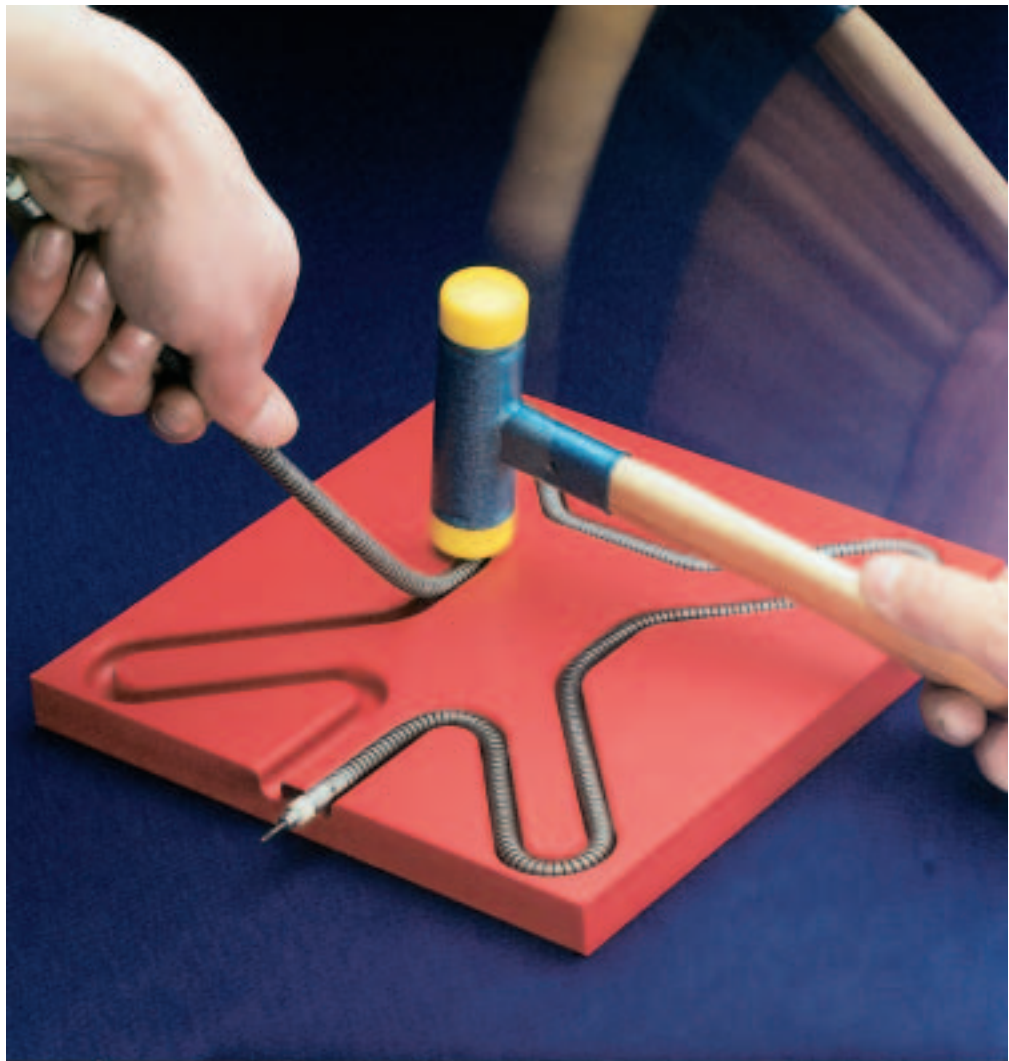


Tubular Heaters & Immersion Heaters



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.

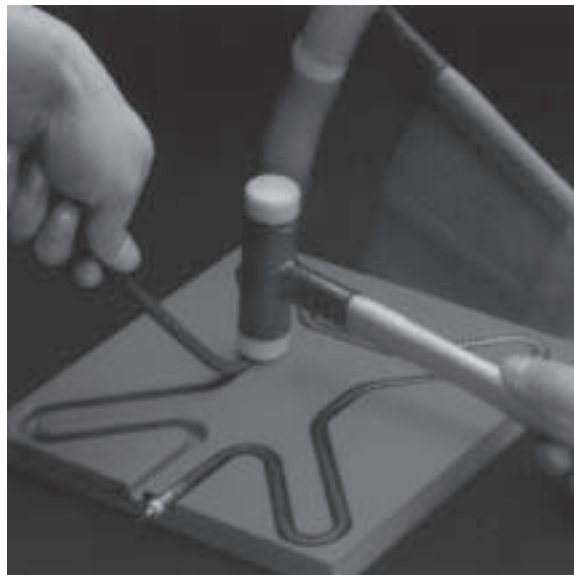
REDUCE UNNECESSARY DOWNTIME

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.

