

2070 Pennsylvania. Avenue Monaca, PA 15061 USA Phone: (724) 770-2130. Fax: (724) 226-5856 Noreen.DeFerrari@ATimetals.com Noreen L. DeFerrari Sr. Manager, Quality Corporate Quality Assurance

November 16, 2017

Subject: AMS 5596M

ATI 718 produced to AMS 5596L meets the composition and properties requirements of AMS 5596M.

Regards,

Worsterwain

Noreen L. DeFerrari

ROLLED ALLOYS QUALITY ASSURANCE

AFFROVE

NATE /9/18

AL 6168-8 417

PACKING LIST

ROLLED ALLOYS INC PO BOX 310		0153926-CIN FORMS DISTRIBUTION	CUST, ORD, NO, & DATE	
MI 48182	L88424	09/27/17 773550	CUST. CODE	
	10430-0 31 PRIME SEC.	09/27/17 773550 BRACKENRIDGE, I	FINISHING LOCATION	Flat Roiled Products
ROLLED ALI 4085 THUNI FAIRFIELD		PA 551519	SHIPPER NO.	Products
OYS INC. DERBIRD LANE	2245 BRACKENRIDGE #3 PA 036024 SHIP TO	13010103060000 32-097-151 12/14/17 MATT. SHIPPING LOCATION INVOICE	PRODUCT CODE	
OH 45014	DGE #3 PA	32-097-151 SLOCATION	MILL ORDER NUMBER	
	036024	112/14/17	DATESHIPPED	

GRADE AND SPECIFICATIONS
"ATI 718" NICKEL ALLOY SHEET C R CUT LENGTHS ANNEALED 2D FIN 3 EDGE (ASQR-01 REV 10)
& E) (12/11/13 EXCEPTIONS TO B50TF14) (ASTM-B-670-07 R2013) (WNR 2.4668) (AMS 5596L) (B50TF14-S22 CLASSES A (S-1000 DATED

C CUST IDENTITY OU13228		ITEM PCS DIMENSIONS W/G/L	05/23/2017) (S-400 DTD 06/03/2016) (NACE MR0175/ISO 15156-3:2015) (E5
ı	07L7J33-02 AAC01718-A 07L7J33-02 AAC01718-B 07L7J33-02 AAC01718-C	HEAT # COIL # T	NACE MR0175/ISO 15156-3:
	3744884 3744884 3744884	TEST #	2015) (E
6220	1690 2345 2185	GROSS TARE	50TF133-S9 CLASS C)
600	200 200 200	rare 1	-89 C
5620	1490 2145 1985	NET THEO	LASS C)
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GAUGE TOL: + 0.00500 - 0.00500

DIST: DO NOT SEND PAPER CPY OF ACK --RECEIVES THROUGH EXTRANET WILL BE SENT ELECTRONICALLY DO NOT SEND S/N - CUSTOMER

	Н	HEAT 07L7J33-02		TEST LOCATION	HEAT 07L7J33-02	T (MT O)	्र महार सञ्चल <i>ा</i> स्थाप
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+ ESR	TC	.002	B	TC	.010	,	I
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PAGE 01 - CONTINUED ON PAGE 02

CONSIGNES.- Please Note—This consignment was turned over to carrier in inst class condition, being correctly loaded, at which time carrier is inst class condition, being correctly loaded, at which time carrier is inst class condition, being correctly loaded, at which time carrier is inst class condition, being correctly loaded, at which time carrier for the graded are available from the product com. A thorough review of the product com. A thorough review of the product and all safety loaded are standard or instancial purchased are standard conditionally at the product and all safety loaded are standard conditionally at the product and all safety loaded are standard conditionally at the product and all safety loaded are standard conditionally.

