

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
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NF&M Work Order 09883	Ingot No. 8-46-3295	Size .750 In RND	Customer P.O. 29463-NI
NF&M Sales Order OC3686-00	Material Titanium 6-4	Description ANNEALED BAR	Report Date 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.

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



CERTIFICATE No 02086Y04A

date 06/03/2004

Purchaser: VSMPO TIRUS U.S.A.

Quality/alloy: T634HV Condition of delivery: Hot Rolled, Machined & Pickled.

Contact: 84021101TMV Annex 1

Purchaser order: 11542

Terms of delivery: C50TF22-S17 Cl.C par. 3.1 (CIA)

Item No: 277 Weight, (kg/LB): 1185/2612.5

Object: B.A.R.

Dimensions (mm/inch) or Drawing: dia 19.05 X 3050 - 3850/0.750X120-143.7

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 ₂	N ₂	H ₂	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

Requirement	0.20% proof stress MPa	Tensile strength MPa	Elonga-tion %	Reduc-tion %	Sample #	Para-mentary T ^o , F	Heat treatment T ^o , F	time
C50TF22-S17 Cl.C	min 827	min 886	% 10	% 25				
	71 904	984	16.5	50.3	TOP	1801.4	1299	2h
	72 908	982	16.5	52.2	BOTTOM	1819.4	air	cooling
	239-10	890	16.9	53.2				
	239-11	883	16.7	53.5				

Ingot triple VAR, dia 745 mm weight 32.10 kg/ 70.77 pounds.

29.33 inch.

signature

Stamp: 13

100% analysis for alloy compliance, no burnt areas.

See Annex 1

Prepared by: Dushina A.A.

Name: Dushina A.A.

Stamp: G.R.P.

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

par. 3.3.8 (free from alpha-case);

Photo 320817, 320819; S470G.

Ultrasonic inspection As per P3TF34, S4, CIA.

Longitudinal & Shear wave.

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.

Product is manufactured by VSMPO.

Bar production to the established process.

GEAENVSMPO S.A.L.-1 Agreement, MP 39.004GE-00 Rev.F; MP 39.006GE-00 Rev.D; MP 39.012GE-00 Rev.F.