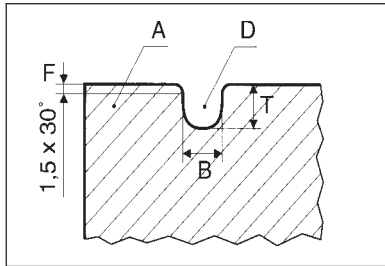
REDUCTION OF STOCK

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.



Hotflex

Hotflex – typical use



The Hotflex can be installed directly into the slot of a manifold by taping it in with a plastic hammer.

A: manifold

D: slot: $B-T = \text{hotflex-O} + 0.1\text{mm}$

F: chamfer

Technical Data:

Ø 8.0mm

Min. bending radius: R 10mm

Expansion factor:

See Chart Below

Connection:

M 4.0 threaded pins with set of nuts (M 4.0) and washers made from stainless steel

Unheated zones (b): 30 and 30mm

Tube material:

stainless steel (material no. 1.4541)

Voltage: up to 250V

Current: max 25A

Wattage: surface load depending on application up to approx. 10 W/cm² (on heated length)

Wattage tolerance: ± 10%

High voltage resistance (cold): 1000 V-AC

Current leakage (cold):

≥ 0.5 mA at 253 V-AC

Insulation resistance (cold):

≥ 5 Mohm at 500 V-DC

Sheath temperature:

max 700° C

Diameter tolerance: ± 0.1mm

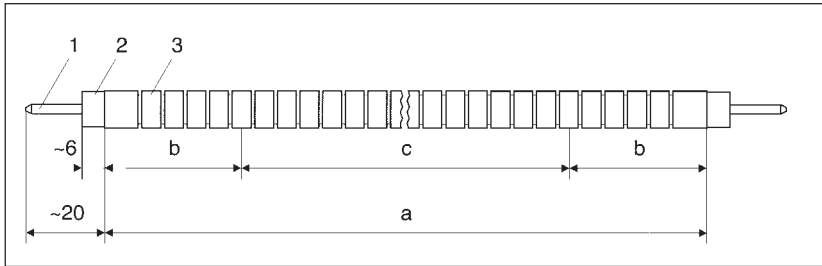
Length: max 2600mm

Length: tolerance: ± 1.5%

Expansion

Factor	R 10	R 12.5	R 15	> R15
8.0mm	0.920	0.930	0.940	0.960
8.2mm	0.920	0.930	0.940	0.960
8.5mm	0.940	0.950	0.950	0.960

Hotflex – construction



1. threaded pin M 4.0 made from stainless steel
2. ceramic isolator
3. tube material made from stainless steel, material no. 1.4541

- a. tube length
- b. unheated zones (min. 30mm, not flexible)
- c. flexible heated length

Options:

Ø 8.2 or 8.5mm

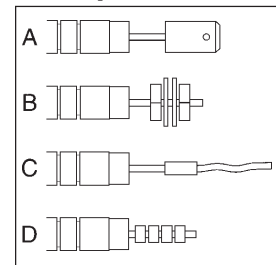
Connection options:

(A) flat plug, (B) spade lug connector post terminals, includes two nut and washers (C), crimped leads (D) ceramic beads installed on Ni-leads

Wattage: surface load depending on application up to 15 W/cm² (on heated length)

Wattage tolerance smaller ± 10%

Connection examples:



plug 'n heat
ceramic terminal connector



Measurements:

All flexible tubular heaters stocked at our facility come complete with:

(8mm) .315" diameter

230V

30mm unheated section at each end

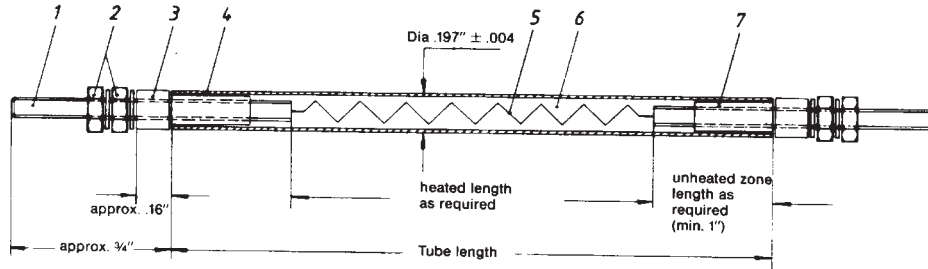
2.5mm threaded pin with hardware at each

Hotflex Ø 8.0mm (standard) • length in mm • wattage at 240V

length (a)	wattage	length (a)	wattage	length (a)	wattage
500	1,025	850	1,845	1,200	2,665
550	1,145	900	1,960	1,250	2,780
600	1,260	950	2,080	1,300	2,895
650	1,380	1,000	2,195	1,350	3,015
700	1,495	1,050	2,316	1,400	3,130
750	1,615	1,100	2,430	1,450	3,245
800	1,730	1,150	2,545	1,500	3,365

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:

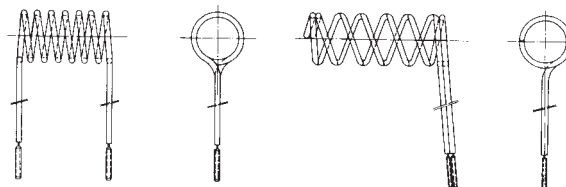
1. The tubular heater is supplied either in a straight form, as illustrated above, bendable or formed.
2. Connections at both ends are M 2.5 Stainless Steel threaded Pins.
3. The heater can be cast in aluminum, copper or brass and can be imbedded in a casting medium such as VM 1000 for better heat transfer.

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!



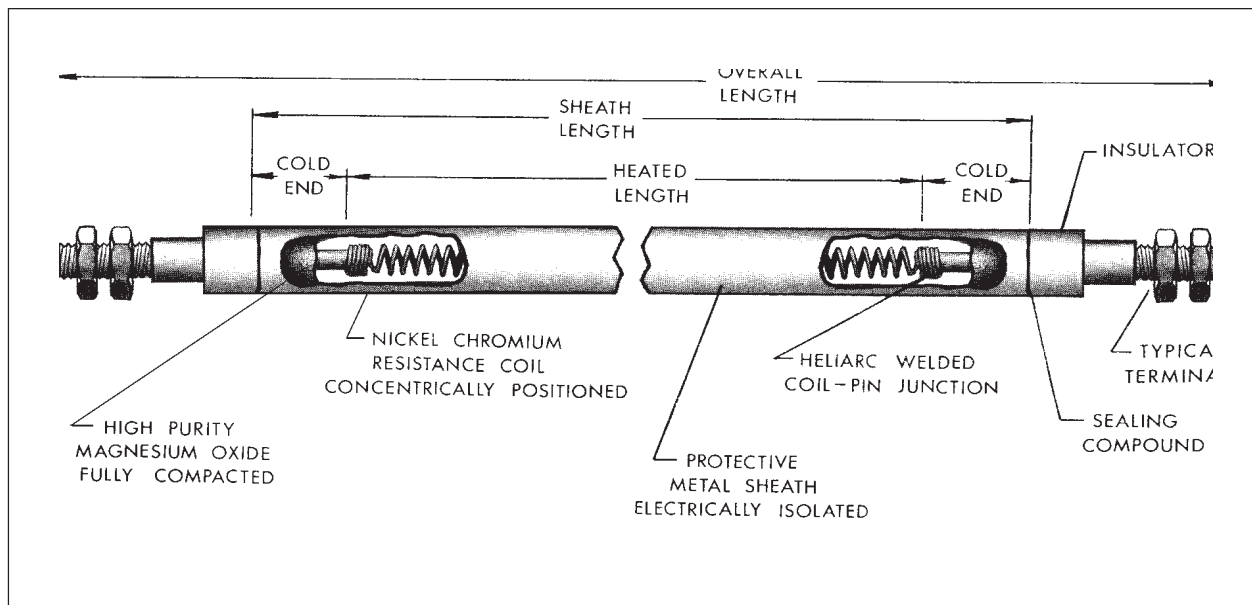
TUBULAR AND FORMED TUBULAR HEATERS

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.

