

KANTHAL®

Part of Sandvik Group

WIDEST RANGE OUTSTANDING PERFORMANCE

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HEATING ELEMENTS



Our program of electric heating elements is the widest on the market. Our heating elements outperform in all temperature ranges, from element temperature 50 to 1850°C (120–3360°F), and atmospheres.

MoSi2 HEATING ELEMENTS



High-power electric molybdenum disilicide (MoSi₂) heating elements for element temperatures up to 1850°C (3360°F). Kanthal® Super MoSi₂ heating elements are available as straight or bent elements in a wide range of shapes and sizes, all characterized by long life and consistent performance. Our program of MoSi₂ heating elements includes seven grades with specific features for use in demanding applications and atmospheres, including nitrogen, hydrogen, vacuum and mixtures of endogas and reducing atmospheres.

ELEMENT TEMPERATURE UP TO 1850°C (3360°F)

Manufactured as ready-made elements in several material grades.

Kanthal® Super 1700, 1800, 1900, ER, RA, HT and NC, in standard or customized dimensions.

Standard element dimensions: 3/6 mm, 4/9 mm, 6/12 mm, 9/18 mm, 12/24 mm.

GLOBAR® SiC HEATING ELEMENTS



Silicon carbide (SiC) electric heating elements are extremely versatile heating elements manufactured in straight, spiraled, single or multi-shank designs for a broad range of applications including heat treatment, melting, and sintering. Globar® SiC heating elements are capable of high power output, and may be mounted either vertically or horizontally. Because the element material remains rigid even at the maximum operating temperature, no special supports are required, which simplifies the design of the equipment.

ELEMENT TEMPERATURE UP TO 1650°C (3000°F)

Size range from 10 mm up to 75 mm Ø (0.375 – 2.95 in.).

Length of up to 6 meters.

High power concentration.

Can be installed in any orientation.

Simple installation – No support necessary inside the furnace.

Product Types: LL, SD, SDA, AS, ASA, SG, SR, B, HD, Type U, W and multi-shank.

Range of geometries, performance features and coatings to suit your application.

METALLIC HEATING ELEMENTS



Ready-made metallic heating elements made from wire or strip in Kanthal® iron-chromium-aluminium alloys or Nikrothal® nickel-chromium alloys.

ELEMENT TEMPERATURES UP TO 1425°C (2600°F)

Metallic heating elements can be manufactured to any specifications and with short delivery times. Examples of element types are:

Coiled wire and strip heating elements (i.e. spiral and edge-wound elements).

ROB – Sinuated wire elements.

Sinuated [corrugated] strip elements.

Cartridge elements (i.e. bundle rod elements and cage elements).

Tubothal® heating elements.

Heating elements continue >

HEATING ELEMENTS CONT.



TUBOTHAL® ELEMENTS



High-power, long life cartridge heaters with hot-zone made from Kanthal APM™ wire. For vertical or horizontal mounting and use with or without radiant tubes for a broad range of applications.

ELEMENT TEMPERATURES UP TO 1250°C (2280°F)

Size range from Ø68 mm up to Ø170 mm

Lengths from 0,5 to 6 meters

Low aging

Low thermal mass

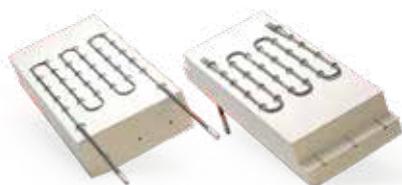
No oxide spallation

HEATING MODULES



Kanthal prefabricated heating modules are designed for a wide range of thermal processing applications up to 1700°C (3090°F) element temperature. Combining the best properties of electric heating and fiber or dense ceramic insulation, Kanthal heating modules are suitable for the smallest laboratory furnace to the largest production furnace.

SUPERTHAL™ HEATING MODULES



Prefabricated heating modules consisting of vacuum-formed ceramic PCW (Polycrystalline wool) with an integral Kanthal® Super molybdenum disilicide (MoSi₂) heating element for up to 1750°C (3180°F) element temperature. Superthal™ heating modules are intended for use in laboratory or production furnaces/heaters wherever concentrated heat is needed. They also provide major energy savings in several applications. The flexibility of the heating modules allows for different tests and processes to take place in the same furnace set-up.

