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		
ISOMERIZATION QUENCH SPILLBACK COOLER	1100	1430	450	32	FV @ 300F	2	2452	MANUAL	NONE
STEAM COIL	232	302	430	32	FV @ 430F	1	684	NONE	NONE

MOTOR HP:	5	**FAN MFGR:**	MOORE	**DIAM (FT):**	3.5
TYPE:	TEFC	**CLASS:**	10000	**ACFM/FAN:**	16044
RPM:	1800	**BLADES:**	5	**HP@ DES.:**	2.55
VAC:	460/3/60	**PITCH:**	15.76		
FRAME:	184T	**RPM:**	656	**DRIVE:**	HTD
SHAFT:	1.125	**SERIES:**	12	**RATIO:**	2.74:1
MOTOR WT:	124 lbs	**TYPE:**	SC	**DRIVE WIDTH:**	24
QTY: 1 PER BAY		**TIP:**	VT	**AIR BRAKE:**	YES
		QTY: 1 PER BAY			

SPECIFICATION NOTES:

VIBE SENSOR: WILCOXON (1)

VIBE SENSOR MODEL NO.; (1)

786A-D2

QTY: 1 PER BAY

COOLER WT #: SEE TABLE

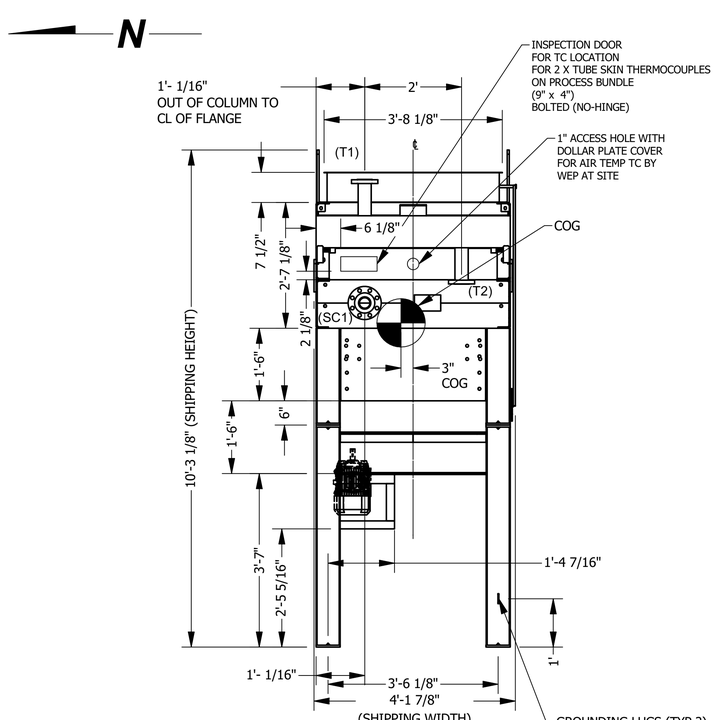
STRUCTURE FINISH: PER A8KM-PP-000-500540-A

NON-FIREPROOFED STRUCTURAL STEEL TO BE GALVANIZED

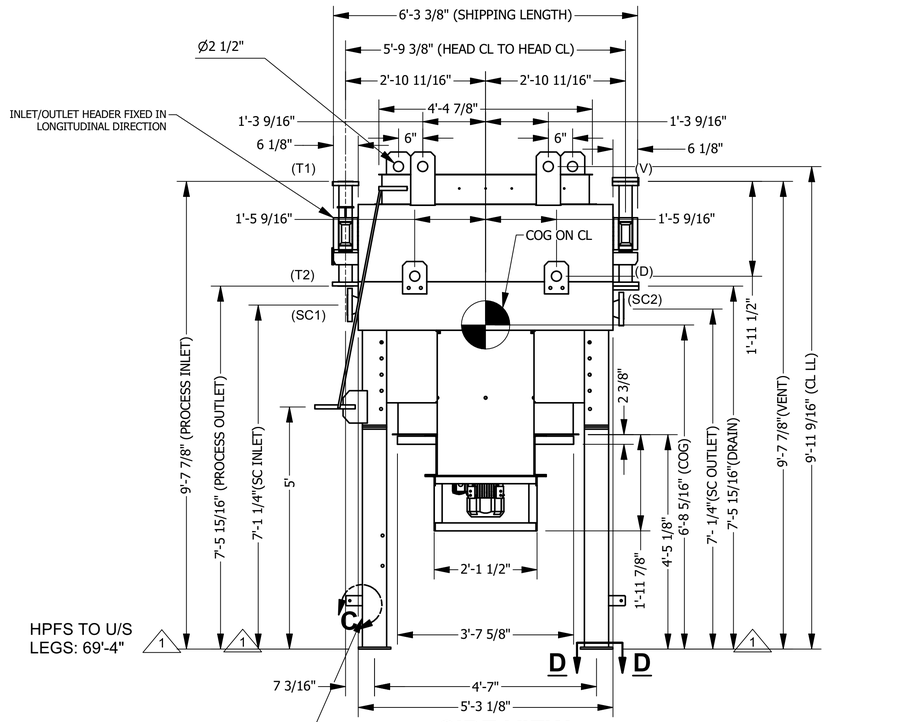
HEADER FINISH: PER A8KM-PP-000-500520-A

SYSTEM 1 AFTER HYDROTEST

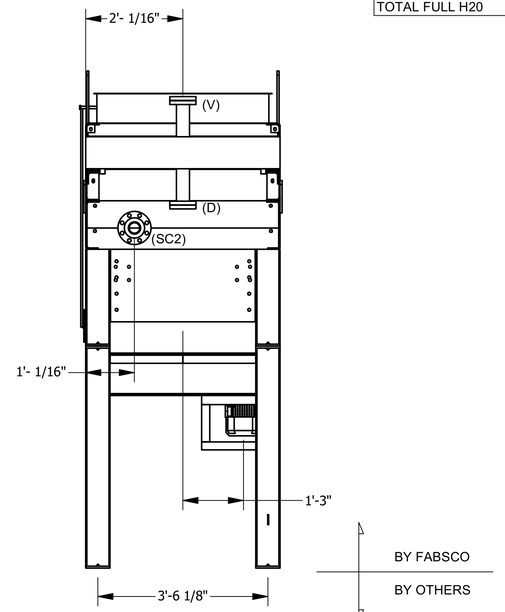
WEIGHTS	
ITEM	WEIGHT (LBS)
COOLER	4416
LOUVERS	55
WALKWAYS	0
SPAN BEAMS	0
H20	159
TOTAL DRY	4471
TOTAL FULL H20	4630



FRONT VIEW (LOOKING EAST)



SIDE VIEW (LOOKING NORTH)

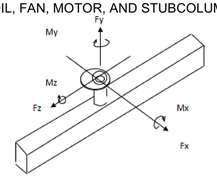


BACK VIEW (LOOKING WEST)

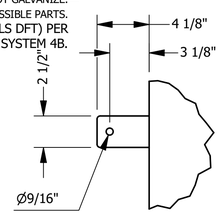
APPROVED BY: _____

DATE: _____

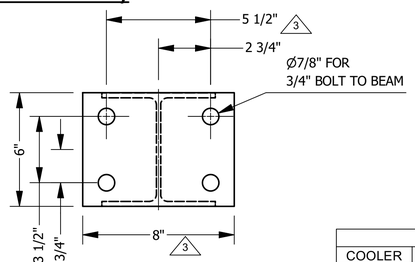
NOTE:
1. (1) BAYS REQUIRED.
2. ALL MOTORS ARE VFD COMPATIBLE, NO SPACE HEATER.
3. MOTOR REMOVAL BEAM PROVIDED
4. MOTORs SHALL BE RATED FOR CLASS 1, DIV. 2, GROUPS B,C,D AND A T3C TEMPERATURE CODE
5. "COOLER WEIGHT" LISTED ABOVE INCLUDES BUNDLE, STEAM COIL, FAN, MOTOR, AND STUBCOLUMNS



STUBCOLUMNS TO BE FIREPROOFED BY OTHERS, DO NOT GALVANIZE. PREP AND PRIMER BY FABSCO, ON ACCESSIBLE PARTS. SP 10, EP (2.0-3.0 MILS DFT) PER A8KM-PP-000-500520-A TABLE A-2 SYSTEM 4B.