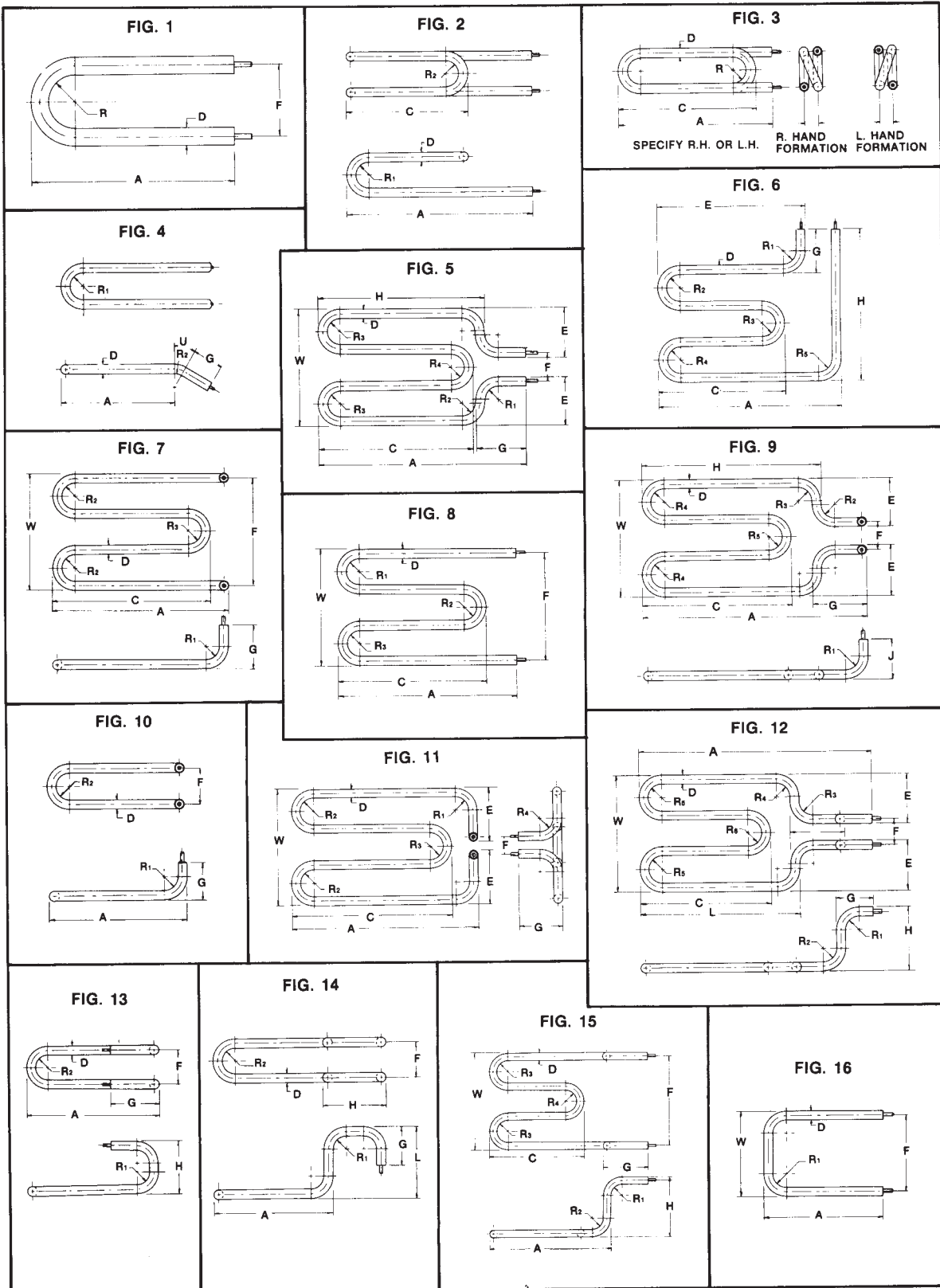
1. Incoloy sheath standard on all items – allows for the widest coverage of applications and temperatures and gives a margin of safety should there be any unknown corrosives or contaminants in the process.
2. High purity MgO powder compacted to provide maximum heat conductivity and optimum dielectric 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

