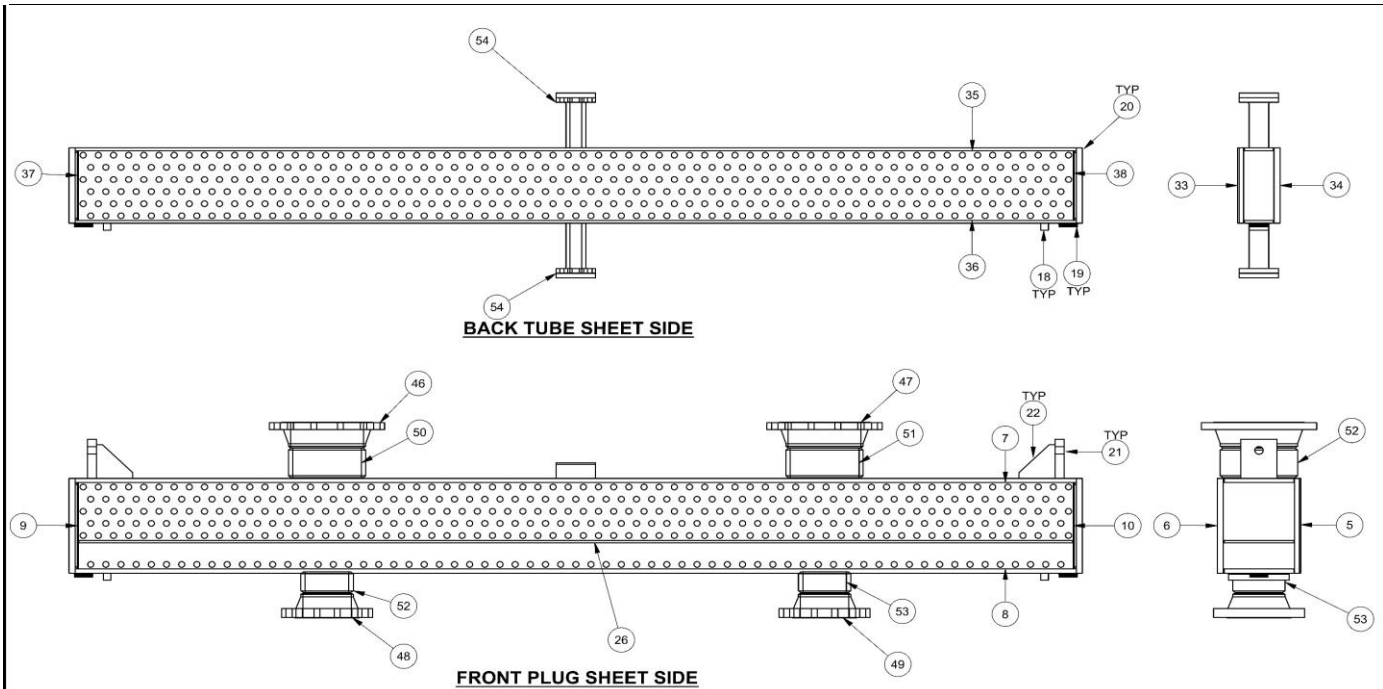


Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
5	NAS	W28E	SA-240-316L
6	NAS	W52L	SA-240-316L
7	NAS	W28E	SA-240-316L
8	NAS	W28E	SA-240-316L
9	NAS	W52R	SA-240-316L
10	NAS	W52R	SA-240-316L
18	NAS	T24Y	SA-240-316L
19	NAS	W00R	SA-240-316L
20	NAS	W00R	SA-240-316L
21	NAS	W14F	SA-240-316L
22	NAS	W52R	SA-240-316L
26	OUTOKUMPU	539139	SA-240-316L
33	NAS	W28E	SA-240-316L
34	NAS	W28E	SA-240-316L
35	NAS	W79T	SA-240-316L
36	NAS	W79T	SA-240-316L
37	NAS	W52R	SA-240-316L
38	NAS	W52R	SA-240-316L
46	FRIEDRICH GELDBACH	255632	SA-182-F316/316L
47	FRIEDRICH GELDBACH	255632	SA-182-F316/316L
48	AMERIFORGE	C1513	SA-182-F316/316L
49	AMERIFORGE	C1513	SA-182-F316/316L
50	NIPPON STEEL	F414053	SA-312-TP316L
51	NIPPON STEEL	F414053	SA-312-TP316L
52	MANNESMANN	734258	SA-312-TP316L
53	MANNESMANN	734258	SA-312-TP316L
54	FCI	N683	SA-182-F316/316L
TUBES	PLYMOUTH TUBE CO.	563766/563767	SA-213-TP316L

CUSTOMER:	AIR PRODUCTS MANUFACTURING, LLC		FABSCO SHELL & TUBE, LLC
PO NO:	4505606038/A8KM-4-406-PO-3	DATE	
ITEM NO:	18-XF-260A	AC	DWG No: A22-13314-1A-HS REV: 0

5
33
34

NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 811572 02
Customer: 0515 004

Mail To:
ARP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Ship To:
ARP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Date: 10/11/2022 Page: 1
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: T-41577 NAS Order: AN 0997744 01

Customer Name: METALS USA- FKA PORT CITY
Customer PO#: 121413
Shipper No: 188056
Heat Number: W28E 02W28E BA

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length--------	Mark	Pieces	COMMODITY CODE
02W28E BA	* 02W28E BA	.9999	60.0000	8,500	PLATE 480.00	3	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W28E	US	.0137	16.5670	.4630	1.1805	2.0570	.0582	10.0450	.0335	.0021

SI %
.3305

MECHANICAL PROPERTIES

Product ID #	Coil #	loc	dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	% Hard RB	R of A %
02W28E BA	02W28E BA	F	T	87.66	43.32	50.35	82.00	69.62

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 10/11/2022

Q.A. APPROVED By Date 2/14/2023

ANTHONY CARDWELL
06/19/2023

GLOBE X-RAY SERVICES, INC.

8441 South Union Tulsa, OK 74132

Certification 167092

Report of Ultrasonic Examination

Customer: Port City P. O 129780

Address: Job #

Ultrasonic Examination

Test Instrument: Sonatest D-20+ S/N: I013300

Surface Condition: Smooth Procedure #: GXS-II-D & B Rev: 1-22

Couplant: Sonix Search Unit Cable: RG-174 Co-Axial, 6FT. Long with BNC to BNC Connectors

Beam Angle: 0 Degrees Search Unit 1" x 2.25 MHz S/N: 66159

Scanning Pattern: 100% Reference Level: 36-42 Db

Calibration Reference: Backwall Technique: Contact, Manual Scan

Scanning Surface: One major surface

Reference Standard:

√ ASTM/ASME A-578/SA-578 LEVEL A(1)

√ ASTM/ASME A-578/SA-578 LEVEL B(2)

√ ASTM/ASME A-578/SA-578 LEVEL C(3)

√ ASTM/ASME A-435/SA-435

Notes:

Thickness/Grade	Slab	Area	Heat Number/Code	Accept	Reject
1" 316L	N/A	61" x 170"	W28E	√	
1" 316L	N/A	61" x 170"	W52L	√	
1" 316L	N/A	61" x 170"	W52L	√	
5/8" SA516-70N	02	120" x 176"	2605016	√	
1-1/4" SA516-70AR	C04	72" x 60"	B2G617	√	
1-1/2" SA516-70N	04	120" x 158"	1606908	√	
1-1/4" SA516-70N	A35	96" x 107"	E2F017	√	
1-1/4" SA516-70N	01	96" x 81"	2605652	√	
1-1/4" SA516-70N	A030862	96" x 80"	822Y39620	√	
1" SA516-70N	E21	120" x 282"	E9E225	√	

Unless otherwise noted by an * following the item number, there were no recordable indications observed.

Examination By: Colter Moyer Qualification Level: II

Date : February 22, 2023 Time : NA AM/PM

GLOBE XRAY ASSUMES NO RESPONSIBILITY FOR THE INTEGRITY OF THE STRUCTURE OR ANY LOSSES OF ANY KIND DUE TO ANY KIND OF INTERPRETATION

Q.A. APPROVED

By Date 2/23/2023

Heat Number W52L 04W52L FA
Shipper No 188056
Customer PO# 121413
Customer Name ETALS USA - FKA PORT CITY

NAS NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 816911 04
Customer: 0515 00-4

Mail To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Ship To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Date: 11/09/2022 Page: 1
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: T-42422
NAS Order: AN 1001542 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length--------	Mark	Pieces	COMMODITY CODE
04W52L FA	* 04W52L FA	.9999	60.0000	8,400	PLATE 480.00	1	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W52L	US	.0185	16.9180	.5390	1.2360	2.0660	.0618	10.0550	.0365	.0011

SI %
.3730

MECHANICAL PROPERTIES

Product ID #	Coil #	loc	dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	Hard RB	R of A %
04W52L FA	04W52L FA	F	T	87.65	43.05	51.10	80.50	74.29

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 11/09/2022

Q.A. APPROVED
By Date 2/24/2023

ANTHONY CARDWELL
06/19/2023

GLOBE X-RAY SERVICES, INC.

8441 South Union Tulsa, OK 74132

Certification 167092

Report of Ultrasonic Examination

Customer: Port City P. O 129780

Address: Job #

Ultrasonic Examination

Test Instrument: Sonatest D-20+ S/N: I013300

Surface Condition: Smooth Procedure #: GXS-II-D & B Rev: 1-22

Couplant: Sonix Search Unit Cable: RG-174 Co-Axial, 6FT. Long with BNC to BNC Connectors

Beam Angle: 0 Degrees Search Unit 1" x 2.25 MHz S/N: 66159

Scanning Pattern: 100% Reference Level: 36-42 Db

Calibration Reference: Backwall Technique: Contact, Manual Scan

Scanning Surface: One major surface

Reference Standard:

√ ASTM/ASME A-578/SA-578 LEVEL A(1)

√ ASTM/ASME A-578/SA-578 LEVEL B(2)

√ ASTM/ASME A-578/SA-578 LEVEL C(3)

√ ASTM/ASME A-435/SA-435

Notes:

Thickness/Grade	Slab	Area	Heat Number/Code	Accept	Reject
1" 316L	N/A	61" x 170"	W28E	√	
1" 316L	N/A	61" x 170"	W52L	√	
1" 316L	N/A	61" x 170"	W52L	√	
5/8" SA516-70N	02	120" x 176"	2605016	√	
1-1/4" SA516-70AR	C04	72" x 60"	B2G617	√	
1-1/2" SA516-70N	04	120" x 158"	1606908	√	
1-1/4" SA516-70N	A35	96" x 107"	E2F017	√	
1-1/4" SA516-70N	01	96" x 81"	2605652	√	
1-1/4" SA516-70N	A030862	96" x 80"	822Y39620	√	
1" SA516-70N	E21	120" x 282"	E9E225	√	

Unless otherwise noted by an * following the item number, there were no recordable indications observed.

Examination By: Colter Moyer Qualification Level: II

Date : February 22, 2023 Time : NA AM/PM

GLOBE XRAY ASSUMES NO RESPONSIBILITY FOR THE INTEGRITY OF THE STRUCTURE OR ANY LOSSES OF ANY KIND DUE TO ANY KIND OF INTERPRETATION

Q.A. APPROVED

By Date 2/23/2023

NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 811571 06
Customer: 0515 004

Mail To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Ship To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Date: 10/11/2022 Page: 1
Steel: 316/316L -
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: T-41664
NAS Order: AN 0998051 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------	Mark	Pieces	COMMODITY CODE
04W28E BA	* 04W28E BA	.7499	60.0000	6,400	PLATE 480.00	1	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W28E	US	.0137	16.5670	.4630	1.1805	2.0570	.0582	10.0450	.0335	.0021

SI %
.3305

MECHANICAL PROPERTIES

Product ID #	Coil #	Loc	Dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	% Hard RB	R of A %
04W28E BA	04W28E BA	F	T	89.21	44.66	61.50	80.00	74.10

Q.A. APPROVED
By _____ Date 2/23/23

PO#129608
02-2c-2023

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 10/11/2022

Customer Name: METALS USA - FKA PORT CITY
Customer PO#: 129608
Shipper No: 188631
Heat Number: W28E 04W28E BA

ANTHONY CARDWELL
06/19/2023

NAS NORTH AMERICAN STAINLESS
An Acerinox Group Company

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 822433 01
Customer: 0305 033

Mail To:
PHOENIX METALS COMPANY
4645 PORT ROYAL ROAD
SPRING HILL, TN 37174

Ship To:
PHOENIX METALS COMPANY
4645 PORT ROYAL ROAD
SPRING HILL, TN 37174

Date: 12/14/2022 Page: 1
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: 507576 NAS Order: AN 1004248 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/22a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Skid #	Prod #	Thickness	Width	Weight	--------Length-------	Mark	Pieces	COMMODITY CODE
PV6006	* 01W52R	.5000	60.0000	2,100	PLATE 120.00		2	403563

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W52R	US	.0141	16.7750	.5030	1.2105	2.1735	.0640	10.0100	.0365	.0021

SI %
.3115

MECHANICAL PROPERTIES

Skid #	Prod #	loc	dir	UTS 20C KSI	.2% YS 20C KSI	ELONG %-2"	Hard RB	R of A %
PV6006	01W52R	F	T	90.56	42.60	56.92	80.00	62.79

PO#127390
01-18-2023

Q.A. APPROVED
By
Date 1/19/23

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 12/15/2022

ANTHONY CARDWELL
06/19/2023

NORTH AMERICAN STAINLESS

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

METALLURGICAL TEST REPORT

Certificate: 775087 01
Customer: 0305 033

Mail To:
PHOENIX METALS COMPANY
4645 PORT ROYAL ROAD
SPRING HILL, TN 37174

Ship To:
PHOENIX METALS COMPANY
4645 PORT ROYAL ROAD
SPRING HILL, TN 37174

Date: 4/21/2022 Page: 1
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: 512934 NAS Order: XN 0985347 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------	Mark	Pieces	COMMODITY CODE
04T24Y DB	* 04T24Y DB	1.2575	60.0000	5,340	PLATE 240.00	1	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
T24Y	US	.0143	16.7005	.4795	1.2505	2.0245	.0706	10.0900	.0300	.0010

SI %
.2895

MECHANICAL PROPERTIES

Product ID #	Coil #	loc	dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	% Hard RB	R of A %
04T24Y DB	04T24Y DB	F	T	87.19	46.44	52.30	82.50	75.88

ANTHONY CARDWELL
06/19/2023

Q.A. APPROVED
By _____ Date 4/22/2022

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. _____
KRIS LARK 4/22/2022

NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 810723 02
Customer: 0305 808

Mail To:
PHOENIX METALS COMPANY
12420 MEANS COURT
CHARLOTTE, NC 28278

Ship To:
PHOENIX METALS COMPANY
12420 MEANS COURT
CHARLOTTE, NC 28278

Date: 10/05/2022
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15;180Bend-OK

Your Order: 305478
NAS Order: AN 0999534 01

PRODUCT DESCRIPTION:

STAINLESS STEEL COIL, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A , MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------		Mark	Pieces	COMMODITY CODE
02W00R C	* 02W00R C	.2500	48.0000	14,270	COIL	338.20	2	1	168408

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W00R	US	.0184	16.7185	.4475	1.2025	2.1915	.0526	10.0350	.0300	.0062

SI %
.2875

MECHANICAL PROPERTIES

Product ID #	Coil #	loc	dir	UTS 20C KSI	.2% YS 20C KSI	ELONG % -2"	Hard RB	Tail Hard
02W00R C	02W00R C	F	T	89.46	47.63	50.22	86.00	87.00

PO#129637
02-09-2023

Q.A. APPROVED
By _____ Date 2/17/23

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 10/06/2022

ANTHONY CARDWELL
06/19/2023

Customer Name METALS USA - FKA PORT CITY
Customer PO# 128900
Shipper No 187158
Heat Number W14F 02W14F DB

NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 810120 03
Customer: 0515 004

Mail To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Ship To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Date: 10/02/2022 Page: 4
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: T-41643
NAS Order: AN 0997974 02

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------		Mark	Pieces	COMMODITY CODE
02W14F DB	* 02W14F DB	1.5000	60.0000	6,500	PLATE	240.00	6	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W14F	US	.0127	16.6750	.5595	1.2325	2.0105	.0632	10.0800	.0320	.0029

SI %
.2745

MECHANICAL PROPERTIES

Product ID #	Coil #	Loc	Dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	Hard RB	A 262 'E' Pr E	R of A %
02W14F DB	02W14F DB	F	T	86.34	46.23	45.85	82.00	OK	76.35

Q.A. APPROVED
By _____ Date 2/13/2023

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. _____

ANTHONY CARDWELL
06/19/2023

Customer Name	Customer PO#	Shipper No	Heat Number
METALS USA - FKA PORT CITY	129608	188631	539139 3463379

Manufacturer / Fabricante: outokumpu

Type of document / Tipo de documento: **INSPECTION CERTIFICATE**
CERTIFICADO DE INSPECCION
according to / de acuerdo con
EN 10204-3.1

Document number / Nº de certificado: 07/13/2022
0000580364 /
Page / Pagina: 1 / 1

1 Steel Drive; P.O. Box 13000; Calvert, AL 36513-1300

METALS INC
P.O. BOX 571300
TULSA OK 74157-1300
USA

Customer/Ship to / Cliente: METALS INC,TULSA
Customer's order number / Nº de Pedido Cliente: T-39286
Manufacturer's works order no. / Nº de Pedido Manufactura: 901311807 / 001
Delivery note no. / Nº de Entrega: 86787190 / 010
Product / Producto: Stainless Steel Hot Rolled Coil/Bobina

Terms of delivery / Condiciones de entrega:
ASTM A240/A240M-22, ASME SA-240 Sec. II part A Ed.2021
ASTM A480/A480M-22, ASME SA-480 Sec. II part A Ed.2019
NACE MR0103 / ISO 17945: 2015
NACE MR0175 / ISO 15156-3: 2015

Steel Grade and Quality / Acero:
TYPE 316L/316
UNS S31603
UNS S31600

Customer's material no./ Nº de material del cliente	Product dimensions (Thickness / Width / Length) / Dimensiones (Espesor / Ancho / Largo)	Steelmaking procedure/ Proceso de manufact.	Finish/ Acabado
	9.53 mm x 1,524.00 mm 0.3750 inch x 60.0000 inch	AOD	IIa / 1D / No.1

Packing-No./ Nº de Empaque	No.of pieces/ Piezas	Actual weight/ Peso actual	Actual length/ Longitud actual	Coil-No./ Bobina No.	Heat No./ Colada	Inspection lot/ Lote de inspeccion	Inspection lot/ Lote de inspeccion
3463379	1	20,503 lb / 9,300 kg	262 ft / 80 m	939881	539139	1000816350	1000816351
Sum / Suma	1	20,503 lb / 9,300 kg					

Heat / Colada	Country of Melt / País de colada	Chemical composition / Composición Química Chemical analysis per ASTM A751-14a									
		% C	% Si	% Mn	% P	% S	% Cr	% Mo	% Ni	% N	% Cu
539139	USA	0.022	0.38	1.46	0.033	0.0018	16.72	2.03	10.07	0.041	0.50

Sample Position/ Localiz.de la muestra: Mechanical testing per ASTM A370-18

Inspection lot/ Lote de inspección	YS0.2% PSI / MPa	TS PSI / MPa	El. 2" %	HRB	Grain Size
1000816350	44,380 / 306	88,615 / 611	54	84	8.5
1000816351	44,380 / 306	88,905 / 613	54	86	9

Resistant to intergranular corrosion / Resistente contra corrosión inter-granular: ASTM A 262-15, PRACTICE E - Sample Acceptable
Dimensions-surface / Dimensiones-Superficie: OK
Positive Material Identification (PMI) / Control de identidad (análisis espectográfico): OK

Heat Treat: Solution anneal 1900°F/1040°C Min, Air and water quench
No welding or weld repairs were performed on this material
Grain Size as per ASTM E112-13, comparison procedure.
DFARS 225.872-1 Compliant
No intentional additions of Mercury compounds were made or used
Free of radioactive contamination
EU RoHS Directive 2011/65/EU Compliant
Product manufactured in the USA
Country of Melt as per ISO 3166-1

