



DYNAMET
A Carpenter Company

195 Museum Road
Washington, PA 15301

Phone 724.228.1000
Fax 724.229.4195

PRODUCT CERTIFICATION

WORK ORDER
107296

SALES ORDER / RLS
065758 / 001

CUSTOMER P.O. PTG59627	CUSTOMER PART	QUANTITY	LADING NO	SHIPMENT DATE						
		1,447 lbs	00097103	11/16/2018						
PART INFORMATION 113DA1MJB07500										
TI 6AL 4V Bar Quality CG Bar - 0.750" Dia.										
Specifications: AMS 2631 Rev: E; MIL-STD-2154 Rev: 82; AMS-STD-2154 Rev: C; S-1000 Rev: 2017; S-400 Rev: 16; EN 10204 3.1 Rev: 04; ASTM B 348 Gr5 Rev: 13; MIL-H-81200 Rev: B; AMS-H-81200 Rev: D; AMS 4928 Rev: W; AMS 4967 Rev: L; ASME SB-348 Gr5 Rev: 2015; AMS 6931 Rev: D; AMS-T-9047 Rev: 03; MIL-J-9047 Ti 6-4 Rev: G; ASTM F 1472 Rev: 14; DMS 1570 Rev: C; AS6279 Rev: A; 100679343 Per Exceptions Rev: AB; SH620001 Rev: AE										
Size: 0.750" Dia. +/- 0.001"										
Length: 10' to 12' Random Length										
✓ Chemical Report (Wt.%)										
Heat	Al T	Al B	C T	C B	Fe T	Fe B	N T	N B	O T	O B
19901DA	6.25	6.22	.052	.047	.19	.18	.029	.029	.18	.18
V T	V B	Y T	Y B	Ti	Ot E	TOE				
3.96	3.95	<.0005	<.0005	BAL	<.10	<.20				
✓ Hydrogen (As Shipped)										
Hydrogen (%)	Hydrogen 2 (%)									
0.0024	0.0027									
✓ As Shipped Properties										
UTS #1 (psi)	YS 0.2% #1 (psi)	EL #1 (%)	RA #1 (%)							
155800	146100	16.6	44							
UTS #2 (psi)	YS 0.2% #2 (psi)	EL #2 (%)	RA #2 (%)							
156700	145700	17.7	40							
UTS #3 (psi)	YS 0.2% #3 (psi)	EL #3 (%)	RA #3 (%)							
154600	143400	16.1	45							
UTS #4 (psi)	YS 0.2% #4 (psi)	EL #4 (%)	RA #4 (%)							
155800	144400	15.8	36							
UTS #5 (psi)	YS 0.2% #5 (psi)	EL #5 (%)	RA #5 (%)							
153900	144700	16.3	44							
UTS #6 (psi)	YS 0.2% #6 (psi)	EL #6 (%)	RA #6 (%)							
154400	143800	16.4	42							
Hardness (HRC)										
40										



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		1,447 lbs	00097103	11/16/2018
Capability@1750°F (954°C) 1hr WQ +1000°F (538°C) 4hrs AC				
UTS #1 (psi) 174200	YS 0.2% #1 (psi) 163200	EL #1 (%) 13.2	RA #1 (%) 35	
Hardness (HRC) 42				
Capability@1740°F 1hr WQ +1000°F 4hrs AC				
UTS #1 (psi) 173700	YS 0.2% #1 (psi) 162600	EL #1 (%) 14.5	RA #1 (%) 43	
Hardness (HRC) 42				
✓ Metallurgy Results				
Microstructure				
Alpha/Beta				
Macrostructure				
Acceptable				
✓ Material Data				
Melt Source TIMET	Melt Origin USA		Melt Type EB-VAR	
Bt Tr °F 1881	Bt Tr °C 1027			
✓ Certification Information				
As Shipped Condition				
Annealed 1300°F (704°C) 2 Hrs. A/C.				



