

Corrosive Service Guide to Materials for Sheaths and Thermowells

Refer to A.S.M.E. Boiler Code, Section VIII for allowable stress levels

(Fluoropolymer coated thermowells and/or Fluoropolymer sheaths may be substituted for all corrosive agents listed)

CORROSIVE AGENT	TEMP. °C	TEMP. °F	CONC. %	RECOM. MATERIAL	CORROSIVE AGENT	TEMP. °C	TEMP. °F	CONC. %	RECOM. MATERIAL
Iodine	83	[190]	ALL	Hast. C	Sea Water (Cavitation)				316 SS
	21	[70]	ALL	Nickel	Soap Solutions	16	[60]	ALL	446 SS
Kerosene	238	[460]	ALL	TFE		54	[130]	ALL	Nickel ^[1]
	193	[380]	ALL	FEP	Sodium Bicarbonate	171	[340]	20%	316 SS
	171	[340]		Steel ^[1]	Sodium Bisulfite	71	[160]	10%	316 SS
Ketones	32	[90]	ALL	Hast. C		93	[200]	10 - 40%	Carp. 20
	127	[260]	ALL	316 SS ^[1]	Sodium Carbonate	93	[200]	30%	Carp. 20
Lactic Acid	154	[310]	ALL	Titanium		293	[560]	10-100%	Hast. B ^[1]
	116	[240]	ALL	Hast. B ^[1]	Sodium Chloride	27	[80]	30%	Nickel
Lime (Sulfur)	238	[460]	ALL	TFE	Sodium Flouride	71	[160]	ALL	Monel®
	193	[380]	ALL	FEP		77	[170]	ALL	Carp. 20 ^[1]
	154	[310]	ALL	316 SS ^[1]	Sodium Hydroxide	104	[220]	ALL	Monel®
Linseed Oil	60	[140]	ALL	Carp. 20		71	[160]	ALL	316 SS ^[1]
	27	[80]	ALL	Steel ^[1]	Sodium Nitrate	171	[340]	60%	316 SS
Magnesium Chloride	143	[290]	ALL	Nickel	Sodium Nitrite	93	[200]	Saturated	Titanium
	88	[190]	50%	Carp. 20 ^[1]		93	[200]	40%	304 SS ^[1]
Magnesium Hydroxide	93	[200]	ALL	304 SS	Sodium Peroxide	16	[60]	10%	446 SS
Magnesium Sulfate	93	[200]	60%	Nickel		171	[340]	10%	316 SS ^[1]
	171	[340]	ALL	316 SS ^[1]	Sodium Phosphate Acid	93	[200]	ALL	Titanium
Mercuric Chloride	143	[290]	ALL	Tantalum		93	[200]	ALL	304 SS ^[1]
	77	[170]	10%	Hast. C ^[1]	Sodium Silicate	27	[80]	ALL	446 SS ^[1]
Mercury	293	[560]	ALL	304 SS		166	[330]	ALL	316 SS ^[1]
Methyl Chloride (Dry)	171	[340]	ALL	316 SS	Sodium Sulfate	199	[390]	ALL	316 SS
Methylene Chloride	93	[200]	ALL	Carp. 20	Sodium Sulfide	238	[460]	50%	TFE
Milk	93	[200]		304 SS		193	[380]	50%	FEP
Naphtha	16	[60]	ALL	446 SS		93	[200]	50%	316 SS ^[1]
	116	[240]	ALL	304 SS ^[1]	Sodium Sulfite	93	[200]	10%	304 SS
Natural Gas	238	[460]		TFE	Sodium Thiosulfate	16	[60]	25%	446 SS
	193	[380]		FEP		116	[240]	ALL	316 SS ^[1]
	43	[110]		Steel ^[1]	Steam (Low Pressure)				Inconel
Nickel Chloride	93	[200]	80%	Hast. C					304 SS ^[1]
Nickel Sulfate	82	[180]	10%	Tantalum	(Medium Pressure)				Nickel
	93	[200]	ALL	304 SS ^[1]					304 SS ^[1]
Nitric Acid	21	[70]	ALL	304 SS	(High Pressure)				316 SS ^[1]
