



## Technical Data Sheet

### I. SCOPE

ATI Ta10W™ tantalum alloy was developed for elevated temperature uses and has multiple applications in the high temperature aerospace field. These uses include nozzles, inserts, directional devices and structural materials. Tantalum-10% tungsten has a combination of low temperature ductility and fabricability in both the recrystallized and the wrought condition and is a weldable alloy. Through the historical use of tantalum-10% tungsten and its varied fabrication techniques, sufficient data has been generated to insure confidence, allow relatively inexpensive processing and restrictive part applications. This alloy has excellent corrosion resistance in many media and is available in all commercial mill product forms, machined net-shaped components and assemblies are also available. The data presented here reflects a collection of previously published data on tantalum-10% tungsten.

### II. TYPICAL COMPOSITION (WT.%)

9-11%	Tungsten
Balance	Tantalum & Residuals

**Table 1. Maximum Residuals, ppm**

	Grade I
Aluminum	<40
Cadmium	<10
Cobalt	<20
Columbium	<500
Chromium	<40
Copper	<50
Magnesium	<40
Manganese	<40
Molybdenum	<200
Nickel	<40
Lead	<40
Silicon	<50
Tin	<40
Titanium	<100
Vanadium	<40
Carbon	<50
Hydrogen	<10
Nitrogen	<50
Oxygen	<150

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### III. PHYSICAL PROPERTIES

**Table 2. Physical Properties**

Density	0. 608 lbs/in <sup>3</sup> , 16. 9 gms/cm <sup>3</sup>
Melting Point	5495°F, 3035°C
Recrystallization Temperature	One hour at 2400–2800°F
Thermal Expansion	See Table 6, Page 5 and Figure 3, Page 6
Thermal Conductivity	See Table 7, Page 7
Hardness	Ingot Hardness BHN 185-210 (3000 kg. load)

### IV. MECHANICAL PROPERTIES

**Table 3. Nominal Tensile Properties — Recrystallized Sheet, .040" to .045" Thick**

Temp. °F	UTS-PSI	YTS-PSI	%Elongation in 1 inch
R. T.	80,000–95,000	70,000–89,000	20–40
2600	36,200–37,100	22,300–28,300	30–36
3000	15,000–16,000	10,500–12,300	35–50
3500	9,600–10,000	9,400	50–64

**Table 4. Nominal Tensile Properties — Stress Relieved Sheet, .040" to .045" Thick**

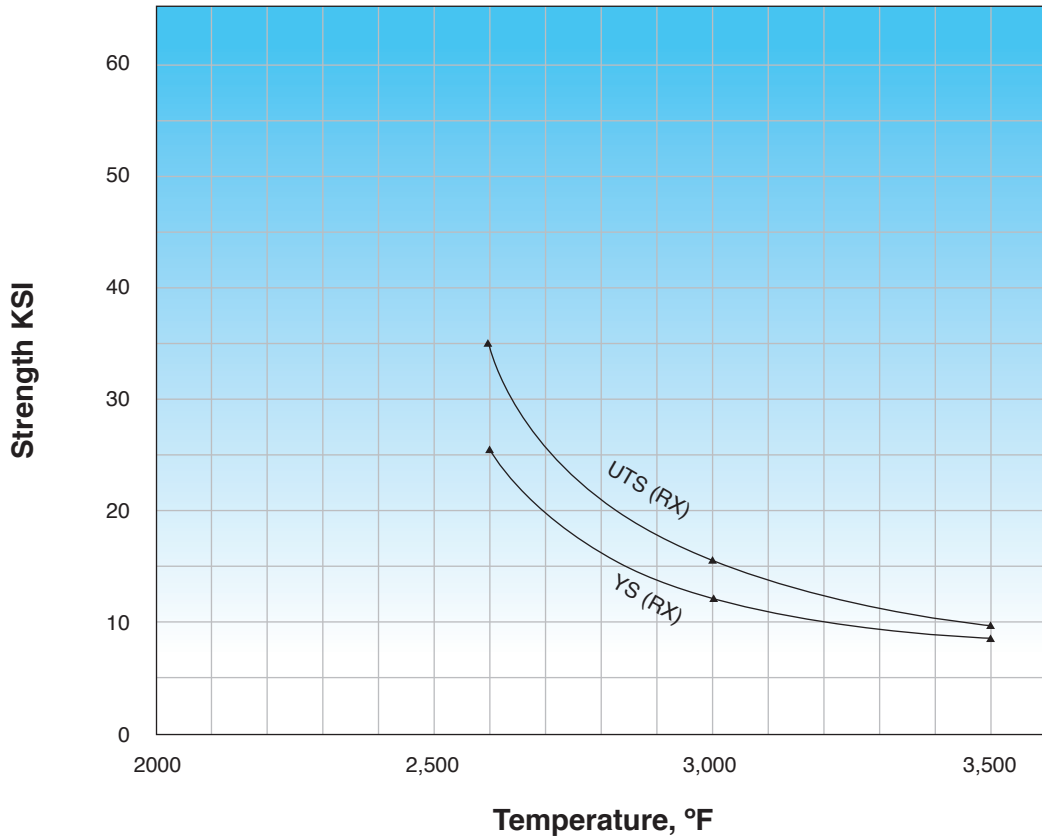
Temp. °F	UTS-PSI	YTS-PSI	% Elongation in 1 inch
2000	60,700	55,100	11
2400	39,500	34,700	19

