



Specialty Alloys  
& Components  
Huntsville Operations  
7400 Highway 20 West  
Huntsville, AL 35896  
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



**ATI**  
 Specialty Alloys  
 & Components  
 Huntsville Operations  
 7400 Highway 20 West  
 Huntsville, AL 35896  
 Phone: (256) 722-2300

**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	125.2	18.7	17.6	44.6
2	141.7	125.7	19.5	17.8	44.6
3	141.4	125	18.9	16.8	44.6
4	141.8	125.9	20.4	18.1	45.8
5	141.5	125.5	20.5	18.9	45.8
6	142.1	125.8	18.8	17.1	45.8
7	141.9	126.1	19.4	17.0	45.8
8	141.5	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



**ATI**  
 Specialty Alloys  
 & Components  
 Huntsville Operations  
 7400 Highway 20 West  
 Huntsville, AL 35895  
 Phone: (256) 722-2300

**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 E538-2011
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.