



RAMA CORPORATION
TUBULAR, IMMERSION,
SCREW-IN AND FLANGED
HEATERS

ESTABLISHED
1947



RAMA CORPORATION

“INNOVATION THROUGH EXPERIENCE”

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RAMA TUBULAR

Rama's tubular heating elements can be applied to many industrial uses. Constructed from the highest quality materials, they meet stringent application requirements ranging from use in general industry to space age technology to nuclear power plants. These heaters offer the best quality product in the industry.



DESIGNED FOR VERSATILITY

Fully annealed for easy forming
Elements can be brazed or welded
Shapes ranging from simple to complex



ENGINEERED FOR STRENGTH

Our heaters can heat products ranging from:

- Oil
- Water
- Plastics
- Metals
- Industrial Gases
- Process Air
- And much more



MANUFACTURED FOR QUALITY

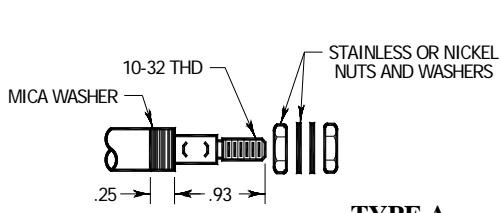
Precision wound resistors
Standard or profiled heat distribution
Magnesium oxide (MGO) compaction to the highest physical density

Specifications & Construction

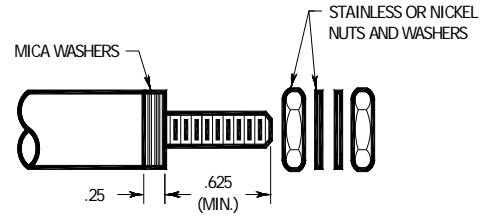
Heater Dia (inch)	Sheath Material	Max Temp (F°)	Max Volts	Resistance (O/I) measured cold		Terminal Configuration
				Min	Max	
.165 +/- .003	Steel Stainless	750 1600	120	.45	8.3	C,D
.215 +/- .003	Stainless Incoloy	1600 1700	120	.17	7.5	A,B,C,D
.245 +/- .005	Incoloy	1700	240	.17	7.5	A,B,C,D
.315 +/- .005	Copper Steel Stainless Incoloy	350 750 1600 1700	240	.10	5.0	A,B,C,D
.375 +/- .005	Incoloy	1700	240	.07	4.7	A,B,C,D
.440 +/- .005 .490 +/- .005	Copper Steel Stainless Incoloy	350 750 1600 1700	480 480	.07 .07	4.7 4.7	A,B,C,D



STANDARD TERMINALS

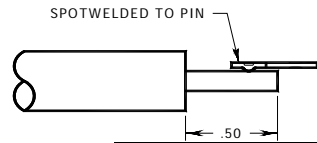
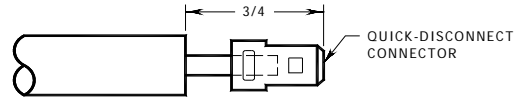


TYPE A

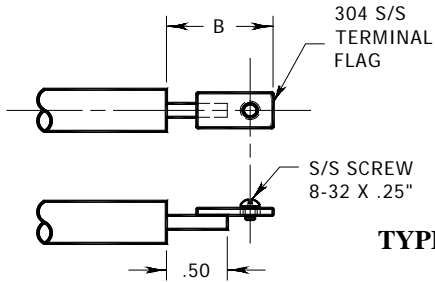


TYPE B

THREADS AVAILABLE IN: 10-32, 8-32, 6-32
THREADED LENGTHS MAY BE CUT TO CUSTOMERS REQUEST.



