

# Mica Heaters

600°C

These heaters consist of an etched foil element sandwiched between layers of mica. An organic material binds the layers together and burns off during initial warmup. Installed by clamping to heat sinks, mica Thermofoil heaters provide the ultimate temperature and wattage capability for fast warmup.

- ◆ Extremely high temperature capability to 600°C (1112°F)
- ◆ Power rated to 110 watts per square inch — 50% higher than conventional mica strip heaters
- ◆ Can be factory formed to curves
- ◆ Clamp directly to heat sink for exceptional heat transfer
- ◆ Suitable for vacuum use after organic binder is burned off in initial power-up



## Typical applications

- ◆ Semiconductor processing
- ◆ Packaging, strapping, and sealing equipment
- ◆ DNA analysis (mica heaters used for rapid temperature cycling)
- ◆ Food service appliances
- ◆ Plastics and rubber molding supplemental heat

## Specifications for catalog models

**Temperature range:** -150 to 600°C (-238 to 1112°F). Lead tab area: 538°C (1000°F) max.

**Material:** 0.010" (0.25 mm) or 0.020" (0.51 mm) thick. 0.020" thickness recommended for operating voltage over 250 V.

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

**Dielectric strength:**

0.010" insulation: 1000 VRMS.

0.020" insulation: 2000 VRMS.

**Mounting:** Must be clamped to heat sink using bolt holes provided in heater and backing plate. See page F-3 for a detailed drawing of installation.

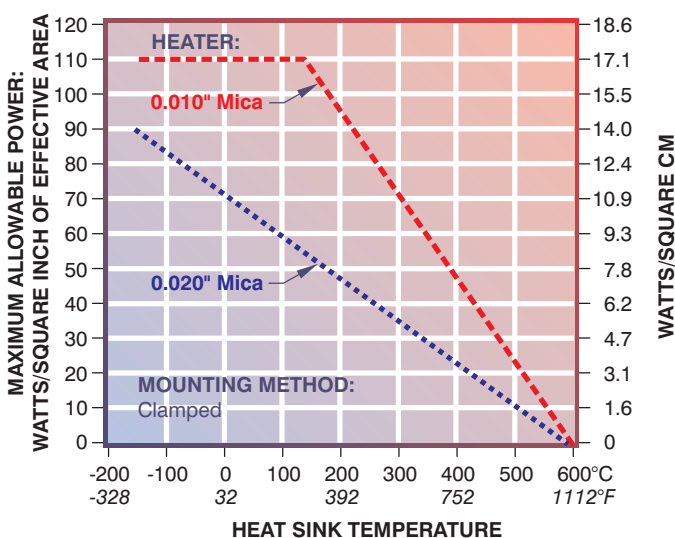
**Burn-in:** Organic binders will burn off, producing small amounts of smoke, when heaters are first powered. After this, layers can separate so heaters should not be reinstalled.

**Leadwire:** Mica/glass insulated, stranded nickel-clad copper, potted over termination with high temperature cement. Current capacity (based on 100°C max. ambient temp.):

AWG 22	AWG 20	AWG 18
8.0 A	9.0 A	11.0 A

F

## Maximum watt density, mica heaters



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

## Custom options

- ◆ Custom shapes and sizes to 22 × 22" (560 × 560 mm)
- ◆ Custom resistance to 11.5 Ω/in² (1.8 Ω/cm²)
- ◆ Factory forming
- ◆ Integral temperature sensors
- ◆ Clamped/encapsulated subassemblies
- ◆ See section J for custom design assistance

## How to order heaters

HM6800	Model number from table (following page)
R4.5	Heater resistance in ohms
L12	Lead length in inches 12" is standard; contact Minco for other lengths
T1	Insulation thickness: T1 = 0.010" T2 = 0.020"
HM6800R4.5L12T1 ← Sample part number	

# Standard Mica 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.

Specification drawings, with heater dimensions and hole locations, are available at [www.minco.com/support](http://www.minco.com/support) as Adobe PDF (Acrobat) files.

