

MICA HEATER INSTALLATION PROCEDURE

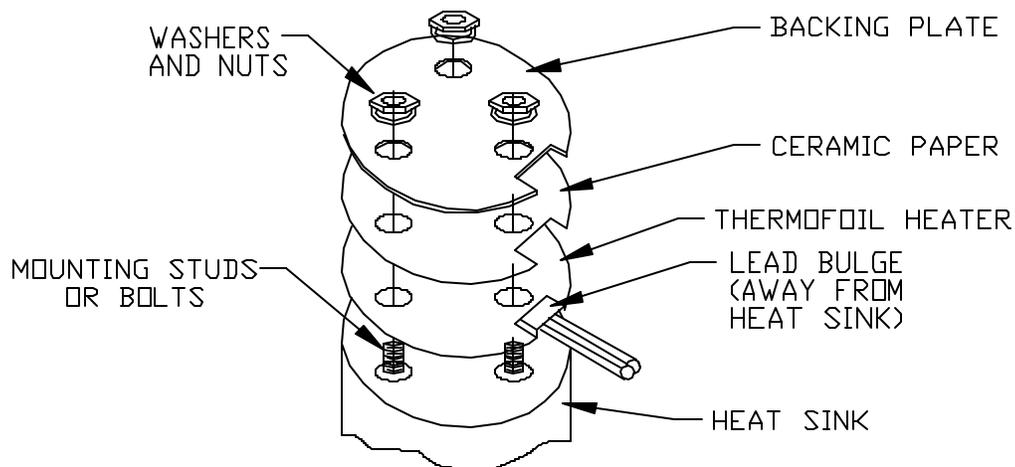
A. INSTALLATION:

Mica heaters are bonded together with an inorganic binder and a temporary organic binder that burns off during initial warm-up. The heaters must be held in place mechanically, either by clamping them to a heat sink or by encapsulating them in a high temperature cement.

For maximum heater life, there should not be any interruption in the intimate contact between the heater and the heated surface. Clamped heaters should use backing plates that provide uniform clamping pressure over the entire heater element. Cement-encapsulated heaters should be free from air pockets or voids in the encapsulating cement.

Minco ships mica heaters to its customers in rigid packaging. Take care in handling the heaters to avoid separation of the mica layers while removing the heaters from the packaging. Heater layers that do separate may still be useable, provided the heating element has not shifted out of place or suffered other damage.

B. INSTALLATION WITH HEATER CLAMPED TO HEAT SINK:



Common backing plate materials are stainless steel and aluminum. The backing plate should be thick enough to maintain uniform clamping pressure over the entire heater surface. A cutout in the backing plate large enough

DR: MH 10/18/00
CHK: BHB 10/18/00
ENG: MK 10/20/00
APP: TJH 10/20/00

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for the lead bulge is required to assure that the lead attachment area is not damaged¹. Ask Minco for specific dimensions of the lead attachment area for the heaters to be mounted. Consider thermal expansion when designing backing plates and fasteners. To avoid stressing the heater or shearing the fasteners, use like materials for clamping.

Also, be sure that holes in the heater are large enough to accommodate any changes in the size of the backing plate. Bolt spacing and torque varies with each application. Make certain plates are clean and free of particles or projections that may pierce the heater insulation. Since heaters are under great pressure, particles as small as .003" [.076 mm] can cause insulation failure. If this becomes a problem, consult your Minco Sales Engineer.

High temperature ceramic papers and boards help to compensate for unevenness between the heater and backing plate. Minco typically furnishes ceramic paper, cut to shape, with each heater. Various thicknesses of ceramic paper and ceramic board are also available. For more information on types and thicknesses of ceramic paper and ceramic board, contact your Minco Sales Engineer.

Note: Provide a cutout in the ceramic paper for the lead bulge if the recess in the backing plate does not allow enough clearance for the lead bulge and ceramic paper thickness.

CAUTION: Do not put ceramic paper or other insulation between heater and heat sink.

Since the ceramic paper "settles" over time, it is a good idea to bring the heater to temperature for a short time, allow the heater to cool, and re-torque the fasteners. The organic binder will smoke slightly as it burns off during the first warm-up. If smoking is a problem, order Minco's inorganic binder ceramic paper.

Lead wire connections are anchored in ceramic cement or silicone rubber potting, forming a bulge on the non-heat sink side of the heater. This area produces little heat and should not be clamped. Providing a cutout, or recess, for the lead bulge backing plate and ceramic paper is required. If a cutout or recess is not possible, the heater can be designed with a lead bulge on a tab that extends from the heater body. Contact your Minco Sales Engineer for more information on the extended tab option.

Although heater reuse is not normally recommended, it may be possible in some applications. If the top and bottom layers of mica insulation are intact and the element is not damaged, the heater can carefully be moved to a new heat sink. Always replace the ceramic paper backing with a new sheet when removing the backing plate and remounting the heater. Contact your Minco Sales Engineer for additional sheets of ceramic paper.

