



Titanium Metals Corporation

Approved Certificate

100 Titanium Way
Toronto, OH, 43964

Telephone (740) 537-5694, Fax (740) 537-5633

Page 1 of 6

CERT ID
H32659-A01
15-JAN-2020 16:12:31 GMT

SOLD TO CUSTOMER
TIMET Service Center St. Louis
1250 Interstate Drive, Wentzville, MO 63385

PURCHASE ORDER 20187201

HEAT NUMBER
H32659 ✓

GRADE
TIMETAL®6-4 ✓

SHIP TO ADDRESS
TIMET Service Center St. Louis
1250 Interstate Drive, Wentzville, MO 63385

TEST NUMBER
S18090

PRODUCT DESCRIPTION
0.016" SQ Sheet ✓

DELIVERY CONDITION
Annealed ✓

Specifications

This material complies with the following specifications:

- ✓ AMS 4911 P
- ✓ AMS-T-9046 A AB-1 Cond A
- ✓ ASTM B 265 -15 Gr. 5
- ASTM F 1472 -14
- BS 2TA59 2009
- BS 7252 PART 3 1997
- DMS 1592 H
- ISO 5832-3 7/1/96
- ✓ MIL-T-9046 J AM 2 AB-1 Cond A

Supra Alloys

PO#: 14936
Tag#: 60612
Approved By: EH

Melt Method	Melt/Process Location
3-VAR	TIMET - Henderson, NV, USA / TIMET - Toronto, OH, USA

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Compliance Statements

1. Surface free from alpha case and product conforms to the other technical requirements of the referenced specification(s).
- ✓ 2. During the manufacturing process, this material has not come in contact with mercury or radioactive luminescent materials; as such, it is certified to be free of mercury and radioactivity.
- ✓ 3. Microstructure examined and acceptable to the order specifications.
4. Bend testing performed meets or exceeds the requirements of the ordered specifications.
5. TIMET-Toronto is an approved supplier of this product per DMS QPL 1592 Issue 19. Ingot melted in accordance with DMS 2442E R-1; TIMET-Henderson, NV, is an approved ingot source per DMS QPL-2442 Issue 20.
6. No weld repair has been performed on this material.
- ✓ 7. Material complies with DFARS 252.225-7008.
8. Material certificate in compliance with EN 10204:2004 Type 3.1.
9. The recording of false, fictitious, or fraudulent statements or entries on this document may be punishable as a felony under Federal Statutes including federal law, Title 18, Chapter 47.
- ✓ 10. TIMET-Toronto has complied with all metal stock producer requirements of AS6279 B.
11. TIMET-Toronto has a Quality Management System that is in compliance with ISO 9001:2015, and AS 9100:2016 Revision D. (AS9100 certificate is available at www.timet.com)
12. Customer will accept TIMET EXCEPTION to microstructure requirements of BS 7252 PART 3 & ISO 5832-3.
13. Material produced and controlled in accordance with PWA 300 Revision BP.
14. Material produced and controlled in accordance with PW-QA 6088 Revision 30.
15. Material processed in accordance with PWA MCL F-14 D.
16. Material produced and controlled in accordance with PWA MCL Manual Section F-22 Revision B.
17. Material testing performed in accordance with PWA MCL Manual Section F-23 Rev G.
18. TIMET has a quality program which meets the requirements of United Technologies ASQR-01, Revision 11, Type 6.
19. This material is capable of the service center providing LCS compliance.

