

**FABSCO LLC.**

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

AIR COOLED EXCHANGER SPECIFICATION SHEET

1	Equipment Owner	Air Products Manufacturing LLC	Customer/Client: World Energy Paramount	Date:	11/28/2023 Rev.	2
2	Plant Location	World Energy, Paramount, CA, USA	Fabsco Job No.: A22-13316	Item No.	18-XF-1802A/B	
3	Service	Flash Steam Condenser	Project: World Energy Renewables Project	Proj No./Unit:	EN-20-7123 / Utilities	
4	Size and Type	10.833 x 24.000 ft	FORCED	No. Bays	2	
5	Surface/Unit - Finned Tube	67229 ft ²		;Bare Tube	3179.3 ft ²	
6	Heat Exchanged	26.64 MMBtu/hr	MTD, Eff.	69.3 °F		
7	Transfer Rate-Finned Tube	6.083 ;Bare Tube, Service	128.64	Clean	142.24 Btu/h.ft ² .F	

PERFORMANCE DATA - TUBE SIDE

10	Fluid Name		Steam Condensate		Vapor Ref. Temp.	°F	218.5	
11	Total Fluid In	lb/h	27104		Specific Heat	Btu/lb.F	0.5	
12	Vapor	lb/h			Viscosity	cP	0.0124	
13	Liquid	lb/h			Conductivity	Btu/h.ft.F	0.0144	
14	Noncond	lb/h			Density	lb/ft3	0.042	
15	Steam	lb/h	27104	0	Liquid Ref. Temp.	°F	202	
16	Water	lb/h	0	27104	Specific Heat	Btu/lb.F	1.0062	
17					Viscosity	cP	0.2989	
18	Temperature In/Out	°F	218.5	202	Conductivity	Btu/h.ft.F	0.39	
19	Pressure In / Out	psia	16.70	14.91	Density	lb/ft3	60.073	
20	Velocity	ft/s	66.63					
21	Press. Drop Allow/Calc	psi	2	1.786	Fouling resistance	h.ft2.F/Btu	0.0005	tubeside / 0.002 airside

PERFORMANCE DATA - AIR SIDE (Air)

23	Std. air flow rate/item	(SCFM)	262250	Altitude above Sea Level	ft	69
24	Air Quantity/Fan	(ACFM)	68303	Temperature In (Dry Bulb)	°F	90
25	Actual Static Press	in H ₂ O	0.391	Temperature Out	°F	183.82
26	Face Velocity	(SFPM)	507.25	Min. Design Ambient	°F	35
27	Max Mass Velocity	lb/h.ft ²		Fan Air Temperature	°F	90

DESIGN - MATERIALS - CONSTRUCTION

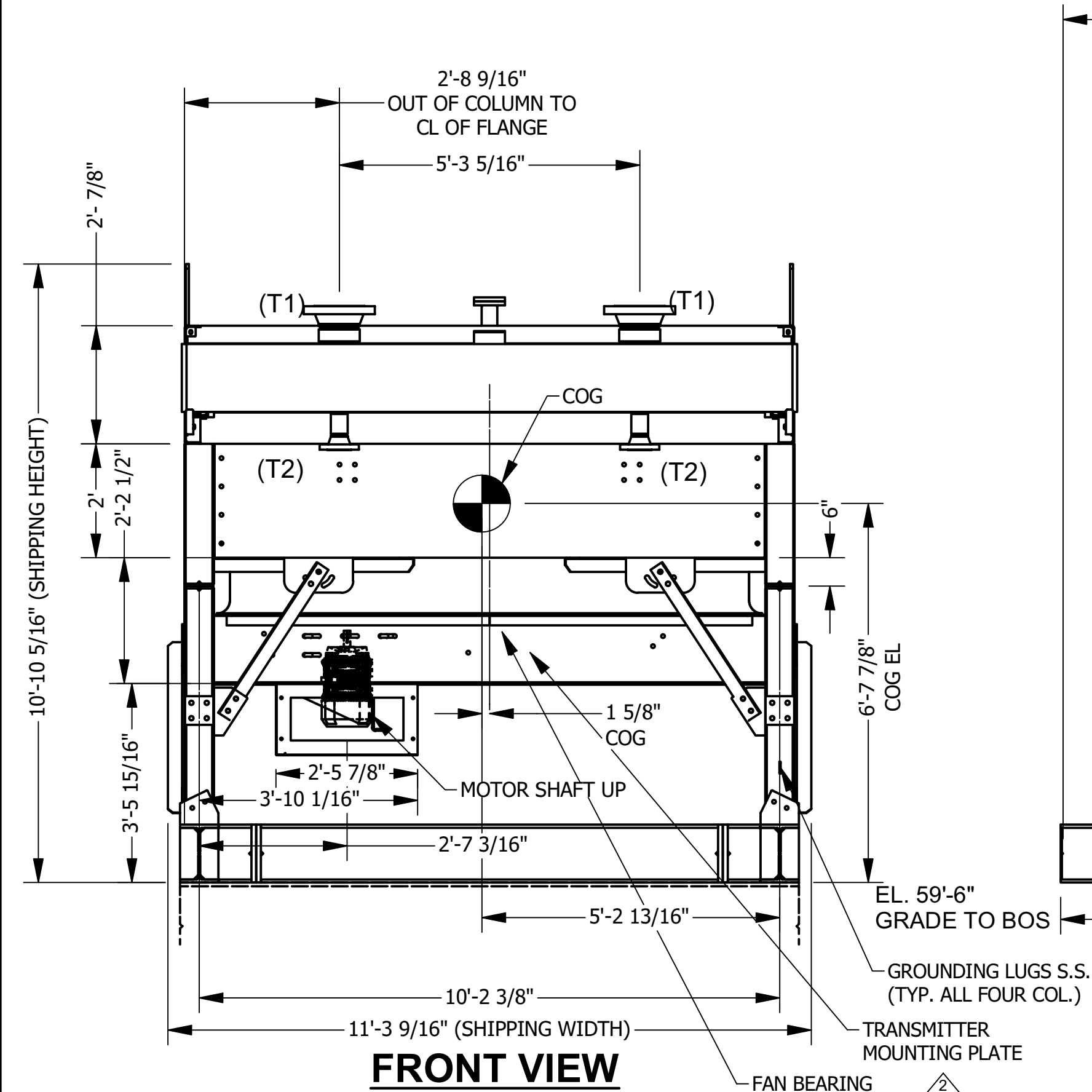
29	Design Pressure psig			FV @ 350F	50	Test Pressure psig			65	Design Temperature			350.0	32	°F	
30	TUBE BUNDLE					HEADER, Type				BOX	TUBE, Material				SA-179	
31	Size 10.771 x 24.000 FT					Material				SA-516-70N				Smls. tube		
32	No./Bay		1	No. Rows		5	No. Passes		2		OD		1	Thickness		0.095 in
33	Arrangement		Bundles in Series			Slope		0.125 in/ft last pass only		No./Bundle		253		MIN WALL		
34	Bundles		2 Bundles in parallel			Plug Material		SA-350-LF2		Length		24		ft		
35	Bays		2 Bays in parallel			Gasket Material		A1008 CS (ZP)		Pitch		2.5		in		
36	Bundle Frame Finish		Note 9	Galvanized		Corr Allow		0.125 in		Fin, Type		EMBEDDED				
37	Header Finish		Note 10	Coating system 1 after hydro			In qty/in.		2 8		Material		ALUMINUM			
38	Structure Finish		Note 9	Galvanized			Out qty/in.		2 3		OD		2.25 Thk.		0.016 in.	
39	Mounting/C TO C		Piperack			Vent/Drain		2" 300# RFLWN w/ BLD (2)		No./in		10		Fin Design Temp		350.0
40	Surf Prep		SSPC SP 10			Rating/Facing		300# RFWN		Code -		ASME		Section VIII Div1		
41	Louvres / Guards		NONE			TI		PI		Natl Board Stamp		YES				
42	Vibration Transmitter		WILCOXON 786A-D2			Flange Calc per UG44(b)		YES		SPECS.		API 661				

