Metal Carriers

Type		Min-Max Temp (°F)	Min-Max Temp (°C)	Brinell
Carbon Steel		-40° to 1000°	-40° to 540°	≈120
	Not suitable for handling crude acids or aqueous solutions of salts in the neutral or acid range. A high rate of failure may be expected in hot water service if the material is highly stressed. Concentrated acids and most alkalies have little or no action.			
Monel® 400	67% Nickel and 30% Copper.	-200° to 1500°	-130° to 820°	≈120
	Excellent resistance against most acids and alkalies, except strong oxidizing acids. Subject to stress corrosion cracking when exposed to florosilic acid mercuric chloride and mercury and should not be used with these media. With PTFE (Polytetrafluorethylene), it is widely used for hydrofluoric acid service. Excellent against Seawater, Hydrofluoric acid, sulfuric acid, Alcalies.			
Inconel® 600/625	77% Nickel, 15% Chromium and 7% Iron.	-150° to 2000°	-100° to 1090°	≈150
	Frequently used to overcome the problem of stress corrosion. Excellent high temperature strength. Has excellent mechanical properties at the cryogenic temperature range. Excellent against: Chlorine induced stress condition cracking. Inconel 625 is standard quality in the chemical industry, ship building, and in off-shore service.			
Copper		500°	260°	≈80
	Nearly pure copper with trace amounts of silver added to increase its working temperature.			
AL-6XN®	Chromium 20-22%, Nickel 23.5-25.5%, approx 6-7% Molybdenum added.	1000°	540°	?
	Outstanding resistance to chloride pitting and crevice corrosion. The levels of chromium, molybdenum and nitrogen all serve to provide resistance to acidic, oxidizing chloride solutions previously achieved only by the nickel based alloys. Excellent for problem ion stress corrosion cracking. Applications: Seawater heat exchanges, pulp bleaching plant washers, vats, press rolls and pipelines. Scrubbers: Chemical process tanks and pipelines; Tall oil distillation columns and packing. Reverse osmosis desalination equipment and pumps; Offshore oil and gas production equipment.			
304/304L Stainless Steel	Chromium 18-20%, Nickel 8-10%. 304L carbon content maintained at a maximum of .03%.	-320° to 1400°	-195° to 760°	≈140
	Vast majority of applications for non-corrosive environments can use 304. Excellent corrosion resistance to a wide variety of chemicals. 304 is subject to stress corrosion cracking and to intergranular corrosion at temperatures between			

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800°F to 1500°F in presence of certain media for prolonged periods of time.
The low carbon content of 304L tends to reduce the precipitation of carbides along grain boundaries. Less subject to intergranular corrosion than 304.

316/316L Stainless Steel	Chromium 18-20%, Nickel 12-14%, approximately 2% Molybdenum. 316L carbon content maintained at a maximum of .03%.	-150° to 1400°	-100° to 760°	≈160

Molybdenum increases its strength at elevated temperatures and results in somewhat improved corrosion resistance. Has the highest creep strength at elevated temperatures of any conventional stainless type. Not suitable for extended service within the carbide precipitation range of 800° to 1650°F when corrosive conditions are severe.
The low carbon content of 316L tends to reduce the precipitation of carbides along grain boundaries. Less subject to intergranular corrosion than 316.

321 Stainless Steel	Chromium 18-20%, Nickel 10-12% with a Titanium addition.	-320° to 1450°	-195° to 760°	≈150

Type 321 has the same characteristics as Type 347.

347 Stainless Steel	Chromium 18-20%, Nickel 10-12% with a Columbium addition.	-320° to 1700°	-195° to 925°	≈160

Not as subject to intergranular corrosion as is Type 304.
Is subject to stress corrosion.

Hastelloy® C-276	16-18% Molybdenum, 13-17.5% Chromium, 3.7-5.3% Tungsten, 4.5-7% Iron, and the balance is Nickel.	-300° to 2000°	-185° to 1090°	≈210

Very good in handling corrosives, High resistance to cold nitric acid of varying conditions as well as boiling nitric acid up to 70% concentration. Good resistance to hydrochloric acid and sulphuric acid.
Excellent resistance to stress corrosion cracking.
Standard quality for desulfurization service.

Nickel 200		-320° to 1400°	-195° to 760°	≈110

Outstanding mechanical and thermal characteristics.
Excellent chemical resistance. Corrosion resistance makes it useful in caustic alkalies and where resistance in structural applications to corrosion is a prime consideration.
Does not have the all-around excellent resistance of Monel.
Uses: Alkays systems, Synthetic fibres, Chloride cracking, Food industry,

Titanium		-320° to 2000°	-195° to 1090°	≈215

Excellent corrosion resistance even at high temperatures.
Known as the best solution to chloride ion attack.
Resistant to nitric acid in a wide range of temperatures and concentrations.
Most alkaline solutions have little if any effect upon it. Outstanding in oxidizing environments.

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Note

Maximum temperature ratings are based upon hot air constant temperatures.
The presence of contaminating fluids and cyclic conditions may drastically affect the maximum temperature range.

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