



ATI
 Specialty Alloys
 & Components
 Huntsville Operations
 7400 Highway 20 West
 Huntsville, AL 35806
 Phone: (256) 722-2300

Certificate of Analysis

IN REGARD TO YOUR

Purchase Order No.: P30530
Sales Order No.: 161011
Item No.: 1
Description: Ti 6Al 4V ELI (Ti64Eli)
Condition: Annealed & Centerless Ground
Diameter: 0.250" +/- 0.0002"
Length: 144" +/- 6"
Specifications: AMS 4930G, AMS6932 Rev A 2011, MIL-T-9047G, ASTM B348-13 Gr 5 & 23, ASTM F136-13, ISO 5832-3:2000, IMS0111 Rev. 7, M000105 Rev. J, EN 10204 3.1:2004, AMS 2631D Cl AA, and Purchase Order
Quantity: 484 Rods
Weight: 540 lbs.
Heat / Lot No. : B4E29
Batch No.: TIW-224298

INGOT CHEMISTRY: (Test facility: ATI Monroe Operations)

Element	Spec. Min.	Spec. Max.	UOM	Top	Bottom
V	3.50	4.50	pct	4.01	3.97
Al	5.5	6.5	pct	6.04	6.05
C		0.08	pct	0.01	0.01
Fe		0.25	pct	0.17	0.15
N		0.03	pct	0.01	0.01
O		0.13	pct	0.104	0.112
Y		0.005	pct	<0.0009	<0.0009
Ti	Balance				
Residuals(each)			0.10	0.10	0.10
Residuals (total)			0.30	0.30	0.30
Beta-Transus			° F	1750	1730

Material melted and manufactured in the United States of America. Melt source ATI Bakers Operations (Monroe, NC).
 Melt method: PAM/ VAR

PRODUCT CHEMISTRY: (Test facility: ATI Frackville Operations)

Element	Spec. Max.	1	2	3	4	5	6	7	8
H	0.012	0.0056	0.0049	0.0042	0.0042	0.0043	0.0045	0.0043	0.0044

9-2-15



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ROOM TEMPERATURE TENSILE RESULTS: (Test facility: ATI Frackville Operations)

Units	Ultimate Tensile Strength:	Yield Strength:	Elongation (4D):	Elongation (5D):	Reduction in Area:
Spec. Minimum	Ksi	Ksi	%	%	%
1	141.4	120	10	10	25
2	141.7	125.2	18.7	17.6	44.6
3	141.4	125.7	19.5	17.8	44.6
4	141.8	125	18.9	16.8	44.6
5	141.5	125.9	20.4	18.1	45.8
6	142.1	125.5	20.5	18.9	45.8
7	141.9	125.8	18.8	17.1	45.8
8	141.5	126.1	19.4	17.0	45.8
		125.3	19.4	17.6	44.0

METALLURGICAL TEST RESULTS: (Test facility: ATI Millersburg Operations)

Orientation:	Microstructure	Alpha Case Results	Macrostructure
Results:	T Acceptable (A1)	T Acceptable	T Acceptable
Examined at	1X, 100X, 200X.		

VISUAL INSPECTION RESULTS: (Test facility: ATI Huntsville Operations)

Inspection Test	Specification	Results
Straightness	0.0625" / 60"	Acceptable

ULTRASONIC TEST RESULTS: (ATI Huntsville Operations)

Specification Results	AMS 2631D CL AA
	Acceptable

ANNEAL TIME AND TEMPERATURE DATA

Details	Units	Results
Temperature:	° F	1450
Time:	Minutes	120



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COMMENTS:

- 1 During the manufacturing, handling, inspection, and testing this material did not come in contact with Mercury or any devices employing a single boundary of containment.
- 2 The recording of false, fictitious, or fraudulent statements may be punishable as a felony under federal statutes.
- 3 This certificate shall not be reproduced except in full without the consent of ATI SA&C Quality.
- 4 Alloy analysis, Acceptable.
- 5 No weld repair was made on this material.

NADCAP REQUIREMENTS:

The tests and the respective test procedures utilized to analyze them are as follows:

CHEMISTRY EVALUATION:

Element	Specification
O, N	ASTM E1409-2013
H	ASTM E1447-2009
C	ASTM E1941-2010
AL, Fe, Ti, V	ASTM E539-2011
Y	ASTM E2371-2013

MICRO / MACRO EVALUATION:

Test	Procedure
Microstructure	ETTC-2
Room temperature tensile	ASTM E8/ E8M 2011

TEST FACILITY INFORMATION:

Test Facility	Nadcap Certification Number
ATI Millersburg Operations	126907
ATI-Albany 34th Ave. Operations	4113145221
ATI Frackville Operations	9155149178
ATI Monroe Operations	3323146395

This document certifies all items comprising this shipment and in the quantities specified are in conformance to the purchase order requirements.

Analysis Certified By: Brad McNatt, Quality Assurance Specialist Yes 08/18/15

ATI Specialty Alloys and Components is registered/ certified to ISO 9001 and AS9100.