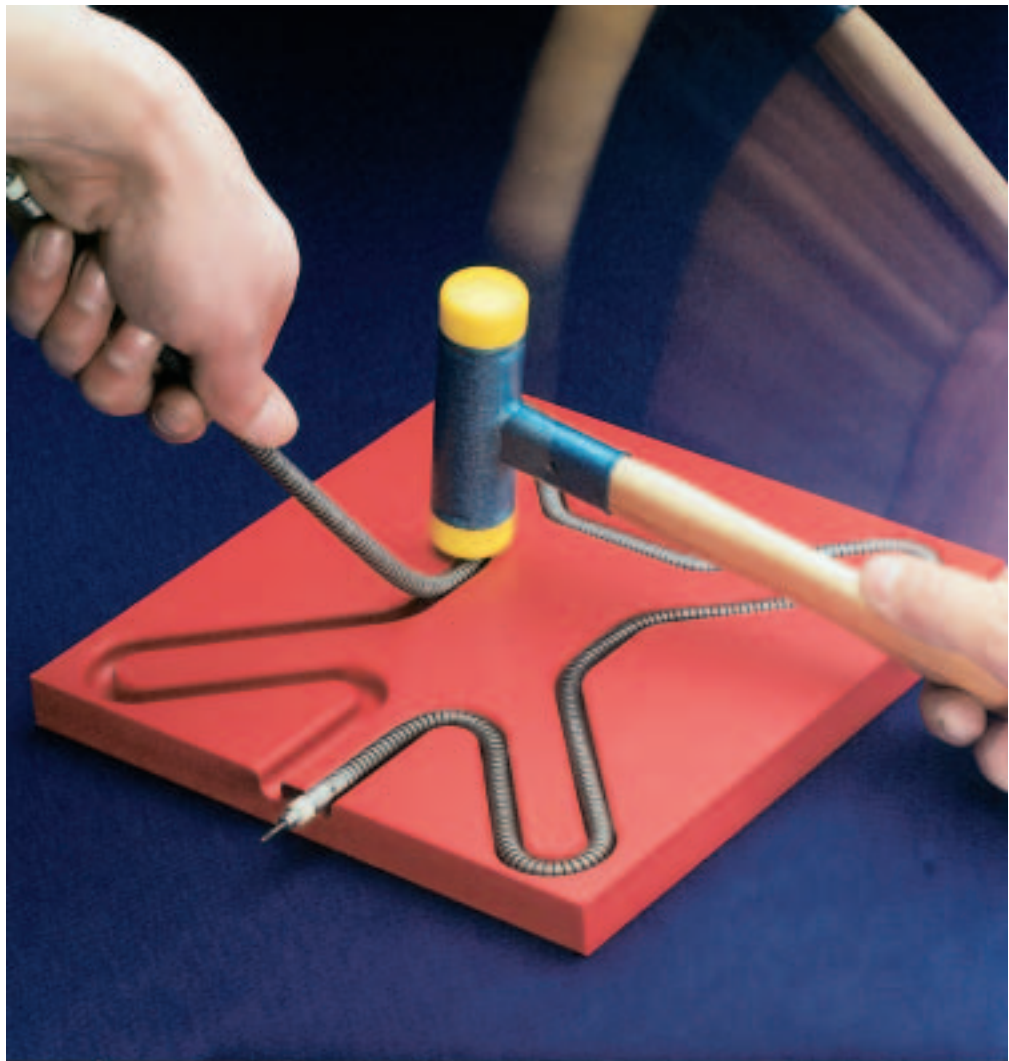


## Tubular Heaters & Immersion Heaters



# Tubular Heater and Immersion Heaters

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## **NEW FLEXIBILITY IN PURCHASE, APPLICATION AND INSTALLATION**

### **Flexible tubular heater (hotflex) new by HOTSET**

#### **HOTFLEX TUBULAR HEATER**

The flexible tubular heater by HOTSET has a heated flexible stainless steel coating with connection on both ends, and can be used in the same applications as original tubular heaters. The flexible tubular heater is supplied with a maximum length of 2.6m, with the diameters 8.0mm, 8.2mm and 8.5mm. the surface load is up to 15 W/cm sq. according to applications with the maximum temperature on the sheath of 1292 degrees F.

