**Quick Ship** • *Same day shipment on stock units with orders received by 11:00 a.m.*

# Flexible Heaters

## Silicone Rubber

Rugged, yet thin, lightweight and flexible … the use of Watlow silicone rubber heaters is limited only by your imagination. With these heaters, you can put the heat where it's needed and, in the process, improve heat transfer, speed warm-ups and decrease wattage requirements.

Fiberglass-reinforced silicone rubber gives your heater dimensional stability without sacrificing flexibility. Because very little material separates the element from the part, heat transfer is rapid and efficient.

### *Performance Capabilities*

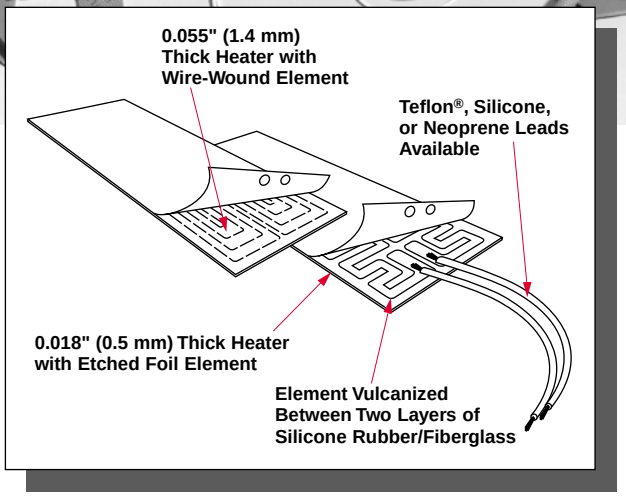
- Operating temperatures to 500°F (260°C)
- Watt densities to 80 W/in$^2$ (12.5 W/cm$^2$) dependent upon application temperature
- 0.055 inch (1.4 mm) thick with a wire-wound element; only 0.018 inch (0.5 mm) with an etched foil element

### *Features and Benefits*

- **Designed in the exact shape and size**, including 3-D geometries, to conform to your equipment.
- **More than 80 designs** available immediately from stock.
- **UR®, cUR® and VDE** recognitions are available on many designs.
- **Moisture and chemical-resistant** silicone rubber material provides longer heater life.
- **Easy to bond or attach** to your part through the use of vulcanizing, adhesives, or fasteners.

### *Applications*

- Freeze protection and condensation prevention for many types of instrumentation and equipment
- Medical equipment such as blood analyzers, test tube heaters, etc.
- Computer peripherals such as laser printers
- Curing of plastic laminates
- Photo processing equipment



# Silicone Rubber

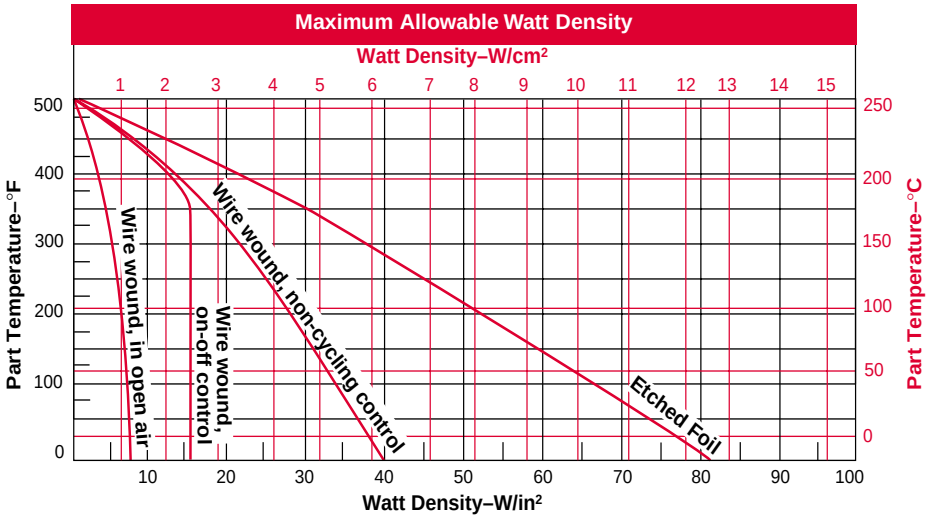
## Applications and Technical Data

### *Determining Watt Density*

The *Maximum Allowable Watt Density* graph illustrates the maximum recommended heater watt density at various metal part or ambient air temperatures. However, it does not indicate the watt density necessary to achieve a given part temperature. See the *Surface Temperature vs. Time* graph on the next page for assistance with those calculations. When using this graph, remember:

- Part temperature is measured at the point where the heater contacts the metal part.
- Thermostats and on-off controls are typically bimetal or capillary bulb.
- Non-cycling controls are typically solid state, time-proportioning or SCR temperature controllers.
- Watt density values should be derated by one third if insulation is used.
- UL® recognition temperature limits are not detailed.
- Consult Watlow before doing any of the following: selecting high watt density etched-foil elements, or operating heaters with back side insulation or non-metallic parts, which are poor thermal conductors.

**Example:** A wire-wound heater with non-cycling control at a part temperature of 250°F (120°C) can be rated at 24 W/in² (3.7 W/cm²) maximum. An etched foil heater under the same conditions can be rated at 45 W/in² (7 W/cm²) maximum.




### *Standard Silicone Rubber Specifications*

**Maximum width x maximum length:**

- Wire wound: 36 x 120 inches (915 mm x 3050 mm)
- Etched foil: 20 x 30 inches (510 mm x 760 mm)

**Thickness (standard):**

- Wire wound: 0.055 inch (1.4 mm)
- Etched foil: 0.018 inch (0.5 mm)

**Weight (standard):**

- Wire wound: 8 oz./ft² (0.24 g/cm²)
- Etched foil: 3 oz./ft² (0.09 g/cm²)

**Maximum operating temperature:** 500°F (260°C)

**Maximum temperature for UL® recognition:** 428°F (220°C)

**Minimum ambient temperature:** -80°F (-62°C)

**Maximum voltage:** 600V~(ac)

**Maximum wattage:** See watt density graph

**Lead size:** Sized to load

**Lead length:** 12 + 1 ½ - ½ inches (305 mm + 40 mm - 15 mm)

**Wattage tolerance:**

- Wire: ±5 percent
- Foil: +5 percent -10 percent

**Dimensional tolerances:**

- 0 to 6 inches (0 to 150 mm): ±1/16 inch (1.6 mm)
- 6 to 18 inches (150 to 455 mm): ±⅛ inch (3.2 mm)
- 18 to 36 inches (455 mm to 915 mm): ±3/16 inch (4.8 mm)
- Over 36 inches (915 mm): ±1 percent

Government Supply Code Number
Cage code = 78056

# Flexible Heaters

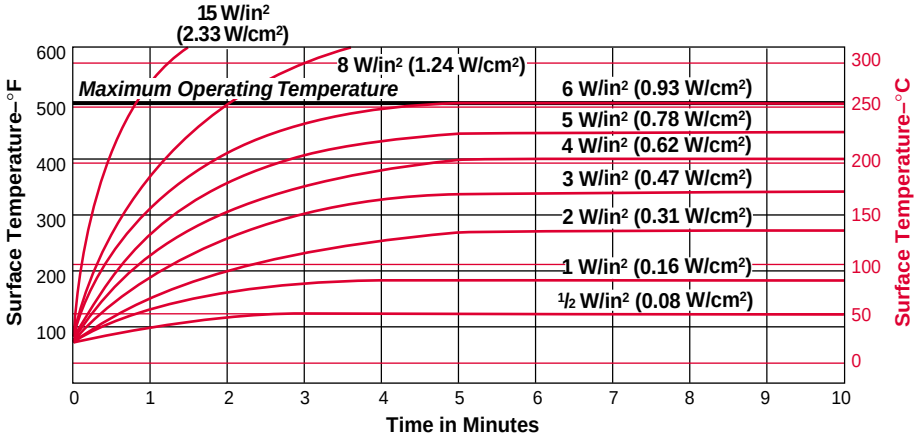
## Silicone Rubber

### Applications and Technical Data

Continued

***Surface Temperature vs. Time***

This graph illustrates the surface temperature a silicone rubber heater will reach when the heater is uninsulated and is suspended vertically in 70°F (20°C) still air. This data is based on 0.055 inch (1.4 mm) thick standard construction and is offered as a reference tool.




***UR®, cUR® and VDE Recognition for Silicone Rubber Heaters***

Watlow frequently works with customers requiring agency approvals such as UR®, cUR® and VDE. Many stock silicone rubber heaters are available with one or more of these certifications. **Watlow's technical letter #3**, flexible heaters, provides in-depth information on agency approvals.