ELEMENT TEMPERATURE UP TO 1750°C (3180°F)

Fast and easy to install and replace

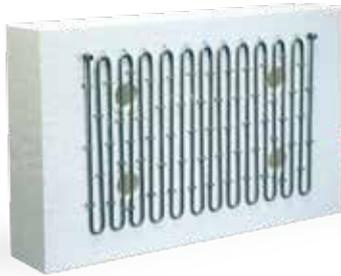
Quick temperature ramping

Accurate temperature profiles

Very high power concentration

Long service life

FIBROTHAL™ HEATING MODULES



Prefabricated heating modules with metallic heating elements and vacuum-formed ceramic wool insulation for up to 1350°C (2460°F) element temperature. The construction method of Fibrothal™ heating modules ensures accurate positioning of the coils and eliminates the distortion or other problems connected to the conventional open coil elements in grooves or on tubes. Fibrothal™ heating modules also provide major energy savings in several applications. RCF free grades available.

ELEMENT TEMPERATURES UP TO 1350°C (2460°F)

Fast and easy to install and replace

Increased insulation

High power concentration

Virtually any shape and size

Ideal for huge furnaces

Low weight construction

Low energy storage

Muffles, cylinders, half cylinders, part cylinders, panels, custom shapes

Retorts

FIBROTHAL™ GSO



A vacuum formed heater module with Kanthal strip heating elements. The Fibrothal™ GSO heater module has a unique support structure for fixing in tough conditions which contributes to a vastly improved service life and provides power loadings up to 100 kW/m². The module offers high temperature uniformity while being flexible in design (i.e. vertical, horizontal, wall). Insulation thickness is very slim (min. 45 t) while retaining mechanical strength. Line voltage applied (50V/100V/200V/380V).

FIBROTHAL™ GSO PANEL TYPE

Easy to apply to line voltage.

Applicable to any sizes from 100 x 100 mm (3.94 x 3.94 inches) up to 1075 x 650 mm (42.3 x 25.6 inches).

FIBROTHAL™ GSO CYLINDRICAL TYPE

Applicable to any sizes from 150 mm (5.9 inch) ID up to 2000 mm (78.7 inch) ID.