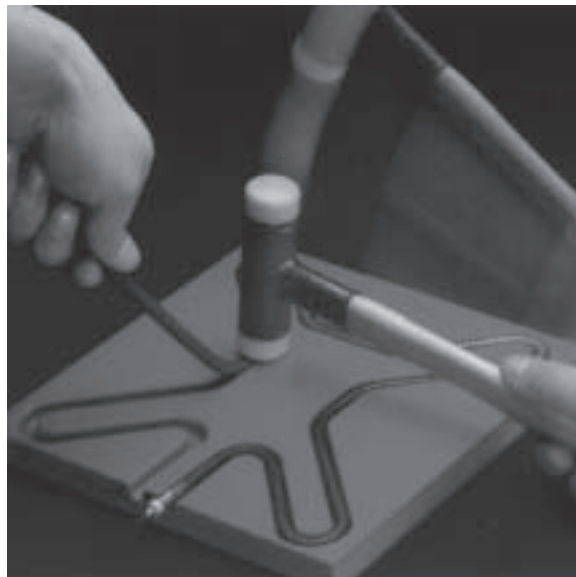
#### **REDUCE UNNECESSARY DOWNTIME**

Up to now tubular heaters have been purchased creating a pattern with expensive set-up costs and no guarantee of a perfect fit, or they have been stocked in straight form and afterwards have been bent to the requested form with expensive folding machines and a lot of time. However, the new Hotflex™ tubular heater can be bent by hand in a few minutes to nearly any form (considering length and diameter) without expensive folding machines. This means you can use the hotset tubular heater where you need it, when you need it.

The hotset tubular heater is known for its high fitting accuracy as the bending radius is not dependant on possible tolerances of forgings. Modifications of the bend are always possible without any effort.

#### **REDUCTION OF STOCK**

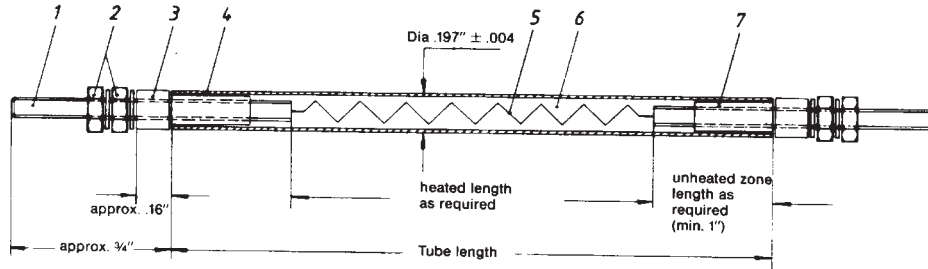
The purchase of pre-bent tubular heaters automatically results in a higher stock level, as failure of a standard tubular heater must be quickly replaced to avoid expensive machine downtime. The Hotflex™ tubular heater is purchased in straight form and is installed where it is needed. The quantity of stock needed decreases drastically. Delivery times for spare parts are reduced. Time is saved and costs are reduced.





## TUBULAR HEATER Type RHK .197"

As an alternative to the existing .25" and .315" diameter tubular heaters a new type has been developed with a diameter of .197". The relatively high watt density of the .197" diameter makes this heater ideal for the heating of the casting nozzles, long distribution beams in the plastic industry and applications on textile and packaging machines.



### The Advantages of this Tubular Heater are:

1. High watt density
2. Short unheated zones
3. Small dimensions
4. Easily formed
5. Scale resistant
6. Easily changed

### Construction:

1. Stainless Steel Threaded pin
2. Stainless Steel set of nuts and washers
3. Ceramic Insulation
4. Stainless Steel Sheath materials AISI 321 or Incoloy 800
5. Helical Wound Nickel Chromium Resistance Wire
6. Highly sealed MGO Insulation
7. Silicone Impregnated Ceramic Head

### Options:

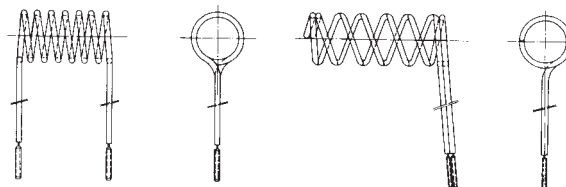
1. The tubular heater is supplied either in a straight form, as illustrated above, bendable or formed.
2. Connections at both ends are M 2.5 Stainless Steel threaded Pins.
3. The heater can be cast in aluminum, copper or brass and can be imbedded in a casting medium such as VM 1000 for better heat transfer.

### Technical Data:

Supply Voltage:	6 - 240V
Current Max:	25 A
Rating:	Watt Density Dependant on application 6.5 - 97 W/in sq (Dependant on length)
High Voltage Stability:	Approx. 1000V
Leakage Current (cold):	<0.1 ma
Insulation Resistance (cold):	>5 Mohms
Sheath Material:	Material Incoloy 800 or Material AISI 321
Diameter of RHK:	.197" + .004"
Max. Length:	100"
Minimum Bend Radius:	Material Incoloy 800 = .4" radius Material AISI 321 = .24" radius
Wattage Rating Tolerance:	+ 10%
Minimum Bending Radius:	6mm

The Tubular heater must not be damaged during installation.