TYPE D



TYPE C

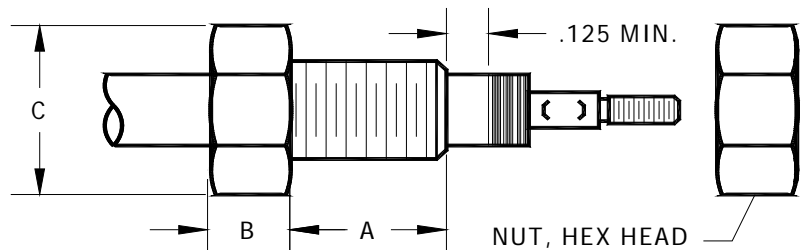
TABLE 1 'C'	
Heater Diameter	Terminal Diameter
.160	.051
.165	
.215	.072
.245	
.265	
.290	.125
.315	
.330	
.375	
.440	
.490	

TABLE 2 'C'	
VOLT	B
<=120	3/4
120-480	7/8
>=480	1+0/- .06

TABLE 1 'D'	
Heater Diameter	Terminal Diameter
.160	.051
.165	
.215	.072
.245	
.265	
.290	.125
.315	
.330	
.375	
.440	
.490	

BUSHINGS

STANDARD BUSHING SPECS				
THREAD	MATERIAL	A	B	C
1/2-20	STEEL	3/4	5/16	.91
1/2-20	STAINLESS	3/4	5/16	.91
5/8-18	STEEL	1	7/16	1.06
3/4-16	STEEL	1	1/2	1.27
3/4-16	STAINLESS	1	1/2	1.27



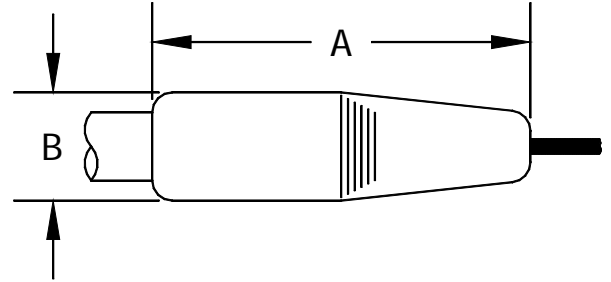
Bushings may also be available in brass.
Gaskets available upon request
For alternate sizes consult factory



SEALS

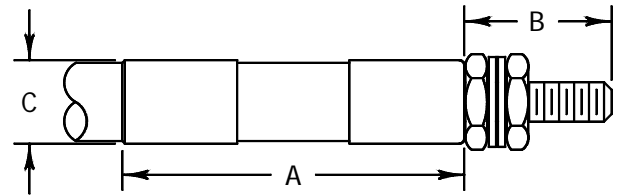
SILICONE RUBBER MOLDED

Heater Diameter	Dimensions	
	A (Max)	B (Max)
.165 to .215	1.75	.375
.245 to .315	1.75	.500
.440 to .490	1.75	.750



CERAMIC TO METAL

Heater Diameter	Dimensions				Ratings	
	A	B	C	THD	VOLTS	AMPS
.215	1.625	.437	.281	8-32	1000	20
.245	1.625	.437	.281	8-32	1000	20
.315	1.875	.437	.361	10-32	1500	30
.440	2.125	.687	.481	1/4-28	2500	60
.490	2.125	.687	.521	1/4-28	2500	60



Ceramic to metal seals are available upon request. This type of seal is hermetically attached to the sheath and is used where temperatures may reach up to 1000°F in the seal area. Nuts and washers are also provided.

