CURTISS-WRIGHT
EST Group

QADOC1 Table of Contents

Questions ? Contact EST Group Customer Care at one of the following locations.

CURTISS-WRIGHT
EST Group

www. cw-estgroup.com

North, Central & South America
EST Group Corporate Office
2701 Township Line Road
Hatfield, PA 19440-1770 USA
P: +1.215.721.1100
+1.800.355.7044
F: +1.215.721.1101
est-info@curtisswright.com

Europe / Middle East / Africa
EST Group B.V.
Hoorn 312a
2404 HL Alphen aan den Rijn
The Netherlands
P: +31.172.418841
F: +31.172.418849
est-emea@curtisswright.com

China
P: +86.400.636.5077
est-china@curtisswright.cn

Singapore
P: +65.3158.5052
est-asia@curtisswright.com

CURTISS-WRIGHT

EST Group

Quality Assurance Department

Manufacturers Certificate of Compliance

Supplier Name:	EST Group	**Customer**:	Customer Name
Supplier Order:	123456	**Customer PO#:**	1234567890
Req Number:	NA		
Supplier ID Number(s):	V555XQA		
Address of Supplier Plant:	2701 Township Line Road Hatfield, PA 19440-1770, USA		

The following listed tests, inspections and reports have been completed as required by the specifications, codes, purchase order, quality program, etc.

- [X] Attached Documentation covers all Components/Materials
- [X] Physical & Chemical Analysis
- [X] Heat Treatment
- [X] Hydro (Test Pressure 3000 PSI @ 15 min.)

Part Number	Description			
V555XQA	Pop-A-Plug® CPI/Perma Kit QA/Safety Related .555" AL-6XN®. For Tube ID 0.556-0.616"(14.12-15.65mm). Max Pressure:1000 PsiG (68.9 BarG). Max Temperature: 900°F (482°C). Kit contains(10) plugs with (1) Threaded Go/No-Go Gage.			
Lot Number	**Quality Inspection**	**Performance Testing**	**Pin Heat**	**Ring Heat**
02392210	Passed	Passed	C2H15	C1H05

These plugs were manufactured, sampled, tested and inspected in accordance with EST Group's Quality Assurance Program (Q.A. Manual, Rev. 19). Audited and approved to 10CFR50, Appendix "B", ANSI N45.2 and ASME NQA-1:2015. This certifies that the listed Component(s) or Material(s) conform to the requirements of the purchase order/ CAT ID and above referenced documents including all codes, standards, test requirements, product specifications and Quality Assurance requirements invoked therein.

Curtiss-Wright EST group accepts responsibility for 10 CFR Part 21 noncompliance reporting.

Authorized by: Sandeep Tom, Quality Engineer 05-17-2023 02:30 PM

Quality Assurance, EST Group Date

CURTISS-WRIGHT
EST Group
www. cw-estgroup.com

North, Central & South America
EST Group Corporate Office
2701 Township Line Road
Hatfield, PA 19440-1770 USA
P: +1.215.721.1100
+1.800.355.7044
F: +1.215.721.1101
est-info@curtisswright.com

Europe / Middle East / Africa
EST Group B.V.
Hoorn 312a
2404 HL Alphen aan den Rijn
The Netherlands
P: +31.172.418841
F: +31.172.418849
est-emea@curtisswright.com

China
P: +86.400.636.5077
est-china@curtisswright.cn

Singapore
P: +65.3158.5052
est-asia@curtisswright.com

Pop-A-Plug ® CPI/Perma Test Report

Part Number	Part Description		Rated Pressure	Minimum Test Pressure	
V555X-QA	Pop-A-Plug ® CPI/Perma Plug		1000 PSIG/ 69 Barg	3000 PSIG/ 207 Barg	
Test Equipment	Test System 07	Shop Number	02392210	Pin Heat	C2H15
Test Procedure	SP0101 Rev. 21	Technician	S. O'Hara	Ring Heat	C1H05
Maximum Test Pressure Achieved in Maximum Clearance Range	6,521 PSIG 450 BarG 6,158 PSIG 425 BarG		Maximum Test Pressure Achieved in Minimum Clearance Range	8,052 PSIG 555 BarG 6,565 PSIG 453 BarG	
Air Test Performed With No Visible Leakage			Passed		
Test Date	04/26/2023	Test Results	Passed		

Test Acceptance Criteria

- Test a minimum of 4 plugs (two large/ two small clearance). Total Tested 4
- Perform 80 PSI minimum air test with no visible leakage
- Perform hydro test and pressurize to ultimate blowout PSI which shall exceed minimum test pressure value.

These products were manufactured, sampled, tested and inspected in accordance with EST Group's Quality Assurance Program (Q.A. Manual, Rev. 19). Audited and approved to 10CFR50, Appendix "B", ANSI N45.2 and NQA-1. . This certifies that the listed Component(s) or Material(s) conform and are in compliance with the codes, standards, test requirements and Quality Assurance requirements invoked therein.

QA Approval:	

CURTISS-WRIGHT
EST Group
www. cw-estgroup.com

North, Central & South America
EST Group Corporate Office
2701 Township Line Road
Hatfield, PA 19440-1770 USA
P: +1.215.721.1100
+1.800.355.7044
F: +1.215.721.1101
est-info@curtisswright.com

Europe / Middle East / Africa
EST Group B.V.
Hoorn 312a
2404 HL Alphen aan den Rijn
The Netherlands
P: +31.172.418841
F: +31.172.418849
est-emea@curtisswright.com

China
P: +86.400.636.5077
est-china@curtisswright.cn

Singapore
P: +65.3158.5052
est-asia@curtisswright.com

LABORATORY TESTING INC.