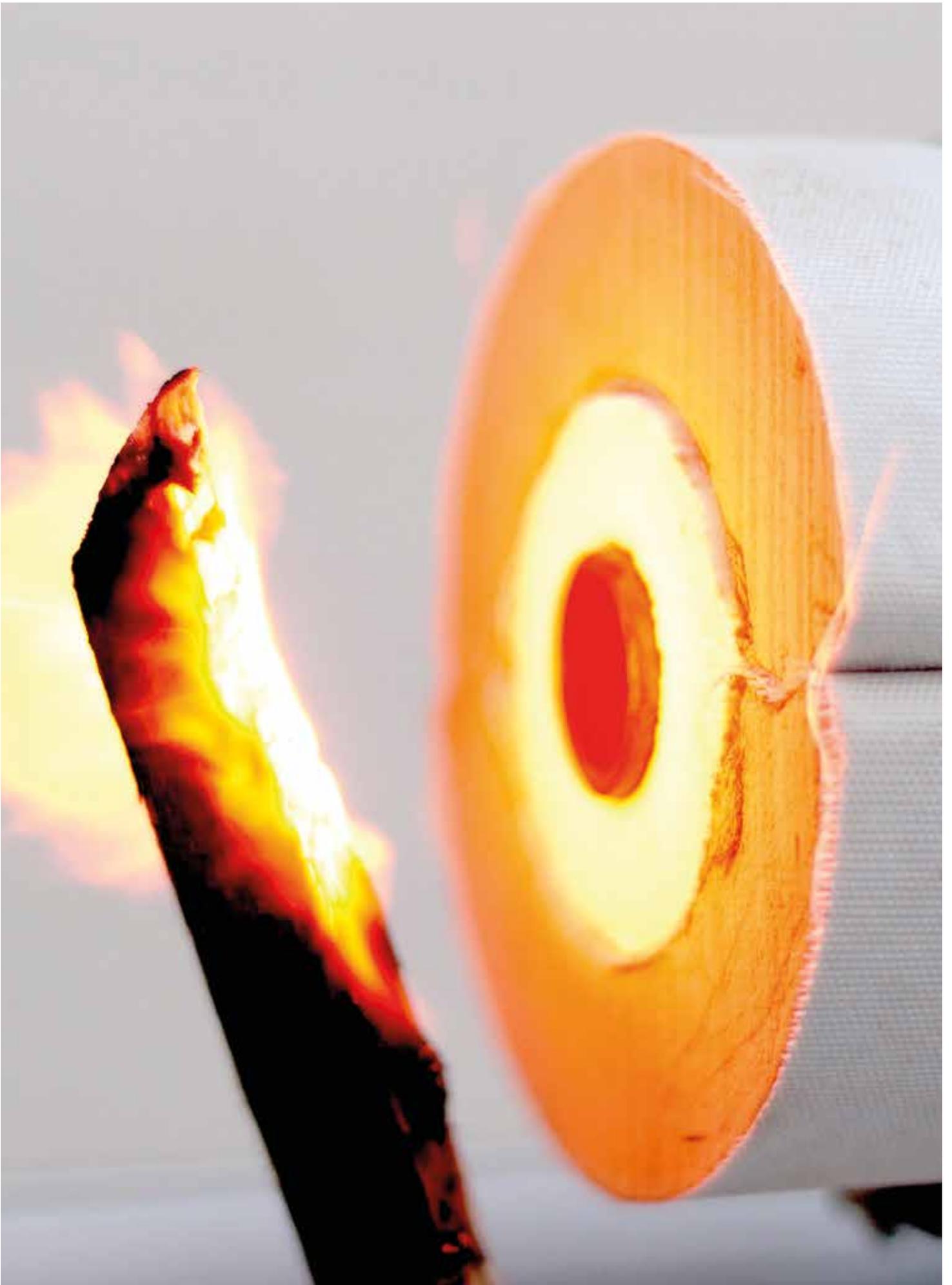
MODUTHAL™ HEATING MODULES



Prefabricated heating modules with metallic heating elements and non-electrically conductive, dense ceramic insulation for use at element temperatures up to 1350°C (2460°F). The construction method of Moduthal™ heating modules ensures accurate positioning of the elements and eliminates the distortion or other problems connected to the conventional open coil elements in grooves or on tubes.

ELEMENT TEMPERATURES UP TO 1350°C (2460°F)

A fiber-free version is available for up to 1250°C (2280°F) element temperature.



AIR HEATERS



High-temperature industrial electrical air heaters of different types for a large variety of applications.

FLOW HEATER



The unique patented design of the Kanthal® Flow Heater allows maximum gas outlet temperatures of 1100°C, what is more than 250°C higher than any conventional air heater based on metallic heating elements. In combination with the integrated temperature measurement the Kanthal® Flow Heater gives excellent controllability and provides a very wide (mass) flow range or pulsed flow operation. Compared to gas burners, electrical heaters offer a cleaner work environment, easier installation, and fewer safety risks. A standard portfolio is available as well as customized solutions.

MAXIMUM GAS OUTLET TEMPERATURE 1100°C (2012°F)

Power 3.5 to 40 kW (standard models) customized design.

High range of (mass) flow rates (up to 1:30).

Extremely small heater size per kW, 1 and 3 phase designs available.

Direct connection to line voltage, usage in high pressure applications possible, easy to control and large turn down ratio, no contamination of gas flow.

For use with air, N₂, O₂, CO₂. Other gases on request.

AIR HEATING CASSETTES



With Kanthal air heating cassettes it is possible to heat air or gases up to 800°C (1470°F) and maintain a uniform temperature throughout the furnace. The air heating cassettes can be produced to fit most existing or new furnace designs. Installation is very simple in most cases.

Compact design

Easy to install

High power output

Long service life

Light weight

Customized design

DIFFUSION CASSETTES



Fibrothal™ diffusion cassettes for atmospheric and/or LPCVD processing of semiconductors and solar cells.

FIBROTHAL™ DIFFUSION CASSETTES



The Fibrothal™ diffusion cassettes are a 'plug and heat' solution for the production of high-quality crystalline silicon wafers for solar cells and semiconductors.

ELEMENT TEMPERATURES UP TO 1350°C (2460°F)

The diffusion cassettes are of heavy or low mass design for both vertical or horizontal furnace system applications.

Customized heaters for specific applications can be delivered on request.

MRL, VERTICAL HEATING ELEMENTS

A line of replacement heating elements for all leading models of vertical furnaces used in semiconductor processing. MRL vertical replacement heating elements are available in more than fifty designs for OEM vertical furnaces. The flexible design allows radical changes in process parameters.

OPERATING TEMPERATURES UP TO 1300°C (2372°F)

Magna AMR, AZ, S and SW.

Improved dynamic performance characteristics.

Currently available with up to 300 mm (11.81 in.) wafer capability.