MECHANICAL EQUIPMENT

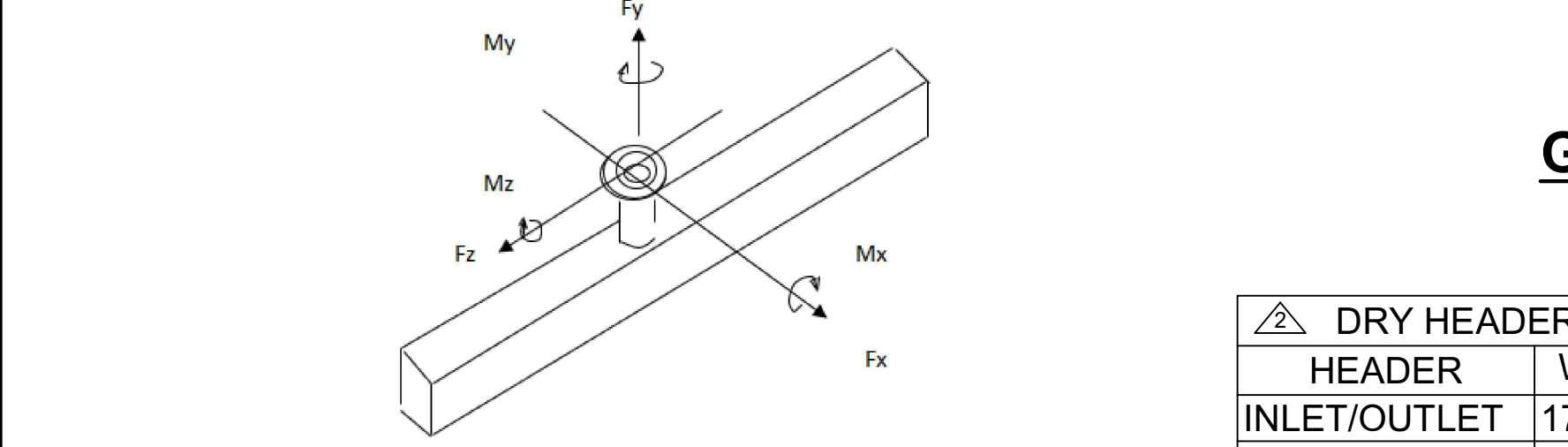
44	Fan Mfg		MOORE		Driver		Speed Reducer				
45	Model	VT	30	10000	Type	MOTOR	Type	HTD			
46	No./Bay	2	Rev./ Min	328	Mfg.	US MOTOR	Mfg.	GATES OR EQ			
47	Fan Diam. Ft	9	No. Blades	4	No/Bay	2	Model				
48	Manual Adjust	Pitch		14.0	hp /Driver	10	No/Bay	2			
49	Mat'l:Blade	ALUMINUM		Hub ALUM	Rev/Min	1800	AGMA Rating, hp	18			
50	hp/Fan, Design	7.27			Enclosure	TEFC	Ratio	5.49			
51	hp/Fan, Min Amb	8.08			Volt;Phase;Cycle	460/3/60	Support	STRUCTURE			
52	Plot Area	10.833 x 24.000		ft2	Bundle WT Dry lb	17942	Full H20 lbs	19968	API Noz Mult.	2	
53	Weight per bay lbs	40268			Motors VFD Compatible	Temp Code T3C		Steam Coil	NO	Heat Treat	YES
54	Weight per unit lbs	80536			Class 1 Div 2 Gr BCD			Recirc	NO	NDE	API
55	dBA @ 3'	85			MOTOR TAG NUMBERS. 18-XF-1802AM1; 18-XF-1802AM2; 18-XF-1802BM1; 18-XF-1802BM2			Ladder	YES	Bugscreen	NO
56	Fan Wt Lbs	93						End Walk	YES	Air Brake	YES
57	CUSTOMER TO ENSURE SYSTEM PROPERLY DRAINS AND VENTS TO NOT BUILD UP NON CONDENSIBLES							Side Walk	NO	N2 Purge	YES
58	Notes:							Drive Walk	NO	Turbulators	NO

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

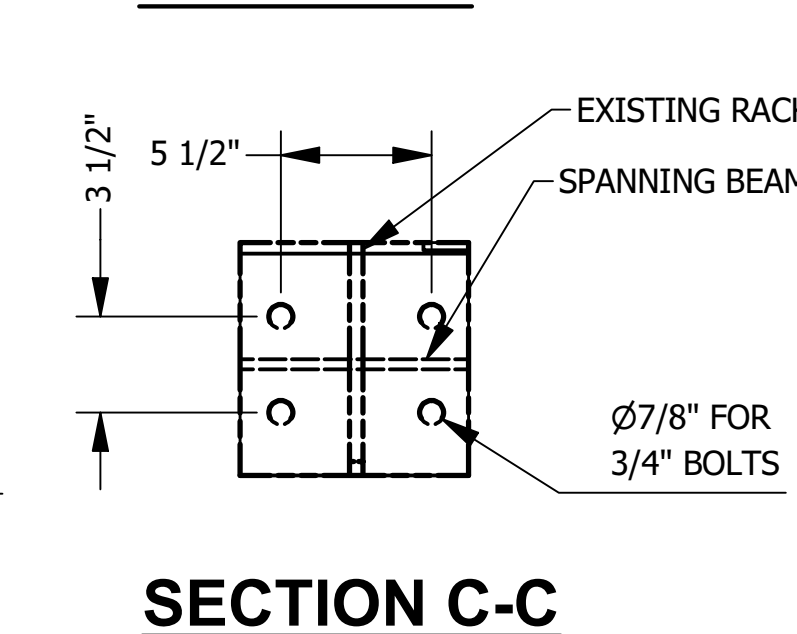
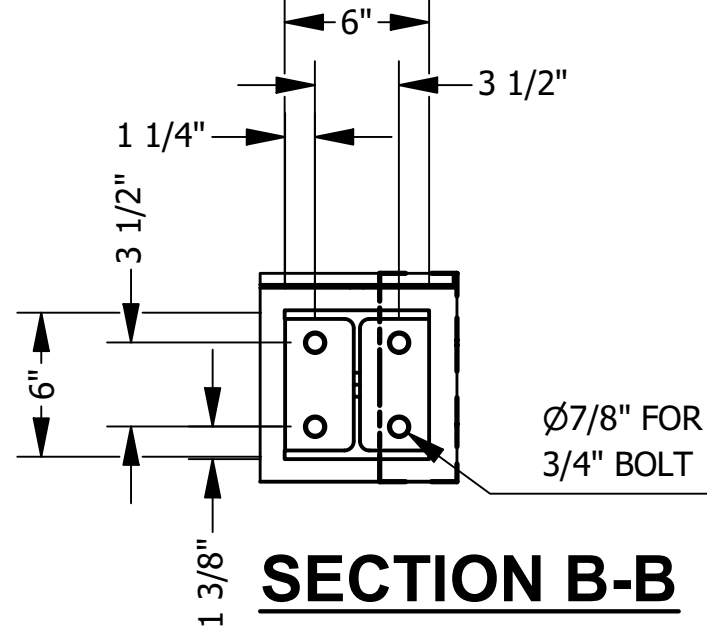
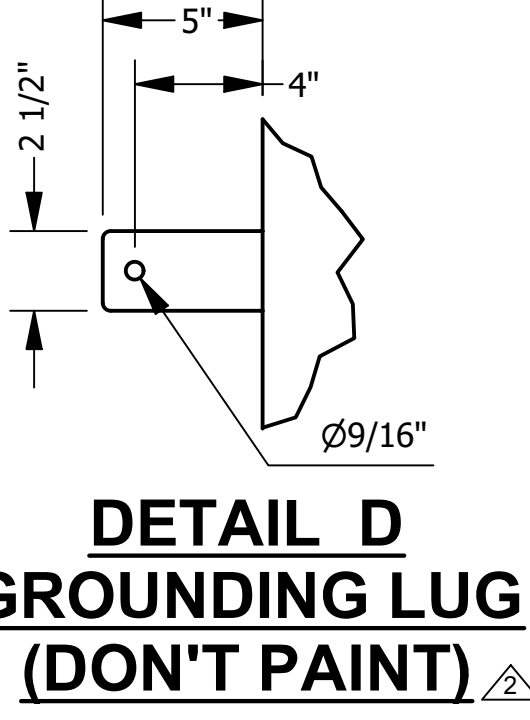
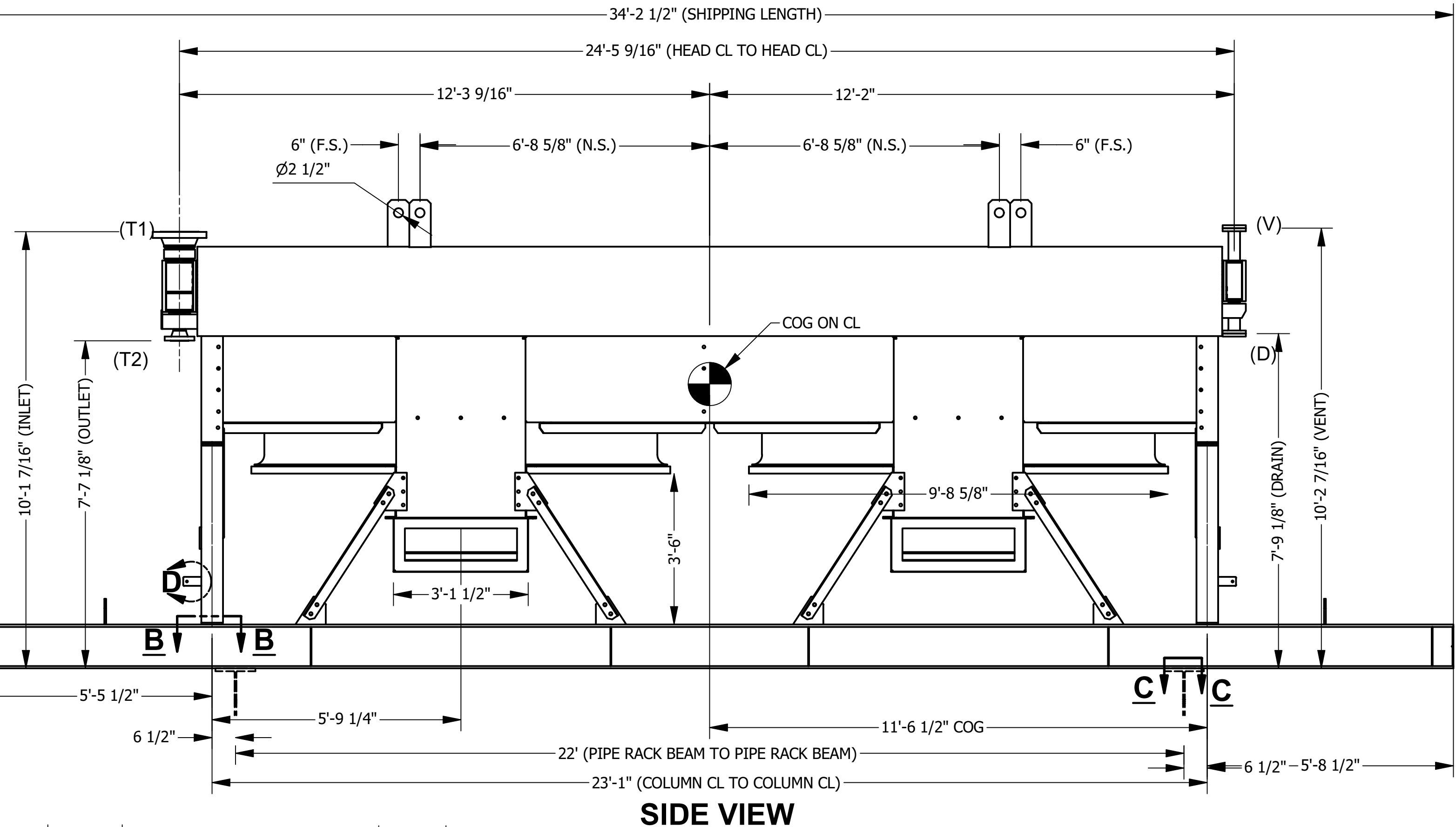
SECTION / DESCRIPTION	MAWP	TEST PRESS	DESIGN TEMP	MDMT	CONN NPS	RATING	BUNDLE VOL	BUNDLE WT	LOUVER	HAILScreens	MOTOR HP:	FAN MFGR:	DIAM (FT):	SPECIFICATION NOTES:	COOLER WT #:
UNITS	PSIG	PSIG	DEG F	DEG F	INCH		CU FT	LBS			10	MOORE	9		SEE TABLE
FLASH STEAM CONDENSER	50/FV	65	350	32	8 \ 3	300#	33	18115	NONE	NONE	TYPE: TEFC	CLASS: 10000	ACFM/FAN: 68303	VIB. TRANSMITTER: WILCOXON	STRUCTURE FINISH: PER A8KM-PP-000-500540-A
18-XF-1802 A/B											RPM: 1800	BLADES: 4	HP@ DES.: 7.27	VIB. TRANS. MODEL NO.:	GALVANIZED
											VAC: 460/3/60	PITCH: 13.99		786A-D2	HEADER FINISH: PER A8KM-PP-000-500520-A
											FRAME: 215T	RPM: 328	DRIVE: HTD	QTY: 2 PER BAY	COATING SYSTEM 1 AFTER HYDRO
											SHAFT: 1.375	SERIES: 30	RATIO: 5.49:1		
											MOTOR WT: 197 lbs	TYPE: SC	DRIVE WIDTH: 36		
											QTY: 2 PER BAY	TIP: VT	AIR BRAKE: YES		
												QTY: 2 PER BAY			