Laboratory Test Report

A2LA ACCREDITED Cert. #0117.03, #0117.05

LTI Order: CO23013099 | SampleID: 23-13829

Revision: 0 | Rev. Date: 04/24/2023

LTI Customer Order	Customer PO	Ship Via	Customer Address	Ship To
CO23013099	253993	EMAIL	EST Group 2701 Township Line Road Hatfield, PA 19440 ATTN David Pierce	EST Group 2701 Township Line Road Hatfield, PA 19440 ATTN David Pierce

Customer Sample Information:

LTI Sample ID	Qty	Sample No.	Sales Order No.	Material	Description	Size	Heat No.	Drawing No.
23-13829	1	1 of 1	325549	ASME SB-691 UNS N08367 Redrawn Latest Edition	AL6XN SS Rod	7/8" Dia	C2H15	02392210

The provisions of 10CFR21 and 10CFR50, Appendix B apply to this order.

The services performed herein were done in accordance with LTI's Quality System Program Manual, Revision 21, dated 5/1/2019, and within the scope of our ISO/IEC 17025:2017 accreditation. These results relate only to the items tested, and this report shall not be reproduced, except in full, without the written approval of Laboratory Testing, Inc. The services provided on this test report have been performed in conformance with the customer's purchase order requirements. L.T.I. is accredited by Nadcap for NDT and Materials Testing for the test methods and specific services as listed in the Scopes of Accreditation available at https://www.labtesting.com. The results reported on this test report represent the actual attributes of the material tested and indicate full compliance with all applicable specification and contract requirements. This is a shared risk decision rule in which the customer also has responsibility for determining acceptance of the results.

MERCURY CONTAMINATION: During the testing and inspection, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing devices employing a single boundary of containment.

NOTE: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statutes.

Authorized By: Cindy Heckler

Digitally Signed By: Cynthia Heckler, QA Supervisor

LABORATORY TESTING INC.

Laboratory Test Report

ACCREDITED Cert. #0117.02, #0117.05

LTI Order: CO23013099 | SampleID: 23-13829 **Revision: 0 | Rev. Date: 04/24/2023**

LTI Job: J230026261 **TENSILE TEST, ROUND, 0.505**

TENSILE TEST:LONGITUDINAL

APPLICABLE SPECIFICATIONS: ASME SB691, 2021 Edition, No Addenda, N08367, REDRAWN, CUSTOMERS REQUREMENTS

KEY: C - Conforms NC - Non-Conformance R - Report for Information

SPECIMEN ID	(ksi) TENSILE STRENGTH	(ksi) YIELD STRESS (0.2% OFFSET)	FRACTURE LOCATION	KEY (C/NC/R)
REQUIRED	Min	Min	Report	
	95	45		
23-13829-1	155	140	Middle 50% of GL	C

Date Complete	Technician	Procedure Name	Procedure Title	Revision	Rev. Date	Addenda
04/19/2023	Anthony Maiolino	86-TT-2	Room Temp. Tensile Test for Metallic Materials	17	08/12/2021	Base

LABORATORY TESTING INC.

Laboratory Test Report

ACCREDITED

LTI Order: CO23013099 | SampleID: 23-13829

Revision: 0 | Rev. Date: 04/24/2023

LTI Job: J230026262

AES + NITROGEN, CHEMICAL ANALYSIS

CHEMICAL ANALYSIS:

APPLICABLE SPECIFICATIONS: ASME SB-691, 2021 Edition, UNS N08367

KEY: C - Conforms NC - Non-Conformance R - Report for Information

	REQUIREMENTS		
ELEMENT	MIN	MAX	23-13829-1
C		0.030%	0.015%
Cr	20.00%	22.00%	20.47%
Cu		0.75%	0.17%
Fe	REMAINDER		47.74%
Mn		2.00%	0.37%
Mo	6.00%	7.00%	6.14%
N	0.18%	0.25%	0.22%
Ni	23.50%	25.50%	24.16%
P		0.040%	0.016%
S		0.030%	<0.001%
Si		1.00%	0.30%
KEY (C/NC/R):			C

Date Complete	Technician	Procedure Name	Procedure Title	Revision	Rev. Date	Addenda
04/24/2023	Zachary Buckley	86-SCA-0	Direct Reading Atomic Emissions Spectroscopy	24	07/14/2022	Base

----- END REPORT -----

----- NEW REPORT ON NEXT PAGE -----

LABORATORY TESTING INC.

Laboratory Test Report

ACCREDITED Cert. #0117.02, #0117.03

LTI Order: CO23013099 | SampleID: 23-13830 **Revision: 0 | Rev. Date: 04/24/2023**

LTI Customer Order	Customer PO	Ship Via	Customer Address	Ship To
CO23013099	253993	EMAIL	EST Group 2701 Township Line Road Hatfield, PA 19440 ATTN David Pierce	EST Group 2701 Township Line Road Hatfield, PA 19440 ATTN David Pierce

Customer Sample Information:

LTI Sample ID	Qty	Sample No.	Sales Order No.	Material	Description	Size	Heat No.	Drawing No.
23-13830	1	1 of 1	325549	ASME SB-691 UNS N08367 Latest Edition	AL6XN SS Rod	5/8" Dia	C1H05	02392210

The provisions of 10CFR21 and 10CFR50, Appendix B apply to this order.

The services performed herein were done in accordance with LTI's Quality System Program Manual, Revision 21, dated 5/1/2019, and within the scope of our ISO/IEC 17025:2017 accreditation. These results relate only to the items tested, and this report shall not be reproduced, except in full, without the written approval of Laboratory Testing, Inc. The services provided on this test report have been performed in conformance with the customer's purchase order requirements. L.T.I. is accredited by Nadcap for NDT and Materials Testing for the test methods and specific services as listed in the Scopes of Accreditation available at https://www.labtesting.com. The results reported on this test report represent the actual attributes of the material tested and indicate full compliance with all applicable specification and contract requirements. This is a shared risk decision rule in which the customer also has responsibility for determining acceptance of the results.