**Attention:** Once formed the heater must not be straightened again. Please note minimum bending radius!



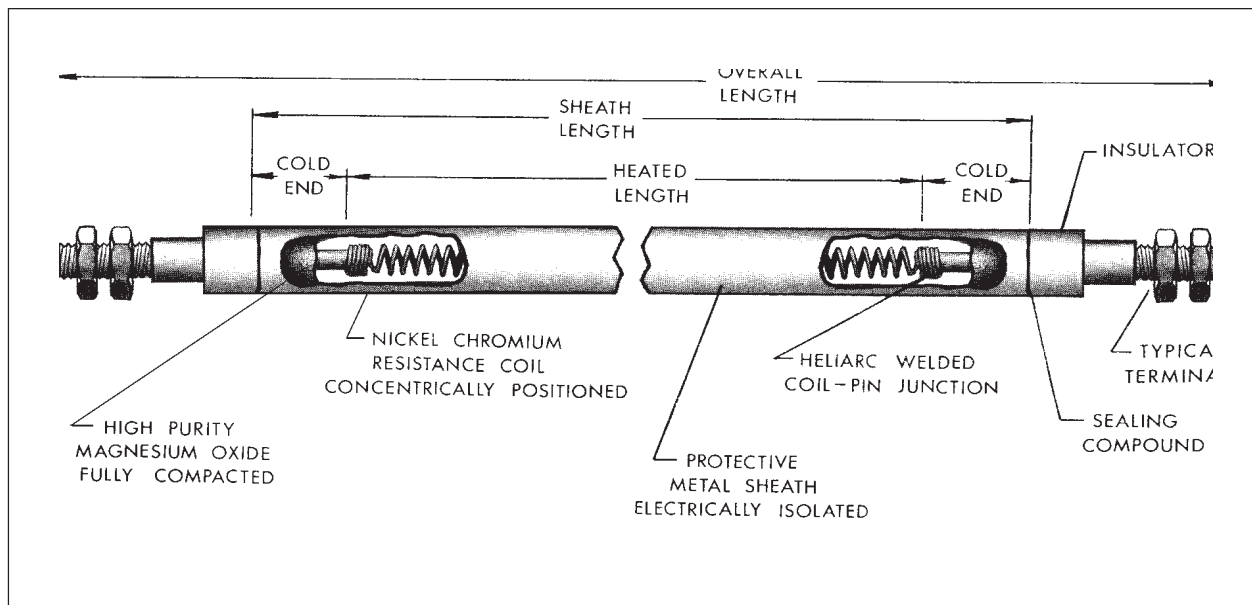
## TUBULAR AND FORMED TUBULAR HEATERS

HOTSET's years of manufacturing and application experience has been combined to provide a high quality product. It is our goal to provide you, the customer, with the finest available materials, engineered to do the desired job in your application. We feel that the HOTSET line of tubular heaters are superior because of the following features.