DETAIL C GROUNDING LUG (DON'T PAINT)



SECTION D 1/2" ANCHOR PLATE

NOZZLE SCHEDULE			
LABEL	ITEM	QTY	FLANGE
T1	PROCESS INLET	1	2" 600# RFLWN
T2	PROCESS OUTLET	1	2" 600# RFLWN
V	PROCESS VENT	1	2" 600# RFLWN W/BLD
D	PROCESS DRAIN	1	2" 600# RFLWN W/BLD
SC1	STEAM INLET	1	3" 300# RFWN
SC2	STEAM OUTLET	1	3" 300# RFWN

EQ. TAG #S (4)		
COOLER	EQUIPMENT	TAG #
18-XF-355	MOTOR	18-XF-355-M1
18-XF-355	FAN	18-XF-355-F01
18-XF-355	VIB SENSOR	18-VE-XF355A

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-355**
SERVICE:	**Isomerization Quench Spillback Cooler**
LOCATION:	**World Energy, Paramount, CA, USA**
PO NO.:	**4505606036 / A8KM-4-406-PO-1**
FABSCO JOB NO.:	**A22-13312-7**

API 661 NOZZLE LOADS MULTIPLIER = 2.0

NOZZLE LOADS	QTY/HEAD	SIZE	CLASS, #		2 X API 661	
FRONT PROCESS HEAD	2	2	600			
SIZE	FX	FY	FZ	MX	MY	MZ
	LBS	LBS	LBS	FT LB	FT LB	FTLB
2	460	600	460	220	360	220
COMBINED	920	1200	920	440	720	440
MAX API	2250	4500	3750	4500	6000	3000
DESIGN LOAD	2250	4500	3750	4500	6000	3000

NOZZLE LOADS	QTY/HEAD	SIZE	CLASS, # (2)		2 X API 661	
STEAM COIL HEAD	1	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	900	760	900	600	900	600
MAX API	2250	4500	3750	4500	6000	3000
DESIGN LOAD	900	760	900	600	900	600

(3) REFERENCE DOCUMENTS	
FABSCO DOC. #	APCI DOC. #
A22-13312-7A-300	EN207119-FAB-9V3-00206
A22-13312-7SC-300	EN207119-FAB-9V3-00207
A22-13312-7A-ASME	EN207119-FAB-9V3-00212
A22-13312-7SC-ASME	EN207119-FAB-9V3-00213
A22-13312-7-LL	EN207119-FAB-9V3-00199
A22-13312-4-5-7 LAYOUT	EN207119-FAB-9V3-00076
A22-13312-7-NOTES	EN207119-FAB-9V3-00298
A22-13312-7-STR	EN207119-FAB-9V3-00347

GENERAL ARRANGEMENT

REV.	DATE	DESCRIPTION
0	3/2/22	FOR APPROVAL
1	8/23/22	PER CUST. COMM.
2	10/20/22	PER CUST. COMM.
3	2/8/23	PER CUST. COMM.
4	3/9/23	PER CUST. COMM.

DRAWN BY: BH

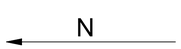
DATE: 3/2/22

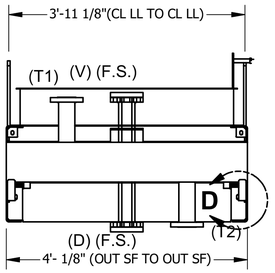
CHECKED BY:

FABSCO Fin-Air, LLC.

DRAWING NO: A22-13312-7-100

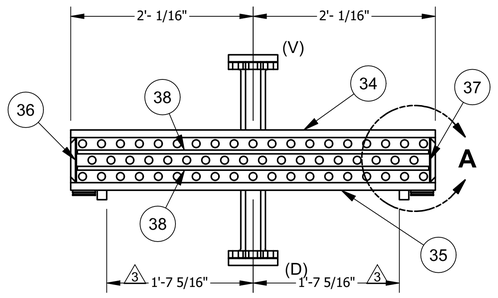
REV: 4



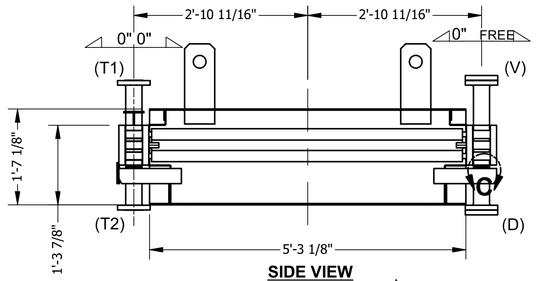


FRONT VIEW

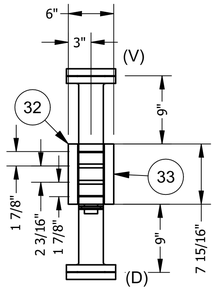
ALL HEADS FREE LATERAL 1/4" IN EITHER DIRECTION △3

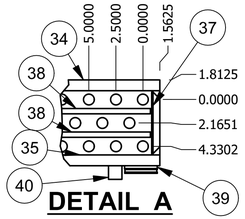


BACK TUBE SHEET SIDE

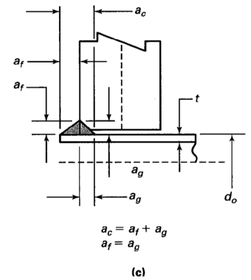


SIDE VIEW LOOKING NORTH △3

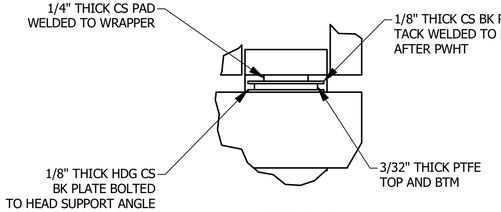




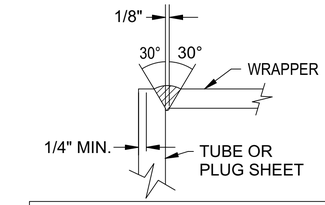
DETAIL A



TUBE TO TUBESHEET STRENGTH WELD
af = 0.0625
ag = 0.0625



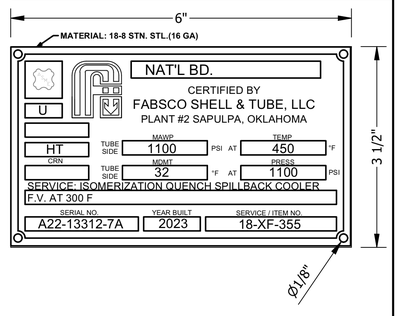
DETAIL C
SLIDE PAD DETAIL

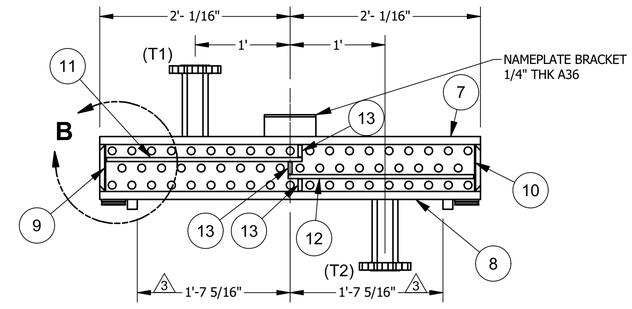


DESIGN INFORMATION	
DESIGN PRESS. PSIG:	1100 / FV
DESIGN TEMP. DEG F:	450 / 300
MDMT DEG F:	32
CORROSION ALLOW. IN.:	0.125
EFFECTIVE SURFACE AREA:	
	BARE: 80.634 FT^2
	EXTENDED: 1632.3 FT^2
SPOT RT	
HYDROTEST PSIG:	1430
DESIGN & STAMP:	ASME
ASME SECT. VIII, DIV. 1 ED. 2021	
CHARPY EXEMPT UG20(f) AND/OR UCS 66	

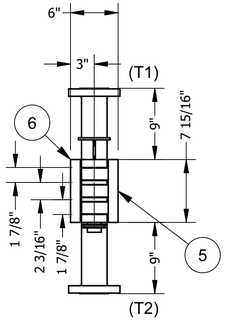
PLUG HOLE INFORMATION	
PREDRILL DIAMETER	0.9688
TUBE REAM	1.01
TAP REAM	1.0469
TPI	12
SPOTFACE OD	1.5
SPOTFACE DEPTH	0.01
GROOVES/HOLE	FRONT (2) / BACK (2)
PLUG DIAM	1.125

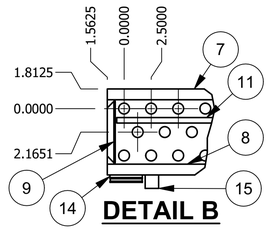
ROLL TOOL INFO	
FRONT ROLLER	1247C / R18
FRONT MANDREL	M62C
BACK ROLLER	1247C / R18
BACK MANDREL	M62C



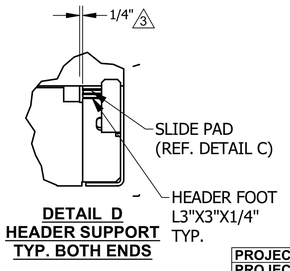


FRONT PLUG SHEET SIDE





DETAIL B



DETAIL D
HEADER SUPPORT
TYP. BOTH ENDS

REV:	DATE	COMMENT	BY
△0	02-03-2022	FOR APPROVAL	BH
△1	8/19/22	PER CUST. COMM.	BH
△2	10/20/22	PER CUST. COMM.	BH
△3	2/8/23	CUST. COMM.	BH