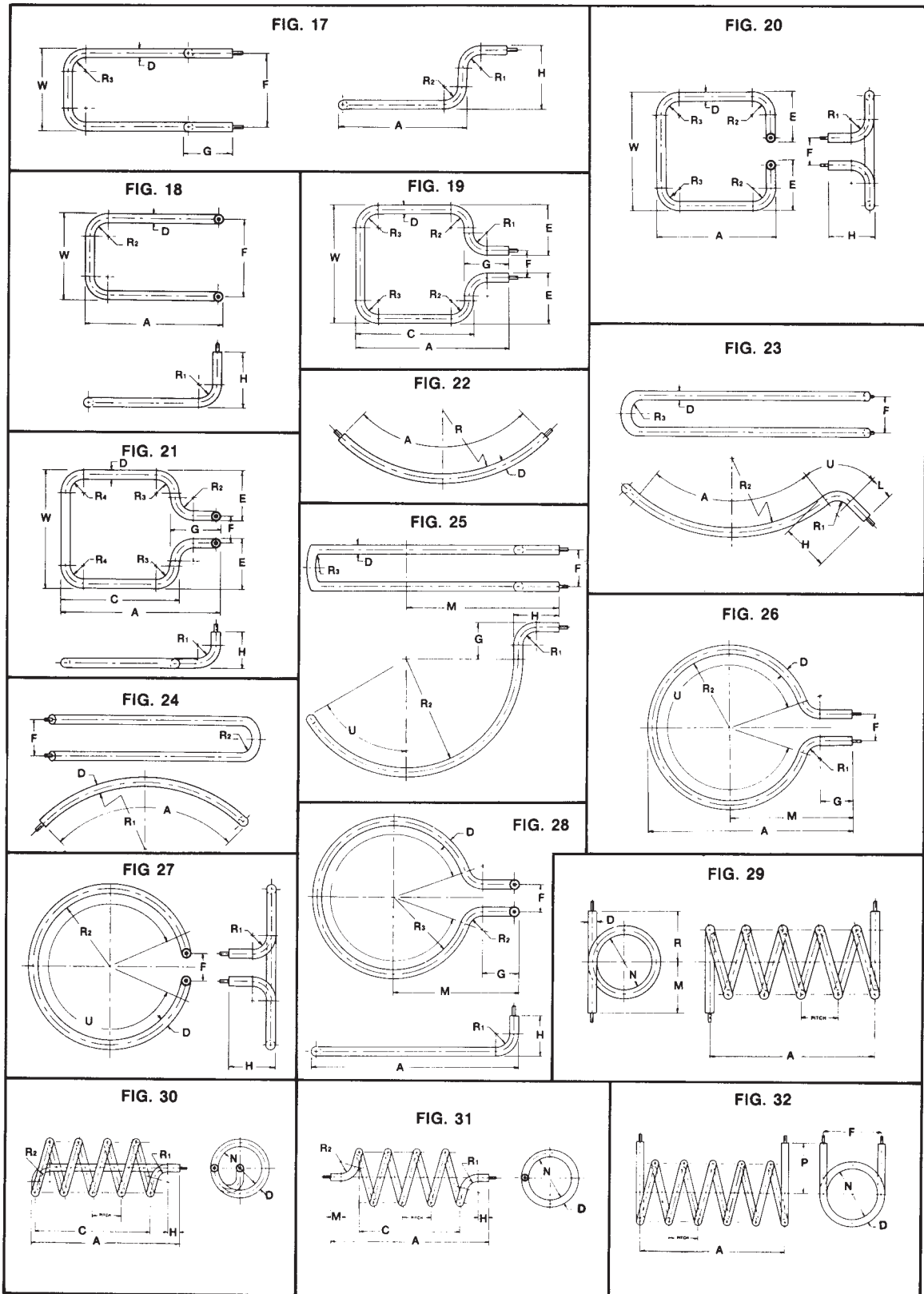
Additional Optional Features:

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.