**UL® Component Recognition (UR)** of factory-bonded heaters is available up to 392°F (200°C), and for customer installed heaters up to 428°F (220°C) (UL File No. E52951).

For Canadian recognition Watlow offers **cUR Recognized®** silicone rubber heaters under UL File #E52951. Several constructions are available with ratings to 600V~(ac) and 428°F (220°C) maximum surface temperature. Consult the factory for further information.

**VDE Approval** is available on several constructions of both wire-wound (File No. 62533) and etched foil (File No. 62535) silicone rubber heaters. The maximum ratings are 440V~(ac) and 428°F (220°C) surface temperature. Under VDE guidelines, minimum installed bend radius is ⅛ inch (3 mm) for etched foil and ¼ inch (6 mm) for wire wound.

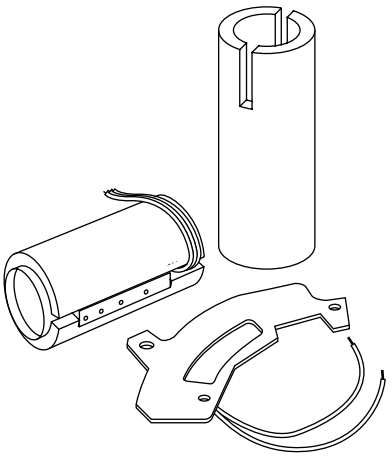
VDE also states that the user is responsible for the safe application, installation and wiring of the heaters. Maximum working temperature must be maintained by an appropriate temperature control.

## Options

Watlow offers a variety of options such as attachment techniques, thermostats, special leads, holes and cutouts and three-dimensional shapes. These are all described in the introduction to flexible heaters section. In addition, the following option is available only on silicone rubber heaters.

***See pages 165 to 168 for more information on options.***

**Thermal Insulation**



To increase the heating efficiency of your application, silicone rubber heaters can be thermally insulated with silicone sponge rubber, bonded to one side in the following thicknesses: 1/16, ⅛, ¼, ⅜ or ½ inch (1.6, 3, 6, 10 or 13 mm). Heaters with thermal insulation are still quite flexible.

An aluminized surface can be added to the back of the heater to reduce radiated heat losses. This aluminized surface, called "Low Loss Treatment," adds very little to the unit thickness and maintains a very clean appearance.

# Silicone Rubber

## Wire-Wound Element

| Width in (mm) | Length in (mm) | Watts | Availability | 120V~(ac) Code No. | 240V~(ac) Code No. |
|---|---|---|---|---|---|
| 1 (25) | 2 (50) | 10 | Stock | **010020C1** | |
| | 3 (75) | 15 | Stock | **010030C1** | |
| | 4 (100) | 20 | Stock | **010040C1** | |
| | 5 (125) | 25 | Stock | **010050C1** | |
| | 5 (125) | 25 | Stock | | **010050C2** |
| | 10 (255) | 50 | Stock | **010100C1** | |
| | 10 (255) | 50 | Stock | | **010100C2** |
| | 15 (380) | 75 | Stock | **010150C1** | |
| | 15 (380) | 75 | Stock | | **010150C2** |
| | 20 (510) | 100 | Stock | **010200C1** | |
| | 20 (510) | 100 | Stock | | **010200C2** |
| | 25 (635) | 125 | Stock | **010250C1** | |
| | 30 (760) | 150 | Stock | **010300C1** | |
| | 35 (890) | 175 | Stock | **010350C1** | |
| | 40 (1015) | 200 | Stock | **010400C1** | |
| | 80 (2030) | 400 | Stock | **010800C1** | |
| | 120 (3050) | 600 | Stock | **010F10C1**① | |
| 2 (50) | 2 (50) | 20 | Stock | **020020C1** | |
| | 5 (125) | 50 | Stock | **020050C1** | |
| | 5 (125) | 50 | Stock | | **020050C2** |
| | 10 (255) | 100 | Stock | **020100C1** | |
| | 10 (255) | 100 | Stock | | **020100C2** |
| | 15 (380) | 150 | Stock | **020150C1** | |
| | 15 (380) | 150 | Stock | | **020150C2** |
| | 20 (510) | 200 | Stock | **020200C1** | |
| | 20 (510) | 200 | Stock | | **020200C2** |
| | 25 (635) | 250 | Stock | **020250C1** | |
| | 30 (760) | 300 | Stock | **020300C1** | |
| | 35 (890) | 350 | Stock | **020350C1** | |
| | 40 (1015) | 400 | Stock | **020400C1** | |

*CONTINUED*

① 010**F**10C1 - F = feet (i.e. 10 feet = 120 inches)

Approx. net weight: 8 ounces/ft² (0.24 g/cm²). Standard thickness: 0.055 inch. Standard lead length: 12 inches UL 1180 Teflon®.
Silicone rubber wire-wound elements rated at 5 W/in².
UL® Component Recognition (UR®).

### *How to Order*

To order stock silicone rubber heaters, specify the Watlow code number and the quantity. To order a heater with options, specify the code number, quantity and options desired **(see page 165)**. Consult Watlow before combining options.

**Made-to-Order:** Consult factory.

For **made-to-order** units, Watlow will need the following application information from you:

- Size (dimensions)
- Voltage
- Wattage/watt density
- Operating temperature
- Options (leads, thermostats, attachment techniques, etc.)
- Will heater be subject to flexing?
- Element type, if you have a preference
- Agency approvals
- Quantity

### Availability

**Stock:** Same day shipment of orders received by 11:00 a.m. CST.

**Stock with Options:** Shipment in five working days or less. Not all options are available with stock heaters.

# Flexible Heaters

## Silicone Rubber

### Wire-Wound Element

| Width in (mm) | Length in (mm) | Watts | Availability | 120V~(ac) Code No. | 240V~(ac) Code No. |
|---|---|---|---|---|---|
| 3 (75) | 3 (75) | 45 | Stock | **030030C1** | |
| | 5 (125) | 75 | Stock | **030050C1** | |
| | 5 (125) | 75 | Stock | | **030050C2** |
| | 10 (255) | 150 | Stock | **030100C1** | |
| | 10 (255) | 150 | Stock | | **030100C2** |
| | 15 (380) | 225 | Stock | **030150C1** | |
| | 15 (380) | 225 | Stock | | **030150C2** |
| | 20 (510) | 300 | Stock | **030200C1** | |
| | 20 (510) | 300 | Stock | | **030200C2** |
| | 25 (635) | 375 | Stock | **030250C1** | |
| | 30 (760) | 450 | Stock | **030300C1** | |
| | 35 (890) | 525 | Stock | **030350C1** | |
| | 40 (1015) | 600 | Stock | **030400C1** | |
| 4 (100) | 4 (100) | 80 | Stock | **040040C1** | |
| | 5 (125) | 100 | Stock | **040050C1** | |
| | 5 (125) | 100 | Stock | | **040050C2** |
| | 10 (255) | 200 | Stock | **040100C1** | |
| | 10 (255) | 200 | Stock | | **040100C2** |
| | 15 (380) | 300 | Stock | **040150C1** | |
| | 15 (380) | 300 | Stock | | **040150C2** |
| | 20 (510) | 400 | Stock | **040200C1** | |
| | 20 (510) | 400 | Stock | | **040200C2** |
| | 25 (635) | 500 | Stock | **040250C1** | |
| | 30 (760) | 600 | Stock | **040300C1** | |
| | 35 (890) | 700 | Stock | **040350C1** | |
| | 40 (1015) | 800 | Stock | **040400C1** | |
| 5 (125) | 5 (125) | 125 | Stock | **050050C1** | |
| | 5 (125) | 125 | Stock | | **050050C2** |
| | 10 (255) | 250 | Stock | **050100C1** | |
| | 10 (255) | 250 | Stock | | **050100C2** |
| | 15 (380) | 375 | Stock | **050150C1** | |
| | 15 (380) | 375 | Stock | | **050150C2** |
| | 20 (510) | 500 | Stock | **050200C1** | |
| | 20 (510) | 500 | Stock | | **050200C2** |
| | 25 (635) | 625 | Stock | **050250C1** | |
| | 30 (760) | 750 | Stock | **050300C1** | |
| | 35 (890) | 875 | Stock | **050350C1** | |
| | 40 (1015) | 1000 | Stock | **050400C1** | |
| 6 (150) | 5 (125) | 150 | Stock | **060050C1** | |
| | 5 (125) | 150 | Stock | | **060050C2** |
| | 10 (255) | 300 | Stock | **060100C1** | |
| | 10 (255) | 300 | Stock | | **060100C2** |
| | 15 (380) | 450 | Stock | **060150C1** | |
| | 15 (380) | 450 | Stock | | **060150C2** |
| | 20 (510) | 600 | Stock | **060200C1** | |
| | 20 (510) | 600 | Stock | | **060200C2** |
| | 25 (635) | 750 | Stock | **060250C1** | |
| | 30 (760) | 900 | Stock | **060300C1** | |
| | 35 (889) | 1050 | Stock | **060350C1** | |
| | 40 (1016) | 1200 | Stock | **060400C1** | |

Approx. net weight: 8 ounces/ft² (0.24 g/cm²). Standard thickness: 0.055 inch. Standard lead length: 12 inches UL 1180 Teflon®. Silicone rubber wire-wound elements rated at 5 W/in². UL® Component Recognition (UR®).