MERCURY CONTAMINATION: During the testing and inspection, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing devices employing a single boundary of containment.

NOTE: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statutes.

Authorized By: Cindy Heckler

Digitally Signed By: Cynthia Heckler, QA Supervisor

LABORATORY TESTING INC.

Laboratory Test Report

ACCREDITED
Cert. #0117.02, #0117.03

LTI Order: CO23013099 | SampleID: 23-13830

Revision: 0 | Rev. Date: 04/24/2023

LTI Job: J230026263

AES + NITROGEN, CHEMICAL ANALYSIS

CHEMICAL ANALYSIS:

APPLICABLE SPECIFICATIONS: ASME SB-691, 2021 Edition, UNS N08367

KEY: C - Conforms NC - Non-Conformance R - Report for Information

	REQUIREMENTS		
ELEMENT	**MIN**	**MAX**	**23-13830-1**
C		0.030%	0.016%
Cr	20.00%	22.00%	20.35%
Cu		0.75%	0.24%
Fe	REMAINDER		47.60%
Mn		2.00%	0.38%
Mo	6.00%	7.00%	6.14%
N	0.18%	0.25%	0.22%
Ni	23.50%	25.50%	24.25%
P		0.040%	0.017%
S		0.030%	<0.001%
Si		1.00%	0.31%
KEY (C/NC/R):			**C**

Date Complete	Technician	Procedure Name	Procedure Title	Revision	Rev. Date	Addenda
04/24/2023	Zachary Buckley	86-SCA-0	Direct Reading Atomic Emissions Spectroscopy	24	07/14/2022	Base

LABORATORY TESTING INC.

Laboratory Test Report

ACCREDITED Cert. #0117.02, #0117.03

LTI Order: CO23013099 | SampleID: 23-13830

Revision: 0 | Rev. Date: 04/24/2023

LTI Job: J230026264

TENSILE TEST, ROUND, 0.357

TENSILE TEST:LONGITUDINAL

APPLICABLE SPECIFICATIONS: ASME SB691, 2021 Edition, No Addenda, N08367

KEY: C - Conforms NC - Non-Conformance R - Report for Information

SPECIMEN ID	(ksi) TENSILE STRENGTH	(ksi) YIELD STRESS (0.2% OFFSET)	(%) ELONGATION IN 4D (MANUAL)	FRACTURE LOCATION	KEY (C/NC/R)
REQUIRED	Min	Min	Min	Report	
	95	45	30		
- 23-13830-1	110	59.5	52.0	Middle 50% of GL	C

Date Complete	Technician	Procedure Name	Procedure Title	Revision	Rev. Date	Addenda
04/19/2023	Anthony Maiolino	86-TT-2	Room Temp. Tensile Test for Metallic Materials	17	08/12/2021	Base

LABORATORY TESTING INC.

Laboratory Test Report

ACCREDITED Cert. #0117.02, #0117.05

LTI Order: CO23013099 | SampleID: 23-13830

Revision: 0 | Rev. Date: 04/24/2023

LTI Job: J230026265

HARDNESS TEST ROCKWELL/SUPERFICIAL AVG 4

HARDNESS TEST:

APPLICABLE SPECIFICATIONS: Customer's instructions

KEY: C - Conforms NC - Non-Conformance R - Report for Information

SPECIMEN ID	HARDNESS READINGS				SCALE	AVG.	SCALE	KEY (C/NC/R)
REQUIRED	REPORT	REPORT	REPORT	REPORT				
23-13830-1	93	94	93	92	HRBW	93	HRBW	R

Date Complete	Technician	Procedure Name	Procedure Title	Revision	Rev. Date	Addenda
04/21/2023	James Wlotko	RH-G	Procedure for Rockwell and Superficial Hardness Testing	23	11/09/2022	Base

SOLAR ATMOSPHERES
1969 Clearview Road, Souderton PA 18964

Solar Atmospheres, Inc.
Certification

Order No.: 434111
Date: 04/21/2023
Entry Date: 04/20/2023

To:
EST GROUP
2701 TOWNSHIP LINE RD
HATFIELD, PA 19440

Purchase Order No.: 254020
Packing List No.:
1 **Material:** AL-6XN

All work performed subject to Solar Atmospheres Terms Of Sale as presented on form TOS-SAI.

Quantity	Part Number / Part Name / Part Description	Pounds
1	AL-6XN M09205 02392213 RINGS (1 LOT) SO# 325549 HT# C1H05 .555	

Insp. Type	Scale	Minimum	Maximum	Number	Other
Customer Requirements:					
Hardness	HR30T		64.		
Results:					
Hardness	HR15T	78.	79.2		
Hardness	HR30T	52.	54.		per ASTM E140-12b; Table 1

This certifies that, per Solar Atmosphere Quality Manual Rev. 26 dated 05/02/2022, the parts listed on the purchase order above have not been chemically altered and were annealed I.A.W. Solar Atmospheres process H6109 as follows;

1. Heated in nitrogen partial pressure to 2075°F±25°F.
2. Held for 30-45 minutes.
3. Nitrogen cooled to below 175°F.

Note: The hardness shown is for reference only, these parts may be under the minimum size requirements of ASTM E-18 for proper spacing of hardness indentations. Hardness testing was performed at EST Group's request.

