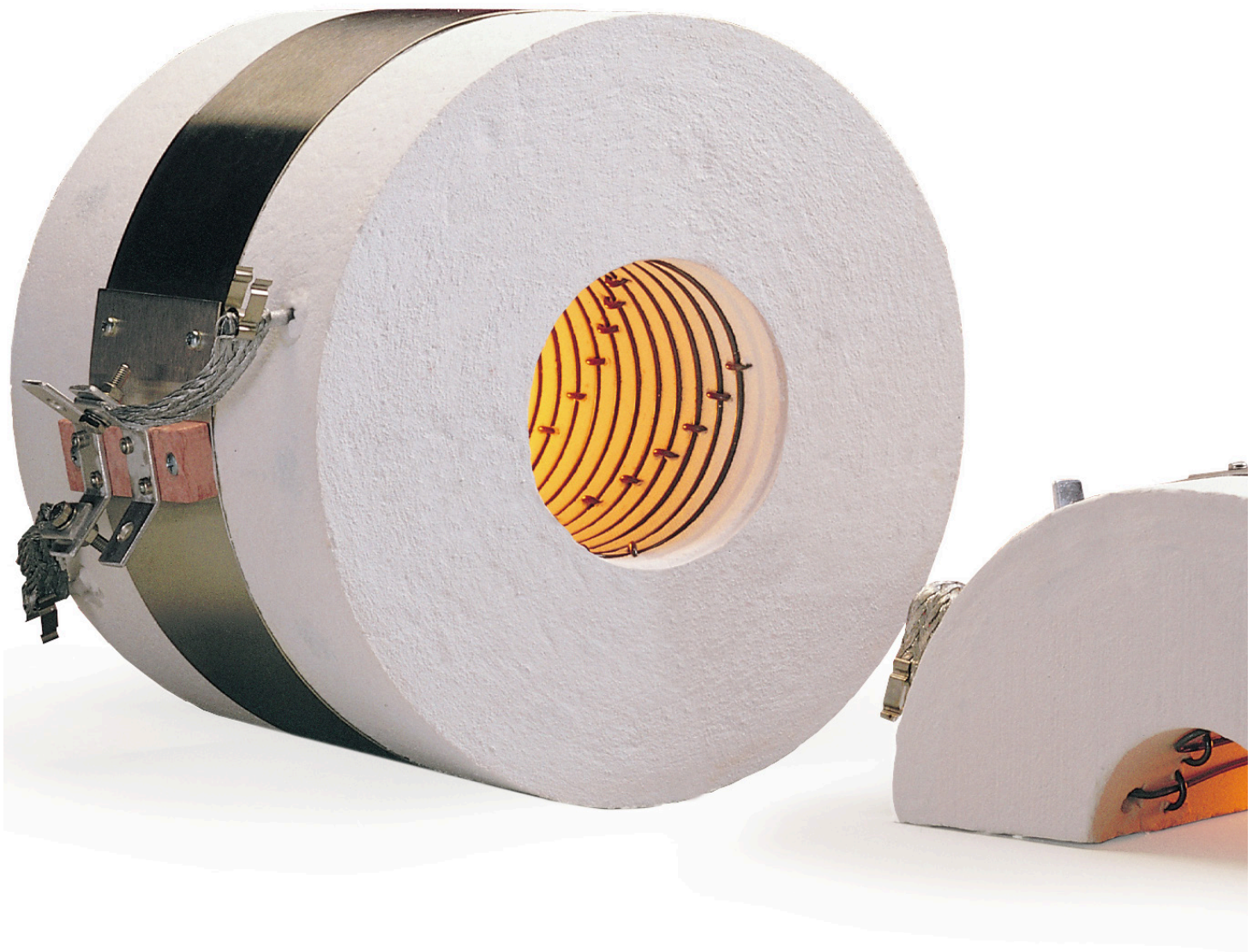


HIGH POWER HEATING MODULES FOR CUSTOMIZED FURNACE AND HEATERS

SUPERTHAL™



HEATING MODULE FOR CUSTOMIZED FURNACES AND HEATERS

Superthal™ heating modules consist of vacuum-formed ceramic fiber with an integral Kanthal® Super molybdenum disilicide (MoSi_2) heating element. The modules are intended for use in laboratory or production furnaces/heaters, where compactness, rapid heating, accurate heating profiles and control are of utmost importance.