The above is a true copy of data on file. The material and test results conform to the sales contract and specification(s) as set forth in ATI Flat Relied Products' Order Acknowledgement. enaustra

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Corporate Quality Assurance

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0153926-CIN

FORMS DISTRIBUTION જ

SOLD

L88424

INC

CUST. ORD. NO. & DATE

MILL ORDER NUMBER

MG BILL | BRACKENRIDGE, CUST, CODE PRIME SEC. FINISHING LOCATION Flat Rolled Products

PA |551519 SHIPPER NO. PRODUCT CODE

|13010103060000 |32-097-151

|2245 |BRACKENRIDGE #3 | PA SHIP TO

036024

12/14/17 INVOICE 1 DATE SHIPPED

ROLLED ALLOYS INC. 4085 THUNDERBIRD LANE FAIRFIELD 品 45014

R CUT LENGTHS ANNEALED 2D FIN 3 EDGE CARRIER - COORDINATORS, INC.

GRADE "ATI 718" NICKEL ALLOY SHEET C

TEMPERANCE PO BOX 310 ROLLED ALLOYS

MI

48182

DSO 10

TEST LOCATION	ITEM TEST NO 001A 3744884		TEST LOCATION			TEST LOCATION			TEST LOCATION			TEST LOCATION			TEST LOCATION		001A 3744884	ITEM TEST NO	
ਸੁਦ	MICRO UNIFORM	* Y.S. BY 0 E50TF133		ELEV TEMP	HT2 AT		ROOM TEMP	HT2 AT		ELEV TEMP	HT1 AT		ROOM TEMP	HT1 AT		RECEIVED		CONDITION	TEST
TC	ATTACK .0000	0.2% OFFSE INTER-G	MM		*139300.	TC		*165600.	MM		*141200.	TC		*172200.	TC		T*64100.	PSI	TIELD
년 년	GRAIN SIZE 6.5	% OFFSET METHOD INTER-GRAN A.L.A.	MM		157600	TC		201100	MM		162200	TC		204000	ic		130600		TENSILE
	SIZE	•	MM		18.	TC		22.	MM		18.	TC		22.	C		52.	IN 2"	% ELONG
	AMS 5596 PASS PASS	MICROSTRUC			# NR	TC	45.HRC	= 46.HRC			# NR	TC	46.HRC	= 46.HRC	TC	94.HRBW	# 94.HRBW	HARDNESS	จ๊
TC	GRAIN SIZE 8.5 8.5	AVERAGE													TC		T PASS 9.5	BEND	
TC															TC	9.5	9.5	SIZE	ASTM
Ω	RUPTURE 91.3 HRS BROKE	(1) STRESS		•	•												NR		GRAIN
TC	RUPTURE 82.0 HRS BROKE	(2) STRESS																CORROSION	RESS
	iRS	TRESS															NR	SALT SPRAY	CORROSION

PAGE 02 -CONTINUED ON PAGE 03

CONSIGNEE—Please Note—This consignment was hared over to carrier in first class condition, being conrectly loaded, at which time Safety Data Sheets for this product are available on our carrier in first class condition, being conrectly loaded, at which time Safety Data Sheets for this product are available or our responsibility for loss or demage in stipment ceased. For your wobsito, www.Althodats.com. A thorough review of the product and at large protection please peranting spinnent as it arrives. If any storage is safety Data Sheets for this product are available of material generated shall be considered on a variety of the product and at lasfety a health considered on outlined must be implemented.

and specification(s) dsta on file. The material and test results conform to the sales contract forth in ATI Flat Relied Products' Order Acknowledgement. mounting

12/14/17

10:13:08

RA TRACER # 6525269 US

Norcen Deferrari - Sr. Manager Quality

AL 6168-8417

DATE SHIPPED

0153926-CIN CUST, ORD. NO. & DATE ро вох 310 ROLLED ALLOYS TEMPERANCE が SOLD

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48182

09/27/17 L88424 10430-0 PRIME

DSO

FINISHING LOCATION Flat Rolled Products PA |551519 SHIPPER NO.

