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**CHEMICAL PROCESSING
INDUSTRY**

Corrosion Resistant Alloys

In the chemical processing industry many aggressive chemicals are produced and handled. In order to do this in a safe and reliable way selection of the appropriate material is critical. Chemical processing presents some of the most challenging high temperature and corrosive environments and calls for a range of material solutions.

The commercially pure titanium grades have excellent sea water resistance and are also very resistant to many chemical environments over a range of concentrations and temperatures. This can be enhanced through minor additions of palladium. Nickel alloys offer a combination of excellent corrosion resistance in a wide range of process media, high temperature strength and are readily fabricated and welded.

Nickel, titanium and their alloys have extensive and varied uses in chemical plant construction. Applications include pressure vessels, heat exchangers and condensers, mixers, reactor vessels, distillation columns, agitators, piping systems, pumps and valves and instrumentation and flow control tubing. Alloy selection is dependent on the operating conditions.

Alloy Properties

	Composition (%)	Key attributes
CP Grade 2 R50400 3.7035	Commercially pure, unalloyed titanium	Excellent resistance to sea water, wet chlorine, alkaline solutions, oxidising acids and organic acids. Resistance to crevice corrosion at temperatures below 80°C
200/201 N02200 2.4060	99.6 Ni	Commercially pure nickel with outstanding resistance to caustic environments. Nickel 201 (with maximum 0.02%C) is used at temperatures above 315°C
800H/HT N08810/N08811 1.4958/1.4959	32Ni – 21Cr – 46Fe – C controlled – Al+Ti 1.2max	Excellent resistance to oxidation and carburisation and good high temperature strength. Alloy 800H/HT has close control of Al and Ti for enhanced creep rupture strength
Alloy 400 N04400 2.4360	65Ni – 32Cu – 1.6Fe	High strength, excellent corrosion resistance in a range of media including sea water, alkalis/caustic solutions, sulphuric acid and hydrofluoric acid
Alloy 600 N06600 2.4816	76Ni – 15Cr – 8Fe	Good high temperature strength and oxidation resistance, resistant to caustic and also phosphoric acid up to 85% concentration at room temperature
Alloy 601 N06601 2.4851	60Ni – 23Cr – 14Fe – 1.4 Al	Addition of aluminium for enhanced resistance to high temperature carburisation and oxidation. High mechanical properties at elevated temperatures
Alloy 625 N06625 2.4856	61Ni – 21Cr – 2Fe – 9Mo – 3Nb	A highly versatile grade which is resistant to pitting and crevice corrosion in a wide range of severe environments with high strength up to 815 °C
Alloy 825 N08825 2.4858	42Ni – 21Cr – 28 – 3Mo – 0.6Ti	Excellent resistance to both reducing and oxidising acids, sulphuric and phosphoric acid, stress corrosion cracking and pitting and crevice corrosion
Alloy 22 N06022 2.4602	57Ni – 21Cr – 13Mo – 4Fe – 3.5W	Excellent resistance to oxidising and reducing acids and also good resistance to mixed acids. Particularly resistant to localised attack in acidic halide environments
Alloy C-276 N10276 2.4819	57Ni – 16Cr – 5Fe – 16Mo – 4W	Outstanding resistance to sulphuric and phosphoric acid and highly resistant to pitting and crevice corrosion. Ideal for service in hot, aggressive environments

