



Original Cert #  
02080404A

# CERTIFICATE OF REPORT NF & M INTERNATIONAL, INCORPORATED

1729 PENNSYLVANIA AVENUE, MONACA, PENNSYLVANIA 15061 Ph. 724-774-9200/FAX 724-728-2544

**Customer:**

VSMPO - TIRUS, US - LEETSDALE  
401 RIVERPORT DRIVE  
LEETSDALE PA 15056  
ATTN: ACCOUNTS PAYABLE

**Ship To:**

VSMPO - TIRUS PA WAREHOUSE  
401 RIVERPORT DRIVE  
LEETSDALE PA 15056  
ATTN: CHRIS CHMURA

<b>NF&amp;M Work Order</b> 09883	<b>Ingot No.</b> 8-46-3295	<b>Size</b> .750 In RND	<b>Customer P.O.</b> 29463-NI
<b>NF&amp;M Sales Order</b> OC3686-00	<b>Material</b> Titanium 6-4	<b>Description</b> ANNEALED BAR	<b>Report Date</b> 11/14/2013

**SPECIFICATIONS: AMS4928T, ASTM B348-13**

**PRODUCT CHEMISTRY**

Sample	75	81	
Hydrogen (ppm) surface	13	10	Hot extraction method.

**TENSILE PROPERTIES (HEAT TREAT ID 1) (FULL SECTION PROPERTIES)**

Sample/Dir	112/L	72/L
Ultimate (KSI)	143	144
Yield (KSI) (0.2% offset)	132	135
4D Elongation (%)	18	18
Reduction (%)	51	51

**HEAT TREATMENT**

Type: VACUUM ANNEALED  
1) Temp (F): 1300 Duration (Hrs): 1.25 Argon Quenched  
Performed at Solar Atmospheres Inc.; 30 Industrial Road; Hermitage, PA 16148

**MACRO**

Acceptable to AMS2380 REV. F, LEVEL 10

**MICRO**

Acceptable to AMS4928T Para 3.5.1.2.1 (L)

**REMARKS**

Material conforms to the requirements of this purchase order.  
ALLOY TYPE TESTING - OK  
No Alpha Case present  
All properties performed at room temperature unless specified otherwise.  
All testing performed at NF&M INTERNATIONAL unless specified otherwise  
Material supplied or processed on this purchase order has not come in direct contact with mercury or it's compounds nor with any mercury containing device employing a single boundary of containment

**SHIPPING DATA**

Weight: 2606#

**QUALITY CONTROL**

*Jeffrey Keefer*  
JEFFREY KEEFER, LAB TECHNICIAN CLASS 2



THE RECORDING OF FALSE, FICTITIOUS, OR FRAUDULENT STATEMENTS OR ENTRIES ON THE CERTIFICATE MAY BE PUNISHABLE AS A FELONY UNDER FEDERAL LAW.

THE TEST REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT WRITTEN APPROVAL OF NF&M QUALITY.



Verkhnaya Saida  
Metallurgical Production Association

1, Parkovaya St., Verkhnaya Saida, Sverdlovsk reg.  
624 600, RUSSIA  
Phone (34345) 2-38-32, 2-17-86  
Fax (34345) 2-47-36, 2-05-00  
Telex 348176, 348177 "SEVER"

**INSPECTION  
CERTIFICATE**

EN 10204-3.1, B ISO 9002 CERT. No 08 100 55266



date: 06/03/2004

**CERTIFICATE No:** 02086Y04A  
**Purchaser:** VSMPO TRUS U.S.A.  
**Quality/Alloy:** Ti6Al4V

**Condition of delivery:** Hot Rolled, Machined & Pickled.

**Contract:** 84021101TMV Annex 1  
**Purchaser order:** 11542  
**Terms of delivery:** C50TF22-S17 Cl.C par. 3.1 (CIA)

**Item No:** 277  
**Units:** 1185/26125

**Object:** B.A.R.

**Dimensions (mm/inch) or Drawing:** dia 19.05 X 3050 - 3850/70.750X120-143.7

**Heat No:** 8-46-3295

**Lot No:** 608-1

**Chemical Composition, % Ti-remainder**

Requirement	Al	Mn	Mo	V	Zr	Cu	Sn	C	Fe	Y	B	O <sub>2</sub>	N <sub>2</sub>	H <sub>2</sub>	Residuals, %	In the Part, %	
C50TF22-S17 Cl.C	5.50-6.75	max 0.10	max 0.10	3.50-4.50	max 0.10	max 0.10	max 0.10	max 0.05	max 0.30	max 0.005	max 0.0014	max 0.20	max 0.05	max 0.0125	each max 0.10	total max 0.20	as-pickled
TOP	8.32	0.003	0.018	3.83	0.020	0.006	0.005	0.003	0.071	0.0001	<0.0014	0.194	0.008	0.0014	<0.10	0.058	72
BOTTOM	8.48	0.004	0.018	4.03	0.020	0.006	0.005	0.003	0.074	0.0001	<0.0014	0.170	0.008	0.0016	<0.10	0.063	239-10

**Macrostructure testing:** As per AMS 2380F Level 10. No defects found (P3TF25). No segregation detected (C50TF22), S470G.

**Microstructure testing:** As per C50TF22 Levels 10,20, single area 50, par. 3.3.8 (free from alpha-case);

Photo 320817, 320819; S470G.

**Ultrasonic inspection:** As per P3TF34, S4 Cl.A, Longitudinal & Shear wave.

C50TF22-S17 Cl.C	0.20% proof stress		Tensile strength		Elonga-tion		Reduc-tion	Sample #	Beta-transus T° F	Heat treatment T° F time
	MPa	MPa	min	MPa	%	min				
71	904	984	16.5	50.3	TOP	1801.4	1299	2h cooling		
72	908	982	16.5	52.2	BOTTOM	1819.4	air cooling			
239-10	890	966	16.9	53.2						
239-11	883	961	16.7	53.5						

We certify that, subject to exceptions or reservations listed hereunder, the supplies detailed here were manufactured in accordance with the technical specifications of the contract, order or sub-order and that all inspectors' specifications and tests, having been considered, the supplies comply in every respect with the relevant particular specifications, drawings, and relevant standards and regulations in force. Information particular to the supplies concerned:  
specify the reference of documents granted.  
**GEAENSMPO S.A.L.-1 Agreement, MP 39.004GE-00 Rev.F; MP 39.006GE-00 Rev.D; MP 39.012GE-00 Rev.F.**  
100% analysis for alloy compliance, no burnt areas. See Annex 1

**Prepared by:** Dushina A.A.  
**Name:** Dushina A.A.

signature

