BIRK
Engineering Thermal Solutions

Birk Mica Install Guide

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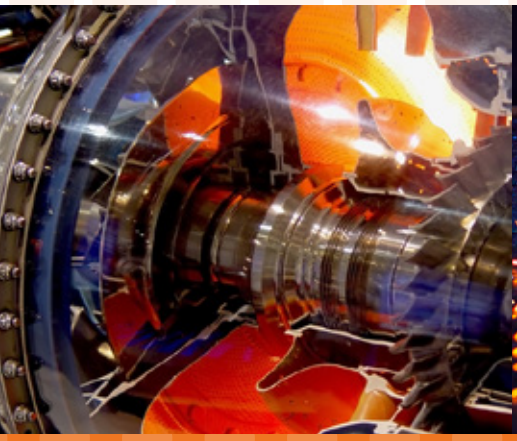

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Heaters Guide

Birk's mica heaters are designed for applications that require higher than normal watt densities and fast temperature recovery. Our customized mica heaters are manufactured with specialized Phlogopite (mica paper) as the insulation material. This mica paper is mica mineral then infused with a high temperature heat resisting polymer, thus creating a thin high temperature insulator. Birk will then use an inorganic binder that burns off during the initial ramp-up. Due to the nature of the mica material and the binder release, it is essential for Birk's mica heaters to be clamped to a heat sink for proper thermal conductivity and heat dissipation.

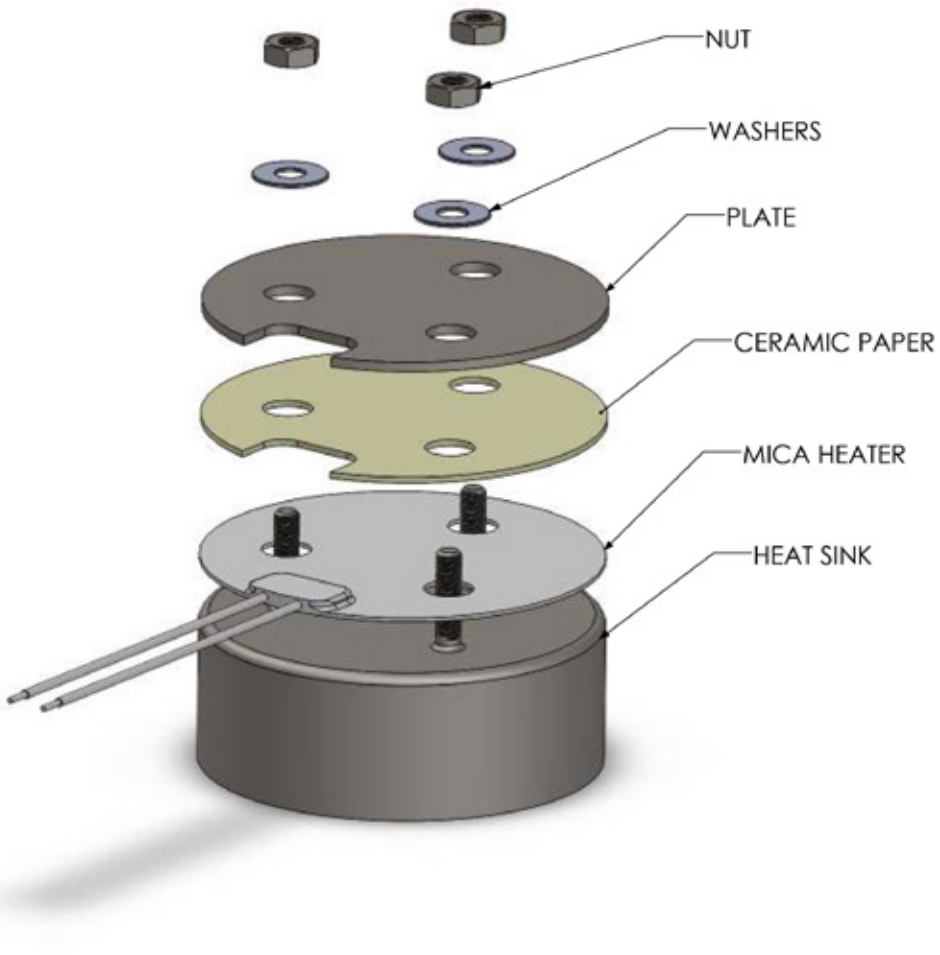
Clamping of the mica heater is required for the overall temperature uniformity output and will ensure longevity of the heater. For optimal temperature uniformity Birk recommends using a thicker stainless steel backing plate so that even pressure is applied over the entire heating element. Aluminum backing plates are available, however, additional attention to your applications operating temperature will be necessary. If you are using the higher temperature ranges of the element, the aluminum may begin to distort. It is imperative that the heater remains clamped and in intimate contact at all times. This will ensure a longer lasting unit.

There are certain elements that are crucial to the design of a mica heater assembly. By incorporating Birk in the early design phases, you help to ensure an assembly that will perform optimally. These steps will be crucial in the full assembly and will allow for better installation:

- A cutout, or recess in the backing plate should be made large enough for lead connection area. If sufficient cutouts are not made, the lead attachment could be compromised. Birk will advise on the minimum area needed for lead attachment.