PO#129608
02-17-2023

Originator of the document / Originador del documento:
Outokumpu Stainless USA, LLC
An ISO 9001:2015 certified company
ISO 17025:2017 accredited testing lab by ANAB
EU PED 2014/68/EU, Anex I, 4.3 certified
Certificate is generated automatically / Certificado es generado automáticamente

The information provided is a true copy of data on file / Los valores mostrados corresponden a los datos archivados
Arturo Hernandez Rubio
Name of expert / Nombre del experto

Date of issue and validation / Fecha de emisión y validación: 07/13/2022

Q.A. APPROVED 2/25/23

ANTHONY CARDWELL
06/19/2023

Heat Number W79T 03W79T A
Shipper No 188631
Customer PO# 129608
Customer Name METALS USA - FKA PORT CITY

NAS NORTH AMERICAN STAINLESS
An Acerinox Group Company

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 823487 01
Customer: 0515 009

Mail To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
C/O TSA PROCESSING
1625 W. SAM HOUSTON PKWY. NORTH
HOUSTON, TX 77043

Ship To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
C/O TSA PROCESSING
1625 W. SAM HOUSTON PKWY. NORTH
HOUSTON, TX 77043

Date: 12/22/2022 Page: 1
Steel: 316/316L
Finish: HRAP

Your Order: T-42942 NAS Order: AN 1003383 01 Corrosion: ASTM A262/15;180Bend-OK

PRODUCT DESCRIPTION:

STAINLESS STEEL COIL, HRAP; UNS 31600/31603
ASTM A240/22a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A , MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED
EN 10204 3.1b

Mill Edge Coil: 60.5" Minimum Width

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------	Mark	Pieces	COMMODITY CODE
03W79T A	* 03W79T A	.4999	60.0000	21,830	COIL 205.20	1	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan) Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W79T	US	.0168	16.1990	.3885	1.5440	2.0090	.0461	10.0200	.0325	.0010

SI %
.4570

MECHANICAL PROPERTIES

Product ID #	Coil #	Loc	Dir	UTS 20C KSI	.2% YS 20C KSI	ELONG %-2"	Hard RB	Tail Hard	R of A %
03W79T A	03W79T A	F	T	90.50	56.88	49.44	86.00	87.00	71.21

PO# 129608
02-20-2023

Q.A. APPROVED
By Date 2/25/23

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 12/22/2022

ANTHONY CARDWELL
06/19/2023

Friedrich Geldbach
seit 1894

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 2017-C_FG-01975 | Datum / Dated 21.12.2017 Z02

A06
US

Kd.-Auftr. / PO	203000555/ 690-S-17 A07
Pos.	151
Lieferschein / Delivery note	2017-18E31-1731260
Packliste / Delivery note	2017-18E41-1741090
Rechnung / Invoice	2017-18E41-1741090 A08
Unser Auftrag / Our ref.	2017-18E21-1720237-0151

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

Chargen code B07 / Heat Code	Charge S07 / Heat Nr	Menge B08 / Quantity	Artikelbezeichnung / Description B01 - (B09 - B11)
	255632	5,00	W/N 150 RF 12" 80S F316/L

Material gemäß / Mat. in acc. to B02 ASTM A 182/A 182M -17 , ASME SA 182/SA 182M-17 ASME CODE SECT. II, PART A, ED. 2017
ASTM A182 F316/F316L
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

Anmerk. z. Mat. / Mat. remarks B02 P.M.I. 100% PERFORMED AND SATISFACTORY

Elemente / Elements (C71 - C92)	C	Si	Mn	S	P	Cr	Ni	Mo	Ti	Cu	V	Nb	N
LADLE ANALYSIS	0,017	0,420	1,810	0,004	0,028	16,600	10,120	2,040	0,000	0,000	0,000	0,000	0,048
	Al								CE LF	CE SF	F1	F2	PREN
LADLE ANALYSIS	0,000								-	-	-	-	24,100

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	262,0	–	564,0	58,0	78,0

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
170,0 - 174,0	KV	10x10 mm	20	176	184	184	181,3

Wärmebeh. / Heat treatment C70	SOLUTION TREAT AT 1050 °C - QUENCHED IN WATER	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	GERMANY

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	FG

A22-13314-1-2.

Ameriforge

An AFG Holdings Company

Material Test Report

Heat Code: C1513

ISO 9001:2015 Certified

Maass Flanges
13770 Industrial Rd. Houston, TX 77015
Sales: (713) 393-4200

Mattsco Supply Co. 00011508 1111 N. 161st Avenue Tulsa, OK 74116	PO: 03331-13.2	Sales Order: 192301	Line: 1
	Item Code: 2200800211E	Qty Shipped: 4	
	Item Desc: D-FIN F316-316L 08.00 300 RF WN S120		
	Mill Heat: 185892		

Spec: ASTM A 182/A 182M (21)/ASME SA 182/SA 182M (21) F316 / 316L

Element	(%wt)	Ladle	Product	EPCRA	CAS#
C	Carbon	0.013			
Mn	Manganese	1.67			
P	Phosphorus	0.034			
S	Sulfur	0.020			
Si	Silicon	0.57			

Element	(%wt)	Ladle	Product	EPCRA	CAS#
Ni	Nickel	10.15			
Cr	Chromium	16.96			
Mo	Molybdenum	2.09			
N	Nitrogen	0.082			

Mechanical Testing

TENSILE (PSI)	83,533
YIELD .2% (PSI)	40,240
ELONG %	54
R OF A %	64
BHN1	143
BHN2	143
A262-E	PASSED

Heat Treat

Solution Annealing Temp (F)	1900
Solution Annealing Dwell Time (Min)	45 MINUTES
Solution Annealing Cooling Type	WATER

Other

Country of Melt	CANADA
Country of Forging	USA
Country of Finish Machining	USA

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

NACE MR0175-2015/ISO15156 & MR0103-2016. ASME B16.5-2020; B16.47-2020 as applicable; Material free from mercury contamination; No weld repair has been preformed.

DNV-GL PED Certificate No 10000425664-PA-ACCREDIA-USA Valid thru December 03, 2023.

Certification No.: 1632852
Certification Date: 4/28/2023
Issued By: Michelle Simien

Dusty Bannon - Quality Analyst

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

ANTHONY CARDWELL
06/19/2023

NIPPON STEEL & SUMITOMO METAL CORPORATION

NIPPON STEEL & SUMITOMO METAL CORPORATION
WAKAYAMA WORKS
1850, MINATO, WAKAYAMA, JAPAN

INSPECTION CERTIFICATE

CERTIFICATE NO. :WYYK7885-01 PAGE : 1/2 DATE : 2014-08-11

CUSTOMER
ORDER NO. :W20514NSJ
SHIPPER :TOYOTA TSUSHO CORPORATION 070 ST4 PC7008B 4P13W600502
COMMODITY :HOT FINISHED SEAMLESS STAINLESS STEEL PIPES
STANDARD :ASTM A312-11 / ASME 2013 SA-312 TP316 ASTM A312-11 / ASME 2013 SA-312 TP316L
ASTM A376-06 / ASME 2013 SA-376 TP316
SPECIFICATION :
MILL WORK NO. :WYYK7885 O.D. :NPS12 W.T. :SCH80S LENGTH:MIN. 17feet MAX. 24feet QUANTITY:5pcs.
TOTAL LENGTH:115.60feet MASS:3433kg

HEAT NO. :F414053
PRODUCTS PCS. :5

HEAT TREATMENT :SOLUTION TREATED (1940°F X 10min. W.Q.)

CHEMICAL COMPOSITION (%)

			*1	C *4	Si	Mn	P *4	S *4	Cr *3	Ni *3	Mo	N *5	Pb *4	*PI *2
SPEC.	MIN.		L	-	-	-	-	-	160	110	200	-	-	-
	MAX.		L	35	75	200	45	30	180	140	300	-	-	-
	MIN.		P	-	-	-	-	-	160	110	200	-	-	-
	MAX.		P	35	75	200	45	30	180	140	300	-	-	-
HEAT NO. F414053			L	14	38	139	11	0	162	112	211	1115	-	25
			P	14	38	134	10	0	160	111	209	-	0	-

*1 L:LADLE ANALYSIS P:PRODUCT ANALYSIS *2:X1 *3:X10 *4:X1000 *5:X10000 OTHER:X100
*PI PITTING INDEX:Cr+3.3Mo+16N

TENSILE TEST

			*1 *2	YS *3	TS *3	EL %
SPEC.	MIN.		L B	P 30.0	P 75.0	35
	MAX.		L B	P -	P -	-
HEAT NO. F414053			L B	P 43.9	P 85.9	66

TYPE OF SPECIMEN:STRIP 1-1/2in. WIDTH *1 SAMPLING DIRECTION L:LONGITUDINAL *2 SAMPLING POSITION B:BASE METAL
*3 UNIT P:ksi GAUGE LENGTH:2.0in. KIND OF YS:0.5% EXTENSION UNDER LOAD

HARDNESS TEST (HRB)

			*1 *2	*3
SPEC.	MIN.		B C	-
	MAX.		B C	-
HEAT NO.				AVG.
F414053			B C	81

*1 SAMPLING POSITION B:BASE METAL *2 LOCATION C:CROSS SECTION *3 AVERAGE

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

J. Takano

HEAD OF DEPARTMENT
QUALITY ASSURANCE DEPARTMENT

NO. 265477W14

NIPPON STEEL & SUMITOMO METAL CORPORATION

NIPPON STEEL & SUMITOMO METAL CORPORATION
WAKAYAMA WORKS
1850, MINATO, WAKAYAMA, JAPAN

INSPECTION CERTIFICATE

CERTIFICATE NO. :WYYK7885-01 PAGE : 2/2 DATE : 2014-08-11

CORROSION TEST (ASTM A262-E) : ACCEPTABLE
FLATTENING TEST: ACCEPTABLE
VISUAL & DIMENSIONS: ACCEPTABLE
ULTRASONIC EXAMINATION (ASME SA-999/SE-213 U-SHAPED NOTCH) : ACCEPTABLE
POSITIVE MATERIAL IDENTIFICATION TEST (X-RAY FLUORESCENCE SPECTROSCOPIC ANALYSIS) : ACCEPTABLE
NO WELD REPAIR
CERTIFIED ACCORDING TO PED97/23/EC, ANNEX I, PAR. 4.3 BY TUEV RHEINLAND INDUSTRIE SERVICE GmbH
(NOTIFIED BODY, ID-No. 0035/CERTIFICATE No. 01 202 J/Q-02 0017)
MATERIAL FREE FROM MERCURY CONTAMINATION
MATERIAL FREE FROM RADIATION CONTAMINATION
COUNTRY OF MELT: JAPAN
NACE MR0175/MR0103/ISO15156 HARDNESS: GUARANTEED
PICKLED
PMI 100%
EN 10204 3.1
MATERIAL FREE FROM CONTAMINATION BY CARBON STEEL AND HALOGENS/CHLORIDES

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

J. Takano

HEAD OF DEPARTMENT
QUALITY ASSURANCE DEPARTMENT

NO. 265477W14

(A01) Salzgitter Mannesmann Stainless Tubes France SAS
(A05) B.P.10 - F 21501 Montbard Cedex - FRANCE
www.mannesmann-stainless-tubes.com

MANNESMANN

INSPECTION CERTIFICATE
Abnahmeprüfzeugnis
Certificat de Réception

(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° 3-21-07905-rev.01 Pag. 1 / 5

(A06) Purchaser / Besteller / Acheteur
Allied Stainless Group Inc.
7200 Mykawa Road
77033 Houston
Texas
Etats-Unis

(A07) Customer Order No / Kundenauftragsnr. / N° Commande Client
PO28444

(A08) SMST-Tubes Order No / Auftragsnr. / N° Commande SMST
0000287693

SMST-Item	(A09) Part No / Teilenummer / Part number
0000287693-000016	PART# 6ISSL8

(B01) (B02) (B04) Product Description / Produkt Beschreibung / Description du Produit

Seamless Stainless Steel Hot Finished Pipes Solution Annealed Pickled / Passivated Plain Ends Square Cut Deburred
Rohre warmgefertigt nahtlos rostfreier Stahl lösungsgeglüht gebeizt / passiviert glatte Enden rechtwinklig gesägt entgratet
Tubes sans soudure Acier Inoxydable Fini à chaud Remis en solution Décapés / Passivés Extrémités lisses coupées d'equerre

Specifications / Spezifikationen / Spécifications: ASME SA 312 19;ASME SA 376 19;ASTM A 312 19;ASTM A 376 19; ANSI/NACE MR0103/ISO 17945 2016; ANSI/NACE MR0175/ISO 15156-3 2015

Grade / Werkstoff / Nuance: TP 316;TP 316L;UNS S31600;UNS S31603;DMV 316L

Tolerances / Toleranzen / Tolérances: A 312

(B03) Supplementary Requirements / Zusatzanforderungen / Exigences Supplémentaires

None / Keine / Aucune

(B06 - D01) Marking of the Product / Kennzeichnung des Produkts / Marquage du Produit

Technical marking: MANNESMANN MST-F - ASTM A 376 / ASTM A 312 / ASME SA 376 / ASME SA 312 - DMV 316L - TP 316 / TP 316L / UNS S31600 / UNS S31603 - NPS 8 X SCH 120 - $INDIV_LENGTH_FT$ FT - SEAMLESS - HEAT $HEAT_NBR$ - $QUAL_LOT_NBR$ - FRANCE - $ORDER_ID$

Country of Origin of the tubes / Herstellungsland der Rohre / Pays d'origin des tubes: France / Frankreich / France

Quantity / Menge / Quantité — Dimensions / Abmessung / Dimensions

(B07) Heat Schmelze Coulée	Quality Lot Qualitätslos Lot Qualité	SMST-Item	(B08) Pieces Stück Pièces	(B13) Weight Gewicht Poids	(B16) Length Länge Longueur	(B09) OD	(B10) WT	(B11) Ordered Length Auftragslänge Longueur commandée min	(B11) Ordered Length Auftragslänge Longueur commandée max
				5905.00 kg	64.816 m	219.10 mm	18.26 mm	6096 mm	7315 mm
734258	QL30160673	000016	10	13018.31 lbs	212.65 ft	NPS 8	SCH 120	20.00 ft	24.00 ft
				13018.31 lbs	212.65 ft	8.626 "	0.719 "	20.00 ft	24.00 ft
			10	**5905.00 kg**	**64.816 m**				
			10	**13018.31 lbs**	**212.65 ft**				

Heat Analysis / Schmelzanalyse / Analyse de Coulée

		Request	C	Si	Mn	P	PREN	S	Cr	Ni	Mo
		Min	0.00	0.00	0.00	0.00	0.0	0.0000	16.0	11.0	2.0
		Max	0.035	0.75	2.0	0.045	99.9	0.0300	18.0	14.0	3.0
(B07) Heat Schmelze Coulée	Heat Origin Ursprung der Schmelze Origine de la Coulée	(C70) Melting Process Erschmelzungsart Procédé d'élaboration	%	%	%	%	%	%	%	%	%
734258	Germany	EAF + AOD	0.024	0.43	1.81	0.030	24.7	0.0005	16.9	11.2	2.1

ANTHONY CARDWELL
06/19/2023

(A01) Salzgitter Mannesmann Stainless Tubes France SAS
(A05) B.P.10 - F 21501 Montbard Cedex - FRANCE
www.mannesmann-stainless-tubes.com

MANNESMANN

INSPECTION CERTIFICATE
Abnahmeprüfzeugnis
Certificat de Réception

(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° **3-21-07905-rev.01**

Product Analysis / Produktanalyse / Analyse sur Produit

ASTM A 312;ASME SA 312;ASME SA 376;ASTM A 376

	Request	C	Si	Mn	P	PREN	S	Cr	Ni	Mo
	Min	0.00	0.00	0.00	0.00	0.0	0.0000	16.0	11.0	2.0
	Max	0.035	0.75	2.0	0.045	99.9	0.0300	18.0	14.0	3.0
Quality Lot Qualitätslos Lot Qualité	(C00) Sample	%	%	%	%	%	%	%	%	%
QL30160673	39053753	0.024	0.43	1.80	0.028	24.8	0.0008	17.0	11.3	2.1
	39053754	0.025	0.43	1.80	0.029	24.8	0.0005	16.9	11.3	2.1

Sampling done on tubes in manufacturing length / Beprobung erfolgte an Rohren in Herstelllänge / Echantillonage realisé par longueur de fabrication

Tensile Test at Room Temperature / Zugversuch bei Raumtemperatur / Essai de traction à température ambiante

ASTM A 370

(C02) Direction: LONGITUDINAL

Coupon Type / Art der Probe / Type du Coupon Test: Round Machined Section

		(C11)	(C12)	(C13)
		YS 0.2%	U.T.S.	EL
		Rp 0,2%	Rm	2"
Request	Min	30	75	35.0
	Max			
Quality Lot Qualitätslos Lot Qualité	(C00) Sample	ksi	ksi	%
QL30160673	39053753	33.2	78.0	57

Sampling done on tubes in manufacturing length / Beprobung erfolgte an Rohren in Herstelllänge / Echantillonage realisé par longueur de fabrication

(C30) Hardness HRC / Härteprüfung HRC / Essai de dureté HRC

ASTM E 18;EN ISO 6508-1

				(C30) HRC	
		Request			22.0 max
Quality Lot Qualitätslos Lot Qualité	(C00) Sample	Result Ergebnis Resultat	(C31) Min	(C31) Max	(C32) Avg
QL30160673	39053753		<18	<18	<18.0

Sampling done on tubes in manufacturing length / Beprobung erfolgte an Rohren in Herstelllänge / Echantillonage realisé par longueur de fabrication

ANTHONY CARDWELL
06/19/2023

(A01) Salzgitter Mannesmann Stainless Tubes France SAS
(A05) B.P.10 - F 21501 Montbard Cedex - FRANCE
www.mannesmann-stainless-tubes.com

MANNESMANN

INSPECTION CERTIFICATE
Abnahmeprüfzeugnis
Certificat de Réception

(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° 3-21-07905-rev.01

(C50) Flattening Test / Faltversuch / Essai d'aplatissement

ASTM A 999

Quality Lot Qualitätslos Lot Qualité	(C00) Sample	Result Ergebnis Resultat
QL30160673	39053753	OK
	39053754	OK

Sampling done on tubes in manufacturing length / Beprobung erfolgte an Rohren in Herstelllänge / Echantillonage réalisé par longueur de fabrication

Intergranular Corrosion Test / Prüfung der interkristallinen Korrosion / Essai de corrosion intergranulaire

ASTM A 262 PRACTICE E;MIL-P-24691/3 Feb. 1991 Ad 1

	Request Max Unit	
Quality Lot Qualitätslos Lot Qualité	(C00) Sample	Result Ergebnis Resultat
QL30160673	39053753	Satisfactory
	39053754	Satisfactory

ANTHONY CARDWELL
06/19/2023

(A01) Salzgitter Mannesmann Stainless Tubes France SAS
(A05) B.P.10 - F 21501 Montbard Cedex - FRANCE
www.mannesmann-stainless-tubes.com

MANNESMANN

INSPECTION CERTIFICATE
Abnahmeprüfzeugnis
Certificat de Réception

(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° **3-21-07905-rev.01** Pag. 4 / 5

Other Tests and Declarations / Andere Prüfungen und Prüffeststellungen / Autres Tests et Déclarations

QL30160673

Heat Treatment / Wärmebehandlung / Traitement thermique : ANNEALED BY DIRECT QUENCHING - Rapid Cooling off the extrusion press - Temperature : 1038°C (1900°F) min

(D01)	Visual and dimensional inspection (VT) on 100% of tubes according to the order Besichtigung und Maßkontrolle von 100% der Rohre gemäß Auftrag Examen visuel et dimensionel sur 100% des tubes selon la commande	Satisfactory Bestanden Satisfaisant
(D51)	Antimixing Check (PMI) on 100% of tubes Verwechselungsprüfung an allen Rohren mittels Spektralprüfung von 100% der Rohre Contrôle anti-mélange par PMI sur 100% des tubes	Satisfactory Bestanden Satisfaisant
(D52)	Hydro Pressure Test on 100% of tubes 5 sec. at 2500.00 PSI ASTM A999 (EP_1107) Wasserdruckprüfung auf 100% Rohren 5 sec. mit 2500.00 PSI ASTM A999 (EP_1107) Epreuve Hydraulique sur 100% des tubes 5 sec. avec 2500.00 PSI ASTM A999 (EP_1107)	Satisfactory Bestanden Satisfaisant

