



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

Attachment to Product Certification	
Customer P.O. Number/Date	15-8154/Sep 24, 2015
TIMET Sales Order Number/Date	452763/Sep 24, 2015
TIMET Packing List Number/Scheduled Ship Date	80689590/Oct 02, 2015

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

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 #			

000010	110478	TIMETAL® 6-4 Titanium ELI Aero Plate		
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Specifications	: TIMET INTERNAL		
Tolerances	: 1 PC @ 2"X44"X6.75"		
	: 4 PCS @ 2"X11"X81"		
Batch Number	: H21561-W07	1,166.000LB	1,166.000LB
Batch Dimensions	: 2.000" X 11.000" X 81.000"		
Batch Number of Pieces	: 4.000		
Country of Origin	: USA		
Heat Number	: H21561		
Test Number	: J13495		
Batch Number	: H21061-W09	100.000LB	100.000LB
Batch Dimensions	: 2.000" X 44.000" X 6.750"		
Batch Number of Pieces	: 1.000		
Country of Origin	: USA		
Heat Number	: H21061		
Test Number	: J13199		
B-Additional customer req			
DFARS 252.225-7008			
Material certs to show chemistry, mechanical properties and heat treat details.			
recrystallize annealed material			
4 pcs @ 2" x 11" x 81" - approx 1141 lbs			
1 pc @ 2" x 44" x 6.75" - approx 96 lbs			



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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

10/2/2015

**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

H21561-11

10-OCT-2014 18:34:02 GMT

PURCHASE ORDER

20116275

SOLD TO CUSTOMER

TIMET Service Center Tustin

14281 Franklin Avenue, Tustin, CA 92780

HEAT NUMBER

H21561

GRADE

TIMETAL®6-4 ELI

SHIP TO ADDRESS

TIMET Service Center Tustin

14281 Franklin Avenue, Tustin, CA 92780

TEST NUMBER

J13495

PRODUCT DESCRIPTION

2" ELI Plate

DELIVERY CONDITION

Recrystallized Annealed

Specifications

This material complies with the following specifications:

HMS 11-1110 C Am. 1 & 2

Melt Method

3-VAR

Melt/Process Location

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. Microstructure examined and acceptable to the order specifications.
3. Microstructure examined and acceptable to HMS 11-1110 Rev. C Am 1 & 2, Section 4.3 (Photomicrographs attached).
4. Immersion ultrasonic tested per AMS-STD-2154 A Type 1 Class A and acceptable.
5. Immersion ultrasonic tested per MIL-STD-2154 Org Type 1 Class A and acceptable.
6. Material certificate in compliance with EN 10204:2004 Type 3.1.
7. Material complies with DFARS 252.225-7008.
8. No weld repair has been performed on this material.
9. 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.
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 9001:2008, and AS 9100:2009 Revision C. (AS9100 certificate is available at www.timet.com)

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First in Titanium Worldwide

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 14281 Franklin Avenue, Tustin, CA 92780

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
Sample ID							
TOP	0.16	4.02	6.12	0.007	0.11	0.005	<0.0004
BOTTOM	0.17	4.11	6.13	0.007	0.11	0.004	<0.0004

Product Analysis
(Weight percent)

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

H**Sample ID**

2S 38

4S 41

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, 0.30% 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

Fracture Toughness Test - LT, ASTM E 399

Test Condition: [MILL] RC 2 Hrs @ 1735°F + VCF 8 Hrs min @ 1400°F + 1 Hr @ 1400°F, SC

KQ **INV-9.1.3**

Sample ID	ksri	P/F
2S	83	YES
4S	79	YES

Test Condition: [MILL] RC 2 Hrs @ 1735°F + VCF 8 Hrs min @ 1400°F + 1 Hr @ 1400°F, SC

W number

Sample ID	in
2S	8
4S	8

Fracture Toughness Test - TL, ASTM E 399

Test Condition: [MILL] RC 2 Hrs @ 1735°F + VCF 8 Hrs min @ 1400°F + 1 Hr @ 1400°F, SC

K1C **KQ** **INV-8.3** **INV-9.1.3** **INV-9.1.4**

Sample ID	ksri	ksri	P/F	P/F	P/F
2S		71		YES	
2S	-		-		-
4S		70		YES	
4S	-		-		-

Test Condition: [MILL] RC 2 Hrs @ 1735°F + VCF 8 Hrs min @ 1400°F + 1 Hr @ 1400°F, SC

W number

Sample ID	in
2S	8
4S	8

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RTT - Longitudinal (ASTM E 8)

Test Condition: [MILL] RC 2 Hrs @ 1735°F + VCF 8 Hrs min @ 1400°F + 1 Hr @ 1400°F, SC

0.2YS U.T.S. 2inEL

Sample ID	ksi	ksi	%
2S	121	133	14
4S	122	134	15

RTT - Transverse (ASTM E 8)

Test Condition: [MILL] RC 2 Hrs @ 1735°F + VCF 8 Hrs min @ 1400°F + 1 Hr @ 1400°F, SC

0.2YS U.T.S. 2inEL

Sample ID	ksi	ksi	%
2S	117	129	16
4S	117	129	13

Metallurgical Properties

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

Micro Exam - Longitudinal

Test Condition: [MILL] RC 2 Hrs @ 1735°F + VCF 8 Hrs min @ 1400°F + 1 Hr @ 1400°F, SC

OVERALL

Sample ID	Micr
2S-EDGE	PASS
4S-EDGE	PASS
5S-EDGE	PASS

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Micro Exam - Longitudinal

Test Condition: [MILL] RC 2 Hrs @ 1735°F + VCF 8 Hrs min @ 1400°F + 1 Hr @ 1400°F, SC

OVERALL

Sample ID

Micr

2S-CTR

PASS

4S-CTR

PASS

Transus MET Plate, L-588

Test Condition: AS SUPPLIED

Transus

Sample ID

oF

1S

1785

Results are from TIMET Quality Control Records on file

Sales Order #421034

Item # 10

v.1

Digitally signed by

Pete Colantoni

Date: 2014.10.10

14:37:22 -04'00'

Pete Colantoni - Certification Specialist

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