Flexible Heater Products

Overview

- **Flexible Heaters, Insulation Blankets, Insulation Covers.**
- **Three Different Insulating Materials; Two Different Element Types**
- **Silicone Rubber Standard and Stock Products**
- **Kapton™ Standard and Stock Products**
- **Drum Heaters**
- **Enclosure and General Purpose Air Heaters**
- **Fiberglas® Woven Heaters**
- **Flexible and Molded Thermal Insulation Products**
- **Up to 600 Volt**
- **Up to 750°F Continuous Operating Temp. Depending on Material**
- **Extensive Stock Program**

Description

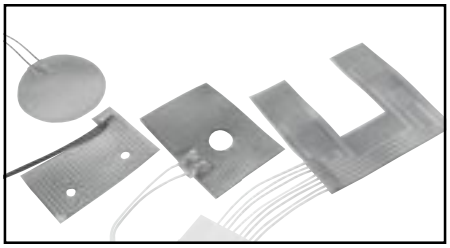
Flexible Heaters and Thermal Insulation Products are flexible in design and application to fit your specific needs. Chromalox provides dedicated engineering support to customize our Flexible heaters per your requirements. Most size, shape or contour can be used to apply direct and efficient heat without sacrificing dependability.

Various insulating materials are available to suit your application environment. Temperature controlling devices can be molded directly to the elements to provide precise system operation. Power requirements can be minimized and heat-up time optimized by applying heat directly to the part. Cool-down time is shortened and distributed wattages or multiple heater circuit designs are possible with Chromalox flexible heating elements.

Features

- Flexible Heaters can be made to meet electrical and contour specifications.
- Holes and Slots can be incorporated for positioning on complex surfaces,
- Fast heat-up and cooling with accurate temperature control is possible.

Kapton™ is a trademark of Dupont
Teflon® is a trademark of Dupont



- Wide choice of electrical terminations including solderless connectors, terminals, stranded wire leads, cords and plugs.
- Thin profile depending on choice of construction and insulation barrier.
- Distributed wattage multiple circuits and designs are available.
- Complete system development available which includes heater, sensor and temperature controller.

Applications

Flexible/Molded Products are suited for application environments in a wide-range of industries:

- Medical
- Semiconductor
- Power Systems/Motors
- Communications
- Food Service
- Laminating/Forming
- Chromatography
- Printing/Copying
- Vending
- Transportation & Aerospace
- Manufacturing
- Military
- Tank/Vessel Heating

Flexible Heaters

Technical & Application Data

Construction

Type SL Silicone Rubber heating elements are wire or etched foil heating circuits positioned between plies of Silicone Rubber insulating material which provides flexibility and strength. They are capable of flexing and will conform to contoured surfaces. They can also be pre-formed to complex shapes and can be supplied with distributed wattages and multiple heating circuits.

Kapton™ heaters incorporate etched foil heating circuits between plies of Kapton™; a polymide material with high dielectric strength, excellent tensile strength, high tear resistance, low outgassing and resistance to many chemicals. Standard Kapton™ heaters are 0.007" thick which allows them to be positioned in tight locations such as instrumentations and analyzers. Etched foil circuits can be engineered with fine lines and close spacing for minimum temperature fluctuations across the surface of the work.

Type W and SLW are made of resistance wire with a double-braided Fiberglas® cover woven into a flexible mesh heating element. This type provides surface temperatures up to 750°F. The heater can be used as constructed in indoor or enclosed environments or encased in silicone rubber for outdoor or abusive environments.

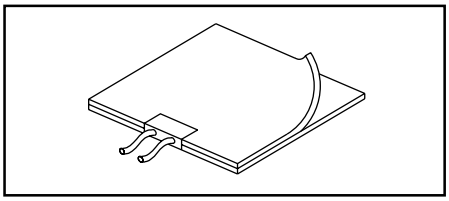
Type IBG insulation blankets and insulation covers provide prefabricated removable insulation for your systems. Blankets are made of 1" thick Fiberglas® insulation encased between cured silicone rubber Fiberglas® cloth. Insulation covers are made by attaching either silicone or neoprene foam rubber to a made-to-specification aluminum shell. Foam insulation is available in thicknesses of 1/8" to 1" thick.

