Heater Mats & Foil Heaters (up to 200°C)

Flexible Heating Elements in Silicone, Kapton and Polyester

Dear Customer,

we would like to use this opportunity to thank you for buying this product from Friedr. Freek GmbH.

Please read this document carefully before installing the heater in order to learn important facts regarding the product's safety and use.

More information about our products you can find on our website: freek-heaters.com.

Silicone

Kapton (Polyimide)

Polyester

Content:

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Download our contact details on your smart phone. Just scan the code with your QR Reader App.

Introduction

Flat heating elements are used wherever a flat side has to be heated symmetrically and effectively. Constructed of coiled wire, printed circuit or ink and two shifts of insulation, custom-made adaption to nearly any surface and dimension is possible. Simultaneously an optimal heat distribution over the heated flat side is achieved.

The main selection criterion for flat heating elements is the maximum surface temperature permitted for the insulation material being used. Especially the 200°C threshold is of major importance as for applications exceeding this temperature the most versatile and flexible polymer insulated Silicone mat heaters, Kapton-Polyimide film heaters and Polyester heaters are no longer an option. Above this 200°C limit Micanite insulated flat heaters (< 350/450°C) and ceramic heaters (> 450°C) are available.

When using a flat heating element properly an optimal temperature distribution can be achieved on the surface to be heated. Uneven contact of the heater to the surface may lead to hot spots. It is important that the produced heat can flow off. Conducting the heat is only possible with an ideal contact to the object to be heated. Poor contact leads to partial overheat on the heating wire. Thus the insulation is damaged and a flashover may occur. The overstrained heating wire embrittles, breaks or burns out.

Safety

As a manufacturer of heating elements, Freek is not responsible for the conditions in which its heating elements are installed and connected in the various customer-specific applications in which they are used, nor is it responsible for how the heating elements are controlled there. Rather, it is the customer's responsibility to be aware of and observe good engineering practice as it is recognised in the application and business markets in question. For example, many machines and their equipment are subject to the standard EN 60204 "Safety of machinery – Electrical equipment of machines".

Additionally, the customer is responsible for ensuring that electrical heating elements are only ever connected under the responsibility of a qualified electrician. This is because only a qualified electrician will know the risks associated with electrical heating elements, such as fire, explosion, combustion or electric shock, and – even more importantly – will know the safety measures that need to be put in place in order to prevent such events from occurring, even if the heating elements malfunction. Examples of these safety measures include protection against contact, thermal insulation, electrical insulation, temperature control, overtemperature prevention, earthing, residual current operated circuit breakers, overcurrent circuit breakers and miniature circuit breakers.

General Remarks & Handling

- The leads must not be strained (danger of tearing the leads off).
- The max. working temperature according to insulation given in the catalogue resp. internet must not be exceeded:
  - Silicone and Kapton (Polyimide): max. 200°C
  - Silicone and Kapton (Polyimide) with adhesive foil: max. 180°C
  - Polyester: max. 90°C
- Our heating elements are designed for being operated at defined voltages. Operation at higher voltages may reduce lifetime considerably or result in immediate failure (15% more voltage = 32% more power!).
- The different types of flexible heaters can be bent according to the allowed minimum radii given in the catalogue resp. internet. You must not crease or fold the elements, though:
  - Silicone: min. 5 mm
  - Kapton (Polyimid): min. 2 mm
  - Polyester: min. 5 mm
- When silicone mats are made in etched foil, i.e. the heating wire consists of a thin foil, they should be moved only rarely.

- If the flat heating element is used to heat a filling material or a liquid, the application mustn't be empty when operated.
- In temperature critical applications we strongly recommend to protect the flat heating elements from over-temperature by using limiters and fuses or additional safety temperature sensors to be integrated into an existing controller unit.
- Install electric heating elements in systems, machines, and devices in such a way that they are easily accessible at all times and can be easily replaced if necessary. Heating elements are wear parts: they age due to temperature-related structural changes in the heating conductor material and can fail due to operational and application-related influences (e.g., thermal expansion, vibration, corrosion, contact with aggressive media) as well as due to incorrect operation or control errors. In the event of a malfunction, replacement is necessary.
- In every practice application there are working and environmental parameters which cannot be calculated exactly in theory. That is why we recommend generally to test our flat heating elements in the application under real working conditions before series use.