NOZZLE:		CONNECTIONS:
(T1)	(INLET)	(1) 2" 600# RFLWN
(T2)	(OUTLET)	(1) 2" 600# RFLWN
(V)	(VENT)	(1) 2" 600# RFLWN W/BLIND
(D)	(DRAIN)	(1) 2" 600# RFLWN W/BLIND

TUBES: (56) 1" OD 0.095" MW 66"
FIN: 5/8" HI 0.016" THK 10/FPI, EMBEDDED
PLUGS: (112) 1.125" OD 1.25" UH SHOULDER

		THICK	LENGTH	WIDTH	BEVELS
5 6	FRONT T/P SHEET	1.2500	48.1250	7.9375	30 LONG
7 8	FRONT WRAPPER	1.0000	48.1250	3.2500	30 LONG
9 10	FRONT END	0.7500	5.6875	3.2500	45 ALL
11	FRONT PASS	0.5000	24.6875	3.2500	45 ALL
12	FRONT PASS	0.5000	23.4375	3.2500	45 ALL
13	FRONT PASS (3)	0.5000	3.2500	2.5625	NONE
14	FRONT HEADER PAD	0.2500	3.5000	3.5000	NONE
15	FRONT LAT STOP BLOCK	1.2500 △3	3.5000	1.2500	NONE
32 33	BACK T/P SHEET	1.2500	48.1250	7.9375	30 LONG
34 35	BACK WRAPPER	1.0000	48.1250	3.2500	30 LONG
36 37	BACK END	0.7500	5.6875	3.2500	45 ALL
38	BACK PASS	0.5000	46.3750	3.2500	45 ALL
39	BACK HEADER PAD	0.2500	3.5000	3.5000	NONE
40	BACK LAT STOP BLOCK	1.2500 △3	3.5000	1.2500	NONE

MATERIALS:	
PLATE:	SA-516-70N
FLANGE:	SA-350-LF2
PLUG:	SA-350-LF2
GASKET:	A1008 CS (ZP)
SIDE FRAME:	A36
TUBE:	SA-179
FIN:	ALUMINUM
STAY PLATE:	SA-516-70N

STRUCTURAL:	
SIDEFRAME:	C 0.25" 18.625" 63.125"
SUPPORT:	(1) - 4" X 4" X 0.1875" RT
BINDER:	(1) - L 2 X 2 X .25
TP AIRSEAL:	Z
BTM AIRSEAL:	Z
LUG:	A36 604 WELDED
HDR FINISH:	SSPC SP10
	System 1 after Hydrotest
	PER: A8KM-PP-000-500520-A
SFR FINISH:	HAND TOOL CLEAN
	Galvanized
	PER: A8KM-PP-000-500540-A

TUBE SPACERS:	
TUBE SPACERS REQD.:	0
SCALLOPED CHANNELS:	
1" X 2.5" PITCH	
ALUMINUM	
TOLERANCES:	
LENGTH:	± 0.125
WIDTH:	± 0.125
TUBE PROJECTION:	0.0625 - 0.000
	+ 0.0625
DRY WEIGHT LBS:	2452
HYDRO WEIGHT LBS:	2578

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.

CERTIFIED
BY:_____ DATE: _____

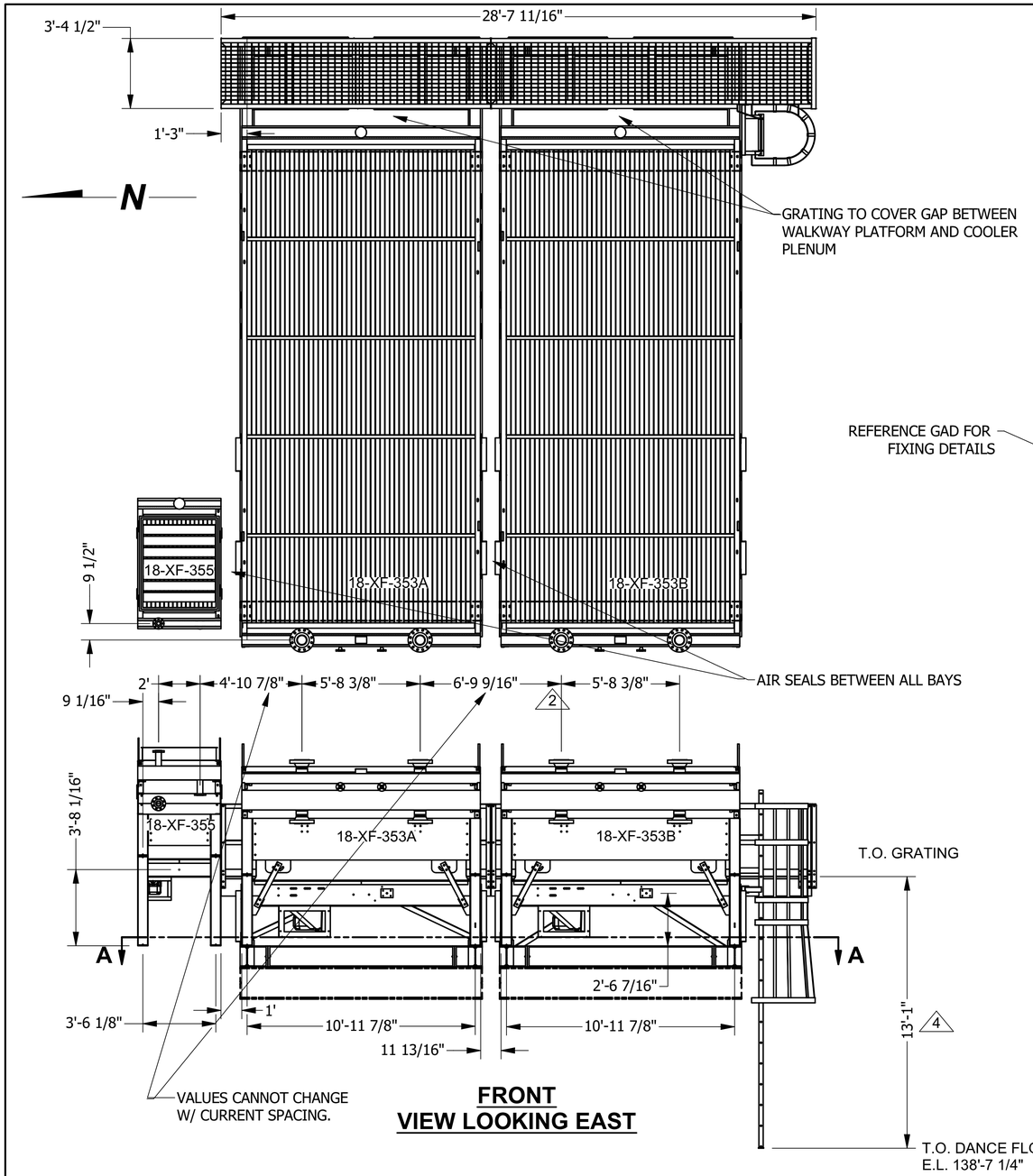
PROJECT NAME:	World Energy Renewables Project
PROJECT NO./UNIT:	EN-20-7119 / RFJU-B
CUSTOMER/CLIENT:	World Energy Paramount
EQUIPMENT OWNER:	Air Products Manufacturing LLC
ITEM NO.:	18-XF-355
SERVICE:	ISOMERIZATION QUENCH SPILLBACK COOLER
LOCATION:	World Energy, Paramount, CA, USA
PO NO.:	4505606036 / A8KM-4-406-PO-1
FABSCO JOB NO.:	A22-13312-7A

DRAWN BY: BH
DATE: 02-03-2022
CHECKED BY:

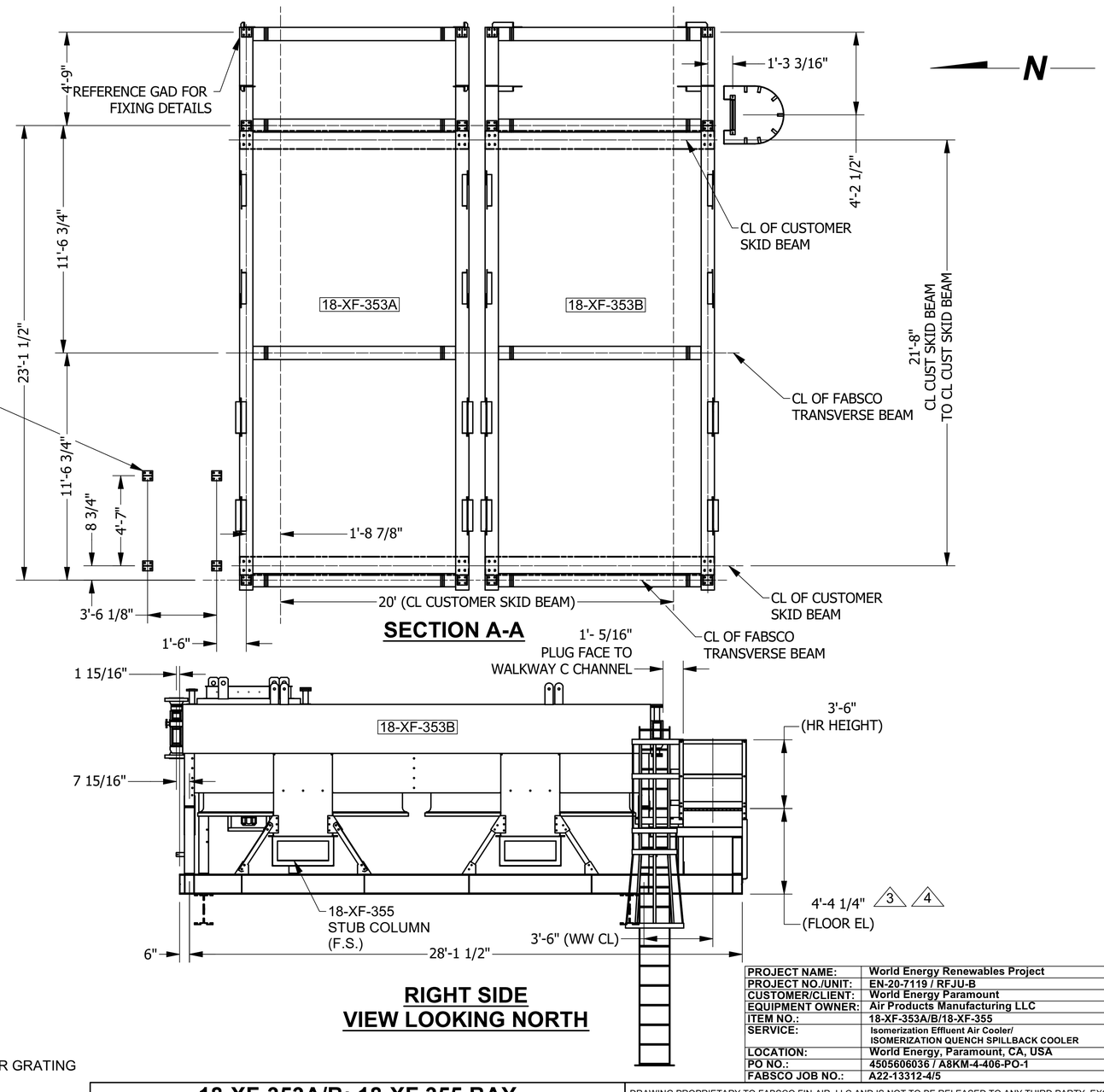
FABSCO Fin-Air, LLC.

BUNDLE ARRANGEMENT DRAWING - 18-XF-355

DRAWING NO: A22-13312-7A-300
REV: 3

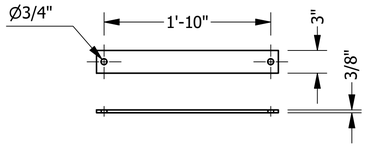


FRONT
VIEW LOOKING EAST



SECTION A-A

RIGHT SIDE
VIEW LOOKING NORTH



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-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.

DRAWN BY: BH

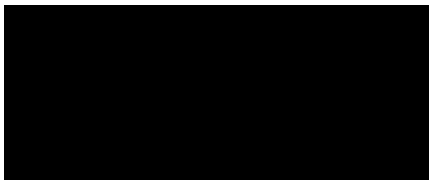
DATE: 3/23/2022

CHECKED BY:

FABSCO Fin-Air, LLC.

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

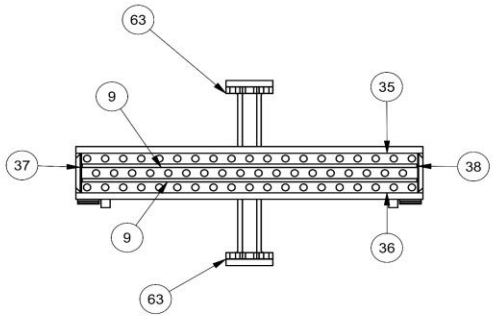
REV: 4



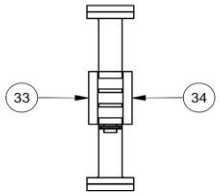
WORLD ENERGY RENEWABLE FUELS CONVERSION PROJECT
Project No: A8KM
Vendor Input to PCMS
Doc number: A8KM-PCMS-001, Rev. 0

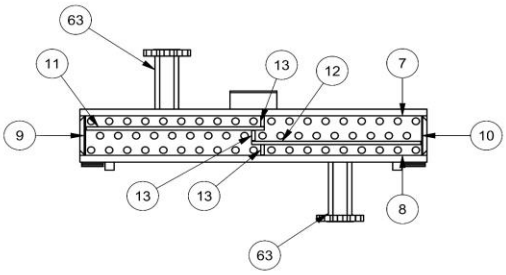
Vendor Doc Number: PCMS_PO Number Rev: 0
EN207119-FAB-9V3-00151 4505606036

Identification					
1: Tag No.	18-XF-355				
2: Model No.	A22-13312-7				
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 ← Legs?				Drop Down
22: External Coating	Epoxy				Drop Down
23: MAWP (psig)	1100				
24: MAWT (F)	450				
25: Design Pressure (psig)	1100				
26: Full Vacuum	yes				Drop Down
27: Design Temp (F)	450				
28: MDMT (F)	32				
29: Weight Empty (lbs)	4471				
30: Weight Full (lbs)	4630				
31: Equipment Length (inches)	5'-4"				
32: Orientation	Horizontal				Drop Down
33: Equipment Width (inches)	4'-2"				
34: Equipment Height (inches)	10'-4"				
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

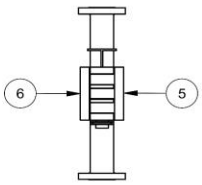


BACK TUBE SHEET SIDE





FRONT PLUG SHEET SIDE



Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
5	NUCOR	2605014	SA-516-70N
6	NUCOR	2605014	SA-516-70N
7	SSAB	E9E225	SA-516-70N
8	SSAB	E9E225	SA-516-70N
9	SSAB	W3A657	SA-516-70N
10	SSAB	W3A657	SA-516-70N
11	SSAB	W2I744	SA-516-70N
12	SSAB	W2I744	SA-516-70N
13	SSAB	W2I744	SA-516-70N
33	NUCOR	2605014	SA-516-70N
34	NUCOR	2605014	SA-516-70N
35	SSAB	E9E225	SA-516-70N
36	SSAB	E9E225	SA-516-70N
37	SSAB	W3A657	SA-516-70N
38	SSAB	W3A657	SA-516-70N
39	SSAB	W2I744	SA-516-70N
63	FCI	11509C	SA-350LF2
TUBES	MANNESMANN	323092	SA-179

CUSTOMER:	AIR PRODUCT MANUFACTURING LLC.		FABSCO SHELL & TUBE, LLC
PO NO:	4505606036 / A8KM-4-406-PO-1	DATE	
ITEM NO:	18-XF-355	AC	DWG No A22-13312-7A-HS 0

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

Mill Test Report

Page 5

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

Issuing Date : 11/18/2022 **B/L No. :** 636451 **Load No. :** 654763 **Our Order No. :** 201070/6 **Cust. Order No. :** 128375

Vehicle No: NOKL 725271

Sold To: PORT CITY METALS SERVICES INC A DIVISION OF METALS USA 3101 CHARLES BLVD TULSA,OK 74127 (2)

Ship To: PORT CITY METAL SERVICES, INC. JUNCTION 12 HALE,OK 74127

Specification: 1.2500" x 120.000" x 480.000"
ASTM A516 70/65/60/485-17/ASMESA516-70/65/60/485 PVQ 2019/2021
Normalized Plate NACEMR0175 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
2605014	0.19	1.03	0.008	0.003	0.17	0.28	0.12	0.11	0.04	0.024	0.003	0.001	0.001	0.0077	0.0010	0.0003	0.011	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)
2605014-05	1	10.20	H-T	47,800	74,200	54.4		1650	49		

			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
2605014-05	1	10.20	H-L	122.8	184.5	109.5	138.9	15											-50	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 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, Metallurgist

11/18/2022 10:05:24 AM

Q.A. APPROVED
By Date 11/18/2022

ANTHONY CARDWELL
04/03/2023

7
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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:
DELTA STEEL, INC.
5599 SAN FELIPE-STE 600
P.O BOX 2289
HOUSTON
TX 77252