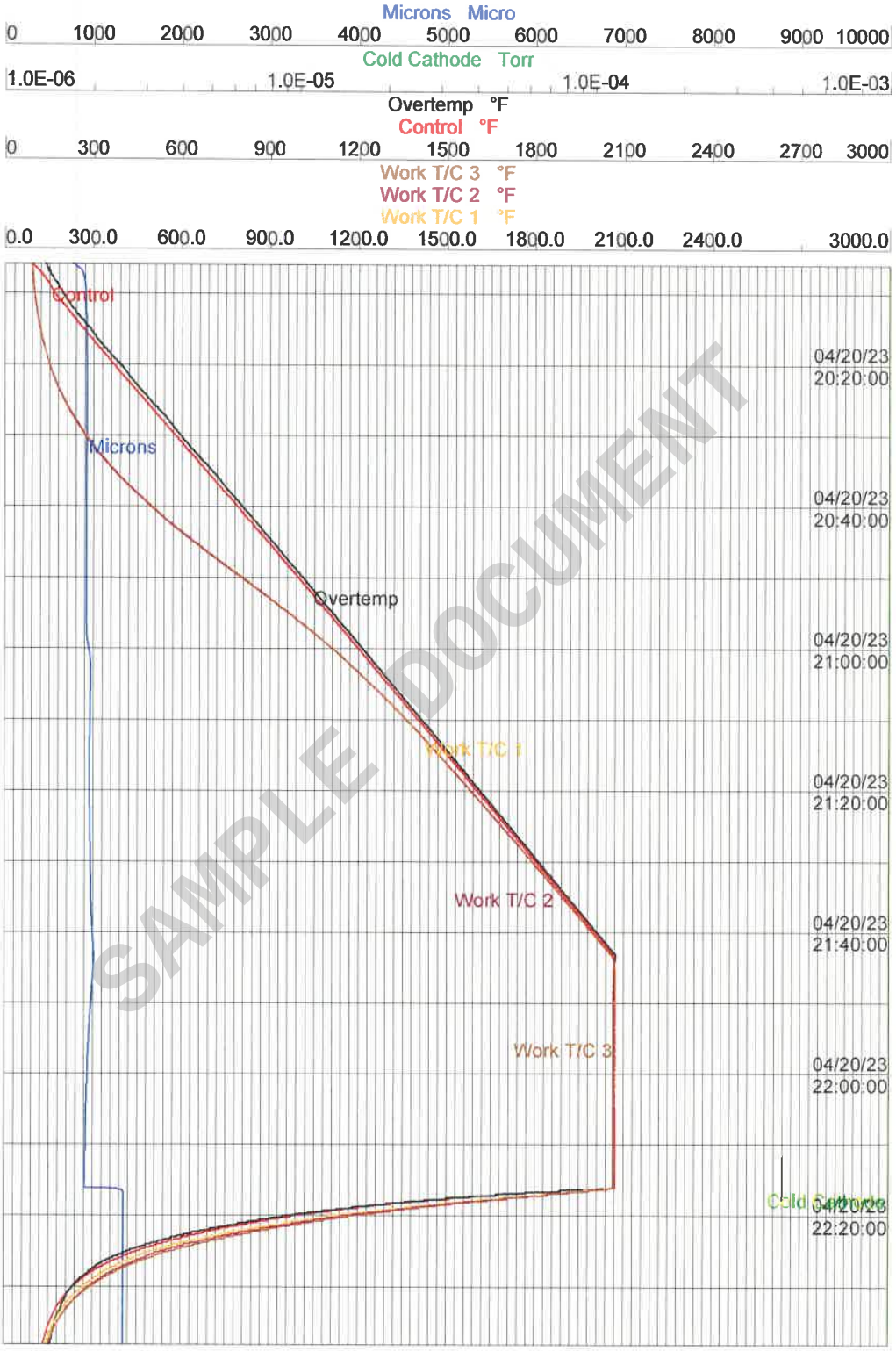
MedAccred Heat Treating
Nadcap Administered by PRI ACCREDITED HEAT TREATING

Dante Melcher
Quality Technician
SOLAR ATMOSPHERES INC

This certification is no guarantee of material performance, properties, or microstructure. Mechanical, physical, and/or metallurgical testing is not performed unless specifically itemized on your purchase order.

Use of mercury or mercury-bearing devices is prohibited. The recording of false, fictitious or fraudulent statements on this document may be punishable as a felony under Federal Statute.

1969 Clearview Road Souderton PA 18964 **Phone:** 215-721-1502 **Fax:** 215-723-6460



04/20/23 20:06:00
4/21/2023 6:42:01 AM

EST Group SO# 434111

HT-129, Solar Atmospheres Souderton, Pa 18964

04/20/23 22:38:15
Page 1 of 1

4/21/2023, 6:42:32 AM

EST GROUP_AL-6XN_434111-01

SOLAR ATMOSPHERES

Device	AT130	**SN**	T-2
CUSTOMER	EST GROUP	**S O #**	434111
P O #	254020	**MATERIAL**	AL-6XN
PROCESS	FINAL INSPECTION	**Operator**	JWW
PART NO.	02392213	**LOAD NO.**	