SPECIAL

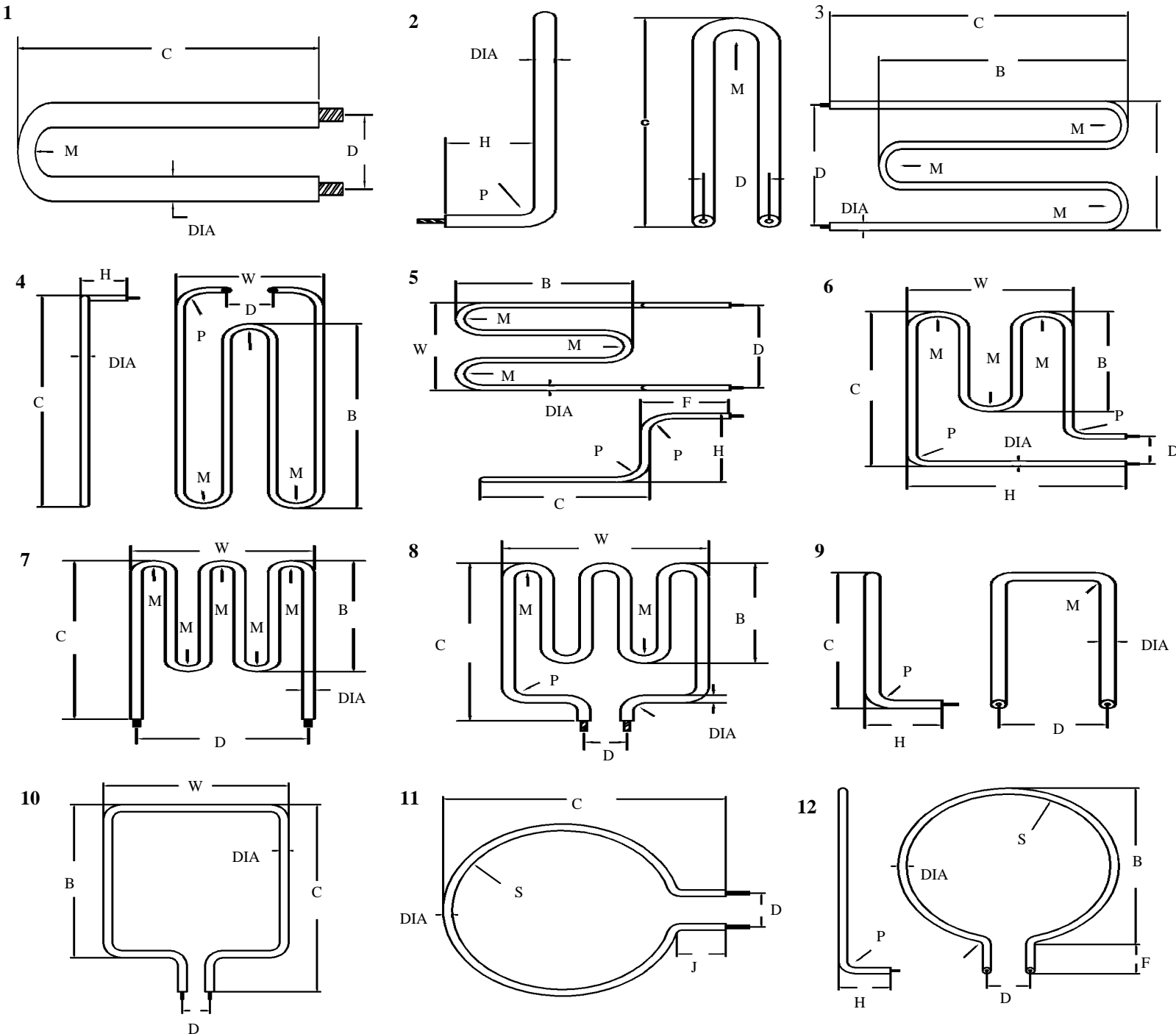
Rama can provide special epoxy seals, silicone varnish, or RTV seals under the mica insulator to meet customer requirements for moisture barriers where high humidity is present.



Tubular Heater Bend Configurations

Rama is equipped to bend heating elements in simple or complex shapes. The following are examples of bends, refer to these when ordering or preparing drawings and specifications. Customers who wish to bend heaters should bend heaters over a mandrel whose radius is greater than the heater diameter and never bend a hot-cold junction. Specialty bends available upon request consult factory.

Heater Diameter (Inch)	.165	.215	.245	.315	.330	.375	.440	.490
Min Bend Radius (Inch)	.33	.43	.49	.63	.66	.75	.88	.98