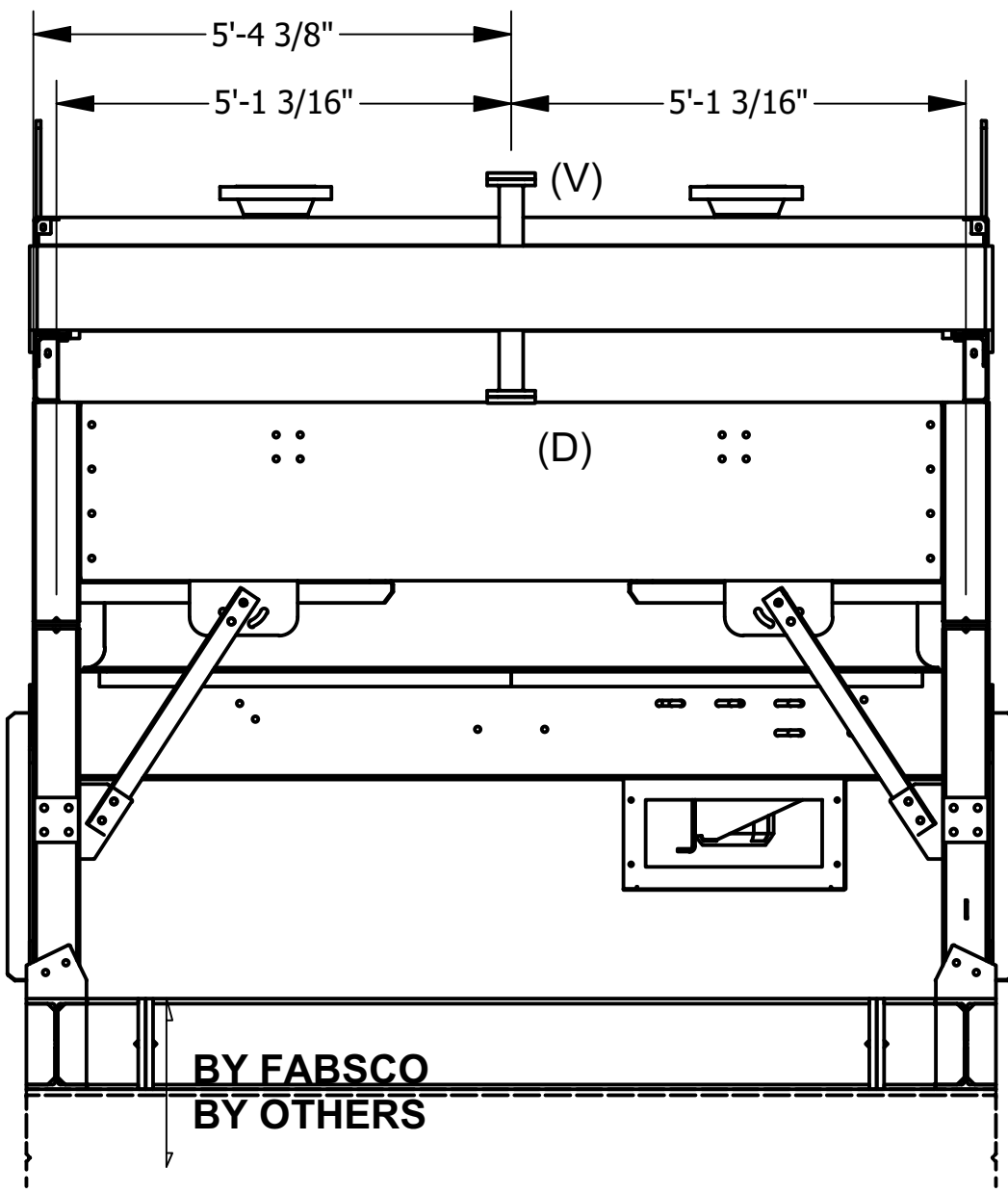
- NOTE: 1. (2) BAYS REQUIRED
2. SPANNING BEAMS, STUB COLUMNS, TRANSV & LONL DIAG BRACES REMOVED FOR SHIPPING.
3. ALL MOTORS ARE VFD COMPATIBLE, NO SPACE HEATER.
4. MOTOR REMOVAL BEAM PROVIDED
5. MOTORS SHALL BE RATED FOR CLASS 1, DIV. 2, GROUPS B,C,D AND A T3C TEMPERATURE CODE
6. "COOLER WEIGHT" LISTED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



NOZZLE LOADS		QTY/HEAD		SIZE	CLASS, #	2 X API 661
FRONT HEAD		2	3	8	300	
SIZE	FX	FY	FZ	MX	MY	MZ
	LBS	LBS	LBS	FT LB	FT LB	FTLB
8	2560	6000	3600	4500	9000	3300
3	900	760	900	600	900	600
COMBINED	6920	13520	9000	10200	19800	7800
MAX API	2250	4500	3750	4500	6000	3000
DESIGN LOAD	2250	4500	3750	4500	6000	3000