Mounting Methods

Chromalox provides the best and most economical mounting method for your application. Working with your Chromalox Representative to specially design your Flexible Heater product will ensure long life, ease of use, and the lowest cost possible for your heated solution.

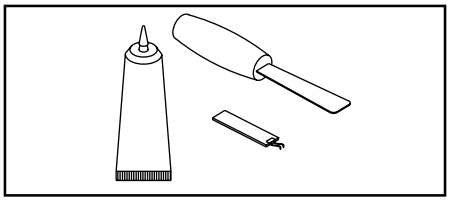
Pressure Sensitive Adhesive (PSA) — Silicone, Silicone/Acrylic, or Acrylic Pressure Sensitive Adhesive tape can be factory bonded to your heating element to provide a strong bond to any clean, smooth surface. Chromalox uses a specially manufactured silicone based PSA that allows for our silicone rubber heaters to be even mounted on curved surfaces. Simply peel away the protective backing and roll the heaters into place.

Pressure Sensitive Adhesive (PSA)



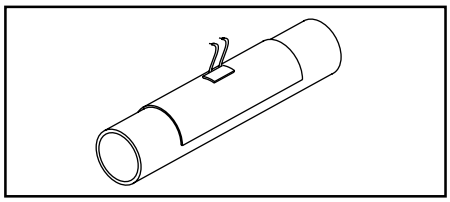
Field Applied RTV Adhesives — Room temperature vulcanizing (RTV) adhesives can be used to mount heaters up to 5 W/In^2. Your local Dow Corning or GE RTV representative can recommend different adhesives based on your application.

Field Applied RTV Adhesives



Factory Vulcanized — Chromalox can factory vulcanize your Silicone Rubber heating element directly onto your part. This provides the greatest bond strength and best heat transfer capability of all mounting methods. Chromalox can either vulcanize to your part or manufacture the part in-house; providing you with unsurpassed value-added work. In some cases, special tooling may be required.

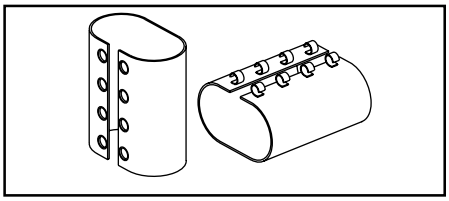
Factory Vulcanized



Eyelets, Mounting Bars and Hooks can be attached or bonded into the heaters to allow for easy lacing of the heaters to the work.

Mounting bars provide the greatest strength and longevity because they are thin strips of aluminum vulcanized between layers of rubber insulation.

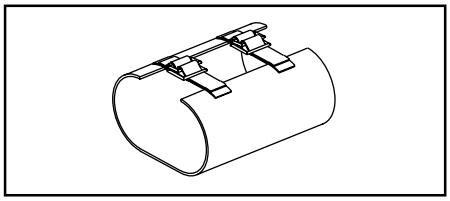
Eyelets, Mounting Bars & Hooks



Silicone or Nylon Straps can be used with D-Rings to provide a simple method of mounting; just slip the straps through and cinch tight. The straps are vulcanized directly to the heaters to provide durability and strength for repeated attachments.

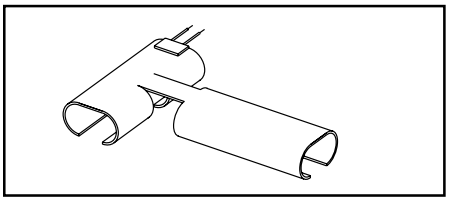
Velcro® can be used for lightweight and low temperature heater applications and on insulation blankets. The Velcro® is generally sewn onto silicone rubber straps to provide greater strength and durability.

Straps



Springs or Spring Clasps can be used for quick on/off attachment of the heaters. Mounting bars or plates are vulcanized into the heaters for greater strength and serviceability. **Note** — The exact circumference of the part to be heated is required when using springs or spring clasps.