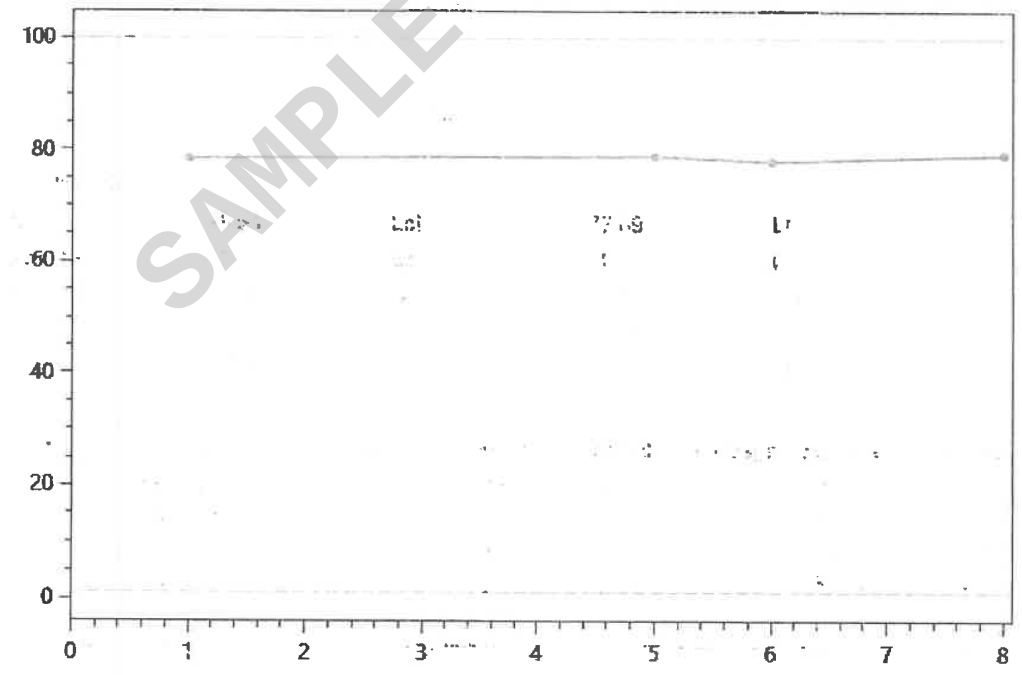
Tolerances

L	1
H	100

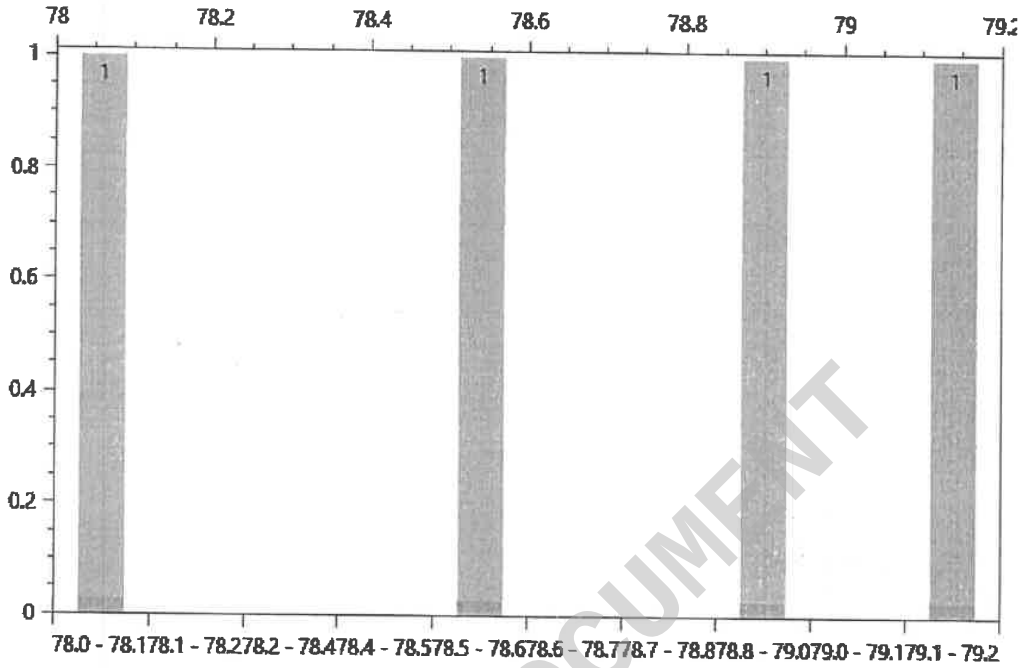
Statistics (n - 1)

Avg	78.65	**Lci**	77.09	**LL**	0
StdDev	0.52	**Uci**	80.21	**L**	0
Min	78	**Cp**	31.75	**OK**	4
Max	79.2	**Cpk**	13.7	**H**	0
Range	1.2			**HH**	0
Total	4				

#	Date	Grad.	Value	Cal.Tol.	Average	Sec.Grad.	Sec.Value
1	21/04/2023 03:30:15	HR15T	78.5	OK		HR30T	53.0
5	21/04/2023 03:33:33	HR15T	78.9	OK		HR30T	53.8
6	21/04/2023 03:34:40	HR15T	78.0	OK		HR30T	51.5
8	21/04/2023 03:36:05	HR15T	79.2	OK		HR30T	54.4



eStat - ver.1.2.11



G & S Bar and Wire, LLC
4000 E. Lincoln Way
Wooster, OH 44691
PHN 330.263.0564
barandwire.com

G&S BAR AND WIRE

CERTIFICATE OF TESTS
EN 10204 3.1

CUSTOMER:	EST GROUP, INC.	DATE:	DECEMBER 12, 2022
CUST. PO:	252945	G&S SO:	SO-1002917
		G&S BA:	BA-1032050

MATERIAL DESCRIPTION	WEIGHT/QUANTITY
.875" X R/L AL-6XN	270.00 LBS

SPECIFICATIONS	HEAT NUMBER
120 KSI MIN. YIELD	C2H15

CHEMICAL COMPOSITION

C .01	Mn .34	P .017	S < .001	Si .29
Cr 20.31	N .22	Ni 23.94	Mo 6.19	Cu 0.17
Fe BALANCE				