# Flexible Heaters

## Silicone Rubber

### Wire-Wound Stock Heater Coding Configured Options

***How to order***

**To order, complete the code number with the information below:**

**Wire wound** **(p. 172-173)**

**0_____-_ _ _ _ _**

**Modification Options**

0 = None
A = PSAS Bottom
B = PSAS Top
E = With Plate. Heater on Side Opposite Flange
F = With Plate. Heater on Flange Side
G = Flaps + Grommets
H = Flaps + Boot Hooks
J = Flaps + Latch Fasteners
K = PSAS and Low Loss
L = Low Loss
M = Low Loss + Flaps + Grommets
N = Low Loss + Flaps + Boot Hooks
P = Low Loss + Flaps + Latch Fasteners
R = 1/16 inch Sponge
S = 1/8 inch Sponge
T = 1/4 inch Sponge
U = 3/8 inch Sponge
V = 1/2 inch Sponge
W = PSAS + 1/16 inch Sponge
Y = PSAS + 1/8 inch Sponge
1 = PSAS + 1/4 inch Sponge
2 = PSAS + 3/8 inch Sponge
3 = PSAS + 1/2 inch Sponge
4 = Tip Plugs
6 = Tip Plugs/PSAS

- Heaters with flaps must be minimum 10 inches long.

**Sensors**

| | Type | LOC | WIR |
|---|---|---|---|
| 0 = | None | | |
| L = | T10 | STD | STD |
| M = | T10 | STD | ALT |
| N = | T10 | ALT | STD |
| P = | T10 | ALT | ALT |
| R = | T207 | STD | STD |
| S = | T207 | STD | ALT |
| T = | T207 | ALT | STD |
| U = | T207 | ALT | ALT |
| V = | T207E | on heater | STD |
| W = | T207E | Remote | STD |
| Y = | B200 | STD | STD |
| 1 = | B200 | STD | ALT |
| 2 = | B200 | ALT | STD |
| 3 = | B200 | ALT | ALT |
| 4 = | JSTD | STD | STD |
| 6 = | JALT | STD | STD |
| 7 = | KSTD | STD | STD |

- For thermostats, standard location is as shown in catalog; standard wiring is integral or series with the heater; alternate location is rotated parallel with heater width; alternate wiring is separate leads for pilot control.
- For thermocouples, J standard is Teflon® insulation; J alternate is fiberglass insulation; K standard is fiberglass insulation.

**T10 Set °F***

0 = None
A = 125
B = 150
E = 175
F = 200
G = 225
H = 250
J = 275
K = 300

**T207 Set °F***

0 = None
1 = 40/55
2 = 60/75
3 = 95/110
4 = 145/1600

**B200 Set °F***

0 = None
2 = 500
3 = 330

**T/C Length**

0 = None
A = 8 in
B = 12 in
E = 18 in
F = 24 in
G = 30 in
H = 36 in
J = 40 in
K = 4 ft
L = 5 ft
M = 6 ft
N = 7 ft
P = 8 ft
R = 9 ft
S = 10 ft
T = 12 ft
U = 15 ft
V = 18 ft
W = 20 ft
Y = 22 ft
1 = 25 ft
2 = 30 ft

* For all thermostats, the heater must be two inches minimum width and five inches minimum length.

**Lead Insulation**

0 = None
1 = 1180 Teflon®
2 = 1180 cUR®
3 = 3133 22 GA
4 = 3134 18 GA
6 = 1199 cUR®
7 = HPN
8 = 6 foot HPN Set
9 = Type E Teflon®
A = 1180VDE*
B = 1199VDE*

* 1180VDE denotes a cUR® heater plus a VDE stamp.

**Lead Length**

A = 8 in
B = 12 in
E = 18 in
F = 24 in
G = 30 in
H = 36 in
J = 40 in
K = 4 ft
L = 5 ft
M = 6 ft
N = 7 ft
P = 8 ft
R = 9 ft
S = 10 ft
T = 12 ft
U = 15 ft
V = 18 ft
W = 20 ft
Y = 22 ft
1 = 25 ft
2 = 30 ft

**Availability:**
Modified Stock: Shipment within five working days

# Flexible Heaters

## Silicone Rubber

### Etched Foil Element

| Width in (mm) | Length in (mm) | Watts | W/in² (W/cm²) | Availability | 120V~(ac) Code No. | 120/240V~(ac) Code No. |
|---|---|---|---|---|---|---|
| 1 (25) | 5 (125) | 25 | 5 (0.8) | Stock | F010050C3 | |
| | 5 (125) | 50 | 10 (1.6) | Stock | F010050C7 | |
| | 5 (125) | 12.5/50 | 2.5/10 (0.4/1.6) | Stock | | F010050C8 |
| | 10 (255) | 100 | 10 (1.6) | Stock | F010100C7 | |
| | 10 (255) | 25/100 | 2.5/10 (0.4/1.6) | Stock | | F010100C8 |
| | 15 (380) | 150 | 10 (1.6) | Stock | F010150C7 | |
| | 15 (380) | 37.5/150 | 2.5/10 (0.4/1.6) | Stock | | F010150C8 |
| | 20 (510) | 200 | 10 (1.6) | Stock | F010200C7 | |
| | 20 (510) | 50/200 | 2.5/10 (0.4/1.6) | Stock | | F010200C8 |
| 2 (50) | 5 (125) | 100 | 10 (1.6) | Stock | F020050C7 | |
| | 5 (125) | 25/100 | 2.5 /10 (0.4/1.6) | Stock | | F020050C8 |
| | 10 (255) | 200 | 10 (1.6) | Stock | F020100C7 | |
| | 10 (255) | 50/200 | 2.5 /10 (0.4/1.6) | Stock | | F020100C8 |
| | 15 (380) | 300 | 10 (1.6) | Stock | F020150C7 | |
| | 15 (380) | 75/300 | 2.5/10 (0.4/1.6) | Stock | | F020150C8 |
| | 20 (510) | 400 | 10 (1.6) | Stock | F020200C7 | |
| | 20 (510) | 100/400 | 2.5/10 (0.4/1.6) | Stock | | F020200C8 |
| 3 (75) | 5 (125) | 75 | 5 (0.8) | Stock | F030050C3 | |
| | 5 (125) | 150 | 10 (1.6) | Stock | F030050C7 | |
| | 5 (125) | 37.5/150 | 2.5 /10 (0.4/1.6) | Stock | | F030050C8 |
| | 10 (255) | 300 | 10 (1.6) | Stock | F030100C7 | |
| | 10 (255) | 75/300 | 2.5 /10 (0.4/1.6) | Stock | | F030100C8 |
| | 15 (380) | 450 | 10 (1.6) | Stock | F030150C7 | |
| | 15 (380) | 112/450 | 2.5 /10 (0.4/1.6) | Stock | | F030150C8 |
| | 20 (510) | 600 | 10 (1.6) | Stock | F030200C7 | |
| | 20 (510) | 150/600 | 2.5 /10 (0.4/1.6) | Stock | | F030200C8 |
| 4 (100) | 5 (125) | 200 | 10 (1.6) | Stock | F040050C7 | |
| | 5 (125) | 50/200 | 2.5 /10 (0.4/1.6) | Stock | | F040050C8 |
| | 10 (255) | 400 | 10 (1.6) | Stock | F040100C7 | |
| | 10 (255) | 100/400 | 2.5 /10 (0.4/1.6) | Stock | | F040100C8 |
| | 15 (380) | 600 | 10 (1.6) | Stock | F040150C7 | |
| | 15 (380) | 150/600 | 2.5/10 (0.4/1.6) | Stock | | F040150C8 |
| | 20 (510) | 800 | 10 (1.6) | Stock | F040200C7 | |
| | 20 (510) | 200/800 | 2.5/10 (0.4/1.6) | Stock | | F040200C8 |
| 5 (125) | 5 (125) | 125 | 5 (0.8) | Stock | F050050C3 | |
| | 5 (125) | 250 | 10 (1.6) | Stock | F050050C7 | |
| | 5 (125) | 62.5/250 | 2.5/10 (0.4/1.6) | Stock | | F050050C8 |
| | 10 (255) | 500 | 10 (1.6) | Stock | F050100C7 | |
| | 10 (255) | 125/500 | 2.5/10 (0.4/1.6) | Stock | | F050100C8 |
| | 15 (380) | 750 | 10 (1.6) | Stock | F050150C7 | |
| | 15 (380) | 187/750 | 2.5/10 (0.4/1.6) | Stock | | F050150C8 |
| | 20 (510) | 1000 | 10 (1.6) | Stock | F050200C7 | |
| | 20 (510) | 250/1000 | 2.5/10 (0.4/1.6) | Stock | | F050200C8 |
| 6 (150) | 5 (125) | 300 | 10 (1.6) | Stock | F060050C7 | |
| | 5 (125) | 75/300 | 2.5/10 (0.4/1.6) | Stock | | F060050C8 |
| | 10 (255) | 600 | 10 (1.6) | Stock | F060100C7 | |
| | 10 (255) | 150/600 | 2.5 /10 (0.4/1.6) | Stock | | F060100C8 |
| | 15 (380) | 900 | 10 (1.6) | Stock | F060150C7 | |
| | 15 (380) | 225/900 | 2.5/10 (0.4/1.6) | Stock | | F060150C8 |
| | 20 (510) | 1200 | 10 (1.6) | Stock | F060200C7 | |
| | 20 (510) | 300/1200 | 2.5/10 (0.4/1.6) | Stock | | F060200C8 |