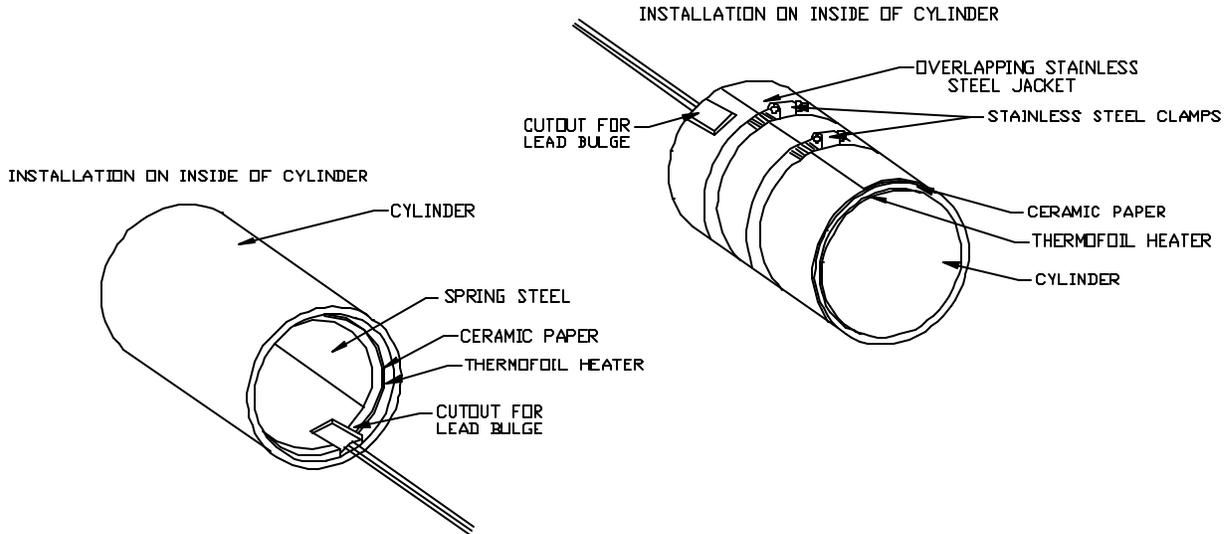
¹ Minco will supply backing plates cut to the size of the heater and having bolt holes that align with the heater. Also supplied with each backing plate is an additional piece of ceramic paper to compensate for the lead bulge thickness and eliminate the need for a cutout in the backing plate.

We believe this information to be reliable, but the customer must assume responsibility for heater performance in the intended application. **MINCO accepts no liability beyond our standard warranty for consequences of improper installation and/or heater or adhesive failure.**

If any questions or problems occur, contact your MINCO sales representative or the factory for assistance.

C. INSTALLATION OF CURVED HEATERS:

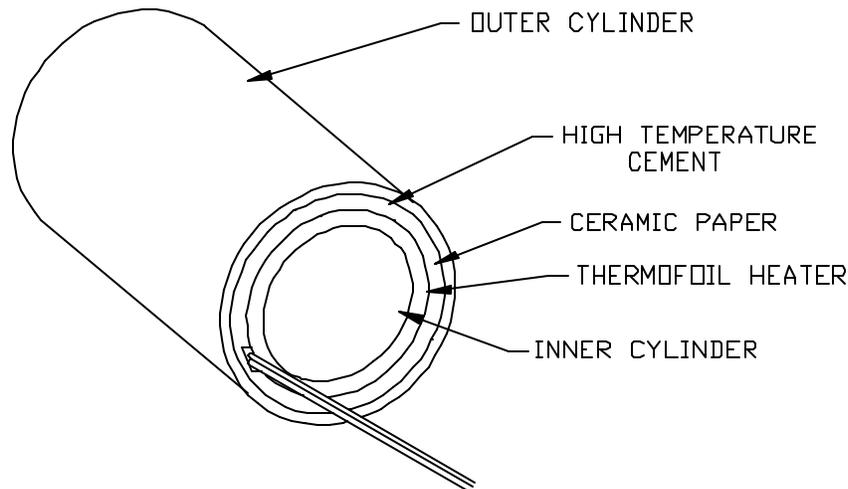
Curved mica heaters may be clamped or potted in place. Specific hardware may vary according to the application. Remember that it is imperative that an intimate thermal path between the heater and heat sink exist. Contact your Minco Sales Engineer for more information on clamping heaters on formed heat sinks. Two examples are shown below.



D. POTTING HEATERS WITH CEMENT:

When clamping heaters to heat sinks is not possible, they may be encapsulated in high temperature cement. Slide the heater into a narrow slot between two cylinders or other rigid surfaces. Cover the heater with ceramic paper, and fill the non-heat sink side of the heater between the heater and the cylinder with cement. **DO NOT** leave any voids. Voids will cause localized hot spots that may cause heater failure. If the slot is too narrow for the lead bulge, design the heater with lead connections on an external tab.

POTTING HEATER BETWEEN CYLINDERS



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