5374/2

VSMPO
Verkhnaya Salda
Metallurgical Production Association

1, Parkovaya St., Verkhnaya Salda, Sverdlovsk reg.,
624 800, RUSSIA
Phone (34345) 2-38-32, 2-17-88
Fax (34345) 2-47-38, 2-05-00
Telex 348176, 348177 "SEVER"

INSPECTION CERTIFICATE

EN 10204-3.1.B ISO 9002 CERT. № 09 100 96260

CERTIFICATE № 04706Y03A **date** 10.07.2003

Purchaser : VSMPO TIRUS, U.S.A.
Quality/alloy Ti6Al4V **Condition of delivery** Hot Rolled, Machined & Pickled.

Contract : 8405431T Annex 4
Purchaser order : 10804
Terms of delivery: C50TF22-S17 Cl.C par. 3.1 (CLA),
GE S 470 01/06/2009, GE S 1000 01/02/2008, AMS 2241R

Item №	Units	Weight, (kg/LB)	Object	Dimensions (mm/inch) or Drawing	Heat №	Lot №
	118	475/1047	BAR	dia 19.05 x 3050 - 3660 / 0.750x120-144 min dia 19,06; max dia 19,11	8-34-2913	635-1

Chemical Composition, % Ti-remainder

Requirement	Al	Mn	Mo	V	Zr	Cu	Sn	C	Fe	Y	B	O_2	N_2	H_2	Residuals,% each	Residuals,% total	In the Part, % H_2	In the Part, % B
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	max 0,10	max 0,20	as-pickled	
TOP	6,50	0,002	0,019	4,08	0,020	0,008	0,005	0,004	0,070	0,0001	<0,0014	0,192	0,006	0,0006	<0,10	0,067	0,0020	<0,0003
BOTTOM	6,50	0,004	0,020	4,07	0,020	0,009	0,005	0,004	0,082	0,0001	<0,0014	0,196	0,006	0,0004	<0,10	0,074	0,0026	<0,0003

Requirement	0,20% prof. stress MPa	Tensile strength MPa	Elongation %	Reduction %	Sample #	Beta-transus T°, F	Heat treatment T°, F	Heat treatment time
C50TF22-S17 Cl.C	min 827	min 896	min 10	min 25				
Longitudinal								
131	927	999	16,1	51,4	TOP	1810,4	1274	30 min
132	936	1008	15,7	50,7	BOTTOM	1819,4	air	cooling
209-6	917	992	16,9	53,4				
209-7	924	1001	16,5	51,5				

Ingot: triple VAR, dia 751 mm/ 30,0 inch,
weight 3425 kg/ 7551 pounds

Macrostructure testing As per AMS 2380F Level 10.P3TF25 no defects.
C50TF22.
No segregation detected.
Microstructure testing As per C50TF22 Levels 10,20
par.3.3.8 (free from alpha-case);
Photo 320817.
Ultrasonic inspection As per P3TF34,S4, Cl.A Longitudinal & Shear wave.

We certify that, subject to exceptions or concessions listed hereafter, the supplies detailed here were manufactured in accordance with the technical specifications of the contract, order or sub-order and that, all inspections operations and tests, having been completed, the supplies comply in every respect with the relevant particular specifications, drawings, and relevant standards and regulations in force.

Information particular to the supplies delivered: Product is manufactured by VSMPO.
Bar production to the established process.
Specify the reference of concessions granted: GEAE/VSMPO SAL-1 Agreement, MP 39.004GE-00 Rev.I; MP 39.006GE-00 Rev.D; MP 39.012GE-00 Rev.F.
See Annex 1
100% analysis for alloy compliance; no burn areas.

Prepared by Dushina A.A.
Name Dushina A.A. signature

stamp 13

GRP

TMS Titanium Sample Cert

VSMPO
Verkhnaya Salda
Metallurgical Production Association

1, Parkovaya St., Verkhnaya Salda, Sverdlovsk reg.,
624 600, RUSSIA
Phone (34345) 2-38-32, 2-17-66
Fax (34345) 2-47-38, 2-05-00
Telex 348176, 348177 "SEVER"

ANNEX TO INSPECTION CERTIFICATE

EN 10204-3.1.B ISO 9002 CERT. № 09 100 96250

ANNEX 1 CERTIFICATE 04706Y03A

Requirement: C50TF22-S17 CLC par. 3.1 (Cl.A)

Purchaser: VSMPO TIRUS, USA
Quantity of Bars 118
Quantity of Samples
Product: Bar
Heat 8-34-2913
Lot 635-1

Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	Bar #	#	Bar #	Bar #	Bar #	Bar #	Bar #
131	148	159-6	176	189-5	204														
132	149	161	177	189-6	205														
133	149-2	162	178	189-7	206														
134	149-3	163	179	191	207														
135	149-5	164	179-1	192	208														
136	149-6	165	179-2	193	209														
137	149-7	166	179-3	194	209-1														
138	151	167	179-4	195	209-2														
139	152	168	179-5	196	209-3														
139-1	153	169	179-6	197	209-4														
139-2	154	169-1	181	198	209-5														
139-3	155	169-2	182	199	209-6														
139-4	156	169-3	183	199-1	209-7														
139-5	157	169-4	184	199-2															
139-6	158	169-6	185	199-3															
139-7	159	169-7	186	199-4															
141	159-1	171	187	199-6															
142	159-2	172	189	199-7															
143	159-3	173	189-1	201															
145	159-4	174	189-2	202															
146	159-5	175	189-4	203															

Notes:

1. Total quantity of bars: 118
2. Bars excluded from the lot: Yes
   Bar #:
   Nonconformace/ Bar #: Dia / 149-1,159-7, 179-7,169-5,188,189-3; Surface / 144,147,149-4,199-5
3. Bar length min 2440 mm: 131,156,132,169-4,168,139,
4. Bars excluded from the lot due to US-results: N/A
   Weight: kg
   Internal Defects:
   Surface Defects:

Prepared by Dushina A.A.
Name Dushina A.A.
signature
stamp

Original Cert #
04706403A

CERTIFICATE OF REPORT
NF & M INTERNATIONAL, INCORPORATED

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

Customer:	Ship To:
VSMPO –TIRUS, US - LEETSDALE 401 RIVERPORT DRIVE LEETSDALE PA 15056 ATTN: ACCOUNTS PAYABLE	VSMPO –TIRUS PA WAREHOUSE 401 RIVERPORT DRIVE LEETSDALE PA 15056 ATTN: CHRIS CHMURA

NF&M Work Order	Ingot No.	Size	Customer P.O.
09881	8-34-2913	.7500 In RND	29463-NI
NF&M Sales Order	**Material**	**Description**	**Report Date**
0C3686-00	Titanium 6-4	ANNEALED BAR	11/1/2013

SPECIFICATIONS: AMS4928T, ASTM B348-13

PRODUCT CHEMISTRY

Sample	156	208X	
Hydrogen (ppm) surface	11	11	Hot extraction method

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

Sample/Dir	158/L	165/L
Ultimate (KSI)	145	144
Yield (KSI) (0.2% offset)	136	134
4D Elongation (%)	19	19
Reduction (%)	49	50

HEAT TREATMENT

Type: VACUUM ANNEALED
1) Temp (F): 1300 Duration (Hrs): 1.0 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: 1048#

QUALITY CONTROL

ALAN YARZEBINSKI, LAB TECHNICIAN CLASS 2

Nadcap

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.