13010103060000 | 32-097-151 PRODUCT CODE MILL ORDER NUMBER

2245 BRACKENRIDGE #3 | PA 036024 12/14/17

ROLLED ALLOYS INC. SHIP TO

FAIRFIELD 4085 THUNDERBIRD LANE

"ATI 718" NICKEL ALLOY SHEET C GRADE CARRIER - COORDINATORS, INC. R CUT LENGTHS ANNEALED 2D FIN 3 EDGE

TEST NO 3744884 ELONGATION ELONGATION 12.0 17.5 S.R. (2) S.R.

TEST LOCATION

H ELONG AFTER FRACTURE

METALLOGRAPHIC MAGNIFICATION: 100X NR = DATA NOT REQUIRED ETCHANT USED: HC1/CHROMIC ACID

ELONG

 AT

FRACTURE

GRADE VERIFICATION WAS CARRIED OUT SPECTROSCOPICALLY

INTERGRANULAR ATTACK MAGNIFICATION: 500X

EN 10204:2005 - 3.1 CERTIFICATE DOES NOT INDICATE PED APPROVAL FOR THIS MATERIAL.

EXPORT ADMINISTRATION REGULATIONS. DIVERSION CONTRARY TO U.S. LAW IS PROHIBITED. U.S. LAW ALSO PROHIBITS DISPOSITION OF THESE COMMODITIES/TECHNICAL DATA TO ANY END-USER OR FOR ANY END-USE RELATED TO THE DESIGN, DEVELOPMENT, PRODUCTION, STOCKPILING, OR USE OF CHEMICAL, BIOLOGICAL, OR NUCLEAR WEAPONS, OR MISSILES, WITHOUT THE PROPER APPROVAL OF THE UNITED STATES GOVERNMENT. THESE COMMODITIES OR TECHNOLOGY, WHEN EXPORTED FROM THE UNITED STATES, ARE IN ACCORDANCE WITH THE USA

ATI-FRP DEFINES THE GRAIN ORIENTATION NOMENCLATURE AS LONGITUDINAL IS THE WIDTH, AND SHORT TRANSVERSE (ST) IS THE THICKNESS OR GAUGE. Ē IS THE LENGTH, LONG TRANSVERSE (LT)

PAGE 03 -CONTINUED ON PAGE 04

Safety thata Sheets for this product and evaluation on our workite, www.ATmeets.com. A thorough review of the safety Data Sheet for the grade of material purchased shall be performed prior to working with this product and all safety & health considerations outlined must be implemented.

The above is a true copy of data on file. The material and tost results conform to the selec contract and specification(s) as set forth in ATI Flat Relied Products' Order Acknowledgement.

Noreen Deferrari - "Cal Sr. Manager Quality, Co warren

12/14/17

10:13:08

RA TRACER # 0525268

CONSIGNEE - Please Nois-This consignment was barried over to carrier in flist dass condition, being correctly baseds at which time our responsibility for loss or darmage in altiquent, ceased. For your protection please examine shipment as it strives, if any shortage or damage it is biscovered, have a full description made by transportation agent on wayful before signing.

0153926-CIN CUST. ORD. NO. & DATE ROLLED TEMPERANCE РО ВОХ 310 ALLOYS SOLD INC 09/27/17 MG BILL L88424 48182 CUST. CODE 10430-0 31 PRIME DSO BRACKENRIDGE, FINISHING LOCATION Flat Rolled Products PA |551519 4085 THUNDERBIRD LANE ROLLED ALLOYS INC. FAIRFIELD SHIPPER NO. |13010103060000 |32-097-151 2245 BRACKENRIDGE #3 PA MILL ORDER NUMBER

> 036024 12/14/17 DATE SHIPPED

"ATI 718" NICKEL ALLOY SHEET C 'n CARRIER - COORDINATORS, INC CUT LENGTHS ANNEALED 2D FIN 3 EDGE

HT1 - HEAT TO 1325 +/- 15F (718 +/- 8C). HOLD AT HEAT FOR 8 +/- 0.5 HOURS; FURNACE COOL TO 1150 +/- (621 +/- 8C) IN 2 +0.1/-0 HOURS THEN HOLD AT 1150 +/- 15F (621C +/- 8C) FOR 8 +0.5/-0 HOURS. AIR COOL TO ROOM TEMPERATURE.