Superthal™ is available in a variety of sizes. The standard shapes are muffles, half-cylinders, flat panels and reflectors. Tailor made modules are supplied to optimize all of your particular application.

Most of our products are developed by our own heating specialists and are at the forefront of performance and quality.

With Superthal™ very quick ramping is achieved during both heating and cooling. The possibility to obtain very accurate temperature control is one of the great benefits of Superthal™ design.

THE SUPERTHAL™ PROGRAM OFFERS YOU

- The possibility of quick temperature ramping
- Accurate temperature profiles
- Flexible units – different tests and processes can take place in the same furnace set-up
- Long life
- Very high power concentration
- Optimized installation and easy to replace
- Highly specialised units for certain applications

PROVEN DESIGN THOROUGHLY TESTED IN DEMANDING APPLICATIONS

Since the introduction of Superthal™ in the early 1990s, it has efficiently contributed to the use of electrical heating and the cutting of energy and operating costs in heating applications throughout the world. Being a unique combination of fast-reacting non-ageing Kanthal® Super elements and a ceramic fiber enclosure with low thermal mass, Superthal™ modules meet all demands for accurate high-temperature control. This leads to higher product quality and fewer rejects as well as minimized energy and maintenance costs.

OUR SERVICE INCLUDES

- Advice on choosing the right element grade, element type, support system and insulation
- Design, calculation and simulation of elements and heating systems
- Supplying complete heating elements or heating systems ready to be installed
- Upgrading of old furnaces to higher power and more reliable operation
- Customized heating solutions for your specific needs



