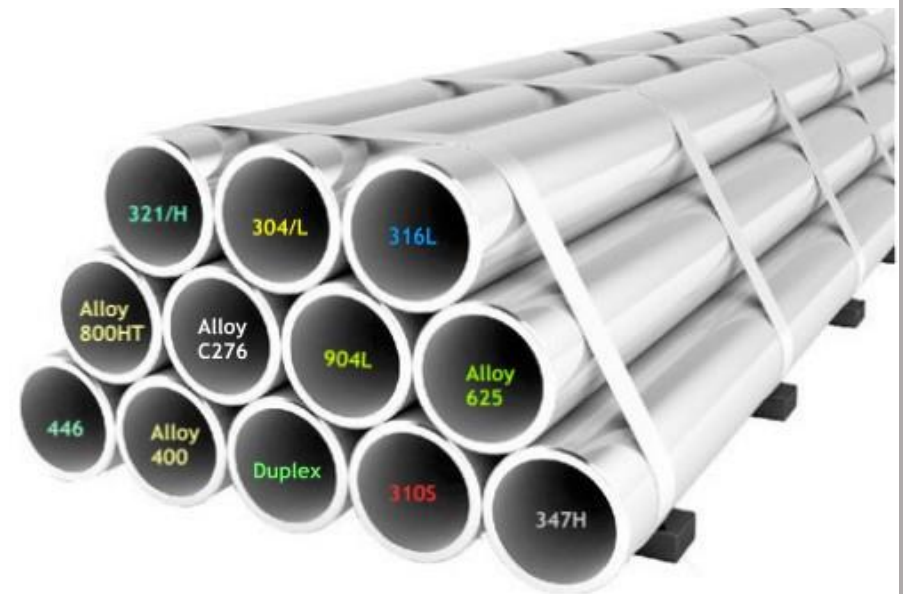

ZIRCONIUM

Datasheet for Zirconium

- Pipes & Tubes
- Sheets & Plates
- Bars & Rods, Forgings
- Fittings & Flanges
- Nuts & Bolts
- Valves



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Datasheet for Zirconium

Zr702 (R60702), Zr704 (R60704), Zr705 (R60705), Zircaloy-2 (R60802), Zircaloy-4

What is Zirconium?

- Zirconium is a lustrous, greyish-white, soft, ductile and malleable metal that is solid at room temperature, though it is hard and brittle at lesser purities. Zirconium is a kind of active metal, which is easy to produce oxidation reaction. It can react with oxygen in the air at room temperature to form an oxide protective film. This protective film gives zirconium and zirconium alloys the best corrosion resistance. This oxide film can be further strengthened by heat treatment, and the surface microhardness can reach Vicat 480 (Rockwell C-scale 47). Most zircon is used directly in high-temperature applications. Even at low temperature, zirconium alloy has good ductility and strength similar to other engineering alloys. Oxygen is not only an indispensable component of oxide film, but also an alloy element to fill the structural gap and increase the strength of zirconium alloy. Zirconium alloy has no tendency from plasticity to embrittlement at low temperature. This material is refractory, hard and resistant to chemical attack. Because of these properties, zircon finds many applications, few of which are highly publicized.
- With good nuclear properties and corrosion resistance, zirconium product is very important material for nuclear. Zirconium product mainly used for chemical equipment. For the higher cost, the zirconium tube use is not very common. In the chemical industry, it is mainly used in hydrochloric acid, molten alkali, acetic acid and other industries.
- The major grades of zirconium are Zr702 (R60702), Zr704 (R60704) and Zr705 (R60705). Zirconium alloys have low neutron absorption; therefore Zircaloy-2 (R60802) and Zircaloy-4 are designed to serve for nuclear industry which is stipulated with low Hf content < 0.01% per ASTM B353.
- Manufacturing Process of Zirconium: Most zircon is used directly in commercial applications, but a small percentage is converted to the metal. Most Zr metal is produced by the reduction of the zirconium (IV) chloride with magnesium metal in the Kroll process. The resulting metal is sintered until sufficiently ductile for metalworking.

Zirconium Product Specification

Product	Zirconium
Standards	Tubes: ASTM B523/B523M
	Pipes: ASTM B658/B658M

	For Nuclear: ASTM 353/353M
Tube Size	For seamless: OD 4-115mm * Wall thick 0.2~8mm * Long 15000mm max
	For welded: OD 80~ 650mm * Wall thick 1 ~ 10mm * Long 15000 max
Grades	Grade R60702 (Zr702): unalloyed zirconium, Grade R60704 (Zr704): zirconium-tin alloy, Grade R60705 (Zr705): zirconium-niobium alloy, Grade R60706, Zircaloy-2 (R60802), Zircaloy-4 (R60804)
Delivery condition	Stress relief annealing, Recrystallization annealing
Testing & Inspection	Dimensional, Chemical analysis, Mechanical properties, Bending test, Flaring Test, Flattening Test, Hydrostatic Test, Eddy Current, Ultra Sonic

Chemical Properties of Zirconium

Element	ASTM B523 / B658 Seamless & Welded Pipe and Tubes		
	R60702	R60704	R60705
Zirconium(+Hf)	≥99.2	≥97.5	≥95.5
Hafnium	≤4.5	≤4.5	≤4.5
Iron+Chromium	≤0.2	0.2~0.4	≤0.2
Tin	-	1.0~2.0	-
Hydrogen	≤0.005	≤0.005	≤0.005
Nitrogen	≤0.025	≤0.025	≤0.025
Carbon	≤0.05	≤0.05	≤0.05