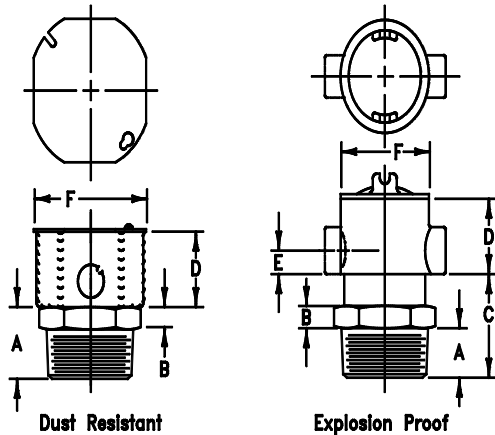
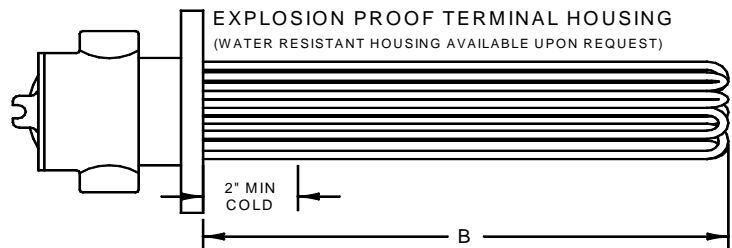
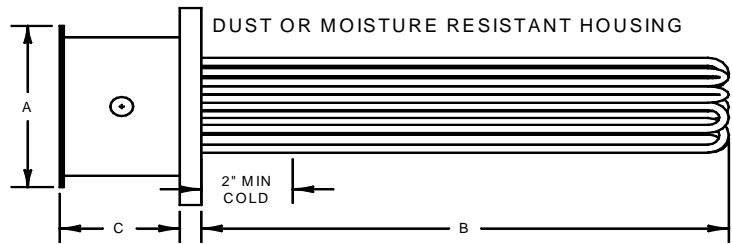


SCREW-IN AND FLANGED IMMERSION HEATERS

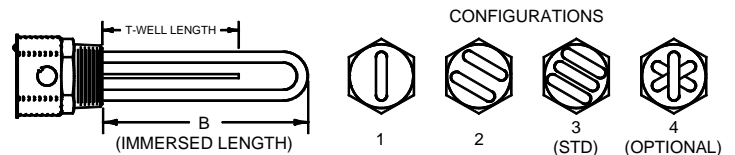
The most efficient method of electrically heating water, oil, or other fluids is by using RAMA immersion heaters. our heaters are made from the best quality materials and can be used in any containment vessel. Thermowells can be supplied for controller sensors.

- Standard terminal housings are dust resistant or moisture resistant
- We use standard explosion proof housings.
- Water resistant versions of our explosion proof housings are available upon request
- Commercial 150 and 300 pound steel or stainless steel flanges are used
- Minimum 2" cold area required
- Special terminal housings
- Special flanges
- Metric flanges available upon request
- Black oxide per MIL-C-13924C Class 1
- Hard black anodize per MIL-8525R Type III Class 2
- Black anodize per MIL-8625F Type I Class 2
- Custom designs to meet your specifications are a RAMA specialty

Flange Size (In.)		Dimensions (inch, max)	
		A (Dia)	C
5	6	8-1/4	3-3/4
6	12	9-1/8	5-5/8
8	18	11-1/4	5-5/8
10	21	13-1/8	6-1/4