MECHANICAL PROPERTIES

TENSILE STRENGTH [KSI]. 151.2
YIELD STRENGTH [KSI]. 141.0
ELONGATION % 4D . 24.0
REDUCTION OF AREA % . 80.0
SURFACE RMS .
BETA TRANSUS TEMP .
HEAT TREAT TEM/TIME .
MACRO/MICRO STRUCTURE .
EDDY CURRENT TEST .
MELT SOURCE .
CONDITION SHIPPED . COLD DRAWN, COLD STRAIGHTENED, CLEANED

received
12-14-22
PO#252945

NO WELD REPAIR WAS DONE TO THIS MATERIAL WHILE AT G&S BAR AND WIRE

THIS STATEMENT IS TO CERTIFY THAT THE ABOVE MATERIAL HAS NOT COME INTO CONTACT WITH MERCURY OR ANY OF ITS ALLOYS OR ANY RADIOACTIVE ELEMENTS WHILE AT G&S BAR AND WIRE LLC. WE ALSO CERTIFY THAT THE ABOVE MATERIAL MEETS ALL REFERENCED SPECIFICATIONS AND CUSTOMER PURCHASE ORDER REQUIREMENTS UNLESS OTHERWISE NOTED.

MARK ROBBINS / QUALITY ASSURANCE

ISO 9001 and AS 9100 certified
GS-01 004 REV. B QE

ATI Specialty Materials

4374 Lancaster Highway,
Richburg, SC 29729
US

CERTIFICATE OF TEST

Cert No.405744 Rev.1

Carol H. Rodriguez\es
Certification Auditor
Date : December 30, 2021

Batch - 279891
Heat - C1H05
Ingot - 3

Customer Name & Address	Purchase Order No	Purchase Order Line No	Sales Order No	Sales Order Line No
Rolled Alloys PO Box 310 125 West Sterns Road Temperance MI 48182 US	0196528-HOU	3	141547	2.1

Size (in)	Cross section	No Pcs	Weight (lbs)	Alloy
0.6250	Round	129	1,748	AL-6XN® Alloy

Specifications

Spec Name	Rev	Class	Compliance Condition
ASME II SA-479/479M	2019	UNSNBR=N08367	Compliant
ASME II SB-691	2019	UNSNBR=N08367	Compliant
ASTM A479/A479M	2020	UNSNBR=N08367	Compliant
ASTM B691	2018	UNSNBR=N08367	Compliant
EN 10204	10-2004		Compliant
NACE MR0103	2012		Compliant
NACE MR0175/ISO 15156	2		Compliant
SECTION 17052	A	UNS NUMBER=N08367	Compliant

Remarks:
Material certified in accordance with EN 10204 Type 3.1.

As Shipped Condition

Heat Treat	Heat Treat Cycles	Hot Work Type
Solution Annealed	Heat To 2025 F Hold 1 Hr(s) No Soak Water Quench	Rolled

Surface Finish
Centerless Ground

Remarks:
Cold Finished

Melt Method Details

	Facility	Address
Primary Melt Electric Arc Furnace/Argon Oxygen Decarburization	ATI Latrobe Operations	242 Allvac Lane, Latrobe, PA 15650 US
Remelt Electroslag Remelt	ATI Lockport Operations	695 Ohio Street, Lockport, NY 14094 US

Conversion Method Details

Conversion Type	Facility	Address
Rolling	ATI Richburg Operations	4374 Lancaster Highway, Richburg, SC 29729 US

ROLLED ALLOYS
Receiving Inspection
By: Wm
Date: 1/10/21

HEAT # C1H05-3
TRACER # 0640608US

ATI Specialty Materials-4374 Lancaster Highway,Richburg, SC 29729 US

Batch - 279891 Heat - C1H05 Ingot - 3

CHEMISTRY

Sample Source			Heat Average
Test Facility			ATI Monroe Operations
Elements	UOM	Method	Average
C	%	CS	0.015
Mn	%	XRF	0.35
P	%	XRF	0.019
S	%	CS	<0.001
Si	%	XRF	0.29
Cr	%	XRF	20.28
N	%	GAS	0.22
Ni	%	XRF	23.97
Mo	%	XRF	6.18
Fe	%	XRF	Balance
Cu	%	XRF	0.26

Remarks:
CS = Combustion/IR Detection
GAS = Inert Gas Fusion
XRF = X-Ray Fluorescence

Remarks:
The PREN (Pitting Resistance Equivalent Number) is equal to 47.3.
PREN = %Cr + (3.3 x %Mo) + (30 x %N) > 46.5

Test Methods: C/S/O/N = ASTM E1019 (2018); XRF = ASTM E572 (2013), ASTM E1085 (2016), ASTM E2465 (2019); OES = ASTM E415 (2017), ASTM E1086 (2014), ASTM E3047 (2016); ICP = ASTM E2594 (2020); Mass Spec. = ASTM E2823 (2017); GFAA = ASTM E1834 (2018)

MECHANICAL

As Shipped

Plant: 2025F,1hr,WQ

Tensile

Piece ID	Sample Direction	Sample Location	Test Temperature	Ultimate Strength (psi)	.2% Yield Strength (psi)	4D-Elongation (%)	Reduction of Area (%)	Initial Gage Length (in)	Initial Diameter (in)	Crosshead Speed	Strain Rate (in/in/min)	Test Facility
1	L	C	ROOM	111,425	57,100	59.9	83.7	0.998	0.2535	0.05	0.003	ATI Monroe Operations

Remarks:
ASTM E8/E8M (2021)
Elongation determined after fracture.

Hardness

Piece ID	Sample Direction	Sample Location	Hardness Value (Rockwell)	Hardness Type	Test Facility
1	T	MR	95	HRBW	ATI Monroe Operations

Remarks:
ASTM E18 (2020)

Piece ID	Sample Direction	Sample Location	Hardness Value (HBW)	Test Facility
1	T	MR	184	ATI Monroe Operations

Remarks:
ASTM E10 (2018)

Remarks:
L = Longitudinal
T = Transverse
C = Center
MR = Mid-Radius

HEAT # C1H05-3
TRACER # 0640608US

METALLOGRAPHY

As Shipped

Plant: 2025F,1hr,WQ

Grain Size

Piece ID	Sample Direction	Sample Location	Structure Type	Duplex Condition	Coarse ASTM	ALA	Etchant	Magnification	Test Facility
1	L	S	Duplex	ALA	3.5	0.5	Modified Kallings / Super	100X	Acuren

continued...

