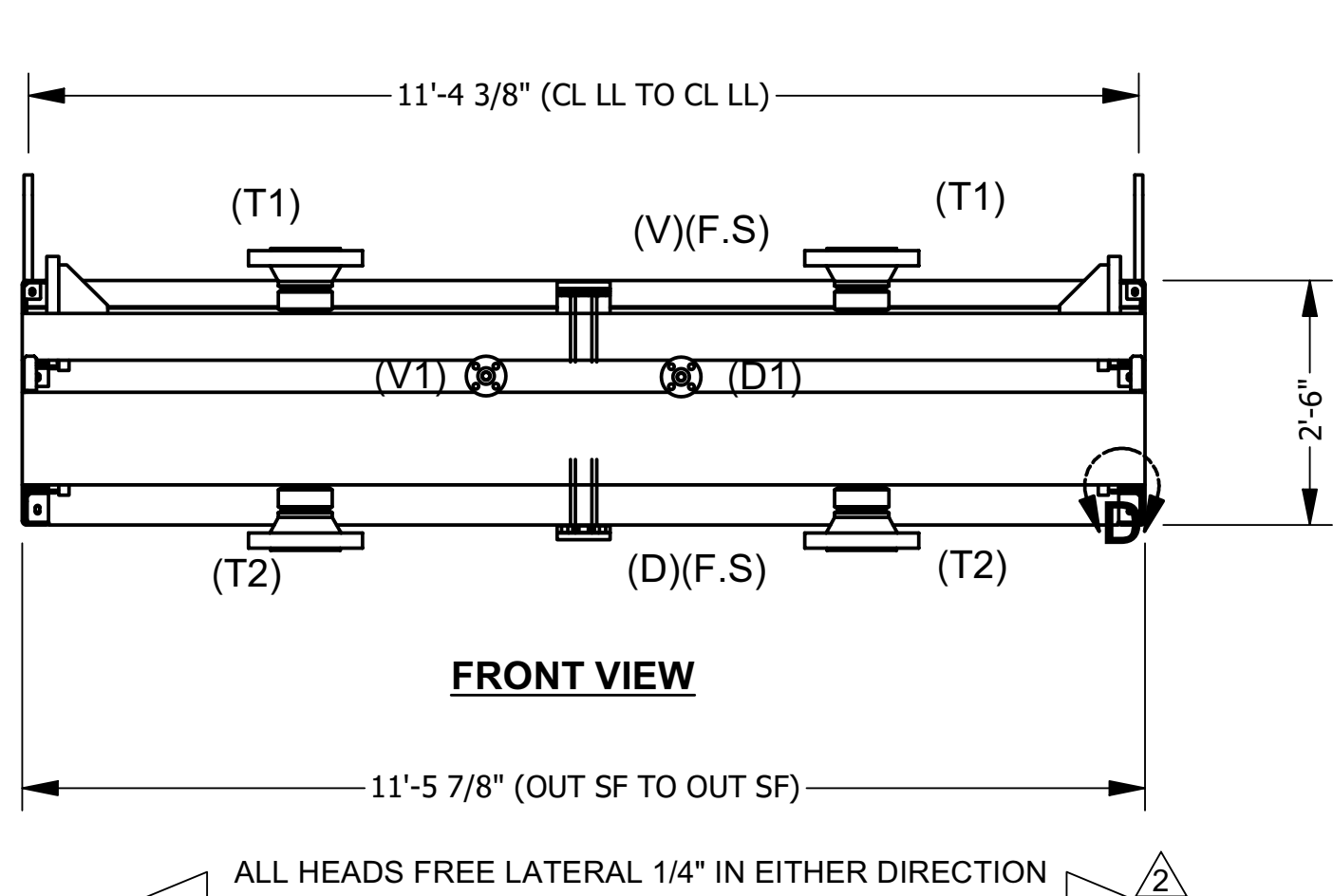




DESIGN INFORMATION	
DESIGN PRESS. PSIG:	550 / FV
DESIGN TEMP. DEG F:	555 / 350
MDMT DEG F:	32
CORROSION ALLOW. IN.:	0.125
EFFECTIVE SURFACE AREA:	BARE - 3110.2 FT^2 EXTENDED - 60351 FT^2

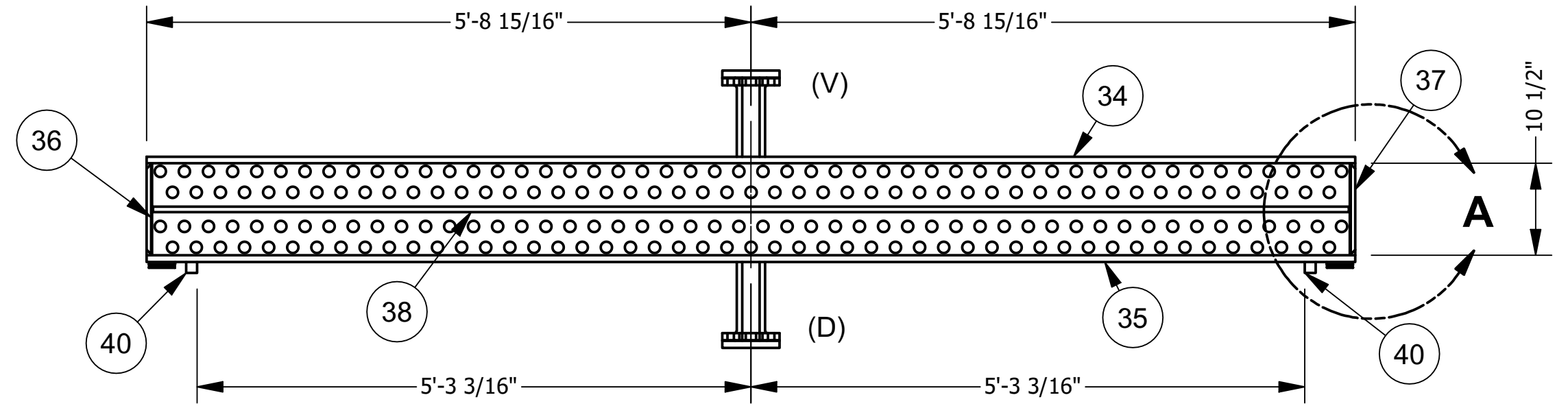
HYDROGEN SERVICE
100% RT/UT

HYDROTEST PSIG: 727
DESIGN & STAMP: ASME

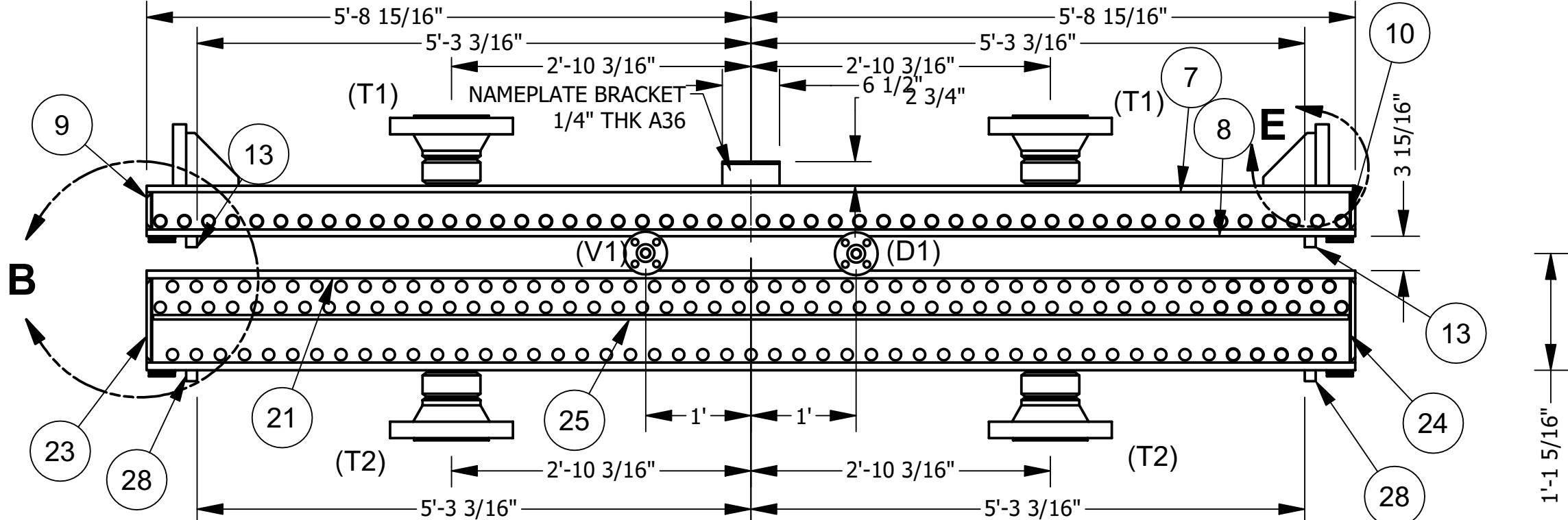
ASME SECT. VIII, DIV. 1 ED. 2021
CHARPY EXEMPT UG20(f) AND/OR UCS 66

PLUG HOLE INFORMATION	
PREDRILL DIAMETER	1.2188
TUBE REAM	1.261
TAP REAM	1.2969
TPI	12
SPOTFACE OD	1.75
SPOTFACE DEPTH	0.01
GROOVES/HOLE	FRONT (2) / BACK (2)
PLUG DIAM	1.375

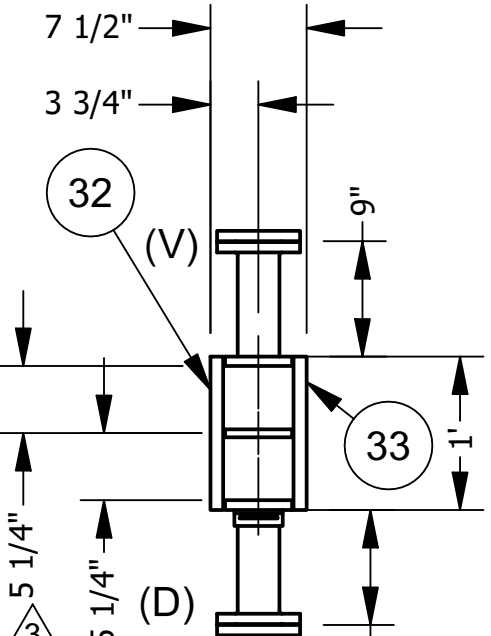
ROLL TOOL INFO	
FRONT ROLLER	1267C / R26
FRONT MANDREL	M66C
BACK ROLLER	1267C / R26
BACK MANDREL	M66C