Country of origin for melt and melting process must be DFARS 252.225-7014 compliant

No Weld Repair
Keine Reparaturschweissung
Aucune réparation par soudure

(Z01) SMST declares that the product was manufactured, sampled, tested, inspected and packed in accordance with the specifications and any other requirements designated in the purchase order within the extent listed in SMST order acknowledgment, and has been found to meet such requirements
SMST bestätigt, dass die Rohre hergestellt, beprobt, geprüft, kontrolliert und gepackt wurden in Übereinstimmung mit den Spezifikationen und anderen Anforderungen in der Kundenbestellung innerhalb des Umfanges wie dieser in der SMST Auftragsbestätigung aufgeführt wurde. Die Rohre entsprechen den Auftragsanforderungen
SMST Atteste que les produits sont fabriqués, prélevés, testés, inspectés et emballés en conformité aux spécifications et autres exigences stipulées dans la commande d'achat avec les limites décrites dans l'accusé de réception de la commande. Les produits livrés sont conformes à ces stipulations

Tubes are free from mercury contamination and from radioactive contamination
Die Rohre sind frei von Quecksilberverunreinigungen und frei von radioaktiver Verunreinigung
Les tubes sont exempts de contamination par le mercure et de contamination radioactive

The material is conforming to directive 2000/53/EC and 2011/65/EU
Das Material entspricht den Anforderungen der Richtlinien 2000/53/EC und 2011/65/EU
Le matériau est conforme aux directives 2000/53/EC et 2011/65/EU

Confirmation with reference to Pressure Equipment Directive 2014/68/EU:
The works operates a quality management system that has undergone a specific assessment for materials for pressure equipment and is certified by a competent body (TÜV-SÜD-Cert.No: 05/2020/MAN)
Bestätigung in Bezug auf Druckgeräterichtlinie 2014/68/EU:
Das Werk wendet ein Qualitätsmanagementsystem an, das in Bezug auf Werkstoffe für Druckgeräte einer spezifischen Bewertung unterzogen wurde und von einer zuständigen Stelle (TÜV-SÜD-Cert.No: 05/2020/MAN) zertifiziert ist.
Confirmation concernant la Directive Equipements sous Pression 2014/68/EU:
L'usine applique un système de management de la qualité qui a fait l'objet d'une évaluation spécifique pour les matériaux pour équipements sous pression et qui est certifié par un organisme compétent (TÜV-SÜD-Cert.No: 05/2020/MAN)

(Z02)	Mill's Inspector Werkssachverständiger Le Contrôleur usine	Florian Suillerot (IU)	Date of Edition Ausgabedatum Date d'Édition	18/10/2021

This certificate is issued by SALZGITTER MANNESMANN STAINLESS TUBES via a computerized system bearing a traceable unique number. It is valid without signature. An intermediary may only pass on the original certificate without any alterations. Providing a copy of the original is only permitted subject to strict compliance with the prerequisites set out in § 6 of EN 10204:2004 i.e. traceability and availability of the original upon request . Any modification or alteration of the certificate or any copies are strictly prohibited Any contravention of this notice or § 6 of EN 10204:2004 is illegal and will be prosecuted. Any falsification of a certificate e.g. by introducing false or fraudulent data for the purpose of promoting the sales of goods is a criminal offence under German law (and many other jurisdictions) punishable with fines and imprisonment. If an authentification is needed, please contact info@mst.mannesmann.com

ANTHONY CARDWELL
06/19/2023

(A01) Salzgitter Mannesmann Stainless Tubes France SAS
(A05) B.P.10 - F 21501 Montbard Cedex - FRANCE
www.mannesmann-stainless-tubes.com

MANNESMANN

INSPECTION CERTIFICATE
Abnahmeprüfzeugnis
Certificat de Réception

(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° 3-21-07905-rev.01

Certificate anti counterfeiting check
Prüfung der Zeugnisse gegen Fälschung
Contrôle de la contrefaçon des certificats

A set of information from the Inspection Certificate cover page are included in encrypted form in the above QR code.
By scanning it with your mobile device you can check if the Inspection Certificate is genuine.
Ein Teil der Informationen der ersten Zeugnis-Seite sind in verschlüsselter Form in dem oben dargestellten QR Code enthalten. Beim Scannen mit einem mobilen Gerät kann das Zeugnis auf Authentizität geprüft werden.
Une partie des informations contenues dans la première page de ce certificat d'inspection sont disponibles sous forme cryptée dans le "QR Code" ci-dessus. Lors de la lecture avec votre appareil mobile, vous pouvez vérifier l'authenticité du certificat d'inspection.

ANTHONY CARDWELL
06/19/2023

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 # 23-042096
DATE: 3/23/2023
FCI ORDER # 118581
IAW ASME 2021 ED.
IAW NACE MR0175 2015Ed
IAW EN10204 TYPE 3.1

CUSTOMER ORDER # 03331-13.1
SOLD / SHIPPED TO: MATTSCO SUPPLY

Item	Quantity	Description	PART HBW: 149
1	4	2" X 300 X 9" LG RF LWN	

Heat Number: N683
Material Type: SA182F316/F316L
Steel Origin (melt): USA

CHEMICAL ANALYSIS

C	.02
Mn	1.42
P	.028
S	.027
Si	.35
Cr	16.72
Mo	2.06
Cu	.35
Ni	10.60
N	.034

PHYSICAL PROPERTIES

Yield PSI	40,600
Tensile PSI	75,800
Elongation %	66.0
Reduction of Area %	76.5
Hardness	143/149 HBW

CuNiCrMoV
CrMo 18.782

Heat Treatment	SOLUTION ANNEALED
Temperature	1900 °F MIN
Time at Temperature	1/2 HR/IN THK
Cooling Media	WATER

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

Prepared by: _____

Name: Cynthia Madrid Title: QA Representative

Date printed: 3/23/2023 3:40:22 PM

ANTHONY CARDWELL
06/19/2023

PLYMOUTH TUBE CO USA
601 Grantham Avenue
West Monroe, LA 71292
(318) 388 - 3360

Sold To:
Webco Industries, Inc.
P.O BOX 100
Sand Springs, OK 74063

Customer's Order No. 10075494
Invoice Number:
Mill Order Number: 200001-1-1

Date: 05-13-22

TEST REPORT

TR# 200001

Size: 1.0000" OD X 0.0650" MIN. WALL
Grade: TP316/316L SEAMLESS
Specifications: ASTM A-213(19a) ASME SA-213(19) COLD DRAWN STAINLESS PRESSURE TUBING
Finish tubes solution bright annealed at a minimum temperature of 1900°F and rapidly cooled in an inert atmosphere.

Heat	Lot Numbers	Yield Strength lbs per sq. in.	Tensile Strength lbs per sq. in.	% Elong in 2"	Hardness Test	
563632	2	46800 / 40200	95800 / 87200	59.00 / 60.00	RB 72-74	2 Tests
563766	3	46800 / 46900	95300 / 95200	58.00 / 57.00	RB 76-80	2 Tests
563767	1	44400 / 44900	92100 / 93700	57.00 / 55.00	RB 76-78	2 Tests

Test	Status	Comments
Flatten	OK	
Flare	OK	
Eddy Current	OK	ASTM -A-1016 100%

Heat 563632

	C	MN	P	S	SI	CR	NI	MO	CU	CO	N	TI	AI
Ladle	0.011	1.690	0.026	0.010	0.380	16.960	11.160	2.020	0.260	0.140	0.059	0.003	0.004
Product	0.012	1.690	0.027	0.007	0.390	16.880	11.190	2.030	0.260	0.130	0.056	0.003	0.004

563766

	C	MN	P	S	SI	CR	NI	MO	CU	CO	N	TI	AI
Ladle	0.013	1.590	0.029	0.008	0.390	17.000	11.150	2.050	0.280	0.140	0.072	0.010	0.005
Product	0.013	1.580	0.029	0.007	0.400	17.000	11.140	2.050	0.280	0.130	0.064	0.011	0.005

563767

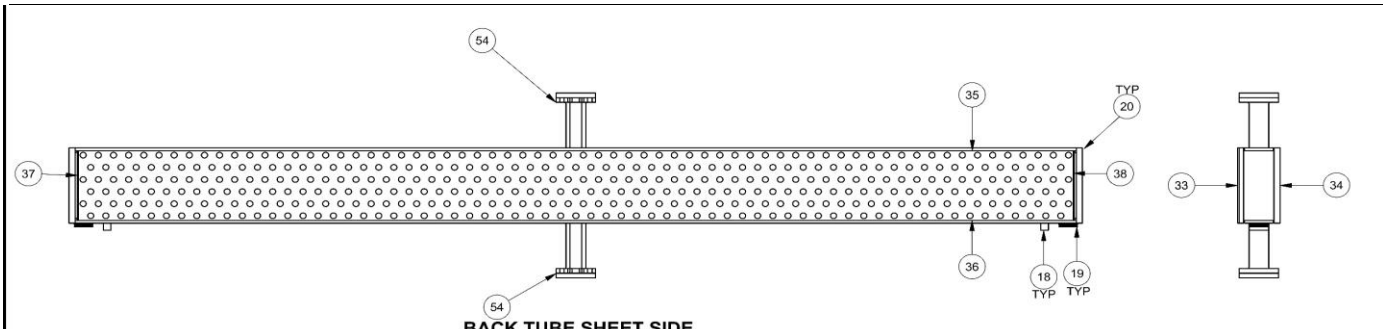
	C	MN	P	S	SI	CR	NI	MO	CU	CO	N	TI	AI
Ladle	0.016	1.630	0.030	0.007	0.390	17.000	11.250	2.060	0.310	0.140	0.076	0.021	0.006
Product	0.017	1.640	0.032	0.007	0.390	16.960	11.370	2.080	0.310	0.140	0.078	0.023	0.006

Additional Requirements:
798 STRAIGHT TUBES PRODUCED PER WEBCO INDUSTRIES, INC. PO# 10075494. MATERIAL COMPLIES WITH EN10204 3.1. TUBES MANUFACTURED IN THE USA. COUNTRY OF MELT: SWEDEN.

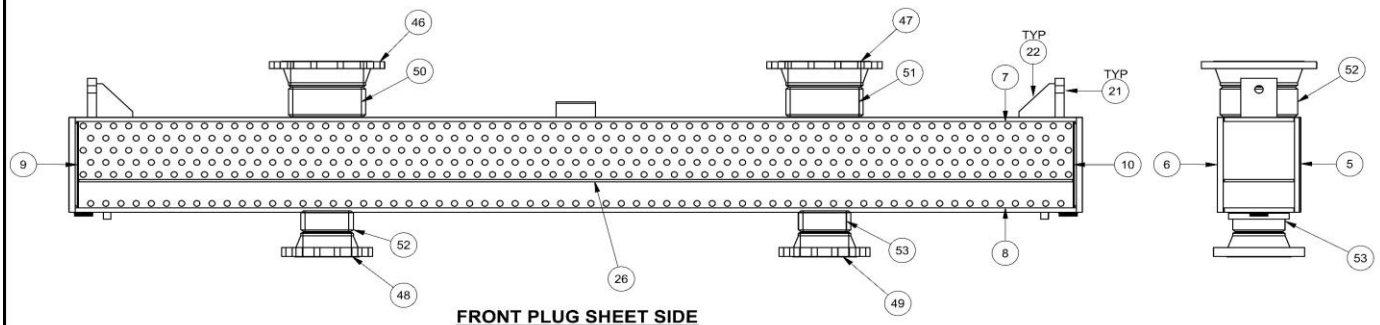
We hereby certify this report to be correct. **By** Justin Lenard
Plymouth Tube Company

APPROVED
Q.A.-TECHNICAL

ANTHONY CARDWELL
10/24/2022



BACK TUBE SHEET SIDE



FRONT PLUG SHEET SIDE

Mark No	MATERIAL DESCRIPTION		
	SUPPLIERS	HEAT No.	MATERIAL
5	NAS	W28E	SA-240-316L
6	NAS	W52L	SA-240-316L
7	NAS	W28E	SA-240-316L
8	NAS	W28E	SA-240-316L
9	NAS	W52R	SA-240-316L
10	NAS	W52R	SA-240-316L
18	NAS	T24Y	SA-240-316L
19	NAS	W00R	SA-240-316L
20	NAS	W00R	SA-240-316L
21	NAS	W14F	SA-240-316L
22	NAS	W52R	SA-240-316L
26	OUTOKUMPU	539139	SA-240-316L
33	NAS	W28E	SA-240-316L
34	NAS	W52L	SA-240-316L
35	NAS	W79T	SA-240-316L
36	NAS	W79T	SA-240-316L
37	NAS	W52R	SA-240-316L
38	NAS	W52R	SA-240-316L
46	FRIEDRICH GELDBACH	255632	SA-182-F316/316L
47	FRIEDRICH GELDBACH	255632	SA-182-F316/316L
48	AMERIFORGE	C1513	SA-182-F316/316L
49	AMERIFORGE	C1513	SA-182-F316/316L
50	NIPPON STEEL	F414053	SA-312-TP316L
51	NIPPON STEEL	F414053	SA-312-TP316L
52	MANNESMANN	734258	SA-312-TP316L
53	MANNESMANN	734258	SA-312-TP316L
54	FCI	N683	SA-182-F316/316L
TUBES	PLYMOUTH TUBE CO.	563632/563767	SA-213-TP316L

CUSTOMER:	AIR PRODUCTS MANUFACTURING, LLC		FABSCO SHELL & TUBE, LLC
PO NO:	4505606038/A8KM-4-406-PO-3	DATE	
ITEM NO:	18-XF-260B	AC	DWG No: A22-13314-2A-HS REV: 0

NAS NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 811572 02
Customer: 0515 004

Mail To:
ARP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Ship To:
ARP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Date: 10/11/2022 Page: 1
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: T-41577 NAS Order: AN 0997744 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length--------	Mark	Pieces	COMMODITY CODE
02W28E BA	* 02W28E BA	.9999	60.0000	8,500	PLATE 480.00	3	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W28E	US	.0137	16.5670	.4630	1.1805	2.0570	.0582	10.0450	.0335	.0021

SI %
.3305

MECHANICAL PROPERTIES

Product ID #	Coil #	loc	dir	UTS 20C KSI	.2% YS 20C KSI	ELONG %-2"	Hard RB	R of A %
02W28E BA	02W28E BA	F	T	87.66	43.32	50.35	82.00	69.62

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 10/11/2022

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

Customer Name: METALS USA - FKA PORT CITY
Customer PO#: 121413
Shipper No: 188056
Heat Number: W28E 02W28E BA

ANTHONY CARDWELL
06/19/2023

GLOBE X-RAY SERVICES, INC.

8441 South Union Tulsa, OK 74132

Certification 167092

Report of Ultrasonic Examination

Customer: Port City P. O 129780

Address: Job #

Ultrasonic Examination

Test Instrument: Sonatest D-20+ S/N: I013300

Surface Condition: Smooth Procedure #: GXS-II-D & B Rev: 1-22

Couplant: Sonix Search Unit Cable: RG-174 Co-Axial, 6FT. Long with BNC to BNC Connectors

Beam Angle: 0 Degrees Search Unit 1" x 2.25 MHz S/N: 66159

Scanning Pattern: 100% Reference Level: 36-42 Db

Calibration Reference: Backwall Technique: Contact, Manual Scan

Scanning Surface: One major surface

Reference Standard:

√ ASTM/ASME A-578/SA-578 LEVEL A(1)

√ ASTM/ASME A-578/SA-578 LEVEL B(2)

√ ASTM/ASME A-578/SA-578 LEVEL C(3)

√ ASTM/ASME A-435/SA-435

Notes:

Thickness/Grade	Slab	Area	Heat Number/Code	Accept	Reject
1" 316L	N/A	61" x 170"	W28E	√	
1" 316L	N/A	61" x 170"	W52L	√	
1" 316L	N/A	61" x 170"	W52L	√	
5/8" SA516-70N	02	120" x 176"	2605016	√	
1-1/4" SA516-70AR	C04	72" x 60"	B2G617	√	
1-1/2" SA516-70N	04	120" x 158"	1606908	√	
1-1/4" SA516-70N	A35	96" x 107"	E2F017	√	
1-1/4" SA516-70N	01	96" x 81"	2605652	√	
1-1/4" SA516-70N	A030862	96" x 80"	822Y39620	√	
1" SA516-70N	E21	120" x 282"	E9E225	√	

Unless otherwise noted by an * following the item number, there were no recordable indications observed.

Examination By: Colter Moyer Qualification Level: II

Date : February 22, 2023 Time : NA AM/PM

GLOBE XRAY ASSUMES NO RESPONSIBILITY FOR THE INTEGRITY OF THE STRUCTURE OR ANY LOSSES OF ANY KIND DUE TO ANY KIND OF INTERPRETATION

Q.A. APPROVED

By Date 2/23/2023

Heat Number W52L 04W52L FA
Shipper No 188056
Customer PO# 121413
Customer Name ETALS USA - FKA PORT CITY

NAS NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 816911 04
Customer: 0515 00-4

Mail To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Ship To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Date: 11/09/2022 Page: 1
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: T-42422
NAS Order: AN 1001542 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length--------	Mark	Pieces	COMMODITY CODE
04W52L FA	* 04W52L FA	.9999	60.0000	8,400	PLATE 480.00	1	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W52L	US	.0185	16.9180	.5390	1.2360	2.0660	.0618	10.0550	.0365	.0011

SI %
.3730

MECHANICAL PROPERTIES

Product ID #	Coil #	Loc	Dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	Hard RB	R of A %
04W52L FA	04W52L FA	F	T	87.65	43.05	51.10	80.50	74.29

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 11/09/2022

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

ANTHONY CARDWELL
06/19/2023

GLOBE X-RAY SERVICES, INC.

8441 South Union Tulsa, OK 74132

Certification 167092

Report of Ultrasonic Examination

Customer: Port City P. O 129780

Address: Job #

Ultrasonic Examination

Test Instrument: Sonatest D-20+ S/N: I013300

Surface Condition: Smooth Procedure #: GXS-II-D & B Rev: 1-22

Couplant: Sonix Search Unit Cable: RG-174 Co-Axial, 6FT. Long with BNC to BNC Connectors

Beam Angle: 0 Degrees Search Unit 1" x 2.25 MHz S/N: 66159

Scanning Pattern: 100% Reference Level: 36-42 Db

Calibration Reference: Backwall Technique: Contact, Manual Scan

Scanning Surface: One major surface

Reference Standard:

√ ASTM/ASME A-578/SA-578 LEVEL A(1)

√ ASTM/ASME A-578/SA-578 LEVEL B(2)

√ ASTM/ASME A-578/SA-578 LEVEL C(3)

√ ASTM/ASME A-435/SA-435

Notes:

Thickness/Grade	Slab	Area	Heat Number/Code	Accept	Reject
1" 316L	N/A	61" x 170"	W28E	√	
1" 316L	N/A	61" x 170"	W52L	√	
1" 316L	N/A	61" x 170"	W52L	√	
5/8" SA516-70N	02	120" x 176"	2605016	√	
1-1/4" SA516-70AR	C04	72" x 60"	B2G617	√	
1-1/2" SA516-70N	04	120" x 158"	1606908	√	
1-1/4" SA516-70N	A35	96" x 107"	E2F017	√	
1-1/4" SA516-70N	01	96" x 81"	2605652	√	
1-1/4" SA516-70N	A030862	96" x 80"	822Y39620	√	
1" SA516-70N	E21	120" x 282"	E9E225	√	

Unless otherwise noted by an * following the item number, there were no recordable indications observed.