Size (inches)		Size (mm)		Resistance options in ohms*		Effective area (in <sup>2</sup> )	Lead AWG	Model number
X	Y	X	Y					
1.00	4.00	25.4	101.6	11.0	21.2	2.5	22	HM6811
1.00	8.00	25.4	203.2	22.0	42.5	5.6	22	HM6812
1.00	10.00	25.4	254.0	29.0	56.0	7.1	22	HM6813
1.00	12.00	25.4	304.8	25.5	49.2	8.6	22	HM6814
1.50	3.00	38.1	76.2	4.5	8.7	3.2	22	HM6800
1.50	8.00	38.1	203.2	21.0	40.5	9.5	20	HM6801
1.50	12.00	38.1	304.8	13.7	26.4	14.7	18	HM6802
2.00	2.00	50.8	50.8	12.0	23.2	2.8	22	HM6815
2.00	4.00	50.8	101.6	26.0	50.2	5.9	18	HM6816
2.00	4.00	50.8	101.6	6.0	11.6	5.9	18	HM6817
2.00	6.00	50.8	152.4	21.9	42.3	9.2	20	HM6803
2.00	8.00	50.8	203.2	24.0	46.3	12.6	18	HM6818
2.00	10.00	50.8	254.0	20.0	38.6	15.9	18	HM6819
2.00	12.00	50.8	304.8	18.0	34.7	19.3	18	HM6820
3.00	3.00	76.2	76.2	31.0	59.8	6.5	20	HM6804
3.00	6.00	76.2	152.4	54.9	106.0	14.7	20	HM6805
3.00	12.00	76.2	304.8	18.0	34.7	30.7	18	HM6821
4.00	4.00	101.6	101.6	11.0	21.2	13.1	18	HM6822
4.00	4.00	101.6	101.6	55.0	106.2	13.1	18	HM6823
4.00	8.00	101.6	203.2	16.0	30.9	27.8	18	HM6824
4.00	12.00	101.6	304.8	16.0	30.9	42.2	18	HM6825
6.00	6.00	152.4	152.4	22.0	42.5	31.9	18	HM6826
6.00	9.00	152.4	228.6	15.0	29.0	48.7	18	HM6827
6.00	12.00	152.4	304.8	43.2	83.4	65.5	18	HM6806
8.00	8.00	203.2	203.2	22.0	42.5	58.3	18	HM6828
10.00	10.00	254.0	254.0	12.0	23.2	92.3	18	HM6829
Diameter (inches)		Diameter (mm)						
1.50		38.1		2.0	3.9	1.2	22	HM6807
2.00		50.8		9.5	18.3	2.2	22	HM6830
3.00		76.2		11.1	21.4	5.4	20	HM6808
4.00		101.6		40.0	77.2	10.0	18	HM6831
5.00		127.0		30.0	57.9	16.7	18	HM6832
6.00		152.4		32.7	63.1	24.7	18	HM6809
8.00		203.2		16.0	30.9	45.4	18	HM6833
9.00		228.6		43.2	83.4	58.5	18	HM6810
10.00		254.0		30.0	57.9	72.9	18	HM6834
10.00		254.0		11.5	22.2	72.9	18	HM6835
12.00		304.8		27.0	52.1	106.0	18	HM6836
12.00		304.8		11.5	22.2	106.0	18	HM6837

\*Resistance tolerance is  $\pm 10\%$  or  $\pm 0.5 \Omega$ , whichever is greater

# Mica Heater Accessories & Assemblies

## 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, depending on the installation.

## How to order backing plates

Order part number AC6800 for HM6800, etc.

## Ceramic paper

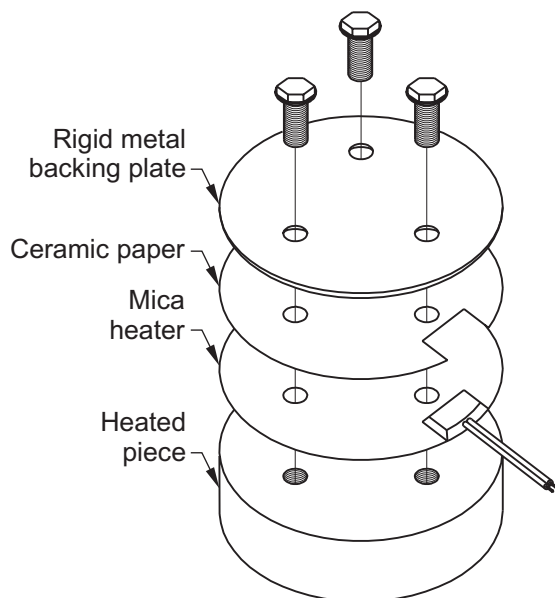
Each mica heater is supplied with two pre-trimmed sheets of 0.125" (3.2 mm) thick ceramic fabric paper for use as a resilient pad between the heater and backing plate. This paper does not have a cut out area for the lead bulge. If the backing plate being used does not have a cut out area for the leads attachment you must use two pieces of this paper and make this cut out in each. See page K-10 to order additional ceramic paper.

## Mica sheets

Additional layers of 0.010" (0.25 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. See page K-10 to order mica sheets.

## Installation instructions

Minco Engineering Instruction #347 describes mica heater installation in detail. Contact Minco for a copy or download the document at [www.minco.com/support](http://www.minco.com/support) as an Adobe PDF (Acrobat) file.



Insulation	Maximum heater thickness			
	Over element	AWG #22	AWG #20	AWG #18
0.010" mica	0.030" (0.8 mm)	0.150" (3.8 mm)	0.200" (5.1 mm)	0.200" (5.1 mm)
0.020" mica	0.050" (1.3 mm)	0.170" (4.3 mm)	0.220" (5.6 mm)	0.220" (5.6 mm)

## Factory formed heaters

Mica insulated heaters are not flexible, but Minco can provide factory formed designs with simple curves. You can specify a custom model with a curve diameter as small as 1.0" (25 mm).



## Heated rollers

Mica heaters installed inside tubes provide reliable, high wattage heating.

## Heater assemblies

Minco can produce a complete heater assembly including metalwork for your custom OEM application. Our machine shop capabilities include milling, turning, welding, and forming aluminum, stainless steel or other metals. If you prefer, Minco can complete the subassembly with your supplied parts.