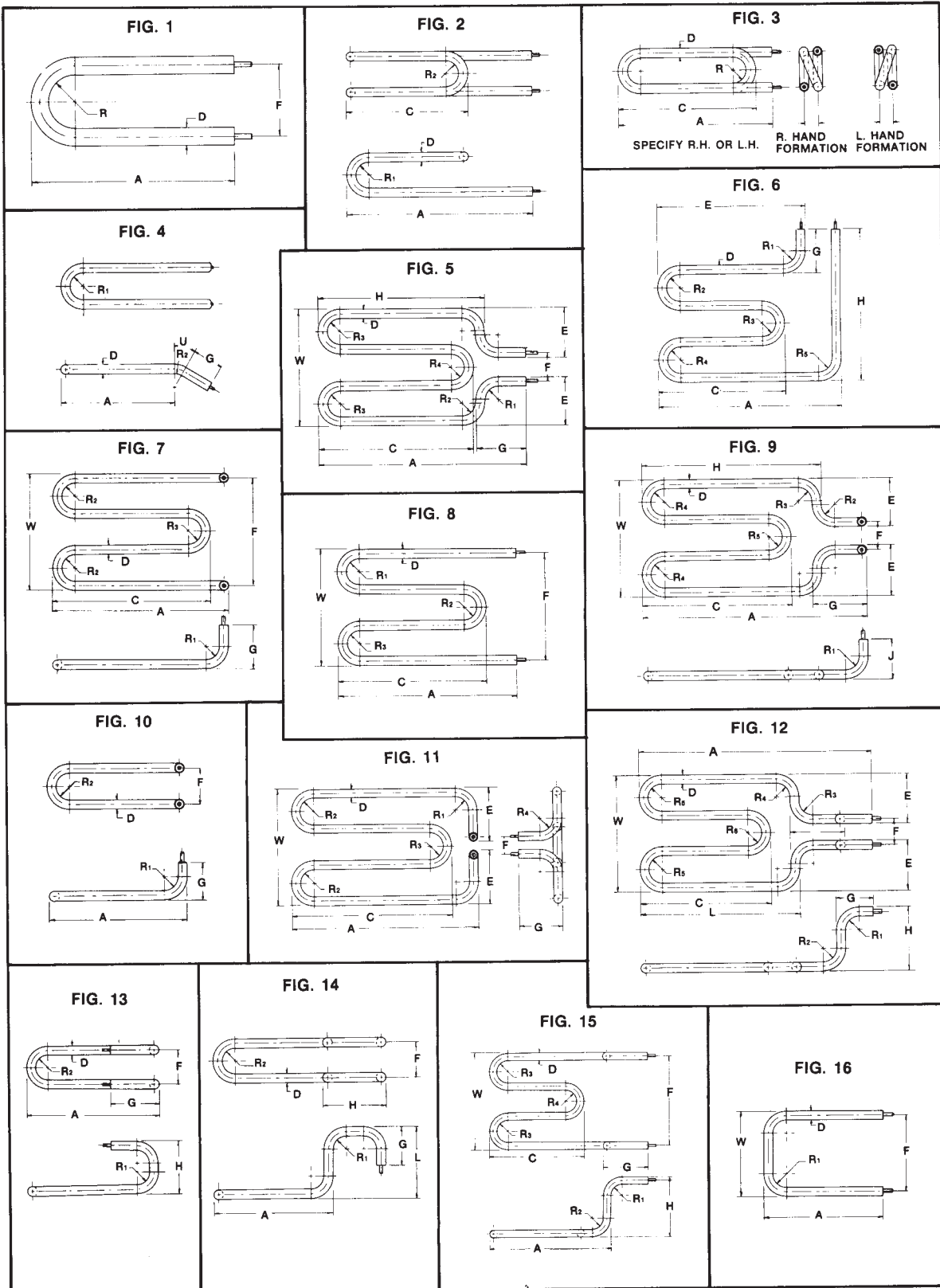
1. Incoloy sheath standard on all items – allows for the widest coverage of applications and temperatures and gives a margin of safety should there be any unknown corrosives or contaminants in the process.
2. High purity MgO powder compacted to provide maximum heat conductivity and optimum dielectric strength.
3. Type "A" 80/20 resistance wire sized to provide lowest wire watt density for maximum life.
4. Fusion welded junction between pin and resistance wire to provide a 360 circumferential joint, giving superior strength and life.
5. Choice of end seals for a variety of applications.
6. Intergral cold pins centered in compacted MgO of nickel plated steel to provide optimum in current carrying capacity.
7. 100% inspected for: A. Hi-Pot B. Insulation resistance C. Wattage tolerance