EQ. TAG #S		
COOLER	EQUIPMENT	TAG #
18-XF-1802A	MOTOR	18-XF-1802AM1
18-XF-1802A	MOTOR	18-XF-1802AM2
18-XF-1802B	MOTOR	18-XF-1802BM1
18-XF-1802B	MOTOR	18-XF-1802BM2
18-XF-1802A	FAN	18-XF-1802AF01
18-XF-1802A	FAN	18-XF-1802AF02
18-XF-1802B	FAN	18-XF-1802BF01
18-XF-1802B	FAN	18-XF-1802BF02
18-XF-1802A	VIB SENSOR	UT-VE-XF1802AA
18-XF-1802A	VIB SENSOR	UT-VE-XF1802AB
18-XF-1802B	VIB SENSOR	UT-VE-XF1802BA
18-XF-1802B	VIB SENSOR	UT-VE-XF1802BB



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

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:
4/8/2022

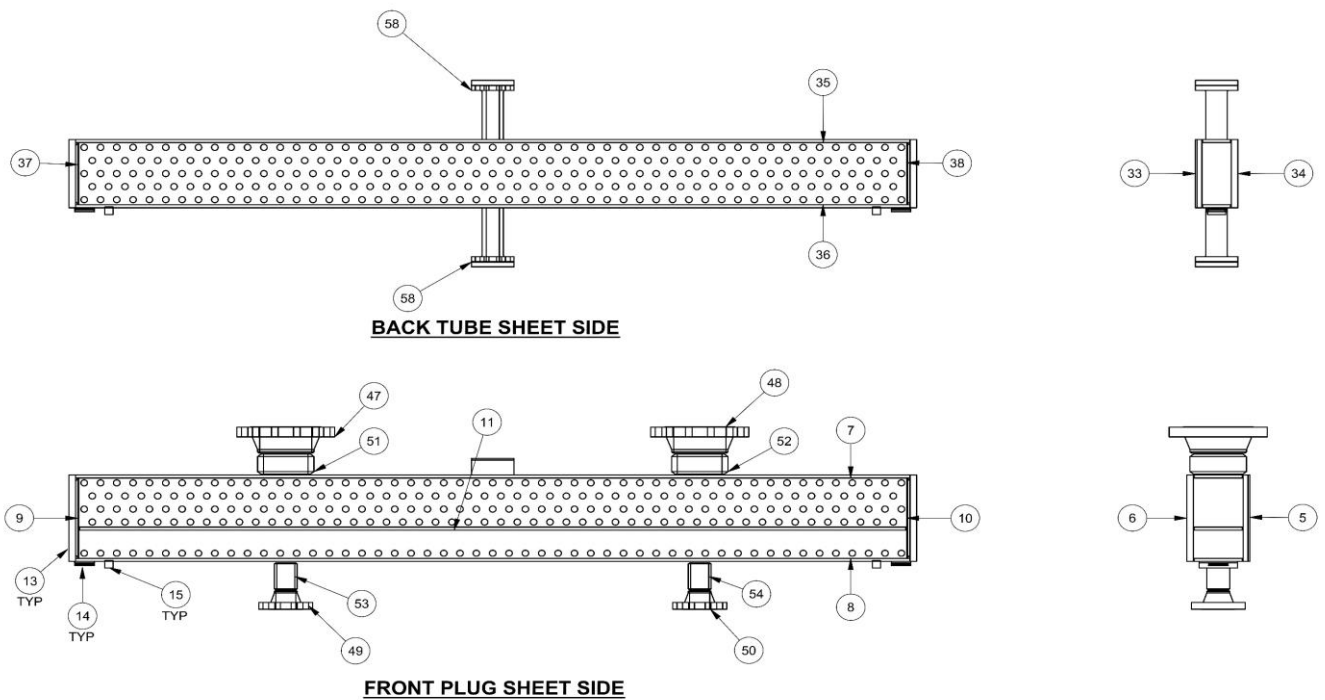
CHECKED BY:

DRAWING NO:
A22-13316-2/3-100

REV:
3

GENERAL ARRANGEMENT		
REV.	DATE	DESCRIPTION
0	4/8/2022	FOR APPROVAL
1	9/19/2022	PER CUST. COMM.
2	1/20/2023	PER CUST. COMM.
3	2/23/2023	PER CUST. COMM.

DRY HEADER WEIGHT		REFERENCE DOCUMENTS	
HEADER	WEIGHT (LBS)	FABSCO DOC. #	APCI DOC. #
INLET/OUTLET	1700	A22-13316-2A-3A-300	EN207123-FAB-9V3-00036
RETURN	1000	A22-13316-2A-3A-ASME	EN207123-FAB-9V3-00032
WEIGHTS PER BAY(LBS)		A22-13316-2-3 LL	EN207123-FAB-9V3-00058
ITEM	WEIGHT	A22-13316-2-3 NOTES	EN207123-FAB-9V3-00099
COOLER	29062	22-13315-1-2&13316-1&	EN207123-FAB-9V3-00126
SPAN BEAMS	6379	13316-2-3-LAYOUTOUT	EN207123-FAB-9V3-00022
LOUVER	0		
WALKWAY W/LADDER	2847		
H20	2050		
PROCESS FLUID	1980		
TOTAL DRY	38288		
TOTAL FULL H2O	40338		
TOTAL OPERATING	40268		



Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
5	NUCOR	3600736	SA-516-70N
6	NUCOR	3600736	SA-516-70N
7	NUCOR	2604930	SA-516-70N
8	NUCOR	2604930	SA-516-70N
9	NUCOR	2604930	SA-516-70N
10	NUCOR	2604930	SA-516-70N
11	NUCOR	2604930	SA-516-70N
13	NUCOR	1200121	SA-516-70N
14	NUCOR	1200121	SA-516-70N
15	CLEVELAND CIFFS BUNRS HARBOR	822Y39620	SA-516-70N
33	NUCOR	3600736	SA-516-70N
34	NUCOR	3600736	SA-516-70N
35	NUCOR	2604930	SA-516-70N
36	NUCOR	2604930	SA-516-70N
37	NUCOR	2604930	SA-516-70N
38	NUCOR	2604930	SA-516-70N
47	DL FLANGE	DL70218	SA-350LF2
48	DL FLANGE	DL70218	SA-350LF2
49	GALPERTI	5015242/02	SA-106B
50	GALPERTI	5015242/02	SA-106B
51	VALLOUREC	I80245	SA-350LF2
52	VALLOUREC	I80245	SA-350LF2
53	VOESTALPINE	1022459461	SA-106B
54	VOESTALPINE	1022459461	SA-106B
58	FEDERAL FLANGE	22T0763	SA-350LF2
TUBES	MANNESMANN PRECISION TUBE	323095	SA-179

CUSTOMER: AIR PRODUCTS MANUFACTURING, LLC.

PO NO: 4505606039/ A8KM-4-406-PO-5

ITEM NO: 18-XF-1802 A/B

DATE

AC



FABSCO
SHELL & TUBE, LLC

DWG No

A22-13316-2A/3A-HS

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Mill Test Report

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Issuing Date : 02/13/2023 B/L No. : 642034 Load No. : 660464 Our Order No. : 202513/15 Cust. Order No. : 128223
Vehicle No: SNC 62519 Sold To: PORT CITY METALS SERVICES INC A Ship To: PORT CITY METAL SERVICES, INC.
Specification: 1.0000" x 120.000" x 480.000" DIVISION OF METALS USA
ASTM A516 70/65/60/485-17/ASME SA516-70/65/60/485 PVQ 2019/2021 3101 CHARLES BLVD
Normalized Plate NACEM R0175 Annex 2.1.2 (2015), MR0103 (2010) TULSA, OK 74127 (2)
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
3600736	0.19	1.03	0.009	0.001	0.20	0.22	0.10	0.09	0.02	0.027	0.004	0.002	0.002	0.0076	0.0012	0.0003	0.010	0.40	0.27

Plate Serial No	Pieces	Tons	Tensile Test					Heat Treat			
			Dir.	Yield (psi)	Tensile (psi)	Elong. % in 2"	Elong. % in 8"	Norm (°F)	Time (min)	Temper (°F)	Time (min)
3600736-05	2	16.33	H-T	49,000	73,200	54.5		1650	41		

Plate Serial No	Pieces	Tons	Charpy Impacts																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
			Absorbed Energy (Ft-lbs)					Lateral Expansion (in.)					Shear (%)					Min	Temp (°F)	Size																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
			Dir.	(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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Piece frequency charpy;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate, unless otherwise noted in Specification. For Mexico shipments: nhc-SalesMX@nucor.com
Yield by 0.5EUL method unless otherwise specified. Ceq = C+(Mn/6)+((Cr+Mo+V)/5)+((Cu+Ni)/15)
Pcm = C+(Si/30)+(Mn/20)+(Cu/20)+(Ni/60)+(Cr/20)+(Mo/15)+(V/10)+5B
Melted and Manufactured in the USA. ISO 9001:2015 certified. PED 2014/68/EU, 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. API Q1-1851 DIN 50049 3.1.B/EN 10204 3.1(2004) 3.1B(1993)/ DIN EN 10204 3.1(2005) compliant. ABS QA-3624366

