Sinus Jevi
Tubular Heating Elements

Heating elements are used for applications such as ovens, cookers and griddles and for warming up tools and machinery. These heating elements are very flexible and can be bent to suit the application.
Sinus Jevi has a broad range of steel types which make it possible to supply products for more or less all applications.

SINUS JEVI

Liquids Gasses Solids Spaces Resistors

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Heating elements are often produced to customer-specific requirements.

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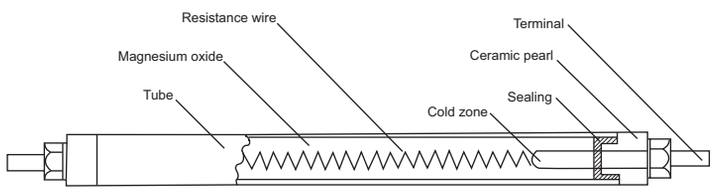
Sinus Jevi's compressed heating elements comprise three components
- a special alloy resistance wire which is centered in the tube (resistance wire can be CrNi or DSD)
- magnesium oxide for electrical insulation
- steel tube cap, material depending on application.

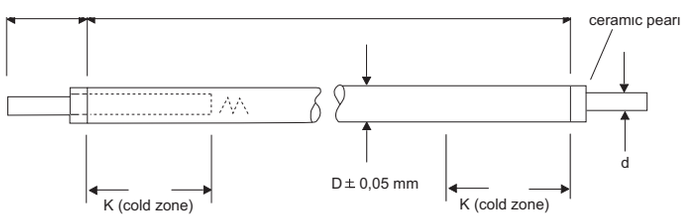
TUBE TYPES
Sinus Jevi has a broad range of steel types which make it possible to supply products for more or less all applications. The table on page 2 shows the stocked steel types, maximum length, temperature range and terminal options.

COLD ZONE
The cold zone at the tube ends may vary from 35 mm up to 1200 mm depending on the choice of terminal and tube type.

SEALING
The heating element is sealed to prevent the magnesium oxide from absorbing moisture and thereby causing a transition point in the heating element. Two types of sealant are used, depending on how high temperature the seal may be subject to.
- silicone: max. 180°C
- polyurethane: max. 120°C

Silicone can only be used in continuous operation in which the heating element is not exposed to moisture, as silicone is not diffusion-proof so moisture transfer is possible. Polyurethane is diffusion-proof and bonds well to metal.





TUBE TYPES

Material	Dimension	Max. surface temperature	Max. tube length	Ø2.5 pin	Ø3.5 pin	M4 steel	M4 stainless steel	M6 stainless steel
Copper	Ø6.25 mm	150°C	3860 mm	X				
Copper	Ø8.50 mm	150°C	7080 mm	X	X	X	X	
Copper	Ø10.2 mm	150°C	7860 mm	X	X	X	X	
AISI 304	Ø6.25 mm	750°C	3700 mm	X				
AISI 304	Ø8.50 mm	750°C	6810 mm	X	X	X	X	
AISI 321	Ø6.25 mm	750°C	3700 mm	X				
AISI 321	Ø8.50 mm	750°C	6810 mm	X	X	X	X	
AISI 321	Ø10.2 mm	750°C	7650 mm	X	X	X	X	
AISI 309	Ø8.50 mm	900°C	6400 mm	X	X	X	X	
AISI 316L	Ø6.25 mm	750°C	3700 mm	X				
AISI 316L	Ø8.50 mm	750°C	6810 mm	X	X	X	X	
AISI 316L	Ø10.2 mm	750°C	7650 mm	X	X	X	X	
AISI 316L	Ø12.7 mm	750°C	7020 mm					X
Inconell 600	Ø8.50 mm	980°C	6810 mm	X	X	X	X	
Incoloy 800	Ø6.25 mm	800°C	3700 mm	X				
Incoloy 800	Ø8.50 mm	800°C	6810 mm	X	X	X	X	
Incoloy 800	Ø10.2 mm	800°C	7650 mm	X	X	X	X	
Incoloy 800	Ø12.7 mm	800°C	7020 mm					X
Incoloy 825	Ø6.25 mm	750°C	3700 mm	X				
Incoloy 825	Ø8.50 mm	750°C	6810 mm	X	X	X	X	
Incoloy 825	Ø12.7 mm	750°C	7020 mm					X
SMO 254	Ø8.50 mm	400°C	6810 mm	X	X	X	X	
Titanium	Ø8.50 mm	650°C	6900 mm	X	X	X	X	
Titanium	Ø12.7 mm	650°C	6960 mm					X