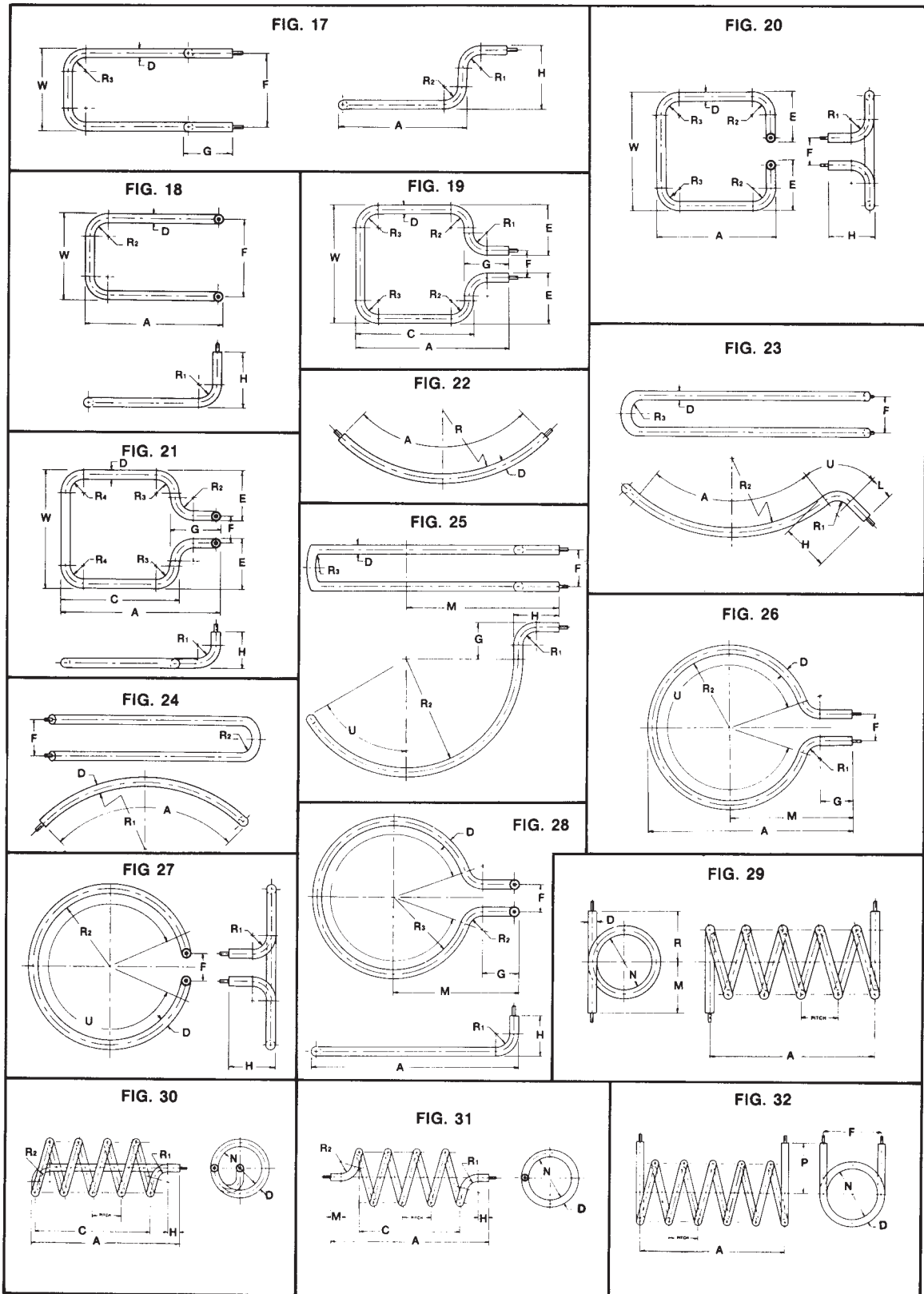
### Additional Optional Features:

1. Mounting methods: A) Bulkhead fittings B) Brackets
2. End seals: A) Silicone resin, the most economical, offers 300 degree F continuous maximum temperature. B) Epoxy, used in high moisture areas, offers 266 degree F continuous maximum temperature. C) Vulcanized overmolded leads. D) Ceramic to metal end seals.
3. Formations to nearly every imaginable configuration.
4. Terminations: A) Leadwire B) Plate terminals with screws C) Threaded stud.
5. Consult factory for: Other sheath materials, special lengths, wattages and voltages.



## Typical forming constructions:





## FINNED TUBULAR ELEMENTS

### Straight or Formed (Steel Sheath with Steel Fins)

#### Uses:

For natural or forced convection space heating and for industrial process air heating. Sheath temperatures are suitable for drying, heat treating, annealing, curing in ovens or dryers and air heating ducts.

#### Construction:

Standard steel tubular element with furnace brazed, edge wounded steel fins to increase heat transfer surface area.

Available in straight lengths or factory formed in U bend or W bend.

Choice of terminals include: threaded stud and lock nut, ceramic-to-metal seal, threaded fitting and mounting bushing or ceramic-to-metal seal mounting bushing.

#### Watt Density:

10 watts per square inch of surface; 64 watts per square inch of sheath.

#### Voltage:

110 - 480. Special voltages available. Contact factory.

#### Insulation:

Maximum permissible sheath temperature is 850 F. Ratings are based on intake air temperatures of 70 F maximum and minimum air velocity of 500 fpm or when incoming air temperatures are higher than 70 F the wattage must be decreased accordingly.

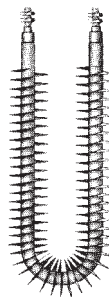
**Note:** Finned Tubular heaters are available in .315, .430 and .540 diameter. Contact factory for further information.

### Standard Factory Formations

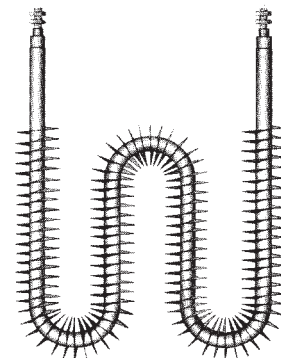
**Straight Length**



**“U” Bend**



**“W” Bend**



## TUBULAR ELEMENTS Terminal Specifications

HOTSET tubular elements are available in your choice of 6 terminal types. The threaded stud type is standard stock and will be supplied unless otherwise specified. Other types must be specified on your order. Special terminations and bushings not shown. For applications not covered by these terminations, consult the factory.