Pre-formed Clasps



Preforming — Flexible heaters can be preformed to exactly fit your part. **Note** — Special tooling may be required to preform the heaters to meet your specifications.

Insulation Covers can be strapped into place or fitted with springs or spring clasps.

Flexible Heaters

Technical & Application Data *(cont'd.)*

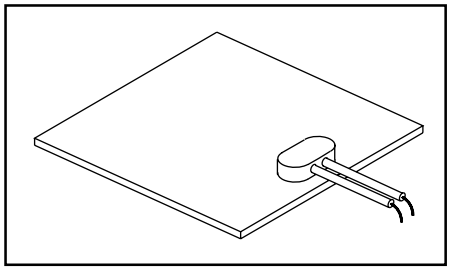
Temperature Controls

Chromalox provides a wide range of thermostats, thermocouples, RTDs, thermal fuses and thermistors for controlling your heated system. All can be mounted to the heater or be free standing; sensing either heater surface, air, or system surface temperature. Sensors can be used in conjunction with one another to provide controlling temperature and overtemperature protection.

Preset Thermostats — Bi-metal thermostats can be molded into the heating elements for part surface, heater surface or air temperature sensing. The thermostats will be mounted in-line with the elements or have their own termination based on the amperage requirements of the heaters.

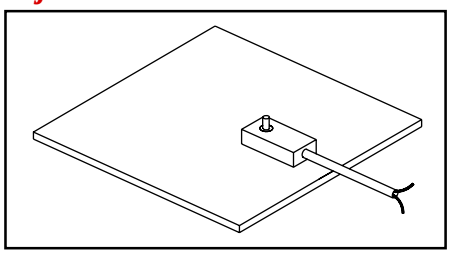
Chromalox maintains a stock of various temperature settings. Check on availability prior to ordering. Non-stock settings may require additional lead-time.

Preset Thermostats



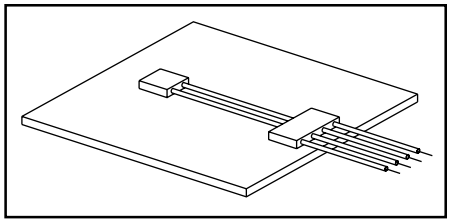
Adjustable Thermostats are available in the ranges of 50 - 300°F or 50 - 450°F. They are mounted to the heaters and covered with a durable rubber box. Adjustments can be made with either a factory provided knob or with a screw driver. Other temperature ranges available on request.

Adjustable Thermostats



Thermocouples, RTDs, Thermal Fuses or Thermistors can also be molded into the heating elements to sense either heater temperature or surface temperature of your part. Thermal Fuses can be mounted for easy replacement once tripped.

Thermocouples, RTDs, Thermal Fuses or Thermistors

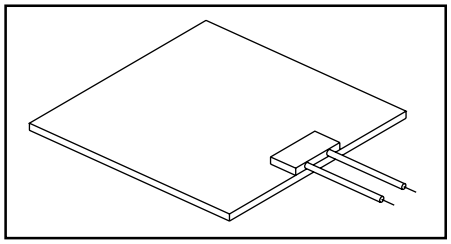


Termination Styles

Chromalox offers many types of leads and terminal connections for your Flexible Heaters. Internal connections to the elements can be made at any point on the surface of the heater or project from any edge. Internal or mounted strain reliefs are used in all constructions to ensure durability of your flexible product.

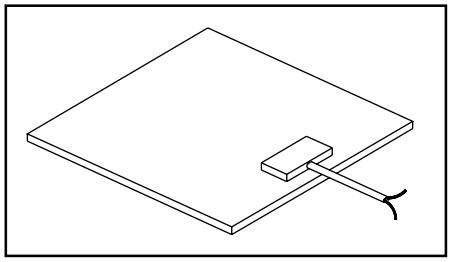
Silicone, Teflon® or Neoprene Insulated Stranded Leads can be encapsulated in the heaters for direct power connection. Silicone rubber insulated leads are used as standard for silicone rubber heaters. Lead wires can come with a multitude of terminals attached.

