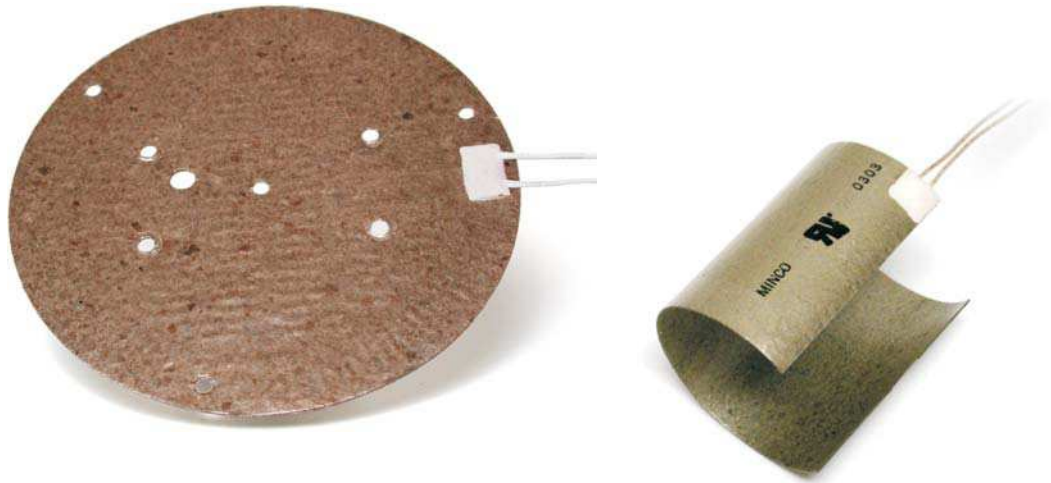


Mica Thermofoil™ Heaters

High watt density and temperature range



Overview

Mica Thermofoil™ heaters consist of an etched foil element sandwiched between layers of mica. Installed by clamping to heat sinks, mica heaters provide the ultimate temperature and wattage capability for fast warmup.

- Broad temperature range of -150° to 600°C provides faster processing and cycle times for greater production output
- High watt density capability to 110 W/in^2 (17 W/cm^2) provides faster processing times than conventional mica strip heaters
- Custom profiled heat density and mechanical clamping offers uniform heat sink temperature which can improve processing yields
- UL certification is available which can save time and money for end-use UL device recognition
- Can be factory formed to curves
- Heaters are suitable for vacuum use after initial warmup

Typical applications

- Semiconductor processing
- Packaging, strapping, and sealing equipment
- DNA thermocycling
- Food service appliances
- Plastics and rubber molding supplemental heat

Custom options

- Custom shapes and sizes to $22" \times 46"$ ($560 \times 1168\text{ mm}$)
- Custom resistance options up to $25\ \Omega/\text{in}^2$ ($3.9\ \Omega/\text{cm}^2$)
- Factory forming techniques offer three dimensional packaging capabilities
- Integral temperature sensors
- Contact Access: Minco Sales and Support for design assistance.

Mica Thermofoil™ Heaters

Specifications

Temperature range: -150 to 600°C (-238 to 1112°F).

Lead tab area: 538°C (1000°F) max.

Resistance tolerance: ±10% or ±0.5 Ω, whichever is greater.

Dielectric strength:

0.010" (0.3mm) insulation: 1000 VRMS.

0.020" (0.5mm) insulation: 2000 VRMS (recommended for over 250 V).

Mounting: Must be clamped to heat sink using bolt holes provided in heater and backing plate. See the mounting diagram below. Please refer to Minco Engineering Instruction #347 for detailed installation information.

Burn-in: Organic binders will burn off, producing small amounts of smoke, when heaters are first powered. After this, layers can separate so heaters should not be reinstalled.

Leadwire: Mica/glass insulated, stranded nickel-clad copper, potted over termination with high temperature cement.

