

Material Selection Guide

This chart is a guide to selection of thermocouple sheath and thermowell materials according to process fluid. It includes factors such as catalytic reaction, contamination and electrolysis. However, there are many instances where factors other than these must be considered. It is recommended that such special applications be submitted to OMEGA ENGINEERING for recommendations.

These recommendations are only guides based on the most economical material selection. OMEGA ENGINEERING cannot be held responsible if these recommendations are not satisfactory for specific applications.

SUBSTANCE	CONDITIONS	RECOMMENDED METAL	SUBSTANCE	CONDITIONS	RECOMMENDED METAL	SUBSTANCE	CONDITIONS	RECOMMENDED METAL
Acetate Solvents	Crude or Pure	Monel or Nickel	Ethyl Acetate		Monel	Picric Acid	70°F	304 Stainless Steel
Acetic Acid	10% - 70°F	304 Stainless Steel	Ethyl Chloride	70°F	304 Stainless Steel	Potassium Bromide	70°F	316 Stainless Steel
"	50% - 70°F	304 Stainless Steel	Ethylene Glycol		Steel (C1018)	Potassium Carbonate	1% - 70°F	304 Stainless Steel
"	50% - 212°F	316 Stainless Steel	Ethyl Sulphate	70°F	Monel	Potassium Chlorate	70°F	304 Stainless Steel
"	99% - 70°F	430 Stainless Steel	Ferric Chloride	1% - 70°F	316 Stainless Steel	Potassium Chloride	5% - 70°F*	304 Stainless Steel
"	99% - 212°F	430 Stainless Steel	"	5% - 70°F	Tantalum	"	5% - 212°F	304 Stainless Steel
Acetic Anhydride		Monel	"	5% - Boiling	Tantalum	Potassium Hydroxide	5% - 70°F	304 Stainless Steel
Acetone	212°F	304 Stainless Steel	Ferric Sulphate	5% - 70°F	304 Stainless Steel	"	25% - 212°F	304 Stainless Steel
Acetylene		304, Monel, Nickel	Ferrous Sulphate	Dilute 70°F	304 Stainless Steel	"	50% - 212°F	316 Stainless Steel
Alcohol Ethyl	70°F	304 Stainless Steel	Formaldehyde		304 Stainless Steel	Potassium Nitrate	5% - 70°F	304 Stainless Steel
"	212°F	304 Stainless Steel	Freon		Steel (C1018)	"	5% - 212°F	304 Stainless Steel
Alcohol Methyl	70°F	304 Stainless Steel	Formic Acid	5% - 70°F	316 Stainless Steel	Potassium		
"	212°F	304 Stainless Steel	"	5% - 150°F	316 Stainless Steel	Permanganate	5% - 70°F	304 Stainless Steel
Aluminum	Molten	Cast iron	Gallic Acid	5% - 70°F	Monel	Potassium Sulphate	5% - 70°F	304 Stainless Steel
Aluminum Acetate	Saturated	304 Stainless Steel	"	5% - 150°F	Monel	"	5% - 212°F	304 Stainless Steel
Aluminum Sulphate	10% - 70°F	304 Stainless Steel	Gasoline	70°F	304 Stainless Steel	Potassium Sulphide	70°F	304 Stainless Steel
"	Saturated 70°F	304 Stainless Steel	Glucose	70°F	304 Stainless Steel	Propane		304 Stainless Steel
"	"	304 Stainless Steel	Glycerine	70°F	304 Stainless Steel	Pyrogallic Acid		304 Stainless Steel
"	10% - 212°F	316 Stainless Steel	Glycerol	70°F	304 Stainless Steel	Quinine Bisulphate	Dry	316 Stainless Steel
"	Saturated 212°F	316 Stainless Steel	Heat Treating		446 Stainless Steel	Quinine Sulphate	Dry	304 Stainless Steel
Ammonia	All concentrations 70°F	304 Stainless Steel	Hydrobromic Acid	48% - 212°F	Hastelloy B	Resin		304 Stainless Steel