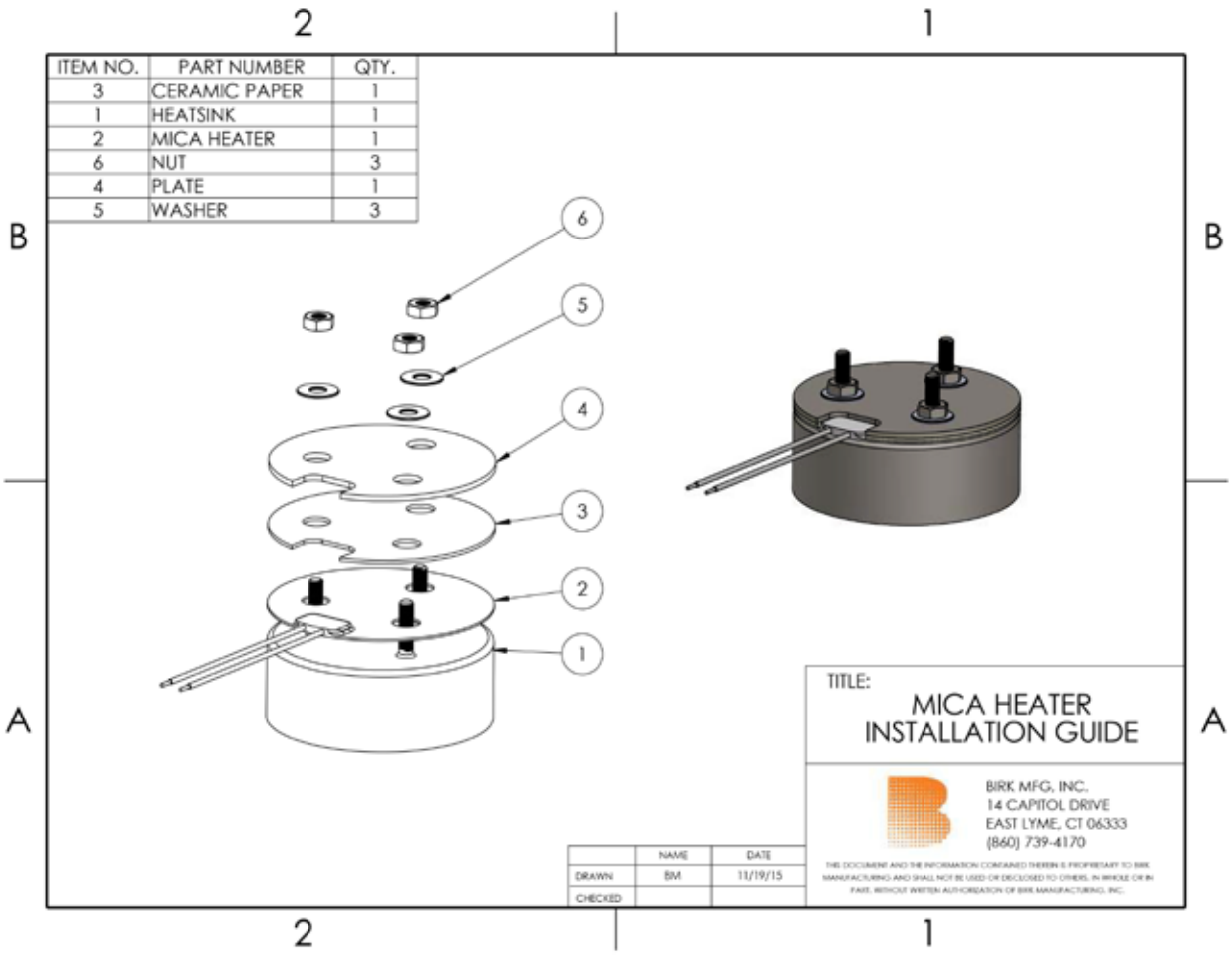
- Thermal expansion will also need to be considered when designing backing plates and clasps. To avoid introducing stress to the heater or shearing the fasteners, use similar materials for clamping. Also, be sure that holes in the heater are large enough to accommodate any changes in the size of the backing plate.

The first step and one of the most essential parts to installing a mica heating element is preparation of the plates. It is crucial that plates are free of any particles or foreign object debris (FOD). A majority of mica heaters are under an abundant amount of pressure which means the smallest of FOD could puncture the heating insulation and damage the heating element. Particles as small as .003" (.076 mm) can cause insulation failure. Once the plates have been properly cleaned it will be time to install the heating element to the heat sink. Please see diagram below for stack up.



Due to the nature of the materials used in mica heater assemblies, it is recommended that customers monitor the fasteners used to tighten assemblies in place. After initial ramp up and a few hours of use, it is likely that the heater will lose some mass due to outgassing of the binder material. This can result in the need to re-torque the fasteners in order to keep intimate contact with the mounting plates. If intimate contact is not sustained you run the risk of burn-ups due to inconsistent pressure across the heater. Birk recommends that the heater be clamped under a minimum of 15 PSI to ensure uniform conformity of the plate/heater interface.

Please see the graph below to help better understand the outgassing characteristics of the binder material.



It is recommended that customers run their assembly at operating temperature for several hours before bringing back to a cooled state and ensuring all fasteners are securely tightened. Please note that during the initial temperature ramp-up the binder and insulating ceramic element provided with the heater will smoke slightly. This is normal and should not continue after the initial ramp-up.