Maximum heater thickness:

Mica insulation	Over heater element	Over lead termination
0.010" (0.3 mm)	0.030" (0.8 mm)	0.200" (5.1 mm)
0.020" (0.5 mm)	0.050" (1.3 mm)	0.220" (5.6 mm)

Current capacity (based on 100°C max. ambient temp.):

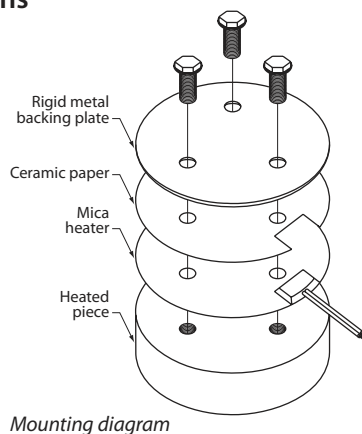
AWG 22 - 8.0 A

AWG 20 - 9.0 A

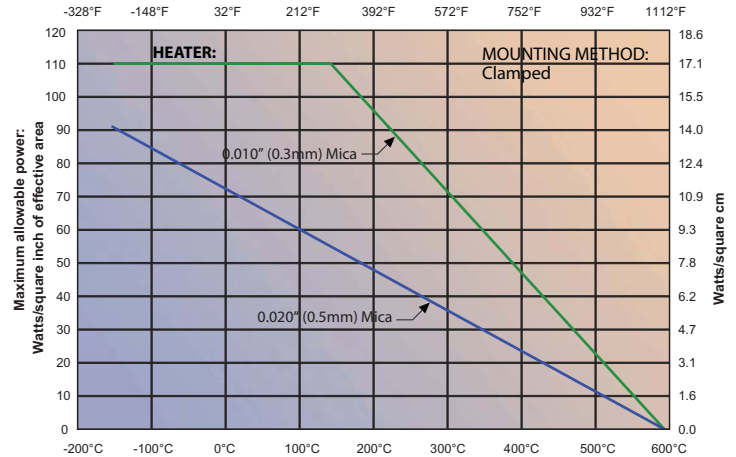
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Installation instructions

Minco Engineering Instruction #347 describes mica heater installation in detail. Contact Minco for a copy or download the document at



Mica Heaters Maximum Watt Density



Example: At 300°C, the maximum power of a 0.010" mica heater is 70 W/in² (10.9 W/cm²).

Backing plates

Backing plates are 0.0625" (1.6 mm) thick stainless steel with pre-drilled holes matching the bolt pattern of the specified model. These backing plates do not have cut out areas for the lead bulge and may require modification.

How to order backing plates

Order part number AC6800 for HM6800, etc.

Ceramic paper and mica sheets

Each mica heater is supplied with two pre-trimmed sheets of 0.125" (3.2 mm) thick ceramic fabric paper for use as a resilient pad between the heater and backing plate. This paper does not have a cut out area for the lead bulge. If the backing plate being used does not have a cut out area for the leads attachment you must use two pieces of this paper and make this cut out in each. Contact Minco to order additional ceramic paper.

Mica sheets

Additional layers of 0.010" (0.3 mm) mica trimmed to the heater size are also available. Using an additional layer of mica will increase the dielectric strength, but it will also reduce the watt density limit by up to 50% across the temperature range. If used on the lead bulge side of the heater then the mica must be cut to allow for the ceramic and wires bulge on that side. Contact Minco to order mica sheets.

Specifications subject to change


Standard Mica Thermofoil™ Heaters

These standard mica heaters are designed to fit a wide range of applications. You can clamp them to any flat surface either with a clamping mechanism outside the heater area or by using a backing plate and bolts through the pre-punched bolt holes. All heaters come with matching 0.125" (3 mm) thick ceramic paper for use as a resilient pad on the lead bulge side of the heater. Matching stainless steel backing plates and additional sheets of ceramic paper are also available.

Typical lead time on standard mica heaters is 3 weeks ARO.

Specification drawings, with heater dimensions and hole locations, are available at

Specification options

HM6800	Model number
R4.5	Heater resistance in ohms
L12	Lead length in inches 12" is standard; contact Minco for other lengths
T1	Insulation thickness from table below: T1 = 0.010" (0.3mm) T2 = 0.020" (0.5 mm)
U	U = Marked for UL component recognition:  Omit for no UL marking (lower cost)
HM6800R4.5L12T1U = Sample part number	

