



# TITANIUM INDUSTRIES, INC.

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## INDUSTRIAL

INDUSTRIAL

## Among the Largest Industrial Titanium Inventories in the World

Titanium is extensively used in the general chemical, power generation, hydro-metallurgical, marine, petrochemical and pulp/paper industries, where corrosion resistance is critical. It is fully resistant to solutions of chlorites, hydrochlorites, chlorates, perchlorates and chlorine dioxide, which are common chemicals used in various industrial applications. Brine solutions, brackish seawater and other corrosive environments will not detract from performance, nor will most oxidizing chemicals and acids. Titanium also has some application in reducing acids as well. Excellent corrosion and erosion resistance, heat transfer efficiency and a superior strength-to-weight ratio make titanium the leading choice of today's design engineers.

### Company & Product Line

Titanium Industries is a manufacturing distributor with locations in the USA, Canada and the UK. Our service centers stock the world's most complete inventory of titanium mill products — including pipe, butt weld fittings, flanges, sheet, plate, bar, billet, tube, weld wire, forged block and fasteners prepared to ASTM and ASME specifications. Quick turnaround, 24/7 order entry and shipping are available upon request to meet the needs of plant shut downs, emergency repairs and other critical situations.

Our worldwide service center can supply titanium mill products to meet "Just In Time" requirements for multi-national companies and subcontractors worldwide. By utilizing our extensive inventory and distribution capabilities, many companies reduce or eliminate the cost of maintaining their own titanium inventory.

### Specifications

- ASTM B 265:** Plate and Sheet
- ASTM B 861:** Seamless Pipe
- ASTM B 862:** Welded Pipe
- ASTM B 338:** Seamless & Welded Tube
- ASTM B 363:** Butt Weld Fittings
- ASTM B 381:** Forgings

### Value Added Services

- JIT Inventory
- Contract Fabrication
- First Stage Processing
- Welding/Welding Instrux.
- Saw Cutting
- Torch Cutting
- Materials Testing
- Waterjet Cutting
- Contract Source Inspect.
- Shearing
- Laser Cutting
- Slitting



### Physical Properties for CP GR2

TECHNICAL DATA	CP GR2
Modulus of Elasticity, psi (10 <sup>3</sup> ) Tension	14.9
Modulus of Elasticity, psi (10 <sup>3</sup> ) Torsion	Approximately 6.5
Density, lb/cu inch	0.163
Melting Range, Degree F	3000 – 3100F
Specific Electrical Resistivity micro ohms/cm/sq cm	56
Specific Heat, Btu/lb/°F	0.125 at room temperature
Thermal Conductivity, Btu/hr.Ft <sup>2</sup> – °F/ft	Approx 9.5 at room temperature
Mean Coefficient of Thermal Expansion Per °F (10 <sup>3</sup> )	32 – 212F: 4.8 32 – 600F: 5.1 32 – 1000F: 5.4 32 – 1200F: 5.6 32 – 1500F: 5.6
Oxidation Characteristics in Air	400F: Good 600F: Good 800F: Good 1000F: Moderate
	Short Time: Good Long Time: Good

### Mechanical Properties for CP GR2

TECHNICAL DATA	CP GR2					
	Guaranteed Room Temp Minimum	Typical Strength (%RT) and Ductility				
	200F	400F	600F	800F	1000F	
Ultimate Tensile Strength, psi	50,000	80	57	46	36	28
Yield Strength, 0.2% Offset, psi	40,000	76	46	30	26	20
El in 2" (>0.025" thick), pct.	22Ⓢ	42	37	25	31	
Bend Radius	2TⓈ 2.5TⓈ					
Impact, Charpy V, ft-lb Room Temp						
Welded Bend Radius	Approx 3–4T					
Hardness	Brinell 200					



TITANIUM INDUSTRIES, INC.  
ISO 9001:2000 REGISTERED



# Titanium Pipe Schedule

**ANSI/ASME B36.19 ( for S sizes ) B36.10 ( for non-S sizes )**

Wall Thickness (inches)

Weight per foot (pounds)