Material stress relieved for 3 hours at 2250° F. Tested at .05 in/in/min.



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Figure 1. Tensile Properties of Tantalum-10% Tungsten



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**Table 5. Creep-Rupture Properties**

Temp. °F	Stress psi	Rupture Hours
2000	52,200	1.5
	50,000	2.4
	47,000	6.8
	45,000	20.0
2400	38,000	0.1
	28,000	2.8
	25,000	4.0
	22,000	16.4

### V. WELDABILITY

Electron beam welding or inert-gas fusion welding are used. The properties of properly welded tantalum-10% tungsten are essentially the same as those of the base metal.

### VI. COATING DATA

See Table 8, Page 7.

### VII. FORMABILITY

Example of ATI Ta10W™ alloy formability shown in Figure 2, Page 5.



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Figure 2. Flow formed, welded and machined ATI Ta10W™ nozzles

Table 6. Thermal Expansion

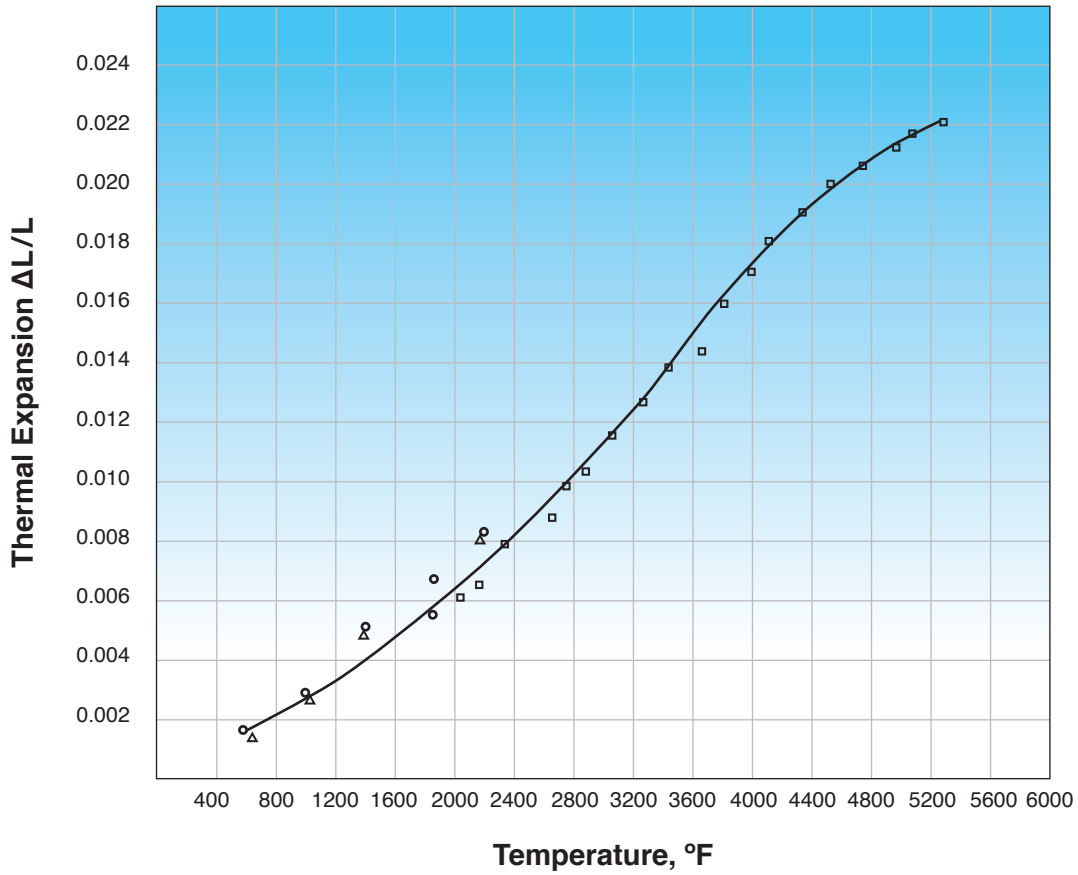
Temperature, °F	$\Delta L / L^*$
1830	0.0054
2010	0.0062
2190	0.0070
2370	0.0079
2550	0.0088
2730	0.0098
2910	0.0107
3090	0.0117
3270	0.0127
3450	0.0138
3630	0.0148
3810	0.0160
3990	0.0171
4170	0.0182
4350	0.0192
4530	0.0200
4710	0.0207
4980	0.0213
5070	0.0218
5250	0.0222

