

**Ecothal™**  
**SER gas burner system**  
**The efficient gas solution**



**KANTHAL**

## Ecotal™ SER gas burner system

*Ecotal™ SER burner (single-ended recuperative) is designed for high efficiency, reliability and low emissions. Emission levels can be reached without having to compromise upon efficiency. The performance can be even more enhanced by using powder metallurgically produced high-temperature materials in components such as Kanthal APM™ and Kanthal APMT™ tubes, allowing higher temperatures, higher productivity and lower maintenance.*

### **High efficiency**

The series of Ecotal burners has an efficiency of 70–80% where efficiency is proportional to burner size/power. This has been made possible by burner design, and the use of powder metallurgically produced high temperature materials allowing increased working temperature. This gives the customer the possibility both to increase productivity and to save fuel.

### **Reduced NO<sub>x</sub> emissions**

Ecotal SER burners are probably one of the cleanest recuperative radiant heaters on the market. A very efficient combustion, together with FGR, (flue gas recirculation), reduces CO and NO<sub>x</sub>. Ecotal burner systems more than fulfill today's tightened environmental demands, and reductions are in the level 75–90% of the general legislation of today and is well prepared for tomorrow's even stricter standards. Emission levels are at 10–25% of legislated levels of today equivalent to a typical reduction in emissions around 90%!

### **Low energy costs**

The high efficiency of Ecotal burner systems saves money by using less fuel to do the job. In some cases savings of up to 35% have been realized.

### **Low maintenance**

Ecotal SER burners are designed for reliability and a maintenance free operation. An all metallic burner means easy handling, with minimal risk of damage. Tubes of Kanthal APM and Kanthal APMT iron-chromium-aluminum (FeCrAl) need no internal cleaning or repositioning by rotation.

### **Adaptable design**

Due to the standardized and modular construction design, Ecotal SER burners is easy to adapt to most furnace systems. It is possible to implement the latest burner technology in both new furnace designs, as well as a "bolt-on" system for upgrading existing furnace equipment. The burner is available with different surveillance and ignition systems, and can be used for both horizontal and vertical installation.





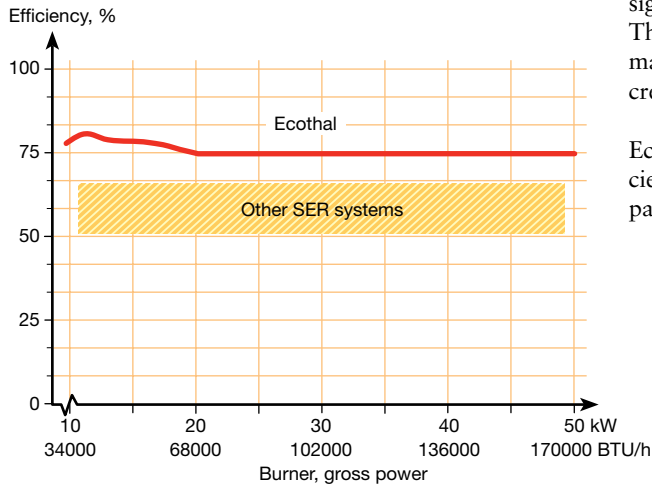
#### **A COMPLETE PARTNER**

We offer a product based upon your request and we offer support throughout the lifetime in terms of engineering, installation, commissioning and aftermarket service. Our heating solutions are standardized and systematized with the intent of simplifying things as much as possible for you as our customer. Through our worldwide organization and global network, our services are available around the clock, every day of the year.

We also offer an all-in contract solution, meaning that we can manage the whole process from engineering to a fully installed, up and running application. This solution means that you only need one speaking partner to get the job done.

# Increased burner efficiency

## Ecothal SER burners high efficiency



Ecothal SER burners (single-ended recuperative) are designed for high efficiency, reliability and low emissions. This is possible by using advanced high temperature materials in combination with a burner design which creates favorable air/gas and exhaust flow.

Ecothal high efficiency SER burner systems offer efficiencies in excess of 80% and are highly cost effective compared with other recuperative systems on the market.