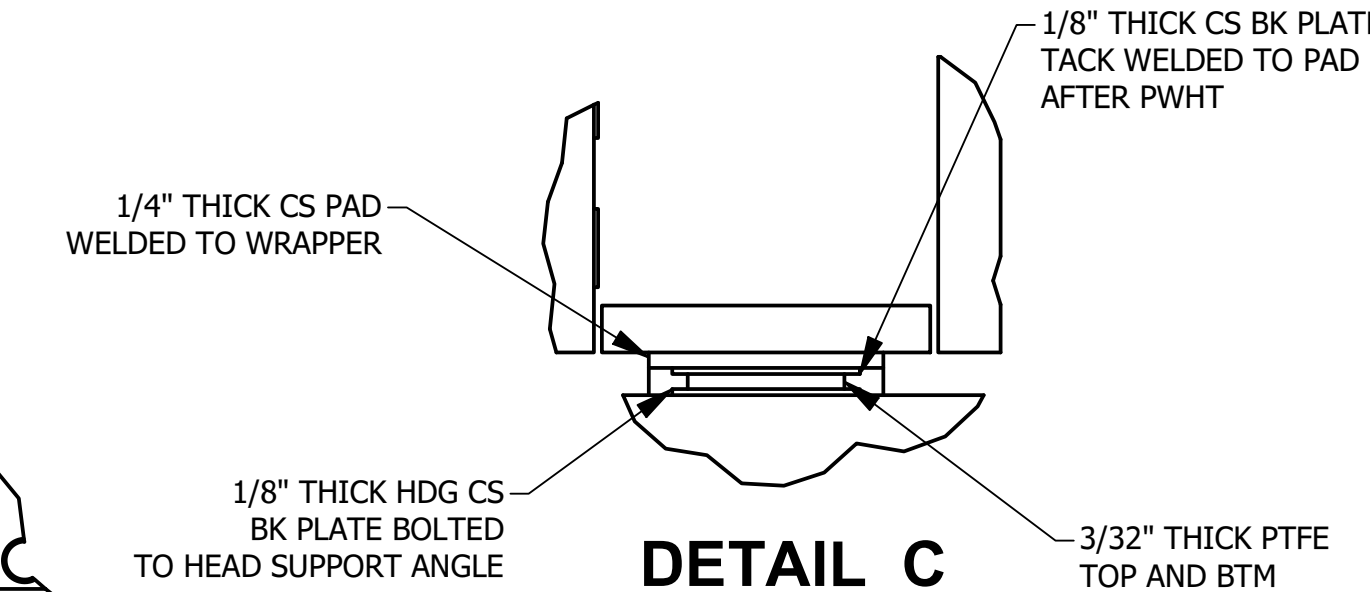
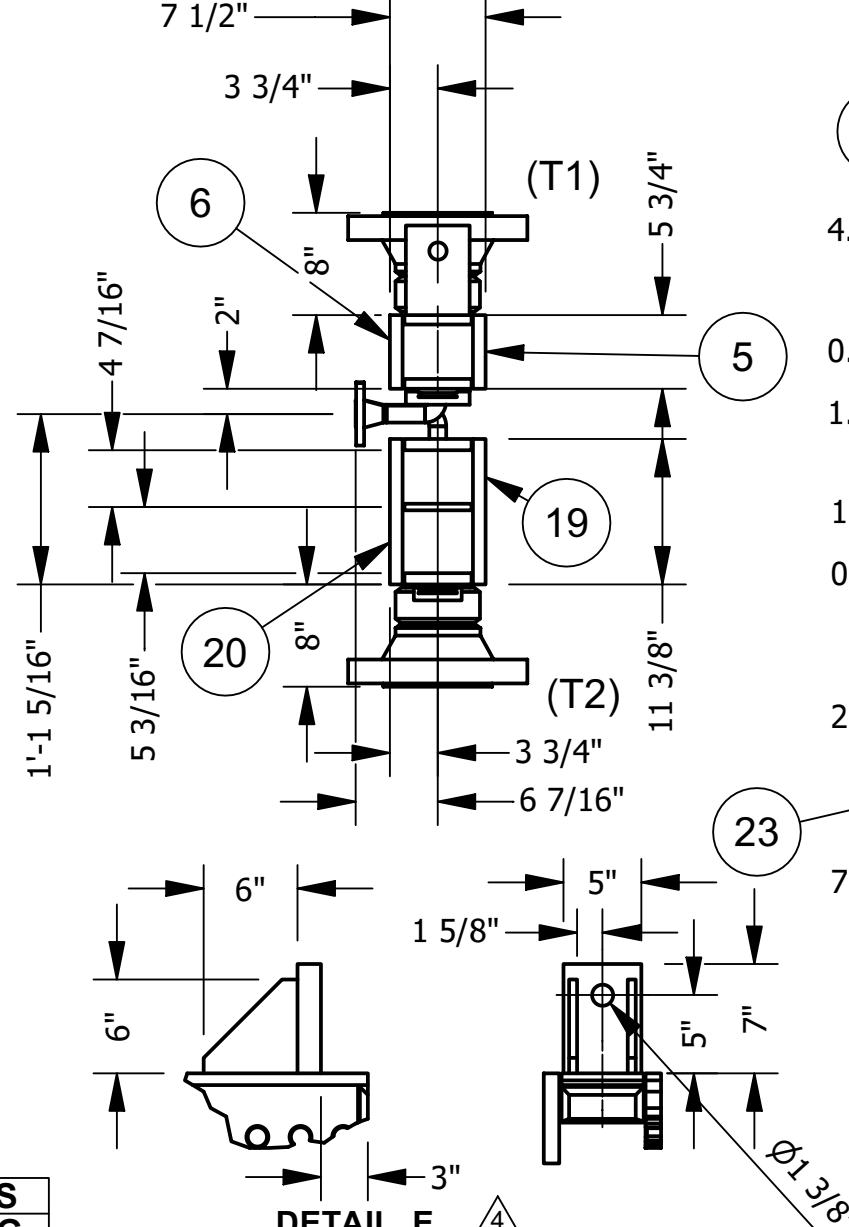
BACK TUBE SHEET SIDE



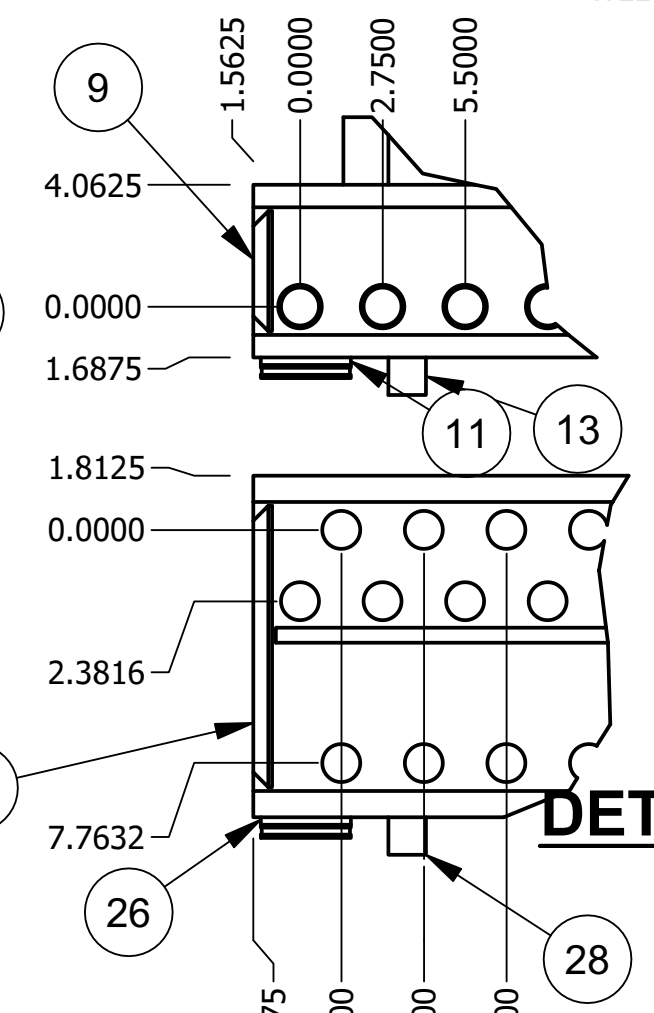
FRONT PLUG SHEET SIDE



DETAIL A



**DETAIL C
SLIDE PAD DETAIL**



**DETAIL D
HEADER SUPPORT
TYP. BOTH ENDS**

REFERENCE DOC #: EN207119-FAB-9V3-00280

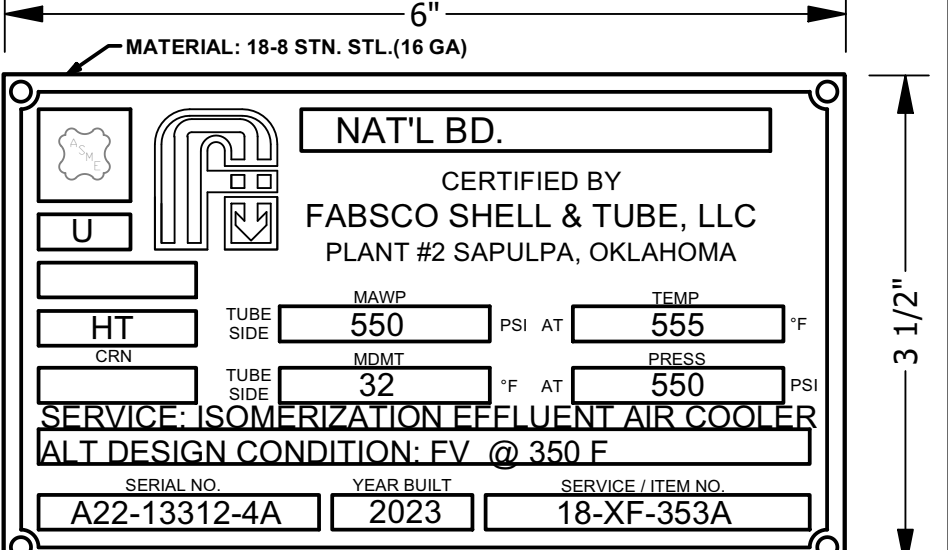
HEAT TREATMENT
A) HEAT FROM 800°F TO 1150°F @ 400°F PER HOUR.
B) HOLD @ 1150°F ± 25°F FOR (60 MIN.).
C) COOL FROM 1150°F TO 800°F @ 500°F PER HOUR.
D) FURTHER COOLING MAY BE IN STILL AIR.

MATERIALS:		STRUCTURAL:		TUBE SPACERS:	
PLATE:	SA-516-70N	SIDEFRAME:	C 0.25" 30" 285.625"	TUBE SPACERS REQD.:	69
PIPE:	SA-106-B	SUPPORT:	(4) - 4" X 6" X 0.1875" RT	SCALLOPED CHANNELS:	
FLANGE:	SA-350-LF2	BINDER:	(4) - L 2 X 2 X .25	1.25" X 2.75" PITCH	
PLUG:	SA-350-LF2	TP AIRSEAL:	Z	ALUMINUM	
		BTM AIRSEAL:	Z		
		LUG:	A36 604 WELDED		
GASKET:	A1008 CS (ZP)			TOLERANCES (INCH):	
SIDE FRAME:	A36	HDR FINISH:	SSPC SP10	LENGTH:	± 0.125
TUBE:	SA-179	System 2 after Hydrotest		WIDTH:	± 0.125
FIN:	ALUMINUM	PER: A8KM-PP-000-500520-A		TUBE PROJECTION:	0.0625 - 0.000 + 0.0625
STAY PLATE:	SA-516-70N	SFR FINISH:	HAND TOOL CLEAN Galvanized		
		PER: A8KM-PP-000-500540-A		DRY WEIGHT LBS:	19965
				HYDRO WEIGHT LBS:	22090

REV:	DATE	COMMENT	BY
0	02-03-2022	FOR APPROVAL	BH
1	7/15/23	CUST. COMM./ SLOPE CORR.	BH
2	10/5/23	CUST. COMM./ FIX IN. HEADER LONGITUDINAL	BH
3	2/10/23	CUST. COMM.	BH
4	10/18/23	THRUST BLOCKS	BH

NOZZLE:		CONNECTIONS:	
(T1) (INLET)	(2) 6" 600# - SCH 160 - RFWN 6" PIPE - SCH 160 - 2.875" LG - BBE	(V) (VENT)	(1) 2" 300# RFLWN W/BLIND
(T2) (OUTLET)	(2) 6" 600# - SCH 160 - RFWN 6" PIPE - SCH 160 - 2.875" LG - BBE	(D) (DRAIN)	(1) 2" 300# RFLWN W/BLIND
		(V1) (VENT)	(1) 1" 300# RFWN, SCH 160 PIPE, 90DEG EL, BLIND
		(D1) (DRAIN)	(1) 1" 300# RFWN, SCH 160 PIPE, 90DEG EL, BLIND
TUBES:	(198) 1.25" OD 0.12" MW 288"		
FIN:	5/8" HI 0.016" THK 10/FPI, EMBEDDED		
PLUGS:	(396) 1.375" OD 1" UH SHOULDER		

	THICK	LENGTH	WIDTH	BEVELS
6 FRONT TOP T/P SHEET	1.0000	137.8750	5.7500	30 LONG
7 FRONT TOP WRAPPER	0.7500	137.8750	5.2500	30 LONG
8 FRONT TOP END	0.6250	4.0000	5.2500	45 ALL
9 HEADER PAD	0.2500	5.0000	3.5000	NONE
10 LATERAL STOP BLOCK	1.5000	7.0000	5.0000	NONE
11 THRUST PLATE	1.5000	7.0000	5.0000	NONE
12 THRUST GUSSET	0.5000	6.0000	6.0000	NONE
13 FRONT BTM T/P SHEET	1.0000	137.8750	11.3750	30 LONG
14 FRONT BTM WRAPPER	0.8750	137.8750	5.2500	30 LONG
15 FRONT BTM END	0.6250	9.3750	5.2500	45 ALL
16 FRONT BTM STAY	0.5000	136.3750	5.2500	45 ALL
17 HEADER PAD	0.2500	5.0000	3.5000	NONE
18 LATERAL STOP BLOCK	1.2500	3.0000	1.2500	NONE
19 BACK T/P SHEET	1.0000	137.8750	12.0000	30 LONG
20 BACK WRAPPER	0.7500	137.8750	5.2500	30 LONG
21 BACK END	0.6250	10.2500	5.2500	45 ALL
22 BACK STAY	0.6250	136.3750	5.2500	45 ALL
23 HEADER PAD	0.2500	5.0000	3.5000	NONE
24 LATERAL STOP BLOCK	1.2500	3.0000	1.2500	NONE



