

Immersion Heater Solution Guide

<u>SOLUTION</u>	<u>TYPE OF HEATER</u>	<u>SOLUTION</u>	<u>TYPE OF HEATER</u>
Acetic Acid.....	PTFE* or Quartz	Cobalt Plating.....	304 Stainless Steel
Actane 70, 80.....	PTFE*	Cobra Etch.....	PTFE*
Actane Salt.....	PTFE*	Copper Acid.....	PTFE* or Quartz
Acid Sulfate.....	PTFE* or Quartz	Copper Bright Acid.....	PTFE* or Quartz
Alcorite.....	PTFE* or Quartz	Copper Cyanide.....	304 Stainless Steel
Alkaline Cleaners (Electrified).....	304 Stainless Steel	Copper Fluoborate.....	PTFE*
Alkaline Soaking Cleaners.....	304 Stainless Steel	Copper Pyrophosphate.....	304 Stainless Steel
Alodine (most formulas).....	316 Stainless Steel	Copper Strike.....	304 Stainless Steel
Alstan.....	304 Stainless Steel	Copper Sulfate.....	PTFE* or Quartz
Aluminum Bright Dip.....	PTFE* or Quartz	Cyanide.....	304 Stainless Steel
Aluminum Cleaners.....	304 Stainless Steel	Deionized Water.....	316 Stainless Steel or Titanium
Aluminum Chloride.....	PTFE* or Quartz	Deoxidizer (Etching).....	PTFE* or Quartz
Aluminum Sulfate.....	304 Stainless Steel	Deoxidizer Non-Chromated.....	316 Stainless Steel
Ammonia.....	304 Stainless Steel	Dichromic Seal.....	Steel
Ammonia Persulfate.....	PTFE* or Quartz	Diethylene Glycol.....	304 Stainless Steel
Ammonium Bi Fluoride.....	PTFE*	Diversey, 511, 514.....	PTFE*
Ammonium Chloride.....	Titanium	Dow Therm.....	316 Stainless Steel
Ammonium Nitrate.....	316 Stainless Steel	Dye Solutions.....	304 Stainless Steel
Anodizing (Aluminum).....	PTFE* or Quartz	Ebonal C.....	Titanium
ARP 28, 80 Blackening Salts.....	PTFE* or Quartz	Electroless Copper.....	PTFE*
Arsenic.....	304 Stainless Steel	Electroless Nickel.....	PTFE* or Titanium
Barium Chloride.....	Quartz or Titanium	Electroless Tin (Acid).....	PTFE* or Quartz
Benzoic Acid.....	Titanium	Electroless Tin (Alkaline).....	316 Stainless Steel
Black Nickel.....	PTFE* or Quartz	Electro Cleaner.....	304 Stainless Steel
Black Oxide (Hi-Temp).....	304 Stainless Steel	Electro Polishing.....	PTFE* or Quartz
Black Oxide (Low-Temp).....	Titanium	Enthone 80 Acid.....	PTFE*
Bonderizing.....	316 Stainless Steel	Ethylene Glycol.....	Steel
Boric Acid.....	Titanium	Ferric Ammonium Oxide.....	316 Stainless Steel
Brass Cyanide.....	304 Stainless Steel	Ferric Chloride.....	PTFE*, Quartz, or Titanium
Bright Nickel.....	PTFE*, Quartz, or Titanium	Ferric Nitrate.....	304 Stainless Steel
Bright Copper Cyanide.....	304 Stainless Steel	Ferric Sulfate.....	304 Stainless Steel
Bronze (Alkaline).....	304 Stainless Steel	Fluoborate.....	PTFE*
Brown Oxide.....	Titanium	Formic Acid.....	316 Stainless Steel
Burnite.....	PTFE* or Quartz	Glycerol.....	304 Stainless Steel
Butyric Acid.....	Titanium	Immersion Gold.....	304 Stainless Steel
Cadmium Black.....	PTFE* or Quartz	Gold-Acid.....	PTFE*, Quartz, or Titanium
Cadmium (Alkaline).....	304 Stainless Steel	Gold Cyanide.....	304 Stainless Steel
Cadmium Fluoborate.....	PTFE*	Grey Nickel.....	PTFE*, Quartz, or Titanium
Calcium Chloride.....	Titanium	Hot Seal Dichromate.....	316 Stainless Steel
Calcium Hypochlorite.....	Titanium	Hydrochloric Acid.....	PTFE* or Quartz
Carbonic Acid.....	Titanium	Hydrofluoric Acid.....	PTFE*
Caustic Etch.....	Steel	Hydrogen Peroxide.....	PTFE* or Quartz
Caustics.....	Steel	Indium.....	PTFE* or Quartz
Caustics (highly concentrated 20% and over).....	Steel	Iridite (4-75,4-73,14,14-2,14-9).....	316 Stainless Steel
Chlorine/Wet.....	PTFE* or Quartz	Iridite (1,2,3,4-C,7,8,15).....	PTFE* or Quartz
Chloride.....	PTFE*, Quartz or Titanium	Iron Fluoborate.....	PTFE*
Chlorosulfuric Acid.....	Titanium	Iron Phosphate.....	316 Stainless Steel
Chromic Anodizing.....	PTFE* or Quartz	Isoprep (186,187,188).....	316 Stainless Steel
Chromic Acetate.....	PTFE* or Quartz	Isoprep Acid Salts.....	PTFE*
Chromic Nickel.....	PTFE* or Quartz	Jetal.....	304 Stainless Steel
Chromium (No Fluorides).....	PTFE*, Quartz, or Titanium	Lead Acetate.....	304 Stainless Steel
Chromium (Fluoride).....	PTFE*	Lime Saturated Water (Alkaline).....	316 Stainless Steel
Citric Acid.....	Titanium	Linseed Oil.....	304 Stainless Steel
Clear Chromate.....	PTFE* or Quartz	Magnesium Hydroxide.....	304 Stainless Steel
Cobalt Nickel.....	PTFE*, Quartz, or Titanium	Magnesium Nitrate.....	PTFE* or Quartz

Solutions requiring derated heaters are indicated by red, bold, italicized type. *PTFE is a polytetrafluoroethylene fluoropolymer.

