TIMET

Attachment to Product Certification

Customer P.O. Number/Date
20-12315/Jul 01, 2020

TIMET Sales Order Number/Date
617860/Jul 01, 2020

TIMET Packing List Number/Scheduled Ship Date
80956715/Jul 06, 2020

St. Louis Mill Sales
1250 Interstate Drive
WENTZVILLE MO 63385
USA
Tel:800-753-1550 Fax:636-887-9098

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	11299	*TIMETAL*® 6-4 Titanium SQ Bar		
Specifications		: AMS 4928 W		
		: AMS 4965 L CAPABLE OF		
		: AMS 4967 L		
		: AMS 6931 C		
		: AMS-T-9047 A		
		: ASME SB 348 -13 GR5		
		: ASTM B 348 -13 GR5		
		: ASTM F 1472 -14		
		: BS 3TA11 -09		
		: DMS 1570 C		
		: MIL-T-9047 G AM2 COND A		
		: PWA-S-4928 P		
Tolerances		: SHIP RANDOM LENGTHS		
Batch Number		: H32054-Y31	340.000LB	340.000LB
Batch Dimensions		: 1.250"Dia X RL		
Batch Number of Pieces		: 12.000		
Heat Number		: H32054		
Batch Number		: H32054-Y30	973.000LB	973.000LB
Batch Dimensions		: 1.250"Dia X RL		
Batch Number of Pieces		: 34.000		
Heat Number		: H32054		
Batch Number		: H32054-Y32	246.000LB	246.000LB
Batch Dimensions		: 1.250"Dia X RL		
Batch Number of Pieces		: 8.000		
Heat Number		: H32054		

TMS Titanium Sample Cert

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

B-Additional customer req
DFARS 252.225-7008
DFARS 252.225-7009
DFARS 252.225-7010

Does not need to be from one heat, but keep heat#'s separated and marked.

RMPT: The parties agree that there is potential for changes in price based upon changes in raw material costs. Any such change in Cost will result in a change in the RMPT component of the Price.

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 JUL 0 2 2020

BRIAN STALEY
Quality Assurance Representative

TSI TITANIUM

TechSpec Inc.
P.O. Box 88, Y Street @ Derry, PA 15627
Phone: 724/694-2718 ■ Fax: 724/694-5305
www.tsititanium.com

Titanium Specialists
TITANIUM
SALES, CONVERSION
FORGING, ROLLING

CERTIFICATION

SOLD TO:

Timet Henderson
Accounting Dept
PO Box 2128
Henderson, NV 89009
USA

Date: 10/15/2019
Cust PO No.: 4501003291
TSI WO No.: 191790

GRADE	SIZE / QUANTITY	MELT SOURCE / HEAT NUMBER
T64TD	Diameter: 1.2500" 5,166 Lbs	Timet - Henderson H32054

SPECIFICATIONS

AMS-4928W,V,U	AMS-6931D,C	AMS-4963D,C
AMS-4965M,L (cap.)	AMS-4967M,L	AMS-T-9047 Cond.A Orig.,Rev.A
MIL-T-9047G Cond.A Am.2 Not.1,2	EN10204:2004 Type 3.1	ASTM B348-13 Gr. 5
ASTM B381-13 F-5 sec. 5.1,only	ASME SB348-13,-17 Gr. 5	ASTM F1472-14,-08e1
DMS-1570C	ISO 5832-3-96,-2016	BS3TA11-09
BS3TA12-09	CMMP015E	PWA 300BP
PW-QA 6078AF	ASQR-01-11, as applicable	PW-QA 6088 Rev. 29,30
PWA MCL F-14D, F-17C	MCL F-22B, F-23G	PWA S4928P