Examination By: Colter Moyer Qualification Level: II

Date : February 22, 2023 Time : NA AM/PM

GLOBE XRAY ASSUMES NO RESPONSIBILITY FOR THE INTEGRITY OF THE STRUCTURE OR ANY LOSSES OF ANY KIND DUE TO ANY KIND OF INTERPRETATION

Q.A. APPROVED

By Date 2/23/2023

NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 811571 06
Customer: 0515 004

Mail To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Ship To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Date: 10/11/2022 Page: 1
Steel: 316/316L -
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: T-41664
NAS Order: AN 0998051 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------	Mark	Pieces	COMMODITY CODE
04W28E BA	* 04W28E BA	.7499	60.0000	6,400	PLATE 480.00	1	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W28E	US	.0137	16.5670	.4630	1.1805	2.0570	.0582	10.0450	.0335	.0021

SI %
.3305

MECHANICAL PROPERTIES

Product ID #	Coil #	Loc	Dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	% Hard RB	R of A %
04W28E BA	04W28E BA	F	T	89.21	44.66	61.50	80.00	74.10

Q.A. APPROVED
By _____ Date 2/23/23

PO#129608
02-2c-2023

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 10/11/2022

Customer Name: METALS USA - FKA PORT CITY
Customer PO#: 129608
Shipper No: 188631
Heat Number: W28E 04W28E BA

ANTHONY CARDWELL
06/19/2023

NAS NORTH AMERICAN STAINLESS
An Acerinox Group Company

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 822433 01
Customer: 0305 033

Mail To:
PHOENIX METALS COMPANY
4645 PORT ROYAL ROAD
SPRING HILL, TN 37174

Ship To:
PHOENIX METALS COMPANY
4645 PORT ROYAL ROAD
SPRING HILL, TN 37174

Date: 12/14/2022 Page: 1
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: 507576 NAS Order: AN 1004248 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/22a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Skid #	Prod #	Thickness	Width	Weight	--------Length-------	Mark	Pieces	COMMODITY CODE
PV6006	* 01W52R	.5000	60.0000	2,100	PLATE 120.00		2	403563

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W52R	US	.0141	16.7750	.5030	1.2105	2.1735	.0640	10.0100	.0365	.0021

SI %
.3115

MECHANICAL PROPERTIES

Skid #	Prod #	loc	dir	UTS 20C KSI	.2% YS 20C KSI	ELONG %-2"	Hard RB	R of A %
PV6006	01W52R	F	T	90.56	42.60	56.92	80.00	62.79

PO#127390
01-18-2023

Q.A. APPROVED
By
Date 1/19/23

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 12/15/2022

ANTHONY CARDWELL
06/19/2023

NORTH AMERICAN STAINLESS

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

METALLURGICAL TEST REPORT

Certificate: 775087 01
Customer: 0305 033

Mail To:
PHOENIX METALS COMPANY
4645 PORT ROYAL ROAD
SPRING HILL, TN 37174

Ship To:
PHOENIX METALS COMPANY
4645 PORT ROYAL ROAD
SPRING HILL, TN 37174

Date: 4/21/2022 Page: 1
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: 512934 NAS Order: XN 0985347 01

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------	Mark	Pieces	COMMODITY CODE
04T24Y DB	* 04T24Y DB	1.2575	60.0000	5,340	PLATE 240.00	1	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
T24Y	US	.0143	16.7005	.4795	1.2505	2.0245	.0706	10.0900	.0300	.0010

SI %
.2895

MECHANICAL PROPERTIES

Product ID #	Coil #	loc	dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	% Hard RB	R of A %
04T24Y DB	04T24Y DB	F	T	87.19	46.44	52.30	82.50	75.88

ANTHONY CARDWELL
06/19/2023

Q.A. APPROVED
By _____ Date 4/22/2022

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. _____
KRIS LARK 4/22/2022

NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 810723 02
Customer: 0305 808

Mail To:
PHOENIX METALS COMPANY
12420 MEANS COURT
CHARLOTTE, NC 28278

Ship To:
PHOENIX METALS COMPANY
12420 MEANS COURT
CHARLOTTE, NC 28278

Date: 10/05/2022
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15;180Bend-OK

Your Order: 305478
NAS Order: AN 0999534 01

PRODUCT DESCRIPTION:

STAINLESS STEEL COIL, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A , MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------		Mark	Pieces	COMMODITY CODE
02W00R C	* 02W00R C	.2500	48.0000	14,270	COIL	338.20	2	1	168408

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W00R	US	.0184	16.7185	.4475	1.2025	2.1915	.0526	10.0350	.0300	.0062

SI %
.2875

MECHANICAL PROPERTIES

Product ID #	Coil #	loc	dir	UTS 20C KSI	.2% YS 20C KSI	ELONG % -2"	Hard RB	Tail Hard
02W00R C	02W00R C	F	T	89.46	47.63	50.22	86.00	87.00

PO#129637
02-09-2023

Q.A. APPROVED
By _____ Date 2/17/23

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 10/06/2022

ANTHONY CARDWELL
06/19/2023

Customer Name METALS USA - FKA PORT CITY
Customer PO# 128900
Shipper No 187158
Heat Number W14F 02W14F DB

NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 810120 03
Customer: 0515 004

Mail To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Ship To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
1010 WEST 37TH PLACE
TULSA, OK 74107

Date: 10/02/2022 Page: 4
Steel: 316/316L
Finish: HRAP
Corrosion: ASTM A262/15 180Bend-OK

Your Order: T-41643
NAS Order: AN 0997974 02

PRODUCT DESCRIPTION:

STAINLESS STEEL PLATE, HRAP; UNS 31600/31603
ASTM A240/20a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A, MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------		Mark	Pieces	COMMODITY CODE
02W14F DB	* 02W14F DB	1.5000	60.0000	6,500	PLATE	240.00	6	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W14F	US	.0127	16.6750	.5595	1.2325	2.0105	.0632	10.0800	.0320	.0029

SI %
.2745

MECHANICAL PROPERTIES

Product ID #	Coil #	Loc	Dir	UTS KSI	20C .2% YS KSI	20C ELONG %-2"	Hard RB	A 262 'E' Pr E	R of A %
02W14F DB	02W14F DB	F	T	86.34	46.23	45.85	82.00	OK	76.35

Q.A. APPROVED
By _____ Date 2/13/2023

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. _____

ANTHONY CARDWELL
06/19/2023

Customer Name	Customer PO#	Shipper No	Heat Number
METALS USA - FKA PORT CITY	129608	188631	539139 3463379

Manufacturer / Fabricante: outokumpu

Type of document / Tipo de documento: **INSPECTION CERTIFICATE**
CERTIFICADO DE INSPECCION
according to / de acuerdo con
EN 10204-3.1

Document number / Nº de certificado: 07/13/2022
0000580364 /
Page / Pagina: 1 / 1

1 Steel Drive; P.O. Box 13000; Calvert, AL 36513-1300

METALS INC
P.O. BOX 571300
TULSA OK 74157-1300
USA

Customer/Ship to / Cliente: METALS INC,TULSA
Customer's order number / Nº de Pedido Cliente: T-39286
Manufacturer's works order no. / Nº de Pedido Manufactura: 901311807 / 001
Delivery note no. / Nº de Entrega: 86787190 / 010
Product / Producto: Stainless Steel Hot Rolled Coil/Bobina

Terms of delivery / Condiciones de entrega:
ASTM A240/A240M-22, ASME SA-240 Sec. II part A Ed.2021
ASTM A480/A480M-22, ASME SA-480 Sec. II part A Ed.2019
NACE MR0103 / ISO 17945: 2015
NACE MR0175 / ISO 15156-3: 2015

Steel Grade and Quality / Acero:
TYPE 316L/316
UNS S31603
UNS S31600

Customer's material no./ Nº de material del cliente	Product dimensions (Thickness / Width / Length) / Dimensiones (Espesor / Ancho / Largo)	Steelmaking procedure/ Proceso de manufact.	Finish/ Acabado
	9.53 mm x 1,524.00 mm 0.3750 inch x 60.0000 inch	AOD	IIa / 1D / No.1

Packing-No./ Nº de Empaque	No.of pieces/ Piezas	Actual weight/ Peso actual	Actual length/ Longitud actual	Coil-No./ Bobina No.	Heat No./ Colada	Inspection lot/ Lote de inspeccion	Inspection lot/ Lote de inspeccion
3463379	1	20,503 lb / 9,300 kg	262 ft / 80 m	939881	539139	1000816350	1000816351
Sum / Suma	1	20,503 lb / 9,300 kg					

Heat / Colada	Country of Melt / País de colada	Chemical composition / Composición Química Chemical analysis per ASTM A751-14a									
		% C	% Si	% Mn	% P	% S	% Cr	% Mo	% Ni	% N	% Cu
539139	USA	0.022	0.38	1.46	0.033	0.0018	16.72	2.03	10.07	0.041	0.50

Sample Position/ Localiz.de la muestra: Mechanical testing per ASTM A370-18

Inspection lot/ Lote de inspección	YS0.2% PSI / MPa	TS PSI / MPa	El. 2" %	HRB	Grain Size
1000816350	44,380 / 306	88,615 / 611	54	84	8.5
1000816351	44,380 / 306	88,905 / 613	54	86	9

Resistant to intergranular corrosion / Resistente contra corrosión inter-granular: ASTM A 262-15, PRACTICE E - Sample Acceptable
Dimensions-surface / Dimensiones-Superficie: OK
Positive Material Identification (PMI) / Control de identidad (análisis espectográfico): OK

Heat Treat: Solution anneal 1900°F/1040°C Min, Air and water quench
No welding or weld repairs were performed on this material
Grain Size as per ASTM E112-13, comparison procedure.
DFARS 225.872-1 Compliant
No intentional additions of Mercury compounds were made or used
Free of radioactive contamination
EU RoHS Directive 2011/65/EU Compliant
Product manufactured in the USA
Country of Melt as per ISO 3166-1

PO#129608
02-17-2023

Originator of the document / Originador del documento:
Outokumpu Stainless USA, LLC
An ISO 9001:2015 certified company
ISO 17025:2017 accredited testing lab by ANAB
EU PED 2014/68/EU, Anex I, 4.3 certified
Certificate is generated automatically / Certificado es generado automáticamente

The information provided is a true copy of data on file / Los valores mostrados corresponden a los datos archivados
Arturo Hernandez Rubio
Name of expert / Nombre del experto

Date of issue and validation / Fecha de emisión y validación: 07/13/2022

Q.A. APPROVED 2/25/23

ANTHONY CARDWELL
06/19/2023

Heat Number W79T 03W79T A
Shipper No 188631
Customer PO# 129608
Customer Name METALS USA - FKA PORT CITY

NAS NORTH AMERICAN STAINLESS
An Acerinox Group Company

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 823487 01
Customer: 0515 009

Mail To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
C/O TSA PROCESSING
1625 W. SAM HOUSTON PKWY. NORTH
HOUSTON, TX 77043

Ship To:
AAP METALS LLC (D/B/A METALS INC. - TUL)
C/O TSA PROCESSING
1625 W. SAM HOUSTON PKWY. NORTH
HOUSTON, TX 77043

Date: 12/22/2022 Page: 1
Steel: 316/316L
Finish: HRAP

Your Order: T-42942 NAS Order: AN 1003383 01 Corrosion: ASTM A262/15;180Bend-OK

PRODUCT DESCRIPTION:

STAINLESS STEEL COIL, HRAP; UNS 31600/31603
ASTM A240/22a,A480/20a,A666/15;ASME SA240/19,SA480/19,SA666/19
CHEM ONLY ON FOLLOWING ASTM: A276/17,A479/20,A484/20b,A312/21
CHEM ONLY ON FOLLOWING ASME: SA312/19,SA479/19

AMS 5507H/5524M X MRK;
NACE MR0175/ISO 15156-3:2015 A , MR0103/07; QQS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED
EN 10204 3.1b

Mill Edge Coil: 60.5" Minimum Width

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1, 2 & 3 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg by a Quality Mgt.Sys. in Conf. w/ISO 9001
ASTM 240/A 240M
*Melted & Manufactured in the USA; Mat'l is DFARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	--------Length-------	Mark	Pieces	COMMODITY CODE
03W79T A	* 03W79T A	.4999	60.0000	21,830	COIL 205.20	1	1	

ANAB, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS

CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan) Chemical Analysis per ASTM A751/20

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
W79T	US	.0168	16.1990	.3885	1.5440	2.0090	.0461	10.0200	.0325	.0010

SI %
.4570

MECHANICAL PROPERTIES

Product ID #	Coil #	Loc	Dir	UTS 20C KSI	.2% YS 20C KSI	ELONG %-2"	Hard RB	Tail Hard	R of A %
03W79T A	03W79T A	F	T	90.50	56.88	49.44	86.00	87.00	71.21

PO# 129608
02-20-2023

Q.A. APPROVED
By Date 2/25/23

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr. KRIS LARK 12/22/2022

ANTHONY CARDWELL
06/19/2023

Friedrich Geldbach
seit 1894

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 2017-C_FG-01975 | Datum / Dated 21.12.2017 Z02

A06
US

Kd.-Auftr. / PO	203000555/ 690-S-17 A07
Pos.	151
Lieferschein / Delivery note	2017-18E31-1731260
Packliste / Delivery note	2017-18E41-1741090
Rechnung / Invoice	2017-18E41-1741090 A08
Unser Auftrag / Our ref.	2017-18E21-1720237-0151

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

Chargen code B07 / Heat Code	Charge S07 / Heat Nr	Menge B08 / Quantity	Artikelbezeichnung / Description B01 - (B09 - B11)
	255632	5,00	W/N 150 RF 12" 80S F316/L

Material gemäß / Mat. in acc. to B02 ASTM A 182/A 182M -17 , ASME SA 182/SA 182M-17 ASME CODE SECT. II, PART A, ED. 2017
ASTM A182 F316/F316L
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

Anmerk. z. Mat. / Mat. remarks B02 P.M.I. 100% PERFORMED AND SATISFACTORY

Elemente / Elements (C71 - C92)	C	Si	Mn	S	P	Cr	Ni	Mo	Ti	Cu	V	Nb	N
LADLE ANALYSIS	0,017	0,420	1,810	0,004	0,028	16,600	10,120	2,040	0,000	0,000	0,000	0,000	0,048
	Al								CE LF	CE SF	F1	F2	PREN
LADLE ANALYSIS	0,000								-	-	-	-	24,100

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	262,0	–	564,0	58,0	78,0

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
170,0 - 174,0	KV	10x10 mm	20	176	184	184	181,3

Wärmebeh. / Heat treatment C70	SOLUTION TREAT AT 1050 °C - QUENCHED IN WATER	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	GERMANY

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	FG

A22-13314-1-2.

Ameriforge

An AFG Holdings Company

Material Test Report

Heat Code: C1513

ISO 9001:2015 Certified

Maass Flanges
13770 Industrial Rd. Houston, TX 77015
Sales: (713) 393-4200

Mattsco Supply Co. 00011508 1111 N. 161st Avenue Tulsa, OK 74116	PO: 03331-13.2	Sales Order: 192301	Line: 1
	Item Code: 2200800211E	Qty Shipped: 4	
	Item Desc: D-FIN F316-316L 08.00 300 RF WN S120		
	Mill Heat: 185892		

Spec: ASTM A 182/A 182M (21)/ASME SA 182/SA 182M (21) F316 / 316L

Element	(%wt)	Ladle	Product	EPCRA	CAS#
C	Carbon	0.013			
Mn	Manganese	1.67			
P	Phosphorus	0.034			
S	Sulfur	0.020			
Si	Silicon	0.57			

Element	(%wt)	Ladle	Product	EPCRA	CAS#
Ni	Nickel	10.15			
Cr	Chromium	16.96			
Mo	Molybdenum	2.09			
N	Nitrogen	0.082			

Mechanical Testing

TENSILE (PSI)	83,533
YIELD .2% (PSI)	40,240
ELONG %	54
R OF A %	64
BHN1	143
BHN2	143
A262-E	PASSED

Heat Treat

Solution Annealing Temp (F)	1900
Solution Annealing Dwell Time (Min)	45 MINUTES
Solution Annealing Cooling Type	WATER

Other

Country of Melt	CANADA
Country of Forging	USA
Country of Finish Machining	USA

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

NACE MR0175-2015/ISO15156 & MR0103-2016. ASME B16.5-2020; B16.47-2020 as applicable; Material free from mercury contamination; No weld repair has been preformed.

DNV-GL PED Certificate No 10000425664-PA-ACCREDIA-USA Valid thru December 03, 2023.

Certification No.: 1632852
Certification Date: 4/28/2023
Issued By: Michelle Simien

Dusty Bannon - Quality Analyst

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

ANTHONY CARDWELL
06/19/2023

NIPPON STEEL & SUMITOMO METAL CORPORATION

NIPPON STEEL & SUMITOMO METAL CORPORATION
WAKAYAMA WORKS
1850, MINATO, WAKAYAMA, JAPAN

INSPECTION CERTIFICATE

CERTIFICATE NO. :WYYK7885-01 PAGE : 1/2 DATE : 2014-08-11

CUSTOMER
ORDER NO. :W20514NSJ
SHIPPER :TOYOTA TSUSHO CORPORATION 070 ST4 PC7008B 4P13W600502
COMMODITY :HOT FINISHED SEAMLESS STAINLESS STEEL PIPES
STANDARD :ASTM A312-11 / ASME 2013 SA-312 TP316 ASTM A312-11 / ASME 2013 SA-312 TP316L
ASTM A376-06 / ASME 2013 SA-376 TP316
SPECIFICATION :
MILL WORK NO. :WYYK7885 O.D. :NPS12 W.T. :SCH80S LENGTH:MIN. 17feet MAX. 24feet QUANTITY:5pcs.
TOTAL LENGTH:115.60feet MASS:3433kg

HEAT NO. :F414053
PRODUCTS PCS. :5

HEAT TREATMENT :SOLUTION TREATED (1940°F X 10min. W.Q.)