STRESS RUPTURE (1) IS HEAT TREATED PER HT1 THEN TESTED AT 1200 +/- 3F (649 +/- 2C) WITH AN INITIAL AXIAL STRESS OF 95,000 PSI (654 MPA) FOR MATERIAL 0.025" (0.635MM) AND LESS OR 100,000 PSI (689 MPA) FOR MATERIAL OVER 0.025" (0.635MM).

HEAT TO 1750 +/- 25F (954 +/- 14C) AND HOLD FOR 60 +/- 5 MINUTES. COOL TO ROOM TEMPERATURE. HEAT TO 1325 +/- 15F (718 +/- 8C) AND HOLD FOR 8 +/- 0.5 HOURS. FURNACE COOL TO 1150 +/- 15F (621 IN 2 +0.1/-0 HOURS. THEN HOLD AT 1150 +/- 15F (621 +/- 8C) FOR 8 +0.5/-0 HOURS. AIR COOL TO ROOM TEMPERATURE.

STRESS RUPTURE (2) IS HEAT TREATED PER HT2 THEN TESTED AT 1200 +/-WITH AN INITIAL AXIAL STRESS OF 100,000 PSI(689 MPA). Ω (649 + / - 20)

ELEVATED TEMPERATURE TENSILES ARE HEAT TREATED AS DESIGNATED PER HT1 (649 $\pm/-$ 3C), HELD AT HEAT 20-30 MINUTES, THEN TESTED AT 1200 $\pm/-$ 5F OR HT2 THEN HEATED TO 1200 +/- 5F (649 +/- 3C).

ATI FLAT ROLLED PRODUCTS HAS COMPLIED WITH ALL PRODUCER REQUIREMENTS OF AS6279

MATERIAL IS OF USA MELT AND MANUFACTURE

PAGE 04 - CONTINUED ON PAGE

Safoty Data Shoets for this product are available on our website, www.ATmodals.com. A thorough poview of the Safoty Data Shoet for the grade of material purchased shall be portionned prior to working with this product and all safety & health considerations cullined must be implemented.

The above is a true copy of data on file. The material and test results conform to the sales contract and specification(s) as set forth in ATI Flat Relied Products' Order Acknowledgement.

12/14/17

Noreen Deterrari - *
Sr. Manager Quality. arrande

NOTICE OF SHIPMENT/ **PACKING LIST**

0153926-CIN

PO BOX 310 ROLLED

ALLOYS

INC

SOLD

L88424

10430-0 PRIME DSO

TEMPERANCE

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48182

CUST, ORD. NO. & DATE

09/27/17/773550 FINISHING LOCATION Flat Rolled Products PA 551519

SHIPPER NO. PRODUCT CODE

13010103060000 32-097-151 2245 BRACKENRIDGE #3 | PA SHIPPING LOCATION 036024 DATE SHIPPED

ROLLED ALLOYS INC. SHIP TO

FAIRFIELD 4085 THUNDERBIRD LANE 45014

CARRIER - COORDINATORS, INC

"ATI 718" NICKEL ALLOY SHEET C R CUT LENGTHS ANNEALED 2D FIN 3 EDGE

BY CERTIFYING TO B50TF14-S22 CLASS A & E, WE HAVE CERTIFIED THAT THIS MATERIAL IS CAPABLE OF MEETING CLASS B & F, WHEN HEAT TREATED IN ACCORDANCE WITH THE CLASS B & F REQUIREMENTS OF PARAGRAPH 3.6.1. HEAT TREATED PROPERTIES REPORTED ON OUR CERTIFICATE OF TEST SHOW THE RESULTS AFTER SAMPLES WERE HEAT TREATED TO THE REQUIREMENT OF CLASS B & F. ACTUAL COIL WAS SUPPLIED IN THE MILL ANNEALED CONDITION IN ACCORDANCE WITH CLASS A & E.