Customer P.O.No.: OFT-40203 | **Mill Order No.** 41-572842-04 | **Shipping Manifest:** AR289290

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

Ship Date: 30 May 19 | **Cert No:** 081724915
Cert Date: 30 May19 | (Page 1 of 1)

Heat Treat Type: NORMALIZED

Size: 1.000 X 120.0 X 382.0 (IN)

Tested Pieces:

Heat Id	Piece Id	Piece Dimensions	Tst Loc
E9E225	E21	1.006 (DISCRT)	C
E9E225	E22	1.007 (DISCRT)	C

Tensiles:

YS (KSI)	UTS (KSI)	%RA	Elong % 2in	Elong % 8in	Tst Dir	Hardness
51	76		50		T	
50	74		57		T	

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
84	76	73	78					-60F	L	10.	
66	91	81	79					-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	
E9E225	.19	1.01	.011	.002	.25	.027	.025	.27	.14	.12	.03	.002	.004	.008	.0002	.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 17495-1:2016 13.1.1(A) AND 13.1.1(C) COMPLIANT
MTR EN 10204:2004 INSPECTION CERTIFICATE 3.1 COMPLIANT
100% MELTED AND MANUFACTURED IN THE USA.
NO WELD REPAIR HAS BEEN PERFORMED ON THIS MATERIAL.
NORMALIZED PLATES. HEATED AT 1665F FOR 44 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:

E9E225 E21	40012650	PCES:	1,	LBS:	13000	E9E225 E21	40012651	PCES:	1,	LBS:	13000
E9E225 E22	40012654	PCES:	1,	LBS:	13000	E9E225 E21	40012653	PCES:	1,	LBS:	13000
E9E225 E21	40012652	PCES:	1,	LBS:	13000						

(P) Cust Part #:

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

Justin Ward
SENIOR METALLURGIST - PRODUCT

Q.A. APPROVED
By _____ Date 2/6/2023

ANTHONY CARDWELL
04/03/2023

Customer Name: PORT CITY PLATE, INC.DIV. META
Customer PO#: 129667
Shipper No: 362414
Heat Number: E9E225 E21

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SSAB

12400 Highway 43 North, Axis, Alabama 36505, US

Test Certificate

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

Form TC1: Revision 5: Date 22 Aug 2022

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

Customer P.O.No.: V29631 | **Mill Order No.** 41-697264-02 | **Shipping Manifest:** AR372275

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: 30 Jan 23 | **Cert No:** 081092170
Cert Date: 30 Jan 23 | (Page 1 of 1)

Heat Treat Type: NORMALIZED

Size: 0.750 X 120.0 X 480.0 (IN)

Tested Pieces: / **Tensiles:** / **Charpy Impact Tests**

Heat Id	Piece Id	Tested Thickness	Tst Loc	YS (KSI)	UTS (KSI)	%RA	Elong % 2in	Elong % 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
W3A657	B35	0.752 (DISCRT)	C	53	76		43		T		135	89	97	107					-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	ORGN
W3A657	.19	1.02	.009	.002	.23	.033	.032	.25	.14	.12	.03	.004	.003	.008	.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:
W3A657 B35 40100588 PCES: 1, LBS: 12252
W3A657 B35 40100589 PCES: 1, LBS: 12252
W3A657 B35 40100590 PCES: 1, LBS: 12252

(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

ANTHONY CARDWELL
04/03/2023

Q.A. APPROVED
By _____ Date 3/1/2023

11
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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:
LEECO STEEL PRODUCTS, INC.
1011 WARRENVILLE ROAD
SUITE 500
LISLE
IL 60532

Customer P.O.No.: V28145 | **Mill Order No.** 41-685336-01 | **Shipping Manifest:** AR367113

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: 31 Oct 22 | **Cert No:** 081077078
Cert Date: 31 Oct 22 | (Page 1 of 1)

Heat Treat Type: NORMALIZED

Size: 0.500 X 96.00 X 480.0 (IN)

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		Abs. Energy(FTLB) 1 2 3 Avg	% Shear 1 2 3 Avg	Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
W2I744	D69	0.502 (DISCRT)	C	54	77		39		T		113 130 121 121		-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	ORGN
W2I744	.18	1.03	.009	.001	.24	.027	.026	.30	.15	.12	.02	.004	.004	.011	.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 21 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
W2I744 D69 40093396 PCES: 1, LBS: 6534 W2I744 D69 40093395 PCES: 1, LBS: 6534

(P) Cust Part #:050096480A516-70N

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

Jason Thomas
Director Technical Services

ANTHONY CARDWELL
04/03/2023

Q.A. APPROVED
By: Date: 1/4/2023

FCI FORGED COMPONENTS INC. 24/7
14527 Smith Rd.
Humble, Texas 77396
TEL: (281) 441-4088
FAX: (281) 441-8899

PAGE: 1 of 1
REPORT # 23-041591
DATE: 3/14/2023
FCI ORDER # 118733
IAW ASME 2021 ED.

CUSTOMER ORDER # 03540-13.1
SOLD / SHIPPED TO: MATTSCO SUPPLY

IAW EN10204 TYPE 3.1

Item Quantity Description

Heat Number: 11509C
Material Type: SA105/SA350LF2CL1
Steel Origin (melt): JAPAN

CHEMICAL ANALYSIS

C	.18
Mn	1.24
P	.013
S	.005
Si	.26
Cr	.02
Mo	.00
V	.00
Cu	.01
Ni	.01
Cb(Nb)	.00
Ti	.00
Al	.02
B	.0003
C E	0.39
CuNiCrMoV	.037
CrMo	.017

PHYSICAL PROPERTIES

Yield PSI	61,000
Tensile PSI	84,100
Elongation %	29.7
Reduction of Area %	78.5
Hardness	187/187 HBW

EF/VD
FULLY KILLED

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: Nancy Loos

Name: Nancy Loos Title: QA Representative

Date printed: 3/14/2023 2:23:37 PM

ANTHONY CARDWELL
04/03/2023

MANNESMANN PRECISION TUBES
A Member of the Salzgitter Group

Inspection Certificate

acc to EN 10204/3.1

Page 1 of: 2 Pages

Certificate no.: 9221152

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

Marking: On tubes / On tags

Manufacturer's mark: **MPT-HE**

Process: Basic oxygen steel

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

Steelmarks: (S)A 179 + N

Extent of the delivery:

Shipping no.: 4400548
Our shipping date: 19-05-2022

Item	Numbers	Dimension			Heat no.	Sample no.
40	29	1,000" OD x 0,095" MW x 11'0"	97,21 m	146 kg	323092	1-2

Shipping marks:
PO : 10075464
Item : 00004
Mat. : A320100000950B
Quantity : 29pcs.
Tag Nr. : PO# A22-13312 T-7
ASTM/ASME A/SA 179 SMLS
Grade 1010
OD: 1,0000" inches
Wall: 0.0950 inches MW Wall
Melting Western Europe
Hot finished tube fabrication in Germany
Cold drawn in The Netherlands
Max. 1 heat per bundle – Max 1 heat per box

	C	Mn	P	S	Cr		Heat no.
Requirements:	*0,06-0,18*	*0,27-0,63*	*≤0,035*	*≤0,035*			
Heat analysis (%)	0,15	0,52	0,009	0,005	0,04		323092

	Mo	V	Cu	Ni	Sn		Heat no.
Requirements:							
Heat analysis (%)	0,01	0,001	0,02	0,03	0,002		323092

Heat treatment: Normalized at 920 °C

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

Helmond(NL.) : 31-05-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022

MANNESMANN
PRECISION TUBES
A Member of the Salzgitter Group

Test results

Certificate no.: 9221152

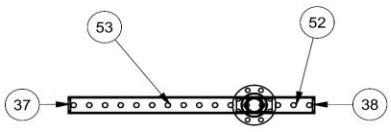
1. Visual inspection and control of dimensions: OK
2. Eddy current test acc. to: E309: OK
3. Flattening test: OK
   Flaring test: OK
4. Hardness test: OK

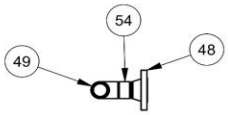
Mechanical data	Dimensions of the test tube mm	Hardness HRB
Requirements:		*Max 72*
1	25,40 x 2,58	68
2		69

Helmond: 31-05-2022

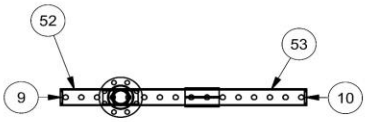
Mannesmann Precision Tubes - NL
Inspector
B. van Lier