NPS	O.D.	5	5-S	10	10-S	40	40-S	80	80-S
1/8	0.405	0.035		0.049	0.049	0.068	0.068	0.095	0.095
		0.80		0.107	0.107	0.141	0.141	0.181	0.181
1/4	0.540	0.049		0.065	0.065	0.088	0.088	0.119	0.119
		0.148		0.190	0.190	0.244	0.244	0.308	0.308
3/8	0.675	0.049		0.065	0.065	0.091	0.091	0.126	0.126
		0.188		0.244	0.244	0.327	0.327	0.425	0.425
1/2	0.840	0.065	0.065	0.083	0.083	0.109	0.109	0.147	0.147
		0.310	0.310	0.386	0.386	0.490	0.490	0.626	0.626
3/4	1.050	0.065	0.065	0.083	0.083	0.113	0.113	0.154	0.154
		0.393	0.393	0.493	0.493	0.651	0.651	0.848	0.848
1	1.315	0.065	0.065	0.109	0.109	0.133	0.133	0.179	0.179
		0.499	0.499	0.808	0.808	0.966	0.966	1.250	1.250
1 1/4	1.660	0.065	0.065	0.109	0.109	0.140	0.140	0.191	.191
		0.637	0.637	1.039	1.039	1.308	1.308	1.724	1.724
1 1/2	1.900	0.065	0.065	0.109	0.109	0.145	0.145	0.200	0.200
		0.733	0.733	1.200	1.200	1.564	1.564	2.089	2.089
2	2.375	0.065	0.065	0.109	0.109	0.154	0.154	0.218	0.218
		0.923	0.923	1.518	1.518	2.102	2.102	2.890	2.890
2 1/2	2.875	0.083	0.083	0.120	0.120	0.203	0.203	0.276	0.276
		1.424	1.424	2.032	2.032	3.333	3.333	4.408	4.408
3	3.500	0.083	0.083	0.120	0.120	0.216	0.216	0.300	0.300
		1.743	1.743	2.492	2.492	4.359	4.359	5.899	5.899
3 1/2	4.000	0.083	0.083	0.120	0.120	0.226	0.226	0.318	0.318
		1.998	1.998	2.861	2.861	5.241	5.241	7.195	7.195
4	4.500	0.083	0.083	0.120	0.120	0.237	0.237	0.337	0.337
		2.253	2.253	3.230	3.230	6.208	6.208	8.621	8.621
5	5.563	0.109	0.109	0.134	0.134	0.258	0.258	0.375	0.375
		3.653	3.653	4.470	4.470	8.411	8.411	11.955	11.955
6	6.625	0.109	0.109	0.134	0.134	0.280	0.280	0.432	0.432
		4.364	4.364	5.345	5.345	10.917	10.917	16.440	16.440
8	8.625	0.109	0.109	0.148	0.148	0.322	0.322	0.500	0.500
		5.704	5.704	7.709	7.709	16.429	16.429	24.964	24.964
10	10.750	0.134	0.134	0.165	0.165	0.365	0.365	0.593	0.500
		8.741	8.741	10.732	10.732	23.293	23.293	37.012	31.493
12	12.750	0.156	0.156	0.180	0.180	0.406	0.375	0.687	0.500
		12.073	12.073	13.904	13.904	30.796	28.516	50.925	37.638
14	14.000	0.156	0.156	0.250	0.188	0.437	0.375	0.750	0.500
		13.271	13.271	21.123	15.956	36.421	31.397	61.065	41.478
16	16.000	0.165	0.165	0.250	0.188	0.500	0.375	0.843	0.500
		16.055	16.055	24.196	18.267	47.623	36.006	78.516	47.623
18	18.000	0.165	0.165	0.250	0.188	0.562	0.375	0.937	0.500
		18.083	18.083	27.268	20.577	60.222	40.614	98.246	53.768
20	20.000	0.188	0.188	0.250	0.218	0.593	0.375	1.031	0.500
		22.888	22.888	30.341	26.500	70.718	45.223	120.177	59.913
24	24.000	0.218	0.218	0.250	0.250	0.687	0.375	1.218	0.500
		31.858	31.858	36.486	36.486	98.418	54.441	170.513	72.203

**Remarks on Fabrication for CP GR2**

TECHNICAL DATA	CP GR2
Beta Transus	1675F ± 25F
Cutting	Readily cut with saw or abrasive wheel.
Machining	Rigid set-up, medium speed, heavy feed, sharp tools, adequate coolant.
Forming	Readily formable at room temperature. Complex shapes require heat.
Joining, Welding	Completely weldable, fusion welding requires protection.

**Remarks on Heat Treatment for CP GR2**

TECHNICAL DATA	CP GR2
Initial Forging	Approximately 1650F rough breakdown, finish 1550F
Annealing	1300F, 2 hr, air cool
Solution Treating	Not applicable
Aging	Not applicable
Stress Relief Annealing	900 - 1000F, 45 min.