Needs



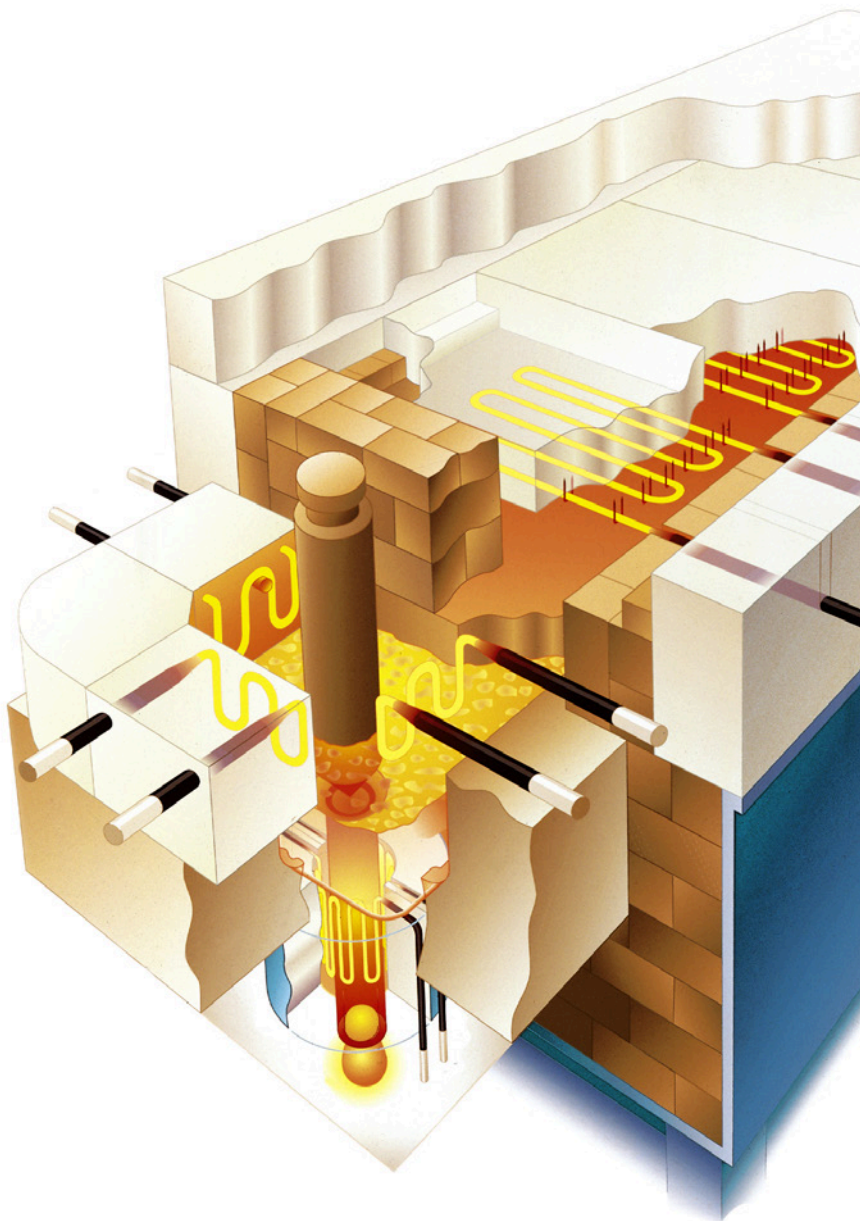
Analysis



Test and simulation



Solution



GRADES FOR DEMANDING APPLICATIONS

Superthal™ program includes several design of standard modules with specific features for use in demanding applications.

SUPERTHAL™ SHC

Superthal™ Half-cylinders, SHC is used both for horizontal and vertical furnace applications. The SHC are specially designed to meet the requirements of each application in terms of power and dimensions. Max. operating temperature 1550°C (2820°F).

SUPERTHAL™ SMU

Superthal™ Muffles SMU is used both for horizontal and vertical furnace applications. The SMU are specially designed to meet the requirements of each application in terms of power and dimensions. Max. operating temperature 1500°C (2730°F).

SUPERTHAL™ FLAT PANELS

Superthal™ Flat panels are widely used as overhead heaters. The panels consist of Kanthal Super heating elements integrated into reinforced ceramic fiber. The terminals are straight or bent 90°. Superthal™ flat panels are specially designed to meet the requirements of each application in terms of power and size. Max. operating temperature 1600°C (2910°F).

SUPERTHAL™ HIGH-POWER REFLECTORS

The high-power reflector is a compact fiber-insulated modular heater with Kanthal Super integrated elements. The reflector is operated horizontally and is easy to install and connect to a standard power supply. It gives a concentrated, very high and clean heating power. Typical applications are single billet heaters up to 1350°C (2462°F), aluminum melting furnaces and ladle heaters. Max. operating temperature 1600°C (2910°F).

SUPERTHAL™ HT

For high furnace temperatures up to 1675°C (3045°F). Superthal™ HT modules, for vertical operation, are available in standard sizes or as specially designed heating packages. Superthal™ HT is only available as half-cylinder, SHC.

SUPERTHAL™ MINI

Superthal™ Mini is a complete compact heater ready to connect to the household power supply. It is widely used for all types of melting and processing in the dental and medical industries as well as for general material research and development. Max. operating temperature 1500°C (2730°F).



Delivery



Follow up

APPLICATIONS

Superthal™ high power heating modules forms a compact modular system. This makes it easy to design compact and flexible set-ups that are easy to install and replace. The combining of modules meets the demands for accuracy, quality assurance and reliability in the system for continuous production installations.

We offer infinite options due to our customized designs where demands on high temperature solutions is needed. Our products are best used by customers looking for energy savings, economic benefits, increased productivity and low maintenance.

GLASS INDUSTRY

The Kanthal® Super program includes products for the primary glass manufacturing, such as technical, specialty and fiber glass. Here are two typical glass processes:

- Glass forehearth (feeders)
- Glass fusions/downdraw process



Superthal™ Mini.