Cert No.405744 Rev.1

ATI Specialty Materials-4374 Lancaster Highway,Richburg, SC 29729 US

Batch - 279891 **Heat - C1H05** **Ingot - 3**

Remarks:

Average Grain Size Test Method = ASTM E112 (2013)

Results reported for information only.

Non-Metallic Structure

Remarks:

Microstructure evaluated at 200X Magnification with Oxalic Etchant in accordance with referenced specifications and found acceptable.
Test Facility: Acuren

Remarks:

Microstructure evaluated at 200X Magnification unetched in accordance with referenced specifications and found acceptable.
Test Facility: Acuren

Remarks:

L = Longitudinal

S = Surface

Outside Source Addresses

Outside Testing Laboratory

Facility	Address
ATI Monroe Operations	2020 Ashcraft Avenue, Monroe, NC 28110 USA
Acuren	4374 Lancaster Hwy., Richburg, SC 29729 USA

Subcontracted Operations

Facility	Address
Voestalpine	2306 Eastover Drive PO Box 447, South Boston, Virginia 24592 USA

Other Attached Files

Attached File Description(s):

1) Photo-1

2) Photo-2

3) Photo-3

Special Remarks

NAFTA country of origin: USA

Remarks

Material has been produced, sampled, inspected and tested in accordance with the acknowledged customer purchase order and referenced specifications and conforms to the requirements unless otherwise noted in this Certificate of Test or in other communications regarding purchase order clarifications, specification exceptions, or long term agreements."

If customer purchase order does not specifically reference a revision to a specification, ATI Specialty Materials will work to the latest revision on file and in effect at the time of order placement.

ATI Specialty Materials has complied with all producer requirements of AS6279.

Any chemical elements analyzed and found to have values below the actual limits of detection may be reported as < less than or reported at the detection level.

When values are reported to the significant places called for in the specifications, rounding will be done in accordance with ASTM E29.

This is to certify that during the manufacturing, handling, testing and inspection, this material did not come in direct contact with mercury or any device employing a single boundary of containment.

ATI Specialty Materials products have not come in contact with radioactive materials during manufacturing or processing.

No weld repair has been performed on this material.

Material melted and manufactured in the United States of America unless otherwise noted in this Certificate of Test.

Material Safety Data Sheets (MSDS) - View or print from our site: www.atimetals.com
Printed copies are available upon request from the ATI Specialty Materials Sales Department.

ATI Specialty Materials certifies that it has procedures in place to provide reasonable assurance that any non-scrap/non-recycled Conflict Minerals (Columbite-Tantalite/Coltan and its derivative metal Tantalum; Cassiterite and its derivative metal Tin; Wolframite and its derivative metal Tungsten; and Gold) included in the materials supplied under this purchase order do not originate from the Democratic Republic of Congo or specified adjoining countries (Covered Countries) as defined by and in accordance with Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2012. ATI Specialty Materials will provide a CMRT form annually upon request.

Note: The recording of false, fictitious, or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.

TR#

064060 8US

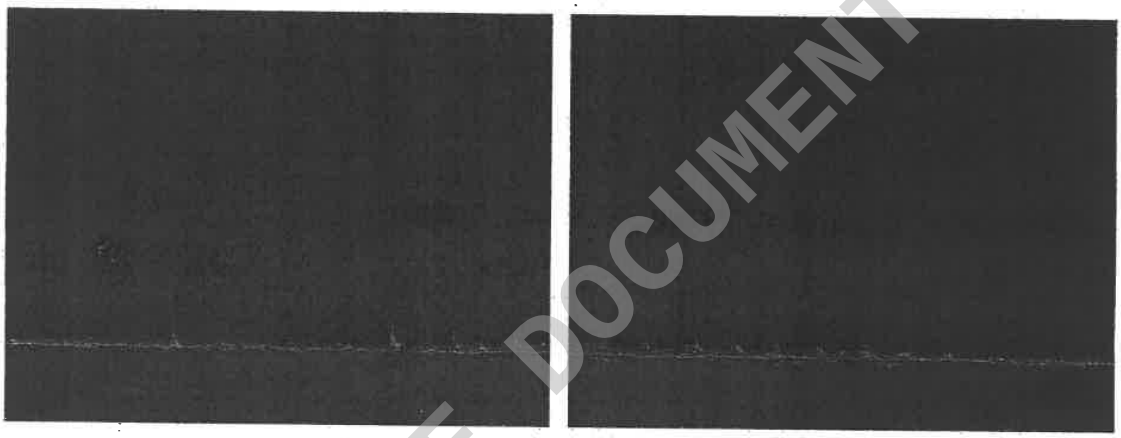
Cert No:405748 Rev.1

ATI Specialty Materials-4374 Lancaster Highway,Richburg, SC 29729 US

Batch - 279891 **Heat - C1H05** **Ingot - 3**

ATI Specialty Materials

CERTIFICATE OF TEST



LOCATION:	1 S	LOCATION:	1 S
MOUNT NO:	284171	MOUNT NO:	284171
MAGNIFICATION:	50X	MAGNIFICATION:	100X

Batch: / Heat: / Grade: / Size: 279891 C1H05 828 0.625

Technican: TERRI DEASON

Date: 12/30/2021

Direction: LONG

LIMS ID: 101779842

Etchant: OXALIC

QF 375-073 Rev. B (02/06/2001)

NOTE LOCATION: S=Surface/MR=MID-RADIUS/C=CENTER
NOTE Direction: LONG=Longitudinal/TRANS=TRANSVERSE

The recording of false, fictitious, or fraudulent statements or entries on this document may violate Federal statutes, including but not limited to Title 18, Chapter 47 of the United States Code, and may be punishable as a felony.