Approx. net weight: 3 ounces/ft² (0.09 g/cm²). Standard lead length: 12 inches UL 1180 Teflon®.
Silicone rubber etched foil elements are 0.018 inch thick.
UL® Component Recognition (UR®).

## Silicone Rubber

### Etched Foil Stock Heater Coding Configured Options

***How to order***

**To order, complete the code number with the information below:**

**Etched Foil** **(p. 175)**

**F0_____-_____**

**Options**
0 = None
A = PSAS Bottom
B = PSAS Top
K = PSAS and Low Loss
L = Low Loss
R = 1/16 inch Sponge
S = 1/8 inch Sponge
T = 1/4 inch Sponge
U = 3/8 inch Sponge
V = 1/2 inch Sponge
W = PSAS + 1/16 inch Sponge
Y = PSAS + 1/8 inch Sponge
1 = PSAS + 1/4 inch Sponge
2 = PSAS + 3/8 inch Sponge
3 = PSAS + 1/2 inch Sponge
4 = Tip Plugs
6 = Tip Plugs/PSAS

- Etched foil heaters not recommended for enclosure heaters.

| Sensors Type | LOC | WIR |
|---|---|---|
| 0 = None | | |
| L = T10 | STD | STD |
| M = T10 | STD | ALT |
| N = T10 | ALT | STD |
| P = T10 | ALT | ALT |
| R = T207 | STD | STD |
| S = T207 | STD | ALT |
| T = T207 | ALT | STD |
| U = T207 | ALT | ALT |
| 4 = JSTD | STD | STD |
| 6 = JALT | STD | STD |
| 7 = KSTD | STD | STD |

- For thermostats, standard location is as shown in catalog; standard wiring is integral or series with the heater; alternate location is rotated parallel with heater width; alternate wiring is separate leads for pilot control.
- For thermocouples, J standard is Teflon® insulation; J alternate is fiberglass insulation; K standard is fiberglass insulation.

**T10 Set °F***
0 = None
A = 125
B = 150
E = 175
F = 200
G = 225
H = 250
J = 275
K = 300

**T207 Set °F***
0 = None
1 = 40/55
2 = 60/75
3 = 95/110
4 = 145/160

**T/C Length**
0 = None
A = 8 in
B = 12 in
E = 18 in
F = 24 in
G = 30 in
H = 36 in
J = 40 in
K = 4 ft
L = 5 ft
M = 6 ft
N = 7 ft
P = 8 ft
R = 9 ft
S = 10 ft
T = 12 ft
U = 15 ft
V = 18 ft
W = 20 ft
Y = 22 ft
1 = 25 ft
2 = 30 ft

* For preset thermostats, the heater must be two inches minimum width and five inches minimum length.

**Lead Insulation**
0 = None
1 = 1180 Teflon®
2 = 1180 cUR®
3 = 3133 22 GA
4 = 3134 18 GA
6 = 1199 cUR®
7 = HPN
8 = 6 Foot HPN Set
9 = Type E Teflon®
A = 1180VDE*
B = 1199VDE*

*1180VDE denotes a cUR® heater plus a VDE stamp.

**Lead Length**
A = 8 in
B = 12 in
E = 18 in
F = 24 in
G = 30 in
H = 36 in
J = 40 in
K = 4 ft
L = 5 ft
M = 6 ft
N = 7 ft
P = 8 ft
R = 9 ft
S = 10 ft
T = 12 ft
U = 15 ft
V = 18 ft
W = 20 ft
Y = 22 ft
1 = 25 ft
2 = 30 ft

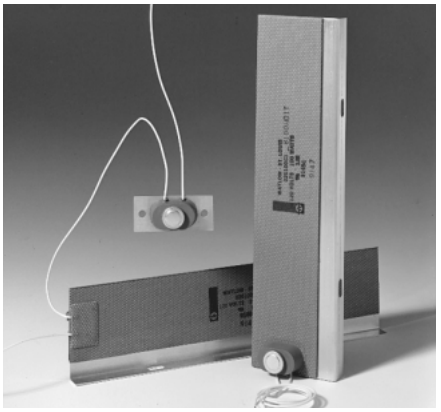
**Availability:**
Modified Stock: Shipment within five working days

# Flexible Heaters

## Silicone Rubber

### Stock Product Offering

***Enclosure Heaters–***
***Wire-Wound Only***



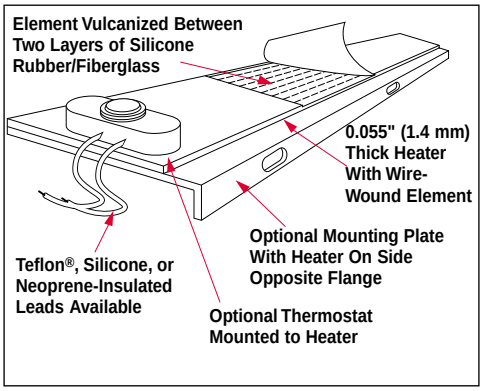
Designed for freeze and condensation protection, Watlow's enclosure heaters are rugged, reliable and safe to operate. These rectangular-shaped, wire-wound silicone rubber heaters can be ordered by themselves with adhesive or vulcanized to an aluminum mounting plate. A thermostat can be attached to the heater or mounted separately. Pictured are units with thermostat on heater in foreground and heater with remote thermostat in background.

***Performance Capabilities***

- Watt density rating of 5 W/in$^2$ (0.8 W/cm$^2$)
- Temperatures to 150°F (66°C)

***Features and Benefits***

- **Easy to install** with options of pressure sensitive adhesive, mounting to aluminum plate, or customer cementing.
- **Quick delivery** on more than 72 variations.
- **Safe and reliable operation** due to no exposed electrical connections.
- **Custom leads** available in any length needed.
- **Horizontal and vertical mounting** options to meet your needs.




***Applications***

Freeze or condensation prevention in housings containing electronic equipment. Examples include:

- Traffic signal boxes
- Automatic teller machines
- Temperature control panels
- Gas or liquid control valve housings

## Applications and Technical Data

***Determining Minimum Wattage Requirements For Enclosures***

This chart is an excellent guide for determining total wattage requirements for both insulated and uninsulated enclosures, assuming the box is relatively airtight. For windy conditions, add an additional 50 percent to the wattage requirement listed.