SOLUTION	TYPE OF HEATER
Manganese Phosphate	316 Stainless Steel
McDermid 629	PTFE*
Mercuric Chloride	Titanium
Muriatic Acid	PTFE* or Quartz
Nickel (Plating Solution) (Watts)	PTFE*, Quartz, or Titanium
Nickel Acetate Seal	316 Stainless Steel
Nickel Chloride	Titanium
Nitric Acid	PTFE* or Quartz
Nitric Hydrochloric Acids	PTFE* or Quartz
Nitric Phosphoric	Quartz
Oil	Steel
Oleic Acid	PTFE* or Quartz
Oxalic Acid	PTFE* or Quartz
Paint Stripper (Alkaline)	304 Stainless Steel
Perchloroethylene	316 Stainless Steel
Phosphoric Acid (No Fluoride)	PTFE* or Quartz
Phosphate Cleaner	304 Stainless Steel
Phosphate	316 Stainless Steel
Potassium Acid Sulfate	PTFE* or Quartz
Potassium Cyanide	304 Stainless Steel
Potassium Hydroxide	304 Stainless Steel
Potassium Hydrochloric	PTFE* or Quartz
Potassium Permanganate	PTFE* or Titanium
Rhodium	PTFE* or Quartz
Rochelle Salt Cyanide	304 Stainless Steel
Ruthenium Plating.....	PTFE* or Quartz
Salt (Actine)	PTFE*
Sea Water	Titanium
Silver Bromide	316 Stainless Steel
Silver Cyanide	304 Stainless Steel
Silver Lume	304 Stainless Steel
Silver Nitrate	316 Stainless Steel
Sodium Bisulfate	PTFE* or Quartz
Sodium Carbonate	Titanium

SOLUTION	TYPE OF HEATER
Sodium Chlorate	Titanium
Sodium Chloride	Titanium
Sodium Cyanide	304 Stainless Steel
Sodium Dichromate (Hot Seal)	316 Stainless Steel
Sodium Hydroxide	Steel
Sodium Hypochlorite	PTFE*
Sodium Persulfate	PTFE* or Quartz
Stannate	Steel
Stanostar	PTFE* or Quartz
Stearic Acid	Quartz
Sulfamate Nickel	PTFE*, Quartz, or Titanium
Sulfur	PTFE* or Quartz
Sulfur Peroxide	PTFE* or Quartz
Sulfuric Acid	PTFE* or Quartz
Sulphamic Acid	PTFE* or Quartz
Tannic Acid	Titanium
Tin Nickel	PTFE*
Tin Plating (Acid)(Stanus/Sulphate)	PTFE* or Quartz
Tin Plating Acid (Fluoborate)	PTFE*
Tin Plating (Alkaline)	304 Stainless Steel
Trichlorethylene	316 Stainless Steel
Trioxide (Pickle)	PTFE* or Quartz
Turco (4181, 4338)	316 Stainless Steel
Unichrome	PTFE* or Quartz
Water	316 Stainless Steel or Quartz
Wood's Nickel Strike	Titanium, PTFE*, or Quartz
Yellow Dichromate	PTFE* or Quartz
Zinc Acid	PTFE* or Titanium
Zinc Ammonium Chloride	Quartz or Titanium
Zinc Cyanide	304 Stainless Steel
Zinc Phosphate	316 Stainless Steel
Zinc Phosphate (Fluoride).....	PTFE
Zincate	304 Stainless Steel

Solutions requiring derated heaters are indicated by red, bold, italicized type. *PTFE is a polytetrafluoroethylene fluoropolymer.

THE DATA LISTED IS PROVIDED GRATIS AND IS OFFERED AS A GUIDE ONLY. IT IS NOT INTENDED TO BE USED AS THE SOLE BASIS OF DESIGN OR TO ESTABLISH SPECIFICATION LIMITS. PROCESS TECHNOLOGY ASSUMES NO OBLIGATION OR LIABILITY FOR ANY ADVICE FURNISHED BY IT OR FOR RESULTS OBTAINED FROM USE. DUE TO THE COMPLEXITIES OF SOLUTIONS AND APPLICATIONS, IT IS THE CUSTOMER'S RESPONSIBILITY TO CONTACT THEIR CHEMICAL SUPPLIER FOR HEATER MATERIAL COMPATIBILITY AND RECOMMENDATIONS.

PLEASE ENSURE APPLICABILITY OF HEATER BEFORE INSTALLATION SINCE WE CANNOT GUARANTEE HEATERS AGAINST PREMATURE FAILURE DUE TO CORROSION OR CHEMICAL DESTRUCTION CAUSED BY UNUSUAL CONDITIONS OVER WHICH WE HAVE NO CONTROL, SUCH AS:

- ◆ Excessively high solution temperatures.
- ◆ The concentration of the solution.
- ◆ The presence of inhibitors.
- ◆ The presence of other acids causing a secondary reaction.
- ◆ Stray electrical currents.
- ◆ Flux floating on the surface.
- ◆ The presence of dissolved gases.
- ◆ Excessive sludge build-up.
- ◆ Stagnant or turbulent flow of the solution.
- ◆ Aeration.
- ◆ Presence of oxygen or an oxidizing agent in the solution.
- ◆ Erosion.
- ◆ High pressures.
- ◆ Vacuum conditions.