TR#

064068 US

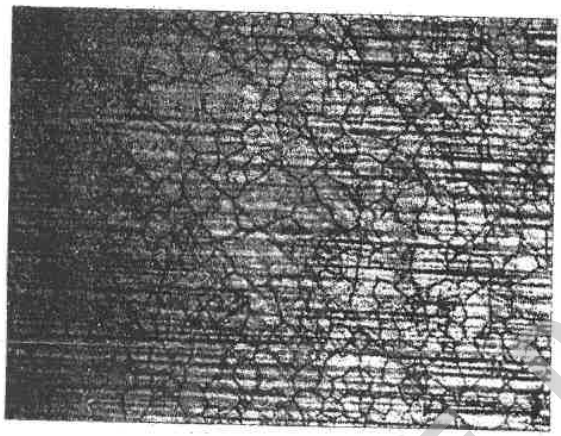
Cert No:405744 Rev.1

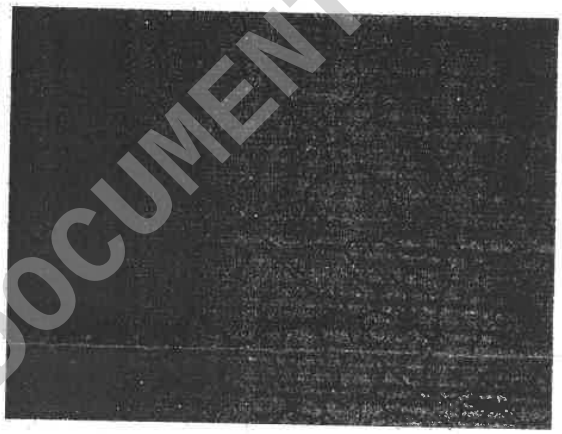
ATI Specialty Materials-4374 Lancaster Highway,Richburg, SC 29729 US

Batch - 279891 **Heat - C1H05** **Ingot - 3**

ATI Specialty Materials

CERTIFICATE OF TEST





LOCATION:	1 MR
MOUNT NO:	284172
MAGNIFICATION:	50X

LOCATION:	1 MR
MOUNT NO:	284172
MAGNIFICATION:	100X

Batch: / Heat: / Grade: / Size: 279891 C1H05 828 0.625

Direction: LONG

LIMS ID: 101779842

Etchant: OXALIC

Technican: TERRI DEASON

Date: 12/30/2021

QF 375-073 Rev. B (02/06/2001)

NOTE LOCATION: S=Surface/MR=MID-RADIUS/C=CENTER
NOTE Direction: LONG=Longitudinal/TRANS=TRANSVERSE

The recording of false, fictitious, or fraudulent statements or entries on this document may violate Federal statutes, including but not limited to Title 18, Chapter 47 of the United States Code, and may be punishable as a felony.

TR#

064068US

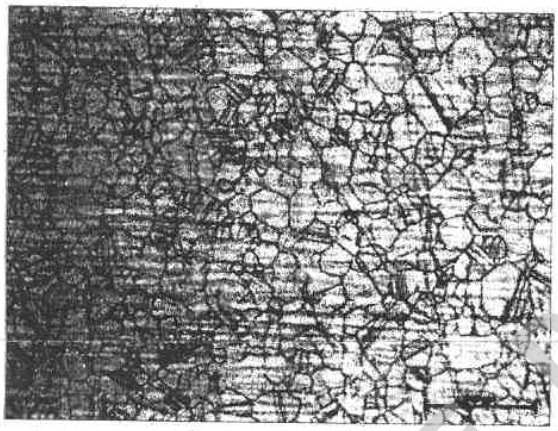
Cert No.405744 Rev.1

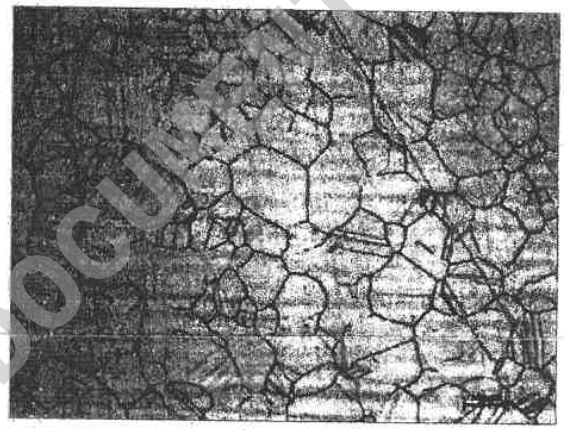
ATI Specialty Materials-4374 Lancaster Highway,Aichburg, SC 29729 US

Batch - 279891 **Heat - C1H05** **Ingot - 3**

ATI Specialty Materials

CERTIFICATE OF TEST





LOCATION:	1 C	LOCATION:	1 C
MOUNT NO:	284173	MOUNT NO:	284173
MAGNIFICATION:	50X	MAGNIFICATION:	100X

Batch: / Heat: / Grade: / Size: 279891 C1H05 828 0.625

Technican: TERRI DEASON

Date: 12/30/2021

Direction: LONG

LIMS ID: 101779842

Etchant: OXALIC

QF 375-073 Rev. B (02/06/2001)

NOTE LOCATION: S=Surface/MR=MID-RADIUS/C=CENTER
NOTE Direction: LONG=Longitudinal/TRANS=TRANSVERSE

TR#

064068US

Cert No.405744 Rev.1