

MATERIAL SELECTION

Material	Max / Operating Temp (°C)	Features
Refractory oxide recrystallised Al ₂ O ₃ -99.7% (710)	1750°C-max	good choice for rare metal Thermocouple. Good resistance to chemical attack. Mechanically strong but severe thermal shock should be avoided.
Silicon carbide	1500°C-max	Good level of protection even in severe conditions. Good resistance to reasonable level of thermal shock. Mechanically strong when tick wall is specified but become brittle when aged. Unsuitable for oxidizing atm but resists fluxes.
Impervious mullits (610)	1600°C-max	good choice for rare metal Thermocouple under severe conduction. Resists sulphurous and carbonaceous atm. Thermal shock should be avoided.
304 S.S.	980	Widely used as a common protection tube against heat and corrosion but not recommended for use in the presence of sulphur or reducing
321 S.S.	980	Higher corrosion resistance than 304 S.S. because of its Ti content to prevent carbon precipitation. Excellent resistance to grain boundary corrosion after welding due to less carbon precipitation.
316 S.S.	980	Contains Mo and has excellent resistance to corrosives, heat, acids and alkalis.
316L S.S.	980	Less carbon content than 316 S.S. and has better resistance to grain boundary corrosion, Resistant to "pit" corrosion.
310 S.S.	1,000	High Ni-Cr content and good high temperature strength with resistance to oxidation at high temperatures. High mechanical strength.
347 S.S.	980	Because of its Nb-Ta content, prevents carbon precipitation, Higher corrosion resistance than 304 S.S. and excellent resistance to grain boundary corrosion.
446 S.S.	980	Excellent resistance to oxidizing and reducing flames containing sulphur. Suitable for use in non-ferrous molten metals and other high temperature applications, but less mechanical strength.
Inconel 600	1,050	Excellent resistance to oxidizing and reducing atmospheres at high temperatures. But sulphurous atmospheres should be avoided. Immune to stress and "pit" corrosion.

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Inconel 601	1,050	superior oxidation resistance at high temperatures to Inconel-600, by virtue of strong bonding of metal oxide film.
Inconel 625	1,050	Improved strength and stress rupture properties up to 980C 0by MO and CB additions, and immune to chloride stress corrosion cracking.
Incoloy 800	870	Excellent to high temperature oxidizing atmospheres and thermal shock. About 10 times longer service life than 304 S.S. against high temperature corrosion.
Nicrobell	1300°C max	Highly stable in vacuum and oxidizing atm. Corrosion resistance generally superiors to stainless steels. Can be used in sulphurous atm at reduced temperature. High operating
Kanthal A1	1,100	Good resistance to high temperature oxidation but becomes brittle due to recrystallization. Poor mechanical strength above 850C°
Hastelloy C-276	1,000	Excellent resistance to high temperature oxidizing and reducing atmospheres and also to Cl ₂ gases
Titanium	Oxi. 250 Red.1000	Superior corrosion resistance in cryogenic temperatures but at high temperatures, easily oxidized and becomes brittle.
Monel	Oxi. 500 Red. 600	Excellent resistance to water vapor and sea water at high pressure and corrosion.
Tantalum	Oxi. 300 Red.2,200	Excellent heat-resistant material with high resistance to all acids but apt to severe oxidation and embrittlement in air at high temperatures.
Molybdenum	Oxi. 400 Red.2,000	Excellent mechanical strength up to 1500C0 for applications under inert, reducing and vacuum atmospheres. Resistant to metal vapours at high temperatures but reacts with carbon or graphite. Should not be used in air or oxygen containing gases.

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