| Temperature Rise from Ambient °F (°C) | Total Enclosure Surface Area—Square Feet (Square Meters) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 (0.2) | 3 (0.3) | 4 (0.4) | 5 (0.5) | 6 (0.6) | 7.5 (0.7) | 9 (0.8) | 10 (0.9) | 15 (1.4) | 20 (1.9) | 25 (2.3) | 30 (2.8) | 40 (3.7) | 50 (4.7) |
| 20 (11) | 30 | 40 | 55 | 70 | 80 | 100 | 120 | 135 | 205 | 270 | 335 | 405 | 540 | 670 |
| | 10 | 10 | 15 | 20 | 20 | 25 | 30 | 35 | 50 | 65 | 80 | 100 | 130 | 160 |
| 40 (22) | 55 | 80 | 110 | 135 | 160 | 200 | 245 | 270 | 405 | 540 | 670 | 805 | 1075 | 1340 |
| | 15 | 20 | 30 | 35 | 40 | 50 | 60 | 65 | 100 | 130 | 160 | 195 | 260 | 320 |
| 60 (33) | 90 | 120 | 160 | 205 | 245 | 300 | 365 | 405 | 605 | 805 | 1005 | 1210 | 1610 | 2010 |
| | 20 | 30 | 55 | 50 | 60 | 75 | 90 | 100 | 145 | 195 | 240 | 290 | 385 | 480 |
| 80 (44) | 110 | 160 | 215 | 270 | 325 | 400 | 485 | 540 | 805 | 1075 | 1340 | 1610 | 2145 | 2680 |
| | 30 | 40 | 55 | 65 | 80 | 100 | 115 | 130 | 195 | 260 | 320 | 385 | 515 | 640 |
| 100 (56) | 135 | 200 | 270 | 335 | 405 | 500 | 605 | 670 | 1005 | 1340 | 1675 | 2010 | 2680 | 3350 |
| | 35 | 50 | 65 | 80 | 100 | 125 | 145 | 160 | 240 | 320 | 400 | 480 | 640 | 800 |
| 120 (67) | 165 | 240 | 320 | 405 | 485 | 600 | 725 | 805 | 1210 | 1610 | 2010 | 2415 | 3220 | 4020 |
| | 40 | 60 | 80 | 100 | 115 | 150 | 175 | 195 | 290 | 385 | 480 | 580 | 770 | 960 |
| 140 (78) | 190 | 280 | 375 | 470 | 565 | 700 | 845 | 940 | 1410 | 1880 | 2345 | 2815 | 3755 | 4690 |
| | 45 | 70 | 90 | 115 | 135 | 175 | 205 | 225 | 340 | 450 | 560 | 675 | 900 | 1120 |

Uninsulated boxes  Insulated boxes

## Silicone Rubber

### Stock Product Offering

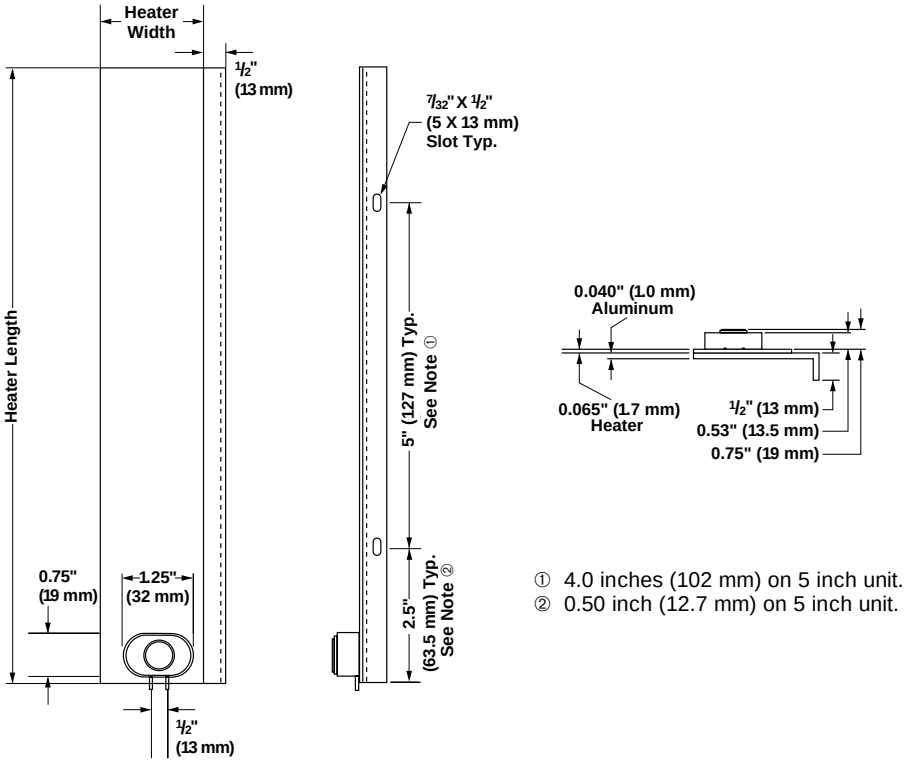
***Enclosure Heaters***

### Options

#### Aluminum Mounting Plate

Both vertical and horizontal mounting can be accomplished with enclosure heaters. The mounting plates are 0.040 inch (1 mm) thick, specified as #3003 H14 aluminum. The preferred orientation is vertical, with a thermostat attached at the lower end (as shown in the drawing).

For horizontal mounting, a remote thermostat is recommended. An enclosure heater can be ordered by itself, with PSAS or vulcanized to an aluminum mounting plate. See *Thermostats* below for more information.




① 4.0 inches (102 mm) on 5 inch unit.
② 0.50 inch (12.7 mm) on 5 inch unit.

***Thermostats***

#### Mounted on Heater

Built-in snap action thermostats from Watlow are designed to sense air temperature. See the ordering chart on the following page for available settings.

#### Remote From Heater

For an air sensing thermostat separate from the heater, the ST-207E is ideal. This is a modified ST-207 mounted on a 1/32 inch (0.8 mm) thick G-10 circuit board with the thermostat's metal cap exposed to sense air temperature. The thermostat is placed at the midpoint of the lead length. The sensor can be preset at the temperatures listed for integral sensors. For more information, turn to **pages 167-168**.

**Notes:**

- On both integral and remote sensors, the thermostat's exposed metal cap is vulnerable to impact. This could defeat the thermostat's switching action and cause heater malfunction.
- T-10 thermostats are not recommended for enclosure heating applications.

# Flexible Heaters

## Silicone Rubber

### Stock Product Offering

***Drum Heaters***

***Performance Capabilities***

- Available with fixed or adjustable thermostats for temperatures up to 330°F (165°C)
- Watt density of 6 W/in² (1 W/cm²)

***Features and Benefits***

- **Protects fluids** stored in drums from freezing temperatures.
- **Quick delivery** on 28 styles from stock.
- **Six-foot cord and plug set** included for convenient use.
- **Quick installation** with easy operating latch fasteners.
- **Custom heaters** available for non-standard sizes.

***Applications***

- Freeze protection
- Viscosity control

***Application Hints***

- Allow a three-inch (76 mm) gap between heater ends when clamped around a drum.
- Heaters with thermostat settings of 40°F and 60°F (4°C and 16°C) will have open circuit readings if room temperature exceeds the thermostat settings.
- Heaters cannot be bench tested since the thermostat is located over a no-heat section of the heater. Accurate testing of the heater requires it to be placed over the drum which is to be heated.
- When a single heater is used, place the heater at the bottom of the drum to minimize stratification.

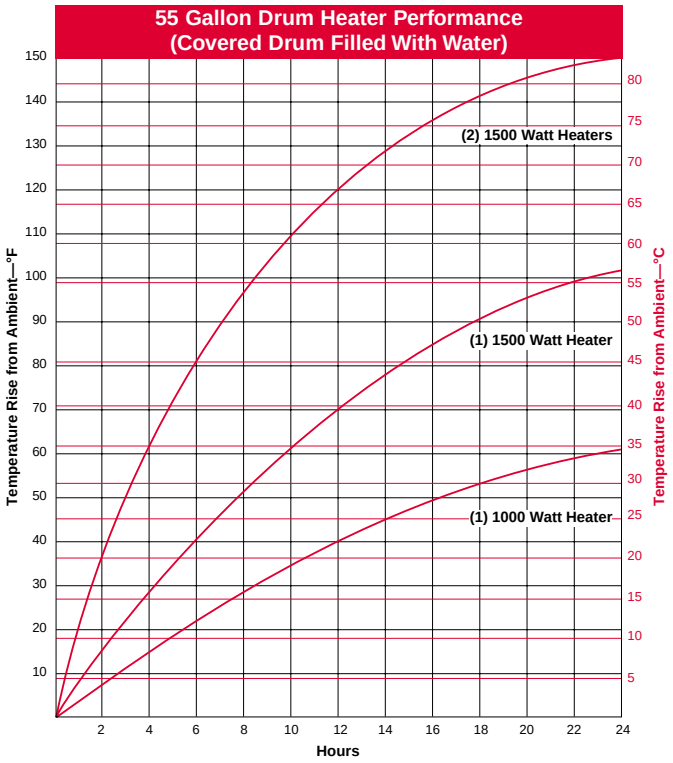
***Standard Features***

Watlow flexible drum heaters are designed for use on 5-, 30-, and 55-gallon **metal** drums. They come with the following standard features:

- Six-foot (1.8 m) cord and plug set
- Latch fasteners and springs
- Two styles of thermostats:

  T-207 snap action, available on all sizes

  B-200-3 adjustable, available only on four-inch (100 mm) wide units, and mounted in a silicone rubber boot to protect it from contamination




### Determining Temperature Rise From Ambient

The total wattage (number of heaters and the material being heated) must be considered when estimating the actual temperature the contents of the drum will reach. The graph above shows the temperature rise from ambient conditions, not drum content temperature.