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

C.L. Cooper

C. L. Cooper, Metallurgist

G.A. APPROVED
By *[Signature]* Date *2/16/2023*

2/13/2023 9:01:52 AM

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03/16/2023 From: AMERICAN ALLOY STEEL, INC. S.O.# 736418
P.O.# 130328
Item 4 (1 PC) 1/2" X 120" X 360"

NUCOR
PLATE MILL GROUP

P.O. Box 278
Winton, NC 27986
(252) 356-3700

Mill Test Report

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

AMERICAN ALLOY
LATE # 271019109

Issuing Date : 11/09/2022 B/L No. : 635781 Load No. : 654093 Our Order No. : 200020/1 Cust. Order No. : 132167-OK
Vehicle No: SNC 62539 Sold To: AMERICAN ALLOY STEEL INC 6230 N HOUSTON ROSSLYN RD PO BOX 40469 NORTH HOUSTON, TX 77091 Ship To: AMERICAN ALLOY STEEL 6350 N ERIE AVE C/O SKOL TRACK #21 OWASSO, OK 74055
Specification: 0.5000" x 120.000" x 360.000" ASTM A516 70/85/60-17/ASME SA516-70/65/60 PVQ 2019/2021 Normalized Plate NACEMF0175 Annex 2.1.2 (2015), MFD103 (2010) Section 2.1.2 Compliant (2015) 13.1.1, 13.1.2 Vacuum Degassed
Marking : 132167-OK

Heat No	C	Mn	P	S	Si	Cu	NI	Cr	Mo	Al (tot)	V	Nb	Ti	N	B	Sn	Ceq	Pcm
2604930	0.20	1.01	0.018	0.002	0.19	0.23	0.09	0.16	0.03	0.025	0.003	0.000	0.001	0.0079	0.0003	0.009	0.42	0.29

Plate Serial No	Pieces	Tens	Tensile Test					Heat Treat			
			Dir.	Yield (psi)	Tensile (psi)	Elong. % in 2"	Elong. % in 8"	Norm (°F)	Time (min)	Temper (°F)	Time (min)
2604930-01	8	24.50	H-T	53,600	78,100	40.5		1650	23		
2604930-02	3	9.18	H-T	55,100	79,800	39.5		1650	23		

Plate Serial No	Pieces	Tons	Charpy Impacts																
			Absorbed Energy (ft-lbs)					Lateral Expansion (in.)					Shear (%)						
			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)
2604930-01	8	24.50	H-L	42.8	34.8	40.0	39.2	15										-50	10mm
2604930-02	3	9.18	H-L	170.5	28.0	34.5	77.7	15										-50	10mm

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

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate, unless otherwise noted in Specification. For Mexico shipments: mhc-SalesM@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/80)+(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. Dupre
T. A. Dupre, Metallurgist

11/9/2022 3:00:57 PM

G.A. APPROVED

By [Signature] Date 3/23/2023

ANTHONY CARDWELL
4/25/2023

05/24/2021 FROM: AMERICAN ALLOY STEEL, INC. TO: PORT CITY METAL SERVICES
P.O.#: 122943 S.O.#: 684780 AA PL#: 5240202
Item: 2 (1 PC) 1/4" X 96 X 480 EXISTING

NUCOR
PLATE MILL

P.O.Box 279
Winton, NC 27996
(252) 356-3700

Mill Test Report

AMERICAN ALLOY
PLATE # 5240202
1505 River Rd
Coffield, NC 27922
(252) 356-3700
NUCOR
It's Our Nature.

Issuing Date : 04/25/2021 B/L No. : 588753 Load No. : 603322 Our Order No. : 186276/1 Cust. Order No. : 126624-OK
Vehicle No: LW 62044 Sold To: AMERICAN ALLOY STEEL INC 6230 N HOUSTON ROSSLYN RD Ship To: AMERICAN ALLOY STEEL 6350 N ERIE AVE
Specification: 0.2500" x 96.000" x 480.000" ASTM A516 70/65/60/485-17/ASME SA516-70/65/60/485 PVQ 2019/2017 Normalized Plate NACE MR0175 Annex 2.1.2 (2015), MR0103 (2010) PO BOX 40469 NORTH HOUSTON, TX 77091 C/O SKOL TRACK #21 OWASSO, OK 74055
Section 2.1.2 (2015) 13.1.1, 13.1.2) Compliant
Marking : 126624-OK

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	Ceq	Pcm	
1200121	0.18	0.90	0.010	0.000	0.20	0.20	0.08	0.06	0.02	0.032	0.004	0.001	0.002		0.0026	0.0001	0.000	0.36	0.26	
Tensile Test										Heat Treat										
Plate Serial No	Plates	Tens	Dir.	Yield (psi)	Tensile (psi)	Elong. % in 2"	Elong. % in 8"	Norm (°F)	Time (min)	Temper (°F)	Time (min)									
1200121-01	4	6.53	H-T	50,800	72,500	38.1		1650	14											
1200121-02 →	3	4.90	H-T	51,000	72,400	39.4		1650	14											
Charpy Impacts																				
Plate Serial No	Plates	Tens	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			
1200121-01	4	6.53	H-L	45.0	34.2	53.6	44.3	15											-50	10mm
1200121-02	3	4.90	H-L	34.7	53.2	49.7	45.9	15											-50	5mm

Certified a true copy of the original, retained in our file.
AMERICAN ALLOY STEEL, INC.
Reviewed By: VB 5/24/2021

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

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate, unless otherwise noted in Specification. For Mexico shipments to Sales@AmericanAlloySteel.com
Yield by 0.5EL method unless otherwise specified. Ceq = C+(Mn/8)+(Cr+Mo+V)/5+(Cu+Ni)/15
Pcm = C/(Si/30)+(Mn/20)+(Cu/20)+(Ni/60)+(Cr/20)+(Mo/15)+(V/10)+53
Milled and Manufactured in the USA. ISO 9001:2015 certified. PED 97/23/EC 712 Annex 1, Para. 4.3 Compliant.
DIN 9048 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate QA-3624398

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. Deprota
T. A. Deprota, Metallurgist

4/25/2021 7:58:41 AM

Q.A. APPROVED

By: [Signature] Date: 5/25/2021

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

Cleveland-Cliffs Burns Harbor LLC				US HWY 12 Burns Harbor, Indiana			
QUALITY ASSURANCE REPORT OF TEST AND ANALYSIS							
SHIPMENT NO. 803-94244		DATE SHIPPED 01-06-23		CAR OR VEHICLE NO. AREA TRANSPORTATION TRLR 27			
AMERICAN ALLOY STEEL INC PO BOX 40469 HOUSTON TX 77240		AMERICAN ALLOY STEEL INC 6350 N ERIE AVE 6350 N ERIE AVE TULSA, OK 74117					
SERIAL NUMBER	PAT NO.	HEAT NUMBER	NO. PCS.	THICKNESS	WIDTH OR DIA.	LENGTH	WEIGHT
				INCHES	INCHES	INCHES	POUNDS

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

PLATES - ASTM A516-17 Grade 70; FVQ Killed Fine Grain Practice; Plate:
NORMALIZED & COOLED IN STILL AIR; VACUUM DEGASSED; CH-V SA2085 PLT
L 15/12 FTLBS AT -50F; ASTM A516-17 Grade 65; ASTM A516-17 Grade
60; ASME SA516 21ED Grade 70; ASME SA516 21ED Grade 65; ASME SA516
21ED Grade 60; TEST CERTS ARE PREPARED IN ACCORD WITH PROCEDURES
OUTLINED IN EN; 10204:2004 TYPE 3.1

NO WELD REPAIR WAS PERFORMED ON BELOW PLATE(S)

CO# 133005-OK GH 391-1038

PLATES HEAT TREATED - TEST SPECIMENS ATTACHED & YIELD STRENGTH @ .5% EUL

MERCURY IN ANY FORM HAS NOT BEEN USED IN THE PRODUCTION OF THIS ORDER

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

(M55)MFST REF#: (PART #)

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

(M55)MFST REF#: (PART #)

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

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

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

AMERICAN ALLOY STEEL

Jk 1/30/2023

HEAT NUMBER	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	Al	B	Cb	N	Sn	ACCORD TO GRAIN SIZE
-------------	---	----	---	---	----	----	----	----	----	---	----	----	---	----	---	----	----------------------

822Y39620 .20 1.07 .017 .003 .339 .217 .18 .04 .038 .002 .002 .035 .0002 .002 .005 .001
823Y69560 .17 1.17 .012 .004 .342 .012 .01 .13 .039 .002 .002 .042 .0002 .002 .004 .001