APPLICATIONS

Of course, when choosing a tube cap material, the medium to be heated has a significant part to play. The surface load, W/cm², is another factor. If the surface load is too high, the heating element will overheat and burn. In the case of certain medium where the heat transmission is particularly high, a significantly higher surface load than in air can be accepted, just as the media may make specific demands of the tube cap material on account of corrosion problems.

Likewise the media may demand a particularly low surface temperature due to -for example- a risk of fire or coating problems. The issue of corrosion can often be resolved by contacting a supplier of chemicals.

This guideline table specifies the recommended maximum surface load in W/cm² for various heating purposes in connection with the most suitable tube cap materials.

Heating materials

	Max. W/cm²	CU	AISI 304	AISI 309	AISI 316	AISI 321	INC 600	INC 800	INC 825	SMO 254	Titanium
Liquid media											
Water, stagnant	6 - 10	X							X	X	X
Water, moving	10 - 15	X							X	X	X
Alkaline bath	4 - 6								X	X	X
Water-dissolved acids and salts	1 - 2								X	X	X
Phosphating bath	2 - 4										
Ammonia and ammonium chloride bath	2 - 3								X	X	X
Oil, thin	1 - 3		X		X				X	X	X
Oil, thick	1 - 1½		X		X						
Wax and lacquers	0.5		X		X						
Gaseous media											
Air, stationary	1 - 3		X	X	X	X	X	X			
Air, moving	5		X	X	X	X	X	X			
Steam 100°C	2 - 4	X				X		X	X	X	
Steam 250°C	1 - 3					X		X	X	X	
Steam 500°C	1 - 3							X	X		
Flue gas 300°C	1 - 3				X	X	X	X	X	X	
Solid media (e.g. steel plate)											
Without regulation	1-½		X	X	X	X	X	X	X		
Embedded in metal	4 - 6		X	X	X	X	X	X	X		
With regulation	8 - 10		X	X	X	X	X	X	X		
Laid in track	3 - 6		X	X	X	X	X	X	X		