SCREW-IN IMMERSION HEATER



For more options consult factory



Corrosion Guide

Solution	Sheath Material (Recommended)	Solution	Sheath Material (Recommended)
Acetic acid - aerated	Titanium, carpenter 20	Caustic soda - 2% 210F	Steel
no air	Titanium, monel	10-30% 210F	Stainless 321, monel
	Carpenter 20	76% 180F	Nickel, inconel
vapor	Titanium, hasteloy C276	Chlorine dry	Inconel
Acetone	Stainless	Choloracetic acid	Titanium
Alcohol	Stainless 316, incoloy, inconel	Chromium plating	Titanium
Alodine	Stainless B27	Chromic acid	Titanium
Aluminum chloride	Hasteloy C276	Citric acid	Hasteloy B, hasteloy C276
Aluminum cleaners	Stainless	Clear chromate	Stainless 316
Aluminum sulphate	Stainless	Cobalt plating	Stainless
Ammonia & oil	Steel	Coconut oil	Nickel
Anhydrous ammonia	Steel, Stainless	Copper bright	Stainless 316
Ammonium chloride	Titanium	Copper chloride	Lead, titanium
Ammonium hydroxide	Stainless, incoloy, inconel	Copper cyanide	Steel
Ammonium nitrate	Steel, Stainless	Copper plating	Steel
Ammonium sulphate	Titanium	Copper pyrophosphate	Stainless
Amyl alcohol	Copper, monel	Copper strike	Steel, stainless
Aniline	Stainless	Copper sulphate	Lead, hasteloy C276
Anodizing (10% solution)		Creostote	Steel
Chromic acid 96F	Stainless	Cresylic acid	Stainless 316
Sulphuric acid 70F	Lead, carpenter 20	Deoxidine	Stainless
Sodium hydroxide 160F	Steel	Deoxidizer (3AL-13)	Stainless
Nigrosene 150F	Monel	Deoxylyle	Stainless
Nickel acetate 200F	Monel	Diethylene glycol	Stainless
Asphalt	Steel, stainless, incoloy	Diphenyloxide	Steel
Barium chloride	Nickel, incoloy	Disodium phosphate	Steel
Barium hydroxide	Stainless, 316, carpenter 20	Diversey No 99	Steel
Barium sulphate	Titanium	Dowtherm A	Steel
Barium sulphite	Stainless	ELECTRO cleaner	Steel, stainless
Bonderizing (zinc phosphate)	Stainless 316	Electroless nickel	Titanium
Boric acid	Hasteloy B, hasteloy C276	Electroless tin (alkaline)	Stainless 316
	Titanium	Ether	Carpenter 20
Bright cyanide	Stainless	Ethyl chloride	Stainless, copper, inconel
Bright copper cyanide	Steel, stainless	Ethylene glycol	Steel
Bright nickel	Titanium	Fatty acids	Stainless 316, carpenter 20
Bronze plating	Steel, stainless	Ferric chloride	Titanium
Brine (salt sea water)	Monel, inconel	Ferric nitrate	Carpenter 20
Butanol	Steel, stainless, incoloy	Ferric sulphate	Lead, titanium
Cadmium plating	Inconel, stainless	Fluorine gas (dry)	Monel, inconel
Calcium chloride	Inconel, hasteloy B,	Formaldehyde	Stainless
	Hasteloy C276	Formic acid	Carpenter 20
Carbon dioxide	Stainless, incoloy	Freon	Copper, monel, steel
Carbon tetrachloride	Inconel, monel	Fuel oil normal	Steel, stainless
Carbonic acid	Inconel	Fuel oil acid	Lead, carpenter 20
Castor oil	Steel, stainless, incoloy	Gasoline sour	Lead, carpenter 20
Caustic etch	Steel, stainless, incoloy	Gasoline refined	Steel, stainless
		Glycerine glycerol	Stainless, inconel, monel