\*From room temperature to indicated temperature.



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Figure 3. Thermal Expansion



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**Table 7. Thermal Conductivity**

Temperature K	Thermal Conductivity cal/(cm <sup>2</sup> ) (sec) (K/cm)
1700	0.135
1800	0.131
1900	0.128
2000	0.124
2100	0.121
2200	0.117
2300	0.114
2400	0.110
2500	0.107
2600	0.103
2700	0.100
2800	0.096
2900	0.092
3000	0.089
3100	0.085
3200	0.082

**Table 8. Cyclic Life-Test Data on Coated Tantalum-10% Tungsten**

Coating Composition Atom Percent	Ave. Coating Life at Indicated Temperature, Hours (Cyclic Test)						Average Life of Defected Coating, Hours	
	1200°F	1300°F	1800°F	2200°F	2500°F	2700°F	2500°F	2700°F
100 Si	100	15	3	50	10	4.5	4.5	<1
Si-5 Al	>100	25	10	15	3.7	4.2	4.5	<1
Si-8 Mn	40	15	3	70	>20	10	4.5	10
50 Sn-50 Al*	--	> 500	>425	290	225	85	--	--

\*Composition in weight percent.

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### REFERENCED WORKS

The data presented in this document reflects a collection of previously published data on tantalum-10% tungsten and is based on the following referenced works:

- Ammon, R. L. 1 and Begley, R. T., "Pilot Production and Evaluation of Tantalum Alloy Sheet", Astronuclear Laboratory Contract NOw-62-656-d, Westinghouse Electric Corporation.
- Ammon, R. L., and Filippi, A. M., "Pilot Production and Evaluation of Tantalum Alloy Sheet", Contract NOw-64-0394-d, Astronuclear Laboratory, Westinghouse Electric Corporation.
- Battelle Memorial Institute, DMIC Report 189, "The Engineering Properties of Tantalum and Tantalum Alloys" (September 1963).
- Douglas, R. W., Torti, M. L., and Moore, J. H., "Research on the Technology of Tantalum Alloys with Maximum Strength in the 3000° F to 3500° F Range", National Research Corporation, Contract AF 33(657)-11255.
- National Research Corporation, "Data on the Alloy Properties of Tantalum-10% Tungsten and Tantalum-8% Tungsten-2% Hafnium Sheet" (May 2, 1963).
- Wah Chang Corporation, "Tantalum Extrusion Development Program", Technical Documentary Report No. ML-TDR-64-218 (June 1964).
- "Coatings for Tantalum-Base Alloys", Sylcor Division, Sylvania Electric Products Inc., Contract AF 33(657)-7339.
- "Development of Protective Coatings for Tantalum-Base Alloys", Battelle Memorial Institute, Contract AF 33(616)-7184.