MULTILAYERED FILM HEATING ELEMENTS
FOR HOUSEHOLD AND INDUSTRIAL HEATERS

Description
The multilayered film heating elements are produced from composites developed at the Department of Structural Macrokinetics, Tomsk. The heaters represent a new generation of safe and handy devices with improved efficiency and reliability. Composite films (100-200 µm) are applied onto metal, glass, ceramics, glassceramics, natural and artificial rocks by common lacquer and enamel covering methods and are suitable for heaters of any shape and size (from several centimetres to ten meters).
The product has significant advantages over the available analogs.

Technical specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Range</th>
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<tbody>
<tr>
<td>Input voltage, V</td>
<td>12 – 220 – 380</td>
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<tr>
<td>Input power, W</td>
<td>0.02 – 10,000</td>
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<tr>
<td>Power density, W/cm²</td>
<td>up to 8</td>
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<tr>
<td>Operation temperature, ºC</td>
<td>up to 500</td>
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<tr>
<td>Surface area, m²</td>
<td>0.001 – 10</td>
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<tr>
<td>Electricity-to-heat conversion ratio, %</td>
<td>100</td>
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</tbody>
</table>

Technical appraisal and economic benefits

- High efficiency
- Fire safety
- Comfort heating
- Safety for human health
- Long lifetime
- High rate and uniformity of heating

Application areas

- Household and industrial heaters
- Heaters of liquids and gases, including film preheaters for petroleum pipelines
- Power and ballast resistors in light sources, gas-discharge lamps
- Various household electrical heaters: ovens, irons, electric frying pans, chafing-dishes, electric ranges, heat blowers, grills, etc.

Development stage
Pilot models

Patent situation
Application for an invention

Commercial offers
Joint production, license sale

Estimated cost
Depends on the type of the product, 8 US$ the lowest for a 300-400W heating element.

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