“Stainless” refers to any series 300 stainless steel



Corrosion Guide Continued

Solution	Sheath Material (Recommended)	Solution	Sheath Material (Recommended)
Gold acid	Steel	Nitro benzene	Steel, stainless, inconel
Gold cyanide	Stainless	Oakite 20, 23, 24, 30 & 51	Steel
Grey nickel	Titanium	Oakite 67	Stainless
Holdens 310 tempering bath	Nickel	Oakite 90 @ 180F	Steel
hot seal sodium dichromate	Stainless 316	Oleic acid	Inconel, carpenter 20, Titanium
Hydrocarbons aliphatic	Steel, stainless, inconel	Oxalic acid	Cupro-nickel
Hydrocarbons aromatic	Steel, stainless, inconel	Paint stripper (high alkaline)	Steel
Hydrochloric acid	Consult factory	Paint stripper (solvent)	Stainless 316
Hydrofluoric acid	Consult factory	Paraffin	Steel, stainless
Hydrogen peroxide	Titanium	Parkerizing	Stainless 316
Iridite #4-73,#4-74, #14 #14-2, #14-9, #18-P	Stainless 316	Perchloroethylene	Monel, inconel
Iron phosphate	Stainless 316	Petroleum crude	Stainless, steel
Isoprep deoxidizer 187 & Isoprep acid aluminum cleaner 186	Stainless 316	Phenol	Copper, titanium, hasteloy B, Hasteloy C276
Isopropanol	Stainless	Phosphate	Stainless 316
Jetal	Stainless	Phosphate cleaner	Stainless
Kerosene	Steel, stainless, incoloy	Phosphatizing	Stainless 316
Kolene	Nickel	Phosphoric acid	Consult factory
Laquer solvent	Stainless	Photofixing bath	Stainless
Lead acetate	Stainless, incoloy	Potassium bichromate	Titanium
Lead acid salts	Stainless	Potassium chloride	Stainless 316, carpenter 20, Titanium
Linseed oil	Steel, stainless	Potassium hydroxide	Monel, nickel
Magnesium chloride	Titanium, carpenter 20	Potassium nitrate	Titanium
Magnesium hydroxide	Steel, stainless, incoloy	Potassium sulphate	Stainless
Magnesium sulphate	Copper, inconel	Prestone 350F	Steel, monel
Mercuric chloride	Titanium	R5 bright dip @ 180F	Stainless 316
Mercury	Steel, stainless	Rochelle salt cyanide	Steel, stainless
Methyl alcohol (methanol)	Stainless 316, inconel, monel	Silver bromide	Titanium
Methyl bromide	Stainless	Silver cyanide	Stainless
Methyl chloride	Copper, carpenter 20	Silver lume	Stainless
Methylene chloride	Stainless 316, inconel, Carpenter 20	Silver nitrate	Titanium, hasteloy B, Hasteloy C276
Mineral oil	Steel, stainless, incoloy	Soap solutions	Steel, stainless
Naphtha	Steel, stainless, incoloy	Sodium liquid metal	Stainless, incoloy, inconel
Naphalene	Steel, stainless	Sodium bisulphate	Carpenter 20
Nickel acetate seal	Stainless 316	Sodium carbonate	Inconel, copper, titanium
Nickel plate bright	Titanium, lead	Sodium chlorate	Copper, monel, inconel
Nickel plate dull	Lead	Sodium chloride	Monel, inconel, cupro-nickel
Nickel plate watts solution	Titanium	Sodium cyanide	Steel, stainless 316
Nickel sulphate 20-40%	Stainless	Sodium hydroxide	Consult factory
Nickel copper strike (cadmium free)	Stainless 316	Sodium hypochlorite	Titanium, hasteloy B, Hasteloy C276
Nitric acid (40% 200F)	Stainless 316	Sodium nitrate	Titanium, monel, inconel
Nitric 6% phosphoric acid	Stainless 316	Sodium phosphate	Copper, monel, inconel
Nitric sodium chromate	Stainless 316		

“Stainless” refers to any series 300 stainless steel



Corrosion Guide Continued

Solution	Sheath Material (Recommended)
Sodium salicylate	Monel, inconel
Sodium silicate	Steel, stainless, inconel
Sodium sulphate 100%	Stainless
Soybean oil	Stainless
Stream 500F	Stainless
Stearic acid	Stainless 316
Sugar solution	Steel, stainless, inconel
Sulfamate nickel	Titanium
Sulfur	Inconel, stainless
Sulfur dioxide	Titanium
Sulfuric acid	Consult factory
Sulfurous acid	Consult factory
Tannic acid	Stainless
Tar	Steel, stainless, incoloy
Tartaric acid	Stainless 316
Tetrachlorethylene	Steel
Tin plating (alkaline)	Steel, stainless
Trichloroethane	Steel, stainless
Trichloroethylene	Stainless
Triethylene glycol	Steel, stainless, incoloy
Trisodium phosphate	Steel
Turco 2623	Steel
Turco 4181, 4008, 4338	Stainless 316
Turco ultrasonic solution	Stainless 316
Turpentine	Stainless
Urea ammonia liquor 48F	Steel
Vegetable oil	Stainless
Vinegar	Stainless 316
Water - deionized	Stainless 316, monel, inconel
Demineralized	Stainless 316, monel, inconel
Fresh	Stainless, copper
Sea	Monel, inconel
Whiskey	Stainless 316, copper
X ray solution	Stainless
Yellow dichromate	Stainless 316
Zinc plating cyanide	Steel, stainless
Zinc phosphate	Stainless 316
Zinc sulphate	Copper, titanium
Zincate	Steel, stainless

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