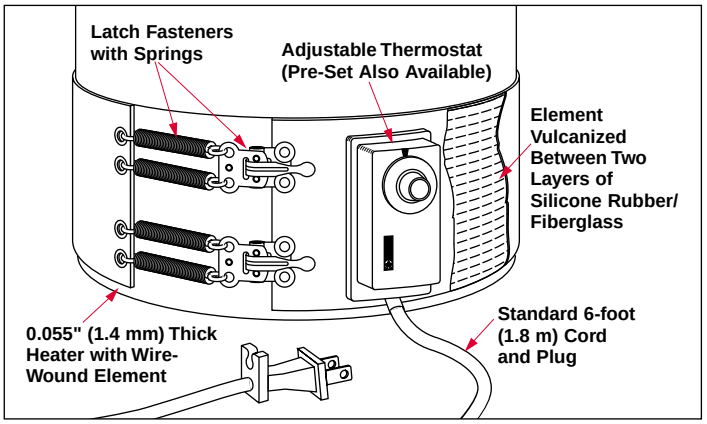
***For more information on thermostats, turn to pages 167 to 168.***

F.O.B.: Columbia, Missouri

# Silicone Rubber

## Stock Product Offering

***Drum Heaters***




| Drum Size | Volts | Watts | Width inches (mm) | Thermostat | Availability | Code No. |
|---|---|---|---|---|---|---|
| 5 gal. (20 L) 11 ½ in. (290 mm) nom. diameter | 120 | 650 | 4 (100) | (no thermostat) | Stock | **04031500A** |
| | | | | 150°F (66°C) | Modified Stock | **04031500BT** |
| | | | | 100°F (38°C) | Modified Stock | **04031500CT** |
| | | | | 40°F (4°C) | Modified Stock | **04031500DT** |
| | | | | 60°F (16°C) | Modified Stock | **04031500HT** |
| | | | | Adj. 25°-330°F (-5°-165°C) | Stock | **04031510** |
| 30 gal. (115 L) 18 ½ in. (470 mm) nom. diameter | 120 | 750 | 2 11/16 (70) | (no thermostat) | Stock | **02655080A** |
| | | | | 150°F (66°C) | Modified Stock | **02655080BT** |
| | | | | 100°F (38°C) | Modified Stock | **02655080CT** |
| | | | | 40°F (4°C) | Modified Stock | **02655080DT** |
| | | | | 60°F (16°C) | Modified Stock | **02655080ET** |
| 55 gal. (210 L) 22 ½ in. (570 mm) nom. diameter | 120 | 1000 | 2 11/16 (70) | (no thermostat) | Stock | **02667700A** |
| | | | | 150°F (66°C) | Modified Stock | **02667700BT** |
| | | | | 100°F (38°C) | Modified Stock | **02667700CT** |
| | | | | 40°F (4°C) | Modified Stock | **02667700DT** |
| | | | | 60°F (16°C) | Modified Stock | **02667700ET** |
| 55 gal. (210 L) 22 ½ in. (570 mm) nom. diameter | 120 | 1500 | 4 (100) | (no thermostat) | Stock | **04067700A** |
| | | | | 150°F (66°C) | Modified Stock | **04067700BT** |
| | | | | 100°F (38°C) | Modified Stock | **04067700CT** |
| | | | | 40°F (4°C) | Modified Stock | **04067700DT** |
| | | | | 60°F (16°C) | Modified Stock | **04067700GT** |
| | | | | Adj.25°-330°F (-5°-165°C) | Stock | **04067710** |
| 55 gal. (210 L) 22 ½ in. (570 mm) nom. diameter | ①240 | 1500 | 4 (100) | (no thermostat) | Stock | **04067701A** |
| | | | | 150°F (66°C) | Modified Stock | **04067701BT** |
| | | | | 100°F (38°C) | Modified Stock | **04067701CT** |
| | | | | 40°F (4°C) | Modified Stock | **04067701DT** |
| | | | | 60°F (16°C) | Modified Stock | **04067701ET** |
| | | | | Adj.25°-330°F (-5°-165°C) | Stock | **04067711** |

① Supplied with 6-foot (1.8 m) cord—no plug.

### *How to Order*

After determining the drum size, volts, watts and temperature sensing requirements, specify the corresponding Watlow code number and quantity desired.

### Availability

**Stock:** Drum heaters without thermostats and those with adjustable thermostats are available for same day shipment if order is received by 11:00 a.m. CST.

**Modified Stock:** Drum heaters with pre-set thermostats require two to three days lead time before being shipped.

**Made-to-Order:** Consult factory

# Flexible Heaters

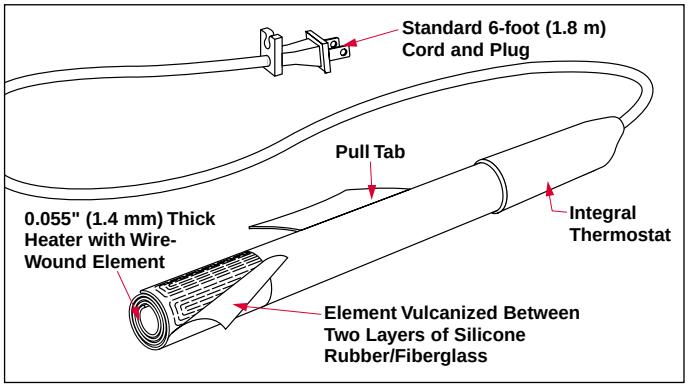
## Silicone Rubber

### Stock Product Offering

***PVC Wirewound Conduit Heaters***

Watlow's conduit heater simplifies bending PVC plastic conduit to the desired shape right on the job site. Just plug it in and within four to 18 minutes—depending upon heater size—the conduit is ready to be formed by hand into the shape or radius you need.

This lightweight silicone rubber heater is easily wrapped around the conduit because of its flexible, self-conforming construction.




***Performance Capabilities***

- Operating temperatures to 250°F (121°C)
- Handles plastic conduits as large as four inches (100 mm) in diameter

***Features and Benefits***

- **Self-conforming** to cylindrical shapes for a snug fit around the conduit.
- **Portable design** for easy use in the field.
- **Thermostat provided** to protect from overheating.
- **Pull tab** allows easy removal or positioning when the heater is hot.
- **Available for immediate delivery** from stock.

**F.O.B.: Columbia, Missouri**

| Conduit Diameter in. (mm) | Length in. (mm) | Watts | Volts | Temp. Limit °F (°C) | Warm-up Time | Code No. |
|---|---|---|---|---|---|---|
| ½ to 1 ½ (15-40) | 12 (300) | 180 | 120 | 250 (121) | 4-10 minutes | **05712082** |
| 2 to 4 (50-100) | 25 (635) | 950 | 120 | 250 (121) | 7-18 minutes | **14825081** |

***How To Order***

Choose between the two sizes available. Specify the Watlow code number and quantity desired.

**Availability**

**Stock:** Both sizes are available for immediate delivery from stock.

**Made-to-Order:** Consult factory

F.O.B.: Anaheim, California

# Silicone Rubber

## Stock Product Offering

### *Composite Flexible Stock Heaters*

The composite bonding industry is a large field that is expanding into a variety of areas. One of the primary fields that utilize flexible heaters for curing is the aerospace industry. Watlow offers a stock list of heaters commonly used for composite bonding and curing. The design includes equal length circuits and a no-heat tab for temperature uniformity. Also, the contact surface is made of a smooth silicone to prevent composite surface imperfections. The heaters are fiberglass reinforced to provide lasting field service durability and life.

### *Features and Benefits*

- Standard 5 W/in$^2$
- 120V~(ac) (standard)/ 240V~(ac) (option) single phase
- Customized leads
- Field service ease
- Equal length circuits—minimum 2 inch x 2 inch tab w/radius
- Smooth contact surface
- UL® recognized

### *Applications*

- Aerospace industry
  - Repair
  - Fabrication
- Composite bonding processes

### *Heat Mapping Certification*

Heat mapping certification is available on customer request at an additional charge.