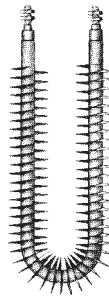
Note: Finned Tubular heaters are available in .315, .430 and .540 diameter. Contact factory for further information.

Standard Factory Formations

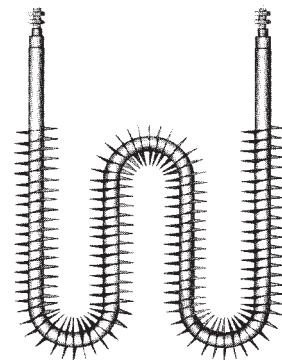
Straight Length



“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.

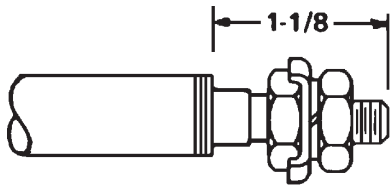


Fig. 1 Threaded stud type, stacked on.

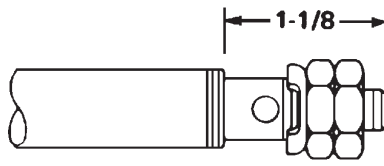


Fig. 2 Threaded stud type, brazed.

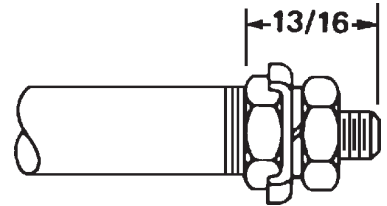


Fig. 3 Standard threaded stud type.

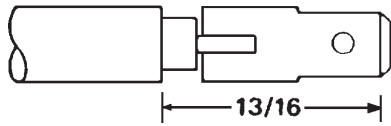


Fig. 4 Quick-connect type projection-welded.

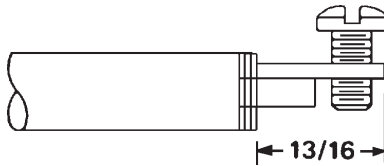


Fig. 5 Screw type, and projection-welded.

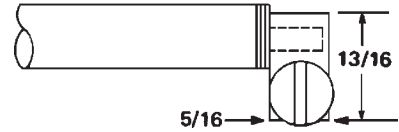
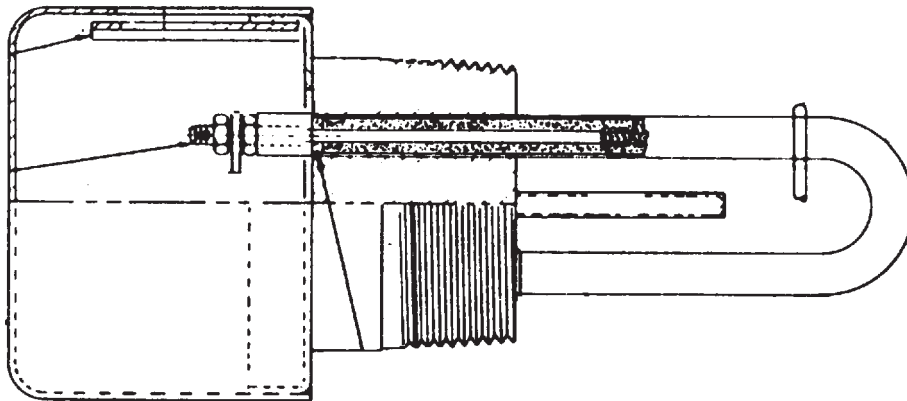


Fig. 6 Screw type, side projection-welded.

SCREW PLUG IMMERSION HEATER

All catalog items have the following features:

1. Incoloy sheath standard on all items – allows for the widest coverage of applications and temperatures, also gives a margin of safety should there be any unknown corrosives or contaminants in the application.
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. Recompacted bends to restore MgO density in bend areas.
6. Moisture sealed to prevent the entrance of contaminants during storage and service. Silicone end for oil, air and corrosive applications. Epoxy seals for water applications.
7. #10-32 terminals for wiring connections. 1” and 1 1/4” NPT have plate terminals with screws. 2” and 2 1/2” NPT have threaded stud type.
8. Standard NEMA 1 housings. Seamless deep drawn housings provide easy access to wiring and offers a degree of protection against splashing of dripping liquids.
9. Fixed conduit support bracket. Supply conduit is not disturbed when cover is removed.
10. Welded construction between elements and plugs on steel and stainless steel headers to give maximum corrosion protection and strength at elevated temperatures. All welds are hydrostatically pressure tested for leaks.
11. Silver braze construction on elements with brass plugs.
12. Spacer supports on multiple element units where immersed length exceeds 18”. This feature prevents adjacent elements from touching and over heating also this allows for easy assembly and disassembly from the coupling.
13. Thermopiles for existing of optional thermostats. 1” and 1-1/4” NPT have a 5/16” tube to accept 1/4” diameter bulbs. 2” and 2 1/2” NPT have 1/2” tube for up to 3/8” diameter bulbs.
14. 100% inspected for: A) Hi Pot B) Insulation resistance C) Wattage tolerances.
15. Hydrostatic pressure testing done on steel and stainless steel plugs also insures the sheath is defect free.



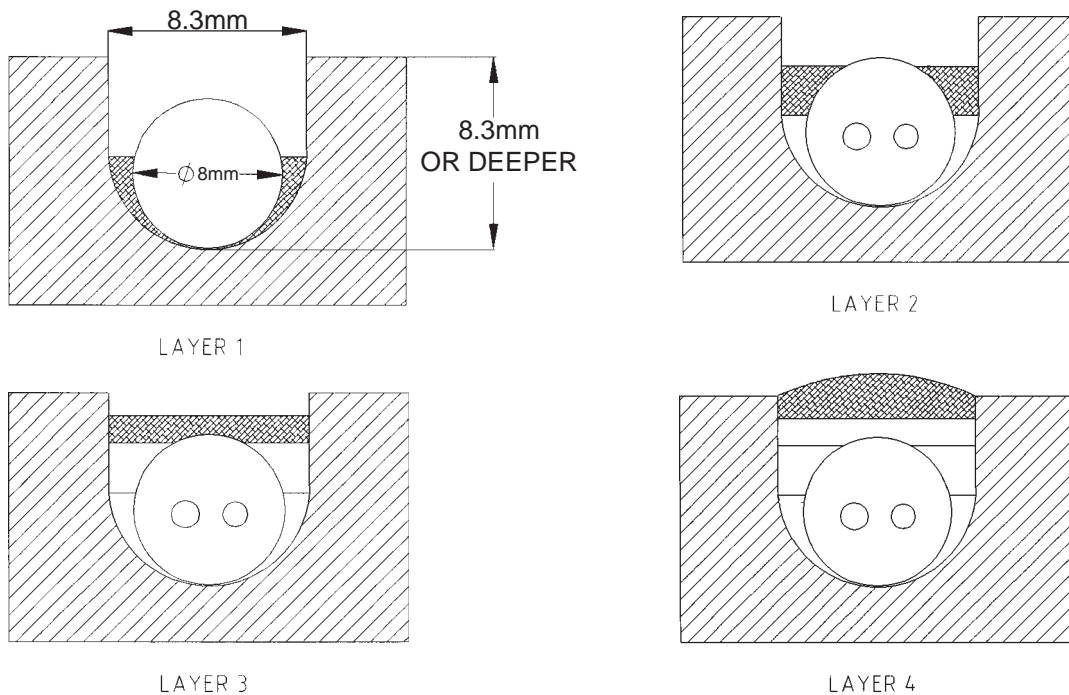
CASTING COMPOUND

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 of 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		

Solution	Type of Heater	Solution	Type of Heater
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 or 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 or Quartz		

*Should be a Derated Heater

NOTES:

A series of 20 horizontal grey bars providing a space for notes.

hotset — in Germany, USA and 28 other countries all over the world:



- Argentina
- Australia
- Austria
- Belgium
- Brazil
- Czech Republic
- Denmark
- Finland
- France
- Great Britain
- Greece
- Hongkong
- India
- Israel
- Italy
- Japan
- Korea
- Netherlands
- New Zealand
- Philippines
- Portugal
- Singapore
- South Africa
- Spain
- Sweden
- Switzerland
- Taiwan
- Turkey



Corporation