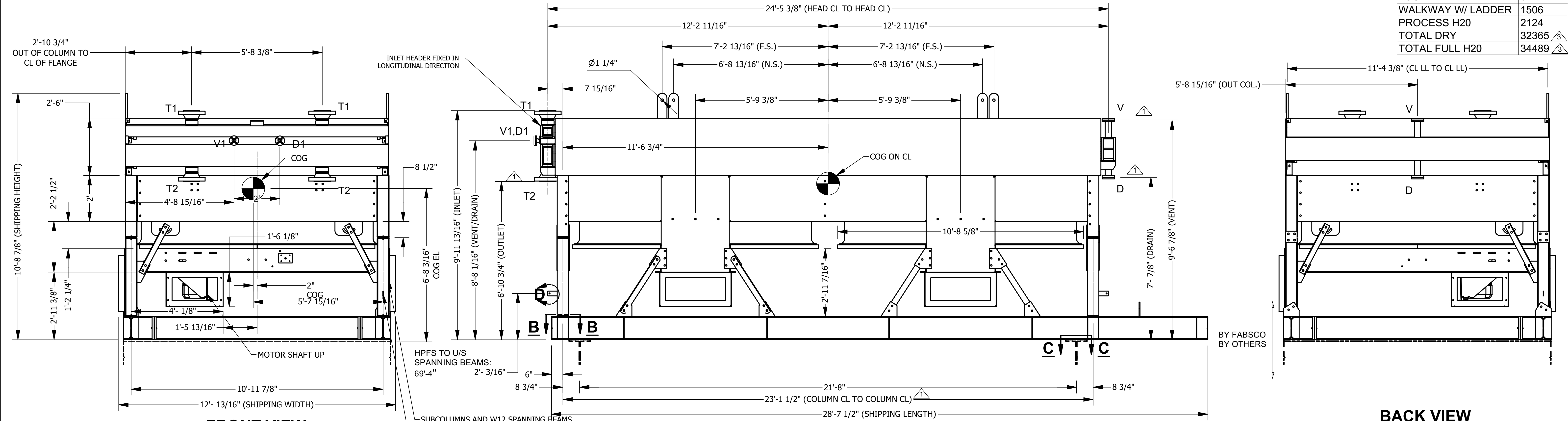
CERTIFIED
BY: _____ DATE: _____

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-353A/B
SERVICE:	ISOMERIZATION EFFLUENT AIR COOLER
LOCATION:	World Energy, Paramount, CA, USA
PO NO.:	4505606036 / A8KM-4-406-PO-1
FABSCO JOB NO.:	A22-13312-4A-5A

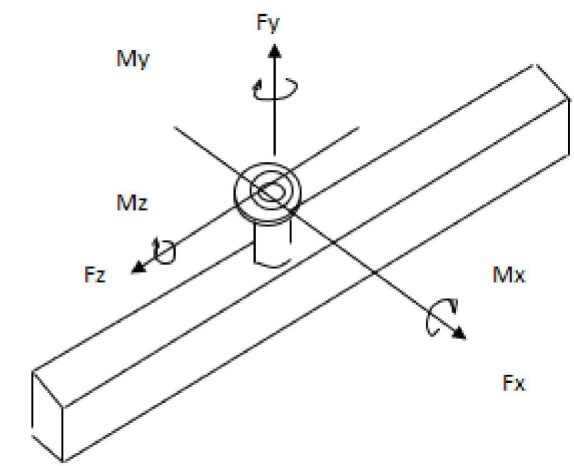
DRAWING PROPRIETARY TO FABSCO FIN-AIR, LLC AND IS NOT TO BE RELEASED TO ANY THIRD PARTY, EXCEPT WITH NOTIFICATION AND APPROVAL IN WRITING OF FABSCO FIN-AIR, LLC OFFICER.

DRAWN BY:	BH		BUNDLE ARRANGEMENT DRAWING - 18-XF-353A/B
DATE:			
CHECKED BY:	02-03-2022	DRAWING NO:	REV:
		A22-13312-4A-5A-300	4

SECTION / DESCRIPTION	MAWP	TEST PRESS	DESIGN TEMP	MDMT	ALTERNATE DESIGN	BUNDLE VOL	BUNDLE WT	LOUVER	HAILSCREENS	MOTOR HP: 20	FAN MFGR: MOORE	DIAM (FT): 10	SPECIFICATION NOTES:	COOLER WT #: SEE TABLE
UNITS	PSIG	PSIG	DEG F	DEG F	CONDITION	CU FT	LBS			TYPE: TEFC	CLASS: 10000	ACFM/FAN: 84546	VIBE SENSOR:WILCOXON	STRUCTURE FINISH: PER A8KM-PP-000-500540-A
ISOMERIZATION EFFLUENT AIR COOLER	550	727	555	32	FV @ 350 F	34	19965	NONE	NONE	RPM: 1800	BLADES: 4	HP@ DES.: 10.43	VIBE SENSOR MODEL NO.;	NON-FIREPROOFED STRUCTURAL STEEL TO BE GALVANIZED
18-XF-353A/B										VAC: 460/3/60	PITCH: 4.2		786A-D2	HEADER FINISH: PER A8KM-PP-000-500520-A
										FRAME: 256T	RPM: 313	DRIVE: HTD		SYSTEM 2 AFTER HYDROTEST
										SHAFT: 1.625	SERIES: 36	RATIO: 5.75:1		
										MOTOR WT: 322 lbs	TYPE: EC	DRIVE WIDTH: 36		
										QTY: 2 PER BAY	TIP: VE	AIR BRAKE: YES		
											QTY: 2 PER BAY			



- NOTE: 1. (2) BAYS REQUIRED
2. SPANNING BEAMS, STUB COLUMNS, TRANSV & LONL DIAG BRACES REMOVED FOR SHIPPING.
3. ALL MOTORS ARE VFD COMPATIBLE, NO SPACE HEATER.
4. MOTOR REMOVAL BEAM PROVIDED
5. MOTORS SHALL BE RATED FOR CLASS 1, DIV. 2, GROUPS B,C,D AND A T3C TEMPERATURE CODE
6. "COOLER WEIGHT" LISTED ABOVE INCLUDES BUNDLE, STEAM COIL FAN, MOTOR, STUB COLUMNS AND BRACES PER BAY.



PER COMMENT ON GA 8/8/2022						
NOZZLE LOADS	QTY/HEAD	SIZE	CLASS, #			
FRONT HEAD	2	6	600			
SIZE	FX	FY	FZ	MX	MY	MZ
	LBS	LBS	LBS	FT LB	FT LB	FT LB
6	1800	2260	2260	3160	4500	3200
6	1800	2260	2260	3160	4500	3200
COMBINED	3600	4520	4520	6320	9000	6400
MAX API	2250	4500	3750	4500	6000	3000
STR DESIGN LOAD	2250	4500	3750	4500	6000	3000

REFERENCE DOCUMENTS	
FABSCO DOC. #	APCI DOC. #
A22-13312-4A-5A-300	EN207119-FAB-9V3-00042
A22-13312-4A-5A-ASME	EN207119-FAB-9V3-00209
A22-13312-4-5-LL	EN207119-FAB-9V3-00172
A22-13312-4A-5A-NOTES	EN207119-FAB-9V3-00284
A22-13312-4-5-7 LAYOUT	EN207119-FAB-9V3-00076
A22-13312-4-5-STR	EN207119-FAB-9V3-00054
A22-13312-4-5-SKID	EN207119-FAB-9V3-00350

GENERAL ARRANGEMENT - 18-XF-353A/B		
REV.	DATE	DESCRIPTION
1	7/19/22	CUST. COMM. / SLOPE CORRECTION
2	10/14/22	CUST. COMM.
3	2/10/23	CUST. COMM.
4	3/15/23	CORR. DIMS TO REV 2/ CUST. COMM.
5	5/1/23	CORR. COMM.

NOZZLE SCHEDULE			
LABEL	ITEM	QTY	FLANGE
T1	PROCESS INLET	2	6" 600# RFWN
T2	PROCESS OUTLET	2	6" 600# RFWN
V1	VENT FRONT	1	1" 300# RFWN; BLIND; 90 DEG EL
D1	DRAIN FRONT	1	1" 300# RFWN; BLIND; 90 DEG EL
V	VENT REAR	1	2" 300# RFLWN; BLIND
D	DRAIN REAR	1	2" 300# RFLWN; BLIND
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-353A/B	
SERVICE:		Isomerization Effluent Air Cooler	
LOCATION:		World Energy, Paramount, CA, USA	
PO NO.:		4505606036 / A8KM-4-406-PO-1	
FABSCO JOB NO.:		A22-13312-4/5	

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:
BH

DATE:
3/22/22

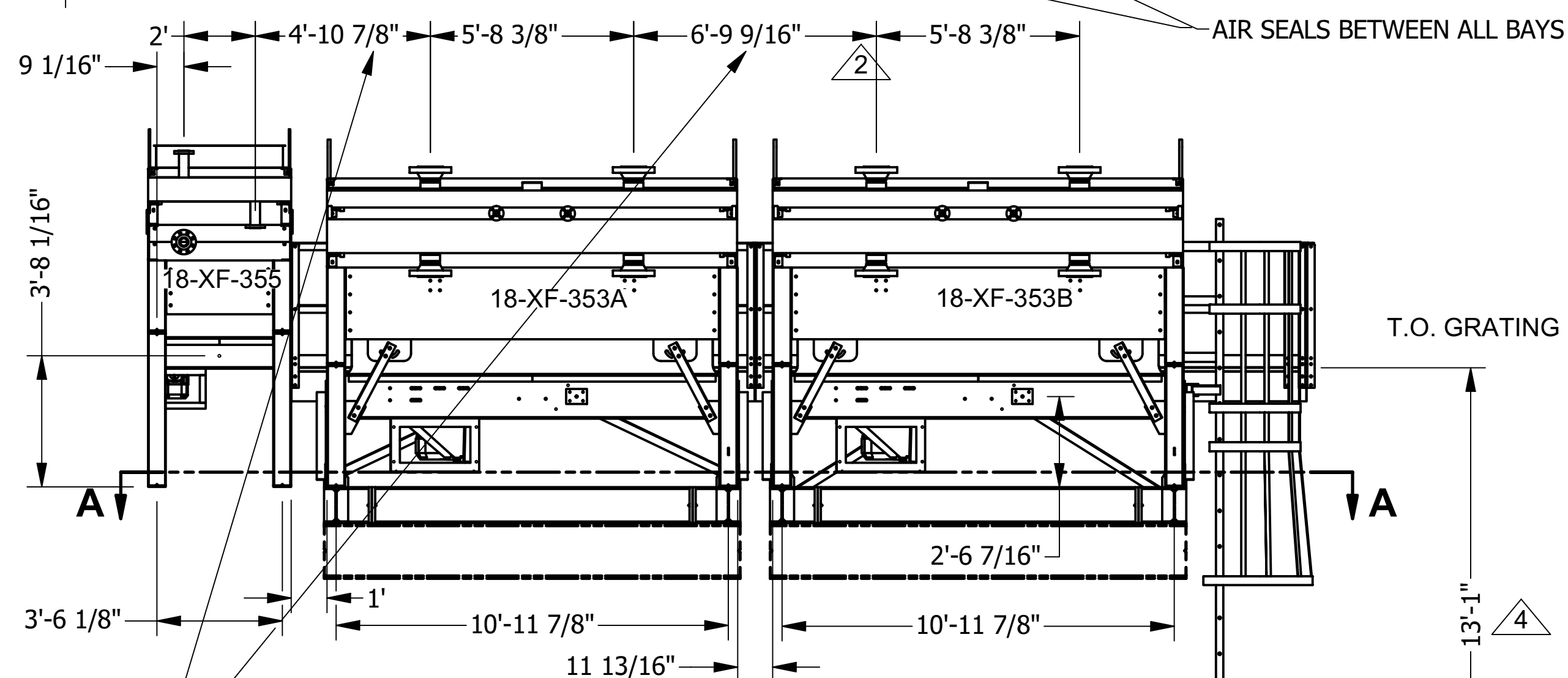
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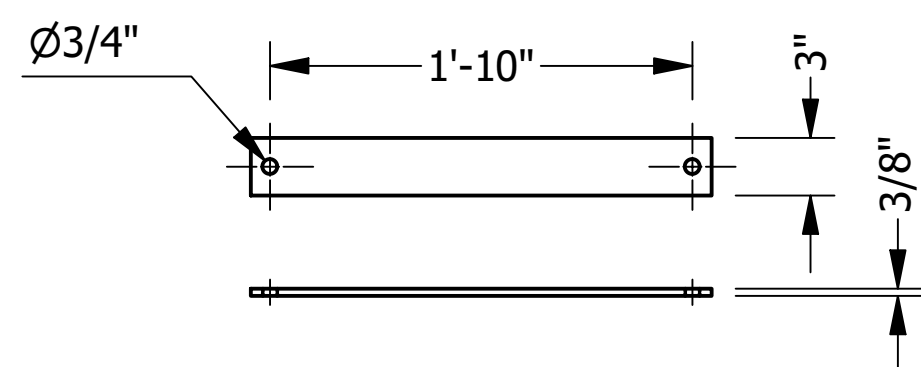
FABSCO
Fin-Air, LLC.