- ±10°F conformity
- Serialized and records maintained five years minimum

### *Availability*

- **Stock**: 24 hours
- **Heat mapping**: One week
- **Made-to-Order:** Two weeks — a net set-up charge will be applied

UL® is a registered trademark of Underwriter's Laboratories, Inc.


| Size in. | Size (mm) | Code Number |
|---|---|---|
| 6 x 6 | (180) | **L060080509S** |
| 6 x 10 | (300) | **L060120510S** |
| 8 x 8 | (320) | **L080100505S** |
| 8 x 12 | (480) | **L080140501S** |
| 10 x 10 | (500) | **L100120506S** |
| 10 x 12 | (600) | **L100140501S** |
| 10 x 18 | (900) | **L100200503S** |

| Size in. | Size (mm) | Code Number |
|---|---|---|
| 12 x 12 | (700) | **L120140510S** |
| 12 x 18 | (1080) | **L120200506S** |
| 12 x 24 | (1440) | **L120260504S** |
| 16 x 16 | (1280) | **L160180502S** |
| 18 x 18 | (1620) | **L180200502S** |
| 20 x 20 | (2000) | **L200220501S** |

# Flexible Heaters

## Silicone Rubber

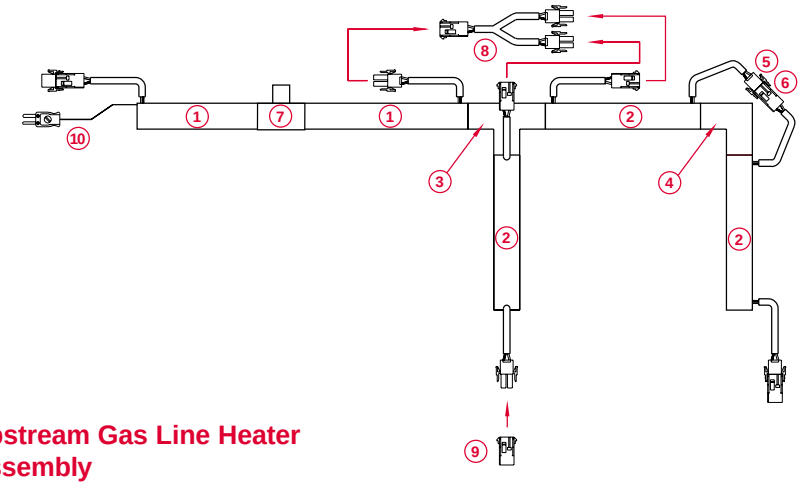
### Modular Gas Line Heaters

***Gas Delivery***

TEOS, $BCl_3$, $AlCl_3$, $ClF_3$ and DCS are gases that condense or liquefy due to a phase shift at low temperatures. The condensation occurs in the gas line and puddles in the shower head before being injected into the vacuum chamber. A substantial number of wafer defects will occur if liquefied gases are injected into the vacuum chamber. Uniform heating of the lines will prevent condensation. TEOS lines are typically heated above 194°F (90°C) and $BCl_3$ above 86°F (30°C), depending on pressure and flow rate. The optimum line temperature will vary depending on the process parameters.

***Specifications***

- Watt density: 2.5 W/in$^2$ (0.39 W/cm$^2$) on gas line O.D.
- UL® recognized for U.S. and Canadian safety standards
- Heaters and insulators meet UL94-HB flammability requirements
- Insulated straight fillers for 100 percent line coverage—elbows and tees are trim-to-fit to proper length
- I.D. available: ¼, ⅜, ½, ¾ inch (6, 10, 13, 19 mm)
- 120V standard, other voltages available




**Upstream Gas Line Heater Assembly**

1 9 inch (229 mm) heater with thermocouple. Heater leads have male plug on one end and a female cap on the other end. Heater materials UL® rated to 392°F (200°C).

2 6 inch (152 mm) heater. Heater leads, see 1.

3 Union tee insulator.

4 90° union elbow insulator.

5 Male plug, amp p/n 1-480698-0 w/ sockets amp p/n 350689-1.

6 Female cap, amp p/n 1-480699-0 w/ pins amp p/n 350690-1.

7 Valve or regulator.

8 Y Connector: one female cap on one end; two male plugs on the other end.

9 Dead plug (sealed).

10 Type J thermocouple w/ male mini-plug (optional).

11 High-temp plastic snaps 212°F (100°C).

12 ⅜ inch (10 mm) wall, silicone rubber, closed cell sponge.

# Flexible Heaters

## Silicone Rubber

### Modular Gas Line Heaters

**Standard Gas Line Diameter**

***¼ Inch (6 mm) O.D. Tubing (Stock)***

| ¼ Inch (6 mm) Heater I.D. x Length inches | (mm) | Description | Volts | Watts | Amps | Watlow Code Number without T/C | Watlow Code Number with Type J T/C |
|---|---|---|---|---|---|---|---|
| 6 | (152) | Heated straight | 120 | 12 | 0.10 | **008060C1** | **008060C1A** |
| 9 | (229) | Heated straight | 120 | 18 | 0.15 | **008090C1** | **008090C1A** |
| 12 | (305) | Heated straight | 120 | 24 | 0.20 | **008120C1** | **008120C1A** |
| 18 | (457) | Heated straight | 120 | 36 | 0.30 | **008180C1** | **008180C1A** |
| 24 | (610) | Heated straight | 120 | 48 | 0.40 | **008240C1** | **008240C1A** |
| 36 | (914) | Heated straight | 120 | 72 | 0.60 | **008360C1** | **008360C1A** |
| 18 | (457) | Straight insulator | N/A | Trim-to-fit | Insulator | **008180C0** | |
| * Elbow | | 90° Union Elbow insulator | N/A | Trim-to-fit | Insulator | **008020C0** | |
| * T | | Union Tee insulator | N/A | Trim-to-fit | Insulator | **008030C0** | |

***⅜ Inch (10 mm) O.D. Tubing***

| ⅜ Inch (6 mm) Heater I.D. x Length inches | (mm) | Description | Volts | Watts | Amps | Watlow Code Number without T/C | Watlow Code Number with Type J T/C |
|---|---|---|---|---|---|---|---|
| 6 | (152) | Heated straight | 120 | 18 | 0.15 | **012060C1** | **012060C1A** |
| 9 | (229) | Heated straight | 120 | 27 | 0.23 | **012090C1** | **012090C1A** |
| 12 | (305) | Heated straight | 120 | 36 | 0.30 | **012120C1** | **012120C1A** |
| 18 | (457) | Heated straight | 120 | 54 | 0.45 | **012180C1** | **012180C1A** |
| 24 | (610) | Heated straight | 120 | 71 | 0.60 | **012240C1** | **012240C1A** |
| 36 | (914) | Heated straight | 120 | 107 | 0.90 | **012360C1** | **012360C1A** |
| 18 | (457) | Straight insulator | N/A | Trim-to-fit | Insulator | **012180C0** | |
| * Elbow | | 90° Union Elbow insulator | N/A | Trim-to-fit | Insulator | **012020C0** | |
| * T | | Union Tee insulator | N/A | Trim-to-fit | Insulator | **012030C0** | |

***½ Inch (13 mm) O.D. Tubing (Stock)***

| ½ Inch (6 mm) Heater I.D. x Length inches | (mm) | Description | Volts | Watts | Amps | Watlow Code Number without T/C | Watlow Code Number with Type J T/C |
|---|---|---|---|---|---|---|---|
| 6 | (152) | Heated straight | 120 | 24 | 0.20 | **016060C1** | **016060C1A** |
| 9 | (229) | Heated straight | 120 | 36 | 0.30 | **016090C1** | **016090C1A** |
| 12 | (305) | Heated straight | 120 | 48 | 0.40 | **016120C1** | **016120C1A** |
| 18 | (457) | Heated straight | 120 | 72 | 0.60 | **016180C1** | **016180C1A** |
| 24 | (610) | Heated straight | 120 | 96 | 0.80 | **016240C1** | **016240C1A** |
| 36 | (914) | Heated straight | 120 | 144 | 1.20 | **016360C1** | **016360C1A** |
| 18 | (457) | Straight insulator | N/A | Trim-to-fit | Insulator | **016180C0** | |
| * Elbow | | 90° Union Elbow insulator | N/A | Trim-to-fit | Insulator | **016020C0** | |
| * T | | Union Tee insulator | N/A | Trim-to-fit | Insulator | **016030C0** | |

* For use on Micro-Fit® weld fittings.

Micro-Fit® is a registered trademark of CAJON Company, A SWAGELOK® Company.