Ingot Chemical Analysis ✓
(Weight percent)

Unless otherwise noted, Ingot Chemical Analysis performed at Henderson Process Lab, 181 N. Water Street, Henderson, NV, 89015, USA

	Fe	V	Al	C	O	N	Y	BT
Sample ID								
TOP	0.20	4.02	6.40	0.024	0.17	0.007	<0.0004	1834
BOTTOM	0.18	3.99	6.50	0.017	0.16	0.007	<0.0004	1828

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Product Analysis ✓
(Weight percent)

Unless otherwise noted, Product Analysis performed at Toronto Laboratory, 100 Titanium Way, Toronto, OH, 43964, USA

H

Sample ID

35	106
40	95

Chemistry Statements

1. Hydrogen values reported in PPM. Hydrogen determined by inert gas fusion per ASTM E1447. Carbon determined by combustion per ASTM E1941. Oxygen and Nitrogen determined by inert gas fusion per ASTM E1409. Henderson Melt: Metallics determined by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES) per ASTM E2371. Morgantown Melt: Copper and Boron by atomic spectrometry (ingot only) and all other elements by x-ray fluorescence spectrometry.
2. Residual elements each less than 0.10% maximum, 0.40% maximum total.
3. Balance titanium.

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Mechanical Properties ✓

Unless otherwise noted, testing performed at Toronto Laboratory, 100 Titanium Way, Toronto, OH, 43964, USA.

Bend Test, L-Direction, R/T, (ASTM E 290)

BF 4.5

Test Condition: [MILL] Annealed 30 Minutes @ 1400°F, AC

20X105

Sample ID	P/F
35/40	PASS

Bend Test, T-Direction, R/T, (ASTM E 290)

BF 4.5

Test Condition: [MILL] Annealed 30 Minutes @ 1400°F, AC

20X105

Sample ID	P/F
VARIOUS	PASS

Bend Test, T-Direction, R/T, (ASTM E 290)

BF 4.5

Test Condition: [MILL] Annealed 30 Minutes @ 1400°F, AC

10X180

Sample ID	P/F
VARIOUS	PASS

RTT - Longitudinal (ASTM E 8) After Fracture

Test Condition: [MILL] Annealed 30 Minutes @ 1400°F, AC

0.2YS	U.T.S.	2inEL	EL 5.65A
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Sample ID	ksi	ksi	%	%
35	138	147	14	17
40	140	149	12	18

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RTT - Transverse (ASTM E 8) After Fracture

Test Condition: [MILL] Annealed 30 Minutes @ 1400°F, AC

0.2YS U.T.S. 2inEL EL 5.65A

Sample ID	ksi	ksi	%	%
35	139	148	12	17
40	140	150	10	15

Metallurgical Properties

Unless otherwise noted, testing performed at Toronto Laboratory, 100 Titanium Way, Toronto, OH, 43964, USA

Micro Exam - Transverse

ETTC4,KROLLS,100X

Test Condition: [MILL] Annealed 30 Minutes @ 1400°F, AC

MT-PRE MT-OCC OVERALL

Sample ID	Micr	Micr	P/F
35	P3	-	PASS
40	P3	-	PASS

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Tests on Other Material

Unless otherwise noted, testing performed at Toronto Laboratory, 100 Titanium Way, Toronto, OH, 43964, USA

Batch: H32090-F01 (S17872)
Bend Test, T-Direction, R/T, (ASTME 290)
BF 4.5
Test Condition: Periodic Test: [MILL] Annealed 30 Minutes @ 1400°F, AC + [LAB] Annealed 20 Minutes @ 1325°F, AC

20X105

Sample Id **bend**
54 PASS

Batch: H32090-F01 (S17872)
RTT - Longitudinal (ASTME 8) After Fracture
Test Condition: Periodic Test: [MILL] Annealed 30 Minutes @ 1400°F, AC + [LAB] Annealed 20 Minutes @ 1325°F, AC

0.2YS U.T.S. 2inEL

Sample Id	ksi	ksi	%
54	138	147	10

Results are from TIMET Quality Control Records on file
Sales Order # 586544 Item # 10
v.1

Michael Giovannone



Michael Giovannone
2020.01.15 11:13:23
-05'00'

Michael Giovannone - Certification Specialist

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St. Louis Mill Sales
 1250 Interstate Drive
 WENTZVILLE MO 63385
 USA
 Tel:800-753-1550 Fax:636-887-9098
 Shipping Plant: St. Louis Service Center

