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COMPANY PROFILE

Hangzhou King Titanium Co., Ltd. is an intermediate manufacturer and full-service distributor of premium titanium mill products. The range of our product line, good quality, and competitive prices have made us one of the fastest growing companies of its kind in China. We are proud of being a reputed and reliable company for serving our customers for more than 10 years. We take our target focus on overseas market now, and about 80% products are sold abroad.

We are cooperating well with many customers all over the world in different areas such as aerospace, automotive, chemical, medical, jewelry. If you have any questions and/or requests, please feel free to contact us.

HISTORY OF TITANIUM

Titanium was first discovered in 1791 by British chemist Reverend William Gregor, and was originally named Gregorite after its founder. In 1793 it was once again discovered-independently-by German chemist M.H. Klaproth.

He named it Titanium after the Titans of Greek Mythology: “the incarnation of natural strength.” The element was successfully isolated in 1910.

Titanium is the 22nd element on the periodic table. It is primarily found in the minerals Rutile and Ilmenite, which make up to 24% of the earth's crust—making Titanium the 9th most abundant element on Earth. It only occurs in nature in chemical combinations; the most common of which are oxygen and iron.

The atomic of Titanium is 47.867amu. It is a low-density element (4510 kg/m3); approximately 60% less dense than steel (7850 kg/m3). Titanium contains no iron, making it a non-ferrous, non-magnetic substance.

Titanium transfers heat well, with a higher melting point than steel. (Titanium melting point: 1993 K (3020 degrees F and 1660 °C). Steel melting point: 1923 K (3000 degrees F and 1650 °C). Titanium has the ability to passivate; therefore, it exhibits high levels of corrosion resistance to most mineral acids and chlorides.

Once primarily used by the aerospace industry, Titanium and Titanium alloys are being used increasingly in medical and other industries due to their coveted properties: non-magnetic, low-density, non-corrosive and very attractive strength to weight ratios. Titanium is also nontoxic and biologically compatible with human tissue and bone, making it useful for artificial hip and knee replacement, heart valves, spinal and Maxillofacial and other implants.

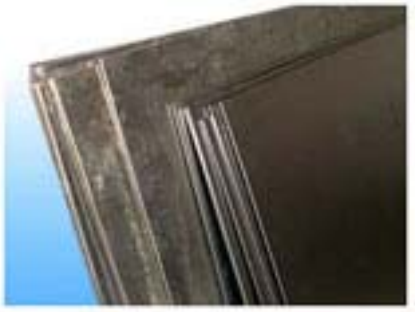
PRODUCT PROFILE

Titanium Bar

Grades: CP, Gr.5, Gr.6, Gr.7, Gr.9, Gr.12, Gr.23
Diameter: up to 150mm
Specifications: ASTM B348, ASME SB348, ASTM F67,
ASTM F136, AMS 4928
Hexagon and rectangle are also available.

Titanium Sheet & Plate

Grades: CP, Gr.5, Gr.6, Gr.7, Gr.9, Gr.12, Gr.23
Specifications: ASTM B265, ASME SB265, ASTM F67, ASTM F136, AMS 4911



Titanium Wire

Grades**:** CP, Gr.5, Gr.6, Gr.7, Gr.9, Gr.12, Gr.23

Diameter: down to 0.2mm

Specifications: ASTM B348, ASME SB348, ASTM F67,

ASTM F136, ASTM B863

Forms: straight, coil, spool

Titanium Weld Wire

Grades: ERTi-1, ERTi-2, ERTi-3, ERTi-5, ERTi-7, ERTi-12

Specification: AWS A5.16

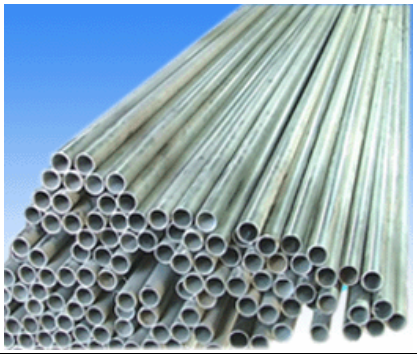
Forms: straight, coil, spool

Titanium Tube & Titanium Pipe (SML only)