Rectangle heaters

Size (inches)		Size (mm)		Resistance options- ohms*		Effective area in ² (cm ²)	Lead AWG	Model number
X	Y	X	Y					
1.00	4.00	25.4	101.6	11.0	21.2	2.5 (16.13)	22	HM6811
1.00	8.00	25.4	203.2	22.0	42.5	5.6 (36.13)	22	HM6812
1.00	10.00	25.4	254.0	29.0	56.0	7.1 (45.81)	22	HM6813
1.00	12.00	25.4	304.8	25.5	49.2	8.6 (55.48)	22	HM6814
1.50	3.00	38.1	76.2	4.5	8.7	3.2 (20.65)	22	HM6800
1.50	8.00	38.1	203.2	21.0	40.5	9.5 (61.29)	20	HM6801
1.50	12.00	38.1	304.8	13.7	26.4	14.7 (94.84)	18	HM6802
2.00	2.00	50.8	50.8	12.0	23.2	2.8 (18.06)	22	HM6815
2.00	4.00	50.8	101.6	26.0	50.2	5.9 (38.06)	18	HM6816
2.00	4.00	50.8	101.6	6.0	11.6	5.9 (38.06)	18	HM6817
2.00	6.00	50.8	152.4	21.9	42.3	9.2 (59.35)	20	HM6803
2.00	8.00	50.8	203.2	24.0	46.3	12.6 (81.29)	18	HM6818
2.00	10.00	50.8	254.0	20.0	38.6	15.9 (102.58)	18	HM6819
2.00	12.00	50.8	304.8	18.0	34.7	19.3 (124.52)	18	HM6820
3.00	3.00	76.2	76.2	31.0	59.8	6.5 (41.94)	20	HM6804
3.00	6.00	76.2	152.4	54.9	106.0	14.7 (94.84)	20	HM6805
3.00	12.00	76.2	304.8	18.0	34.7	30.7 (198.06)	18	HM6821
4.00	4.00	101.6	101.6	11.0	21.2	13.1 (84.52)	18	HM6822
4.00	4.00	101.6	101.6	55.0	106.2	13.1 (84.52)	18	HM6823
4.00	8.00	101.6	203.2	16.0	30.9	27.8 (179.35)	18	HM6824
4.00	12.00	101.6	304.8	16.0	30.9	42.2 (272.26)	18	HM6825
6.00	6.00	152.4	152.4	22.0	42.5	31.9 (205.81)	18	HM6826
6.00	9.00	152.4	228.6	15.0	29.0	48.7 (314.19)	18	HM6827
6.00	12.00	152.4	304.8	43.2	83.4	65.5 (422.58)	18	HM6806
8.00	8.00	203.2	203.2	22.0	42.5	58.3 (376.13)	18	HM6828
10.00	10.00	254.0	254.0	12.0	23.2	92.3 (595.48)	18	HM6829

*Resistance tolerance is ±10% or ±0.5 Ω, whichever is greater

Round heaters

Diameter (inches)	Diameter (mm)	Resistance options- ohms*		Effective area in ² (cm ²)	Lead AWG	Model number
1.50	38.1	2.0	3.9	1.2 (7.74)	22	HM6807
2.00	50.8	9.5	18.3	2.2 (14.19)	22	HM6830
3.00	76.2	11.1	21.4	5.4 (34.84)	20	HM6808
4.00	101.6	40.0	77.2	10.0 (64.52)	18	HM6831
5.00	127.0	30.0	57.9	16.7 (107.74)	18	HM6832
6.00	152.4	32.7	63.1	24.7 (159.35)	18	HM6809
8.00	203.2	16.0	30.9	45.4 (292.90)	18	HM6833
9.00	228.6	43.2	83.4	58.5 (377.42)	18	HM6810
10.00	254.0	30.0	57.9	72.9 (470.32)	18	HM6834
10.00	254.0	11.5	22.2	72.9 (470.32)	18	HM6835
12.00	304.8	27.0	52.1	106.0 (683.87)	18	HM6836
12.00	304.8	11.5	22.2	106.0 (683.87)	18	HM6837

*Note: Resistance tolerance is ±10% or ±0.5 Ω, whichever is greater

Insulation thickness

Insulation thickness	Maximum heater thickness		Code
	over element	over leads	
0.010" (0.3 mm) mica	0.030" (0.8 mm)	0.200" (5.1 mm)	T1
0.020" (0.5mm) mica	0.050" (1.3 mm)	0.220" (5.6 mm)	T2

Specifications subject to change