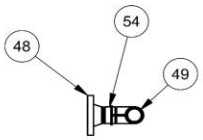
ANTHONY CARDWELL
10/24/2022





BACK TUBE SHEET SIDE





FRONT PLUG SHEET SIDE

Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
9	SSAB	E2H323	SA-516-70N
10	SSAB	E2H323	SA-516-70N
37	SSAB	E2H323	SA-516-70N
38	SSAB	E2H323	SA-516-70N
48	FRIEDRICH GELDBACH	3083	SA-350LF2
49	APP	BA5925	SA-420-WPL6
52	ARCELORMITTAL	28B3823	SA-106B
53	ARCELORMITTAL	28B3823	SA-106B
54	ARCELORMITTAL	28B3823	SA-106B
TUBES	MANNESMANN	323092	SA-179

CUSTOMER:	AIR PRODUCT MANUFACTURING LLC.		FABSCO SHELL & TUBE, LLC
PO NO:	4505606036 / A8KM-4-406-PO-1	DATE	
ITEM NO:	18-XF-355	AC	DWG No A22-13312-7SC-HS 0

Steam Coil End

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FABSCO ITT#E2H323
PO#A22-13312-7 SL#C53
SO#443333 ITEM#1 4PCS

SSAB

12400 Highway 43 North, Axis, Alabama 36505, US

Test Certificate

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

Form TC1: Revision 5: Date 22 Aug 2022

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

Customer P.O.No.: V28145 | **Mill Order No.** 41-685336-01 | **Shipping Manifest:** AR364522

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: 16 Sep 22 | **Cert No:** 081069346
Cert Date: 16 Sep 22 | (Page 1 of 1)

Heat Treat Type: NORMALIZED

Size: 0.500 X 96.00 X 480.0 (IN)

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		Abs. Energy(FTLB) 1 2 3 Avg				% Shear 1 2 3 Avg			Tst Tmp	Tst Dir	Tst Siz (mm)	BDWTT Tmp %Shr
E2H323	C53	0.501 (DISCRT)	C	57	80		40	T		96	111	115	107				-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	ORGN
E2H323	.19	1.00	.010	.002	.26	.028	.028	.35	.19	.11	.03	.004	.004	.008	.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 21 MINUTES.
TEST COUPONS TAKEN FROM HEAT TREATED PLATE.
PRODUCTS SHIPPED:
E2H323 C53 40092239 PCES: 1, LBS: 6534

(P) Cust Part #:05009648OA516-70N

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

Jason Thomas
Director Technical Services

ANTHONY CARDWELL
04/03/2023

Q.A. APPROVED
By ... Date 4/3/2023

Friedrich Geldbach GmbH A01
Bergmannstr. 170
45886 Gelsenkirchen - Deutschland
Telefon: +49 (0)209 170990 - Telefax: +49 (0)209 1709955
E-Mail: info@geldbach.de

COMPANY WITH MANAGEMENT SYSTEM CERTIFIED BY TÜV NORD = DIN EN ISO 9001 : 2015 =

ABNAHMEPRÜFZEUGNIS - INSPECTION CERTIFICATE EN 10204:2004 / 3.1 A02 | Nr A03 2018-C_FG-00431 | Datum / Dated 07.04.2018 Z02

A05
US

Kd.-Auftr. / PO	892-S-18	A07
Pos.	0073	
Lieferschein / Delivery note	2018-18E31-1830237	
Packliste / Delivery note	2018-18E41-1840245	
Rechnung / Invoice	2018-18E41-1840245	A08
Unser Auftrag / Our ref.	2017-18E21-1720391-0073	

Kunde MATTSCO SUPPLY COMPANY A06
1111 N. 161st East Ave.
74116 TULSA, OK US

Chargen code B07 / Heat Code	Charge B07 / Heat Nr	Menge B08 / Quantity	Artikelbezeichnung / Description B01 - (B09 - B11)
	3083	20,00	W/N 300 RF 3" XXS LF2 CL1

Material gemäß / Mat. in acc. to B02 ASTM A 350M -17 ,ASME SA 350 M - 17 ,ASME CODE SECT. II, PART A, ED. 2017
ASTM A350 LF2 CL1
NACE MR-0175/2015 ISO 15156
NACE MR-0103/2015
Q.A.S.IN ACCORD.WITH PRESS.EQUIPM.DIRECT.97/23/EC(PED) ANNEX I,PARAGRAPH 4.3

Elemente / Elements (C71 - C92)	C	Si	Mn	S	P	Cr	Ni	Mo	Ti	Cu	V	Nb	N
LADLE ANALYSIS	0,186	0,218	1,150	0,013	0,014	0,092	0,096	0,020	0,012	0,188	0,001	0,000	0,011
	Al								CE LF	CE SF	F1	F2	PREN
LADLE ANALYSIS	0,030								0,419	0,378	0,397	0,112	-

CE LF=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15 CE SF=C+(Mn/6) F1=Cu+Ni+Cr+Mo+V F2=Cr+Mo

Probe / Test specimen Sez/Sect mm2	L. mm	Form C10 / Shape 1=O - 2=□	°C C03	Streckgrenze>0,2% C11 / Yield Strength>0,2% MPa	Streckgrenze>1,0% C11 / Yield Strength>1,0% MPa	Zugfestigkeit C12 / Tensile MPa	Dehnung C13 / Elongation %	Einschnürung C15 / Reduction of area %
126,60	50,80	1	20	312,0	--	527,0	30,0	65,0

HÄRTE / HARDNESS C22 HBW	Typ/Type C40	KERBSCHLAG / IMPACT TEST Probe / Test Specimen	°C C03	1-Joule C42	2-Joule C42	3-Joule C42	Mittelw. / Average C43
147,0 - 151,0	KV	10x10 mm	-50	56	43	61	53,3

Wärmebeh. / Heat treatment C70	NORMALIZED AT 910 °C - COOLED IN STILL AIR	ELECTRIC FURNACE
Abm. gem. / Dim. acc. to B14	ASME/ANSI B16.5-2017, ASME/ANSI B36.10M-2015, ASME/ANSI B16.25-2012	
Ausführung / Roughness	125/250 MICROINCH AARH	

Stempelung gem. B06 / Marking in acc. to	MSS SP25 Ed. 2013	Maß & Sichtk / Vis. & Dim.	SATISFACTORY	Herkunft / Origin of Steel	ITALY

Bemerkung / Notes 100% MANUFACTURED IN GERMANY
MANUFACTURING IN ACCORDANCE WITH ORDER AND SPECIFICATION

QUALITÄTSKONTROLLE / QUALITY CONTROL DEPARTMENT A05	WERKSACHVERSTÄNDIGER (ZEICHEN TS) / INSPECTION AUTHORITY Z03	HERSTELLERZEICHEN / MANUFACTURER'S SYMBOL A04
Tim Scheideler	TS	

ANTHONY CARDWELL
04/03/2023

ALLOY PIPING PRODUCTS LLC

Mill Test Report

Date: 09/25/20
Time: 10:42:56
Page: 1/3

INSPECTION CERTIFICATE
EN 10204:2004 Type 3.1

Alloy Piping Products, LLC
A NexusPipe & Supply Company

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

To:

Customer Order#:

APP Invoice#:

Heat Number	Item Number	Item Description	Quantity
BA5925	464770	3" XXH WPL6 S B/W TEE	

Starting Material:
Pipe Seamless

Order Spec:

Item Spec:	ASTM A420 2014	ASME SA420 2015		

Test ID:1 — Chemical Composition (wt%)

Element	Content	Element	Content	Element	Content
C	0.11000	CR	0.04000	SUM OF CU+NI+CR+MO	0.10
MN	1.30000	MO	0.01000	SUM OF CR+MO	0.05
P	0.01600	CU	0.02000	SUM NB+V	0.02
S	0.00200	V	0.01000	CARBON EQUIVALENT:	0.34
SI	0.19080	NB	0.01000	CE2 C+(MN/4):	0.44
NI	0.03000	CARBON EQUIVALENT:	0.34	CE2 C+(MN/4):	0.44

Test Results

Work Order#: 20463 Load Designation: Test Set: 0

Test ID: 1 — Tensile Test

Specimen Type: Longitudinal Rectangular	Gauge Length: 2.0000 in
Tensile Strength: 66,800 psi	Yield Strength: 43,100 psi
Elongation: 49 %	Reduction:

ANTHONY CARDWELL
04/03/2023

ALLOY PIPING PRODUCTS LLC

Mill Test Report

Date: 09/25/20
Time: 10:42:56

Alloy Piping Products, LLC
A Texas Pipe & Supply Company

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
BA5925	464770	3" XXH WPL6 S B/W TEE	

Charpy Test

Test ID: 1

Specimen Size : .39400 X .39400 — Test Temperature : -50 °F

Sample Area: BASE — Location: 1/2t Longitudinal

	Sample 1	Sample 2	Sample 3	Average Shear %:
Shear				Average Absorbed Energy: 315 ft-lbs
Absorbed Energy	345 ft-lbs	340 ft-lbs	259 ft-lbs	Minimum Absorbed Energy: 259 ft-lbs
Lateral Expansion				Minimum Lateral Expansion:
Specimen Status				