Grades: Gr.2, Gr.3, Gr.7, Gr.9, Gr.12

Specifications: ASTM B338, ASME SB338,

ASTM B861, ASME B861



Titanium Forgings (flange, disc, ring)

Grades: F-1, F-2, F-3, F-4, F-5, F-7 and F-12

Specifications: ASTM B381, ASME SB381

Titanium Fastener (screw, bolt, nut, washer)

Grade: Gr.2, Gr.3 and Gr.5

Specifications: ASTM B348 / ASME SB348

Standards: DIN933, DIN912, DIN934, DIN125, DIN975

Sizes: M4-M20

QUALITY OF TITANIUM

Titanium Grade 1-4 is pure Titanium, the other grades are alloys. Pure Titanium is used due to its high corrosion resistance, the alloys because of the extremely high strength to weight ratio.

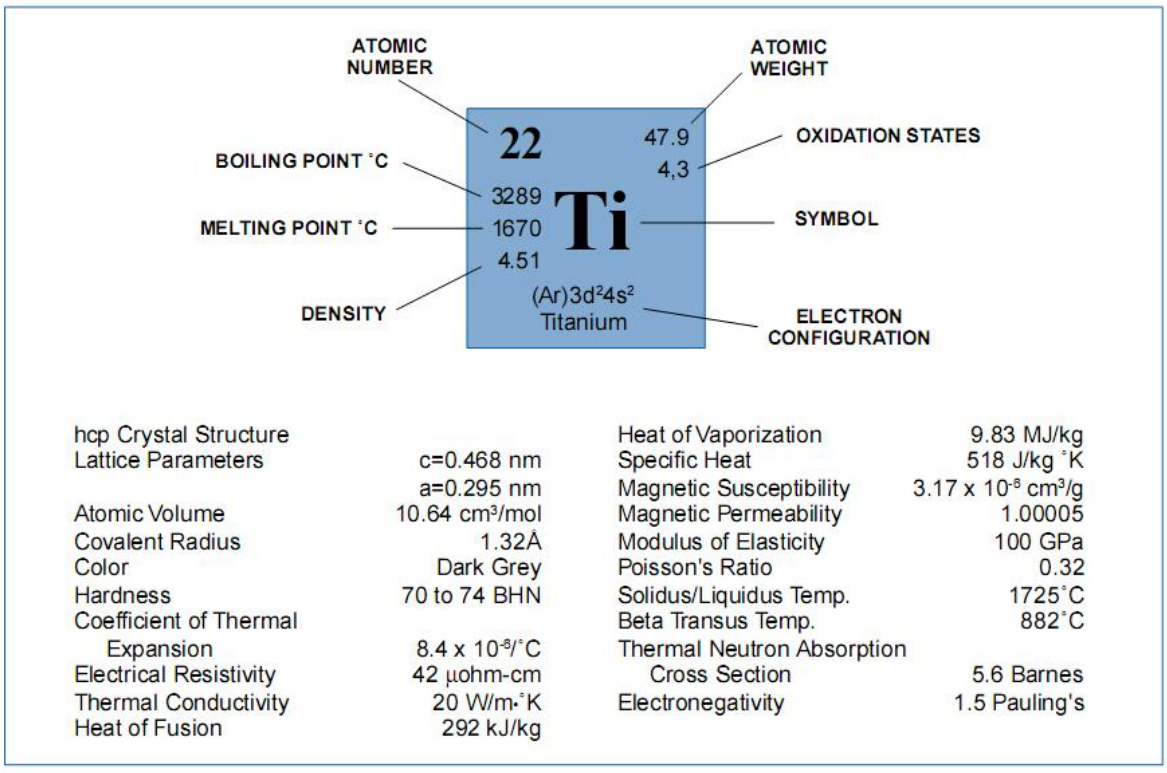
- •Grade 1. Pure Titanium, relatively low strength and high ductility.
- •Grade 2. The pure titanium most used. The best combination of strength, ductility and weldability.
- •Grade 3. High strength Titanium, used for Matrix-plates in shell and tube heat exchangers.
- •Grade 5. The most manufactured titanium alloy. Exceedingly high strength. High heat resistance.
- •Grade 7. Superior corrosion resistance in reducing and oxidizing environments.
- •Grade 9. Very high strength and corrosion resistance.
- •Grade 12. Better heat resistance than pure Titanium. Applications as for Grade 7 and Grade 11.
- •Grade 23. Titanium-6Aluminum-4Vanadium ELI (Extra Low Interstitial) Alloy for surgical implant Applications.