BENDING SKETCHES

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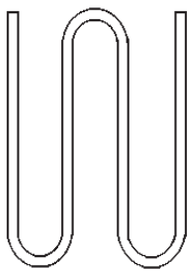
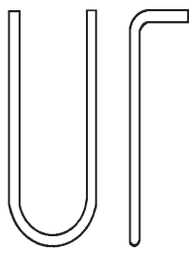
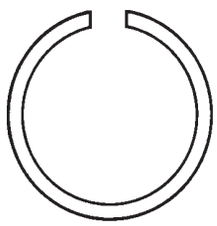
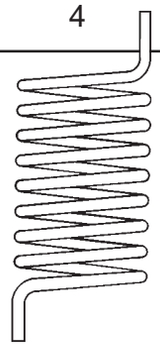
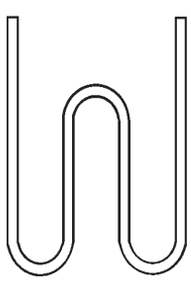
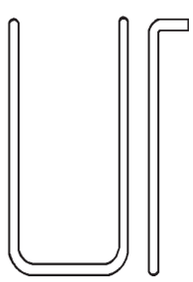
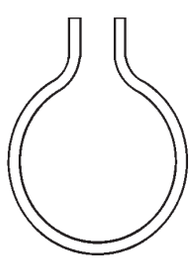
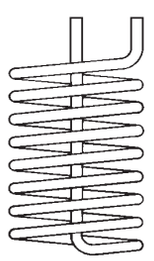
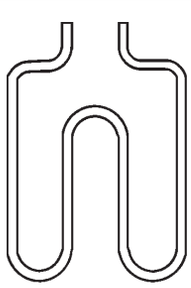
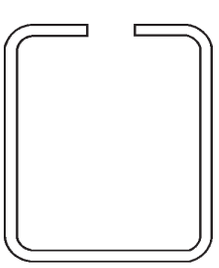
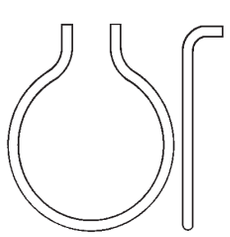
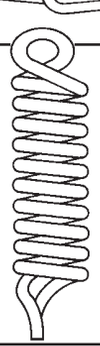
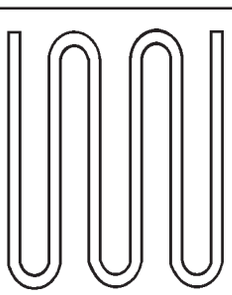
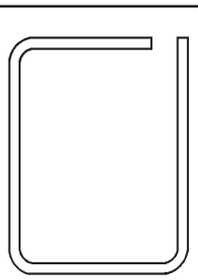
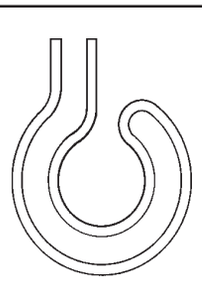
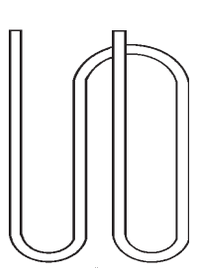
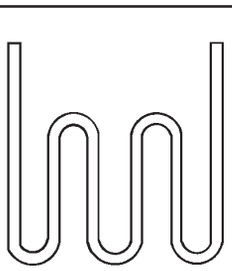
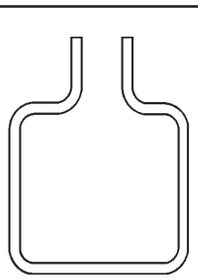
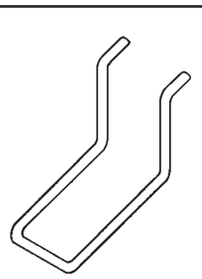
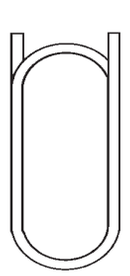
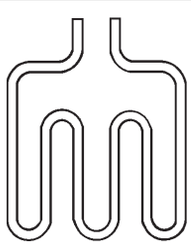
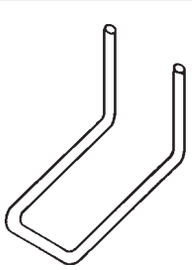
I				
J				
K				
L				
M				
N			There are many different ways of bending tubular heating elements. Take a look at the table and find the bend drawing that suits your requirements – or send us a drawing of your own!	

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FINISHES

The illustrations show typical end pieces used for heating elements and electric heater cartridges. There are lots of other options available too, so please contact our sales team for more information.

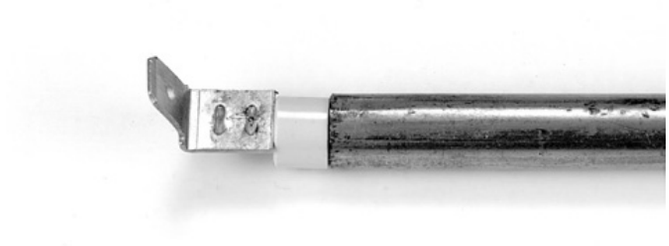
M4 threaded bolt on Ø8.5 and Ø10.2 tubes.
M6 threaded bolt on Ø12.7 tube only.

Double spade, 90° angle.

Single spade 6.3 mm.

Fitted with an insulated flex or stranded wire.
High-temperature flex for up to 400°C is stocked.

Single spade with 45° or 90° angle bend.



End piece with welded cable and shrink flex

Double spade, straight.

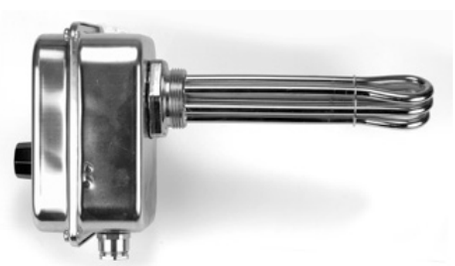
Fully cast end piece with polyurethane for outstanding seal.

FLANGES AND NIPPLES

Tubular heating elements soldered or welded with brass or stainless steel nipples. The following are stocked: Brass nipples: ½", ¾", 1", 1¼", 1½", 2", 2 ½" and 3". Stainless steel nipples: ½", ¾", 1", 1½" and 2 ½".

Electric heater cartridge with oval galvanised or stainless steel box end piece IP55 with PG 13.5. 1½" and 2".

Electric heater cartridge with quadrilateral box end piece. Thermostat and thermal fuse fitting optional depending on task and temperature.



Heating elements terminated with nipples for fitting in tanks or reservoirs. Nipples are stocked in: M10, M12, M14 and M16 sizes, made of brass and stainless steel. M14 made of galvanized steel is also stocked.

UF40 flange for household appliances. Can be used for one tubular heating element only.

UF70 flange for household appliances. Can be used for one or two tubular heating elements.

Connecting boxes for electric heater cartridges and tubular heating elements. These can be fitted with thermostats and thermal fuses depending on type.

Special flanges for electric heater cartridges and tubular heating elements. The various flanges can be soldered, welded or clamped onto the heating elements.

STAINLESS STEEL TUBING, AISI 304

All standard tubes of Ø8.5mm and Ø10.2mm come with M4 threaded bolt. Standard tubes of Ø6.25mm come with a Ø2.5mm pin (flat). It is possible to weld a spade or wire onto a flat pin.

AISI 304 is used widely for duct heater in ventilation and air conditioning systems, for ovens, cookers and griddles, warming up tools and machinery, fan heaters and oil heater cartridges.
AISI 304 is not suitable for water, and can be used only to a very limited extent for chemicals. The surface load must be very low for use in air and oil. The surface load may be increased in the case of contact heating.

Type Ø6.25mm, AISI 304, cold zone 55 mm				
Item no.	**Length**	**Voltage**	**Power**	**Surface load**
22800080	350 mm	230V	225W	4.8 W/cm²
22800098	500 mm	230V	350W	4.6 W/cm²
22800106	600 mm	230V	500W	5.2 W/cm²
22800114	850 mm	230V	750W	5.2 W/cm²
22800122	1100 mm	230V	1000W	5.1 W/cm²
22800130	1300 mm	230V	1200W	5.1 W/cm²
22800148	1600 mm	230V	1500W	5.1 W/cm²
22800155	2100 mm	230V	1000W	2.6 W/cm²
22800163	2100 mm	230V	1500W	3.8 W/cm²
22800171	2100 mm	230V	2000W	5.1 W/cm²
22800254	600 mm	400V	500W	5.2 W/cm²
22800262	850 mm	400V	750W	5.2 W/cm²
22800270	1100 mm	400V	1000W	5.1 W/cm²
22800288	1300 mm	400V	1200W	5.1 W/cm²
22800296	1600 mm	400V	1500W	5.1 W/cm²
22800304	2100 mm	400V	1000W	2.6 W/cm²
22800312	2100 mm	400V	2000W	5.1 W/cm²
22800320	2500 mm	400V	2500W	5.3 W/cm²

Type Ø8.5mm, AISI 304, cold zone 90 mm				
Item no.	**Length**	**Voltage**	**Power**	**Surface load**
23801202	700 mm	400V	500W	3.6 W/cm²
23801210	1000 mm	400V	750W	3.4 W/cm²
23801228	1350 mm	400V	1000W	3.2 W/cm²
23801236	1950 mm	400V	1500W	3.2 W/cm²
23801244	2600 mm	400V	2000W	3.1 W/cm²
23801251	3450 mm	400V	2700W	3.1 W/cm²
23801269	700 mm	400V	1000W	7.2 W/cm²
23801277	1000 mm	400V	1500W	6.8 W/cm²
23801285	1350 mm	400V	2000W	6.4 W/cm²

Type Ø8.5mm, AISI 304, cold zone 55 mm				
Item no.	**Length**	**Voltage**	**Power**	**Surface load**
23801293	1950 mm	400V	3000W	6.3 W/cm²
23801301	2600 mm	400V	4000W	6.2 W/cm²
23801319	3450 mm	400V	5400W	6.2 W/cm²
23800964	500 mm	230V	150W	1.8 W/cm²
23800972	500 mm	230V	250W	2.9 W/cm²
23800980	650 mm	400V	500W	4.0 W/cm²
23800998	650 mm	400V	1000W	8.0 W/cm²
23801004	900 mm	400V	1500W	7.8 W/cm²
23801012	1200 mm	400V	2100W	7.8 W/cm²
23801020	1500 mm	400V	2700W	7.7 W/cm²
23801038	1800 mm	400V	3300W	7.6 W/cm²
23801046	2100 mm	230V	1300W	2.5 W/cm²
23801053	2400 mm	230V	1500W	2.5 W/cm²
23801061	2700 mm	230V	1700W	2.5 W/cm²
23801087	3300 mm	230V	2100W	2.5 W/cm²
23801103	3900 mm	230V	2500W	2.5 W/cm²
23801525	750 mm	400V	700W	4.6 W/cm²
23801541	950 mm	400V	1000W	4.9 W/cm²
23801566	1350 mm	400V	1500W	4.8 W/cm²
23801582	1750 mm	400V	2000W	4.8 W/cm²
23801608	2200 mm	400V	2500W	4.6 W/cm²
23801624	2600 mm	400V	3000W	4.6 W/cm²
23801657	3450 mm	400V	4000W	4.6 W/cm²

Type Ø10.2mm, AISI 304, cold zone 90 mm				
Item no.	**Length**	**Voltage**	**Power**	**Surface load**
24800104	1800 mm	400V	2500W	4.8 W/cm²
24800112	2100 mm	400V	3000W	4.8 W/cm²
24800120	2500 mm	400V	3500W	4.7 W/cm²

STAINLESS STEEL TUBING, AISI 316L

AISI 316L is used primarily for air heating in duct heater, particularly for offshore applications, oil installation and in other damp environments. To a limited extent, AISI 316L is also used with restrictions with some acids/bases and with aggressive gases.

Type Ø8.5mm, AISI 316L, cold zone 90 mm				
Item no.	**Length**	**Voltage**	**Power**	**Surface load**
23802101	500 mm	230V	1000W	11.7 W/cm²
23802119	700 mm	230V	1500W	10.8 W/cm²
23802127	900 mm	230V	2000W	10.4 W/cm²
23802135	1300 mm	230V	3000W	10.0 W/cm²
23802143	500 mm	400V	1000W	11.7 W/cm²
23802150	700 mm	400V	1500W	10.8 W/cm²
23802168	900 mm	400V	2000W	10.4 W/cm²
23802176	1300 mm	400V	3000W	10.0 W/cm²
23802184	1700 mm	400V	4000W	9.8 W/cm²
23802192	1000 mm	230V	1000W	4.6 W/cm²
23802200	1350 mm	230V	1500W	4.8 W/cm²
23802218	1700 mm	230V	2000W	4.9 W/cm²
23802226	1000 mm	400V	1000W	4.6 W/cm²
23802234	1350 mm	400V	1500W	4.8 W/cm²
23802242	1700 mm	400V	2000W	4.9 W/cm²
23802259	3000 mm	400V	3500W	4.6 W/cm²

CORROSION AND ACID RESISTANT TUBING, INCOLOY 825

Incoloy 825 is used wherever heating elements are required which are able to withstand aggressive media, but it can also be used for heating water which contains a lot of minerals and lime.

Incoloy 825 is a high alloy steel with a molybdenum content higher than the AISI types, making it suitable for aggressive media.
Incoloy 825 is replacing the AISI steels to an increasing extent in many areas.

Type Ø8.5mm, Incoloy 825, cold zone 90 mm				
Item no.	**Length**	**Voltage**	**Power**	**Surface load**
23804008	600 mm	230V	1000W	8.9 W/cm²
23804016	850 mm	400V	1500W	8.4 W/cm²
23804024	1100 mm	400V	2000W	8.1 W/cm²
23804040	1550 mm	400V	3000W	8.2 W/cm²
23804032	2000 mm	400V	4000W	8.2 W/cm²
23804057	3000 mm	230V	2000W	2.7 W/cm²

DIMENSIONING

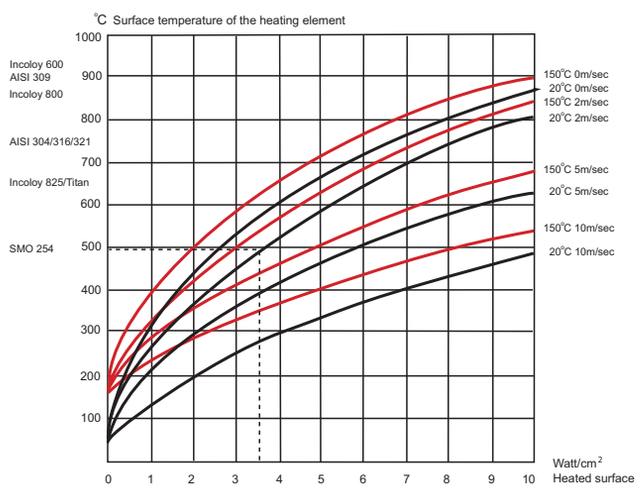
Diagrams/curves are used to indicate the maximum permitted surface load (W/cm²) as a function of the operating/ambient temperature. These curves act merely as a guideline as the heat passing between the elements will have a part to play. If the heating elements are used in a duct heater, the length of this will also have an influence.

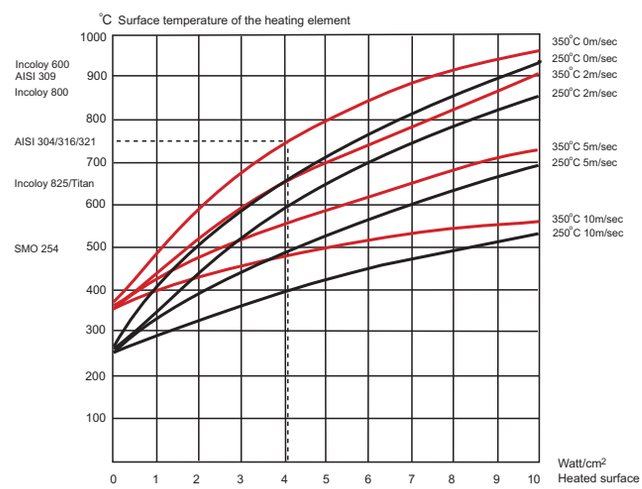
Example 1 (see the diagram below)
We wish to find out what maximum permitted surface load is applicable to the heating element, working on the basis of the following information:
- the duct heater as an input temperature of 20°C
- the air speed is 2 m/sec.
- AISI 304 is used (indicated to be able to withstand 700 - 800°C)
- a maximum permitted surface temperature of 500°C is selected for safety reasons.

What surface load will this give for the element?
We select the curve 20°C 2 m/sec and follow it down to 500°C.
A maximum permitted surface load of 3.5 W/cm² can be seen. If this is too low, it is possible to select a faster airflow of 5 m/sec, for example, which would give a value of 5.8 W/cm², or else less stringent requirements for a safety temperature of 500°C could be selected.

Example 2 (see the diagram below)
What would the maximum permitted surface load be if we have an AISI 316 heating element and the following operating conditions are prevalent?
- operating temperature of 350°C
- the heating element is located in stationary air, 0 m/sec.

We find the curve 350°C 0 m/sec and follow it until we see AISI 316. We can see a maximum permitted surface load of 4 W/cm².
If a different type of steel is selected, such as Incoloy 800, the surface load increases to 6.4 W/cm².





SINUS JEVI

Sinus is one of the pioneers in the field of explosion proof heating equipment, today we are still operating at the forefront. We manufacture according to ATEX as well as IECEx and EAC directives.

For the production of Ex-proof equipment a PQAN (Product Quality Assurance Notification) is issued by TUV-Nord. Our ISO-9001 and ISO-14001 systems are also monitored by this organisation.

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