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

SUPV. QUALITY ASSURANCE
Form BHPLTRPT.TIF

FARID HASSANI PER MWT

AMERICAN ALLOY
DATE 1/30/2023

ANTHONY CARDWELL
4/25/2023

Q.A. APPROVED
By W Date 2/1/2023



DL FLANGE

ISO 9001

DL Flange

7200 Mykawa Rd.
Houston, TX 77033



ALLIED GROUP

EN 10204 3.1

CERTIFIED MATERIAL TEST REPORT

Date of Report: 04/12/2023 **Certificate No.:** 30011312 Page 1 of 1

Customer: INDUSTRIAL PIPING SPEC
PO BOX 581270
Tulsa, OK 74158

Cust PO#: TP798900X

Customer Order No: WOSO601477-1 **Qty:** 4.00

Allied Fitting, LP SO No: SO601477

Item Description: Q3WRP8 8 300# RF WN S160 LF2 **Heat Code:** DL70218

Specification: A350-18/SA350-2021 LF2 CL1 **Lot No:**

Heat C.E.: 0.41 **Melt Practice:** ELECTRIC FURNACE

Forging MFR:

Heat Treatment	Init Temperature	Tempering Temperature	Time
NORMALIZED	1,700 F	0 F	N=1.40HRS

Heat Composition

Heat Product	C	Mn	Si	P	S	Cr	Ni
	0.20	1.24	0.23	0.017	0.002	0.02	0.02

Heat Product	Mo	Cu	V	Nb
	0.00	0.01	0.001	0.00

Mechanical Properties

Tensile Specimen Size: STD **Tensile Specimen Orientation:**

Impact Specimen Size: 10 X 10 **Impact Specimen Orientation:** TG

	Hardness	Ultimate Strength	Yield Strength	Elongation	Area Reduction
Base Weld HAZ	150 152 HBW	516 Mpa	331 Mpa	34 %	69 %

CHARPY IMPACT TEST

Base Value	Impact Value	Shear Fracture	Lateral Expansion	Temperature
	J 56 60 56	% 50 60 55		-46.00 °C

Notes

NACE NACE MR0103/ISO17945:2015

NACE NACE MR0175-2021/ISO15156-1:2020

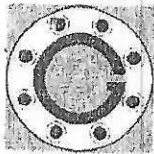
Remarks

Material in accordance with the applicable Standard to which it is ordered including:
ASME Sect II, ASME B16.5, B16.9, B16.36, B16.47, CSA, MSS, AWWA C-207.
NO WELD REPAIR MERCURY FREE
Material conforms to both ASTM (A) and ASME (SA) applicable specifications.
We hereby certify that all information presented on this CMTR conforms to the above specification.
We hereby certify the results to be a true copy of the records of the company.

Troy Gorrell

Troy Gorrell
Q.C Inspector

A22-13316-2-3-FL | | 5015242/02 | LN: 3 | T0530580-1 | DG330RFWN160NL2 | |



GALPERTI, inc.
160 Southbelt Industrial Drive
Houston, Texas 77047
PH. 713-433-0700 - FAX 713-433-6560
Email: galpmail@galperti-am.com

INDUSTRIAL PIPING SPECIALIST

P. O. BOX 581270
TULSA OK 74158

TEST/CERTIFICATE EN 10204 INTERNAL JOB
220980

3.1

M.T. CERTIFICATE N.
007875

DATE
11/09/2022

YOUR P.O.
STP93182

DATE
05/19/2022

ITEM	DESCRIPTION	QUANTITY	B/P	MATERIAL	HEAT N°	FORGING ORIGIN	#
004/004	4" 150 SO RF LF2N B1 F	100	B	A105N/F42/LF2N	34553/02	ITALY	A
011/011	14" 150 WN RF STD LF2N B1 F	4	B	A105N/F42/LF2N	132090/02	ITALY	B
013/013	3" 300 WN RF STD LF2N B1 F	50	B	A105N/F42/LF2N	5015241/02	ITALY	C
015/015	3" 300 WN RF 160 LF2N B1 F	10	B	A105N/F42/LF2N	5015242/02	ITALY	D

#		C %	MN %	SI %	P %	S %	CR %	NI %	MO %	CU %	V %	SN %	AL %	NB %	TI %	N %	B %	12 %	CE %
A	L	0.180	1.190	0.250	0.011	0.009	0.120	0.070	0.010	0.140	0.016		0.027	0.001	0.013		0.0001	6.611	0.42
A	C	0.170	1.210	0.230	0.014	0.012	0.130	0.080	0.020	0.130	0.011		0.039	0.001	0.013		0.0001	7.117	0.41
B	L	0.157	1.216	0.232	0.013	0.003	0.133	0.113	0.031	0.192	0.022		0.028	0.002	0.003		0.0004	7.745	0.41
B	C	0.147	1.236	0.252	0.016	0.006	0.143	0.123	0.041	0.182	0.017		0.045	0.002	0.003		0.0004	8.408	0.41
C	L	0.169	1.161	0.248	0.015	0.003	0.114	0.111	0.012	0.200	0.012		0.029	0.002	0.001		0.0002	6.849	0.41
C	C	0.163	1.160	0.240	0.014	0.002	0.120	0.110	0.016	0.200	0.014		0.030	0.002	0.001		0.0003	7.116	0.40
D	L	0.171	1.169	0.224	0.017	0.003	0.117	0.110	0.014	0.227	0.012		0.024	0.003	0.001		0.0002	6.810	0.41
D	C	0.160	1.170	0.230	0.018	0.002	0.120	0.110	0.017	0.200	0.014		0.024	0.002	0.001		0.0001	7.312	0.40

NOTES
12=Manganese/Carbonio
CE=LONG FORMULA

L = ANALISI COLATA / LADLE ANALYSIS
C = ANALISI DI PRODOTTO / CHECK ANALYSIS

#		MECHANICAL PROPERTIES										CHARPY TEST			
#	TYPE	Ø DIAMETER mm.	AREA mm.	LENGTH mm.	TEMP. F	TENSILE PSI	YIELD PSI	ELONG %	REDUCT %	TYPE KV	TEMP. F	VALUES Ft-lbs			HARDNESS HB
												Min.	12 Med.	15	Max.
A	S	12.50	122.70	50.00	68	70,000	36,000	22.0	30.0		-50	Min.	12 Med.	15	Max. 197
A	O	12.50	122.70	50.00	68	74,549	42,931	27.8	30.0		-50	45 - 40 - 36			162-165
B	S	12.50	122.70	50.00	68	70,000	36,000	22.0	30.0		-50	Min.	12 Med.	15	Max. 197
B	O	12.50	122.70	50.00	68	79,500	48,900	37.0	66.0		-50	40 - 45 - 29			165-165
C	S	12.50	122.70	50.00	68	70,000	36,000	22.0	30.0		-50	Min.	12 Med.	15	Max. 197
C	O	12.50	122.70	50.00	68	73,534	44,671	31.0	66.0		-50	34 - 36 - 41			164-163
D	S	12.50	122.70	50.00	68	70,000	36,000	22.0	30.0		-50	Min.	12 Med.	15	Max. 197
D	O	12.50	122.70	50.00	68	74,259	44,671	27.5	67.5		-50	36 - 44 - 46			163-164

NOTES
Lateral Exp/Shear Area (Average)
A = in.0.02/ 20% B = in.0.02/ 20% C = in.0.02/ 20% D = in.0.02/ 20%

O = OBTAINED
S = STANDARD

HEAT TREATMENT										GENERAL NOTES	
A	Normalized at 900 dgr.C for	1 h.-Cooling from 900 dgr. in still air	ROUGHNESS F =STOCK FINISH 125-250 microinch STANDARD B1 = ASME B16.5 INCH STD 2017								
B	Normalized at 900 dgr.C for	1.1/2 h.-Cooling from 900 dgr. in still air									
C	Normalized at 900 dgr.C for	1.1/2 h.-Cooling from 900 dgr. in still air									
D	Normalized at 900 dgr.C for	1 h.-Cooling from 900 dgr. in still air									
NOTES											

NOTES
MATL I.A.W NACE MR-0175/ISO 15156-2-15ED, NACE MR0103 15 ED A/SA105N-19ED A694F42-19ED A/SA350LF2N CL1-19ED
Steel Fully killed made to fine grain practice.