DRAWING NO:
A22-13312-4/5-100

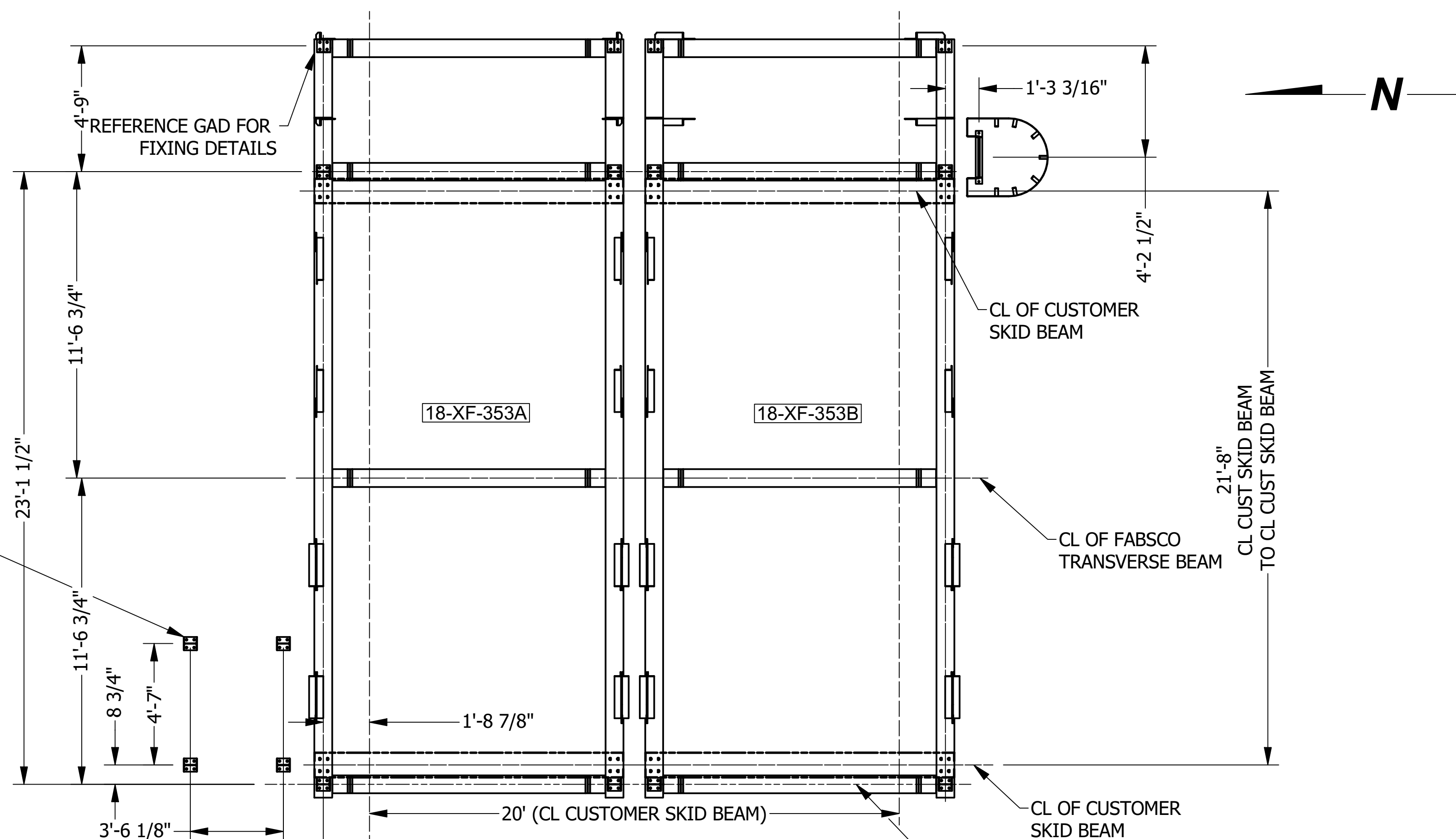
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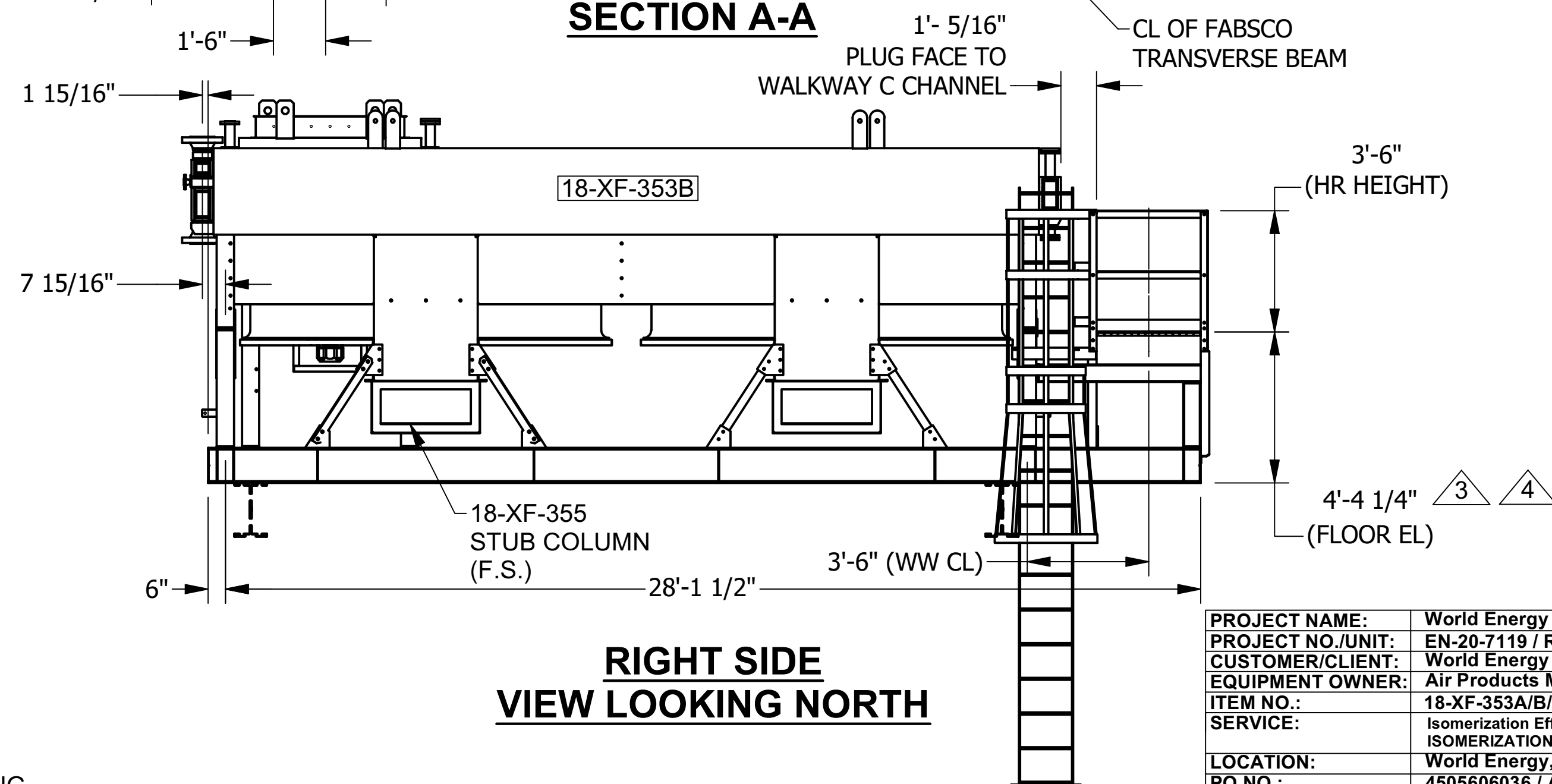
FRONT
VIEW LOOKING EAST



LADDER ANCHOR PLATE TYP



SECTION A-A



RIGHT SIDE
VIEW LOOKING NORTH

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-353A/B/18-XF-355
SERVICE:	Isomerization Effluent Air Cooler/ ISOMERIZATION QUENCH SPILLBACK COOLER
LOCATION:	World Energy, Paramount, CA, USA
PO NO.:	4505606036 / A8KM-4-406-PO-1
FABSCO JOB NO.:	A22-13312-4/5

18-XF-353A/B; 18-XF 355 BAY LAYOUT		
REV.	DATE	DESCRIPTION
0	3/23/2022	FOR APPROVAL
1	7/19/2022	CUST. COMM.
2	10/14/2022	CUST. COMM.
3	2/17/2023	CUST. COMM.
4	04/27/2023	CUST. COMM.

DRAWING PROPRIETARY TO FABSCO FIN-AIR, LLC AND IS NOT TO BE RELEASED TO ANY THIRD PARTY, EXCEPT WITH NOTIFICATION AND APPROVAL IN WRITING OF FABSCO FIN-AIR, LLC OFFICER.

DRAWN BY:

BH

DATE:

3/23/2022

CHECKED BY:

DRAWING NO: **A22-13312-4-5-7**
LAYOUT

REV:	
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4





WORLD ENERGY RENEWABLE FUELS CONVERSION PROJECT

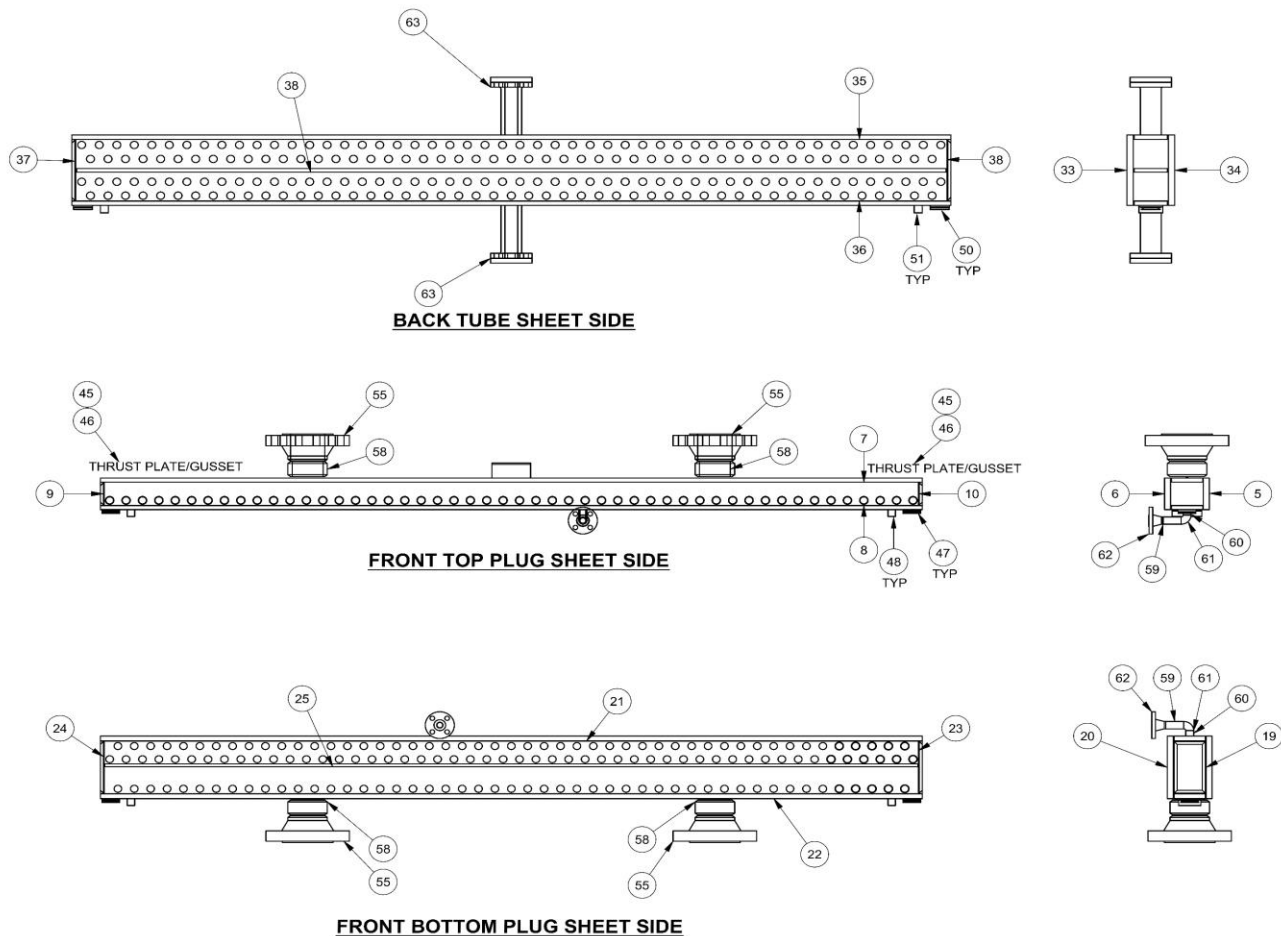
Project No: A8KM

Vendor Input to PCMS

Doc number: A8KM-PCMS-001, Rev. 0

Vendor Doc Number: EN207119-FAB-9V3-00115 PCMS_PO Number: 4505606036 Rev: 0

Identification					
1: Tag No.	18-XF-352A/B	353A/B			
2: Model No.	A22-13312-4-5				
3: Serial No.	there is a serial no. on				
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)	550				
24: MAWT (F)	555				
25: Design Pressure (psig)	550				
26: Full Vacuum	yes				Drop Down
27: Design Temp (F)	555				
28: MDMT (F)	32				
29: Weight Empty (lbs)	32365				
30: Weight Full (lbs)	34489				
31: Equipment Length (inches)	28'-8"				
32: Orientation	Horizontal				Drop Down
33: Equipment Width (inches)	12'-1"				
34: Equipment Height (inches)	10'-9"				
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



Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
5/6	NUCOR	1600564	SA-516-70N
7/8	SSAB	W2B694	SA-516-70N
9/10	NUCOR	1604766	SA-516-70N
19/20	SSAB	W2H551	SA-516-70N
21/22	SSAB	E2H052	SA-516-70N
23/24	NUCOR	1604766	SA-516-70N
25	SSAB	W2F527	SA-516-70N
33/34	SSAB	W2H551	SA-516-70N
35/36	SSAB	W2B694	SA-516-70N
37/38	NUCOR	1604766	SA-516-70N
45	SSAB	E1K179	SA-516-70N
46	NUCOR	3603032	SA-516-70N
47/50	SSAB	B0J740	SA-516-70N
48	JSW	S31285	A-36
51	JSW	S31285	A-36
55	KERKAU	6203A-6204	SA-350LF2
58	VALLOUREC	MA0118	SA-106B
59/60	MST	5394350	SA-106B
61	APP	BC8904	SA-234WPB
62	ULMA	K8AV9	SA-350LF2
63	FCI	11014B	SA-350LF2
TUBES	MANNESMANN	270569	SA-179

CUSTOMER: AIR PRODUCT MANUFACTURING LLC.

PO NO: 4505606036 / A8KM-4-406-PO-1

ITEM NO: 18-XF-353A/B

DATE

AC



FABSCO
SHELL & TUBE, LLC

DWG No

A22-13312-4A/5A-HS

0

NUCOR
PLATE MILL

P.O.Box 279
Winton, NC 27986
(252) 356-3700

Mill Test Report

Page 1

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

NUCOR
It's Our Nature.

Issuing Date : 02/26/2021 B/L No. : 583342 Load No. : 597241 Our Order No. : 182309/1 Cust. Order No. : MUS-257551
Vehicle No: SNC 62532 Sold To: METALS USA - SOUTHCENTRAL Ship To: METALS USA - PLATES AND SHAPES
Specification: 1.0000" x 120.000" x 480.000" 2800 N 43RD ST E TRACK 747
ASTM A516 70/65/60/485-17/ASME SA516-70/65/60/485 PVQ 2019/2017 MUSKOGEE, OK 74401
Normalized Plate NACE MR0175 Annex 2.1.2 (2015), MR0103 (2010)
Section 2.1.2 (2015) 13.1.1, 13.1.2) Compliant

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	Ceq	Pcm
1600564	0.18	1.00	0.009	0.003	0.18	0.18	0.09	0.08	0.01	0.027	0.004	0.002	0.001	0.0048	0.0010	0.0001	0.013	0.39	0.25

Plate Serial No	Pieces	Tons	Dir.	Tensile Test				Heat Treat			
				Yield (psi)	Tensile (psi)	Elong. % in 2"	Elong. % in 8"	Norm ("F)	Time (min)	Temper ("F)	Time (min)
1600564-05	2	16.33	H-T	48,500	74,100	54.4		1650	41		

1600564-05	2	16.33	H-T	48,500	74,100	54.4	Charpy Impacts													
Plate Serial No	Pieces	Tons	Dir.	Absorbed Energy (Ft-lbs)				Min	Lateral Expansion (in.)					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	(%) Ave			
1600564-05	2	16.33	H-L	70.3	52.2	78.7	67.1	15											-60	10mm

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 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant.
DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 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.

T. A. Depretis
T. A. Depretis, Metallurgist

2/26/2021 9:46:39 AM

ANTHONY CARDWELL
01/09/2023

Q.A. APPROVED
By *[Signature]* Date 10/3/2022



CERTIFICATE OF COMPLIANCE

DATE: OCTOBER 26, 2022
SUBJECT: NACE

GENTLEMEN:

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH PRESCRIBED METHODS IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING DOES CONFORM TO THE REQUIREMENTS OF NACE MR 01-75.

PLATE: ASTM A516-70N AND ASME SA516-70N LATEST EDITION.
SIZE: 1" NOMINAL
MILL CERTIFIED: NUCOR
HEAT: 1600564
SLAB: 05

Specification: NACE MR 01-75

Hardness, HRC	Results	Hardness, BHN	Results
			168, 168, 162

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT.

A handwritten signature in cursive script, appearing to read "Marty L. Eubanks", is written over a horizontal line.

MARTY L. EUBANKS
QUALITY ASSURANCE MANAGER
(918) 583-2222

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: LEECO STEEL PRODUCTS, INC. 1011 WARRENVILLE ROAD SUITE 500 LISLE IL 60532		Customer P.O.No.: V25952		Mill Order No. 41-665166-01		Shipping Manifest: AR353021											
		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: 17 Mar 22 Cert Date: 17 Mar 22		Cert No: 081035689 (Page 1 of 1)									
		Size: 0.750 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) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr		
W2B533	C72	0.751 (DISCRT)	C 51	75			44	T		86 104 107 99		-50F	L	10.			
W2B694	D34	0.750 (DISCRT)	C 52	75			44	T		146 107 96 116		-60F	L	10.			
W2B694	D36	0.752 (DISCRT)	C 51	74			45	T		134 115 115 121		-60F	L	10.			
Chemical Analysis																	
Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	IIW	ORGN
W2B533	.19	1.00	.008	.001	.23	.029	.028	.27	.14	.10	.05	.000	.002	.010	.0001	.41	USA
W2B694	.19	1.00	.010	.001	.24	.025	.022	.30	.15	.13	.03	.002	.003	.006	.0001	.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 (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 31 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.

PRODUCTS SHIPPED:

W2B533 C72 40079683 PCES: 1, LBS: 12252
W2B694 D34 40080773 PCES: 1, LBS: 12252

W2B694 D36 40080781 PCES: 1, LBS: 12252
W2B694 D34 40080770 PCES: 1, LBS: 12252

ANTHONY CARDWELL
01/09/2023

Q.A. APPROVED
By [Signature] Date 7/22/2022

(P)

Cust Part #: 075120480A516-70N

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

Jason Thomas
Director Technical Services



CERTIFICATE OF COMPLIANCE

DATE: OCTOBER 26, 2022

SUBJECT: NACE

GENTLEMEN:

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH PRESCRIBED METHODS IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING DOES CONFORM TO THE REQUIREMENTS OF NACE MR 01-75.

PLATE: ASTM A516-70N AND ASME SA516-70N LATEST EDITION.
SIZE: 3/4" NOMINAL
MILL CERTIFIED: SSAB
HEAT: W2B694
SLAB: D36

Specification: NACE MR 01-75

Hardness, HRC

Results

Hardness, BHN

Results

168, 162, 161

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT.



MARTY L. EUBANKS
QUALITY ASSURANCE MANAGER
(918) 583-2222

Mill Test Report

Page 1

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

Issuing Date : 08/08/2021 B/L No. : 599264 Load No. : 614480 Our Order No. : 189413/2 Cust. Order No. : V24013
Vehicle No: TTPX 804312 Sold To: LEECO STEEL PRODUCTS 1011 WARRENVILLE RD STE 500 LISLE, IL 60532 Ship To: LEECO STEEL, LLC % WATCO TRANSLOADING LLC C/O PORT OF CATOOSA DBA WATCO TERMINALS & PORT SERVICES CIF-A00129465-9000 TULSA PORT AUTHORIT,OK 74015
Specification: 0.6250" x 120.000" 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: 1604766-04-5-01
Marking : V24013

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	Ceq	Pcm
1604766	0.19	1.00	0.009	0.001	0.19	0.22	0.10	0.09	0.01	0.028	0.005	0.001	0.002	0.0069	0.0017	0.0000	0.009	0.40	0.26

			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)
1604766-04	1	5.10	H-T	49,300	74,300	43.5		1650	27		

			Charpy Impacts														
			Absorbed Energy (Ft-lbs)				Lateral Expansion (in.)				Shear (%)				Min	Temp (°F)	Size
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
1604766-04	1	5.10	H-L	93.5	107.4	80.0	93.6	20									

ANTHONY CARDWELL
01/09/2023

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.

T. A. Depretis
T. A. Depretis, Metallurgist

8/8/2021 7:08:27 PM

Q.A. APPROVED
By *[Signature]* Date 8/13/2021

9
10
23
24
37
38



CERTIFICATE OF COMPLIANCE

DATE: OCTOBER 26, 2022
SUBJECT: NACE

GENTLEMEN:

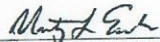
I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH PRESCRIBED METHODS IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING DOES CONFORM TO THE REQUIREMENTS OF NACE MR 01-75.

PLATE: ASTM A516-70N AND ASME SA516-70N LATEST EDITION.
SIZE: 5/8" NOMINAL
MILL CERTIFIED: NUCOR
HEAT: 1604766
SLAB: 04

Specification: NACE MR 01-75

Hardness, HRC	Results	Hardness, BHN	Results
			162, 160, 160

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT.



MARTY L. EUBANKS
QUALITY ASSURANCE MANAGER
(918) 583-2222

PO/Rel

Attn:

PART NO.

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.: TUL-344				Mill Order No.: 41-681134-08				Shipping Manifest: AR362993									
				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. @ -80F/A673-P				Ship Date: 22 Aug 22 Cert Date: 22 Aug 22				Cert No: 081064457 (Page 1 of 1)									
				Size: 1.000 X 120.0 X 480.0 (IN)				Heat Treat Type: NORMALIZED													
Tested Pieces:				Tensiles:				Hardness				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) 1 2 3 Avg				% Shear 1 2 3 Avg				Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W2H551	A37	1.008 (DISCRT)	C	51	75		48	T		114 121 93 109								-80F	L	10.	
Chemical Analysis																					
Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Co	V	Ti	B	INW	ORGN				
W2H551	.19	1.02	.010	.001	.23	.026	.025	.30	.16	.11	.03	.001	.003	.007	.0000	.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 (IIN) = 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: W2H551 A37 40091563 PCS: 1, LBS: 16335 W2H551 A37 40091562 PCS: 1, LBS: 16335																					
ANTHONY CARDWELL																					
01/09/2023																					
												Q.A. APPROVED									
												By <u>AW</u> Date <u>9/30/2022</u>									
(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 COMPLIANCE

DATE: OCTOBER 26, 2022

SUBJECT: NACE

GENTLEMEN:

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH PRESCRIBED METHODS IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING DOES CONFORM TO THE REQUIREMENTS OF NACE MR 01-75.