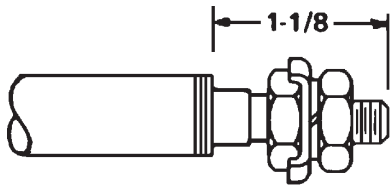


Fig. 1 Threaded stud type, stacked on.

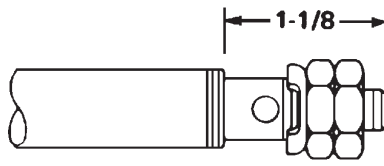


Fig. 2 Threaded stud type, brazed.

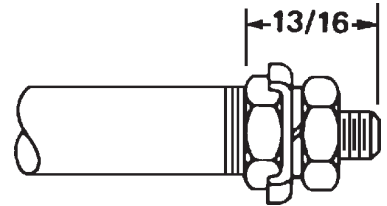


Fig. 3 Standard threaded stud type.

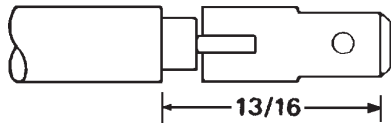


Fig. 4 Quick-connect type projection-welded.

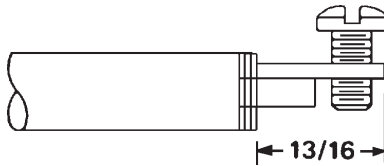


Fig. 5 Screw type, and projection-welded.

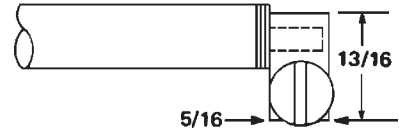


Fig. 6 Screw type, side projection-welded.



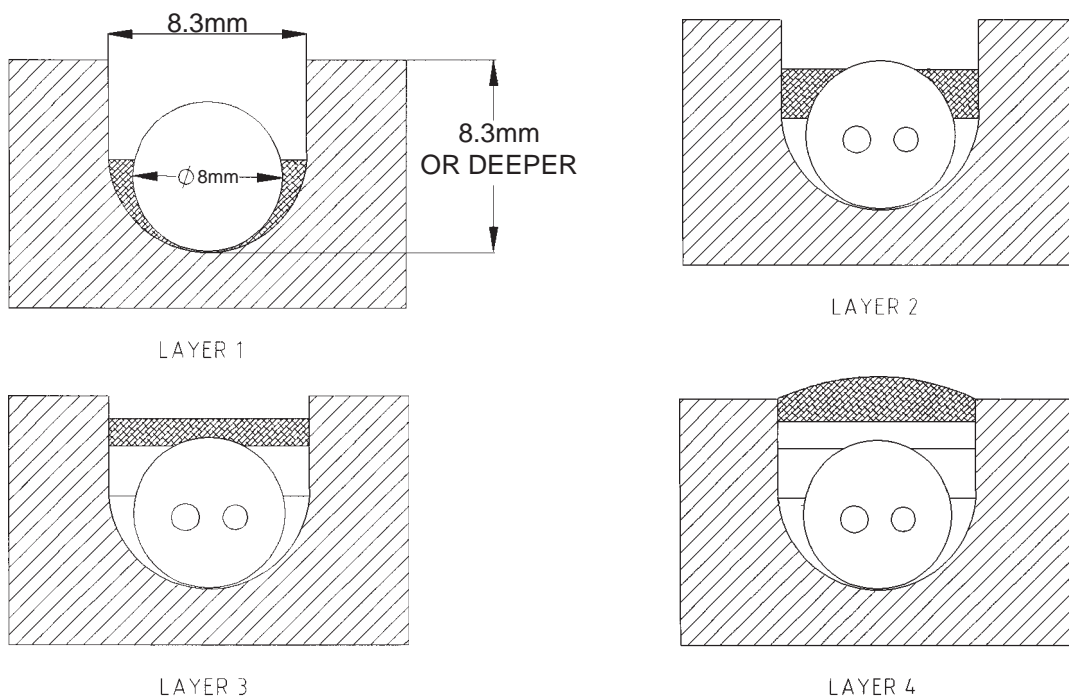
## CASTING COMPOUND

**The following instruction should be considered for effective use:**

This compound is best used when applied in 4-6 layers.