TRADE MARK / LOGO  INT. INSPECT DATE **11/09/2022** INT. INSPECTOR **D. RUZICKA**

INSPECTION AUTHORITY

Dion Ruzicka

Galperti, inc
An ISO 9001/2008 certified company.
Certification issued by:
Lloyds register quality assurance
Certificate No. UQA 10414361

STEEL USED TO PRODUCE GALPERTI INC. PRODUCTS ARE 100% SMELTED IN USA OR WESTERN EUROPE

DS8160

2669 MARTIN LUTHER KING
BLVD
YOUNGSTOWN, OH 44510VALLOUREC STAR, LP
Seamless Tubular ProductsCertified Test
Report
09/17/2018

Order Line #: Y-112929-001 Desc: SEAMLESS HOT ROLLED
Grade: API 5L X42/B PSL 2 16th Ed., April 2018
OD (in): 8.625 Wall (in): 0.906 Lbs/Ft: 74.76 Length: DRL
End Finish: PEB

Customer: INDUSTRIAL PIPING SPECIALISTS
Customer PO-Rev#: HR088289-00

SLN (Heat): I80245

Comment: Melted and Manufactured in Ygstin, OH USA

This pipe is also manufactured to: ASTM A106B/C-15; ASTM A53B-12; ASME SA106B/C-2015; ASME SA53B-2015; V&M Star's QA program meets the requirements of DIN EN 10204-2004 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
LONGITUDINAL	STRIP	1.526	0.884	1.3580	44.6	70.7	0.63	2	43.0

MAX INTERNAL YIELD (psi): 8272

Supplemental Requirement

Flattening	PASSED
Hardness	80 HRBW AVG
Hydrostatic Pressure	6500 for a 5 second minimum
Nace TEST	MR0175 / ISO15156-2

Chemical Analysis

Chem Spec: 698

Ultrasonic Inspection. Reference Standard was a test joint with 10% OD Longitudinal and Transverse notches.

WT%	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Nb	V	Al	Ca	B	Ti	N	C.E.
HEAT	0.19	0.95	0.012	0.004	0.28	0.15	0.05	0.07	0.01	0.008	0.000	0.022	0.034	0.0025	0.0002	0.003	0.0075	0.39
PRODUCT 1	0.20	0.93	0.011	0.004	0.28	0.14	0.05	0.07	0.01	0.007	0.000	0.022	0.033	0.0027	0.0003	0.003	0.0072	0.39
PRODUCT 2	0.19	0.95	0.010	0.003	0.27	0.14	0.05	0.07	0.01	0.008	0.000	0.021	0.031	0.0021	0.0002	0.003	0.0068	0.38

Charpy Impact Testing

	Notch	Direction	Size	Temp °F	Position	Ft Lbf 1	Ft Lbf 2	Ft Lbf 3	Ft Lbf Avg	Shear 1	Shear 2	Shear 3	Shear Avg
Min Target	—	TRANS	FULL	32	—	15	15	15	20	NR	NR	NR	NR
Actual	V	TRANS	FULL	32	—	44	46	31	40	20	15	20	18

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 Vallourec Star; without the expressed written consent of Vallourec Star negates the validity of the test report. Vallourec Star is not responsible for the inability of the material to meet specific applications.

Signed: *Jeff Schultz*

Name: JEFF SCHULTZ

Date Approved: 09/17/2018

voestalpine Tubulars GmbH & Co KG

Alpinestrasse 17
8652 Kindberg-Aumuehl
T. +43/050304/23-0
F. +43/050304/63-532
www.voestalpine.com/tubulars

Legal Structure: Limited Partnership
Location: Kindberg/Austria
Company Registry Number 165400k
Commercial Court of Leoben
DPR 0592684, VAT Nr. ATU 43630406

General Partner: voestalpine Tubulars
GmbH
Legal Structure: Limited Liability Company
Location: Linz, Company Registry Number
106933f
Commercial Court of Linz

MILL TEST CERTIFICATE 3.1

(according to EN 10204)

ABNAHMEPRUEFZEUGNIS 3.1

(gem. EN 10204)

CERTIFICAT DE CONTROLE DES PRODUITS PAR L'USINE 3.1

(selon EN 10204)

No. 188510 Rev.: 0

Auftrags-Nr.: 47347 / 14
Our works order No.:
No usine:

Bestellnr./Pos.: HR137492/2206008
Your order No.:
No de la commande:

Zeichen des Lieferwerks: **va**
Marking of producer:
Marque du fabricant:

Erschmelzungsart: **BOF**
Melting process: fully killed, produced to
Procédé d'élaboration: fine grain practice

Hersteller:
Manufacturer:
Producteur: voestalpine Tubulars GmbH & Co KG, Austria

Besteller:
Purchaser:
Archeteur: VOEST-ALPINE TUBULAR CORPORATION
HOUSTON, TEXAS 77077, USA
INDUSTRIAL PIPING SPECIALISTS, INC
P. O. BOX 581270
TULSA OK 74158-1270, USA

Pruefgegenstand:
Object of tests:
Epreuve: **Seamless hot rolled carbon steel tubes**
Line Pipe LP-USA-STD-2-PSL-2
LINEPIPE-04.0
LP-USA-STD-2-PSL-2-1 Rev. 1
non upset ends (API-5-L) - non upset
UV coating
A/SA 106 - GRADE-B
A/SA 53 - GRADE-B
API-5-L - GRADE-BN - PSL2
API-5-L - GRADE X42N - PSL2
API-5-L-46.edt.
NACE MR 0175 / ISO 15156
NACE MR 0103 / ISO 17945
Mechanical properties A/SA 106 GRADE-C (if applicable)
GRADE-C - no marking on pipes

Werkstoff:
Material:
Matières: **GRADE B / GRADE BN/X42N / GRADE C**

Anforderungen:
Requirements:
Exigence: **GRADE-B acc. to ASTM A 106 / A 106 M-2019**
ASME SA 106-2019
GRADE-B acc. to ASTM A 53 / A 53 M-2020
ASME SA 53-2019
GRADE BN / X42N acc. to API-5-L, 46.edt., Edition/Errata 1, May 2018 (PSL-2)
NACE MR 0175 / ISO 15156-2015; NACE MR 0103 / ISO 17945-2016
LINEPIPE-04.0; LP-USA-STD-2-PSL-2-1 Rev.1

Ausführung:
Condition:
Cond. de livraison: **NU, PLAIN END, PE, BEB-API/ASTM (30°)**

Wärmebehandlung: **NORMALIZED ROLLED**
Heat treatment:
Traitement de chaleur:

Kindberg, 29.07.2022

Page 1 of 9

Abnahmeprüfzeugnis wurde digital signiert und ist ohne
Originalunterschrift gültig/
Inspection certificate has been signed digitally and is
valid without an original signature

No. 188510

voestalpine Tubulars GmbH & Co KG
Qualitätsstelle / Quality Department
WEITZER

Abnahmebeauftragter
Authorized inspection representative
Représentant autorisé du contrôle

voestalpine
ONE STEP AHEAD

voestalpine Tubulars GmbH & Co KG

Coupl. die stamped:

Coupl. paint stencilling:

Coupl. colour coding: Fully painted: Bands:

Tube die stamped:

Tube paint stencilling: va API Spec 5L-0033 "API" 07-22 3,500 x 0,438 BN/X42N PSL2 SMLS 2970 PSI /length FT Heat No. Lot No. A/SA 53 Grade B S A/SA 106 Grade B Sched 160 LP-USA-STD-2-PSL-2-1 PO# HR137492 Made in Austria

Tube colour coding: Fully painted: Bands: Violet

Label: PO# HR137492 DAT Quay Port of Houston, TX

Measurement Notes: Product was tested and verified against requirements using the International System of units (SI).
Reported data were converted and rounded from SI units into United States customary units (USC).

Remarks:

*) Grade C without marking on tubes

Steelmaking & Casting:

voestalpine Stahl Donawitz GmbH, Kerpelystraße 199, 8700 Leoben-Donawitz, Austria

Kindberg, 29.07.2022

Page 2 of 9

No. 188510

Abnahmeprüfzeugnis wurde digital signiert und ist ohne
Originalunterschrift gültig/
Inspection certificate has been signed digitally and is
valid without an original signature

voestalpine Tubulars GmbH & Co KG
Qualitätsstelle / Quality Department
WEITZER

Abnahmebeauftragter
Authorized inspection representative
Représentant autorisé du contrôle

voestalpine
CHANGING THE WORLD

voestalpine Tubulars GmbH & Co KG

Umfang der Lieferung / Volume of delivery / Contenu de la livraison:

Versandanzeige: Dispatch advice No. Avis d'expédition:	Pos.: Pos.: Pos.:	Abmessung: Dimension: Dimension:	Bundnr.: Bundle No.: Numéro de lot:	Stückzahl: Number of pieces: Pièces:	Länge: Length: Longueur:	Gewicht: Weight: Poids:	Los: Lot: Lot:
	14	3,500 in x 0,438 in	1-11	131	5399,455 ft	35003,80 kg	
		14,33 lb/ft					
		SCHED 160					

Heat	Lot	Remark
1022459461	282017	-- 01
1022459462	282018	-- 01

Kindberg, 29.07.2022

Page 3 of 9

No. 188510

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voestalpine Tubulars GmbH & Co KG
Qualitätsstelle / Quality Department
WEITZER