# Flexible Heaters

## Silicone Rubber

### Modular Gas Line Heaters

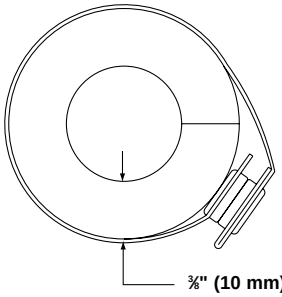
**Standard Gas Line Diameter**

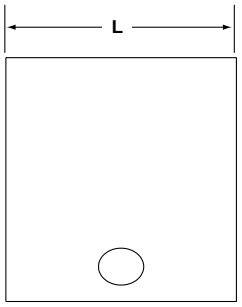
***¼ Inch (19 mm) O.D. Tubing***

| ¼ Inch (19 mm) Heater I.D. x Length inches | (mm) | Description | Volts | Watts | Amps | Watlow Code Number without T/C | Watlow Code Number with Type J T/C |
|---|---|---|---|---|---|---|---|
| 6 | (152) | Heated straight | 120 | 36 | 0.30 | **024060C1** | **024060C1A** |
| 9 | (229) | Heated straight | 120 | 54 | 0.45 | **024090C1** | **024090C1A** |
| 12 | (305) | Heated straight | 120 | 71 | 0.60 | **024120C1** | **024120C1A** |
| 18 | (457) | Heated straight | 120 | 107 | 0.90 | **024180C1** | **024180C1A** |
| 24 | (610) | Heated straight | 120 | 142 | 1.19 | **024240C1** | **024240C1A** |
| 36 | (914) | Heated straight | 120 | 213 | 1.78 | **024360C1** | **024360C1A** |
| 18 | (457) | Straight insulator | N/A | Trim-to-fit | Insulator | **024180C0** | |
| * Elbow | | 90° Union Elbow insulator | N/A | Trim-to-fit | Insulator | **024020C0** | |
| * T | | Union Tee insulator | N/A | Trim-to-fit | Insulator | **024030C0** | |

**Standard Designs**

***VCR Union Heaters/Insulators***



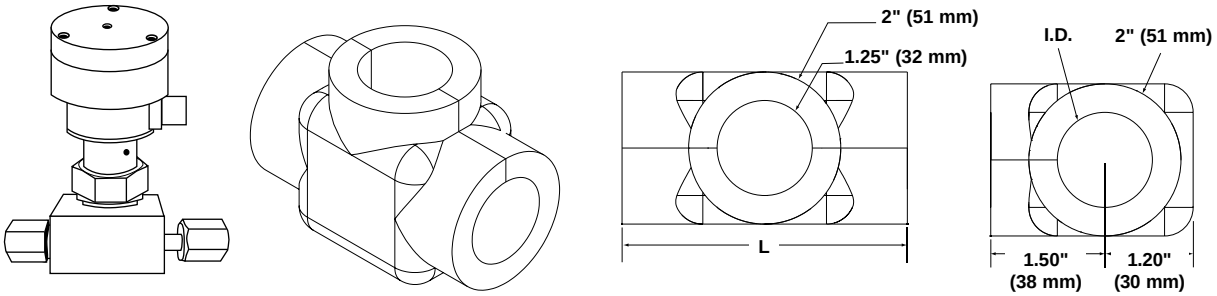

| I.D. x Length inches | (mm) | Description | Volts | Watts | Amps | Watlow Code Number without T/C | Watlow Code Number with Type J T/C |
|---|---|---|---|---|---|---|---|
| ⅞ x 1¾ | (22 x 44) | ¼" (6 mm) VCR Union heater | 120 | 10 | 0.09 | **01702783** | **01702783A** |
| ¾ x 1½ | (19 x 38) | ¼" (6 mm) VCR Union insulator | N/A | N/A | N/A | **02401580** | N/A |
| 1¼ x 1½ | (32 x 38) | ½" (13 mm) VCR Union heater | 120 | 12 | 0.10 | **03901581** | **0301581A** |
| 1¼ x 1½ | (32 x 38) | ½" (13 mm) VCR Union insulator | N/A | N/A | N/A | **03901580** | N/A |

# Flexible Heaters

## Silicone Rubber

### Modular Gas Line Heaters

#### VCR Valve Heaters




| Tube Diameter inch | (mm) | I.D. inch | (mm) | Fitting Type | Length inches | (mm) | Watts | Amps @ 120V | Watlow Code Number |
|---|---|---|---|---|---|---|---|---|---|
| ¼ | (6) | ⅞ | (22) | Male VCR Valve heater | 3.00 | (76) | 18 | 0.15 | **03104786** |
| ¼ | (6) | ⅞ | (22) | Female VCR Valve heater | 4.75 | (121) | 28 | 0.24 | **04704893** |
| ½ | (13) | 1 ¼ | (32) | Male VCR Valve heater | 3.75 | (95) | 27 | 0.23 | **03804782** |
| ½ | (13) | 1 ¼ | (32) | Female VCR Valve heater | 6.51 | (165) | 47 | 0.39 | **04706690** |

**Note**: Heaters fit Nupro® BN and BK series valves.

### Accessories

| Part | Description | Watlow Code Number |
|---|---|---|
| Y Connector* | Power splitter: 1 female, 2 male | **Z5303-2** |
| Female Dead Plug* | Insulating plug for last connector in chain | **Z5309-2** |
| Type J Thermocouple | 12 inch (305 mm) 24 ga Type J Teflon® w/mini plug | **Z5786** |
| Type K Thermocouple | 12 inch (305 mm) 24 ga Type K Teflon® w/mini plug | **Z5639** |
| Male Dead Plugs* | Insulating plug for last connector in chain | **Z6332** |
| Y Connector* | Power splitter: 2 female, 1 male | **Z6333** |
| Adaptor* | Female to male | **Z6334** |
| Adaptor* | Male to female | **Z6335** |
| Extender* | 6 inch (152 mm) | **Z6374** |

*All connectors use AMP Mate-N-Lok® connectors.

Y-adaptors and dead plugs

Sensor Pocket thermocouple: 12 in (305 mm) long, Type J or K, Teflon® insulated, #24 AWG, 2-prong mini-plug connector

Interconnects with Watlow temperature control consoles

# Flexible Heaters

## Silicone Rubber

### Modular Pump Line Heaters

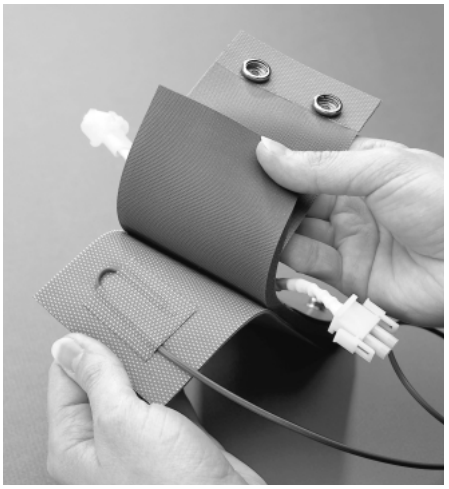
NEW PRODUCT

The tight contact fit of Watlow's pump line heaters provide superior, uniform heating of transfer lines.

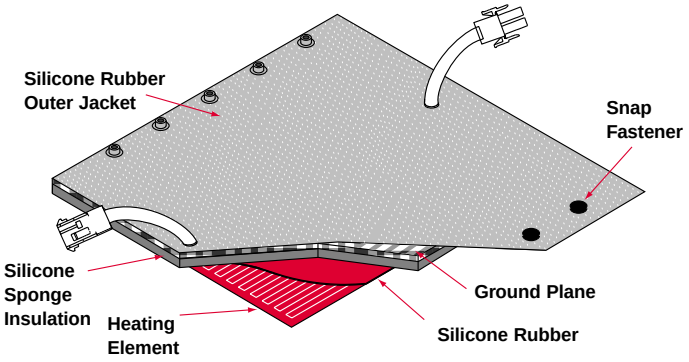
**Agency Certification, Recognition Compliance, and Approvals**
(Contact factory for specific application and approvals)

- Complies with SEMI S2-93 standards
- UL® recognized for U.S. and Canadian safety standards
- CE, VDE
- NEC (National Electrical Code), Article #427-23
- UL® Listed available

**General Specifications**
- Heater and jacket material: reinforced silicone rubber fabric
- Color:
  Insulation and outer jacket: gray
  Heater: red-orange



Sensor Pocket™ built-in to all straight length heaters 3 inches (76 mm) long and greater; one per heater.




- Snap type fasteners: ½ inch (13 mm) nominal diameter metal construction with nylon cover; maximum operating temperature 392°F (200°C)
- Velcro® fasteners available
- 120 and 208V~(ac) standard. Consult factory for other voltages.
- Power lead wires: 4 inch (102 mm) #18 AWG UL® 1180/CSA Teflon® insulated, rated 10A, leadwire pair encapsulated in reinforced silicone rubber sleeving
- Heaters interconnectable up to a 10A circuit
- **New low watt density:**
  1.5-2 inch diameter,
  1.5 W/in² (0.23 W/cm²)
  3-4 inch diameter,
  1.25 W/in² (0.19 W/cm²)