CERAMIC INDUSTRY

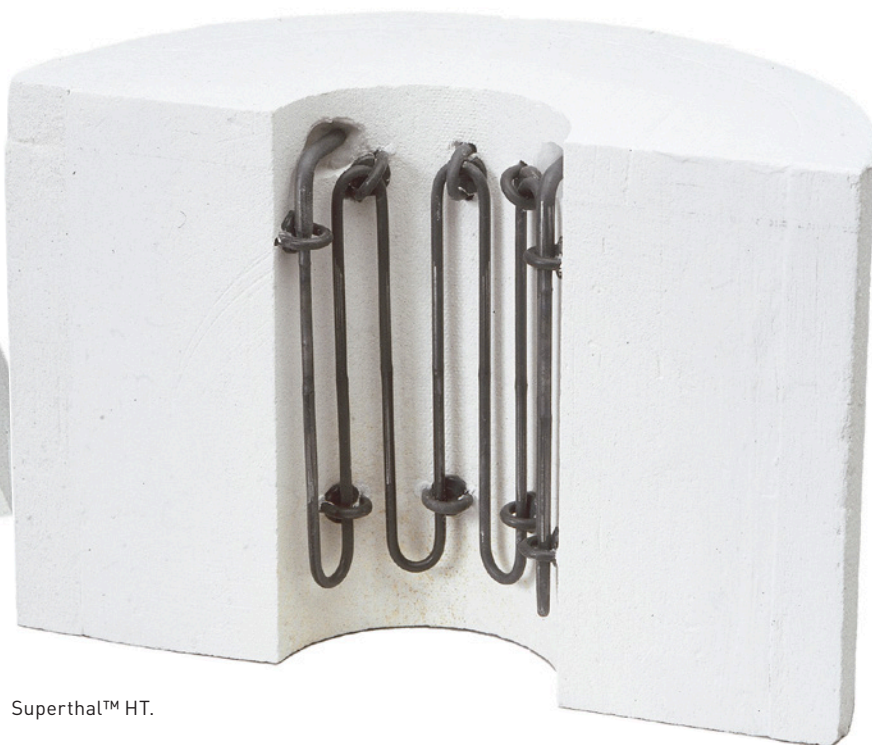
The Kanthal® Super program offers several products for the production of traditional ceramics, functional ceramics and ceramics used as engineering materials. For example, Kanthal® Super products are widely used in:

- Ceramics sintering
- Ceramics firing
- Heat treatment of ceramics





Superthal™ Flat panels.



Superthal™ HT.

ALUMINUM

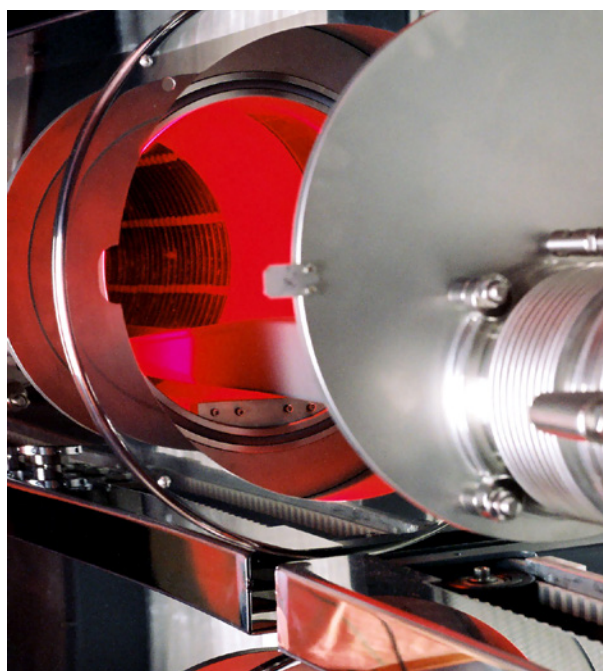
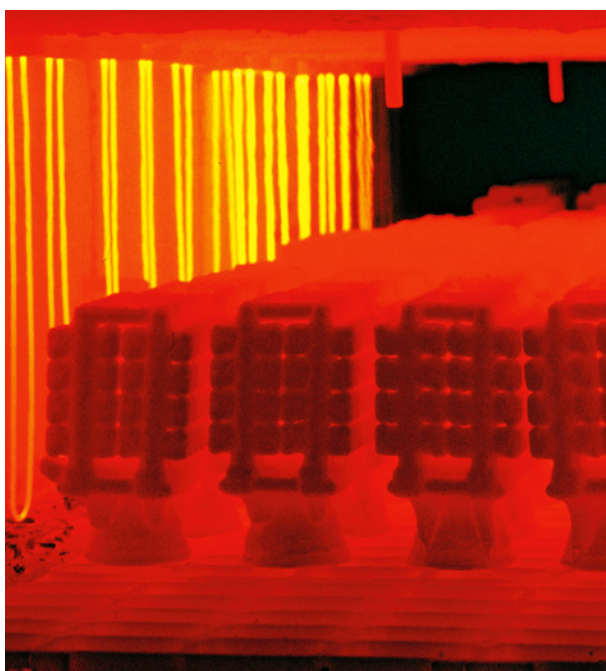
The Kanthal® Super program includes a wide range of products for primary aluminum production and secondary aluminum processing. For example, our products are widely used in the following applications:

- Primary aluminum production
- Secondary aluminum processing

ELECTRONIC INDUSTRY

The Kanthal® Super program offers products for the heating processes in the electronic industry. Our products are used in, for example:

- Furnace for single growth crystal Si,GaAs
- Diffusion cassettes
- MLCC sintering
- ITO sintering



TECHNICAL INFORMATION

The optimal choice in the wide range of Superthal™ modules depends on a number of factors, such as ramping speed and temperature profile.