Table 1 CHEMICAL, PHYSICAL AND MECHANICAL PROPERTIES

CHEMICAL, PHYSICAL AND MECHANICAL PROPERTIES							
CHEMICAL COMPOSITION	**ASTM Grade**						
(Max. Values)	1	2	5	7	9	12	23
N, Nitrogen	0,03	0,03	0,05	0,03	0,02	0,03	0,03
C, Carbon	0,1	0,1	0,1	0,1	0,05	0,08	0,08
H, Hydrogen	0,015	0,015	0,0125	0,015	0,013	0,015	0,0125
Fe, Iron	0,2	0,3	0,4	0,3	0,25	0,3	0,25
O, Oxygen	0,18	0,25	0,20	0,25	0,12	0,25	0,13
Pd, Palladium				0,12-0,25			
Al, Aluminum			5,5-6,75		2,5-3,5		5,5-6.5
Mo, Molybdenum						0,2-0,4	
V, Vanadium			3,5-4,5		2,0-3,0		3,5-4,5
Ni, Nickel						0,6-0,9	
Ti, Titanium	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.
MECHANICAL PROPERTIES							
Tensile strength, min (Mpa)	240,00	345,00	895,00	345,00	620,00	483,00	828,00
Yield strength, 0,2% Offset, min (Mpa)	170,00	275,00	825,00	275,00	483,00	345,00	759,00
Elongation (in 4D, min, %)	24,00	20,00	10,00	20,00	15,00	18,00	10,00
Reduction of Area, min, %	30,00	30,00	25,00	30,00	25,00	25,00	15,00
Hardness * Interpolated	Rb70	Rb80	Rc36	Rb80	Rc28	Rc17*	Rc36

Table 2 COMPARISON OF PROPERTIES WITH OTHER METALS

Property	Titanium	304 SS	Aluminium	Magnesium	Nickel	Copper
Atomic No.	22	--	13	12	28	29
Atomic Wt.	47.9	--	26.97	24.32	58.69	63.57
Specific Gravity	4.5	7.9	2.7	1.7	8.9	8.9
Linear thermal expansion coefficient (/°C)	$8.4X10^{-6}$	$17X10^{-6}$	$23X10^{-6}$	$25X10^{-6}$	$15X10^{-6}$	$17X10^{-6}$
Specific heat (cal/gr/°C)	0.124	0.12	0.21	0.24	0.11	0.092
Thermal conductivity coefficient (cal/cm2/sec/°C/cm)	0.041	0.039	0.49	0.38	0.22	0.92
Specific electrical resistance (µOhm-cm)	55	72	2.7	4.3	9.5	1724
Electrical conductivity (%IACA)	3.1	2.4	64	40	18	100
Young's modulus (kg/mm2)	10850	20403	7050	4570	21000	11000
Poisson's ratio	0.34	0.3	0.33	0.35	0.30	0.34



hcp Crystal Structure		Heat of Vaporization	9.83 MJ/kg
Lattice Parameters	c=0.468 nm	Specific Heat	518 J/kg °K
	a=0.295 nm	Magnetic Susceptibility	3.17×10^{-6} cm³/g
Atomic Volume	10.64 cm³/mol	Magnetic Permeability	1.00005
Covalent Radius	1.32Å	Modulus of Elasticity	100 GPa
Color	Dark Grey	Poisson's Ratio	0.32
Hardness	70 to 74 BHN	Solidus/Liquidus Temp.	1725°C
Coefficient of Thermal Expansion	8.4×10^{-6}/°C	Beta Transus Temp.	882°C
Electrical Resistivity	42 µohm-cm	Thermal Neutron Absorption Cross Section	5.6 Barnes
Thermal Conductivity	20 W/m·°K	Electronegativity	1.5 Pauling's
Heat of Fusion	292 kJ/kg		


DURA-ACE