Increased reliability, extended life and improved throughput and yield.

Provides uniform heating from hot faces, accurate centering of heating element chamber, and forced air cooling options to increase production capability and decrease recovery time.

Vacuum formed hot face insulation and advanced heating element alloys.

Particulate reduction through the use of proprietary surface coatings.

Forced air and water cooling options to maximize throughput.

FURNACE TUBES



Extruded tubes made from Kanthal APMT™ and Kanthal APM™ iron-chromium-aluminium (FeCrAl) and nickel-chromium (NiCr) alloys for gas-heated or electrically heated furnaces.

RADIANT TUBES



Long life, robust, high performance extruded tubes for a wide range of furnace applications, including radiant protection tubes for electrically heated and gas fired systems. Superior resistance to, for example, carburization, thermal shock, sagging and distortion. Excellent mechanical properties and the ability to form a dense and adhesive oxide film that protects against corrosion and atmospheric attack. Kanthal furnace tubes can be used at temperatures up to 1250°C (2280°F) and are available in sizes from 26 to 260 mm (1.02–10.2 in.) outside diameter.

TUBE TEMPERATURES UP TO 1250°C (2280°F)

Std. size range from 26.7 mm dia to 260 mm dia (1.05–10.24 in.).

Long tube life.

Maintenance free operation.

Kanthal APM™/Kanthal APMT™ tubes for carburizing and sulfidizing conditions.

Sandvik 353 MA tubes for nitriding conditions.

Muffle tubes for strand annealing furnaces.

Thermocouple protection tubes.

Inner and outer tubes for SER gas burners.

Retorts.

Available as straight, U- and W-shaped tubes.

U AND W RADIANT TUBES



U- and W-shaped radiant tubes for tube temperatures up to 1250°C (2280°F). The Kanthal program of U- and W-shaped radiant tubes includes nickel-chromium (NiCr) alloys or Kanthal APM™ and Kanthal APMT™ iron-chromium-aluminium (FeCrAl) alloys for extremely demanding environments, or as hybrid solutions with combinations of the different material types for maximized performance.

KANTHAL APM™ AND KANTHAL APMT™



Radiant tubes (radiation tubes) in Kanthal APM™ and Kanthal APMT™ iron-chromium-aluminium alloys (FeCrAl alloys) available as complete ready-to-install assemblies according to almost any customer specification. Radiant tubes in Kanthal APMT™ and Kanthal APM™ FeCrAl alloys offer several advantages compared to ceramic tubes, silicon carbide tubes and nickel-chromium (NiCr) alloy-based tubes.

FURNACE ROLLERS



Furnace rollers in different alloys that suit both the hot and cool zones of your furnace. Our furnace rollers are available in outside diameters from 26 to 1,800 mm (1 to 70 inch).

KANTHAL APMT™ FURNACE ROLLERS



Our sophisticated Kanthal APMT™ rollers ensure the best performance in critical 'hot zones', with operating temperatures up to 1250°C (2250°F). Kanthal APMT™ furnace rollers provide longer service life compared to conventional materials, for high temperature and demanding applications. Kanthal furnace rollers are available in outside diameters from 26 to 260 mm (1 to 10 in.), according to customer design.

FOR DIFFERENT APPLICATIONS RUNNING AT TEMPERATURES UP TO 1250°C (2250°F):

Continuous galvanizing furnaces for strip steel.

Annealing furnaces for stainless steel tubes and wire.

Continuous furnaces for electrical / silicon steel strip.

Nickel briquette sintering furnaces.

MAIN ADVANTAGES

High mechanical strength and form stability. No bending or elongation.

High resistance to oxidation and corrosion which give smooth Kanthal APMT roller surface and no defects in the good transported by the rollers.

Excellent in most oxidizing, carburizing, sulfurizing and inert or controlled atmospheres.

Not sensitive to thermal shock.

No water cooling required for roller temperatures up to 1250°C (2280°F), which results in large cost and energy savings.

NICR FURNACE ROLLERS



Our nickel-chromium (NiCr) rollers, produced in close cooperation with our manufacturing partners, are ideally suited for lower temperature zones. They are highly efficient and cost-effective to run and maintain. And just like our Kanthal APMT™ rollers, they are resistant to oxidation and corrosion, guaranteeing a long service life and maximum uptime.

NiCr furnace rollers for less demanding applications.

Ideally suited for low-temperature zones 1100°C (1980°F) – 1150°C (2102°F).