PLATE: ASTM A516-70N AND ASME SA516-70N LATEST EDITION.

SIZE: 1" NOMINAL

MILL CERTIFIED: SSAB

HEAT: W2H551

SLAB: A37

Specification: NACE MR 01-75

Hardness, HRC

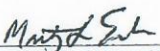
Results

Hardness, BHN

Results

171, 173, 175

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT.



MARTY L. EUBANKS
QUALITY ASSURANCE MANAGER
(918) 583-2222

PO/Rel

Attn:

PART NO.

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.: TUL-344		Mill Order No. 41-681134-06		Shipping Manifest: AR362993															
		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. @ -60F/A673-P				Ship Date: 22 Aug 22 Cert Date: 22 Aug 22 Cert No: 081064459 (Page 1 of 1) Heat Treat Type: NORMALIZED															
		Size: 0.875 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 8in	Tst Dir	Hardness	Abs. Energy(FTLB) 1 2 3 Avg				% Shear 1 2 3 Avg				Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tnp %Shr
E2H052	A62	0.883 (DISCRT)	C 52	75			48	T		35	30	35	33					-50F	L	10.	
Chemical Analysis																					
Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cr	Ni	Cr	Mo	Cb	V	Ti	B	IW	ORGN USA				
E2H052	.18	1.03	.010	.001	.25	.029	.028	.30	.16	.14	.03	.001	.003	.008	.0001	.42					

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 37 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.

PRODUCTS SHIPPED:

E2H052 A62 40091599 PCS: 1, LBS: 14293
E2H052 A62 40091597 PCS: 1, LBS: 14293

E2H052 A62 40091598 PCS: 1, LBS: 14293

ANTHONY CARDWELL
01/09/2023

Q.A. APPROVED
By [Signature] Date 10/13/2022

(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 COMPLIANCE

DATE: OCTOBER 26, 2022
SUBJECT: NACE

GENTLEMEN:

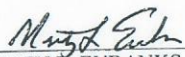
I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH PRESCRIBED METHODS IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING DOES CONFORM TO THE REQUIREMENTS OF NACE MR 01-75.

PLATE: ASTM A516-70N AND ASME SA516-70N LATEST EDITION.
SIZE: 7/8" NOMINAL
MILL CERTIFIED: SSAB
HEAT: E2H052
SLAB: A62

Specification: NACE MR 01-75

Hardness, HRC	Results	Hardness, BHN	Results
			167, 160, 169

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT.



MARTY L. EUBANKS
QUALITY ASSURANCE MANAGER
(918) 583-2222

Certificate of Mill Test Results

PO/Rel

TUL-000000-000

Pg 1/1

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 4: Date 6 Feb 2019

Customer: CHAPEL STEEL CORPORATION PO BOX 1000 SPRING HOUSE PA 19477	Customer P.O.No.: TUL-331	Mill Order No. 41-676504-01	Shipping Manifest: AR359558
	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. @ -60F/A673-P		Ship Date: 28 Jun 22 Cert Date: 28 Jun 22 Cert No: 081054059 (Page 1 of 1)
	Size: 0.500 X 96.00 X 480.0 (IN)		Heat Treat Type: NORMALIZED

Tested Pieces:				Tensiles:						Charpy Impact Tests										BDWTT Tnp %Shr	
Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in 8in	Tst Dir	Hardness	Abs. Energy(FTLB)				% Shear				Tst Tnp	Tst Dir		
										1	2	3	Avg	1	2	3	Avg				
W2F527	A23	0.502 (DISCRT)	C	55	76		39	T		114	94	108	105					-60F	L	10.	

Chemical Analysis																	ORGN
Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	IRW	
W2F527	.18	1.03	.013	.001	.23	.028	.026	.27	.14	.13	.02	.000	.003	.006	.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 (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 22 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

W2F527 A23	40086955	PCES:	1, LBS:	6534	W2F527 A23	40086957	PCES:	1, LBS:	6534
W2F527 A23	40086956	PCES:	1, LBS:	6534	W2F527 A23	40086954	PCES:	1, LBS:	6534
W2F527 A23	40086950	PCES:	1, LBS:	6534	W2F527 A23	40086958	PCES:	1, LBS:	6534
W2F527 A23	40086959	PCES:	1, LBS:	6534					

ANTHONY CARDWELL
01/09/2023

Q.A. APPROVED

By Joe Date 10/12/2022

(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

MTR 6833

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: LEECO STEEL PRODUCTS, INC. 1011 WARRENVILLE ROAD SUITE 500 LISLE IL 60532	Customer P.O.No.: V25285	Mill Order No.: 41-657721-01	Shipping Manifest: AR351092
Product Description: ASME SA516-70/SA516-65/SA516-60(21) ASTM A516-70/SA516-65/SA516-60(17) LCVN 20/15 FT LBS @ -50F/A573-P CEV .43% MAX		Ship Date: 15 Feb 22	Cert No: 081030419 (Page 1 of 1)
Size: 1.500 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	BDWTT								
E1K179	A26	1.513 (DISCOT)	C51	77			56	T		1	2	3	Avg	1	2	3	Avg				Tmp %Shr								
										35	32	35	34					-50F		10									
Chemical Analysis																													
Heat Id	C	Mn	P	S	Si	Tot Al	Sol Al	Cu	Ni	Cr	Mo	Co	V	Ti	B	IIW	ORG/USA												
E1K179	19	1.08	.007	<.001	.33	.042	.041	.26	.13	.12	.02	.005	.004	.001	.0001	.42													

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 15495-1:2015 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 63 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

E1K179 A26 40079715 PCS: 1, LBS: 24503

E1K179 A26 40079716 PCS: 1, LBS: 24503

CEQ = .42

(P) Cust Part #: 150120490A516-70N

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

Colt Beck
PRODUCT METALLURGIST

NUCOR
PLATE MILL GROUP

P.O. Box 279
Winton, NC 27986
(252) 356-3700

MILL Test Report

1546 River Rd
Coffield, NC 27922
(252) 356-3700

AMERICAN ALLOY
PLATE # 211110

Issuing Date: 06/03/2023 E/L No.: 000114 Load No.: 045813 Our Order No.: 2060302 Cust. Order No.: 136043-OK
Vehicle No: TTPX 81632 Sold To: AMERICAN ALLOY STEEL INC 6298 N HOUSTON ROSSLYN RD PO BOX 40488 NORTH HOUSTON, TX 77061 Ship To: AMERICAN ALLOY STEEL 6350 N ERIE AVE C/O BKOL TRACK #21 OWASSO, OK 74055
Specification: 0.5000" x 96.000" x 480.000" ASTM A516 70/60/50-17/ASME SA516-70/60/50 FYQ 2019/2021 Normalized Plate NACEMR0175 Annex 2.1.2 (2018), MR0183 (2010) Section 2.1.2 Compliant (2019) 13.1.1, 13.1.2 Vacuum Degassed
Marking: 136043-OK

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Nb	V	Al	Ti	N	Ca	B	Sn	Cuq	Pcm
8603032	0.20	1.06	0.010	0.001	0.21	0.24	0.11	0.07	0.02	0.030	0.005	0.002	0.001	0.0054	6.9013	0.0002	0.010	0.41	8.28
8603033	0.19	1.04	0.010	0.001	0.18	0.21	0.09	0.06	0.02	0.028	0.002	0.002	0.001	0.0052	6.9013	0.0001	0.011	0.40	8.29

Plate Serial No	Pieces	Tens	Dir.	TENSILE TEST				HEAT TREAT			
				Yield (ksi)	Tensile (ksi)	Elong. % in 2"	Elong. % in 6"	Norm (°F)	Time (min)	Temper (°F)	Time (min)
8603032-07	8	19.80	H-T	51,400	76,800	47.4		1650	23		
8603033-01	4	13.06	H-T	56,900	75,400	45.9		1650	23		

			Charpy Impact																				
Plate Serial No	Pieces	Tens	Dir.	Absorbed Energy (ft-lbs)				Min	Lateral Expansion (in.)					Min	Shear (%)				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	(%) Ave					
3603032-07	8	19.80	H-L	87.7	88.2	105.2	86.4	15														-50	10mm
3603033-01	4	13.06	H-L	56.8	88.1	33.4	69.4	15														-80	10mm

CEQ = .41

HOT ROLLED CARBON STEEL PLATE
TEST COUPONS TAKEN FROM HEAT TREATED PLATE
Please frequency check:

MATERIAL CONFORMS TO
NACE MR0175
3HN 153 TO 159
CERTIFIED BY
AMERICAN ALLOY STEEL
BY LMS DATE 10/12/23

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

Reviewed By:

#0111/23

Material subject to fully 100% inspection by Electric Arc Furnace. Welding of test 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 Special location. For Mexico shipments: info@alloysteel.com
Yield by 0.55% method unless otherwise specified. CEQ = C + (Mn/5) + (Si/3) + (Mo/5) + (V/3) + ((Cu+Ni)/15)
Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/50) + (Cr/20) + (Mo/15) + (V/10) + 5
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 Q1-1961
DIN 50448 S.1, EN 10204 S.1 (2004) S.1 (1993) DIN EN 10204 S.1 (2006) compliant. ABS QA-962408

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

6/3/2023 2:00:08 PM

ANTHONY CARDWELL
01/09/2023

SSAB**Test Certificate**

1770 Bill Sharp Boulevard, Muscatine, IA 52761-9412, 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: STEEL & PIPE SUPPLY P.O. BOX 1688 MANHATTAN KS 66502				Customer P.O.No.: 4500353651				Mill Order No. 41-617854-01				Shipping Manifest: MR417701																											
Product Description: ASTM A36(19)/A709(18)36/ASME SA36(19) 0.80%-1.20% MN, MAX 0.05% SI, 0.45% CEV								Ship Date: 27 Oct 20 Cert Date: 27 Oct 20				Cert No: 061863816 (Page 1 of 1)																											
Size: 0.242(MIN) X 72.00 X COIL (IN)																																							
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) 1 2 3 Avg				% Shear 1 2 3 Avg				Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tnp %Shr																		
B0J739	0673	0.250		54	73		26	T																															
B0J740	0663	0.250		50	70		34	T																															
Chemical Analysis:																																							
Heat Id	C	Mn	P	S	Si	Tot Al	Cu	Ni	Cr	Mo	Cb	V	Ti	B	N	IIW	ORGN																						
B0J739	.16	.83	.006	.004	.03	.027	.31	.15	.09	.03	.001	.002	.006	.0000	.0081	.35	USA																						
B0J740	.16	.84	.008	.003	.04	.024	.32	.15	.12	.04	.000	.002	.006	.0000	.0079	.36	USA																						
KILLED STEEL MERCURY IS NOT A METALLURGICAL COMPONENT OF THE STEEL AND NO MERCURY WAS INTENTIONALLY ADDED DURING THE MANUFACTURE OF THIS PRODUCT. HOT-ROLLED COIL INTENDED FOR CONVERSION TO GRADE. CERTIFIED TO CHEMISTRY ONLY. COIL END PHYSICAL TEST RESULTS, IF REPORTED, ARE FOR INFORMATION ONLY. CEV (IIW) = C + MN/6 + (CR+MO+V)/5 + (NI+CU)/15 MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT 100% MELTED, POURED, AND ROLLED IN THE USA PRODUCTS SHIPPED: <table> <tr> <td>B0J740</td> <td>0665</td> <td>PCES:</td> <td>1, LBS:</td> <td>49200</td> <td>B0J739</td> <td>0670</td> <td>PCES:</td> <td>1, LBS:</td> <td>49200</td> </tr> <tr> <td>B0J739</td> <td>0668</td> <td>PCES:</td> <td>1, LBS:</td> <td>49250</td> <td>B0J739</td> <td>0667</td> <td>PCES:</td> <td>1, LBS:</td> <td>49200</td> </tr> </table>																				B0J740	0665	PCES:	1, LBS:	49200	B0J739	0670	PCES:	1, LBS:	49200	B0J739	0668	PCES:	1, LBS:	49250	B0J739	0667	PCES:	1, LBS:	49200
B0J740	0665	PCES:	1, LBS:	49200	B0J739	0670	PCES:	1, LBS:	49200																														
B0J739	0668	PCES:	1, LBS:	49250	B0J739	0667	PCES:	1, LBS:	49200																														
ANTHONY CARDWELL 01/09/2023										Q.A. APPROVED Date <u>2/3/21</u>																													
(P) Cust Part # 70872999M3										WE HEREBY CERTIFY THAT THIS MATERIAL WAS TESTED IN ACCORDANCE WITH, AND MEETS THE REQUIREMENTS OF, THE APPROPRIATE SPECIFICATION Brian Wales SENIOR METALLURG ST. PRODUCT																													



CERTIFICATE OF COMPLIANCE

DATE: OCTOBER 26, 2022
SUBJECT: NACE

GENTLEMEN:

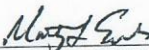
I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH PRESCRIBED METHODS IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING DOES CONFORM TO THE HARDNESS REQUIREMENTS OF NACE MR 01-75.

