

**Titanium Metals Corporation****Approved Certificate**100 Titanium Way  
Toronto, OH, 43964

Telephone (740) 537-5694, Fax (740) 537-5653

Page 1 of 4

**CERT ID**18918DA-11  
28-SEP-2015 11:45:36 GMT**SOLD TO CUSTOMER**TIMET Service Center St. Louis  
1250 Interstate Drive, Wentzville, MO 63385**PURCHASE ORDER** 20169603**HEAT NUMBER**

18918DA

**GRADE**

TIMETAL®6-4

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

J18580

**PRODUCT DESCRIPTION**

3.5" SQ Plate

**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
- BS 7252 PART 3 1997
- CMMP015 Rev E
- ISO 5832-3 7/1/96

**Melt Method**

EB+VAR

**Melt/Process Location**TIMET - Morgantown, PA, USA /  
TIMET - Toronto, OH, USA**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. Immersion ultrasonic tested to a #3 FBH per AMS 2631 E Class A1 and acceptable (per Table 1 for Grade 1 or non-premium material).
5. Immersion ultrasonic tested per AMS-STD-2154 C Type 1 Class A, PS 21211 P Class A and GAMPS 9103 B Class A and acceptable.
6. Original ultrasonic inspection meets the requirements of MIL-STD-2154 Org Type 1 Class A.
7. No weld repair has been performed on this material.
8. Material complies with DFARS 252.225-7008.
9. Material certificate in compliance with EN 10204:2004 Type 3.1.
10. 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.
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](http://www.timet.com))
12. Customer will accept TIMET EXCEPTION to microstructure requirements of BS 7252 PART 3 & ISO 5832-3.
13. This revised certificate supersedes all previously issued certificates but does not in any way alter, amend, waive, or modify the terms and conditions of the original sale as contained on TIMET's sales acknowledgement.

*This test report shall not be reproduced except in full, without the written approval of TIMET.*

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*First in Titanium Worldwide*



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**✓ Ingot Chemical Analysis  
(Weight percent)**

Unless otherwise noted, Ingot Chemical Analysis performed at Morgantown Process Lab, 900 Hemlock Road, Morgantown, PA, 19543, USA

	Fe	V	Al	C	O	N	Y	BT
<b>Sample ID</b>								
<b>TOP</b>	0.18	3.99	6.38	0.024	0.18	0.006	<0.0005	1843
<b>BOTTOM</b>	0.17	4.03	6.54	0.027	0.20	0.006	<0.0005	1860

**✓ Product Analysis  
(Weight percent)**

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

	H
<b>Sample ID</b>	
<b>1S</b>	53
<b>2U</b>	69

**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

**RTT - Longitudinal (ASTM E 8) After Fracture**

Test Condition: [MILL] Annealed 1 Hour @ 1400°F, AC

	0.2YS	U.T.S.	2inEL	R.A.
<b>Sample ID</b>	<b>ksi</b>	<b>ksi</b>	<b>%</b>	<b>%</b>
1S	128	139	15	27
2U	130	140	16	28

**RTT - Transverse (ASTM E 8) After Fracture**

Test Condition: [MILL] Annealed 1 Hour @ 1400°F, AC

	0.2YS	U.T.S.	2inEL	R.A.
<b>Sample ID</b>	<b>ksi</b>	<b>ksi</b>	<b>%</b>	<b>%</b>
1S	138	149	16	32
2U	135	146	16	29

✓ **Metallurgical Properties**

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

**Micro Exam - Transverse**

ETC4,KROLLS,100X

Test Condition: [MILL] Annealed 1 Hour @ 1400°F, AC

	MT-PRE	MT-OCC	OVERALL
<b>Sample ID</b>	<b>Micr</b>	<b>Micr</b>	<b>P/F</b>
1S	P10	-	PASS
2U	P10	-	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: 18961DB-10 (J18531)

RTT - Longitudinal (ASTM E 8) After Fracture

Test Condition: Periodic Test: [MILL] Annealed 60 Minutes 1400°F, AC + [LAB] Annealed 20 Minutes @ 1325°F, AC