Diameters from 50 – 1800 mm (2 – 70 inch).



Ceramic supporting materials for electric elements and furnaces in a variety of forms. The Kanthal program of technical ceramics include three different types of ceramics, all manufactured using raw materials of the highest quality and not containing conductive ingredients.

ALUMINOSILICATES, ALUMINOUS AND CORDIERITES



Kanthal technical ceramics uses alumina and refractory pre-sintered clays which, when combined with basic clays, form a dense structure and a good mechanical strength. Our technical ceramics use clay with low iron oxide and alkaline content to improve electrical resistance. Good thermal shock resistance is obtained by achieving the right level of porosity or, in certain cases, by the addition of magnesium oxide.

ALUMINOSILICATES (KANTHAL CODE A42P)

Materials for temperatures up to 1100 – 1200°C (2010 – 2190°F) with good thermal shock resistance. Alumina content of less than 50%.

ALUMINOUS (KANTHAL CODES A60P, A50C, A73E, A80E)

Materials for up to about 1300°C (2370°F) with fairly good thermal shock resistance and excellent dielectric properties. Alumina content of more than 50%.

CORDIERITES (KANTHAL CODE A38E)

Materials with added magnesium oxide for up to about 1100°C (2010°F) with excellent mechanical and thermal shock resistance.



HEATING MATERIAL – WIRE



Wire in a wide range of alloys optimized for use in, for example, resistance, high-temperature and conductive applications.

RESISTANCE HEATING WIRE



Round and flat resistance heating wire and resistance wire with bright annealed or oxidized surface, depending on size. Round resistance wire sizes up to 0.40 mm (0.0157 inch) are available with insulation and coating.

SIZE RANGE

Round wire

0.010–12 mm (0.00039–0.472 inch).

Other sizes are available on request.

Ribbon (flat wire)

Thickness: 0.023–0.8 mm (0.0009–0.031 inch).

Width: 0.038–4 mm (0.0015–0.157 inch).

Width/thickness ratio max 40, depending on alloy and tolerance.

Other sizes are available on request.

Stranded wire

Some resistance heating alloys and pure nickel are available as stranded wire.

CONDUCTIVE WIRE



Round and flat conductive wire (magnet wire) in aluminium, copper-clad aluminium and copper. The Kanthal program includes standard conductive wire sizes but also custom-designed sizes and resistance to meet specific design requirements. The wire is available with or without insulation or coating.

SIZE RANGE

Round wire

0.023–1.27 mm (0.0009–0.050 inch).

Ribbon (flat wire) / Square wire

Thickness: 0.023–0.635 mm (0.0009–0.025 inch).

Width: 0.038–2.032 mm (0.0015–0.041 inch).

Width/thickness ratio max 40, depending on alloy and tolerance.

SPRAY WIRE



Thermal spray wire in a wide range of alloys for high-temperature corrosion protection, bonding layers, build-up coating and sealing.

SIZE RANGE

Standard sizes are 1.20, 1.60 and 2.00 mm (0.0472, 0.0693 and 0.0787 inch).

Other sizes can be offered on request.

The standard delivery form is tight wound on SD 300K spools.

HEATING MATERIAL – STRIP



Strip in a wide range of alloys optimized for use in electrical resistance and high-temperature applications. Standard sizes range from thickness 0.10 to 3.5 mm (0.0039 to 0.1378 inch) and width 4–195 mm (0.157–7.68 inch).

RESISTANCE HEATING STRIP



Resistance heating strip for furnace heating elements and other heat-generating applications. The strip is normally delivered in cold-rolled condition with ground surface.

SIZE RANGE

Thickness: 0.10–4 mm (0.00394–0.157 inch).

Width: 4–200 mm (0.157–7.874 inch).

Other sizes can be delivered on request.

THERMOCOUPLE WIRE AND STRIP



Thermocouple wire and thermocouple strip for use at temperatures up to 1260°C (2300°F). Kanthal thermocouple wire is supplied with bright or oxidized surface according to standard or special EMF requirements.

THERMOCOUPLES



We offer thermocouple materials (types K, E, T, J, N) for a range of temperatures to 1260°C. Kanthal offers homogeneous and stable melts that withstand the test of time for demanding applications.

WIRE

Kanthal thermocouple wire ranges from 0.05 to 8.0 mm (0.0019 to 0.315 inch).

Thermocouple wire in the size range 0.0254 mm to 0.51 mm (0.001 to 0.0201 inch) can be supplied with or without an insulating coating.