Lead Wires

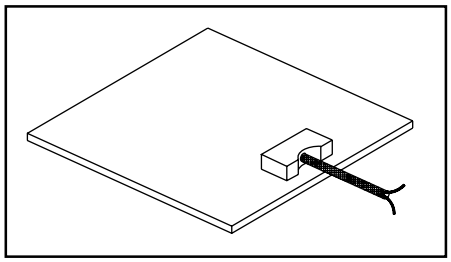


Silicone, Fiberglas® Sleeving or Armor Braiding can be molded over the lead-wires to provide greater abrasion resistance.

Silicone Sleeving

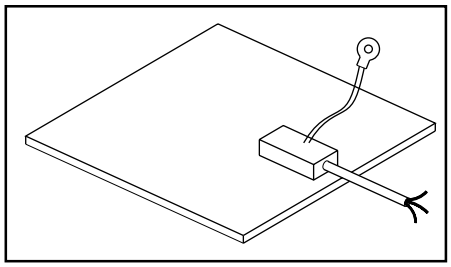


Armor Braid Sleeving



Power Cords can be vulcanized into the heaters either with or without plugs. Internal and external strain reliefs are used to ensure cord attachment strength and durability of the element. Ground wires, if used, can be mounted to internal grounding screens, mounting plates or foil backing. All "flying" ground wires are a minimum of 6" in length and may have a ring terminal attached for easy field grounding to your part.

Power Cords



Flexible Heaters

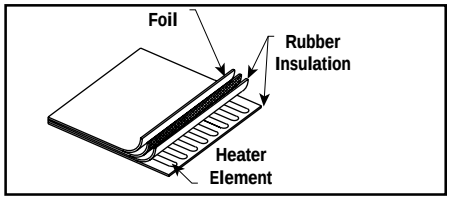
Selection Guidelines

Capabilities

Chromalox is capable of designing and manufacturing complete heated systems to meet your application. Chromalox has a reputation for going beyond the basic heater construction to give you value-added technical service.

Grounding to meet evolving NEC, Military standards or your application requirements can be easily managed with Chromalox Flexible Heaters. Internal grounding screens, surface-piercing mounting plates, or foil backing can be incorporated in the heater construction to ensure system grounding.

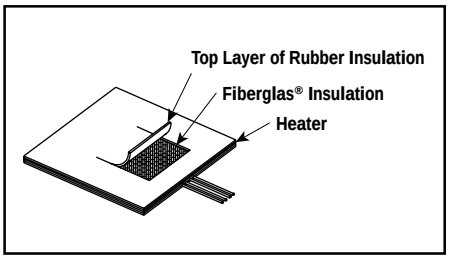
Foil Backing



Foil Backing is also used to improve heat transfer. More heat is drawn and radiated by binding foil to an outer layer of rubber.

Insulation of the heater element can be factory achieved by bonding silicone or neoprene foam rubber to the element or by encasing Fiberglas® insulation as the outer layer of the heating element. Encasing Fiberglas® is not recommended for outdoor application since "breathing holes" are used that may allow for moisture absorption.

Encased Insulation



Flexible & Molded Heaters — Selection Guidelines

Max. Operating Temperature	Application Environment	Product Type	Model	Stock Products	Page
392°F	Most Industrial Indoor / Outdoor	**SL —** Silicone Rubber Insulated	SL-N SL-D SL-B	Standard Strip Heaters Drum Heaters Enclosure Heaters	A-110
392°F	Most Industrial Indoor / Outdoor	**KH —** Kapton™	KH		A-114
750°F	Chemical Free Indoor / Enclosed	**W —** Fiberglas® Woven	W	—	A-115
392°F		**SLW —** Fiberglas® Woven, Rubber Laminated	SLW		
	Most Industrial Indoor / Outdoor		PHD Series	Heavy Duty Drum` Heaters	A-117

Flexible & Molded Thermal Insulation — Selection Guidelines

Max. Exposure Temperature	Application Environment	Product Type	Model	Stock Products	Page
450°F	Most Industrial Indoor / Outdoor	**IBG —** Silicone Rubber Insulation Blankets — Silicone Foam Insulation Coats	IBG Series	Blanket Drum Heaters	A-118