PLATE: ASTM A-36
SIZE: 1/4" NOMINAL
MILL CERTIFIED: SSAB
HEAT: B0J740
SLAB: None

Specification: NACE MR 01-75

Hardness, HRC	Results	Hardness, BHN	Results
			158, 156, 160

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT.



MARTY L. EUBANKS
QUALITY ASSURANCE MANAGER
(918) 583-2222



JSW Steel (USA) INC.
5200, East McKinney Road,
BAYTOWN, TX 77523

METALLURGICAL TEST REPORT

MET - 04 Rev. No.: 3 Rev. Date: 02/27/2018

5/28/2022

Bulletin	Order Item	Heat	PO No.	Shipping Mode	Order Dimensions	Slab Origin	TC No.
B114564	JSW19151-06	S31285	25.498	BARGE ITFX54141	1.25x96x240	JSW USA	B114564-1285-1

MELTED AND MANUFACTURED IN THE USA.

Plates Certified for the Following grades	Specifications	Marking Instructions
ASTM-A36, ASTM-A709-36, ASME-SA36 AR		Stencil in 1 location(s); X Loc. 18 Y Loc. 30; CUST; MADEINUSA PN PO; DIM GRADE; FREIGHT ORDER ITEM PLATE ID SHIPWEEK SLAB ID
Hot Rolled Carbon Steel Plates Plates Manufactured In the USA		TRANSMODE Stamp in 1 location(s); X Loc. 18 Y Loc. 12; Slab ID; Slab ID

Sold To: SUNBELT GROUP INC. 1990 POST OAK BLVD. SUITE 950 HOUSTON, TX 77056

Complies with ASTM A36 2019

Ship To: SUNBELT GROUP C/O RICHARDSON CO 2333 CLINTON DRIVE GALENA PARK, TX 77547

Test	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Nb	Ca	CE
LADLE	0.14	1.05	0.009	0.003	0.22	0.081	0.034	0.042	0.001	0.004	0.042	0.0086	0.004	0.0003	0.006	0.002	0.0019	0.33

Carbon Equivalent CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15

PCM = C + Si/30 + Mn/20 + Cu/20 + Nb/60 + Cr/20 + Mo/15 + V/10 + 5B

AWS = C + (Mn+Si)/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15

Plate Tested	Smpl. Loc.	Slab Identity	Gauge Tested	Test Cond	Test Dir.	Yield Point (KSI)	Ten. Stgth. (KSI)	Elong In 2"	YS/UTS Ratio	Yield Strength Determined At
1236158	A	06A	1.2500	AR	T	46	70	32.0%	0.66	0.2%
1236159	A	06B	1.2500	AR	T	42	69	34.0%	0.61	0.2%

Plates Certified For The Above Tests

Material	Thick(IN)	Width(IN)	Len(IN)	Wgt(LB)	Material	Thick(IN)	Width(IN)	Len(IN)	Wgt(LB)	Material	Thick(IN)	Width(IN)	Len(IN)	Wgt(LB)
1248104A	1.2500	96.000	240.00	8167.680										

ANTHONY CARDWELL
01/09/2023

Q.A. APPROVED
By April W Date 12/12/2022
April W

DIN: EN 10204 2004 3.1 This is to certify that the product described herein was manufactured, sampled, and tested in accordance with the specifications and requirements in such specifications. Fine Grain, Si-Al Fully Killed Steel. We certify that delivery of this product with the requirement of the specification and purchase order received from customer. DRC Conflict Free. No intentional addition of Pb, Se, S, Hg or B.



April Watkins 8323835325 april.watkins@jswsteel.us



CERTIFICATE OF COMPLIANCE

DATE: OCTOBER 26, 2022

SUBJECT: NACE

GENTLEMEN:

I HEREBY CERTIFY THAT THE MATERIAL LISTED HEREIN HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH PRESCRIBED METHODS IN THE GOVERNING SPECIFICATIONS AND BASED UPON THE RESULTS OF SUCH INSPECTION AND TESTING DOES CONFORM TO THE HARDNESS REQUIREMENTS OF NACE MR 01-75.

PLATE: ASTM A-36

SIZE: 1-1/4" NOMINAL

MILL CERTIFIED: JSW STEEL

HEAT: S31285

SLAB: None

Specification: NACE MR 01-75

Hardness, HRC

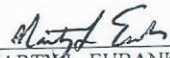
Results

Hardness, BHN

Results

160, 154, 165

WE HEREBY CERTIFY THE ABOVE INFORMATION IS CORRECT.



MARTY L. EUBANKS
QUALITY ASSURANCE MANAGER
(918) 583-2222



Flanges-Precision Machining

1321 Valley Center Dr.
Bay City, MI 48706

Phone (989) 686-0350
Toll Free (800) 248-5060
Fax (989) 686-0399

13312-4-5
Flanges

Material Test Report

Date: 12/29/2022

Sold To: LEE SUPPLY CO.
P.O. BOX 1475
821 E. INDEPENDENCE

Ship To: LEE SUPPLY CO.
P.O. BOX 1475
821 E. INDEPENDENCE

USA

USA

Order No: 0707735

Ship Instructions: 795089 KC

PO No: 22-3171-CM

Item Description

6 600# WN RF S160 A350 LF2 ASTM A350-2017 ASME SA350-2015 LF2 CL1
105-2017 ASME SA105-2015

Heat No.

6203A-6204

C%	Mn%	P%	S%	Si%	Cr%	Cu%	Ni%	Mo%	V%	Cb%	Al%
0.20000	1.18000	0.03000	0.01100	0.25000	0.07800	0.02700	0.03300	0.00900	0.00600	0.00100	0.02300

Tensile (PSI)	Yield (PSI)	Elong %	Reduction %	Brinell	Rockwell	CE
73,726	48,997	34.82	71.26	149-153	0	0.41927
Grain Size	Test Size	Impact	Charpy	Shear	Lateral Exp.	
0	0	50/40/47	-46°C			

"THE RECORDING OF FALSE, FICTITIOUS, OR FRAUDULENT STATEMENT OR ENTRIES ON THIS DOCUMENT MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL STATUTE."

DIN 50049/EN 10204 3.1

NACE MR0103/ISO 17945-2017 NACE MR0175/ISO 15156-1 2017

MATERIAL FULLY KILLED & FINE GRAIN PRACTICE

NORMALIZED @910°C FOR 2HRS AIR COOLED, TEMPERED @620°C FOR 2HRS AIR COOLED

NO WELD REPAIR/MERCURY FREE. ELONGATION IN 4D.

YIELD STRENGTH WAS DETERMINED USING THE 0.2% OFFSET METHOD.

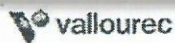
THIS IS A DIGITALLY CREATED DOCUMENT

Brian Dennis

BRIAN DENNIS/QUALITY CONTROL

ANTHONY CARDWELL
01/09/2023

13312-4-5 Fittings

2669 Martin Luther King Jr Blvd
Youngstown, OH 44510VALLOUREC STAR LP
Seamless Tubular ProductsCertified Test Report
02/22/2022
Revision: 0

Order: Y-221121023-001 Desc: Seamless Quench And Tempered

Customer:

SLN / (Heat): MA0118

Grade: API 5L X42/B NBN PSL2 46th Edition April 01, 2018

Customer Order: 301113

Split: 00

OD(in): 6.625

Wall(in): 0.719

Lbs/Ft: 45.39

Length: Double Random

End Finish: Plain End Beveled

Comments: Melted and Manufactured in Youngstown, Ohio USA

Pipe is also manufactured to: ASTM A106B/C-19a, ASTM A53B-20, ASME SA106B/C-2021, ASME SA53B-2021. Vallorec Star's QA program meets the requirements of DIN EN10204-2004 Type 3.1. Satisfies NACE MR0175/ISO15156:2015 and ANSI/NACE MR0103/ISO17945:2015.

No repair welding has been conducted. Material is free from Mercury.

Mechanical Properties

		Tensile Size Specimen Cross Section			Strength (ksi)			Elongation		
Orientation	Type	Width (in)	Thick (in)	Area (sqin)	Yield	Tensile	Y/T Ratio	Gage Length	% Elong	% RA
Longitudinal	Strip	1.000	0.720	0.7200	43.7	73.7	0.59	2	37.9	50.7

Required Min/Max Yield Strength (ksi): 42.1/71.8

Required Min/Max Tensile Strength (ksi): 70/95

Calculated Max Internal Yield (psi): 8306

Required Min Elongation(%): 30

Supplemental Requirements

Flattening Test	Passed
Hardness 3 Point	77.6 avg HRBW
Hydrostatic Pressure	6860 psi
Hydrostatic Hold Time	5 seconds

Chemical Analysis

Chem Spec: 61S

WT%	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Nb	V	Al	Ca	B	Ti	N	C.E.
Heat	0.21	0.88	0.008	0.006	0.20	0.16	0.06	0.10	0.03	0.009	0.000	0.001	0.030	0.0021	0.0001	0.003	0.0086	0.40
Product 1	0.21	0.90	0.009	0.005	0.20	0.16	0.06	0.09	0.03	0.009	0.000	0.001	0.029	0.0019	0.0001	0.003	0.0095	0.40
Product 2	0.21	0.89	0.008	0.004	0.20	0.16	0.06	0.09	0.03	0.008	0.000	0.001	0.028	0.0020	0.0001	0.003	0.0080	0.40

Charpy Impact Testing

	Notch	Direction	Size	Temp °F	Ft Lbf 1	Ft Lbf 2	Ft Lbf 3	Ft Lbf Avg	Shear 1	Shear 2	Shear 3	Shear Avg
Min Target	--	Transverse	1/1	32	15	15	15	20	NR	NR	NR	NR
Actual	V	Transverse	1/1	32	51	38	54	47	30	30	30	30

NR - Not Required

This material has been produced and tested in accordance with the requirements of applicable specifications unless otherwise listed below. We hereby certify that the above test results are representative of those contained in the records of the company. Any modification to this certification as provided by Vallorec Star without the expressed written consent of Vallorec Star negates the validity of this test report. Vallorec Star is not responsible for the inability of this material to meet specific applications.

THIS CERTIFICATE IS NOTARIZED ONLY WHEN REQUESTED.

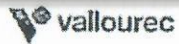
Signed:

Name: Jeff Schultz, Lab Supervisor

Date Approved: 02/22/2022

This document is uncontrolled when printed. Always refer to the MTR System for the most current version. FS-VMS-8.2.4.1.1 Rev 7

ANTHONY CARDWELL
01/09/2023

2669 Martin Luther King Jr Blvd
Youngstown, OH 44510VALLOUREC STAR LP
Seamless Tubular ProductsCertified Test Report
02/22/2022
Revision: 0

Order: Y-221121023-001 Desc: Seamless Quench And Tempered

Customer:

SLN / (Heat): MA0118

Grade: API 5L X42B NBN PSL2 46th Edition April 01, 2018

Customer Order: 301113

Split: 00

OD(in): 6.625

Wall(in): 0.719

Lbs/Ft: 45.39

Length: Double Random

End Finish: Plain End Beveled

Inspection Company: Tuboscope

Non-Destructive Evaluation Criteria

EMI CHANNELS

ID

10% Longitudinal

10% Transverse

OD

5% Longitudinal

5% Transverse

WALL THICKNESS CHECK

75% Wall Reduction

87.5% Wall Reduction

Required Volumetric Coverage: 100%

END AREA

Mag. Particle (Ref. Ind. Burmah/Castrol Strip)

OD

White Light

Longitudinal

ID

White Light

Longitudinal

Wall

Method: UT or Go/No-Go

25% Wall Thickness Verification

ADDITIONAL REQUIREMENTS

Notch Length 1.5" Max

Notch Width .020" Max

PSL2



400 McMunn St.
South Lyon, MI 48178

TEST REPORT



Date : 07/28/2022

Page : 1

Truck# : MT07694

Heat : 5394350

Job : MJ00007743

Pick# : 62769

Ship# :