	93	[200]	40%	304 SS	Sulfur	293	[560]	ALL	304 SS
Nitrobenzene	143	[290]	ALL	Carp. 20		871	[1600]	ALL	Alloy 556
	171	[340]	ALL	316 SS ^[1]	Sulfur Chloride (Dry)	32	[90]	ALL	Tantalum
Oleic Acid	138	[280]	ALL	316 SS		293	[560]	ALL	Nickel ^[1]
Oleum	49	[120]	40%	Hast. C	Sulfur Dioxide (Dry)	49	[120]	ALL	Steel
	116	[240]	ALL	316 SS ^[1]		293	[560]	ALL	316 SS ^[1]
Oxalic Acid	93	[200]	ALL	Tantalum	Sulfur Trioxide (Dry)	238	[460]	ALL	TFE
	93	[200]	ALL	Carp. 20 ^[1]		193	[380]	ALL	FEP
Oxygen	271	[520]	ALL	Tantalum		293	[560]	ALL	304 SS ^[1]
	16	[60]	ALL	446 SS	Sulfuric Acid	38	[100]	100%	Carp. 20
	171	[340]	ALL	316 SS ^[1]		121	[250]	60%	Hast. B
Palmitic Acid	238	[460]	ALL	TFE	Sulfurous Acid	71	[160]	ALL	Titanium
	193	[380]	ALL	FEP		177	[350]	ALL	Carp. 20 ^[1]
	199	[390]	ALL	304 SS ^[1]	Tannic Acid	93	[200]	10 - 20%	Titanium
Phenol (Carbolic Acid)	293	[560]	ALL	316 SS		93	[200]	ALL	304 SS ^[1]
Phosphoric Acid	93	[200]	50-85%	Hast. C	Tartaric Acid	199	[390]	ALL	304 SS
Phosphoric	43	[110]	50-85%	Carp. 20	Titanium Tetrachloride	27	[80]	ALL	Carp. 20
	171	[340]	ALL	316 SS		138	[280]	ALL	Titanium
Phosphoric Solutions	27	[80]	ALL	Titanium	Toluene (Toluol)	171	[340]	ALL	Steel
Picric Acid	21	[70]	ALL	Aluminum		93	[200]	ALL	304 SS
	199	[390]	ALL	316 SS ^[1]	Trichloroacetic Acid	238	[460]	ALL	TFE
Potassium Bromide	93	[200]	30%	Titanium		193	[380]	ALL	FEP
	93	[200]	30%	446 SS		93	[200]	ALL	Hast. C ^[1]
Potassium Carbonate	93	[200]	50%	304 SS	Trichloroethylene	71	[160]	ALL	Inconel®
Potassium Chlorate	171	[340]	30%	316 SS	Turpentine	88	[190]	ALL	304 SS
Potassium Hydroxide	93	[200]	50%	Nickel	Whiskey and Wine			ALL	304 SS
Potassium Nitrate	171	[340]	80%	Aluminum	Xylene (Xylol)	88	[190]	ALL	446 SS
	277	[530]	80%	446 SS ^[1]	Zinc Chloride	82	[180]	to 70%	Titanium
Potassium Permanganate	21	[70]	20%	Hast. C		293	[560]	ALL	Hast. B ^[1]
	171	[340]	20%	316 SS ^[1]	Zinc Sulfate	93	[200]	SAT.	316 SS
Potassium Sulfate	171	[340]	10%	316 SS					
Propane	60	[140]	ALL	446 SS					
	27	[80]	ALL	Brass					
Pyrogalllic Acid	27	[80]	ALL	Copper					
	171	[340]	ALL	316 SS ^[1]					
Salicylic Acid	116	[240]	ALL	Hast. C					
	171	[340]	ALL	316 SS ^[1]					
Sea Water (Stagnant)				Monel®					

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All materials listed are rated < 2 Mils penetration/year except as noted: [1] = < 20 Mils penetration/year

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