Ammonium Chloride	All concentrations 212°F	316 Stainless Steel	Hydrochloric Acid	1% - 70°F	Hastelloy C	Rosin	Molten	304 Stainless Steel
Ammonium Nitrate	All concentrations 70°F	304 Stainless Steel	"	1% - 212°F	Hastelloy B	Sea Water		Monel
"	All concentrations 212°F	304 Stainless Steel	"	5% - 70°F	Hastelloy C	Salomoniac		Monel
Ammonium Sulphate	5% - 70°F	304 Stainless Steel	"	5% - 212°F	Hastelloy B	Salicylic Acid		Nickel
"	10% - 212°F	316 Stainless Steel	"	25% - 70°F	Hastelloy B	Shellac		304 Stainless Steel
"	Saturated 212°F	316 Stainless Steel	"	25% - 212°F	Hastelloy B	Soap	70°F	304 Stainless Steel
Aniline	All concentrations 70°F	304 Stainless Steel	Hydrocyanic Acid		316 Stainless Steel	Sodium Bicarbonate	All concentrations 70°F	304 Stainless Steel
Amylacetate		Monel	Hydrofluoric Acid		Hastelloy C	"	5% - 150°F	304 Stainless Steel
Asphalt		Steel (C1018) Phosphor Bronze, Monel, Nickel	Hydrogen Peroxide	70°F	316 Stainless Steel	Sodium Bisulphate		Monel
				212°F	316 Stainless Steel	Sodium Carbonate	5% - 70°F	304 Stainless Steel
Barium Carbonate	70°F	304 Stainless Steel	Hydrogen Sulphide	Wet and dry	316 Stainless Steel	"	5% - 150°F	304 Stainless Steel
Barium Chloride	5% - 70°F	Monel	Iodine	70°F	Tantalum	Sodium Chloride	5% - 70°F	316 Stainless Steel
"	Saturated 70°F	Monel	Kerosene	70°F	304 Stainless Steel	"	5% - 150°F	316 Stainless Steel
"	Aqueous - Hot	316 Stainless Steel	Lactic Acid	5% - 70°F	304 Stainless Steel	"	Saturated - 70°F	316 Stainless Steel
Barium Hydroxide		Steel (C1018)	"	5% - 150°F	316 Stainless Steel	"	Saturated - 212°F	316 Stainless Steel
Barium Sulphite		Nichrome	"	10% - 212°F	Tantalum	Sodium Fluoride	5% - 70°F	Monel
Benzaldehyde		Steel (C1018)	Lacquer	70°F	316 Stainless Steel	Sodium Hydroxide		304 Stainless Steel
Benzene	70°F	304 Stainless Steel	Latex		Steel (C1018)	Sodium Hypochlorite	5% still	316 Stainless Steel
Benzine		Steel (C1018), Monel, Inconel	Lime Sulphur		Steel (C1018), 304, Monel	Sodium Nitrate	Fused	317 Stainless Steel
Benzol	Hot	304 Stainless Steel	Linseed Oil	70°F	304 Stainless Steel	Sodium Peroxide		304 Stainless Steel
Boric Acid	5% Hot or Cold	304 Stainless Steel	Magnesium Chloride	5% - 70°F	Monel	Sodium Phosphate		Steel (C1018)
Bromine	70°F	Tantalum	"	5% - 212°F	Nickel	Sodium Silicate		Steel (C1018)
Butadiene		Brass, 304	Magnesium Sulphate	Cold and Hot	Monel	Sodium Sulphate	70°F	304 Stainless Steel
Butane	70°F	304 Stainless Steel	Malic Acid	Cold and Hot	316 Stainless Steel	Sodium Sulphide	70°F	316 Stainless Steel
Butylacetate		Monel	Mercury		Steel (C1018), 304, Monel	Sodium Sulphite	150°F	304 Stainless Steel
Butyl Alcohol		Copper	Methane	70°F	Steel (1020)	Stearic Acid		304 Stainless Steel
Butylenes		Steel (C1018), Phosphor Bronze	Milk		304, Nickel	Sulphur Dioxide	Moist Gas - 70°F	316 Stainless Steel
Butyric Acid	5% - 70°F	304 Stainless Steel	Mixed Acids (Sulphuric and Nitric - all temp. and %)		Carpenter #20	Sulphur	Gas - 575°F	304 Stainless Steel
"	5% - 150°F	304 Stainless Steel	Molasses		Steel (C1018), 304, Monel, Nickel	"	Dry - Molten	304 Stainless Steel