Your local Kanthal sales representative will be happy to supply you with further detailed information.

Visit www.kanthal.com to find your local contact.

SUPERTHAL™ MUFFLE AND HALF-CYLINDER MODULES

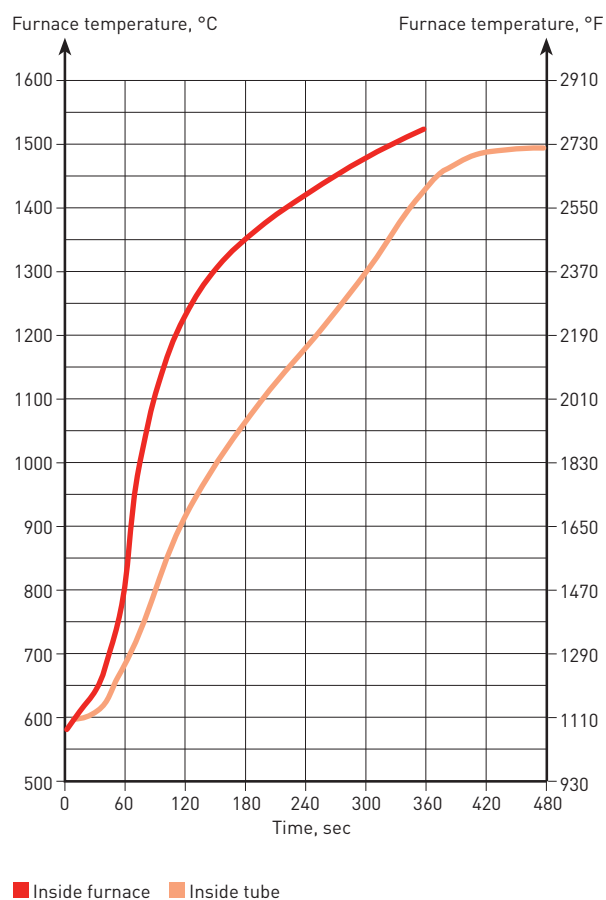
SUPERTHAL™ MUFFLE MODULES, SMU

Element temperature can reach 1550°C (2820°F)
Furnace temperature can reach 1500°C (2730°F)

SUPERTHAL™ HALF-CYLINDER MODULES, SHC

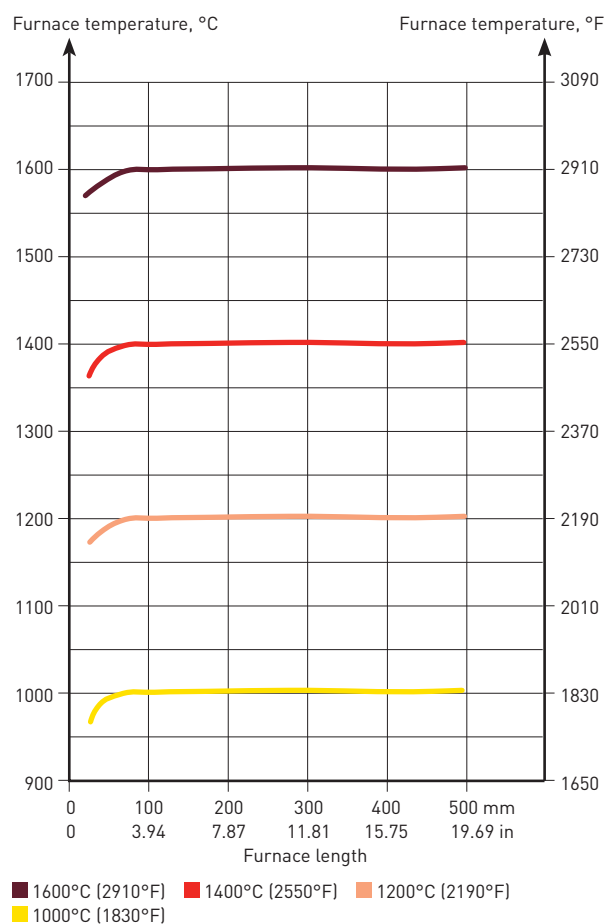
Element temperature can reach 1600°C (2910°F)
Furnace temperature can reach 1550°C (2820°F)

RAMPING SPEED



Heating speed for a Superthal™ SHC 200 furnace equipped with a ceramic working tube.