# A breakthrough in reduction of NO<sub>x</sub> emission

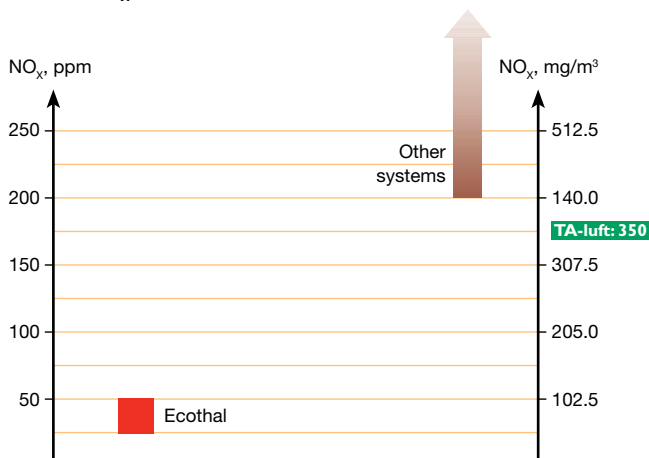
Ecothal SER burners are one of the cleanest recuperative radiant heaters on the market. The high efficiency also reduces emissions of carbon dioxide per energy unit produced. This gives you less pollution and greenhouse effect, lower costs and a lot of goodwill!

## Typical Ecothal values

Reference is natural gas:

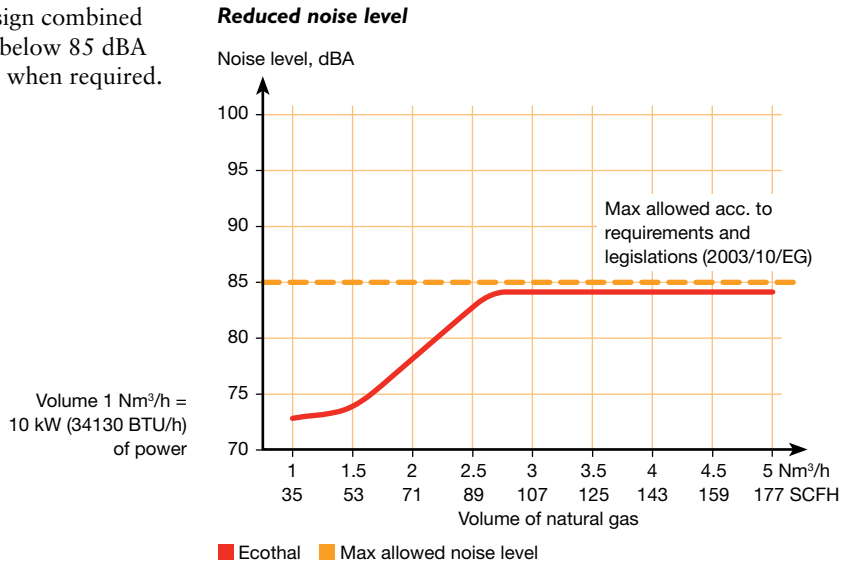
- Carbon dioxide 75 g/MJ
- Carbon monoxide ≈0 ppm
- Nitrous oxide <50 ppm (3% O<sub>2</sub>)
- Nitrous oxide 20 mg/MJ

## Typical NO<sub>x</sub> emissions of different burner systems



# Noise level

Noise level is reduced by optimized design combined with a silencer. Typical noise levels are below 85 dBA but levels of 75–80 dBA are achievable when required.

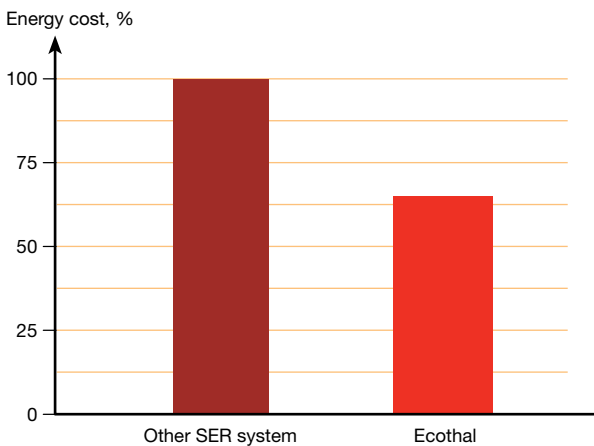


# Reduced energy costs

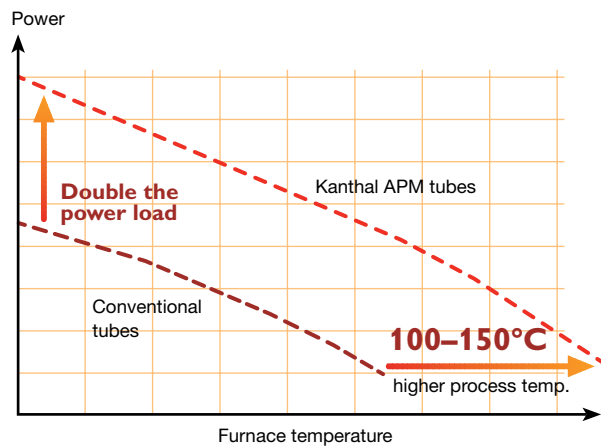
Ecothal SER burners are one of the most efficient gas solutions on the market. They simultaneously increase productivity, reduce gas consumptions and emissions. This is the ultimate solution for achieving cost efficiency in production. The tubes made of Kanthal APM used in Ecothal SER burner systems provides higher power,

higher productivity, increased life and better overall cost efficiency. Upgrading from conventional SER burners to Ecothal SER burners can provide fuel cost savings of approx 35% due to the higher efficiency.

## 35% reduction in running costs



## Comparison of tubes in Kanthal APM vs. conventional tubes

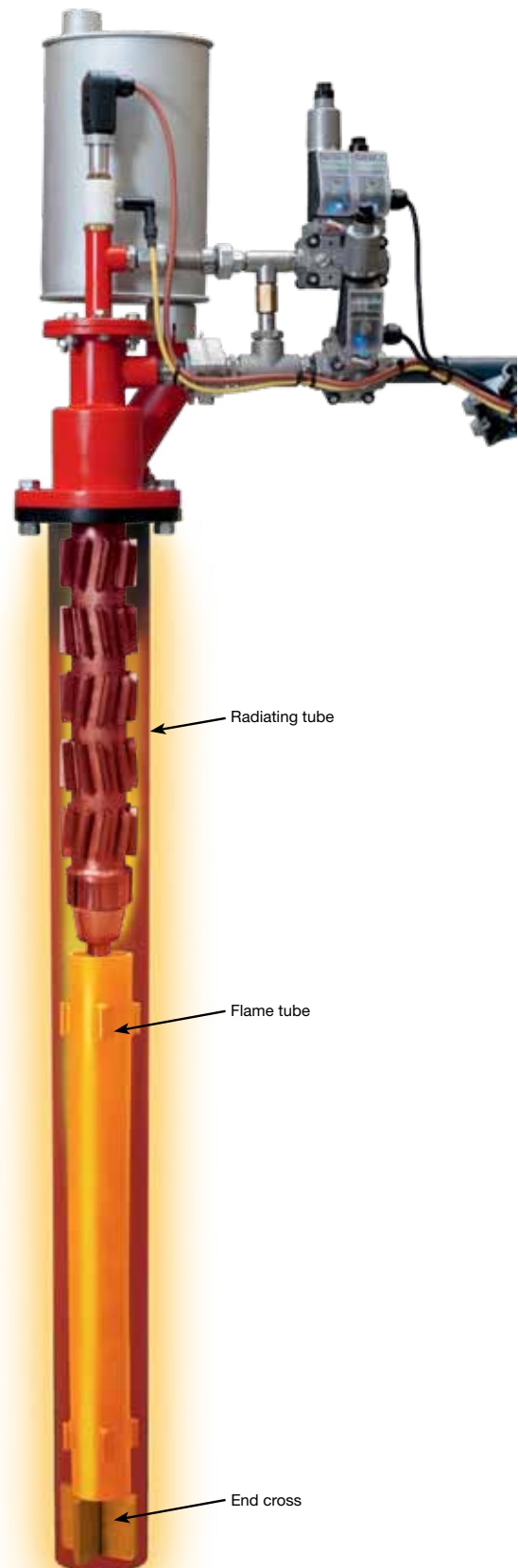


# Adaptable design

Ecothal SER burner is easily adaptable to existing systems. With Ecothal burner it is possible to implement the latest burner technology in both new furnace designs as well as in upgrading of existing furnaces.

The ultimate Ecothal SER burner model complete with UV-cell and ignition/supervision system to monitor and report malfunctions. This is a sophisticated control and regulation system, often demanded in larger industries. In most cases this upgrade requires just a minor redesign of the electrical and gas supply system.

- Upgrading of gas and air distribution system (to fulfill EN 746-2)
- Implementation of control and surveillance components (to fulfill EN 746-2)



# Product range

## Combinations and performance of Ecothal SER burner systems and tubes in Kanthal APM and/or Kanthal APMT

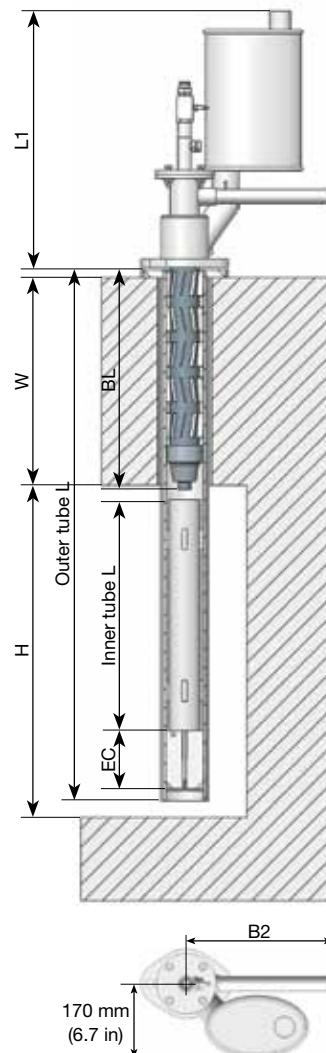
Type of SER burner	Outer tube OD		Flame tube OD		Hot zone length nominal		Recuperator length nominal		Power nominal kW	Emission NO <sub>x</sub> 3% O <sub>2</sub>	
	mm	in	mm	in	mm	in	mm	in		ppm	mg/MJ
Ecothal™ 4-20	115	4.5	75	3.0	1100	43.3	535	21.1	5-20	<50	<20
	128	5.0	75	3.0	1100	43.3	535	21.1			
Ecothal™ 5-30	128	5.0	83	3.3	1510	59.4	565	22.2	5-20	<50	<20
	146	5.7	83	3.3	1510	59.4	565	22.2			
	154	6.1	83	3.3	1510	59.4	565	22.2			
Ecothal™ 6-45	164	6.5	109	4.3	1630	64.2	654	25.7	10-45	<50	<20
	178	7.0	109	4.3	1630	64.2	654	25.7			
	198	7.8	109	4.3	1630	64.2	654	25.7			

Direct flame control by UV-cell

Regulation high/low/off

Reference for emissions is natural gas (high), process temperature 925°C (1700°F) run at  $\lambda$  1.15 resulting in remaining O<sub>2</sub> content in exhaust 3%

## Typical installation



- Burner all metallic
- Separate flame tube – designed for FGR (flue gas recirculation)
- Both ignition and flame supervision directly by using ignition rod respectively UV-cell

# Reliable and easy to upgrade

Sandvik provides you with great opportunities to obtain a cost effective heating solution in a very short time. The typical lead time for a total system is about 4–6 weeks.

We carry burner components, protection tubes, surveillance and regulation components in stock or in semi-manufactured form to ensure fast and reliable availability, just when you need it.

It typically takes about 2–3 days to upgrade a typical heat treatment furnace in to an Ecothal burner system solution.

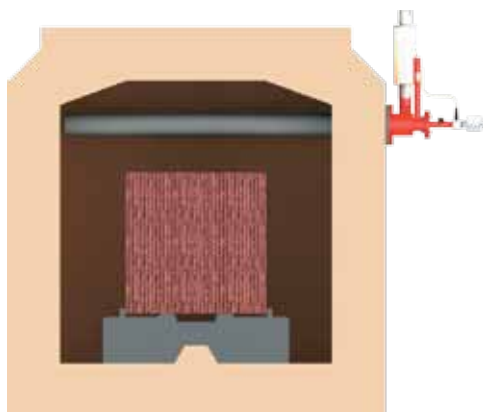
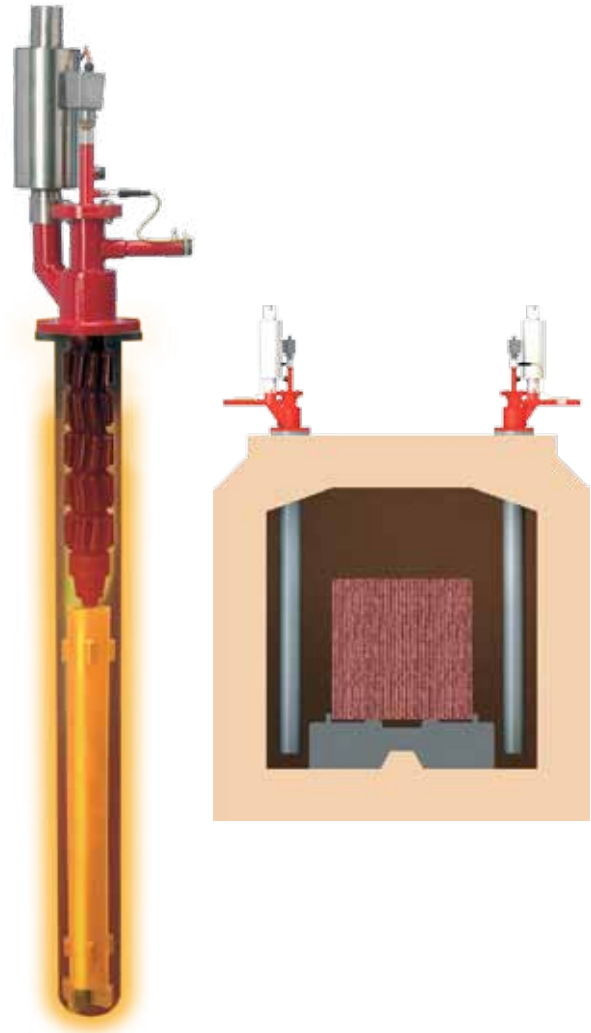
## Maintenance

Ecothal burner systems have been developed based upon existing techniques but have been optimized using the latest technology. A robust design, all metallic construction ensures reliable and virtually maintenance free operation.

The fully metallic design also means easy handling with no risk of damage. The tube system components made from Kanthal APM and Kanthal APMT, dramatically reduce the need for turning and cleaning stops as compared to a conventional NiCr tube based system.

## Adaptable design

Ecothal SER burner is easily adaptable to existing systems. With Ecothal it is possible to implement the latest burner technology in both new furnace designs as well as in upgrading of existing furnaces.

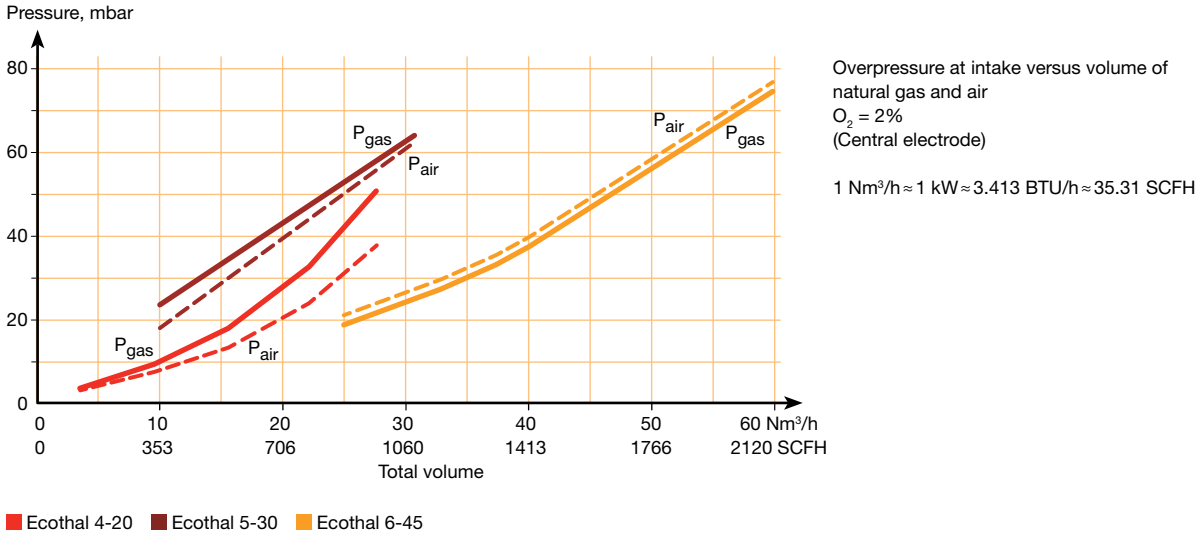


*The burners are produced according to customer specifications and are available for horizontal or vertical installation. Ecothal SER burners fit most standard systems.*



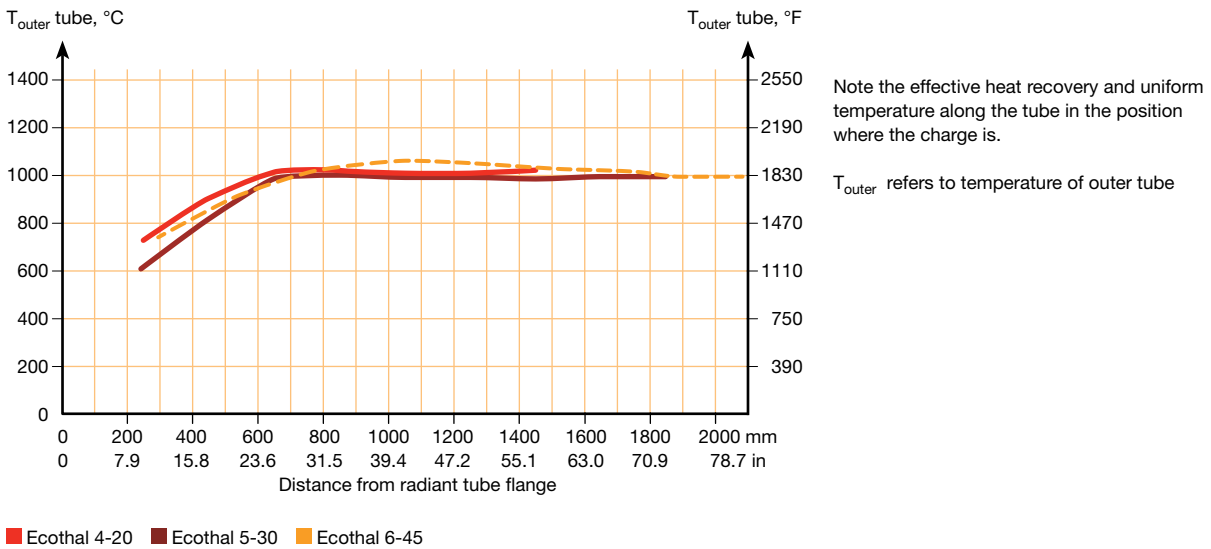
# Pressure drop

**Ecothal SER burner is easily adaptable to existing systems**



# Temperature distribution

**Temperature distribution at 25 kW at furnace temperature 925°C (1665°F), recuperator length 565 mm (22 in)**



# Tubes in Kanthal APM™ and Kanthal APMT™

Tubes in Kanthal APM and Kanthal APMT iron-chromium-aluminum (FeCrAl) alloys, are seamless and produced by extrusion. They are produced by an advanced powder metallurgy process route and are dispersion strengthened. Tubes in Kanthal APM tubes are suitable for use in a wide range of temperatures and atmospheres, covering many applications and processes in various industries. Kanthal APMT alloy, has the same excellent high-temperature corrosion resistance as Kanthal APM, but with even higher strength. This property can be beneficial in horizontal applications at the highest temperatures.

Tubes in Kanthal APM and Kanthal APMT are very form stable, resistant to bending and other forms of creep deformation. The tubes do not exhibit the same dramatic decrease in strength that FeNiCr tubes show at elevated temperatures. Tubes in Kanthal APM and Kanthal APMT will work well at temperatures up to 1250°C (2280°F). At this high temperature oxidation is still not a big concern; this is due to the oxide layer formed on the tube surface. Instead of conventional Chromium oxide, Cr<sub>2</sub>O<sub>3</sub>, the Kanthal alloys form the much more stable aluminum oxide, Al<sub>2</sub>O<sub>3</sub>. The oxide is non-spalling, hence no scaling and no contamination of the heat treated goods and reduced risk of burner set-up malfunction.

Besides oxidation this aluminum oxide offers excellent corrosion resistance to carburizing and sulphidizing atmospheres. Kanthal alloys also outperform the FeNiCr-alloys in high carbon potential atmospheres, where coking, carbon build-up and metal dusting can be problematic.

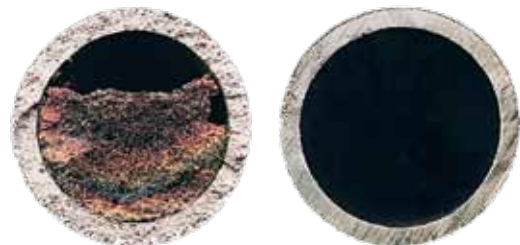
Radiant tubes in Kanthal APM and Kanthal APMT are capable of far higher operating temperatures than FeNiCr-tubes. This allows system manufacturers and users to exploit the higher outputs of modern heating designs. It is possible to dissipate the same power input with fewer tubes or to utilize the loading potential for productivity increases.

At a furnace temperature of 1000°C (1830°F) a gas fired SER system using tubes in Kanthal APM and Kanthal APMT could operate with twice the power of a similar system that uses FeNiCr-tubes.

The tubes for SER-applications are supplied as ready-to-install tubes with flange and bottom welded to the outer tube and distance spacers to the inner tube. End crosses and other components are also manufactured from Kanthal APM and Kanthal APMT alloys.

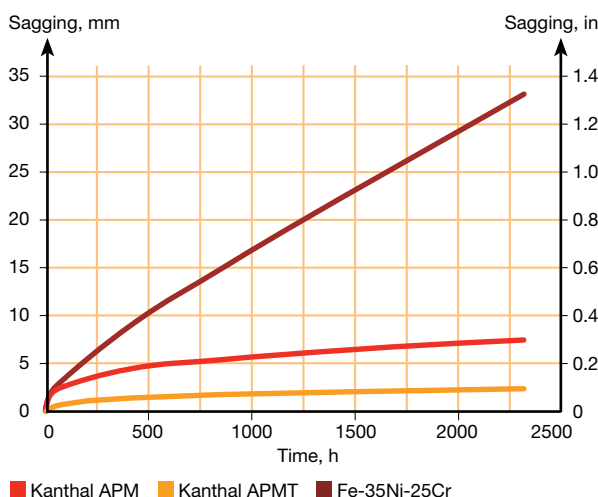
## Typical chemical composition

Grade	Weight %			
	Cr	Mo	Al	Fe
Kanthal APM	22	–	5.8	balance
Kanthal APMT	22	3.0	5.0	balance



Comparison of carbon build-up in a strand annealing furnace, NiCr (left) and Kanthal APM (right).

## Comparative sagging test at 1100°C (2010°F)



Comparison of tube in Kanthal APMT vs. tube in Fe-35Ni-25Cr after 2300 hours at 1100°C (2010°F). The FeNiCr tube is severely contaminated with oxide flakes.

**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.

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**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.

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