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CUSTOMER P.O.	CUSTOMER PART	QUANTITY	LADING NO	SHIPMENT DATE
PTG59627		1,447	lbs 00097103	11/16/2018
CERTIFICATION REQUIREMENTS				
<ul style="list-style-type: none"> 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-81200B. Hydrogen analysis from final product. Composition similar to UNS R56400 Manufacturing Method: hot rolled and centerless ground. Material ultrasonic inspected in accordance with MIL-STD-2154 Type 1 Class AA Immersion Method, AMS-STD-2154 Type 1 class AA Immersion Method and AMS 2631 class AA grade I Immersion Method #2 FBH - ALL ACCEPTED. 100679343 Rev AB with exception to section 4.6 (Retention IAW AQ-31). Material furnished under this contract contain no metallic mercury or mercury compounds and are free of mercury contamination. Material free of radioactive material. 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). Hydrogen analysis performed at Carpenter Powder Products G.E. supplier Code 90661. Nadcap & GE approved. Mechanical properties and microstructure performed at Product Evaluation System. Nadcap & GE approved. No weld repair was performed on this product at Dynamet. Material melted and manufactured in the U.S.A Tension test method in accordance with ASTM E8. Hardness test method in accordance with ASTM E18. Material meets all the requirements of AMS 4928 Rev. W as per section 4.4.1. 				
 <hr/> Jamie L. Burrows Administrator II - Quality				
<p>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.</p>				



Titanium Metals Corporation

Approved Certificate

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

CERT ID
19901DA
29-AUG-2018 11:48:10 GMT

SOLD TO CUSTOMER
Dynamet Inc
195 Museum Road, Washington, PA 15301

PURCHASE ORDER 072650 item 005

HEAT NUMBER ✓
19901DA

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: 119" WEIGHT: 16916 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 W
- AMS 4967 M
- DI-1036 C
- DI-2113 B
- DMS 1583 H
- DMS 2442 E R-1 Process 1
- TIMET/MORGANTOWN/DYNAMET VAP 5

Melt Method	Melt Date	Melt Country of Origin	Melt Location
EB+VAR	28-AUG-2018	US	TIMET - Morgantown, PA, USA

Compliance Statements

1. Material manufactured in accordance with TIMET Morgantown recipe SR807
- ✓ 2. Timet has complied with all producer requirements of AS6279
- ✓ 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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Page 2 of 3

CERT ID

19901DA

29-AUG-2018 11:48:10 GMT

SOLD TO CUSTOMER

Dynamet Inc

195 Museum Road, Washington, PA 15301

PURCHASE ORDER 072650 item 005**✓ 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	-	-	-	-	0.18	-	3.50	-	5.90
Max Lim	0.100	0.100	0.100	0.100	0.30	0.100	4.50	0.10	6.30
TOP	0.017	0.013	0.011	<0.005	0.19	<0.005	3.96	<0.01	6.25
BOTTOM	0.017	0.014	0.011	<0.005	0.18	<0.005	3.95	<0.01	6.22

	C	O	N	Ni	Cr	B	Y	OT-64	BT
Sample ID									
Min Lim	0.030	0.17	0.020	-	-	-	-	-	1800
Max Lim	0.070	0.20	0.050	0.100	0.100	0.0030	0.0050	0.400	-
TOP	0.052	0.18	0.029	0.016	0.014	<0.0010	<0.0005	0.106	1885
BOTTOM	0.047	0.18	0.029	0.014	0.011	<0.0010	<0.0005	0.102	1877

H

Sample ID	
Min Lim	-
Max Lim	0.0020
TOP	<0.0010
BOTTOM	<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 per ASTM E2994 and all other elements by x-ray fluorescence spectrometry per ASTM E539.
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 < 0.10%
6. Balance Titanium

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First in Titanium Worldwide



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PURCHASE ORDER 072650 item 005

Results are from TIMET Quality Control Records on file
Sales Order # 547053 Item # 20
v.1

Digitally signed by William
Richter
Date: 2018.08.29 07:50:39 -04'00'

William A. Richter Jr. Quality Specialist

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