CHEMICAL COMPOSITION (%)

			*1	C *4	Si	Mn	P *4	S *4	Cr *3	Ni *3	Mo	N *5	Pb *4	*PI *2
SPEC.	MIN.		L	-	-	-	-	-	160	110	200	-	-	-
	MAX.		L	35	75	200	45	30	180	140	300	-	-	-
	MIN.		P	-	-	-	-	-	160	110	200	-	-	-
	MAX.		P	35	75	200	45	30	180	140	300	-	-	-
HEAT NO. F414053			L	14	38	139	11	0	162	112	211	1115	-	25
			P	14	38	134	10	0	160	111	209	-	0	-

*1 L:LADLE ANALYSIS P:PRODUCT ANALYSIS *2:X1 *3:X10 *4:X1000 *5:X10000 OTHER:X100
*PI PITTING INDEX:Cr+3.3Mo+16N

TENSILE TEST

			*1 *2	YS *3	TS *3	EL %
SPEC.	MIN.		L B	P 30.0	P 75.0	35
	MAX.		L B	P -	P -	-
HEAT NO. F414053			L B	P 43.9	P 85.9	66

TYPE OF SPECIMEN:STRIP 1-1/2in. WIDTH *1 SAMPLING DIRECTION L:LONGITUDINAL *2 SAMPLING POSITION B:BASE METAL
*3 UNIT P:ksi GAUGE LENGTH:2.0in. KIND OF YS:0.5% EXTENSION UNDER LOAD

HARDNESS TEST (HRB)

			*1 *2	*3
SPEC.	MIN.		B C	-
	MAX.		B C	-
HEAT NO.				AVG.
F414053			B C	81

*1 SAMPLING POSITION B:BASE METAL *2 LOCATION C:CROSS SECTION *3 AVERAGE

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

J. Takano

HEAD OF DEPARTMENT
QUALITY ASSURANCE DEPARTMENT

NO. 265477W14

NIPPON STEEL & SUMITOMO METAL CORPORATION

NIPPON STEEL & SUMITOMO METAL CORPORATION
WAKAYAMA WORKS
1850, MINATO, WAKAYAMA, JAPAN

INSPECTION CERTIFICATE

CERTIFICATE NO. :WYYK7885-01 PAGE : 2/2 DATE : 2014-08-11

CORROSION TEST (ASTM A262-E) : ACCEPTABLE
FLATTENING TEST: ACCEPTABLE
VISUAL & DIMENSIONS: ACCEPTABLE
ULTRASONIC EXAMINATION (ASME SA-999/SE-213 U-SHAPED NOTCH) : ACCEPTABLE
POSITIVE MATERIAL IDENTIFICATION TEST (X-RAY FLUORESCENCE SPECTROSCOPIC ANALYSIS) : ACCEPTABLE
NO WELD REPAIR
CERTIFIED ACCORDING TO PED97/23/EC, ANNEX I, PAR. 4.3 BY TUEV RHEINLAND INDUSTRIE SERVICE GmbH
(NOTIFIED BODY, ID-No. 0035/CERTIFICATE No. 01 202 J/Q-02 0017)
MATERIAL FREE FROM MERCURY CONTAMINATION
MATERIAL FREE FROM RADIATION CONTAMINATION
COUNTRY OF MELT: JAPAN
NACE MR0175/MR0103/ISO15156 HARDNESS: GUARANTEED
PICKLED
PMI 100%
EN 10204 3.1
MATERIAL FREE FROM CONTAMINATION BY CARBON STEEL AND HALOGENS/CHLORIDES

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

J. Takano

HEAD OF DEPARTMENT
QUALITY ASSURANCE DEPARTMENT

NO. 265477W14

(A01) Salzgitter Mannesmann Stainless Tubes France SAS
(A05) B.P.10 - F 21501 Montbard Cedex - FRANCE
www.mannesmann-stainless-tubes.com

MANNESMANN

INSPECTION CERTIFICATE
Abnahmeprüfzeugnis
Certificat de Réception

(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° 3-21-07905-rev.01 Pag. 1 / 5

(A06) Purchaser / Besteller / Acheteur
Allied Stainless Group Inc.
7200 Mykawa Road
77033 Houston
Texas
Etats-Unis

(A07) Customer Order No / Kundenauftragsnr. / N° Commande Client
PO28444

(A08) SMST-Tubes Order No / Auftragsnr. / N° Commande SMST
0000287693

SMST-Item	(A09) Part No / Teilenummer / Part number
0000287693-000016	PART# 6ISSL8

(B01) (B02) (B04) Product Description / Produkt Beschreibung / Description du Produit

Seamless Stainless Steel Hot Finished Pipes Solution Annealed Pickled / Passivated Plain Ends Square Cut Deburred
Rohre warmgefertigt nahtlos rostfreier Stahl lösungsgeglüht gebeizt / passiviert glatte Enden rechtwinklig gesägt entgratet
Tubes sans soudure Acier Inoxydable Fini à chaud Remis en solution Décapés / Passivés Extrémités lisses coupées d'equerre

Specifications / Spezifikationen / Spécifications: ASME SA 312 19;ASME SA 376 19;ASTM A 312 19;ASTM A 376 19; ANSI/NACE MR0103/ISO 17945 2016; ANSI/NACE MR0175/ISO 15156-3 2015

Grade / Werkstoff / Nuance: TP 316;TP 316L;UNS S31600;UNS S31603;DMV 316L

Tolerances / Toleranzen / Tolérances: A 312

(B03) Supplementary Requirements / Zusatzanforderungen / Exigences Supplémentaires

None / Keine / Aucune

(B06 - D01) Marking of the Product / Kennzeichnung des Produkts / Marquage du Produit

Technical marking: MANNESMANN MST-F - ASTM A 376 / ASTM A 312 / ASME SA 376 / ASME SA 312 - DMV 316L - TP 316 / TP 316L / UNS S31600 / UNS S31603 - NPS 8 X SCH 120 - $INDIV_LENGTH_FT$ FT - SEAMLESS - HEAT $HEAT_NBR$ - $QUAL_LOT_NBR$ - FRANCE - $ORDER_ID$

Country of Origin of the tubes / Herstellungsland der Rohre / Pays d'origin des tubes: France / Frankreich / France

Quantity / Menge / Quantité — Dimensions / Abmessung / Dimensions

(B07) Heat Schmelze Coulée	Quality Lot Qualitätslos Lot Qualité	SMST-Item	(B08) Pieces Stück Pièces	(B13) Weight Gewicht Poids	(B16) Length Länge Longueur	(B09) OD	(B10) WT	(B11) Ordered Length Auftragslänge Longueur commandée min	(B11) Ordered Length Auftragslänge Longueur commandée max
				5905.00 kg	64.816 m	219.10 mm	18.26 mm	6096 mm	7315 mm
734258	QL30160673	000016	10	13018.31 lbs	212.65 ft	NPS 8	SCH 120	20.00 ft	24.00 ft
				13018.31 lbs	212.65 ft	8.626 "	0.719 "	20.00 ft	24.00 ft
			10	**5905.00 kg**	**64.816 m**				
			10	**13018.31 lbs**	**212.65 ft**				

Heat Analysis / Schmelzanalyse / Analyse de Coulée

		Request	C	Si	Mn	P	PREN	S	Cr	Ni	Mo
		Min	0.00	0.00	0.00	0.00	0.0	0.0000	16.0	11.0	2.0
		Max	0.035	0.75	2.0	0.045	99.9	0.0300	18.0	14.0	3.0
(B07) Heat Schmelze Coulée	Heat Origin Ursprung der Schmelze Origine de la Coulée	(C70) Melting Process Erschmelzungsart Procédé d'élaboration	%	%	%	%	%	%	%	%	%
734258	Germany	EAF + AOD	0.024	0.43	1.81	0.030	24.7	0.0005	16.9	11.2	2.1

ANTHONY CARDWELL
06/19/2023

(A01) Salzgitter Mannesmann Stainless Tubes France SAS
(A05) B.P.10 - F 21501 Montbard Cedex - FRANCE
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MANNESMANN

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(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° **3-21-07905-rev.01**

Product Analysis / Produktanalyse / Analyse sur Produit

ASTM A 312;ASME SA 312;ASME SA 376;ASTM A 376

	Request	C	Si	Mn	P	PREN	S	Cr	Ni	Mo
	Min	0.00	0.00	0.00	0.00	0.0	0.0000	16.0	11.0	2.0
	Max	0.035	0.75	2.0	0.045	99.9	0.0300	18.0	14.0	3.0
Quality Lot Qualitätslos Lot Qualité	(C00) Sample	%	%	%	%	%	%	%	%	%
QL30160673	39053753	0.024	0.43	1.80	0.028	24.8	0.0008	17.0	11.3	2.1
	39053754	0.025	0.43	1.80	0.029	24.8	0.0005	16.9	11.3	2.1

Sampling done on tubes in manufacturing length / Beprobung erfolgte an Rohren in Herstelllänge / Echantillonage realisé par longueur de fabrication

Tensile Test at Room Temperature / Zugversuch bei Raumtemperatur / Essai de traction à température ambiante

ASTM A 370

(C02) Direction: LONGITUDINAL

Coupon Type / Art der Probe / Type du Coupon Test: Round Machined Section

		(C11)	(C12)	(C13)
		YS 0.2%	U.T.S.	EL
		Rp 0,2%	Rm	2"
Request	Min	30	75	35.0
	Max			
Quality Lot Qualitätslos Lot Qualité	(C00) Sample	ksi	ksi	%
QL30160673	39053753	33.2	78.0	57

Sampling done on tubes in manufacturing length / Beprobung erfolgte an Rohren in Herstelllänge / Echantillonage realisé par longueur de fabrication

(C30) Hardness HRC / Härteprüfung HRC / Essai de dureté HRC

ASTM E 18;EN ISO 6508-1

				(C30) HRC	
		Request			22.0 max
Quality Lot Qualitätslos Lot Qualité	(C00) Sample	Result Ergebnis Resultat	(C31) Min	(C31) Max	(C32) Avg
QL30160673	39053753		<18	<18	<18.0

Sampling done on tubes in manufacturing length / Beprobung erfolgte an Rohren in Herstelllänge / Echantillonage realisé par longueur de fabrication

ANTHONY CARDWELL
06/19/2023

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(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° 3-21-07905-rev.01

(C50) Flattening Test / Faltversuch / Essai d'aplatissement

ASTM A 999

Quality Lot Qualitätslos Lot Qualité	(C00) Sample	Result Ergebnis Resultat
QL30160673	39053753	OK
	39053754	OK

Sampling done on tubes in manufacturing length / Beprobung erfolgte an Rohren in Herstelllänge / Echantillonage réalisé par longueur de fabrication

Intergranular Corrosion Test / Prüfung der interkristallinen Korrosion / Essai de corrosion intergranulaire

ASTM A 262 PRACTICE E;MIL-P-24691/3 Feb. 1991 Ad 1

	Request Max Unit	
Quality Lot Qualitätslos Lot Qualité	(C00) Sample	Result Ergebnis Resultat
QL30160673	39053753	Satisfactory
	39053754	Satisfactory

ANTHONY CARDWELL
06/19/2023

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(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° **3-21-07905-rev.01** Pag. 4 / 5

Other Tests and Declarations / Andere Prüfungen und Prüffeststellungen / Autres Tests et Déclarations

QL30160673

Heat Treatment / Wärmebehandlung / Traitement thermique : ANNEALED BY DIRECT QUENCHING - Rapid Cooling off the extrusion press - Temperature : 1038°C (1900°F) min

(D01)	Visual and dimensional inspection (VT) on 100% of tubes according to the order Besichtigung und Maßkontrolle von 100% der Rohre gemäß Auftrag Examen visuel et dimensionel sur 100% des tubes selon la commande	Satisfactory Bestanden Satisfaisant
(D51)	Antimixing Check (PMI) on 100% of tubes Verwechselungsprüfung an allen Rohren mittels Spektralprüfung von 100% der Rohre Contrôle anti-mélange par PMI sur 100% des tubes	Satisfactory Bestanden Satisfaisant
(D52)	Hydro Pressure Test on 100% of tubes 5 sec. at 2500.00 PSI ASTM A999 (EP_1107) Wasserdruckprüfung auf 100% Rohren 5 sec. mit 2500.00 PSI ASTM A999 (EP_1107) Epreuve Hydraulique sur 100% des tubes 5 sec. avec 2500.00 PSI ASTM A999 (EP_1107)	Satisfactory Bestanden Satisfaisant

Country of origin for melt and melting process must be DFARS 252.225-7014 compliant

No Weld Repair
Keine Reparaturschweissung
Aucune réparation par soudure

(Z01) SMST declares that the product was manufactured, sampled, tested, inspected and packed in accordance with the specifications and any other requirements designated in the purchase order within the extent listed in SMST order acknowledgment, and has been found to meet such requirements
SMST bestätigt, dass die Rohre hergestellt, beprobt, geprüft, kontrolliert und gepackt wurden in Übereinstimmung mit den Spezifikationen und anderen Anforderungen in der Kundenbestellung innerhalb des Umfanges wie dieser in der SMST Auftragsbestätigung aufgeführt wurde. Die Rohre entsprechen den Auftragsanforderungen
SMST Atteste que les produits sont fabriqués, prélevés, testés, inspectés et emballés en conformité aux spécifications et autres exigences stipulées dans la commande d'achat avec les limites décrites dans l'accusé de réception de la commande. Les produits livrés sont conformes à ces stipulations

Tubes are free from mercury contamination and from radioactive contamination
Die Rohre sind frei von Quecksilberverunreinigungen und frei von radioaktiver Verunreinigung
Les tubes sont exempts de contamination par le mercure et de contamination radioactive

The material is conforming to directive 2000/53/EC and 2011/65/EU
Das Material entspricht den Anforderungen der Richtlinien 2000/53/EC und 2011/65/EU
Le matériau est conforme aux directives 2000/53/EC et 2011/65/EU

Confirmation with reference to Pressure Equipment Directive 2014/68/EU:
The works operates a quality management system that has undergone a specific assessment for materials for pressure equipment and is certified by a competent body (TÜV-SÜD-Cert.No: 05/2020/MAN)
Bestätigung in Bezug auf Druckgeräterichtlinie 2014/68/EU:
Das Werk wendet ein Qualitätsmanagementsystem an, das in Bezug auf Werkstoffe für Druckgeräte einer spezifischen Bewertung unterzogen wurde und von einer zuständigen Stelle (TÜV-SÜD-Cert.No: 05/2020/MAN) zertifiziert ist.
Confirmation concernant la Directive Equipements sous Pression 2014/68/EU:
L'usine applique un système de management de la qualité qui a fait l'objet d'une évaluation spécifique pour les matériaux pour équipements sous pression et qui est certifié par un organisme compétent (TÜV-SÜD-Cert.No: 05/2020/MAN)

(Z02)	Mill's Inspector Werkssachverständiger Le Contrôleur usine	Florian Suillerot (IU)	Date of Edition Ausgabedatum Date d'Édition	18/10/2021

This certificate is issued by SALZGITTER MANNESMANN STAINLESS TUBES via a computerized system bearing a traceable unique number. It is valid without signature. An intermediary may only pass on the original certificate without any alterations. Providing a copy of the original is only permitted subject to strict compliance with the prerequisites set out in § 6 of EN 10204:2004 i.e. traceability and availability of the original upon request . Any modification or alteration of the certificate or any copies are strictly prohibited Any contravention of this notice or § 6 of EN 10204:2004 is illegal and will be prosecuted. Any falsification of a certificate e.g. by introducing false or fraudulent data for the purpose of promoting the sales of goods is a criminal offence under German law (and many other jurisdictions) punishable with fines and imprisonment. If an authentification is needed, please contact info@mst.mannesmann.com

ANTHONY CARDWELL
06/19/2023

(A01) Salzgitter Mannesmann Stainless Tubes France SAS
(A05) B.P.10 - F 21501 Montbard Cedex - FRANCE
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MANNESMANN

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(A02) EN 10204: 2004 TYPE 3.1

(A03) No. / Nr. / N° 3-21-07905-rev.01

Certificate anti counterfeiting check
Prüfung der Zeugnisse gegen Fälschung
Contrôle de la contrefaçon des certificats

A set of information from the Inspection Certificate cover page are included in encrypted form in the above QR code.
By scanning it with your mobile device you can check if the Inspection Certificate is genuine.
Ein Teil der Informationen der ersten Zeugnis-Seite sind in verschlüsselter Form in dem oben dargestellten QR Code enthalten. Beim Scannen mit einem mobilen Gerät kann das Zeugnis auf Authentizität geprüft werden.
Une partie des informations contenues dans la première page de ce certificat d'inspection sont disponibles sous forme cryptée dans le "QR Code" ci-dessus. Lors de la lecture avec votre appareil mobile, vous pouvez vérifier l'authenticité du certificat d'inspection.

ANTHONY CARDWELL
06/19/2023

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 # 23-042096
DATE: 3/23/2023
FCI ORDER # 118581
IAW ASME 2021 ED.
IAW NACE MR0175 2015Ed
IAW EN10204 TYPE 3.1

CUSTOMER ORDER # 03331-13.1
SOLD / SHIPPED TO: MATTSCO SUPPLY

Item	Quantity	Description	PART HBW: 149
1	4	2" X 300 X 9" LG RF LWN	

Heat Number: N683
Material Type: SA182F316/F316L
Steel Origin (melt): USA

CHEMICAL ANALYSIS

C	.02
Mn	1.42
P	.028
S	.027
Si	.35
Cr	16.72
Mo	2.06
Cu	.35
Ni	10.60
N	.034

PHYSICAL PROPERTIES

Yield PSI	40,600
Tensile PSI	75,800
Elongation %	66.0
Reduction of Area %	76.5
Hardness	143/149 HBW

CuNiCrMoV
CrMo 18.782

Heat Treatment	SOLUTION ANNEALED
Temperature	1900 °F MIN
Time at Temperature	1/2 HR/IN THK
Cooling Media	WATER

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

Prepared by: _____

Name: Cynthia Madrid Title: QA Representative

Date printed: 3/23/2023 3:40:22 PM

ANTHONY CARDWELL
06/19/2023

PLYMOUTH TUBE CO USA
601 Grantham Avenue
West Monroe, LA 71292
(318) 388 - 3360

Sold To:
Webco Industries, Inc.
P.O BOX 100
Sand Springs, OK 74063

Customer's Order No. 10075494
Invoice Number:
Mill Order Number: 200001-1-1

Date: 05-13-22

TEST REPORT

TR# 200001

Size: 1.0000" OD X 0.0650" MIN. WALL
Grade: TP316/316L SEAMLESS
Specifications: ASTM A-213(19a) ASME SA-213(19) COLD DRAWN STAINLESS PRESSURE TUBING
Finish tubes solution bright annealed at a minimum temperature of 1900°F and rapidly cooled in an inert atmosphere.

Heat	Lot Numbers	Yield Strength lbs per sq. in.	Tensile Strength lbs per sq. in.	% Elong in 2"	Hardness Test	
563632	2	46800 / 40200	95800 / 87200	59.00 / 60.00	RB 72-74	2 Tests
563766	3	46800 / 46900	95300 / 95200	58.00 / 57.00	RB 76-80	2 Tests
563767	1	44400 / 44900	92100 / 93700	57.00 / 55.00	RB 76-78	2 Tests

Test	Status	Comments
Flatten	OK	
Flare	OK	
Eddy Current	OK	ASTM -A-1016 100%

Heat 563632

	C	MN	P	S	SI	CR	NI	MO	CU	CO	N	TI	AI
Ladle	0.011	1.690	0.026	0.010	0.380	16.960	11.160	2.020	0.260	0.140	0.059	0.003	0.004
Product	0.012	1.690	0.027	0.007	0.390	16.880	11.190	2.030	0.260	0.130	0.056	0.003	0.004

563766

	C	MN	P	S	SI	CR	NI	MO	CU	CO	N	TI	AI
Ladle	0.013	1.590	0.029	0.008	0.390	17.000	11.150	2.050	0.280	0.140	0.072	0.010	0.005
Product	0.013	1.580	0.029	0.007	0.400	17.000	11.140	2.050	0.280	0.130	0.064	0.011	0.005

563767

	C	MN	P	S	SI	CR	NI	MO	CU	CO	N	TI	AI
Ladle	0.016	1.630	0.030	0.007	0.390	17.000	11.250	2.060	0.310	0.140	0.076	0.021	0.006
Product	0.017	1.640	0.032	0.007	0.390	16.960	11.370	2.080	0.310	0.140	0.078	0.023	0.006

Additional Requirements:
798 STRAIGHT TUBES PRODUCED PER WEBCO INDUSTRIES, INC. PO# 10075494. MATERIAL COMPLIES WITH EN10204 3.1. TUBES MANUFACTURED IN THE USA. COUNTRY OF MELT: SWEDEN.

We hereby certify this report to be correct. **By** Justin Lenard
Plymouth Tube Company

APPROVED
Q.A.-TECHNICAL

ANTHONY CARDWELL
10/24/2022

NIDEC MOTOR CORPORATION
8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136

DATE: 10/31/2022

P.O. NO.: GA41
Order/Line NO.: 24829 MN 100

TO:

Model Number: GA41
Catalog Number: 8D25P2C
841 Plus Configuration
CONF,MOTOR,841 PLUS

REVISIONS:
(NONE)

ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY NIDEC MOTOR CORPORATION.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.

Features:

Horsepower ..... 00025.00 ~ KW: 18.65
Enclosure ..... TEFC
Poles ..... 04 ~ RPM: 1800
Frame Size ..... 284~T
Phase/Frequency/Voltage.. 3~060~460
Winding Type ..... Random Wound
Service Factor 1.15
Insulation Class ..... Class "F" ~ Insulife 2000
Altitude In Feet (Max) .. 3300 Ft.(1000 M)
Ambient In Degree C (Max) +40 C
Assembly Position ..... "F-1" Assembly Position
Efficiency Class ..... Premium Efficiency
Application ..... Air Cooler Fan
~
Customer Part Number ....
"AK" Dimension (Inches).. NA
Temperature Rise (Sine Wave): "B" Rise @ 1.0 SF (Resist)
Design Letter ..... B
Starting Method ..... Direct-On-Line Start or VFD
Duty Cycle ..... Continuous Duty
Efficiency Value ..... 93.6 % ~ NEMA Nominal
Load Inertia: NEMA ~ Standard Inertia: 122 LB-FT2
Number Of Starts Per Hour: NEMA
Motor Type Code ..... CE

Rotor Inertia (LB-FT²)	3.48 LB-FT²
Qty. of Bearings PE (Shaft)	1
Qty. of Bearings SE (OPP)	1
Bearing Number PE (Shaft)	6310-J/C3
Bearing Number SE (OPP)	6310-J/C3

NIDEC MOTOR CORPORATION

8050 WEST FLORISSANT AVE.
ST. LOUIS, MO 63136

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REVISIONS:
(NONE)

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THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.

