



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

Sold-to Address
 Titanium Metal Supply
 12215 Kirkham Road, Suite 300
 POWAY CA 92064
 USA

Attachment to Product Certification

Customer P.O. Number/Date
 16-8718/May 06, 2016
 TIMET Sales Order Number/Date
 472892/May 06, 2016
 TIMET Packing List Number/Scheduled Ship Date
 80720526/May 13, 2016

Ship-to Address
 Titanium Metal Supply
 12215 Kirkham Road, Suite 300
 POWAY CA 92064
 USA

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

000010	125153	TIMETAL® 6-4 Titanium Aero Sheet 3.000PC 136.000LB		
	Specifications	: AMS 4911 * N : AMS-T-9046 * A AB-1 COND A : ASTM B 265 * -15 GRADE 5 : DMS 1592 * H : MIL-T-9046*J AM 2 AB-1 COND A		
	Batch Number	: H24194-Y04		
	Batch Dimensions	: 0.080" X 36.000" X 96.000"		
	Batch Number of Pieces	: 3.000		
	Country of Origin	: USA		
	Heat Number	: H24194		
	Test Number	: S10887		
	B-Additional customer req			
	GEAE S-400 Approved Laboratory			
	GEAE S-1000 Supplier Quality Req'ts			
	DFARS 252.225-7008			

000020	300203	MISC SALES - PACKING BOXES/LUMBER 1.000EA 0.000LB		
--------	--------	--	--	--

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

TIMET
107

Date

MAY 13 2016

BRIAN STALEY

Quality Assurance Representative



Titanium Metals Corporation

Approved Certificate

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

Page 1 of 5

CERT ID
H24194-F01
08-APR-2016 16:43:36 GMT

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

PURCHASE ORDER 20128848

HEAT NUMBER
H24194

GRADE
TIMETAL®6-4

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

TEST NUMBER
S10887

PRODUCT DESCRIPTION
0.080" SQ Sheet

DELIVERY CONDITION
Annealed

Specifications

This material complies with the following specifications:

- AMS 4911 N
- AMS-T-9046 A AB-1 Cond A
- ASTM B 265 -13ae1 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

Melt Method	Melt/Process Location
3-VAR	TIMET - Henderson, NV, 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. 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.
11. TIMET-Toronto has a Quality Management System that is in compliance with ISO 9001:2008, and AS 9100:2009 Revision C. (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.

*This test report shall not be reproduced except in full, without the written approval of TIMET.
The intentional recording of false, fictitious, or fraudulent statements or entries on the certificate may be punished as a felony under federal law.*

First in Titanium Worldwide



Titanium Metals Corporation

Approved Certificate

100 Titanium Way
Toronto, OH, 43964

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

CERT ID

H24194-F01

08-APR-2016 16:43:36 GMT

SOLD TO CUSTOMER

TIMET Service Center St. Louis

1250 Interstate Drive, Wentzville, MO 63385

PURCHASE ORDER 20128848

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	0.18	4.02	6.30	0.019	0.17	0.009	<0.0004	1831
BOTTOM	0.18	3.99	6.26	0.017	0.18	0.009	<0.0004	1833

Product Analysis
(Weight percent)

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

	H
Sample ID	
2	71
9	76

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.

*This test report shall not be reproduced except in full, without the written approval of TIMET.
The intentional recording of false, fictitious, or fraudulent statements or entries on the certificate may be punished as a felony under federal law.*



Titanium Metals Corporation

Approved Certificate

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

CERT ID
H24194-F01
08-APR-2016 16:43:36 GMT

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

PURCHASE ORDER 20128848

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

2/9

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 5.0

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
Sample ID	ksi	ksi	%	%
2	144	153	14	18
9	142	150	18	24

This test report shall not be reproduced except in full, without the written approval of TIMET.
The intentional recording of false, fictitious, or fraudulent statements or entries on the certificate may be punished as a felony under federal law.



Titanium Metals Corporation

Approved Certificate

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

CERT ID

H24194-F01
08-APR-2016 16:43:36 GMT

SOLD TO CUSTOMER

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

PURCHASE ORDER 20128848

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	%	%
2	135	145	14	19
9	136	146	14	20

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
2	P5	-	PASS
9	P5	-	PASS

*This test report shall not be reproduced except in full, without the written approval of TIMET.
The intentional recording of false, fictitious, or fraudulent statements or entries on the certificate may be punished as a felony under federal law.*



Titanium Metals Corporation

Approved Certificate

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

CERT ID

H24194-F01
08-APR-2016 16:43:36 GMT

SOLD TO CUSTOMER

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

PURCHASE ORDER 20128848

Tests on Other Material

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

Batch: H24194-F01 (S10087)

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

BF 5.0

Test Condition: Periodic Test: [MILL] Annealed 30 Minutes @ 1400°F, AC + [LAB] Annealed 20 Minutes @ 1325°F, AC

20X105

Sample Id	bend
4	PASS

Batch: H24194-F01 (S10087)

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	ksi	ksi	%
4	136	144	16

Sample Id	ksi	ksi	%
4	136	144	16

Results are from TIMET Quality Control Records on file
Sales Order # 445912 Item # 20
v.1

Michelle Edwards



Digitally signed by Michelle Edwards
DN: c=US, st=OH, f=Toronto, email=Michelle.Edwards@Timet.com, o=Titanium Metals Corporation, cn=Michelle Edwards
Date: 2016.04.08 12:45:32 -04'00'

Michelle Edwards - Certification Specialist

This test report shall not be reproduced except in full, without the written approval of TIMET.
The intentional recording of false, fictitious, or fraudulent statements or entries on the certificate may be punished as a felony under federal law.

First in Titanium Worldwide