Hardness Test

Test ID: 1

Hardness	Notes
147 HBW(79 HRB)	HARDNESS: 144/153 HBW. HARDNESS IS ACCEPTABLE IN ACCORDANCE WITH NACE MR0175/ISO 15156:2015 AND MR0103/ISO 17495:2016

Supplemental Info

Test ID: 1

MAGNETIC PARTICLE EXAMINATION — Pass

SATISFACOTRY

Heat Treatment Statement

Test ID: 1

NORMALIZED AT 1670°F

ANTHONY CARDWELL
04/03/2023

ALLOY PIPING PRODUCTS LLC

Mill Test Report

Date: 09/25/20
Time: 10:42:56
Page: 3/3

INSPECTION CERTIFICATE
EN 10204:2004 Type 3.1

Alloy Piping Products, LLC
A Texas Pipe & Supply Company

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

To:

Customer Order#:

APP Invoice#:

Heat Number	Item Number	Item Description	Quantity
BAB925	454770	3" XXH WPL6 S B/W TEE	

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 and 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

09/25/20

Date

ANTHONY CARDWELL
04/03/2023

ArcelorMittal South Africa Limited
Tubular Products
273 Genl. Hertzog Rd, Peacehaven
Vereeniging 1939
P O Box 48 Vereeniging 1930
South Africa

Telephone +27 (0)16 450 4220
Fax +27 (0)16 423 4906

MATERIAL TEST CERTIFICATE
SEAMLESS TUBE

Licensed under API Spec 5L and 5CT
5L - 0319
5CT - 0419

ISO 9001: 2008
DE-395997 QM

Test Certificate
EN 10204:2004 TYPE 3.1

ArcelorMittal

Customer:	Mattsco Supply Company	Customer Order/Contract No:	SUSO 151953
Order No:	4000021153	Material No:	1000038208
Certificate Reference No:	040061830522	Cast/Heat No:	28B3823
Product:	FULLY KILLED HOT FINISHED CARBON STEEL SEAMLESS TUBES		
Specification:	ISO3183:2012/API 5L:2012 L245/L290/B/X42 PSL1 ASTM A/SA53B.12 A106B/C.14 A530.12 ASME SA53B.12 SA106B/C.13 SA530.13		
Product Marking:	ARCELORMITTAL SA ISO3183/Spec 5L-0319 MONOGRAM 10-15 ASTM/ASME A/SA106B/C A53B 3.500 0.600 40.000 L245/B L290/X42 PSL1 SMLS TESTED 3000 psi CAST NO: 28B3823 PROD/O NO: T0942115310 MADE IN SOUTH AFRICA NDE		

General Information

Quantity	Mass	Dimensions			Total Length
		Tube OD	Thickness	Length	
69	51,374.610(lb)	3.500(")	0.600(")	40.000 (ft)	2,760.000(ft)

Steel making process	Final Rolling Operation
Electric Arc	As Rolled Final hot rolling finished above 1,580°F and cooled in still air

Chemical Composition

Element(%)	C	Si	Mn	S	P	Cr	Ni	Mo	Cu	V	Al	Ti	Sn	Ca	N	B	Nb	CE	R22	R24
Minimum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maximum	0.200	-	1.30	0.030	0.030	0.50	0.50	0.150	0.500	-	-	-	-	-	-	-	-	0.41	0.15	0.060
Heat	0.190	0.25	0.77	0.005	0.008	0.05	0.10	0.009	0.050	0.004	0.048	0.001	0.004	0.0009	0.0094	0.0002	0.0010	0.34	0.01	0.005
Product	0.1900	0.2500	0.7700	0.0055	0.0080	0.0500	0.1000	0.0090	0.0500	0.0040	0.0480	0.0010	0.0040	0.0009	0.0094	0.0002	0.0010	0.3409	0.0060	0.0050
Product (ADD)	0.1900	0.2500	0.7700	0.0055	0.0080	0.0500	0.1000	0.0090	0.0500	0.0040	0.0480	0.0010	0.0040	0.0009	0.0094	0.0002	0.0010	0.3409	0.0060	0.0050

R22-(V+Nb+Ti)
R24-(Nb+V)

Mechanical Properties

Specification Limits	UTS (Rm) MPa	UTS (Rm) psi	Yield (0.5%) MPa	Yield (0.5%) psi	% EL 2 inch
Minimum		70000		42000	30.0
Maximum		-		-	-
(1) Actual		71213		55549	41.0
(2) Actual		71503		55114	41.0
(3) Actual					
(4) Actual					

	UTS (Rm) MPa	UTS (Rm) psi	Yield (0.5%) MPa	Yield (0.5%) psi	% EL 2 inch
(5) Actual					
(6) Actual					
(7) Actual					

Orientation & type of tensile test	Longitudinal, Strip
Width of tensile piece (inch)	0.75 Inch
Orientation of impact test piece	

OTHER TESTS	
Category	Result
Flattening	Passed
Hydrostatic	3000 psi for 5 Sec
NDI: EMI	PASS - ASTM E570 - 12.5% NOTCH
NDI: UT	UT not required
HV 22 lbs	137 140 141

Remarks:

Material in accordance with NACE MR0175:2009/ISO15156-3:2009, MR0103:2012. Dimensions to ASME B36.10M-2010.
The material conform to the hot yield strength requirements as per ASME, Sect II, Pt D, Table Y-1, 2013
All the material conform to the visual and dimensional requirements and is made to a suitable fine grain practice.

Quality Assurance Manager: PJ Venter *Date of Release: 2015.10.09* *Certified by:*

ANTHONY CARDWELL
04/03/2023

MANNESMANN PRECISION TUBES
A Member of the Salzgitter Group

Inspection Certificate

acc to EN 10204/3.1

Page 1 of: 2 Pages

Certificate no.: 9221152

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

Marking: On tubes / On tags

Manufacturer's mark: **MPT-HE**

Process: Basic oxygen steel

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

Steelmarks: (S)A 179 + N

Extent of the delivery:

Shipping no.: 4400548
Our shipping date: 19-05-2022

Item	Numbers	Dimension			Heat no.	Sample no.
40	29	1,000" OD x 0,095" MW x 11'0"	97,21 m	146 kg	323092	1-2

Shipping marks:
PO : 10075464
Item : 00004
Mat. : A320100000950B
Quantity : 29pcs.
Tag Nr. : PO# A22-13312 T-7
ASTM/ASME A/SA 179 SMLS
Grade 1010
OD: 1,0000" inches
Wall: 0.0950 inches MW Wall
Melting Western Europe
Hot finished tube fabrication in Germany
Cold drawn in The Netherlands
Max. 1 heat per bundle – Max 1 heat per box

	C	Mn	P	S	Cr		Heat no.
Requirements:	*0,06-0,18*	*0,27-0,63*	*≤0,035*	*≤0,035*			
Heat analysis (%)	0,15	0,52	0,009	0,005	0,04		323092

	Mo	V	Cu	Ni	Sn		Heat no.
Requirements:							
Heat analysis (%)	0,01	0,001	0,02	0,03	0,002		323092

Heat treatment: Normalized at 920 °C

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

Helmond(NL.) : 31-05-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022

MANNESMANN
PRECISION TUBES
A Member of the Salzgitter Group

Test results

Certificate no.: 9221152

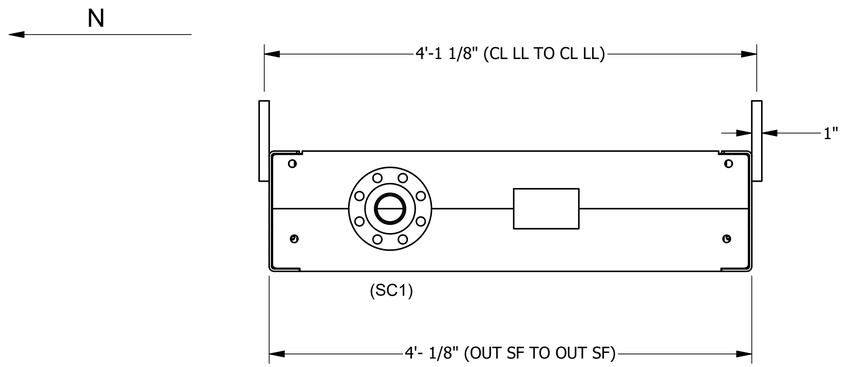
1. Visual inspection and control of dimensions: OK
2. Eddy current test acc. to: E309: OK
3. Flattening test: OK
   Flaring test: OK
4. Hardness test: OK

Mechanical data	Dimensions of the test tube mm	Hardness HRB
Requirements:		*Max 72*
1	25,40 x 2,58	68
2		69