TEMPERATURE PROFILE



Temperature profile for a three-zone Superthal™ furnace equipped with standard Superthal™ SHC 200 modules at different furnace temperatures.

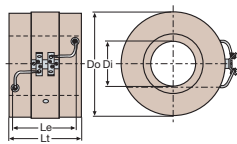
Technical data and dimensions for typical modules.
 For information of other dimensions, contact your local
 office www.kanthal.com/contact-us

TECHNICAL DATA AND DIMENSIONS

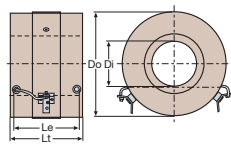
| TYPE | OPTIONS | OPTIONS AND DIMENSIONS | | | | | | | | DATA AT FURNACE TEMPERATURE: | | | |
|---------|---------|-------------------------|------|-------------------------|------|-----------------------|-------|-----------------------|-------|------------------------------|--------------|-----------------|--------------|
| | | LENGTH | | | | DIAMETER | | | | 1400°C (2550°F) | | 1550°C (2820°F) | |
| | | OVERALL, L _T | | ELEMENT, L _E | | INNER, D _I | | OUTER, D _O | | POWER W | VOLTAGE V | POWER W | VOLTAGE V |
| | | MM | IN | MM | IN | MM | IN | MM | IN | | | | |
| SMU 40 | A, B | 250 | 9.84 | 209 | 8.23 | 40 | 1.57 | 240 | 9.45 | 1440 | 34.3 | 1050 | 30.4 |
| SMU 60 | A, B | 250 | 9.84 | 209 | 8.23 | 60 | 2.36 | 260 | 10.23 | 2100 | 50.0 | 1520 | 44.1 |
| SMU 80 | A, B | 250 | 9.84 | 209 | 8.23 | 80 | 3.15 | 280 | 11.02 | 2760 | 65.7 | 2000 | 58.0 |
| SMU 100 | A, B | 250 | 9.84 | 209 | 8.23 | 90 | 3.54 | 300 | 11.81 | 3420 | 81.4 | 2480 | 71.9 |
| SMU 125 | A, B | 250 | 9.84 | 209 | 8.23 | 115 | 4.53 | 325 | 12.80 | 4240 | 101 | 3070 | 89.0 |
| SMU 150 | A, B | 250 | 9.84 | 209 | 8.23 | 140 | 5.51 | 350 | 13.78 | 5040 | 120 | 3670 | 106 |
| SMU 200 | A, B | 250 | 9.84 | 209 | 8.23 | 190 | 7.48 | 400 | 15.75 | 6720 | 160 | 4860 | 141 |
| SHC 100 | A, B, C | 200 | 7.87 | 150 | 5.91 | 85 | 3.35 | 300 | 11.81 | 1000 | 23.8 | 730 | 21.2 |
| SHC 150 | A, B, C | 200 | 7.87 | 150 | 5.91 | 135 | 5.31 | 350 | 13.78 | 1490 | 35.5 | 1080 | 31.3 |
| SHC 200 | A, B, C | 200 | 7.87 | 150 | 5.91 | 185 | 7.28 | 400 | 15.75 | 1980 | 47.1 | 1430 | 41.4 |
| SHC 250 | A, B, C | 200 | 7.87 | 150 | 5.91 | 235 | 9.25 | 450 | 17.71 | 2460 | 58.6 | 1780 | 51.6 |
| SHC 300 | A, B, C | 200 | 7.87 | 150 | 5.91 | 285 | 11.22 | 500 | 19.68 | 2950 | 70.2 | 2140 | 62.0 |

Superthal™ Muffle modules, SMU

Option A

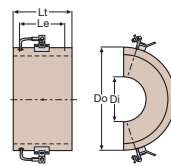


Option B

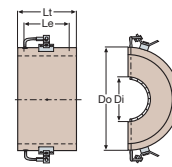


Superthal™ Half-cylinder modules, SHC

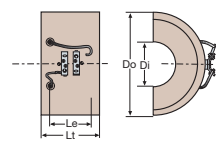
Option A



Option B



Option C



SUPERTHAL™ FLAT PANELS

For energy saving roof heater.