1. Take care to ensure that the tubular heater and the groove are free from grease - clean with solvent. Heat block to approx. 95° F.
2. Mix VM 1000 casting powder and BM 1000 binding agent according to the label forming a paste that is not too thin. Avoid trapping air bubbles, Mixing Proportions: 100% powder and 55-65% binding agent (% by weight).
3. Apply up to three layers and allow each layer to dry for approx. 20 min.
4. Where necessary apply a further 1-2 layers and allow to dry.
5. Allow to dry approx. 95° F for approx. 6-16 hours, then heat to approx. 356° F for approx 2 hours. Oven heating will speed up dry time.
6. Rough spots on the casting compound can be removed afterwards by and with a grinding stone (only when cured).
7. All layers applied bond to one another well even compound that is applied later will adhere equally well (for repairs).
8. Mixing utensils can be cleaned in clear tap water.
9. After casting, the tool must be covered as the casting compound swells.

**Note: The casting compound is electrically conductive. Do not allow it to come into contact with the connections.**



## IMMERSION HEATER SOLUTION GUIDE

Solution	Type of Heater	Solution	Type of Heater
Acetic	Teflon** or Quartz	Clear Chromate	Teflon or Quartz
Actane 70,80	Teflon	Cobalt Nickel	Teflon, Quartz or Titanium
Actane Salt	Teflon	Cobalt Plating	304 Stainless Steel
Acid Sulfate	Teflon or Quartz	Cobra Etch	Teflon
Alcorite	Teflon or Quartz	Copper Acid	Teflon or Quartz
Alkaline Cleaners (Electrified)	304 Stainless Steel	Copper Bright Acid	Teflon or Quartz
Alkaline Soaking Cleaners	304 Stainless Steel	Copper Cyanide	304 Stainless Steel
Alodine	316 Stainless Steel	Copper Fluoborate	Teflon
Alstan	304 Stainless Steel	Copper Pyrophosphate	304 Stainless Steel
Aluminum Anodizing	Teflon or Quartz	Copper Strike	304 Stainless Steel
Aluminum Bright Drip	Teflon or Quartz	Copper Sulfate	Teflon or Quartz
Aluminum Cleaners	304 Stainless Steel*	Cyanide	304 Stainless Steel
Aluminum Chloride	Teflon or Quartz	Deionized Water	316 Stainless Steel
Aluminum Sulfate	304 Stainless Steel	Deoxidizer (Etching)	Quartz
Ammonia	304 Stainless Steel	Deoxidizer Non-Chromatid	316 Stainless Steel
Chromated	316 Stainless Steel	Ammonia BiFlouride	Teflon Diethylene
Clycol	304 Stainless Steel	Ammonium Chloride	Titanium
Diversey, 511, 514	Teflon	Ammonium Nitrate	316 Stainless Steel
Dow Therm	316 Stainless Steel*	Anodizing	Teflon or Quartz
Die Solutions	304 Stainless Steel	Arp28, 80 Blackening Salts	Teflon or Quartz
Ebonal	C Titanium	Arsenic	304 Stainless Steel
Electroless Copper	Teflon	Barium Chloride	Titanium
Electroless Nickel	Teflon of Titanium*	Benzoic Acid	Titanium
Electroless Tin (Acid)	Teflon or Quartz	Black Nickel	Teflon or Quartz
Electroless Tin (Alkaline)	316 Stainless Steel	Black Oxide (Hi-Temp)	304 Stainless Steel*
Electro Cleaner	304 Stainless Steel	Black Oxide (Low-Temp)	Titanium
Electro Polishing	Teflon or Quartz	Bonderizing	316 Stainless Steel*
Enthone 80 Acid	Teflon	Boric Acid	Titanium
Ethylene Glycol	Steel*	Brass Cyanide	304 Stainless Steel
Ferric Nitrate	304 Stainless Steel	Bright Nickel	Teflon Quartz or Titanium
Ferric Sulfate	304 Stainless Steel	Bright Copper-Cyanide	304 Stainless Steel
Ferric Ammonium Oxide	316 Stainless Steel	Bronze 304	Stainless Steel
Ferric Chloride	Teflon, Quartz or Titanium	Brown Oxide	Titanium
Fluborate	Teflon	Burnite	Teflon or Quartz
Formic Acid	316 Stainless Steel	Butyric Acid	Titanium
Glycerol	304 Stainless Steel	Cadmium Black	Teflon or Quartz
Immersion Gold	304 Stainless Steel*	Cadmium Fluoborate	Teflon
Gold Cyanide	304 Stainless Steel	Calcium Chloride	Titanium
Grey Nickel	Teflon, Quartz or Titanium	Calcium Hypochlorite	Titanium
Hot Seal Dichromate	316 Stainless Steel	Carbonic Acid	Titanium
Hydrogen Peroxide	Teflon or Quartz*	Caustic Etch	Steel*
Hydrochloric Acid	Teflon or Quartz	Caustics	Steel
Hydrofluoric Acid	Teflon	Caustics (highly concentrated 20% & over)	Steel
Indium	Teflon or Quartz	Chlorine/Wet	Teflon or Quartz
Iridite (4-75, 4-73, 14, 14-2, 14-9)	316 Stainless Steel	Chloride	Teflon or Quartz
Iridite (1, 2, 3, 4-C, 7, 8, 15)	Teflon or Quartz	Chlorosulfuric Acid	Titanium
Iron Fluborate	Teflon	Chromic Anodizing	Teflon or Quartz
Iron Phosphate	316 Stainless Steel*	Chromic Acetate	Teflon or Quartz
Isoprep (186, 187, 188)	316 Stainless Steel	Chromic Nickel	Teflon or Quartz
Isoprep Acid Salts	Teflon	Chromium (No Fluorides)	Teflon Quartz or Titanium
Jetal	304 Stainless Steel		