STRIP

Standard sizes for thermocouple strip range from thickness 0.10 to 3.0 mm (0.0039 to 0.181 inch) and width from 4 to 195 mm (0.157 to 7.68 inch).

CONSTRUCTION MATERIAL



High-temperature construction materials for the manufacturing of furnace accessories like furnace furniture and furnace rollers.

HIGH-TEMPERATURE CONSTRUCTION MATERIALS



The Kanthal program of high-temperature construction materials includes an advanced powder-metallurgical, iron-chromium-aluminum alloy (FeCrAl). It offers high creep strength and good oxidation properties at high temperatures of 1100–1425°C (1980–2565°F) where conventional metallic materials cannot operate – all available in a variety of product forms and dimensions (tube, plate, rod, bars, square bars, forging blanks, wire, strip).

FOR MATERIAL TEMPERATURES UP TO 1425°C (2565°F)

Kanthal high-temperature construction materials are suitable for the manufacturing of construction parts.

Fixtures

Supports

Tube hangers

Fasteners and holders

Burner nozzles

Muffles and retorts

Rotative drums

And many others, where conventional alloys fail.

STEEL PRODUCTS



In our melting shop in Hallstahammar, we can give you all the flexibility you need in terms of shapes, alloys mix and, best of all, volumes. We can supply batches as small as 5–10 tonnes.

STEEL PRODUCTS



Our main scope of supply is wire rod (size range: 5.5–12.5 mm), billets and ingots. We can also deliver round bars and profiles through our network of distributor contacts. We offer: Fe-based alloys; nickel alloys with Ni levels ranging from ~30 % to 75 %; and special grades, such as C-276, 625.

Are you looking for larger quantities?

No problem – we also have a bigger steel plant within the Sandvik group, with a capacity of up to 60 tonnes per batch.

OUR TOTAL RANGE INCLUDE 550 DIFFERNT ALLOYS IN:

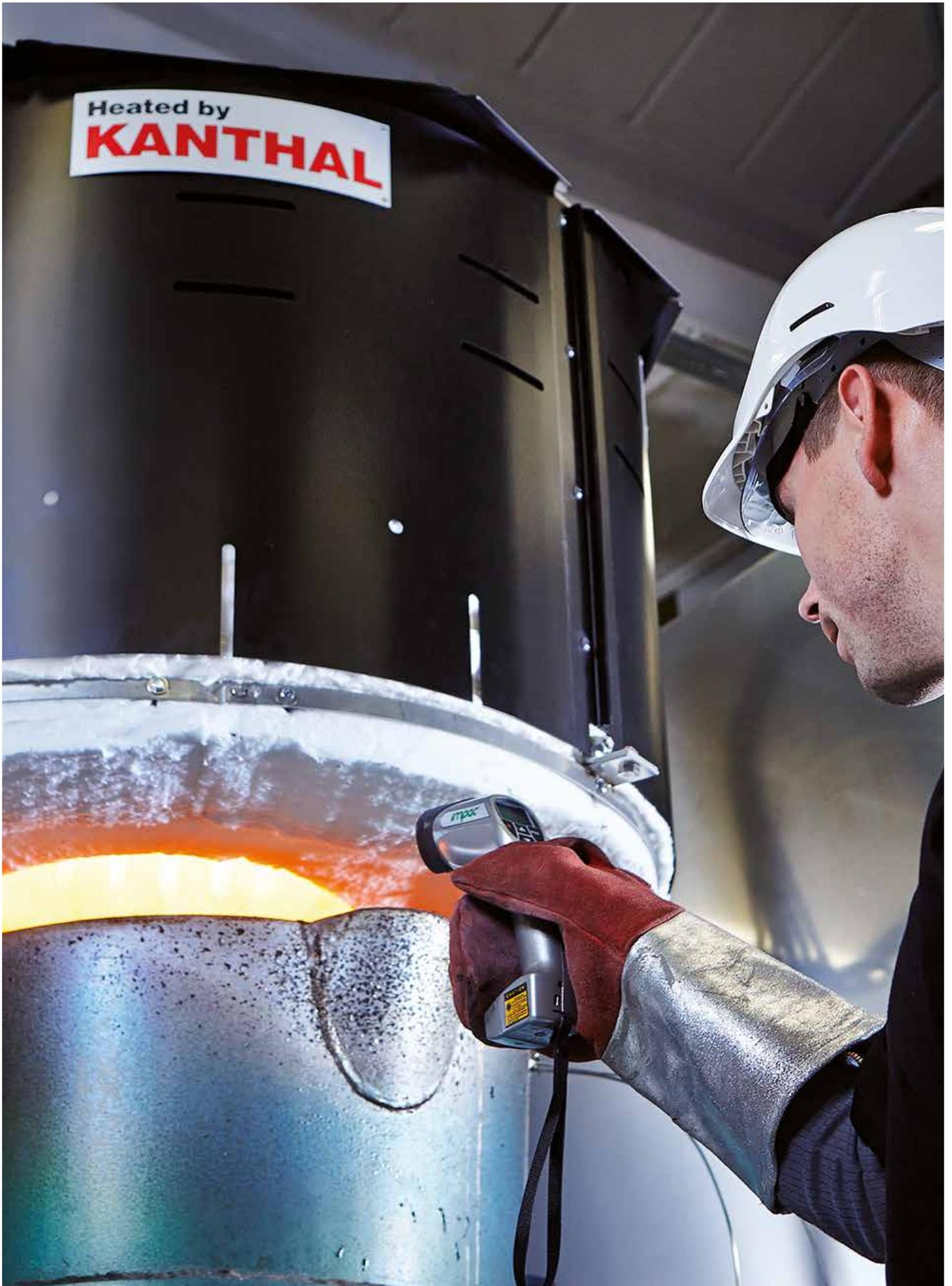
Heat resistant alloys

FeNi alloys

Corrosion resistant alloys

Ni based alloys

Stainless alloys



ELECTRIC HEATING SYSTEMS



Using electrical heating reduces CO₂ emissions. Kanthal reflector technology is uniquely designed to provide focused radiation into the stub holes only, and not on the anode block itself. This means that significant energy savings can be achieved. Electric heat transfer rate is 70% compared to only 20% for gas. Furthermore, a cleaner, safer and quieter environment is achieved, making it a much healthier place for the operators. Below you find examples of electric heating systems for specific process steps in primary aluminium and steel production. We also provide systems for areas such as glass production and for R&D purposes.

ANODE STUB DRYING STATION



A perfectly dry stub contributes to a homogeneous welded joint free of porosity, ensuring minimized voltage drop over the thimble. Open burners with atmospheric air mixture consume approximately three to four times more gross energy compared to electricity.

ANODE PRE-HEATING STATION



The Kanthal highly focused reflector-based electric heating solution ensures more thorough drying. Kanthal reflector technology is uniquely designed to provide focused radiation into the stub holes only, and not on the anode block itself. This means that significant energy savings can be achieved.

CATHODE PRE-HEATING STATION



By heating the pre-assembled steel bar and cathode block, the Kanthal solution eliminates the need to move, lift and/or position hot steel bars, a potentially dangerous process.

Significant energy savings are achieved by eliminating the need for heating up the entire mass of the graphite block.

Efficient cathode handling and greater precision in positioning of the bars.