Attachment to Product Certification

Customer P.O. Number/Date

TIMET Sales Order Number/Date

586337/Jun 12, 2019

TIMET Packing List Number/Scheduled Ship Date

80938310/Jan 31, 2020

TIMET Internal Revision #: 6

TIMET Item #	Material #	Material Description	Quantity	Weight
Customer Item #	Customer Material #			
000010	125057	TIMETAL® 6-4 Titanium Aero Sheet		
Specifications		<input checked="" type="checkbox"/> 01 AMS4911P <input type="checkbox"/> 02 AMS4911N <input type="checkbox"/> 04 ASTM F 1472 * -14 <input type="checkbox"/> 05 DMS 1592 * H <input checked="" type="checkbox"/> 06 AMS-T-9046 * A AB-1 COND A <input checked="" type="checkbox"/> 07 MIL-T-9046J AM2 AB-1 COND A <input type="checkbox"/> 08 CMMP015 * REV E <input checked="" type="checkbox"/> 09 AS6279 * A		
Tolerances		<input checked="" type="checkbox"/> GAUGE TOLERANCE +/- .002" <input type="checkbox"/> SUPPLY FROM ONE HEAT		
Batch Number		H32090-Y08	3.000PC	26.000LB
Batch Dimensions		: 0.016" X 36.000" X 96.000"		
Batch Number of Pieces		: 3.000		
Country of Origin		: USA		
Heat Number		: H32090-		
Test Number		: S17870		
Batch Number		H32659-Y08	23.000PC	213.000LB
Batch Dimensions		: 0.016" X 36.000" X 96.000"		
Batch Number of Pieces		: 23.000		
Country of Origin		: USA		
Heat Number		: H32659-		
Test Number		: S18090		
Batch Number		H32090-Y07	45.000PC	415.000LB
Batch Dimensions		: 0.016" X 36.000" X 96.000"		
Batch Number of Pieces		: 45.000		
Country of Origin		: USA		
Heat Number		: H32090		
Test Number		: S17872		



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Customer P.O. Number/Date

TIMET Sales Order Number/Date

586337/Jun 12, 2019

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80938310/Jan 31, 2020

TIMET Internal Revision #: 6

TIMET Item #	Material #	Material Description	Quantity	Weight
Customer Item #	Customer Material #			

B-Additional customer req
 PLEASE CLEARLY STENCIL OR MARK "FOR SUPRA ALLOYS" ON ALL PACKAGES AND SKIDS

GEAE S-400 Approved Laboratory
 GEAE S-1000 Supplier Quality Req'ts
 RR9000: SABRE

ALL MATERIAL PRODUCED IAW D1-4426 * WEB

SUPRA Quality Clauses FM_PURSUPRA-01 C are applicable

DFARS 252.225-7008

DFARS 252.225-7009

DFARS 252.225-7010

Certified to current material specification revisions

Mill test reports required with material shipment and invoice

Require melt source as well as melting and all processing location(s) to be listed on certifications.

Require latest revisions on all specifications. Single heat lot. No alpha case, no surface defects; mercury free.

Material to be domestically melted and all subsequent processing completed within the USA.



St. Louis Mill Sales
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Customer P.O. Number/Date

TIMET Sales Order Number/Date

586337/Jun 12, 2019

TIMET Packing List Number/Scheduled Ship Date

80938310/Jan 31, 2020

TIMET Internal Revision #: 6

TIMET Item #	Material #	Material Description	Quantity	Weight
Customer Item #	Customer Material #			

✓ Results are from TIMET Quality Control Records on file. The undersigned has verified that the information on the attached mill product certification meets the requirements of the above referenced order. This Attachment to Product Certification is specific to your referenced order, is an integral part of and amends the physical and chemical test reports attached. All specification(s) and revision(s) that differ from the attached have been approved for inclusion by the producing facility.

Authorized TIMET Signature



Date

JAN 24 2020

BRIAN STALEY

Quality Assurance Representative