



DYNAMET

A Carpenter Company

195 Museum Road
Washington, PA 15301
Phone 724.228.1000
Fax 724.229.4195

PRODUCT CERTIFICATION

WORK ORDER
515650

SALES ORDER / RLS
061687 / 005

CUSTOMER P.O. PTG58197	CUSTOMER PART 111DD2LBL02500	QUANTITY 1,231	LADING NO lbs 00068008	SHIPMENT DATE 07/27/2017						
PART INFORMATION 111DD2LBL02500 TI 6AL 4V Fastener Quality CG Bar - 0.250" Dia. Specifications: AMS 4928 Rev: V; AMS 4967 Rev: L; ASTM B 348 Gr5 Rev: 13; AMS 8931 Rev: C; AMS-T-8047 Rev: 03; MIL-T-9047 TI 6-4 Rev: G; ASTM F 1472 Rev: 14; AMS 2241 Rev: S; DMS 1570 Rev: C; MIL-H-81200 Rev: B; AMS 2631 Rev: D; MIL-STD-2154 Rev: 82; AMS-STD-2154 Rev: B; S-1000 Rev: 13; S-400 Rev: 15; EN 10204 3.1 Rev: 04; AMS-H-81200 Rev: D; ASME SB-348 Gr5 Rev: 2010; AS6279 Rev: A Size: 0.250" Dia. +/- 0.0005" Length: 10' to 12' Random Length										
Chemical Report (Wt.%)										
Heat 16058DB	Al T 6.27	Al B 6.21	C T .025	C B .023	Fe T .16	Fe B .15	N T .008	N B .008	O T .16	O B .17
V T 3.94	V B 3.93	Y T <.0005	Y B <.0005	Ti BAL	Other <.05	TOE <.20				
✓ Hydrogen (As Shipped)										
Hydrogen (%) 0.0021										
✓ As Shipped Properties										
UTS #1 (psi) 158600	YS 0.2% #1 (psi) 138400	EL #1 (%) 17	RA #1 (%) 47							
UTS #2 (psi) 157200	YS 0.2% #2 (psi) 137100	EL #2 (%) 17	RA #2 (%) 46							
✓ Capability@1750°F (954°C) 1hr WQ +1000°F (538°C) 4hrs AC										
UTS #1 (psi) 186000	YS 0.2% #1 (psi) 174000	EL #1 (%) 14	RA #1 (%) 54							
Capability@1740°F 1hr WQ +1000°F 4hrs AC										
UTS #1 (psi) 186900	YS 0.2% #1 (psi) 172600	EL #1 (%) 14	RA #1 (%) 54							
UTS #2 (psi) 188100	YS 0.2% #2 (psi) 174200	EL #2 (%) 14	RA #2 (%) 54							
Metallography Results										



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PRODUCT CERTIFICATION

WORK ORDER
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SALES ORDER / RLS
061887 / 005

CUSTOMER P.O.	CUSTOMER PART	QUANTITY	LADING NO	SHIPMENT DATE
PTG58197		1,231	lbs 00086008	07/27/2017
Macrostructure Acceptable Microstructure Alpha-Beta Alpha Case Material Free of Alpha Case				
Material Data				
Melt Origin		Bt Tr °F		
USA		1817		
Melt Source		Bt Tr °C		
TUBET		992		
Certification Information				
As Shipped Condition				
Annealed 1300°F 2 Hours A/C				
INSR 5				
DATE: 7.28.17				



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PRODUCT CERTIFICATION

WORK ORDER
516650

SALES ORDER / RLS
061687 / 005

CUSTOMER P.O.	CUSTOMER PART	QUANTITY	LADING NO	SHIPMENT DATE
PTG58197		1,231	lbs 00080008	07/27/2017

CERTIFICATION REQUIREMENTS

- Material free of alpha case, or other surface contamination.
- Macrostructure and microstructure meet all requirements of MIL-T-9047.
- Material annealed in accordance with AMS-H-81200; MIL-H-81200.
- Hydrogen analysis from final product.
- Material ultrasonic inspected in accordance with AMS-STD-2154 CL AA; MIL-STD-2154 CL AA, AMS 2831 class AA grade I #2 FBH - ALL ACCEPTED.
- Material free of mercury and radioactive contamination.
- DRG Conflict Free material
- Material certified to the requirements of MIL-T-9047G Cond.A (Dated - 12/15/78), MIL-T-9047G Amendment 2 (Dated - 05/30/88), MIL-T-9047G Notice 1 (Dated - 2/8/83) and MIL-T-9047G Notice 2 (Dated - 4/4/89).
- Material conforms to RoHS Directive 2011/65/EU.
- Dynamet inc has complied with all producer requirements of AS8279.
- Material testing performed at Product Evaluation Systems, Inc. - Latrobe, PA.
- Complete copy of the original material chemistry attached.

Steven R. Dockus

Steven R. Dockus
Q. A. Lab Manager

End of Certification

This is to certify that the above test results are correct as contained in the records of the company.

Certification shall not be reproduced except in full without the approval of Dynamet Inc. The recording of false, fictitious or fraudulent statements or entries on this document may be punished as a felony under Federal Law.

INSP 5

DATE: 7.28.17



Titanium Metals Corporation

Approved Certificate

900 Hemlock Road
Morgantown, PA, 19543

Telephone (610) 286-6100, Fax (610) 286-3831

Page 1 of 3

CERT ID

16058DB

27-JAN-2017 13:00:57 GMT

PURCHASE ORDER U25114

HEAT NUMBER

✓ 16058DB

GRADE

✓ TIMETAL®6-4

SHIP TO ADDRESS

Dynamet
22059 Thomas L. Hammons Road, Tanner, AL 35671

PRODUCT DESCRIPTION

34" SQ EB+VAR INGOT
INGOT - LENGTH: 118" WEIGHT: 16654 lbs

DELIVERY CONDITION

AS CAST

Specifications

This material complies with the chemistry, melting/processing and quality requirements (as applicable) of the following specifications:

- AMS 4928 V
- AMS 4967 L
- ASTM B 348 -13 Grade 5
- DI-4426 Web
- DI-1036 B
- DI-2111 B

Melt Method

EB+VAR

Melt Date

20-JAN-2017

Melt Country of Origin

US

Melt Location

TIMET - Morgantown, PA, USA

Compliance Statements

1. Material manufactured in accordance with TIMET Morgantown recipe SR800.
2. Melted in accordance with TIMET Morgantown/Dynamet VAP, latest revision.
3. 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.
4. This certificate applies to only material from the heat number shown above.
5. Chemistry is reported from top to bottom in the as cast positions.
6. Customer Part No: 111PX1 - 34.000
7. CUST PO 064355 & ITEM# 006
8. TMX Part#: 838467-9
9. TMX R.O.#: U25114
10. TMX W.O.#: K08787
11. Timet has complied with all producer requirements of AS6279

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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

INSP. 5

DATE: 7.28.17

**Titanium Metals Corporation**

900 Hemlock Road
 Morgantown, PA, 19543
 Telephone (610) 286-6100, Fax (610) 286-3831

Approved Certificate**CERT ID**

16058DB

27-JAN-2017 15:00:57 GMT

PURCHASE ORDER U25114

Ingot Chemical Analysis
(Weight percent)

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

	Sn	Mo	Zr	Cu	Fe	Mn	V	Si	Al
Sample ID									
Min Lim	-	-	-	-	0.13	-	3.50	-	5.90
Max Lim	0.050	0.050	0.050	0.050	0.25	0.050	4.50	0.05	6.30
TOP	0.016	0.015	0.017	0.003	0.16 ✓	<0.005	3.94 ✓	<0.01	6.27 ✓
BOTTOM	0.017	0.015	0.017	<0.001	0.15 ✓	<0.005	3.93 ✓	<0.01	6.21 ✓

	C	O	N	Ni	Cr	B	Y	OT-64	BT
Sample ID									
Min Lim	0.007	0.14	0.004	-	-	-	-	-	1785
Max Lim	0.060	0.17	0.020	0.050	0.050	0.0030	0.0050	0.200	-
TOP	0.025 ✓	0.16 ✓	0.008 ✓	0.017	0.009	<0.0010	<0.0005 ✓	0.108	1816
BOTTOM	0.023 ✓	0.17 ✓	0.008 ✓	0.015	0.006	<0.0010	<0.0005 ✓	0.101	1818

H

Sample ID	
Min Lim	-
Max Lim	0.0020
TOP	<0.0010
BOTTOM	<0.0010

Chemistry Statements

- Method of Analysis: Carbon determined by combustion per ASTM E1941; Nitrogen, Oxygen and Hydrogen by inert gas fusion per ASTM E1409 and E1447.
- Method of Analysis: Copper and boron by atomic emission spectrometry and all other elements by x-ray fluorescence spectrometry.
- Balance Titanium ✓
- Each Residual is < 0.05% ✓
- Total residuals are stated as OT-64.
- BT (Beta Transus) is a calculated value and reported in degree F.

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DATE: 7.28.17



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Page 3 of 3

CERT ID

16058DB

27-JAN-2017 15:00:57 GMT

PURCHASE ORDER U25114

Results are from TIMET Quality Control Records on file
Sales Order # 482361 Item # 10
v.1

Digitally signed by Peggy Moyer
DN: c=US, st=PA, l=Morgantown,
o=Titanium Metals Corporation,
cn=Peggy Moyer,
email=Peggy.Moyer@Timet.com
Date: 2017.01.27 10:45:14 -05'00'

Peggy S. Moyer - Quality Specialist

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INSP. 5

DATE: 7. 29. 17