APPROVED FACILITY. WESTMORELAND MECHANICAL TESTING & RESEARCH, YOUNGSTOWN, PA (T7869) IS A GEAE S400 AND ISO/IEC 17025

RECORDING OF FALSE, FICTITIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THE CERTIFICATE AND MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL LAW. ATI FRP HOLDS SEVERAL QUALITY CERTIFICATIONS THAT INCLUDE ISO-9001, AS9100, NADCAP, AND ISO/IEC 17025. MATERIAL WAS MANUFACTURED IN ACCORDANCE WITH THE ATI FRP QUALITY MANUAL REVISION 26 DATED 06/14/2017. THIS CERTIFIED MATERIAL TEST REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL. FEDERAL LAW PROHIBITS

ATI FLAT ROLLED PRODUCTS WORKS TO THE ROLLS ROYCE SABRE QUALITY MANAGEMENT SYSTEM REQUIREMENTS

FLAT ROLLED PRODUCTS PERFORMS CHEMICAL ANALYSIS BY THE FOLLOWING TECHNIQUES

FOR TESTING LOCATIONS TC, BN, & LO: S BY COMBUSTION/INFRARED

N, O, H BY INERT FUSION/THERMAL CONDUCTIVITY MN, P, SI, CR, NI, MO, CU, CB, CO, V BY WDXRF B BY OES

AL AND TI (>=0.10%) PB, BI, AG BY GFAA BY WDXRF, OTHERWISE BY OES

PAGE 05 -CONTINUED ON PAGE 90

Noreen Deferred - Y Sr. Manager Quality.

The above is a true copy of data on file. The and specification(s) as set forth in ATI Flat The material and test results conform to the seles contract rights Products' Order Acknowledgement.

12/14/17

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TONSIGNETS.-Prease Note—This consignment was turned over to carrier in fast class councillon, being correctly leaded of without mour responsibility for less or damage inshipment cased, For your websito, www.ATimetats.com. A thorough review of the outcomest, have a full description made by logate sharing with this product and shall profession please examine shipment as & antives, it any shoriage and shall profession please examine shipment as & antives, it any shoriage and shoriage and shoriage and shoriage and description made by logate profession agent on wayfull before signing.

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NOTICE OF SHIPMENT/ PACKING LIST

0153926-CIN

09/27/17 773550

L88424

PRIME 10430-0

DSO

FORMS DISTRIBUTION

PO BOX 310 ROLLED

ALLOYS INC

SOLD TO

TEMPERANCE

CUST, ORD. NO. & DATE

FINISHING LOCATION Flat Rolled Products SHIPPER NO.

PA |551519

|13010103060000 |32-097-151 | MATE | SHEPPING LOCATION 2245 BRACKENRIDGE #3 | PA PRODUCT CODE MILL OFFICER NUMBER 036024 112/14/17 DATE SHIPPED

SHIP TO

4085 THUNDERBIRD LANE ROLLED ALLOYS INC.

MI 48182 FAIRFIELD

CARRIER - COORDINATORS, INC

"ATI 718" NICKEL ALLOY SHEET C R CUT LENGTHS ANNEALED 2D FIN 3 EDGE

NATRONA HEIGHTS, PA; BRACKENRIDGE, PA AND NEW BEDFORD, MA. MATERIAL TESTED AT ATI FLAT ROLLED PRODUCTS GEAE S400 APPROVED FACILITIES (T1225 & T9317):

ATI FLAT ROLLED PRODUCTS HOLDS SEVERAL QUALITY AND LABORATORY CERTIFCATIONS THAT INCLUDE ISO-900 AD 2000-MERKBLATT WO, EU PRESSURE EQUIPMENT DIRECTIVE 2014/68/EU, NADCAP, ISO/EIC 17025, GEAE S400 (T1225 & T9317), GEAE S-1000. REFER TO WWW.ATIMETALS.COM TO ACCESS THE CURRENT ATI FRP QUALITY CERTIFICATIONS. ISO-9001, AS9100,

GE B50TF14 ACCEPTANCE TESTS. HT1 MEETS THE REQUIREMENTS FOR AMS 5596 ACCEPTANCE TESTS; HT2 MEETS THE REQUIREMENTS FOR

THE NUMERIC CODES SHOWN UNDER MELT SOURCE CAN BE INTERPRETED AS FOLLOWS:

1. - MATERIAL MELTED, ROLLED AND TESTED IN THE UNITED STATES.