<b>Solution</b>	<b>Type of Heater</b>	<b>Solution</b>	<b>Type of Heater</b>
Chromium (Fluoride)	Teflon	Lead Acetate	304 Stainless Steel
Citric Acid	Titanium	Lime Saturated Water (Alkaline)	316 Stainless Steel*
Linseed Oil	304 Stainless Steel	Sodium Carbonate	Titanium
Magnesium Hydroxide	304 Stainless Steel*	Sodium Chlorate	Titanium
Magnesium Nitrate	Teflon or Quartz	Sodium Chloride	Titanium
Manganese Phosphate	316 Stainless Steel*	Sodium Cyanide	304 Stainless Steel
McDermid 629	Teflon Sodium	Dichromate (Hot Sealed)	316 Stainless Steel
Mercuric Chloride	Titanium	Sodium Hydroxide	Steel
Muriatic Acid	Teflon or Quartz	Sodium Hypochlorite	Steel
Nickel (Plating Solution (Watts))	Teflon, Quartz Titanium	Sodium Persulfate	Teflon or Quartz
Nickel Acetate Seal	316 Stainless Steel	Stannate	Steel
Nickel Chloride	Titanium	Stanostar	Teflon or Quartz
Nitric Acid	Teflon or Quartz	Stearic Acid	Quartz
Nitric Hydrochloric Acids	Teflon or Quartz	Sulfonate Nickel	Teflon, Quartz or Titanium
Nitric Phosphoric	Quartz*	Sulfur	Teflon or Quartz
Oil	Steel*	Sulfuric Acid	Teflon or Quartz
Oleic Acid	Teflon or Quartz	Sulfur Peroxide	Teflon or Quartz
Paint Stripper (Alkaline)	304 Stainless Steel*	Sulphamic Acid	Teflon or Quartz
Perchloroethylene	316 Stainless Steel*	Tannic Acid	Titanium
Phosphoric Acid (No Fluoride)	Teflon or Quartz*	Tin Nickel	Teflon
Phosphate Cleaner	304 Stainless Steel*	Tin Plating (Acid)(Stannous Sulphate)	Teflon or Quartz
Phosphate	316 Stainless Steel*	Tin Plating Acid (Fluoborate)	Teflon
Potassium Acid Sulfate	Teflon Quartz	Tin Plating (Alkaline)	304 Stainless Steel
Potassium Cyanide	304 Stainless Steel	Trichlorethylene	316 Stainless Steel*
Potassium Hydroxide	304 Stainless Steel	Trioxide (Pickle)	Teflon or Quartz
Potassium Hydrochloric	Teflon or Quartz	Turco (4181, 4338)	Stainless Steel*
Potassium Permanganate	Teflon of Titanium*	Unichrome	Teflon or Quartz
Rhodium	Teflon or Quartz	Water	316 Stainless Steel or Quartz
Rochelle Salt Cyanide	304 Stainless Steel	Wood's Nickel Strike	Teflon or Quartz
Ruthenium	Teflon or Quartz	Yellow Dichromate	Teflon or Quartz
Salt (Actine)	Teflon	Zinc Acid	Teflon or Titanium
Sea Water	Titanium	Zinc Ammonium Chloride	Quartz or Titanium
Silver Bromide	316 Stainless Steel	Zinc Cyanide	304 Stainless Steel
Silver Cyanide	304 Stainless Steel	Zinc Phosphate	316 Stainless Steel*
Silver Lume	304 Stainless Steel	Zincate	304 Stainless Steel
Silver Nitrate	316 Stainless Steel		
Sodium Bisulfate	Teflon of Quartz		

\*Should be a Derated Heater

**NOTES:**

A series of 20 horizontal grey bars intended for writing notes.

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