Niobium	-	-	2.0~3.0
Oxygen	≤0.16	≤0.18	≤0.18

Mechanical Properties of Zirconium

ASTM B550/B658	Tensile Strength, min.		Yield Strength, min.		Elongation
	ksi	MPa	ksi	MPa	min. %
R60702	55	380	30	205	16
R60704	60	415	35	240	14
R60705	80	550	55	380	16

Properties of Zirconium

- Long-term validity as compared to other materials
- Cost saving if it is well maintained
- Corrosion resistant
- High heat transfer efficiency
- Eliminates expensive downtime due to equipment failure
- Good heat conductor with Welding properties

Applications of Zirconium

- Metallurgy
- Getter
- Military Use
- Heat Exchanger
- Power and Chemical Plant Applications

- Automotive components
- Cooling system parts
- Aerospace Industry

Types of Zirconium Products

Zirconium Anodes, Platinum-coated	Zirconium Honeycomb	Zirconium Satellites
Zirconium Balls	Zirconium Ingot	Zirconium Shaving
Zirconium Bands	Zirconium Lump	Zirconium Sheet
Zirconium Bars	Zirconium Mesh	Zirconium Shot
Zirconium Blocks	Zirconium Metal	Zirconium Single Crystal
Zirconium Boats	Zirconium Microfoil	Zirconium Sleeves
Zirconium Chunk	Zirconium Microleaf	Zirconium Slugs
Zirconium Coil	Zirconium Non-Woven Fabric	Zirconium Specimens
Zirconium Concentrate	Zirconium Particles	Zirconium Spheres
Zirconium Crucibles	Zirconium Parts	Zirconium Sponges
Zirconium Crystal Bar Milled Chips	Zirconium Pellets	Zirconium Spring
Zirconium Cubes	Zirconium Pieces	Zirconium Strip
Zirconium Cylinder	Zirconium Plate	Zirconium Tape
Zirconium Disc	Zirconium Powder	Zirconium Tube
Zirconium Flake	Zirconium Puck	Zirconium Wafer
Zirconium Flanges	Zirconium Ribbon	Zirconium Wire

Zirconium Foam	Zirconium Rings	Zirconium Wool
Zirconium Foil	Zirconium Rod	Zirconium Samples
Zirconium Granules		

Manufacturing Zirconium Products

Zirconium Sheet	Zirconium Plate Cuttings/Profiles	Zirconium Nuts, Bolts and Fasteners
Zirconium Plate	Zirconium Foil, Coil	Zirconium Wire
Zirconium Blocks/Slabs	Zirconium Strip	Zirconium Ingot
Zirconium Rod/Bar	Zirconium Pipes and Tubes	Zirconium Forgings and Castings
Zirconium Flanges	Zirconium Forged Fittings	Zirconium Buttweld Fittings

About Metallica Metals – The Steel Pipes Factory

- Established in 1975, the Metallica Metals Group (The Steel Pipes Factory) has its operations spread across major cities in India. We are a pioneer in the stainless steel pipes, nickel alloy products, titanium products, carbon steel pipes and alloy steel pipes manufacturing and processing industry. Our products including pipe fittings, flanges, pipes, sheet plates and valves are exported to over 70 countries across the world, while in India we have supplied to even the remote areas. With over 250 tons of sale in stainless steel and carbon steel pipes every day, Metallica has emerged as a prominent vendor for many buyers in India and Overseas
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Our Key Products

STAINLESS STEEL & NICKEL ALLOYS

Pure Nickel Alloys
Monel Alloys (Ni-Cu Alloys)
Inconel (Ni-Cr-Mo) Alloys

INSTRUMENTATION TUBES & FITTINGS

Instrumentation Tube
Hydraulic Tubing
Seamless Tubing

PRODUCTS

Steel Sheet & Plate
Steel Coil & Strip
Steel Pipes

Incoloy Alloys (Ni-Cr-Fe)

Hastelloy Alloys

Stainless Steel 304/304L

Stainless Steel 309S/309H

Stainless Steel 310/310S

Stainless Steel 316/316L

Stainless Steel 316Ti

Stainless Steel 317/317L

Stainless Steel 321/321H

Stainless Steel 347/347H

Stainless Steel 904L

Duplex Steels (UNS S32205, UNS S31803)

Super Duplex Steels (UNS S32760 / UNS
S32750)

Stainless Steel 254 SMO (UNS S31254 / 1.4547)

Instrumentation Tube Fittings

Double Compression Tube Fittings

Precision Pipe Fittings

Needle & Gauge Valves

Manifold Valves

Steel Tubes

Electropolish Tube

Heat Exchanger Tubes

Steel Bars/Rods & Wire

Fasteners (Nut, Bolt, Washer)

Steel Angle Bars

Hex Steel Bars

Round Steel Bars & Rod

Flat Steel Bars

Forgings, Rings & Forged Blocks

Stainless Steel Pipe

Stainless Steel Seamless Pipe

Stainless Steel Welded Pipe

Stainless Steel Tubes

Stainless Steel Furnace Tubes

Stainless Steel Seamless Tubing

Stainless Steel Heat Exchanger Tubes

Large Diameter Pipe

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