ı FOREIGN MELT; ROLLED AND TESTED IN THE UNITED STATES.

CORROSION TESTING, MECHANICAL TEST SPECIMEN PREPARATION, AND HEAT TREATMENT OF SPECIMENS. ATI FLAT ROLLED PRODUCTS HAS RECEIVED NADCAP APPROVAL FOR CHEMICAL, MECHANICAL, VERIFICATION OF SCOPE AND ACCREDITATION IS AVAILABLE ONLINE. METALLOGRAPHIC, HARDNESS,

EN 10204:2005 3.1 CERTIFICATE.

TESTING WAS PERFORMED AT THE FOLLOWING LOCATIONS:

PE = PRODUCT EVALUATION SYSTEMS; 637 DONOHOE ROAD; LATROBE, PA 15650 HEIGHTS, PA 15065

Ħ ATI-FLAT ROLLED PRODUCTS; 1300 PACIFIC AVENUE; NATRONA

WESTMORELAND MECHANICAL TESTING; 221 WESTMORELAND DRIVE; YOUNGSTOWN,

PAGE 0 CONTINUED ON PAGE 07

The above is a true capy of data on file. The material and test results contorm to the sales contract and specification(s) as set forth in ATI Flat Heliad Products' Order Acknowledgement.

12/14/17

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St. Manager Chastly, Corporate Qualty Assurance # 053 5369 سيمسطن

CONSIGNES.- Please hote-This consignment was turned over to carefur in first class condition, being connectly backed, at which time our responsibility for loss or damage it stilfurated, ceased. For your protection please examine shipment as it arrives, if any simulated or damage is accorated, have a full examplian made by transportation agent on wayfail before stigning.

Safety Data Shoots for this product are available on our waballa, www.ATmetals.com. A therough roview of the Safety Data Shoot for the grade of material purchased shall be performed pricer to working with this product and all safety & health considerations outlined must be implemented.

PACKING LIST

0153926-CIN FORMS DISTRIBUTION

09/27/17 773550

CUST, ORD, NO. & DATE

BRACKENRIDGE, FINISHING LOCATION Flat Rolled Products SHIPPER NO.

ORDER RATE ORITY

10430-0 31 PA |551519

|13010103060000 |32-097-151 PRODUCT CODE MILL ORDER NUMBER

12/14/17

DATE SHIPPED

2245 BRACKENRIDGE #3 | PA | 036024

SHIP TO

ROLLED ALLOYS INC. 4085 THUNDERBIRD LANE

45014

FAIRFIELD

ĭ 48182 DSO

PRIME

ROLLED ALLOYS INC PO BOX 310

SOLD TO

L88424

TEMPERANCE

"ATI 718" NICKEL ALLOY SHEET C GRADE CARRIER - COORDINATORS, INC. R CUT LENGTHS ANNEALED 2D FIN 3 EDGE

^^^^^ ^^^^ FOR ACCESS TO ONLINE CERTIFICATES OF REGISTER AT MYATI.ATIMETALS.COM TEST >>>>>>>> >>>>>>

PMI VERIFIED BY:

Receiving Inspection

PAGE 07 - FINAL PAGE.

CONSIGNEE—Reaso Nota—This consignment was carrier in latid assa condition, being corriedly locabe carriesponsibility for loss of damage in dispinent or projection please examine shipment as it arrives. or damage is discovered, lavey a full descript transportation agent on wayfull before eigning.

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