Calcium Bisulfite	70°F	316 Stainless Steel	Muriatic Acid	70°F	Tantalum	"	Wet	316 Stainless Steel
Calcium Chlorate	Dilute 70°F	304 Stainless Steel	Nap	70°F	304 Stainless Steel	"	5% - 70°F	304 Stainless Steel
"	Dilute 150°F	304 Stainless Steel	Natural Gas	70°F	304 Stainless Steel	"	10% - 212°F	304 Stainless Steel
Calcium Hydroxide	10% - 212°F	304 Stainless Steel	Neon	70°F	304 Stainless Steel	"	10% - 212°F	304 Stainless Steel
"	20% - 212°F	316 Stainless Steel	Nickel Chloride	70°F	304 Stainless Steel	"	50% - 70°F	304 Stainless Steel
"	50% - 212°F	317 Stainless Steel	Nickel Sulphate	Hot and Cold	304 Stainless Steel	"	50% - 212°F	304 Stainless Steel
Carbolic Acid	All 212°F	316 Stainless Steel	Nitric Acid	5% - 70°F	304 Stainless Steel	"	90% - 70°F	304 Stainless Steel
Carbon Dioxide	Dry	Steel (C1018), Monel	"	20% - 70°F	304 Stainless Steel	"	90% - 212°F	Hastelloy D
"	Wet	Aluminum, Monel, Nickel	"	50% - 70°F	304 Stainless Steel	Tannic Acid	70°F	304 Stainless Steel
Carbon Tetrachloride	10% - 70°F	Monel	"	50% - 212°F	304 Stainless Steel	Tar		Steel (C1018), 304, Monel, Nickel
Chlorex Caustic	Dry 70°F	316SS, 317SS	"	65% - 212°F	316 Stainless Steel	Tartaric Acid	70°F	304 Stainless Steel
Chlorine Gas	Moist 70°F	317 Stainless Steel	"	Concentrated - 70°F	304 Stainless Steel	"	150°F	316 Stainless Steel
"	Moist 212°F	Hastelloy C	"	Concentrated - 70°F	304 Stainless Steel	Tin	Molten	Cast Iron
Chromic Acid	5% - 70°F	304 Stainless Steel	Nitrobenzene	70°F	304 Stainless Steel	Toluene		Aluminum, Phosphor Bronze, Monel
"	10% - 212°F	316 Stainless Steel	Nitrous Acid		304 Stainless Steel	Trichloroethylene		Steel (C1018)
"	50% - 212°F	316 Stainless Steel	Oleic Acid	70°F	316 Stainless Steel	Turpentine		304 Stainless Steel
Citric Acid	15% - 70°F	304 Stainless Steel	Oleum	70°F	316 Stainless Steel	Varnish		304 Stainless Steel
"	15% - 212°F	317 Stainless Steel	Oxalic Acid	5% - Hot and Cold	304 Stainless Steel	Vegetable Oils		Steel (C1018), 304, Monel
"	Concentrated 212°F	304 Stainless Steel	Oxygen	10% - 212°F	Monel	Vinegar		304 Stainless Steel
Coal Tar	Hot	Aluminum	"	70°F	Steel (C1018)	Water	Fresh	Copper, Steel (C1018), Monel
Coke Oven Gas		304, 316	Palmitic Acid		304 Stainless Steel	"		Aluminum
Copper Nitrate		304, 316	Petroleum Ether		304 Stainless Steel	Whiskey, Wine		304, Nickel
Copper Sulphate		316 Stainless Steel	Phenol		304 Stainless Steel	Xylene		Copper
Core Oils		304 Stainless Steel	Pentane		304 Stainless Steel	Zinc	Molten	Cast Iron
Cottonseed Oil		Steel (C1018), Monel, Nickel	Phosphoric Acid	1% - 70°F	304 Stainless Steel	Zinc Chloride		Monel
Creosols		304 Stainless Steel	"	5% - 70°F	304 Stainless Steel	Zinc Sulphate	5% - 70°F	304 Stainless Steel
Creosote Crude		Steel (C 1018), Monel, Nickel	"	10% - 70°F	316 Stainless Steel	"	Saturated - 70°F	304 Stainless Steel
Cyanogen Gas		304 Stainless Steel	"	10% - 212°F	Hastelloy C	"	25% - 212°F	304 Stainless Steel
Dowtherm		Steel (C1018)	"	30% - 70°F	Hastelloy B			
Epsom Salt	Hot and Cold	304 Stainless Steel						
Ether	70°F	304 Stainless Steel						