TECHNICAL DATA

| | | |
|---------------------------------------|-----------------------|------------------------|
| Max. length | 1000 mm | 39.37 in |
| Standard thickness | 125 mm | 4.92 in |
| Max. power output | 150 kW/m ² | 96.8 W/in ² |
| Max. continuous operating temperature | 1600°C | 2910°F |

SUPERTHAL™ HIGH-POWER REFLECTORS

Modular heaters for extra high power.

TECHNICAL DATA

| | | |
|--------------------------|-----------------------|-----------------------|
| Power density | 110 kW/m ² | 1.8 W/in ² |
| Max. element temperature | 1650°C | 3000°F |
| Element type | Kanthal® Super | |



Superthal™ High-power reflector.

SUPERTHAL™ MINI

Compact heating at high temperatures.

| TECHNICAL DATA | MS 26 | | MS 31 | |
|--|----------------|---------|--------|---------|
| Inner diameter | 26 mm | 1.02 in | 31 mm | 1.22 in |
| Outer diameter | 100 mm | 3.94 in | 100 mm | 3.94 in |
| Height | 115 mm | 4.53 in | 115 mm | 4.53 in |
| Power at furnace temperature 1500°C (2730°F) | 300 W | | 400 W | |
| Max. element temperature | 1550°C | 2820°F | 1550°C | 2820°F |
| Voltage | 19 V | | 24 V | |
| Current | 16 A | | 17 A | |
| Element type | Kanthal® Super | | | |



SUPERTHAL™ HT

Superthal™ HT modules, for vertical operation, are available in standard sizes or as specially designed heating packages with heating modules, back insulation and stainless steel casing.

On request, Kanthal® can assist in calculating and manufacturing complete heating packages. Superthal™ HT is only available as half-cylinder, SHC.

The tables below show examples of configurations and dimensions.

TECHNICAL DATA

| Type | Superthal™ SHC HT | |
|---------------------|------------------------|-------------------------|
| Overall length | 200 mm | 7.87 in |
| Element length | 150 mm | 5.91 in |
| Element temperature | 1700°C | 3090°F |
| Surface loading | 14.2 kW/m ² | 232.7 W/in ² |
| Current | 80 to 90 A | |

TECHNICAL DATA AND DIMENSIONS

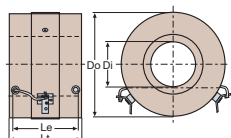
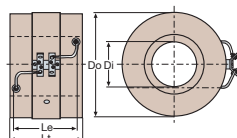
| TYPE | OPTIONS | OPTIONS AND DIMENSIONS | | | | | | | | DATA AT FURNACE TEMPERATURE: | | | |
|---------|---------|-------------------------|------|-------------------------|------|-----------------------|-------|-----------------------|-------|------------------------------|---------|-----------------|---------|
| | | LENGTH | | | | DIAMETER | | | | 1400°C (2550°F) | | 1550°C (2820°F) | |
| | | OVERALL, L _T | | ELEMENT, L _E | | INNER, D _I | | OUTER, D _O | | POWER | VOLTAGE | POWER | VOLTAGE |
| | | MM | IN | MM | IN | MM | IN | MM | IN | W | V | W | V |
| SHC 100 | A, B, C | 200 | 7.87 | 150 | 5.91 | 85 | 3.35 | 300 | 11.81 | 1000 | 23.8 | 730 | 21.2 |
| SHC 150 | A, B, C | 200 | 7.87 | 150 | 5.91 | 135 | 5.31 | 350 | 13.78 | 1490 | 35.5 | 1080 | 31.3 |
| SHC 200 | A, B, C | 200 | 7.87 | 150 | 5.91 | 185 | 7.28 | 400 | 15.75 | 1980 | 47.1 | 1430 | 41.4 |
| SHC 250 | A, B, C | 200 | 7.87 | 150 | 5.91 | 235 | 9.25 | 450 | 17.71 | 2460 | 58.6 | 1780 | 51.6 |
| SHC 300 | A, B, C | 200 | 7.87 | 150 | 5.91 | 285 | 11.22 | 500 | 19.68 | 2950 | 70.2 | 2140 | 62.0 |

Superthal™ Muffle modules, SMU

Superthal™ Half-cylinder modules, SHC

Option A

Option B



Max. inner diameter is 300 mm (11.81 in)

Option A

Option B

Option C