Storage

- Flexible heating elements, especially those with self-adhesive foil, should be stored indoors avoiding fluctuations of humidity or temperature. Ideal storage conditions are 18 – 22 °C and 30 – 50% relative humidity. The heaters should be protected from direct sunlight.
- For Silicone- and Kapton heaters with self-adhesive foil a max. storage of 6 months is recommended. Without self-adhesive foil they can be stored longer.
- For Polyester heating elements the recommended max. storage is 24 months.

Fastening

- The attachment of the flat heating element has to ensure that the produced heat can be conducted optimally, hence without thermal resistances, into the contact surface resp. object to be heated. Poor contact leads to hot spots and partial overheat on the heating wire. Thus the insulation is damaged and a flashover may occur. The overstrained heating wire embrittles, breaks or burns out.
- For heating mats or heating foils **with self-adhesive foil, please follow the instructions** below:
  - In continuous operation, the max. permitted working temperature for silicone heating mats and Kapton heaters with self-adhesive foil is 180°C (without self-adhesive foil 200°C).
  - The surface to be heated must be clean, dry and free of grease.
  - The heater must be bonded evenly and without bubbles.
  - Once heater mat is installed it cannot be reapplied.

Sticking with adhesive foil

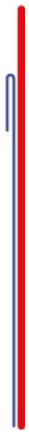
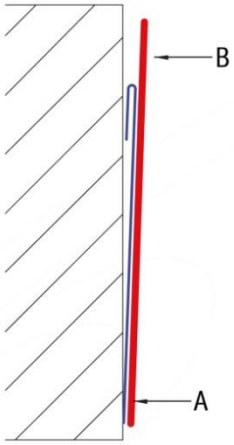
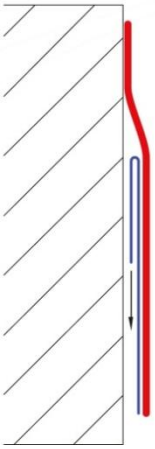
Note. Once heater mat is installed it cannot be reapplied

1. Care should be taken not to bend, crease or fold the element especially while the backing paper is on the mat.
2. Clean the surface with a fine sandpaper. Ensure surface to be heated is clean of grease and dirt (use cleaning solvent-free cleaning agents if required). Debris on the surface may damage the heater mat.
3. Place the heater mat with release paper on the surface tentatively and mark the corner of the mat if necessary.
4. Peel release paper from farthest corner away from the lead connection (as Fig. 1)
5. Place the heater mat into position immediately after peeling off the paper to avoid any dust or grit adhering to the heater (as Fig. 2)
6. Place the heater mat into exact position, roll from one edge against the surface to be heated and press firmly ensuring good even contact (as Fig. 3)
7. Route and secure heater mat cold lead/cable
8. Visually inspect heater mat installation.
9. Electrically static test heater mat for correct element resistance reading and earth isolation.

10. Equipment that the heater mat is fitted to should provide protection against electrical shock according to relevant European standards.

The surface to be heated must be clean, dry and free of grease.

The heater must be bonded evenly and without bubbles

1	2	3
		
Peel away approximately 50 mm of release paper and fold back on itself.	Position edge of mat against component at "A" keeping exposed adhesive away from surface at "B". When heater is in correct position, press exposed adhesive against surface at "B".	Pull release paper back at the same time pressing or rolling heater mat on to component.

Sticking without adhesive foil

1. Ensure surface to be heated is clean of grease and dirt (use solvent-free cleaning agents if required, e. g. spirit if required).
2. Whilst the elements are flexible, care should be taken not to rough handle, fold or crease them.
3. Ensure heating element is clean of dust and dirt (to clean use a damp cloth).
4. Apply a thin layer of suitable silicone rubber adhesive to cover the H/SR element side which is to be placed in contact with the surface to be heater in it entirety.
5. Place heater mat into position, against surface to be heated and press firmly ensuring good, even contact.
6. Route and secure heater mat cold lead/cable.
7. Visually inspect heater mat installation.
8. Electrically static test heater mat for correct element resistance reading and earth isolation.
9. Equipment that the heater mat is fitted to should provide protection against electrical shock according to relevant European standards.

No warranty claims can be derived from these user instructions.