COMPLIANCE STATEMENTS

No weld repair. Mercury free during processing.
No exposure to radioactive materials.
Material Safety Data Sheets (MSDS) available upon request
Melt source - Timet, Henderson. Method - 3XVAR. Chemistry performed by Timet (GE S400 code 87869).
Residual elements each less than 0.10%; less than 0.40% total.
Final product testing performed by WMTR, Inc. (GE S400/S-Spec-35 code T7869).
GE S-SPEC-1 / GE S-1000 (12-18-18) Supplier Quality Requirements Compliant, as applicable.
Bar product was produced from ingot by open die forging (Cartech Tanner: ingot to 9.00" RCS) and formed on forging and bar mill operations at TSI Titanium. Machined surface finish to a tolerance of +/-0.0025".
Periodic test data for this AMS-4928 size range is available upon request.
Product conforms to the technical requirements of the specification(s) and the requirements of the purchase order.
Melted and manufactured in the United States.Product complies with DFARS 252.225-7008, 252.225-7009,and 252.225-7014, Alt. 1
TSI Titanium has complied with all producer requirements of AS6279B (4.1.3)
This material has been controlled to P&W requirements for LCS per P&W MCL Manual Section F-17 and tested in accordance with P&W MCL Manual Section F-23.

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The specifications and additional information set forth in this certificate are accurate with respect to the materials described herein as of the date set forth above. Any subsequent thermo-mechanical or similar processing (including any such processing to change the gauge, condition or specification of materials described herein) shall nullify the information set forth in this certificate and TechSpec, Inc. shall have no responsibility for, and makes no representations or warranties with respect to, any such processing or the materials resulting therefrom.

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Titanium Specialists
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Accounting Dept
PO Box 2128
Henderson, NV 89009
USA

CERTIFICATION

Page 2 of 3

Date: 10/15/2019
Cust PO No.: 4501003291
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HEAT TREAT CONDITION

Annealed per AMS-H-81200D and MIL-H-81200B: 1300F, 2.00 hours at temperature. Air Cooled.

AMS-4967M:
Test sample solution treated: 1750F, 1.91 hours at temperature. Water Quenched. Aged: 1000F, 4.5 hours at temperature. Air Cooled.

TSI Titanium is Nadcap accredited for Heat Treating and can be found on the Nadcap Qualified Manufacturers List.

METALLOGRAPHY

Macro and micro acceptable per applicable specfications.
Alpha case free.

ISO 5832-3-96,-2016 is reported for information only and not cause for rejection.

NON-DESTRUCTIVE TESTING

Immersion ultrasonic, including circumferential shear wave, acceptable per:
AMS-2631D,E Gr.1 CL. AA,A1,A
AMS-STD 2154 Orig. and Rev.A, Rev. C, Type 1. CL. AA,A
MIL-STD-2154 Type 1 CL. AA,A
NAS 824 Rev.1 and 2 Gr. A
Inspection performed by West Penn NDT
Reported rejected areas have been removed.

HEAT NO.: H32054 — **CHEMICAL ANALYSIS - WGT%**

	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	W	Fe
T	0.020										0.19
B	0.019										0.18
	Co	Ti	Al	V	N	Zr	Sn	B	O	H	Y
T		Bal.	6.33	3.97	0.007			<0.001	0.18	NA	<0.0004
B		Bal.	6.38	3.97	0.006			<0.001	0.18	NA	<0.0004

Beta Transus: T- 1835 B-1836

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TSI TITANIUM

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PHYSICAL ANALYSIS							
ID	UTS	.2%YS	% ELONG				
	PSI	PSI	Elong 4 D	Elong 5 D	%RA	Hardness	Hyd Final - %
1L	147,800	135,600	16.0	11.0	42.0		
2L	150,500	142,600	14.0	13.0	47.0		
3L	147,800	137,500	14.0	13.0	46.0		
4L	151,700	144,200	16.0	13.0	45.0		
5L	151,500	145,600	14.0	11.0	45.0		
6L	152,300	145,300	16.0	9.5	45.0		0.0058
7L	148,300	138,700	14.0	11.0	45.0		0.0043
8L	149,900	139,300	14.0	12.0	46.0		0.0067
9L-4967HT	160,500	147,100	14.0	11.0	46.0		

BY: Matthew J. Woiton 10/15/2019
Matthew J. Woiton, QA Certification Manager

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