LADLE HEATING SYSTEMS



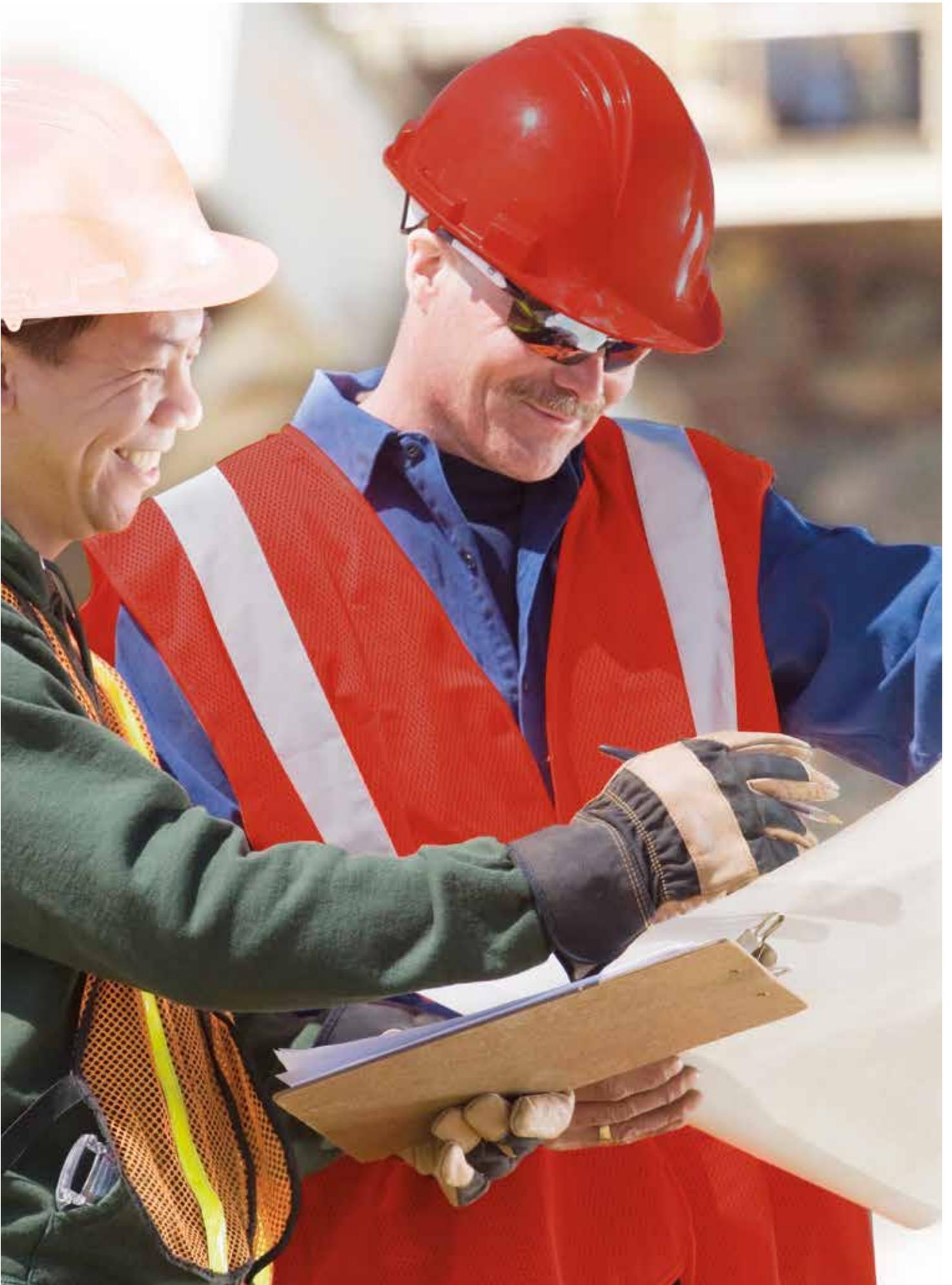
Our ladle dryers and ladle heaters (pre-heaters) are typically used in the production of aluminium and steel. They are available for ladles with inner diameter 500–2100 mm (20–83 in.), and installation is very simple in most cases.

The design of the system allows the radiation to be more accurately directed towards the target area – a highly efficient heating method.

Our heaters distribute heat more evenly – which results in better process control and an extended liner lifetime.

The systems ensure that the refractory lining lifetime is significantly extended.

Dual functionality is provided as they can be used both for pre-heating and holding of liquid metal.





Improve your productivity, optimize the quality of your end-product or design an entirely new heating solution, we can help you.



Over our 85 year history we have accumulated knowledge and experience in the world of electrical heating. This experience we now provide in various forms of service. If you are looking for ways to improve your productivity, optimize the quality of your end-product or design an entirely new heating solution, we can help you.

PRODUCT DEVELOPMENT

- From idea to product design and detailed engineering services.
- We have the industry's leading R&D department.
- Technical testing in different temperatures and atmospheres.

FINANCIAL SERVICES

- Financial packages and flexible payment plans.
- "Payment for performance" contracts.

PROJECT MANAGEMENT

- We have a team of experienced project leaders that will strengthen you during your project.
- Project program tracking through an online Gantt Chart model.

ENERGY AND PRODUCTIVITY SERVICES

- With our highly-qualified engineers we can provide process improvements and energy efficient solutions.
- We'll support you with payback calculations, i.e. from gas to electric conversions.
- We can run a simulation process before your investment to minimize trial costs.

MAINTENANCE SERVICES

- Maintenance service contracts.
- On-demand, on-site and remote consulting services by a field service engineer.
- Performance review and consulting services by a field service engineer inspecting element lifetime. Guidance on future actions to repair, upgrade or improve parts of an existing asset.

CONSULTANCY SERVICES

- Utilizing our application know-how and industry leading expertise in heating technology and materials.
- Advice on the most suitable product to meet your requirements, on-line or through a site visit.