	0.2YS	U.T.S.	4DEL	R.A.
<b>Sample Id</b>	<b>ksi</b>	<b>ksi</b>	<b>%</b>	<b>%</b>
1U	125	137	17	25

Results are from TIMET Quality Control Records on file  
Sales Order # 545423 Item # 60  
v.2

*Michael Giovannone*

Michael Giovannone  
2018.09.28 07:46:51  
-04'00'

Michael Giovannone - Certification Specialist

**Version History**

v.1 03-AUG-2018 Original Version

v.2 28-SEP-2018 Certificate revised, per customer request, to add MIL-STD-2154 Org Type 1 Class A.

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St. Louis Mill Sales  
 1250 Interstate Drive  
 WENTZVILLE MO 63385  
 USA  
 Tel:800-753-1650 Fax:636-887-9036

Attachment to Product Certification	
Customer P.O. Number/Date	'May 10, 2018
TIMET Sales Order Number/Date	544336/May 14, 2018
TIMET Packing List Number/Scheduled Ship Date	80866039/Oct 19, 2018
TIMET Internal Revision #:	2

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

000010	110415	TIMETAL® 6-4 Titanium Aero Plate	✓3,995.000LB	3,995.000LB
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Specifications

- ✓ : 01 D1-4428 \* WEB
- ✓ : 02 EN 10204 2004 TYPE 3.1
- ✓ : 03 AMS 4911 P
- ✓ : 06 MIL-H-81200 \* B
- ✓ : 07 AMS-H-81200 \* D
- ✓ : 08 AMS 2631 \* E CLASS A1
- ✓ : 09 CMMPO15 \* REV E
- ✓ : 10 AS6279 \* A
- ✓ AMS-STD-2154\* C TYP 1 CLASS A
- ✓ AMS-T-9046 \* A AB-1 COND A
- ✓ ASME SB 265 \* -17 GRADE 5
- ✓ ASTM B 265 \* -15 GRADE 5
- ✓ MIL-STD-2154 ORG TYP 1 CLASS A
- ✓ MIL-T-9046J AM2 AB-1 COND A

Tolerances

- : GRAIN TO RUN WITH LENGTH
- ✓ GUAGE TOL +.175/-010
- : R/W/ R/L OK - ADVSE SIZE 1ST

Batch Number

- : 18918DAY03
- ✓ 3.500" X 48.187" X 144.937"

Batch Dimensions

Batch Number of Pieces

Country of Origin

Heat Number

Metal ID

Test Number

- : 1.000
- : USA
- : 18918DA
- : 18918DA-11
- : PLT #2
- : J18580



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

**Attachment to  
Product Certification**

Customer P.O. Number/Date

/May 10, 2018

TIMET Sales Order Number/Date

544336/May 14, 2018

TIMET Packing List Number/Scheduled Ship Date

80866039/Oct 19, 2018

TIMET Internal Revision #: 2

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

- B-Additional customer req
- ✓ GEAE S-400 approved Laboratory
- ✓ GEAE S-1000 Supplier Req'ts
  
- ✓ DFARS 252.225-7008
  
- ✓ UNS R56400
  
- ✓ AMS 2631\*E CLASS A1  
Grade 1 or Non Premium Material Immersion method
  
- Supply from one heat of material
  
- Line mark per Spec
  
- ✓ Grain to run with length
  
- ✓ During Manufacturing, handling, testing, and inspection this material did not come in contact with mercury or any device employing a single boundary of containment.
  
- ✓ This Titanium product contains no purposeful addition of any element regulated by the Dodd-Frank Conflict Minerals law.
  
- "Except where an exemption under the Annex to REACH Directive (European Union Environmental Regulations (EC No.1907/2006) applies, none of the titanium materials supplied on this order to your company, exceed the concentration limits for the substances named in the REACH / RoHS Directives."
  
- ✓ \*\*\*\*DO NOT TAPE PACKING LIST DIRECTLY ON MATERIAL\*\*\*\*



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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 10-19-18

**Kenneth Renshaw**  
 NASC Quality Supervisor