Abnahmebeauftragter
Authorized inspection representative
Représentant autorisé du contrôle

voestalpine
FORM 5000-01-0001

voestalpine Tubulars GmbH & Co KG

Additional tests and inspections performed on pipe

- 1 Dimensionskontrolle/ Dimensional inspection: bestanden/passed
- 2 Magnetpulverprüfung der Rohrenden nass fluoreszierend nach ASTM E 709 (304,8mm) / Magnetic particle inspection acc. ASTM E 709 (wet MPI) 12" each pipe end: bestanden/passed Reference indicator: Type Castrol Strip ELYI; location: OD & ID; orientation: longitudinal and transverse
- 3 Ringfaltversuch/Flattening test: bestanden/passed
- 4 Streifflussprüfung ASTM E 570; Laengs- und Querfehler/ Flux Leakage testing acc. ASTM E 570; longitudinal and transversal: bestanden/passed / Reference indicator: acceptance level 5% $\sqrt{a}$ WT; location OD; orientation: long & trans; type: Notch; size length 1 in. ; width 0,012 in. . Acceptance Level 10% $\sqrt{a}$ WT; location ID; orientation: long & trans; type: Notch; size length 1 in. ; width 0,020 in. .
- 5 Streifflussprüfung nach API 5L EN ISO 10893-3; Laengs- und Querfehler/ Flux Leakage testing acc. API 5L EN ISO 10893-3; longitudinal and transversal: bestanden/passed / Reference indicator: acceptance level F2 5% $\sqrt{a}$ WT; location OD; orientation: long & trans; type: Notch; size length 1 in. ; width 0,012 in. . Acceptance Level F3 10% $\sqrt{a}$ WT; location ID; orientation: long & trans; type: Notch; size length 1 in. ; width 0,020 in. .
- 6 Ultraschallprüfung gem. EN ISO 10893-12 (Wanddicke - 100 % Umfang)/Ultrasonic inspection acc. EN ISO 10893-12 (wall thickness - 100 % circumference): bestanden/passed
- 7 Visuelle Inspektion / Visual inspection: bestanden / passed (Wo es die Norm und die Bestellung zulässt erfolgte entweder eine visuelle Inspektion oder eine diese VT ersetzende geeignete zerstörungsfreie Prüfung nach Wahl des Herstellers / Where allowed by the applicable specification and the order a visual inspection or a suitable VT replacing nondestructive test was performed by the option of the manufacturer)
- 8 Wasserinnendruckversuch/Hydrostatic test: bestanden/passed, Mindestprüfdruck/min test pressure: 205 bar / 20.5 MPa / 2970 psi, min. Haltezeit/min duration: 5 sec
- 9 Restmagnetfeld gemäß API 5L max. 3,0 mT (30Gs) / Residual magnetism according API 5L max. 3,0 mT (30Gs): bestanden/passed

Test remarks

Wir bestätigen, dass die gelieferten Erzeugnisse den Anforderungen der Bestellung entsprechen.
We hereby certify that the goods delivered are in compliance with the requirements of the order.

Kindberg, 29.07.2022

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voestalpine
ONE STEP AHEAD

voestalpine Tubulars GmbH & Co KG

Tensile testing

Lot No	Test type	Heat treatment	Loc. Temp	Specimen	Yield strength	Tensile strength	Elong.	Gage length in area	Reduct. Rt/Rm
--------	-----------	----------------	-----------	----------	----------------	------------------	--------	---------------------	---------------

															[°F]	No.	Type	Pipe	Dimension[inch]	[psi]	[psi]	[%]	[inch]	[%]	
																				Req. from	42100	60200	30.0	-	
																				Req. to	71800	95000			-
282017	--	01	Standard	normalized rolled	Rear	68	1	Strip-long	-	.750 x .441	Rt0.5	46400	73700	34.3	2.0	-	0.63								
282018	--	01	Standard	normalized rolled	Rear	68	1	Strip-long	-	.749 x .439	Rt0.5	50200	75700	35.2	2.0	-	0.66								
															Yield strength:										
															Gr B: min. 35000 PSI										
															BN - PSL-2: 35500 - 71800 PSI										
															X42N - PSL-2: 42100 - 71800 PSI										
															Gr C (if applicable): min. 40000 PSI										
															Tensile strength:										
															Gr B: min. 60000 PSI										
															BN - PSL-2: 60200 - 95000 PSI										
															X42N - PSL-2: 60200 - 95000 PSI										
															Gr C (if applicable): min. 70000 PSI										

Kindberg, 29.07.2022

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voestalpine
ONE STEP AHEAD

ANTHONY CARDWELL
4/25/2023

voestalpine Tubulars GmbH & Co KG

Hardness testing

Lot No	Test type	Heat treatment	Specimen				Test method	Hardness Number		Mean Hardness Number		Variation		
			Loc.	No.	location	Pipe		from	to	from	to			
Req.:								99.50						
282017	-- 01	Standard	normalized	rolled	Rear	1	Body	-	HRB	79.10	80.70	79.47	79.90	0.43
Quadrant	1	1_Outer	2_Outer	3_Outer	AVG_Outer	1_Mid	2_Mid	3_Mid	AVG_Mid	1_Inner	2_Inner	3_Inner	AVG_Inner	AVG_Variation
		79.20	79.80	79.40	79.47	79.40	79.10	80.20	79.57	79.40	79.60	80.70	79.90	0.43
282018	-- 01	Standard	normalized	rolled	Rear	1	Body	-	HRB	78.80	82.30	79.23	81.07	1.84
Quadrant	1	1_Outer	2_Outer	3_Outer	AVG_Outer	1_Mid	2_Mid	3_Mid	AVG_Mid	1_Inner	2_Inner	3_Inner	AVG_Inner	AVG_Variation
		79.50	79.40	78.80	79.23	79.90	80.10	79.60	79.87	80.60	82.30	80.30	81.07	1.84

Kindberg, 29.07.2022

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voestalpine

ONE STEP AHEAD



MATERIAL TEST REPORT

FFI-QACON-F0003

Revision: 08, 05/02/2017

Mill Test Report			
Industrial Piping Specialist		Purchase Order:	TP780801
PO Box 581270		Sales Order:	221013
Tulsa, OK 74158		Line Item:	001 Qty: 50

Item Code:	FF105AU010A	Material:	A/SA105N / A/SA350 LF2 CL1
Description:	2" 300# RF LWN x 9" B16.5		Manufactured in the U.S.A.
FID:	A9178	Heat Code:	22T0763

Element	Ladle
C	Carbon
Mn	Manganese
P	Phosphorous
S	Sulphur
Si	Silicon
Cu	Copper
Ni	Nickel
Cr	Chromium

Element	Ladle
N	Nitrogen
Mo	Molybdenum
V	Vanadium
CbNb	Columbium/Niobium
Ti	Titanium
Al	Aluminum
B	Boron
Sn	Tin

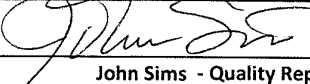
Additional Chemicals
CRMOVNICU;0.051 CRMO 0.025

Melting Practice	EFVR	Reduction Ratio	>3
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Mechanical Test Results			
Tensile (PSI)	79,045		
Yield (PSI)	52,358		
Elong (%)	33.00		
Red (%)	76.00		
CE	0.3905		
PCM			
HBW	158	to	160
CVN Test Temperature	-50		°F
Ft/Lbs.	135	184	129
Shear (%)	65	80	65
MLE	1.30	1.80	1.30
Charpy Sample	10 X 10 X 55mm		
QTC Type & Size			

Heat Treatment Information	
Normalizing Temperature (°F)	1670
Normalizing Time (HRS)	2

Additional Comments
MADE TO FINE GRAIN PRACTICE


John Sims - Quality Representative

3/31/2023

Date

Product is compliant with NACE MR0175/ISO 15156 / Product is compliant with NACE MR0103. No weld repair is performed. The product is free of Mercury contamination. Tensile test is taken from round specimen. Yield Strength is determined using 0.2% offset method, unless otherwise specified. When reported on the MTR: Tensile testing per ASTM E 8, Charpy impact testing per ASTM E 23 and Brinell Hardness Testing per ASTM E 10. Federal Flange manufactures products according to a certified QMS conforming to ISO 9001:2015. Products are manufactured in compliance to EN 10204 Type 3.1.

Physical Address: 4014 Pinemont Dr Houston, TX 77018 Telephone: (713) 681-0606 Fax: (713) 681-3005



MANNESMANN
PRECISION TUBES
A Member of the Salzgitter Group

Inspection Certificate

Page 1 of:

2 Pages

acc to EN 10204/3.1

Certificate no.:

9220353

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

Manufacturer's mark: MPT-HE

Process: Basic oxygen steel

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

Steelmarks: (S)A 179 + N

Shipping no.: 4400548

Our shipping date: 19-05-2022

Extent of the delivery:

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

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

Shipping marks:

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

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

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

Heat treatment: Normalized at 920 °C

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

Helmond(NL.) : 31-05-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier

ANTHONY CARDWELL
10/24/2022



**MANNESMANN
PRECISION TUBES**
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Test results

Page 2 of:

2 Pages

Certificate no.:

9220353

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

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

Helmond: 31-05-2022

Mannesmann Precision Tubes - NL
Inspector
B. van Lier