



Titanium Metals Corporation

100 Titanium Way
Toronto, OH, 43964
Telephone (740) 537-5694, Fax (740) 537-5653

Approved Certificate

Page 1 of 6

CERT ID

24325DGE01

11-MAR-2021 12:47:28 GMT

SOLD TO CUSTOMER

TIMET Service Center St. Louis

1250 Interstate Drive, Wentzville, MO 63385

PURCHASE ORDER 20191240

HEAT NUMBER

24325DG

GRADE

TIMETAL®6-4

SHIP TO ADDRESS

TIMET Service Center St. Louis

1250 Interstate Drive, Wentzville, MO 63385

TEST NUMBER

S19883

PRODUCT DESCRIPTION

.02" 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

Additional Specifications

AMS 4911 R

ASTM B 265 -20a Grade 5

ASTM F 1472 -20a

Melt Method

EB+VAR

Melt/Process Location

TIMET - Morgantown, PA, USA /

TIMET - Toronto, OH, USA

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5/28/21



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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-R1; TIMET-Morgantown, PA, 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 BR and BP.
14. Material produced and controlled in accordance with PW-QA 6088 Revision 30.
15. TIMET has a quality program which meets the requirements of United Technologies ASQR-01, Revision 11, Type 6.
16. Material processed in accordance with PWA MCL F-14 D.
17. Material produced and controlled in accordance with PWA MCL Manual Section F-22 Revision B.
18. Material testing performed in accordance with PWA MCL Manual Section F-23 Rev G.
19. This material is capable of the service center providing LCS compliance.
20. 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.
21. Material produced and controlled in accordance with CMMP015 Rev. E.

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
Sample ID								
TOP	0.14	3.85	6.48	0.031	0.18	0.008	<0.0005	1860
BOTTOM	0.13	3.84	6.52	0.035	0.19	0.008	<0.0005	1870

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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

51	114
53	94
56	110

Chemistry Statements

- 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.
- Residual elements each less than 0.10% maximum, 0.40% maximum total.
- 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

51/53/56

P/F

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

VARIOUS

P/F

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

VARIOUS

P/F

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

Sample ID

51

ksi

136

ksi

146

%

12

%

16

53

137

147

14

20

56

137

148

14

19

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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	%	%
51	139	150	14	19
53	137	148	15	20
56	136	148	12	26

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
51	P1	-	PASS
53	P1	-	PASS
56	P1	-	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: 24338DGE01 (S19917)

Bend Test, T-Direction, R/T, (ASTM E 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
63

bend
PASS

Batch: 24338DGE01 (S19917)

RTT - Longitudinal (ASTM E 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
63

ksi
138

ksi
150

%
14

Results are from TIMET Quality Control Records on file
Sales Order # 596123 Item # 70
v.2

Digitally signed by

Michael Giovannone

Date: 2021.03.11

07:48:29 -05'00'

Michael Giovannone

Michael Giovannone - Certification Specialist

Version History

v.1 18-FEB-2021 Original Version

v.2 11-MAR-2021 Certificate revised to add CMMP015 Rev. E and PWA 300 BP

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