NF&M #10

CERTIFICATE OF REPORT
NF & M INTERNATIONAL, INCORPORATED

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

Amend certificate on 2-11-15 to add ASTM B 348.

Customer:	Ship To:

NF&M Work Order	Ingot No.	Size	Customer P.O.
A0938	8-11-5166	.250 In RND	15-7393
NF&M Sales Order	**Material**	**Description**	**Report Date**
046390-00	Titanium 6-4	ANNEALED BAR	1/26/2015

SPECIFICATIONS: DMS 1583 REV. H, ASTM B348-13

INGOT CHEMISTRY (From ingot Source)

Element / Sample	Top	Bottom	
Aluminum (%)	6.20	6.24	
Vanadium (%)	4.03	4.08	
Iron (%)	0.17	0.16	
Carbon (%)	0.006	0.007	
Nitrogen (%)	0.030	0.026	
Oxygen (%)	0.160	0.157	
Yttrium (%)	<0.001	<0.001	
Others, Each (%)	<0.10	<0.10	
Others, Total (%)	0.054	0.051	
Calc. Beta Trans (F)	1818	1814	+/-25°F

Titanium, Balance

Ingot Diameter: 30 In Ingot Source: VSMPO-AVISMA CORP, RUSSIA

PRODUCT CHEMISTRY

Sample	3	4	
Hydrogen (ppm) surface	84	78	Hot extraction method.

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

Sample/Dir	1/L	2/L
Ultimate (KSI)	159	160
Yield (KSI) (0.2% offset)	140	140
4D Elongation (%)	16	16
Reduction (%)	47	46

PERFORMED AT Westmoreland Mechanical Testing & Research, Inc. P.O. Box 388, 221 Westmoreland Drive Youngstown, PA. 15696-0388

TENSILE PROPERTIES (HEAT TREAT ID 2) (FULL SECTION 0.250" Dia. X 6.5" Long)

Sample/Dir	1/L	2/L
Ultimate (KSI)	174	176
Yield (KSI) (0.2% offset)	159	161
4D Elongation (%)	16	16
Reduction (%)	54	55

PERFORMED AT Westmoreland Mechanical Testing & Research, Inc. P.O. Box 388, 221 Westmoreland Drive Youngstown, PA. 15696-0388

TMS Titanium Sample Cert

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SPECIFICATIONS: DMS 1583 REV. H, ASTM B348-13

HEAT TREATMENT

Treat ID: 1 Type: MILL		
1) Temp (F): 1300	Duration (Hrs): 2	Cooling Method: AC
Treat ID: 2 Type: LAB		
1) Temp (F): 1740	Duration (Hrs): 1	Cooling Method: WQ
2) Temp (F): 1000	Duration (Hrs): 4	Cooling Method: AC

IMMERSION ULTRASONIC

PERFORMED AT West Penn Non-destructive Testing, Inc. 1010 Industrial Blvd. New Kensington, PA 15068
Acceptable to NAS 824 REV 1 GRADE A CLASS A; Report No. 10305

MICRO

Acceptable to DMS 1583H Figure 2.

REMARKS

Material conforms to the requirements of this purchase order.
ALLOY TYPE TESTING - OK
All properties performed at room temperature unless specified otherwise.
All testing performed at NF&M INTERNATIONAL unless specified otherwise.
No Alpha Case present
Originally produced on NF&M work order 08617
*Diameter tolerance 0.250''+/-.001''

SHIPPING DATA Weight: 14# (15 Bars)

QUALITY CONTROL

SP

STEVE FITZGERALD, LAB TECHNICIAN CLASS 1

NF&M #10

Accredited 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.