Accessories:

THIS MOTOR WILL BE LABELED AS: IEEE STD 841-2021 Inpro Seals - Both Ends
Stainless Steel T-Drains-Both
Corro-Duty
Special Foot Flatness
Grease Fittings/Press. Drains
Ground Lug In Conduit Box
Grounding Terminal on Frame (Two 3/8" dia UNC coarse threaded holes located in motor frame on each side of the junction box)
Precision Balance
Standard Leadtime: NA
F.O.B.:
PRIMARY GROUND
LOCATED IN MAIN
CONDUIT BOX

THIS MOTOR WILL BE~ LABELED AS:
IEEE STD 841-2021~

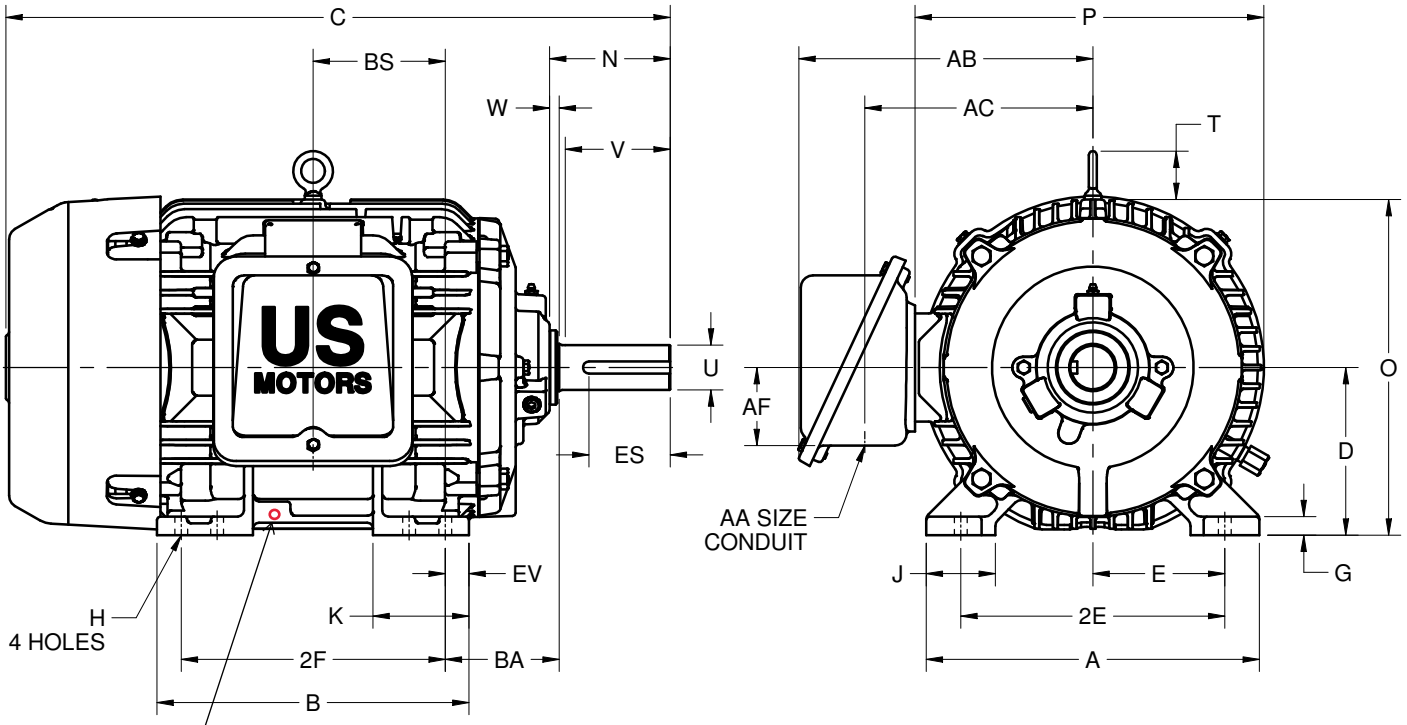
USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT

Horsepower	25
Pole(s)	04
Voltage(s)	460
Frame Size	284T
Shaft U Diameter	1.875
Outlet Box AF	3.25
Outlet Box AA	1.50

- Additional Modifications -

(3) to make a total of (4) Grounding Lugs
in the Junction Box and Shaft
Slinger for Shaft Down.

EFFECTIVE: 02-FEB-18	DIMENSION PRINT WORLD MOTOR 841 PLUS FRAME: 284T, 286T BASIC TYPE: CE	PRINT: 08-1003
SUPERSEDES: 22-DEC-16		SHEET: 1 OF 1



(Two 3/8" dia UNC coarse threaded holes located in motor frame on each side of the junction box)

ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	A	B	C	D -.06	E	2E ±.03	G	H +.05	J	K	N	O	P [2]
IN	13.88	13.00	27.69	7.00	5.50	11.00	.78	.53	2.88	4.00	5.03	14.00	14.78
MM	353	330	703	178	140	279	20	13	73	102	128	356	375

UNITS	T	U -.001	V MIN	W	AA	AB	AC	AF	BA	BS	EV	ES MIN	SQ KEY
IN	2.03	1.875	4.38	.41	1-1/2 NPT	12.25	9.50	3.25	4.75	5.50	1.00	3.28	.500
MM	52	47.63	111	10		311	241	83	121	140	25	83	12.70

FRAME	UNITS	2F ±.03
284T	IN	9.50
	MM	241
286T	IN	11.00
	MM	279

Note:
4 grounding lugs located inside conduit box. Bolts are steel and lugs are SS or brass. Lug hole size = 3/8-inch diameter

1. DIMENSIONS MAY VARY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS
2. LARGEST MOTOR WIDTH
3. STANDARD ASSEMBLY POSITION F-1 IS SHOWN. F-2 IS PROVIDED WHEN SPECIFIED. CONDUIT OPENING MAY BE LOCATED IN STEPS OF 90° REGARDLESS OF THE LOCATION
4. TOLERANCES ARE SHOWN IN INCHES ONLY

Nidec Motor Corporation
St. Louis, Missouri

ISSUED BY	R. TIMMERMANN
APPROVED BY	M. CULLEN

IHP_DP_NMCA (MAR-2011) SOLIDEDGE

NAMEPLATE DATA

CATALOG NUMBER:	8D25P2C		NAMEPLATE PART #:	2104620-007	
MODEL	GA41	FR	284T	TYPE	CE	ENCL	TEFC-IP55
SHAFT END BRG	6310-J/C3 - QTY 1		OPP END BRG	6310-J/C3 - QTY 1	
PH	3	MAX AMB	40 C	ID#			
INSUL CLASS	F	Asm. Pos.	F1	DUTY	CONT		

HP	25	RPM	1775	HP		RPM	
VOLTS	460			VOLTS			
FL AMPS	29.2			FL AMPS			
SF AMPS	33.0			SF AMPS			
SF	1.15	DESIGN	B	CODE	G	SF		DESIGN		CODE	
NEMA NOM EFFICIENCY	93.6	NOM PF	85.5	KiloWatt	18.65	NEMA NOM EFFICIENCY		NOM PF			
GUARANTEED EFFICIENCY	92.4	MAX KVAR	6.6	HZ	60	GUARANTEED EFFICIENCY		MAX KVAR		HZ	

HAZARDOUS LOCATION DATA (IF APPLICABLE):

DIVISION		CLASS I		GROUP I	
TEMP CODE		CLASS II		GROUP II	

Class 1 Div 2
Gas Group A,B,C,D
Temp Code T3C

VFD DATA (IF APPLICABLE):

VOLTS	460	AMPS	30.7
TORQUE 1	73.90LB-FT	TORQUE 2	
VFD LOAD TYPE 1	VT/PWM	VFD LOAD TYPE 2	
VFD HERTZ RANGE 1	3-60	VFD HERTZ RANGE 2	
VFD SPEED RANGE 1	90-1800	VFD SPEED RANGE 2	
SERVICE FACTOR	1.00	FL SLIP	
NO. POLES		MAGNETIZING AMPS	
VECTOR MAX RPM		Encoder PPR	
Radians / Seconds		Encoder Volts	

TEAO DATA (IF APPLICABLE):

HP (AIR OVER)		HP (AIR OVER M/S)		RPM (AIR OVER)		RPM (AIR OVER M/S)	
FPM AIR VELOCITY		FPM AIR VELOCITY M/S		FPM AIR VELOCITY SEC			

ADDITIONAL NAMEPLATE DATA:

Decal / Plate	WD=499495	Customer PN	
Notes		Non Rev Ratchet	
Max Temp Rise		OPP/Upper Oil Cap	GREASE
Thermal (WDG)		SHAFT/Lower Oil Cap	GREASE
Altitude		Usable At	
Regulatory Notes		Regulatory Compliance	CC 030A
COS		Marine Duty	
Balance	0.05 IN/SEC	Arctic Duty	
3/4 Load Eff.	94.2	Inrush Limit	
Motor Weight (LBS)	340	Direction of Rotation	
Sound Level		Special Note 1	
Vertical Thrust (LBS)		Special Note 2	
Thrust Percentage		Special Note 3	
Bearing Life		Special Note 4	
Starting Method		Special Note 5	
Number of Starts		Special Note 6	
200/208V 60Hz Max Amps		SH Max. Temp.	
190V 50 hz Max Amps		SH Voltage	
380V 50 Hz Max Amps		SH Watts	
NEMA Inertia		Load Inertia	
Sumpheater Voltage		Sumpheater Wattage	
Special Accessory Note 1		Special Accessory Note 16	
Special Accessory Note 2		Special Accessory Note 17	
Special Accessory Note 3		Special Accessory Note 18	
Special Accessory Note 4		Special Accessory Note 19	
Special Accessory Note 5		Special Accessory Note 20	
Special Accessory Note 6		Special Accessory Note 21	
Special Accessory Note 7		Special Accessory Note 22	
Special Accessory Note 8		Special Accessory Note 23	
Special Accessory Note 9		Special Accessory Note 24	
Special Accessory Note 10		Special Accessory Note 25	
Special Accessory Note 11		Special Accessory Note 26	
Special Accessory Note 12		Special Accessory Note 27	
Special Accessory Note 13		Special Accessory Note 28	
Special Accessory Note 14		Special Accessory Note 29	
Special Accessory Note 15		Special Accessory Note 30	
Heater in C/B Voltage		Heater in C/B Watts	
Zone 2 Group		Division 2 Service Factor	
Note 1	CL.I GR.A B C D	Note 2	CL.II GR.F
Note 3	T3C TEMP CODE DIV 2	Note 4	AT 1.0 S.F.
Note 5		Note 6	
Note 7		Note 8	
Note 9		Note 10	
Note 11		Note 12	
Note 13		Note 14	
Note 15		Note 16	
Note 17		Note 18	
Note 19		Note 20	
Note 21		Note 22	

NIDEC MOTOR CORPORATION
ST. LOUIS, MO

TYPICAL NAMEPLATE DATA
ACTUAL MOTOR NAMEPLATE LAYOUT MAY VARY
SOME FIELDS MAY BE OMITTED

MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
GA41	8D25P2C	3	CE	284T

ORDER NO.	24829	LINE NO.	

MPI:	217657
HP:	25
POLES:	4
VOLTS:	460
HZ:	60
SERVICE FACTOR:	1.15
EFFICIENCY (%):	
S.F.	93.1
FULL	93.6
3/4	94.2
1/2	93.8
1/4	90.8
POWER FACTOR (%):	
S.F.	86.3
FULL	85.5
3/4	82.5
1/2	74.6
1/4	54.2
NO LOAD	4.9
LOCKED ROTOR	40
AMPS:	
S.F.	33
FULL	29.2
3/4	22.6
1/2	16.7
1/4	11.9
NO LOAD	9.8
LOCKED ROTOR	195.5
NEMA CODE LETTER	G
NEMA DESIGN LETTER	B
FULL LOAD RPM	1775
NEMA NOMINAL / EFFICIENCY (%)	93.6
GUARANTEED EFFICIENCY (%)	92.4
MAX KVAR	6.6
AMBIENT (°C)	40
ALTITUDE (FASL)	3300
SAFE STALL TIME-HOT (SEC)	30
SOUND PRESSURE (DBA @ 1M)	0
TORQUES:	
BREAKDOWN{% F.L.}	280
LOCKED ROTOR{% F.L.}	210
FULL LOAD{LB-FT}	73.9

NEMA Nominal and Guaranteed Efficiencies are up to 3,300 feet above sea level and 25 ° C ambient

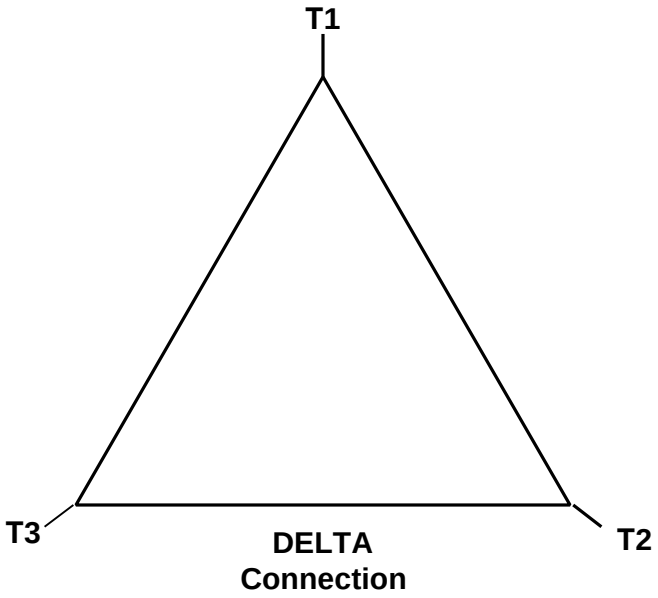
The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

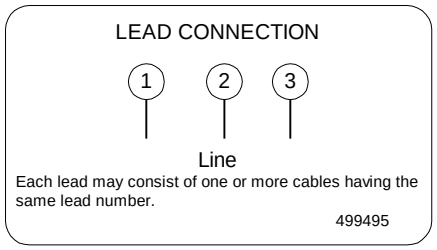
NIDEC MOTOR CORPORATION
ST. LOUIS, MO

499495

Motor Wiring Diagram

MOTOR LEAD SIZE
SHALL BE DETERMINED
BY OTHERS





To reverse direction of rotation interchange connections L1 and L2.
Each lead may be comprised of one or more cables.
Each cable will be marked with the appropriate lead number.

EFFECTIVE: 2/27/96
SUPERCEDES: X736618, 96441, 179879, 284138
Connection Plate: 499495
Connection Decal: 912113

Certificate of Compliance

Certificate: 1175021 (LR 13009-55) **Master Contract:** 191252

Project: 2608857 **Date Issued:** June 19, 2013

Issued to: **Nidec Motor Corporation**

8050 West Florissant Ave.
St. Louis, MO 63136
USA
Attention: Joel Northwall

The products listed below are eligible to bear the CSA Mark shown

D. Somma

Issued by: D. Somma, C.E.T.

PRODUCTS

CLASS 4228 01 - MOTORS AND GENERATORS - For Hazardous Locations

Class I, Division 2, Groups A, B, C and D:Temperature Coded T3C, T3B, T3A, T3, T2D or T2C(where applicable)

Three phase, squirrel cage induction motors, Class B or F insulation, 50 or 60Hz, 2, 4, 6, 8 or 10 pole.

- Types TU, TV, TV-4, CTV, CTV-4, CTV-9; Rated 600 V max, 30 HP max, Frame Sizes 143T to 286T; TEFC, Temperature Coded T3C/T3B[1] - Notes: b, d, e, f
- Types TV-9, CT; Rated 600 V max, 200 HP max, Frame Sizes 143T to 447T; TEFC, Temperature Coded T3C - Notes: a, b, c, d, e, f
- Types TVC, TVC-4, TVC-9, CE, TC, TUC; Rated 600 V max, 200 Hp max, Frame Sizes 143T to 447T; TEFC , Temperature Coded T3C - Notes: a, b, d, e, f
- Types JU, JV, JV4; Rated 600 V max, 350 HP max, Frame Size 449, TEFC, Temperature Coded T3/T2B[aaaa]- Notes: b, d, e
- Types J, JC; Rated 600 V max, 400 HP max, Frame Size 449, TEFC, Temperature Coded T3/T2D[a]- Notes: a, b, d, e
- Types JU, JV, JV4; Rated 6900 V max, 600 HP max, Frame Sizes 5807 - 5811, TEFC, Temperature Coded T3C/T3[aa] - Notes: b, d, e, f
- Types JU, JV, JV4; Rated 6900 V mac, 1250 HP max, Frame Size 5812, TEFC, Temperature Coded T3B/ T3[aaa] - Notes b, d, e
- Types R, RS; Rated 6900 V max, 1000 HP max, Frame Sizes 5006 - 5012, ODP, WPI, WPII, Temperature Coded T3C/T_[2] - Notes: b, d, e, f
- Types R, RS; Rated 6900 V max, 2000 HP max, Frame Sizes 5800 - 5813, ODP, WPI, WPII, Temperature Coded T3C/T_[2] - Notes: b, d, e, f

Certificate: 1175021 (LR 13009-55) **Master Contract:** 191252

Project: 2608857 **Date Issued:** June 19, 2013

- Types RU, RV, RV-4; Rated 6900 V max, 1750 HP max, Frame Size 5813, ODP, WPI, WPII, Temperature Coded T3A; Notes: b, d, e
- Types J, JC, JP ; Rated 6900 V max, 700 HP max, Frame Sizes 5008 - 5012, TEFC, Temperature Coded T3/T2D[3] - Notes: b, d, e, f
- Types J, JC, JP; Rated 6900 V max, 1000 HP max, Frame Sizes 5810 - 5812, TEFC, Temperature Coded T3C/T3AΦ - Notes: b, d, e

Where:

[1] T3B is for Frame Size 280 when used with Inverter Duty

[2] (i) T3 is for Frame Size 5012, 2 pole, 800 HP and Frame Size 5813, 2 pole, 1250 HP

(ii) T2D is for Frame Size 5012, 2 pole, 800 HP and Frame Size 5813, 2 pole, 1250 HP when used with Inverter Duty

[3] T2D when used with Inverter Duty

Φ T3C for 1.0 S.F. @ 60 Hz; T3A for 1.15 S.F.@ 60 Hz

[a] (i) 350 HP max @ 600V max, when used with Inverter Duty @ 4:1 CT= T2C

(ii) 350 HP max @ 600V max when used with Inverter Duty @ 3:1 CT or VT (10:1) = T3A

(iii) 300 HP max @ 600V max when used with Inverter Duty @4:1 CT or VT (10:1) = T3A

[aa] Where T3C for HP rating up to 400 HP and T3 for 600 HP ratings

[aaa] Temperature Coded T3B for 1.0 S.F. and T3 for 1.15 S.F. ratings

[aaaa] T2B for VT 10:1, 200HP max [JU, JV, JV4 for 449 Frame, 600V max]

Notes:

a) May be C-Face or D-Flange mounted on frames less than 5000 or p-base mounted on all frames.

b) Cast iron stator frame, except 143T and 145T stator frame which may be optionally steel construction, 1.15 SF.

c) 1.15 SF on Frames 286T-447T, 1.0 SF max below, HP times SF = 350 max on 449T.

(Frame 449 rated 350 HP @ 1.15 S.F.)

d) May include options; motor shroud, auxiliary junction box, corro duty, bearing temperature sensing device, Therma- Sentry, thermistors or RTD's embedded in winding.

e) Basic motor Types TV, TU, TVC, CE, CT, CTV, J, JC, JP, JV, JU, R, RS and TC may be provided with additional prefix and/or suffix letters or numbers to signify types of electrical and/or mechanical variations which do not affect Certification.

f) Motors used with Inverter Duty: 0 to 60 Hz, Type of application: Variable Torque (VT), 10:1 or Constant Torque (CT) 4:1 or 3:1; Inverter Types; PWM, VSI or CSI; SF 1.0 max.

APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No 0-M1991 - General Requirements - Canadian Electrical Code Part II.

CAN/CSA-C22.2 No.100-04 - Motors and Generators

CAN/CSA-C22.2 No.145-M1986 - Motors and Generators for Use in Hazardous Locations (For Guidance)

CAN/CSA-C22.2 No.213-M1987 - Non-Incendive Electrical Equipment for Use in Class I, Division 2, Hazardous Locations (For Guidance)

MARKINGS

- Manufacturer's name;
- Motor type designation;
- Hazardous Locations Designation (Class I, Division 2, Groups A, B, C and D);
- Temperature Coded: T3C, T3B, T3A, T3, T2D or maximum operating temperature (160°C or T3C; 165°C or T3B; 180°C or T3A; 200°C or T3; 215°C or T2D; 230°C or T2C);
- Complete electrical ratings (e.g., volts, frequency, horsepower, revolutions per minute, FLA, SFA, etc.);
- Motors provided with space heaters shall be provided with a separate nameplate marked with heater's voltage and wattage ratings.
- Class of insulation;
- Service Factor 1.0 or 1.15;
- Number of poles;

- Serial number or date code;
- Enclosure type;
- Number of phases;
- Ambient temperature;
- CSA Monogram.

In addition to the marking above, inverter-duty machines shall be permanently marked with the following:

(a) machine application(eg, Inverter-duty motor);

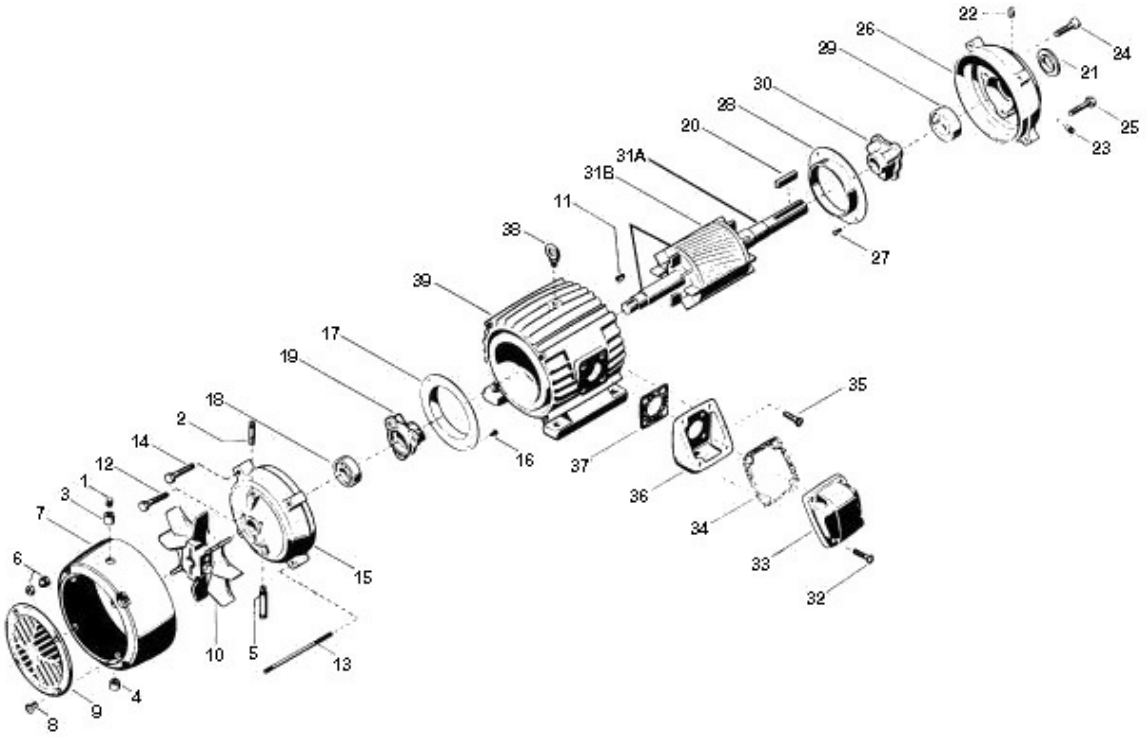
(b) speed range over which the machine is designed to operate;

(c) type(s) of torque application for which the machine is designed: VT(Variable Torque, 10:1); CT (Constant Torque, 4:1 or 3:1) or equivalent;

(d) type(s) of inverter with which the machine is intended to be used: PWM, VSI or CSI

RENEWAL PARTS

FRAMES 254T THRU 447T, 449T (WORLD MOTOR) - TOTALLY ENCLOSED AND EXPLOSIONPROOF MOTORS
TYPES: CE, CE1, CE4, CEF, CT, CT1, CT4, CTC, CTE, CTE1, CTE4, CTEF, CTEF1, CTEF4, CTEI, CTEN, CTF, CTF1, CTF4, CTFI, CTFI1, CTFI4, CTFN, CTI, CTI4, CTN, CTNI, EC, ECEI, FCT, FCTF, FCTF1, FCTN, FD, FDF, FDF1, FL, FLC, FLCA, FLCF, FLF, FN, FNC, FTC, FTCF, JAD, JDE, L, L1, L4, LC, LC1, LCA, LCAE, LCE, LCEF, LCEI, LCE1, , LCF, LCFI, LCI, LE, LE1, LE4, LEF, LF, LF1, LF4, LFC, LFI, LI, LN, N, NC, NCE, NCEF, NCF, NCFI, NCI, NE, NF, NN, T, T1, T4, TC, TC1, TC4, TCA, TCE, TCE1, TCE4, TCEF, TCEF4, TCEI, TCEN, TCEP, TCF, TCF1, TCFI, TCI, TCI1, TCN, TE, TEF, TEN, TF, TFC, TFN, TN



ITEM NO.	QTY	NAME OF PART
1	1	Slotted Headless Pipe Plug
2	1	Pipe Coupling
3	1	Pipe Nipple
4	1	Pipe Cap
5	1	Pipe Nipple
6	2	Cap and Jam Nut
7	1	Fan Cover Guard
8	3	Screw & Lockwasher
9	1	Grill
10	1	Vent Fan Assembly
11	1	Woodruff Key (Not used on frames 254T &256T
12	2	Screw
13	2	Stud & Nut
14	2	Screw (Qty 6 on frames 254T & 256T)
15	1	Bracket
16	4	Screw (Used only on frame 286T & 326T)
17	1	Air Deflector (Used only on frame 286T & 326T)
18	1	Ball Bearing
19	1	Bearing Cap
20	1	Key
21	1	Water Deflector

ITEM NO.	QTY	NAME OF PART
22	1	Slotted Headless Pipe Plug
23	1	Pipe Plug
24	2	Screw
25	4	Screw (Qty 8 on frames 286T & 326T)
26	1	Bracket (Not used on types TF)
27	4	Screw (Used only on frame 286T & 326T)
28	1	Air Deflector ((Used only on frame 286T & 326T)
29	1	Ball Bearing
30	1	Bearing Cap
31	1	Rotor Assembly (Includes items 31A & 31B)
31A	1	Motor Shaft
31B	1	Rotor Core
32	4	Screw
33	1	Outlet Box Cover
34	1	Gasket
35	4	Screw (Qty 2 on frames 254T & 256T)
36	1	Outlet Box Base
37	1	Gasket (Outlet Box Base)
38	1	Eyebolt
39	1	Wound Stator Assembly

WARNING:
Any disassembly or repair work on explosionproof motors will void the Underwriters Laboratories, Inc. label unless done by the manufacturer, or a facility approved by the Underwriters Laboratories, Inc. Refer to your nearest sales office for assistance.

BEARINGS:
Refer to motor nameplate for the bearing numbers.

PRICES:
Parts stocking distributors: refer to renewal parts numerical index. All Others: refer to your nearest parts distributor.

IEEE 841 Plus® World Motor

Specifically designed for Severe Duty Oil & Gas, Petro Chemical, Pulp & Paper, Automotive, Mining and Waste Treatment Industries

Product Specifications

Horsepower:
350 HP with World motor (Stock)
Have capability to offer through 500 HP (ETO)

Frame SIzes: 143 – 447

Pole Designs: 2, 4, 6, 8

Design Voltages: 460 and 575 Volts at 60 Hz

Requirements: Meets or exceeds 2016 DOE NEMA Premium Efficiency rule;
Meets vibration requirements of GM7E-TA

Warranty: 5-year limited warranty

Product Overview and Options

Designed to exceed the industry's most stringent IEEE 841 standards, the U.S. MOTORS® brand 841 PLUS® motors are commonly used in severe duty environments for pumps, compressors, fans, blowers, and other material processing applications. These rugged motors are ideal for constant speed or inverter duty applications typically found in the petroleum, chemical, pulp and paper, wastewater, automotive and mining industries.

U.S. MOTORS brand 841 PLUS motors are rated NEMA Premium®† efficient. Low-loss silicon steel construction and streamlined design enables the motor to operate at lower temperatures resulting in lower energy costs. This motor is designed to operate in ambient temperatures of -30°C to 40°C, in altitudes of up to 1,000 meters above sea level and with NEMA Design B torque-current characteristics. Inertia load acceleration capabilities for the 841 Plus motor meet the stringent requirements of NEMA MG 1-2009, Section 12.54.

Product Features

- NEMA Premium®† efficient
- 1.15 Service Factor on sine wave power; 1.0 Service Factor on Inverter Duty
- Class B temperature rise at 1.0 Service Factor by resistance with sine wave power
- Class F insulation materials to increase motor life
- Exceeds NEMA MG1 Part 31 Inverter Duty
- Polyurea grease
- Stainless-steel nameplate
- Variable frequency drive or full voltage, across-the-line starting
- Ground on frame
- Division 2 suitable per NEC article 500 (NFPA 70)
- AFBMA bearing numbers on nameplate
- Protective coating on each rotor and shaft from bearing journal to bearing journal

Inverter Duty

Nidec Motor Corporation's patented inverter grade insulationsystem allows the U.S. MOTORS brand 841 PLUS motor to withstand spike and transient voltages induced by insulated bipolar gate transistor drives, making it fully compliant with NEMA MG-1, Part 31. This is made possible through:NEMA Premium®† efficient

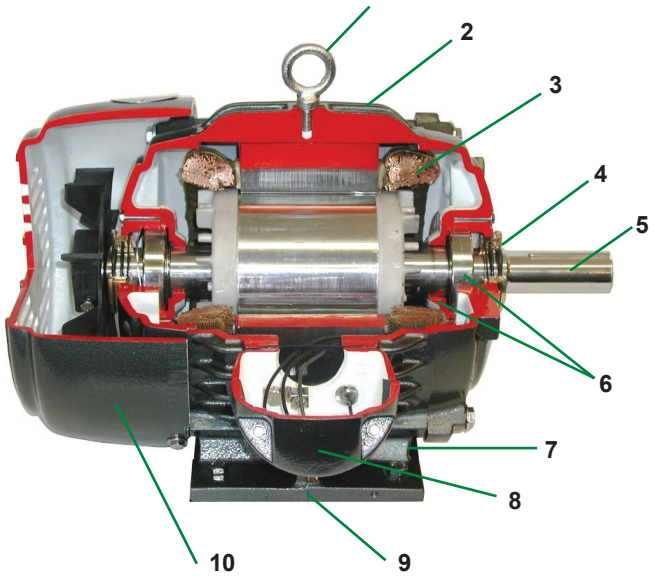
- Pulse-resistant magnetic wire that provides protection against high-voltage spikes
- Additional lacing on the end turns improve coil rigidity
- Multiple bake cycles to help prevent coil-to-coil circuits
- Phase paper to help prevent phase-to-phase arcs
- Adjustable frequency of 5:1 constant torque or 20:1 variable torque for the full product line.

NIDEC MOTOR CORPORATION

Product Overview and Options

Typical 841 PLUS® Motor Construction:

1. Corrosion resistant zinc dichromate-plated hardware
2. Heavy duty cast-iron enclosure for long life and reduced vibration
3. Inverter grade insulation
4. Inpro/SealTM “VBXX” on both ends provides IP56 protection and prolongs motor life by shielding bearings from contaminants in even the harshest environments
5. Special shaft runouts for ball bearing motors of 0.0010 inches for shafts up to 1.625 inches and 0.0015 inches for larger shafts.
6. Same size oversized bearings on each end. Cast iron inner bearing caps
7. Brass breather drains
8. Oversized, double-gasketed and rotatable conduit box to protect against contaminants and correctly position non-braided, non-wicking motor leads
9. Foot flatness machined to within 0.005 inch tolerance ensures easy installation and proper alignment
10. Corrosion-resistant mill and chemical duty paint capable of withstanding a 500-hour salt spray test



Options and Accessories

Nidec Motor Corporation offers the following custom-design options on the U.S. MOTORS brand 841 PLUS motor:

- Cylindrical roller bearings where applicable
- Horizontal or vertical mounting
- Vibration detectors
- Sealed insulation treatments, available on form wound, medium voltage motors above 200 HP, to help shield motor windings
- Winding and bearing thermal protection for motors 50 HP and up
- Inpro/SealTM MGS grounding shaft rings
- API 661 Duty

841 Plus Stock Motors

- 1 – 200 HP
- 2, 4, 6 pole designs
- 460 and 575 Volts
- Constant or variable torque
- 1–10 HP C-Face Footless

Custom and Conversion Motors

- 1 – 500 HP
- 2, 4, 6, 8 pole designs
- 200, 230, 460, 575, 2300, 4000 Volts
- Constant or variable torque
- C & D flange kits available 140 – 440 frame

Testing and Inspection

Nidec Motor Corporation conducts extensive testing and inspections on each of its U.S. MOTORS brand 841 PLUS motors.

- No load current, power and speed
- High-potential test on stator windings
- Insulation resistance test by megohmeter and polarization index
- Precision balanced to typical vibration levels of less than 0.05 inches per second
- Optional complete test, including full load test

For additional information, please refer to our Full Line Standard Motor Catalog (FL600) or contact your Nidec Motor Corporation representative.

NIDEC MOTOR CORPORATION

8050 W. Florissant Avenue | St. Louis, MO 63136
Phone: 888-637-7333 | Fax: 866-422-7758

General Information for Integral Horsepower (IHP) Motors on Variable Frequency Drives (VFDs)

Variable Frequency Drives (VFD)

A VFD is a type of controller used to vary the speed of an electric motor. The VFD takes a fixed AC voltage and frequency and allows it to be adjusted in order to get different speeds from the motor. Motor speed can be varied by changing the frequency of the input power waveform. The equation below shows how the frequency affects the speed of a three phase induction motor.

$$\text{Speed} = \frac{120^* \text{ Fundamental Input Frequency}}{\text{Number of Motor Poles}}$$

How does a VFD work?

A VFD takes the fixed frequency and voltage sine wave from the power grid or power station and puts it through a few steps in order to allow the VFD user to vary the frequency and in turn control the motor speed. First it rectifies the AC power into DC Power. Because of this step, a term commonly used instead of VFD is inverter. This only describes one step of what the VFD does to the power waveform. Once rectified into a DC voltage the drive sends the power through a set of transistors or switches. These switches can take the DC waveform and by opening and closing at certain speeds and durations can create an output waveform that mimics the sine wave that is required to drive a three phase electric motor. The output wave form is known as a Pulse Width Modulation (PWM) waveform because the waveform is created by multiple pulses of the switches at short intervals.

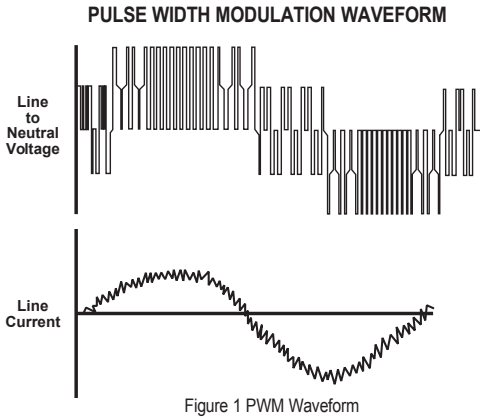


Figure 1 PWM Waveform

What variables should be considered when deciding whether to power a motor with a VFD?

VFD compatibility with motors is complex. As a result, many variables must be considered when determining the suitability of a particular motor for use with a VFD. These variables include:

- Torque requirements (Constant or Variable)
- Speed Range
- Line / System Voltage
- Cable length between the VFD and the motor
- Drive switching (carrier) frequency
- Motor construction
- VFD dv/dt - winding end turn differential in voltage versus differential in time
- High temperatures or high humidity
- Grouding system

Wider speed ranges, higher voltages, higher switching frequencies, insufficient grounding and increased cable lengths all add to the severity of the application and, therefore, the potential for premature motor failure.

How does a VFD affect the motor?

There are many things to consider when a motor is powered using a VFD or PWM power. When a motor is powered by a PWM waveform the motor windings very often see a large differential voltage, either from phase to phase or turn to turn. When the voltage differential becomes large enough it creates a reaction at the molecular level that converts available oxygen into O3. This phenomenon is called partial discharge or corona. This reaction creates energy in the form of light and heat. This energy has a corrosive effect on the varnish used to protect the motor windings. PWM waveforms can also magnify shaft voltages which lead to arcing across the bearing and causing premature bearing failure. Corrective action must be taken to mitigate these issues that arise when using an electric motor with a VFD.

How do I protect the motor?

Nidec Motor Corporation (NMC) has developed specific motor designs to decrease the harmful affects that a VFD can have on a motor. NMC's INVERTER GRADE® insulation system is the first line of defense against corona and phase to phase faults that can be common when a motor is powered using a PWM waveform. The INVERTER GRADE® insulation system is standard on all of NMC's Inverter Duty products. Along with the INVERTER GRADE® insulation, thermostats are installed as a minimum protection against over heating the motor. Special consideration must also be given to bearings in motors powered by VFD's. In order to create a low resistance path to ground for built up shaft voltages a shaft grounding device can be used. On larger horsepower motors an insulated bearing system should be used in conjunction with the shaft grounding device when installed, to force the stray shaft voltages to ground. The bearing failures are more prominent on motors with thrust handling bearings. NMC has created an Inverter Duty vertical motor line that not only uses the INVERTER GRADE® insulation system, but that also comes standard with a shaft grounding device. On motors that are 100 HP and greater the thrust bearing is also insulated for additional protection.

What does "Inverter Duty" mean?

An Inverter Duty motor should describe a motor that helps mitigate potential failure modes of a motor that is powered by a VFD. Inverter duty motor windings should be able to withstand the voltage spikes per NEMA MG1 Part 31.4.4.2 and protect against overheating when the motor is run at slow speeds. On thrust handling bearings it is apparent that the bearings require additional protection. Inverter Duty vertical motors should have a shaft grounding device to protect the motor bearings from fluting due to voltage discharge through the bearing. On larger motors (100HP and larger) the shaft should also be electrically isolated from the frame in order to aid the shaft grounding ring in discharging the shaft voltages to ground.

*This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL®† & CSA®† listings where indicated.

Motor / Inverter Compatibility

Thermal Overloads and Single Phase Motors

Motors with thermal overloads installed may not operate properly on a VFD. The current carrying thermal overload is designed for sine wave power. Operation on a VFD may cause nuisance tripping or potentially not protect the motor as would be expected on line power. Thermostats or thermistors installed in the motor and connected properly to the VFD may provide suitable thermal overload protection when operating on a VFD.
(consult codes for installation requirements)

Single phase motors and other fractional horsepower ratings are not designed to be operated on a VFD. Within Nidec Motor Corporation standard products, all motors NEMA®† 48 frame (5.5" diameter) and smaller are not suitable for VFD applications. Three phase 56 and 143/145 frame applications should be noted on the catalog price page; or if in doubt ask a Nidec Motor Corporation technical representative for recommendations on compatibility with a VFD.