Order : MS00011201

Ship To :		Sold To :	
P.O. No : 10P37874	Cust Item :	Shape : Round Round	Wt/ft : 2.844
OD Size : 1.315 IN	ID Size :	Wall Size : 0.250 IN (Average)	
Surface : BLUE UV COATING		Anneal : Per Spec	

Specifications : ASME-SA106-B/C, ASME-SA53-GrB, ASTM-A106-19a-B/C, ASTM-A53-20-Gr. B, DIN-DIN 50049 3.1-1998, EN-EN 10204 3.1-2004, NACE-MR0103-2015, NACE-MR0175-2015

BLUE UV ECT. Cert & stencil to A/SA106B, A/SA106C, A/SA53B, TYPE S. EN10204 3.1, DIN 50 049 3.1, NACE MR0175 & 0103. Melt & Mfg in USA. HtTime & Temp, trace elements. Ship +/-10%. Email ship docs to Carri Bethel when ready

Heat	Furnace	Melted Source	Feet	Weight (lbs)
5394350	BAF	USA, REPUBLIC STEEL CANTON, OH	3843	10929

	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al	V	Sn	Nb	SB	As	Ti	Zr	N	Ca	CO	W	B	H2	CE
L	0.26	0.72	0.018	0.021	0.310	0.130	0.10	0.015	0.02	0.021	0.003	0.005	0.000	0.001	0.003	0.001		0.006		0.010				0.42
P1	0.24	0.72	0.012	0.013	0.282	0.114	0.09	0.013	0.02	0.016	0.004													
P2	0.25	0.72	0.013	0.014	0.278	0.116	0.09	0.013	0.02	0.016	0.004													

Tensile	Yield	%Elong	HRbw Mid
76349	51497	49.3	79.0 82.0

Tensile: Full Size Longitudinal

Hydro(Tested 100% Length)	Ultrasonic %	Eddy Current	Flatten	Flare	Bend	Expansion
		PASS			PASS	

Normalized		Temper		Final Anneal		Stress Relieved	
Temperature	Time	Temperature	Time	Temperature	Time	Temperature	Time
1650 F	20.00 Min						

Bundle	Footage	Pcs	Length
ms0001120101001	1281	61	Cut 21' 0.000" -
ms0001120101002	1281	61	Cut 21' 0.000" -
ms0001120101003	1281	61	Cut 21' 0.000" -



400 McMunn St.
South Lyon, MI 48178

TEST REPORT



Date : 07/28/2022

Page : 2

Job : MJ00007743

Order : MS00011201

Truck# : MT07694

Heat : 5394350

Pick# : 62769

Ship# :

- Material has not been exposed to metallic mercury, lead or asbestos so as to cause contamination. Material is free from radioactive contamination. Cold Drawn Seamless. No weld repair. 100% Manufactured, USA.
- Michigan Seamless Tube LLC, South Lyon MI is a division of Specialty Steel Works, Inc.
- Certificate of Conformance Statement: This certificate asserts that the tubing listed above has been manufactured, inspected and approved in accordance with all specifications, requirements and the customer's purchase order.

Jacob Gorkowski
Quality Assurance Manager

P2827 / BC8904 / 1.0LR90160D / 1" S160 LR 90 ELBOW SA234 WPB
ALLOY PIPING PRODUCTS LLC

Mill Test Report

Date: 07/20/22
Time: 10:37:16
Page: 1/2

INSPECTION CERTIFICATE
EN 10204:2004 Type 3.1



From:

Alloy Piping Products, LLC
740 North Market Street
Shreveport, LA 71107

To:

Customer Order#:

APP Invoice#:

Heat Number	Item Number	Item Description	Quantity
BC8904	263257	1" 160 WPB SMLS B/W LR 90 ELBOW	

Starting Material:
Pipe Seamless

Order Spec:

Item Spec:	ASTM A234	2019	ASME SA-234	2021		
------------	-----------	------	-------------	------	--	--

Chemical Composition (wt%)					
Element	Content	Element	Content	Element	Content
C	0.11000	CR	0.12000	SUM OF CU+NI+CR+MO	0.16
MN	1.26000	MO	0.01000	SUM OF CR+MO	0.13
P	0.01200	CU	0.01000	SUM OF NB+V	0.00
S	0.00100	V	0.00200	CREQ: CR+(0.19*MO)+(0.40*CU)	0.13
SI	0.29000	NE	0.00100	MN/C RATIO	11.45
NI	0.02000	CARBON EQUIVALENT	0.35		

Test Results

Work Order#: 1001090 Load Designation: Test Set: 0

Tensile Test	
Test ID: 1	
Specimen Type: Longitudinal Rectangular	Gauge Length: 2.0000 in
Tensile Strength: 65,300 psi	Yield Strength: 46,500 psi
Elongation: 52 %	Reduction:

Hardness Test	
Test ID: 1	
Hardness	Notes
147 HBW(79 HRB)	HARDNESS IS ACCEPTABLE IN ACCORDANCE WITH NACE MR0175/ISO 15156:2015 AND MR0103/ISO 17945:2015

ANTHONY CARDWELL
12/13/2022

P2827 / BC8904 / 1.0LR90160D / 1" S160 LR 90 ELBOW SA234 WPB
ALLOY PIPING PRODUCTS LLC



Mill Test Report

Date: 07/20/22
Time: 10:37:16
Page: 2/2

INSPECTION CERTIFICATE
EN 10204:2004 Type 3.1

To:

From:
Alloy Piping Products, LLC
740 North Market Street
Shreveport, LA 71107

Customer Order#: APP Invoice#:

Heat Number	Item Number	Item Description	Quantity
BC8904	263257	1" 160 WPB SMLS B/W LR 90 ELBOW	

Test ID: 1	Heat Treatment Statement
NORMALIZED AT 1670°F	

Material supplied in accordance with a Quality Management System certified to ISO 9001:2015. Certificate Number: Q1674

Dimensions and Tolerances in accordance with ASME B16.9 or B16.5, as applicable. Bevels in accordance with ASME B16.25, unless noted otherwise.

Material, when shipped, is free from contamination by mercury, radium, alpha source and low melting elements. Where applicable, welds are 100% radiographed and acceptable to ASME Section VIII - Para UW-51. We hereby certify that the materials listed above have been manufactured, sampled, tested and inspected in accordance with the specifications and grade listed, and have been found to meet the requirements.

Stacey Freeman

QA Supervisor

07/20/22

Date

CLIENTE / Customer / Client

CERTIFICADO DE INSPECCION

UNE EN 10204:06 / 3.1

Inspection Certificate - Certificat de Réception

ISO 10474:15 / 3.1

FECHA:
Date:

25/10/2021

N.º
No.

216291

HOJA:
Page:

SGI 1922164



SGI 6000236



SGI 6009987



Advanced Forged Solutions

ULMA FORJA, S.COOP.

Management Systems certified by LRQAE

Certified acc. PED 97/23/EC+AD2000-W0

PED 14/68/UE

by TÜV Rheinland

N.º 01 202 E/Q 02 7443

MARCA DEL FABRICANTE

Mark of factory

Marque du fabricant

DEPARTAMENTO

Section

Département

QUALITY ASSURANCE

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

Packing List: 164645
Expedition: 382897

FLANGES

SU PEDIDO N.º

Your Order No.

LA0507 HOUSTON

Votre Cde. N.º

DE

of. de 13/10/2021

ASME B16.5-17

ASME SA350LF2CL1-2-19, ASTM A350LF2CL1-2-18

Material Correspondent - Qualité

MODO DE FUSION (*)

Steel Making - Elaboration de l'acier

E = Elec. Y = Oxígeno básico

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

CANTIDAD Quantity Quantité	DESCRIPCION Description Description	LOTE	OBSERVACIONES Remarks Observations (*)	COLADA N.º	RESISTENCIA		LIMITE ELAST	ALARGAM. Elongation Allongement	ESTRICCION	RESILIENCIA			CHARPY V 10x10mm		DUREZA
				Heat No N.ºCoulée	T.Strength Resist Rupt N/mm2	Y.Strength 0.2 % N/mm2	%	Red. Area Striction %	Impact test Résilience Joules		MEDIA Average Moyenne	°C	Hardness Dureté HBW		
50	WN 1/2 150LB XS/80 RF A350LF2	09D17A	NE	D6AV7	510	308		34,20	62,00	68	76	76	73	-50	149 152
50	WN 3/4 150LB XS/80 RF A350LF2	17D821	NE	C03A8	515	334		36,70	73,60	115	91	77	94	-50	146 149
50	WN 1 300LB S160 RF A350LF2	13E011	NE	K8AV9	520	330		39,08	73,68	122	129	137	129	-50	140 143
24	SO 1 300LB RF A350LF2	13N17C	NE	A0AV7	508	307		30,50	61,60	64	74	68	69	-50	146 156
6	SO 1 300LB RF A350LF2	26F18M	NE	E1AV7	518	309		29,20	63,80	59	63	58	60	-50	147 148

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 %	B %	CEq %	Origin of Steel
D6AV7 L	0,170	0,260	1,010	0,012	0,001	0,160	0,080	0,020	0,005	0,003	0,150	0,026	0,003	0,0001	0,39	Italy
C03A8 L	0,190	0,250	1,060	0,010	0,003	0,050	0,060	0,011	0,004	0,001	0,210	0,025	0,001	0,0004	0,40	France
K8AV9 L	0,180	0,190	1,070	0,012	0,002	0,070	0,150	0,030	0,001	0,002	0,200	0,025	0,001	0,0002	0,40	Italy
A0AV7 L	0,182	0,240	1,000	0,015	0,003	0,180	0,110	0,020	0,004	0,002	0,200	0,022	0,000	0,0000	0,41	Italy
E1AV7 L	0,177	0,240	1,020	0,011	0,002	0,120	0,100	0,020	0,005	0,005	0,180	0,032	0,003	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.

(*) OBSERVACIONES:
Remarks
Observations

N_NORMALIZED ABOVE 900°C AND COOLED UNIFORMLY IN STILL AIR



14527 Smith Rd.
Humble, Texas 77396
TEL: (281) 441-4088
FAX: (281) 441-8899

PAGE: 1 of 1
REPORT # 22-036458
DATE: 11/17/2022

FCI ORDER # 117259

IAW ASME 2021 ED.

IAW NACE MR0175 2015Ed

CUSTOMER ORDER # 22-3172-CM
SOLD / SHIPPED TO: LEE SUPPLY

Item Quantity Description

1 4 2" X 300 X 9" LG RF LWN, TAG# 795089 KC
RACK RW0320

PART HBW: 159

Heat Number: 11014B

Steel Origin (melt): JAPAN

Material Type: SA105N/SA350LF2CL1

CHEMICAL ANALYSIS

PHYSICAL PROPERTIES

C .18
Mn 1.23
P .014
S .006
Si .27
Cr .04
Mo .01
V .00
Cu .01
Ni .03
Cb(Nb) .00
N
Sn
As
Sb
Ti .00
Al .03
B .0005
C E 0.40

Yield PSI 41,600
Tensile PSI 71,900
Elongation % 39
Reduction of Area % 71.6
Hardness 143/143 HBW
CVN -50 °F FT LBS 25/23/18
% Shear 10/10/10
MLE .022/.021/.015

MADE TO FINE GRAIN PRACTICE

Heat Treatment NORMALIZED
Temperature 1706 °F
Time at Temperature 4 HRS
Cooling Media AIR

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

Prepared by:

Name: Cynthia Madrid

Title: QA Representative



MANNESMANN
PRECISION TUBES
A Member of the Salzgitter Group

Inspection Certificate

Page 1 of:

2 Pages

acc to EN 10204/3.1

Certificate no.:

9220347

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
SA 179 SA179 **Edition:** 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.: 4400587
Our shipping date: 01-06-2022

Extent of the delivery:

Item	Numbers	Dimension	Heat no.	Sample no.
11	408	1,250" OD x 0,120" MW x 24'0"	2984,52 m 6928 kg 270569	1-2

Shipping marks:

PO : 10075464
Item : 00001 Line 2
Mat. : A32012501200B
Quantity : 408pcs.
Tag Nr. : PO# A22-13312 T-4.5
ASTM/ASME A/SA 179 SMLS
Grade 1010
OD: 1,2500" inches
Wall: 0.1200 inches MW Wall
Melling 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	0,009	0,002	0,03	270569

	Mo	V	Cu	Ni	Sn	Heat no.
Requirements:						
Heat analysis (%)	0,01	0,001	0,02	0,03	0,001	270569

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.): 01-06-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022



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

Test results

Page 2 of:

2 Pages

Certificate no.:

9220347

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	31,75 x 3,28	64
2		64

Helmond: 01-08-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier