



**DYNAMET**  
A Carpenter Company

195 Museum Road  
Washington, PA 15301  
Phone 724.228.1000  
Fax 724.229.4196

**PRODUCT CERTIFICATION**

WORK ORDER  
**514816**

SALES ORDER / RLS  
**060375 / 002**

CUSTOMER P.O. <b>PTG57756</b>	CUSTOMER PART <b>113DD2FSK06250</b>	QUANTITY <b>1,188</b>	LADING NO <b>lbs 00086477</b>	SHIPMENT DATE <b>05/04/2017</b>						
<b>PART INFORMATION</b> <b>Ti 6AL 4V CG Bar - 0.625" Dia.</b> Specifications: AMS 4928 Rev: V; AMS 4967 Rev: L; ASTM B 348 Gr5 Rev: 13; AMS 6931 Rev: C; AMS-T-9047 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: A; 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: 0.625" Dia. +/- 0.0005" Length: 10' to 12' Random Length										
<b>Chemical Report (Wt.%)</b>										
Heat 15463DA	Al T 6.20	Al B 6.18	C T .024	C B .027	Fe T .18	Fe B .17	N T .005	N B .006	O T .17	O B .16
V T 3.92	V B 3.92	Y T <.0005	Y B <.0005	Ti BAL	Ot E <.05	TOE <.20				
<b>Hydrogen (As Shipped)</b>										
<b>Hydrogen (%)</b> 0.0016										
<b>As Shipped Properties</b>										
<b>UTS #1 (psi)</b> 160500	<b>YS 0.2% #1 (psi)</b> 142000	<b>EL #1 (%)</b> 14	<b>RA #1 (%)</b> 44							
<b>UTS #2 (psi)</b> 159300	<b>YS 0.2% #2 (psi)</b> 140400	<b>EL #2 (%)</b> 14	<b>RA #2 (%)</b> 46							
<b>Hardness (HRC)</b> 35.23										
<b>Capability@1750°F (954°C) 1hr WQ +1000°F (538°C) 4hrs AC</b>										
<b>UTS #1 (psi)</b> 175200	<b>YS 0.2% #1 (psi)</b> 160600	<b>EL #1 (%)</b> 13	<b>RA #1 (%)</b> 54							
<b>Hardness (HRC)</b> 39.58										
<b>Capability@1740°F 1hr WQ +1000°F 4hrs AC</b>										
<b>UTS #1 (psi)</b> 174700	<b>YS 0.2% #1 (psi)</b> 159600	<b>EL #1 (%)</b> 15	<b>RA #1 (%)</b> 54							



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CUSTOMER P.O. <b>PTG57756</b>	CUSTOMER PART	QUANTITY	LADING NO	SHIPMENT DATE
		<b>1,188 lbs</b>	<b>00086477</b>	<b>05/04/2017</b>
<b>UTS #2 (psi)</b> 175400	<b>YS 0.2% #2 (psi)</b> 161400	<b>EL #2 (%)</b> 14	<b>RA #2 (%)</b> 55	
<b>Hardness (HRc)</b> 40.13				
<b>✓ Metallurgy Results</b>				
<p>Macrostructure <b>Acceptable</b></p> <p>Microstructure <b>Fine dispersion of equiaxed and/or slightly elongated alpha in a transformed beta matrix resulting from processing in the alpha plus beta field. There is no continuous network of alpha at prior beta grain boundaries.</b></p> <p>Alpha Case <b>Material Free of Alpha case</b></p>				
<b>✓ Material Data</b>				
<b>Melt Origin</b> USA		<b>Bt Tr °F</b> 1815		
<b>Melt Source</b> TIMET		<b>Bt Tr °C</b> 991		
<b>✓ Certification Information</b>				
<p>As Shipped Condition <b>Annealed 1300°F 2 Hours A/C</b></p>				



**DYNAMET**  
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**PRODUCT CERTIFICATION**

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SALES ORDER / RLS  
**060375 / 002**

CUSTOMER P.O.	CUSTOMER PART	QUANTITY	LADING NO	SHIPMENT DATE
<b>PTG57756</b>		<b>1,188 lbs</b>	<b>00086477</b>	<b>05/04/2017</b>

**CERTIFICATION REQUIREMENTS**

- ✓ **UNS R56400**
- Material free of alpha case, or other surface contamination.
- Macrostructure and microstructure meet all requirements of MIL-T-9047.
- Material annealed in accordance with MIL-H-81200, AMS-H-81200.
- Hydrogen analysis from final product.
- Material immersion ultrasonic inspected at the finished diameter in accordance with MIL-STD 2154; AMS-STD-2154; AMS 2631 class AA grade 1 & 2 FBH - ALL ACCEPTED.
- Material free of mercury and radioactive contamination.
- Material certified to the requirements of MIL-T-9047G Cond.A (Dated - 12/15/78), MIL-T-9047G Amendment 2 (Dated - 09/30/86), MIL-T-9047G Notice 1 (Dated - 2/8/93) and MIL-T-9047G Notice 2 (Dated - 4/4/98).
- ✓ **DRC Conflict Free material.**
- Material conforms to RoHS Directive 2011/65/EU.
- ✓ **Dynamet Inc has complied with all producer requirements of AS9279.**
- Complete copy of the original material chemistry attached.
- Revision 1 05/05/2017: Revise ultrasonic inspection statement per customer request.

*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.

**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**

15463DA

19-OCT-2016 12:42:39 GMT

**SOLD TO CUSTOMER**

Dynamet Inc

195 Museum Road, Washington, PA 15301

**PURCHASE ORDER** 064880 Line 002**HEAT NUMBER**

15463DA ✓

**GRADE**

TIMETAL®6-4 ✓

**SHIP TO ADDRESS**

Latrobe Steel Company

2626 Ligonier Street, Latrobe, PA 15650

**PRODUCT DESCRIPTION**

34" SQ EB+VAR INGOT

INGOT - LENGTH: 120" WEIGHT: 17052 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

DEPUY 0

DI-1036 B

DI-2111 B

DYNAMET - INGOT 4

**Melt Method**

EB+VAR

**Melt Date**

27-SEP-2016

**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.

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**First in Titanium Worldwide**

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 Dynamet Inc  
 195 Museum Road, Washington, PA 15301

**PURCHASE ORDER** 064880 Line 002

**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
<b>Sample ID</b>									
<b>Min Lim</b>	-	-	-	-	0.13	-	3.50	-	5.90
<b>Max Lim</b>	0.050	0.050	0.050	0.050	0.25	0.050	4.50	0.05	6.30
<b>TOP</b>	0.007	0.020	<0.005	<0.001	0.18	<0.005	3.92	<0.01	6.20
<b>BOTTOM</b>	0.007	0.019	<0.005	<0.001	0.17	<0.005	3.92	<0.01	6.18
	C	O	N	Ni	Cr	B	Y	OT-64	BT
<b>Sample ID</b>									
<b>Min Lim</b>	0.007	0.14	0.004	-	-	-	-	-	1785
<b>Max Lim</b>	0.060	0.17	0.020	0.050	0.050	0.0030	0.0050	0.200	-
<b>TOP</b>	0.024	0.17	0.005	0.026	0.017	<0.0010	<0.0005	0.106	1813
<b>BOTTOM</b>	0.027	0.16	0.006	0.026	0.019	<0.0010	<0.0005	0.107	1816
	<b>H</b>								
<b>Sample ID</b>									
<b>Min Lim</b>	-								
<b>Max Lim</b>	0.0020								
<b>TOP</b>	<0.0010								
<b>BOTTOM</b>	<0.0010								

**Chemistry Statements**

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

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**PURCHASE ORDER** 064880 Line 002

Results are from TIMET Quality Control Records on file  
Sales Order # 486862 Item # 10  
v.1

Digitally signed by Peggy Moyer  
DN: c=US, st=PA, l=Morgantown,  
email=Peggy.Moyer@Timet.com,  
o=Titanium Metals Corporation,  
cn=Peggy Moyer  
Date: 2016.10.19 15:57:53 -04'00'

Peggy S. Moyer - Quality Specialist

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