Slow Speed Motors

Motors with a base design of slower than six poles require special consideration regarding VFD sizing and minimizing harmonic distortion created at the motor terminals due to cable installation characteristics. Additional external PWM waveform filters and shielded motor cables designed for PWM power may be required to provide acceptable motor life. Harmonic distortion on the output waveform should be kept to a minimum level (less than 10%) mismatch impedance.

690V Applications

Motors that are rated for 690VAC and that will be powered by 690VAC PWM VFDs require the use of an external filter to limit peak voltage spikes and the use of an INVERTER GRADE® motor. Where available, an alternative to using an output filter is to upgrade to a 2300V insulation system.

Low Voltage TITAN® Motors

When using 449 frame and larger motors on PWM type VFDs consider the use of an external filter and shielded motor cables designed for PWM power to minimize harmonic distortion and peak voltages at the motor terminals. Harmonic distortion on the output waveform should be kept to a minimum level (less than 10%).

Bearing Currents Related to PWM Waveforms

Protection of the motor bearings from shaft currents caused by common mode voltages is becoming a standard feature on Inverter Duty motor products. Some installations may be prone to a voltage discharge condition through the motor bearings called Electrical Discharge Machining (EDM) or fluting. Vertical HOLLOSHAFT and HOSTILE DUTY World Motor come with grounding devices installed as standard. EDM damage is related to characteristics of the PWM waveform, and the VFD programming, and installations factors.

Bearing Protection on Inverter Duty Vertical Motors
All U.S. MOTORS® brand "Inverter Duty" vertical products have a shaft grounding system that allows damaging shaft currents a low resistance path to ground. **Bearings on vertical motors fed by VFD power without this bearing protection are not covered under any warranty.** All other bearing failure is covered per NMC's standard warranty. An electric motor repair shop approved to service U.S. MOTORS® brand motors must verify that the cause of the bearing failure was not due to EDM damage.

Guideline For Insulated Anti-Friction Bearings

Bearing insulation is required to prevent circulating shaft currents which can damage bearings. Circulating shaft current can be caused by use of improper power and/or ground cables, improper grounding systems and higher switching frequencies. Finding and correcting the external condition(s) is the responsibility of the system designer or specifying engineer. To prevent circulating shaft current in motors with anti-friction bearings, Nidec Motor Corporation's standard practice is to insulate the non-drive end bearing.

Adjustable Speed Drives produce a common mode voltage condition. To interrupt common mode voltage on induction motors of all sizes, NEMA MG1-2018 Part 31 recommends insulating both bearings. In cases where both anti-friction bearings are insulated, the system designer or specifying engineer should determine whether to apply one or more of the following options to prevent or reduce shaft currents: sinewave filters, line reactors or mechanical devices, such as shaft grounding or an insulated half coupling. Motors with shaft grounding devices are not suitable for installation in hazardous locations unless housed in an enclosure suitable for the specified Division (or Zone), Class and Group(s).

Multiple Motors on a Single VFD

Special considerations are required when multiple motors are powered from a single VFD unit. Most VFD manufacturers can provide guidelines for proper motor thermal considerations and starting/stopping of motors. Cable runs from the VFD and each motor can create conditions that will cause extra stress on the motor winding. Filters may be required at the motor to provide maximum motor life.

Grounding and Cable Installation Guidelines

Proper output winding and grounding practices can be instrumental in minimizing motor related failures caused by PWM waveform characteristics and installation factors. VFD manufacturers typically provide detailed guidelines on the proper grounding of the motor to the VFD and output cable routing. Cabling manufacturers provide recommended cable types for PWM installations and critical information concerning output wiring impedance and capacitance to ground.

Integrated Motor and Inverter

By integrating the motor and inverter at NMC's manufacturing facility, many of the motor compatibility problems are minimized or eliminated. During the manufacturing process, the motor is matched to the inverter characteristics which ensures the winding temperature and torque levels meet the design specification. Since the inverter output wiring to the motor is nearly eliminated, bearing currents are rarely experienced. When the unit is properly grounded, reducing the output cable lengths in conjunction with an inverter grade insulation system and low factory setting of the switching frequency of the inverter drive, results in low risk of voltage peaks produced by the PWM waveform.

Vertical Motors on VFDs

Vertical motors operated on VFD power present unique conditions that may require consideration by the user or installation engineer:

- Locked rotor and drive tripping caused by non-reversing-ratchet operation at low motor speeds. It is not recommended to operate motors at less than 1/4 of synchronous speed. If slow speeds are required contact NMC engineering.
- Unexpected / unacceptable system vibration and or noise levels caused by the torque pulsation characteristics of the PWM waveform, a system critical frequency falling inside the variable speed range of the process or the added harmonic content of the PWM waveform exciting a system component
- Application related problems related to the controlled acceleration/deceleration and torque of the motor on VFD power and the building of system pressure/ load.
- The impact the reduction of pump speed has on the down thrust reflected to the pump motor and any minimum thrust requirements of the motor bearings
- Water hammer during shutdown damaging the non-reversing ratchet

Humidity and Non-operational Conditions

The possible build-up of condensation inside the motor due to storage in an uncontrolled environment or non-operational periods in an installation, can lead to an increased rate of premature winding or bearing failures when combined with the stresses associated with PWM waveform characteristics. Moisture and condensation in and on the motor winding over time can provide tracking paths to ground, lower the resistance of the motor winding to ground, and lower the Corona Inception Voltage (CIV) level of the winding.

Proper storage and maintenance guidelines are important to minimize the potential of premature failures. Space heaters or trickle voltage heating methods are the common methods for drying out a winding that has low resistance readings. **Damage caused by these factors are not covered by the limited warranty provided for the motor unless appropriate heating methods are properly utilized during non-operational periods and prior to motor start-up.**

NEMA®† Application Guide for AC Adjustable Speed Drive Systems: http://www.nema.org/stds/acadjustable.cfm#download

* This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL®† & CSA®† listings where indicated.

Warranty Guidelines for Integral Horsepower (IHP)* Motors on Variable Frequency Drives

Warranty Guidelines

The information in the following section refers to the motor and drive application guidelines and limitations for warranty.

Hazardous Location Motors

Use of a variable frequency drive with the motors in this catalog, intended for use in hazardous locations, is only approved for Division1, Class I, Group D hazardous location motors with a T2B temperature code, with a limitation of 2:1 constant torque or 10:1 variable torque output. **No other stock hazardous location motors are inherently suitable for operation with a variable frequency drive.** If other requirements are needed, including non-listed Division 2, please contact your Nidec Motor Corporation territory manager to conduct an engineering inquiry.

575 Volt Motors

575 volt motors can be applied on Inverters when output filters are used. Contact the drive manufacturer for filter selection and installation requirements.

Applying INVERTER GRADE® Insulated Motors on Variable Frequency Drives (2, 4, 6 pole)

The products within this catalog labeled "Inverter Duty" or "Vector Duty" are considered INVERTER GRADE® insulated motors. INVERTER GRADE® motors exceed the NEMA®† MG-1 Part 31 standard. Nidec Motor Corporation provides a three-year limited warranty on all NEMA®† frame INVERTER GRADE® insulated motors and allows long cable runs between the motor and the VFD (limited to 400 feet without output filters). Cable distance can be further limited by hot and humid environments and VFD manufacturers cable limits. These motors may be appropriate for certain severe inverter applications or when the factors relating to the end use application are undefined (such as spares).

Nidec Motor Corporation's U.S. Motors® brand is available in the following INVERTER GRADE® insulated motors:

- Inverter Duty NEMA®† frame motors good for 20:1 Variable Torque & 5:1 Constant Torque, including Vertical Type RUSI (10:1 V.T.)
- Inverter Duty motors rated for 20:1 Constant Torque
- ACCU-Torq® and Vector Duty Motors with full torque to 0 Speed or 5000:1
- 841 Plus® NEMA®† Frame Motors

Applying Premium Efficient motors (that do not have INVERTER GRADE® insulation) on Variable Frequency Drives (2, 4, 6 pole)

Premium efficient motors without INVERTER GRADE insulation meet minimum NEMA®† MG-1, Section IV, Part 31.4.4.2. These motors can be used with Variable Frequency Drives (with a reduced warranty period) under the following parameters:

- On NEMA®† frame 447 and smaller motors, 20:1 speed rating on variable torque loads & 4:1 speed range on constant torque loads.
- On TITAN® 449 and larger frame motors, 10:1 speed rating on variable torque loads.
- On TITAN® frame motors, inquiry required for suitability on constant torque loads.

Cable distances are for reference only and can be further limited by hot and humid environments (refer to Table 1). Refer to specific VFD manufacturers cable limits. Refer to the Motor/ Inverter Compatibility page for special consideration of vertical motor bearings.

Table 1 - Cable Distances			
Maximum Cable Distance VFD to Motor			
Switching Frequency	460 Volt	230 Volt	380 Volt
3 Khz	127 ft	400 ft	218 ft
6 Khz	90 ft	307 ft	154 ft
9 Khz	73 ft	251 ft	126 ft
12 Khz	64 ft	217 ft	109 ft
15 Khz	57 ft	194 ft	98 ft
20 Khz	49 ft	168 ft	85 ft

Warranty Period Clarifications and Exceptions

Standard Energy Efficient Exclusion

Applying Standard & Energy Efficient Motors on Variable Frequency Drives is not recommended. VFD related failures on standard and energy efficient motors will not be covered under warranty.

Vertical Motor Windings

Premium efficient vertical motors without INVERTER GRADE® insulation that are installed using the criteria described in this document and applied in the correct applications shall have a warranty while powered by a VFD for 12 months from date of installation or 18 months from date of manufacturing whichever comes first. See limited warranty page for horizontal motor warranty periods.

Bearing Exclusion for Thrust Handling Bearings

Bearings used in premium efficienct vertical motors, and all thrust handling bearings, that are powered by VFDs without shaft grounding devices or insulated bearings (when required) will not be covered under any warranty for damages caused from being powered by a VFD. All other bearing failure is covered per NMC's standard warranty. An electric motor repair shop approved to service U.S. MOTORS® brand motors must verify that the cause of the bearing failure was not due to Electrical Discharge Machining.

Medium Voltage and Slow Speed Considerations

Motors that are rated above 700 VAC or that are eight pole and slower require special consideration and installation and are not covered under the warranty guidelines in this document. Motors that are rated above 700VAC have special cable length and voltage differential issues that are specific to the VFD type and manufacture. The motor construction and cost may vary dramatically depending on the VFD topology and construction. Contact your NMC representative with VFD manufacturer name and model type for application and motor construction considerations. Motors that are designed eight pole and slower also require special installation and filters per the drive manufacturer.

* This information applies only to Integral Horsepower (IHP) motors as defined on the Agency Approval page, under UL®† & CSA®† listings where indicated.

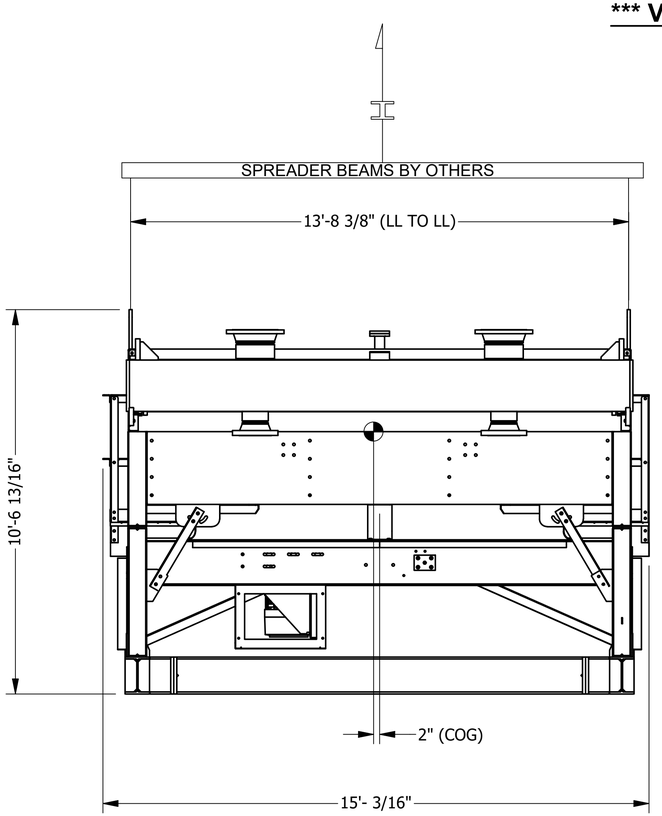
WORLD ENERGY RENEWABLE FUELS CONVERSION PROJECT
Project No: A8KM
Vendor Input to PCMS
Doc number: A8KM-PCMS-001, Rev. 0

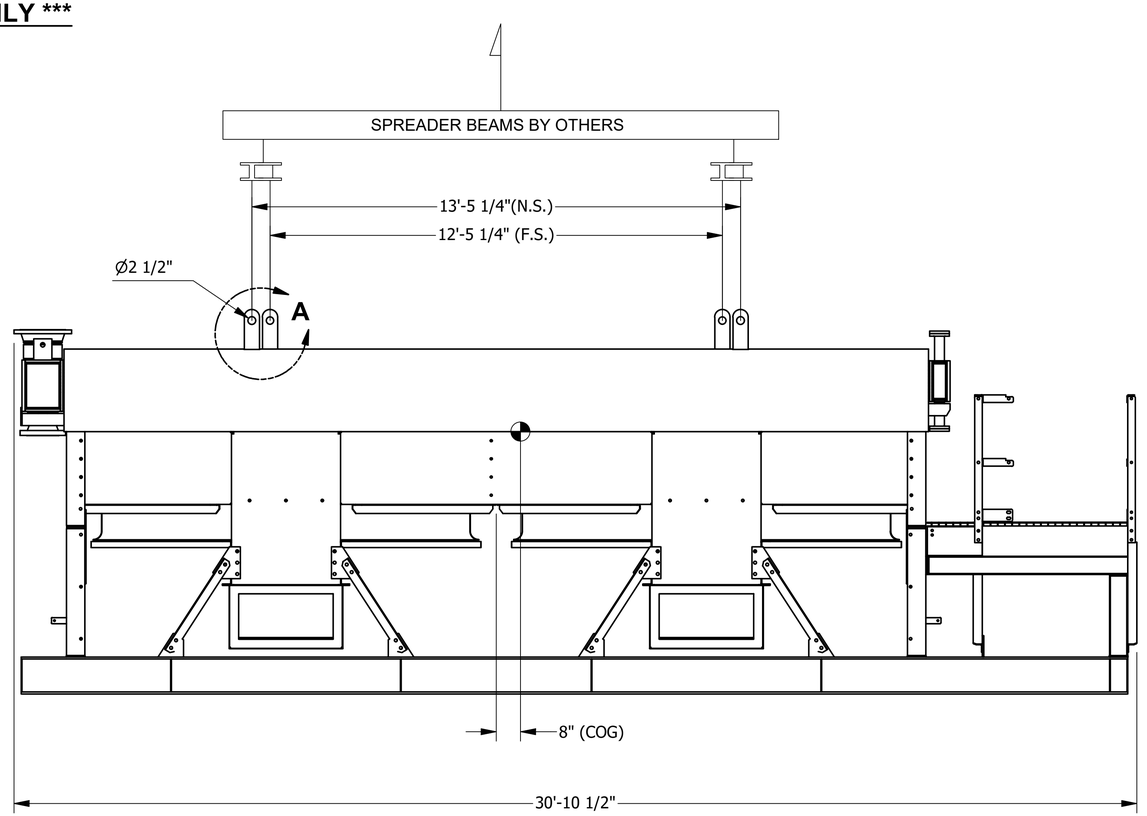
Vendor Doc Number: EN207121-FAB-9V3-00085
PCMS_PO Number 4505606038/A8km-4-406-PO-3
Rev: 0

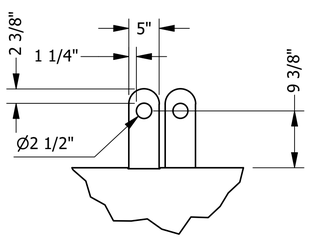
Identification					
1: Tag No.	18-XF-260 A	18-XF-260 B			
2: Model No.					
3: Serial No.	A22-13314-1A	A22-13314-2A			
4: Registration No.	NB# 11242	NB# 11243			Code Vessels Only
5: Code Stamped	yes	yes			Drop Down
General Design					
15: Build Date	2023	2023			
17: Manufacturer	FABSCO FIN AIR, LLC.	FABSCO FIN AIR, LLC.			
19: General Material	SS	SS			
20: Insulation Type	None	None			Drop Down
21: Support Type	Baseplate	Baseplate			Drop Down
22: External Coating	Galvanized	Galvanized			Drop Down
23: MAWP (psig)	75	75			
24: MAWT (F)	340	340			
25: Design Pressure (psig)	75	75			
26: Full Vacuum	yes	yes			Drop Down
27: Design Temp (F)	340	340			
28: MDMT (F)	32	32			
29: Weight Empty (lbs)	41458	41458			
30: Weight Full (lbs)	45907	45907			
31: Equipment Length (inches)	25' 8 7/8"	25' 8 7/8"			
32: Orientation	Horizontal	Horizontal			Drop Down
33: Equipment Width (inches)	14' 4-13/16"	14' 4-13/16"			
34: Equipment Height (inches)	10' 6-13/16"	10' 6-13/16"			
35: Storage Volume (bbls)	12.07	12.07			Vessels Only
36: Outer Diameter (inches)	NA	NA			
37: PWHT	no	no			
38: Fire Proofing	no	no			
39: Heat Tracing	None	None			
40: Test Medium	Water	Water			Pressure Testing

SECTION / DESCRIPTION	MAWP	TEST PRESS	DESIGN TEMP	MDMT	CONN NPS	RATING	BUNDLE VOL	BUNDLE WT	LOUVER	HAILSCREENS	MOTOR HP: 25	FAN MFGR: MOORE	DIAM (FT): 10	SPECIFICATION NOTES:	COOLER WT #: SEE TABLE
UNITS	PSIG	PSIG	DEG F	DEG F	INCH		CU FT	LBS			TYPE: TEFC	CLASS: 10000	ACFM/FAN: 104466	VIBE TRANSMITTER: WILCOXON	STRUCTURE FINISH:
AMINE REGENERATOR OVERHEAD	75 / FV	100	340	32	12 \ 8	150#/300#	71	26403	NONE	NONE	RPM: 1800	BLADES: 3	HP@ DES.: 16.07	VIBE TRANS. MODEL NO:	GALVANIZED PER A8KM-PP-000-500540-A
CONDENSER 18-XF-260A/B											VAC: 460/3/60	PITCH: 10.11		D786-D2	HEADER FINISH:
											FRAME: 284T	RPM: 313	DRIVE: HTD	QTY: 2 PER BAY	NONE PER A8KM-PP-000-500520-A
											SHAFT: 1.875	SERIES: 42	RATIO: 5.75:1		
											MOTOR WT: 445 lbs	TYPE: EC	DRIVE WIDTH: 36		
											QTY: 2 PER BAY	TIP: VE	AIR BRAKE: YES		
												QTY: 2 PER BAY			

***** VERTICAL LIFT ONLY *****
42,000 LB.







DETAIL A
SCALE 0.08 : 1

WEIGHTS PER BAY(LBS)	
ITEM	WEIGHT (LBS)
COOLER	32797
SPAN BEAMS	6908
LOUVER	0
WALKWAY	1753
TOTAL DRY	41458

PROJECT NAME:	World Energy Renewables Project
PROJECT NO./UNIT:	EN-20-7121 / Amine
CUSTOMER/CLIENT:	World Energy Paramount
EQUIPMENT OWNER:	Air Products Manufacturing LLC
ITEM NO.:	18-XF-260 A/B
SERVICE:	Amine Regenerator Overhead Condenser
LOCATION:	World Energy, Paramount, CA, USA
PO NO.:	4505606038 / A8KM-4-406-PO-3
FABSCO JOB NO.:	A22-13314-1/2

LIFT DIAGRAM

REV.	DATE	DESCRIPTION
0	4/7/2022	FOR APPROVAL

DRAWN BY: BH
DATE: 4/7/2022
CHECKED BY:

FABSCO Fin-Air, LLC.

DRAWING NO: A22-13314-1/2-LIFT
REV: 0