Kanthal® Super RA
High-temperature element for protective atmospheres and reactive environments

Kanthal® Super RA is specially designed to work in nitrogen at temperatures above 1250°C (2280°F). Other Kanthal Super molybdenum disilicide (MoSi₂) heating elements have an excellent lifetime in oxidizing atmospheres but, when operating in nitrogen, nitration occurs. At temperatures above 1250°C (2280°F), the protective glaze is consumed and the silicon in the silicide of the elements may react with nitrogen forming silicon nitride, which can cause scaling. The speed of the process depends on the dew point and the time in the atmosphere. The solution to these problems has been to run the elements in air at high temperature for a couple of hours to restore the glaze.

Kanthal Super RA heating elements withstands nitration at high temperatures better than any other type of Kanthal Super MoSi₂ heating element. The nitration process still occurs, but to a 50% lower rate than for Kanthal Super 1800. The temperature, at which the weight reduction starts, is about 75°C (135°F) higher. The element has also a substantially longer lifetime in all reduced and oxygen-deficient atmospheres and is characterized by a high tolerance in other aggressive environments.

Applications
Kanthal Super RA heating elements is used in different types of sintering-, forging- and heat treatment furnaces.

Special Features
- Longer life at high temperatures in reactive atmospheres
- Long life in all reduced and oxygen deficient atmospheres
- Can be used in nitrogen up to 1700°C (3090°F) at a 40°C (105°F) dew point
- Standard and specially designed elements
**Technical information**

**Rate of nitration**

Mass change, mg/cm²

![Graph of Mass change, mg/cm² vs Temperature](image)

The graph shows the mass change in mg/cm² for two different materials, Kanthal® Super RA and Kanthal Super 1800, in various atmospheres as a function of temperature. The x-axis represents temperature in °C and °F, while the y-axis represents the mass change.

**Maximum recommended element temperatures in different atmospheres**

The diagram is a guide to maximum temperatures in different atmospheres depending on dew point, vacuum etc.

For details regarding specific applications, we recommend contact with Sandvik.

![Diagram of Maximum recommended element temperatures](image)
Kanthal® Heating zone diam. le terminal diam. lu

Super RA mm in mm in
6 0.24 12 0.47
9 0.35 18 0.71
12 0.47 24 0.94

Kanthal® Super RA/1700
Kanthal Super 1800
Kanthal Super 1900

PROPERTIES
Maximum operating temperature 1700°C (3090°F)
Composition Mainly MoSi₂
Density 5.6 g/cm³ (0.2 lb/in³)
Thermal conductivity
   20–600°C (68–1110°F) 30 Wm⁻¹ K⁻¹
   600–1200°C (1110–2190°F) 15 Wm⁻¹ K⁻¹
Coefficient of linear expansion 7–8 x 10⁻⁶ K⁻¹
Specific heat capacity at 20°C (68°F) 0.42 kJ kg⁻¹ K⁻¹
Emissivity 0.70–0.80

Resistivity

<table>
<thead>
<tr>
<th>Resistivity, Ω mm² m⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
</tr>
<tr>
<td>32</td>
</tr>
<tr>
<td>32</td>
</tr>
</tbody>
</table>

Element temperature

Resistivity vs. element temperature for Kanthal Super 1700, 1800, 1900 and RA

Standard product range
Kanthal Super RA is delivered as two- and four-shank elements with fixed terminals as an option for safe and reliable electrical connections. Special designs are available on request.
Sandvik Group
The Sandvik Group is a global high technology enterprise with 47,000 employees in 130 countries. Sandvik’s operations are concentrated on three core businesses: Sandvik Tooling, Sandvik Mining and Construction and Sandvik Materials Technology – areas in which the group holds leading global positions in selected niches.

Sandvik Materials Technology
Sandvik Materials Technology is a world-leading manufacturer of high value-added products in advanced stainless steels and special alloys, and of medical implants, steel belt-based systems and industrial heating solutions.

Kanthal is a Sandvik owned brand, under which world class heating technology products and solutions are offered. Sandvik and Kanthal are trademarks owned by Sandvik Intellectual Property AB.

Quality management
Sandvik Materials Technology has quality management systems approved by internationally recognized organizations. We hold, for example, the ASME Quality Systems Certificate as a materials organization, approval to ISO 9001, ISO/TS 16949, ISO 17025, and PED 97/23/EC, as well as product approvals from TÜV, JIS and Lloyd’s Register.

Environment, health and safety
Environmental awareness, health and safety are integral parts of our business and are at the forefront of all activities within our operation. We hold ISO 14001 and OHSAS 18001 approvals.

Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice.

This printed matter is only valid for Sandvik material. Other material, covering the same international specifications, does not necessarily comply with the mechanical and corrosion properties presented in this printed matter.