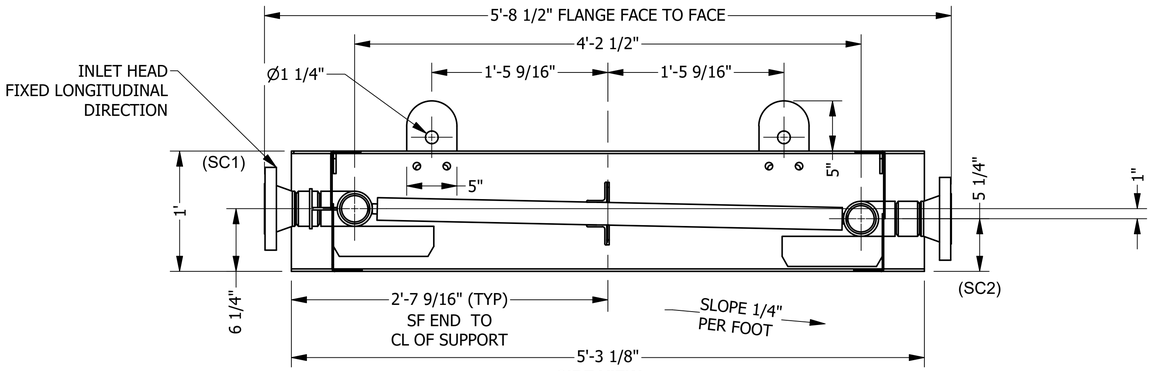
Helmond: 31-05-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

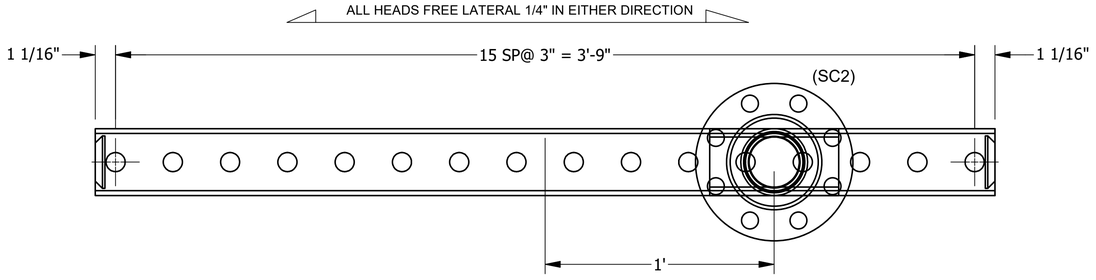
ANTHONY CARDWELL
10/24/2022



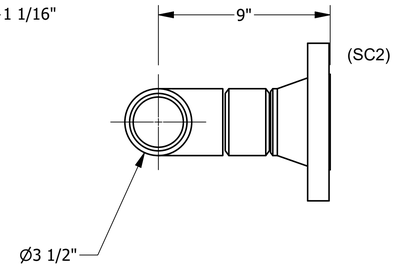
FRONT VIEW

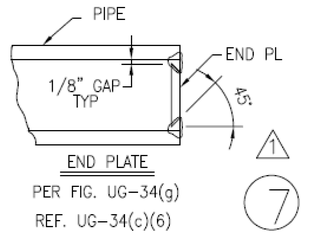


SIDE VIEW
LOOKING NORTH

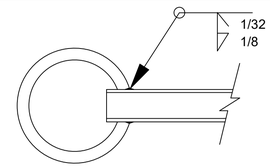


BACK HEADER TUBE SIDE

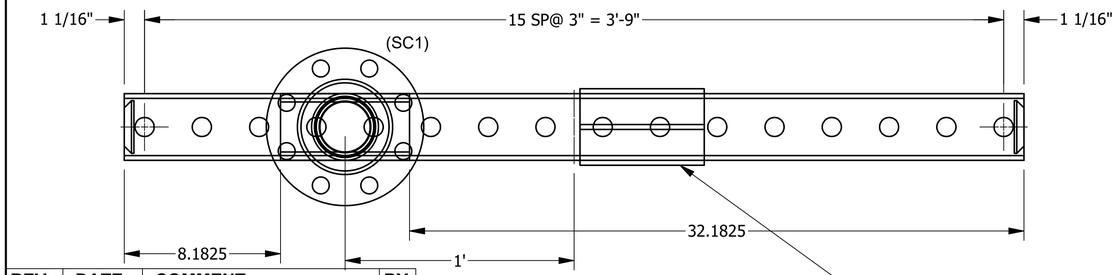




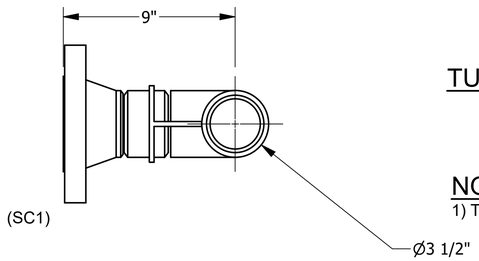
END PLATE WELD DETAIL



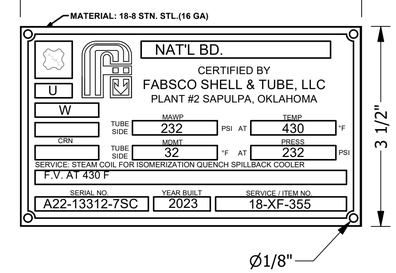
TUBE TO PIPE HEAD DETAIL



FRONT HEADER NOZZLE SIDE



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



DESIGN INFORMATION	
DESIGN PRESS. PSIG:	232 / FV
DESIGN TEMP. DEG F:	430 / 430
MDMT DEG F:	32
CORROSION ALLOW. IN.:	0.125
NDE: MT OR PT EDGES	
RT SPOT API 661 100% RT BUTT WELDS	
EFFECTIVE SURFACE AREA:	BARE: 17 FT^2
	EXTENDED: 350 FT^2
HYDROTEST PSIG:	302
DESIGN & STAMP:	ASME
ASME SECT. VIII, DIV. 1 ED. 2021	
CHARPY EXEMPT UG20(f) AND/OR UCS 66	
PLUG HOLE INFORMATION	
PREDRILL DIAMETER	0.9688
TUBE REAM	1.01
TPI	12

REV:	DATE	COMMENT	BY
0	03-21-2022	FOR APPROVAL	BH
1	8/22/22	PER CUST. COMM.	BH
2	10/24/22	PER CUST. COMM.	BH
3	2/8/23	XXH FITTING SCHEDULE/ CUST. COMM.	BH
4	3/9/23	PER CUST. COMM.	BH
5	11/28/23	CORR. SLOPE NOTE UPDATED LIFT LUGS	BH
6	2/20/24	MDMT / CUST. COMM.	BH

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-355
SERVICE:	STEAM COIL For Isomerization Quench Spillback Cooler
LOCATION:	World Energy, Paramount, CA, USA
PO NO.:	4505606036 / A8KM-4-406-PO-1
FABSCO JOB NO.:	A22-13312-7SC

NOZZLE: CONNECTIONS:

(SC1) (INLET) (1) 3" 300# - XXH - RFWN
3" PIPE - XXH - 3.3125" LG - BBE
3" - TEE - SCH XXH
(SC2) (OUTLET) (1) 3" 300# - XXH - RFWN
3" PIPE - XXH - 3.3125" LG - BBE
3" - TEE - SCH XXH

TUBES: (16) 1" OD 0.095" MW 48"
FIN: 0.625" HI 0.016 11/FPI, EMBEDDED

		THICK	DIA	BEVELS
FRONT HEAD (PIPE)	3" PIPE - SCH XXH - 32.0625" LG			BOE
	3" PIPE - SCH XXH - 8.0625" LG			BOE
BACK HEAD (PIPE)	3" PIPE - SCH XXH - 32.0625" LG			BOE
	3" PIPE - SCH XXH - 8.0625" LG			BOE
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

STRUCTURAL:	
SIDEFRAME:	C 0.25" 12" 63.125"
SUPPORT:	(1) - L 3 x 3 x .25
BINDER:	(1) - L 2 X 2 X .25
TP AIRSEAL:	L
BTM AIRSEAL:	L
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.:	3
SCALLOPED CHANNELS:	
1" X 1.5" PITCH	
ALUMINUM	
TOLERANCES: (INCH)	
LENGTH:	± 0.125
WIDTH:	± 0.125
TUBE PROJECTION:	0.0625 ± 0.125
DRY WEIGHT LBS:	684
HYDRO WEIGHT LBS:	717

DRAWN BY: BH
DATE: 03-21-2022
CHECKED BY:

FABSCO, LLC

BUNDLE ARRANGEMENT DRAWING - STEAM COIL FOR 18-XF-355

DRAWING NO: A22-13312-7SC-300

REV: 6