FURNATEMP

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The Heat with Solutions

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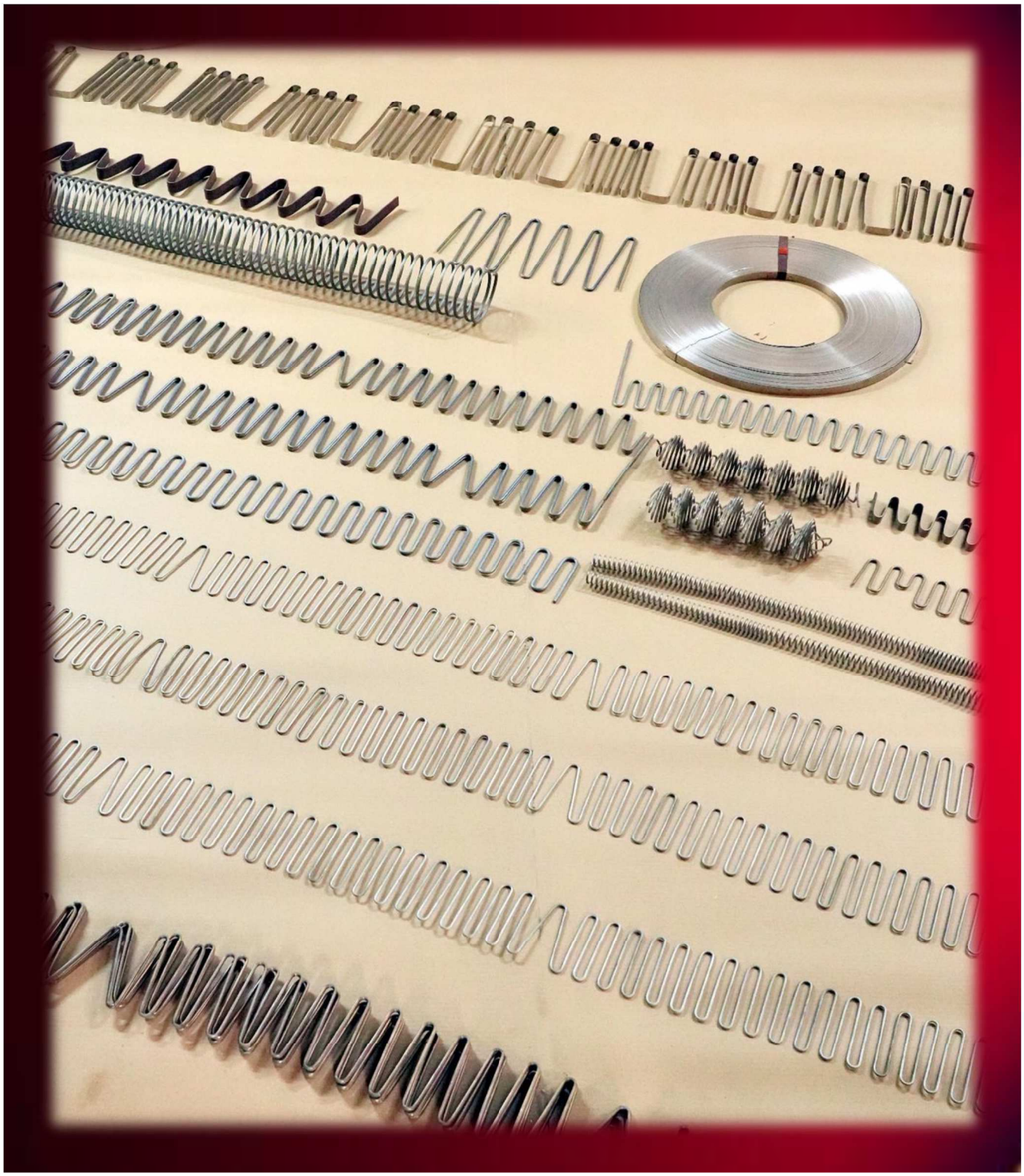
FURNATEMP® HEATING ELEMENTS



FURNATEMP METATEK INDIA PRIVATE LIMITED

302/3-5, Seetharam Industrial Estate, V.P.Road,
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GSTIN: 29AAFCF5214K1ZH, CIN: U28150KA2023PTC175221

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FURNATEMP HEATING ALLOY

FURNATEMP Heating Alloy is a metallic heating alloy that supports the maximum duty temperature of 1420°C. This alloy supports the continuous operating temperature of 1250°C in free atmosphere. The alloy is processed with special alloying technology and is different from conventional methods. The improved form stability and hot strength is exceptionally good compare to other standard alloy due to the advanced electro slag & PM method. The material features high deformation resistance at high temperature and oxidation resistance, which have been impossible in traditional molten metal heating materials.

FEATURES & CHARACTERISTICS

- Better form stability at elevated temperature.
- Better hot strength.
- Superior deformation resistance at high temperature with minimum sagging and deformation of heating wires at high temperature (1100 to 1420°C).
- Exceptionally good oxidation resistance
- Strong and Cohesive alumina layer is formed on the heating wire surface, resulting in a long service life.
- Excellent formability.
- Easy heating wire design and workability, when determining the shapes of heating wires made of molten alloy, it is normally necessary to take deformation into consideration. However, the FURNATEMP Heating Alloy is almost free from deformation after long use and features superior welding performance. Thus, it is easy to design and process heating elements.

APPLICATIONS

FURNATEMP Heating Alloy can be used for all types of industrial high temperature furnaces up to 1235°C. FURNATEMP Heating Alloy can find application in all metallurgical heat treatment furnaces, Ceramic industries, Heavy Engineering, Automobile Industries, defense applications with research & development activities.

ELEMENT FORMS

FURNATEMP ROB (Rod Over bend) ELEMENT

FURNATEMP TANDEM ELEMENT

FURNATEMP SPIRAL ELEMENT

FURNATEMP STRIP ELEMENT (SOB)

FURNATEMP PORCUPINE ELEMENT

FURNATEMP STRAIGHT ROD ELEMENT

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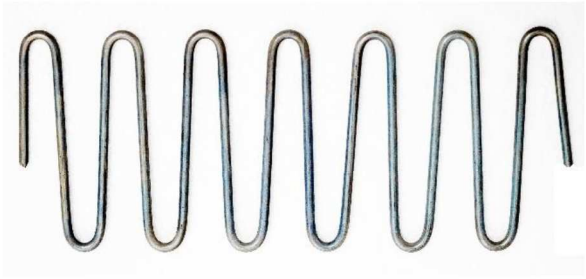

ROB or **Rod Over Bend** Element refers to Heating elements in round form, that is nothing but electrical resistance wire in different sizes. These elements are formed in zigzag / sinusoidal shape.

These Elements are supported by a top hook at every bend which is embedded to FURNATEMP Module/Board or any other heating surfaces.

FURNATEMP TANDEM ELEMENT

Two or more **ROB** (**Rod Over Bend)** Element arranged one behind the other by the method of fusing is called FURNATEMP TANDEM Element.
These heating elements has more advantage of loading more power in same heating length as surface area is increased.

FURNATEMP SPIRAL ELEMENT

Spiral Elements are metallic round form electrical resistance wire in different sizes. These elements are formed in spiral / round spring shape.

These Elements are embedded with FURNATEMP Module/Board or any other heater supporting surfaces like grooved bricks, Coil on ceramic tube heaters, FURNATEMP Candy heaters, etc.

FURNATEMP STRIP ELEMENT (SOB)

SOB or **Strip Over Bend** Element refers to Heating elements in strip/flat form, that is nothing but electrical resistance strip in different sizes. These elements are formed in zigzag / sinusoidal shape.
These Elements are supported by a top hook at every bend which is embedded to FURNATEMP Module/Board or any other heating surfaces. Strip Heating element can be used in Heating cassettes, Edge wound heaters, etc.

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FURNATEMP PORCUPINE ELEMENT

Popularly known Porcupine Elements are in star shape in longitudinal view.

These heaters are used in Heating cassettes where the rapid temperature is required. More power density can be achieved in a given space, due to this large freely exposed surface area.

FURNATEMP STRAIGHT ROD ELEMENT

These elements are used in horizontal & vertical applications like Bundle rod/ bird Cage Heaters & terminal connection.

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FURNATEMP METALIC HEATING ELEMENT DATA

	Fe-Cr-Al Heating Element			Ni-Cr Heating Element
	FURNA -T1	FURNA-TPM		FURNA-NiCr80
Standard chemical Components (%)	Al 6.0 Cr 23 Fe Remaining	Al 6.0 Cr 23 Fe Remaining		Cr 19-21 Fe 1 or less Ni 77 or more
	Other elements in small quantity			
Max. duty temp. of Heating Elements (°C)	1400	1420		1100
Electric resistivity 20 °C (μΩ-m)	1.45 ± 5%	1.45 ± 5%		1.08 ± 5%
Expansion from thermal Factor (for various temperature range)	15.1×10^{-6} [20°C - 1000°C ($°C^{-1}$)]	14.8×10^{-6} [20°C - 1000°C ($°C^{-1}$)] 15.9×10^{-6} [20°C - 1400°C ($°C^{-1}$)]		17.6×10^{-6} [20°C - 1000°C ($°C^{-1}$)]
Yield strength MPa	300-600	300-600		200-600
Hardness (Hv)	200-240	200-240		150-190
Melting Point (°C)	1500	1500		1400
Electric resistance temperature coefficient	33×10^{-6}	15×10^{-6}		58×10^{-6}
Increase from Oxidation 1,200°C (mg/cm^2 h)	0.05	0.05		0.25 or less
Tensile strength	MPa	650-900	650-900	700-900
	(kgf/mm^2)	(65-90)	(65-90)	(70-90)
Specific Gravity	7.1	7.1		8.4
Elongation (%)	15-25	15-25		20 or more
Emissivity - fully oxidized material	0.70	0.70		0.88
Max operating temperature in air (°C)	1250	1250		1100
Magnetic Properties	Magnetic	Magnetic		Non- Magnetic
Recommended Surface loading (W/cm^2) (for various temperature range)	Max. 5 W/cm^2 [100- 500 °C] Max. 3 W/cm^2 [500- 800 °C] Max. 2.5 W/cm^2 [800- 1050 °C] Max. 1.5 W/cm^2 [1050- 1250 °C]	Max. 6 W/cm^2 [100- 500 °C] Max. 3.5 W/cm^2 [500- 800 °C] Max. 3 W/cm^2 [800- 1050 °C] Max. 2 W/cm^2 [1050- 1250 °C]		Max. 5 W/cm^2 [100- 500 °C] Max. 3 W/cm^2 [500- 800 °C] Max. 2 W/cm^2 [800- 1100 °C]

NOTE: Surface loading for Heating Element in Radiant tube is lower than above

Temperature factor of resistivity of FURNA-T1 & FURNA -TPM

Multiply the resistance at the normal temperature by the coefficient [Ct] shown below to obtain the resistance at working temperatures.

Temp. °C	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400
Ct	1.00	1.00	1.00	1.01	1.01	1.02	1.02	1.03	1.03	1.04	1.04	1.04	1.04	1.04

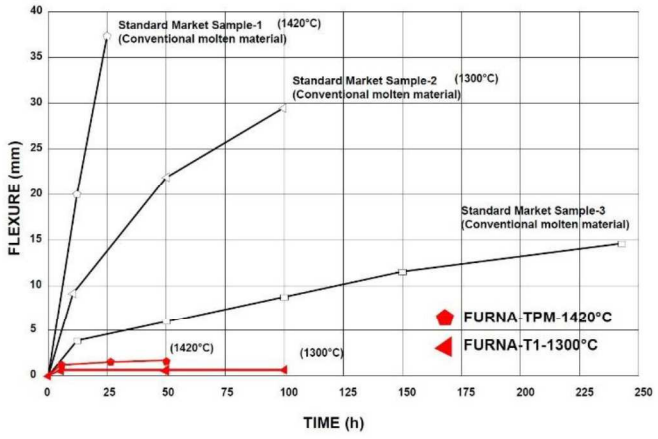
Specific heat capacity of FURNA-T1 & FURNA -TPM

Temp °C	20	200	400	600	800	1000	1200	1400
kJ kg^{-1} K^{-1}	0.46	0.56	0.63	0.75	0.71	0.72	0.74	0.80

Thermal conductivity of FURNA-T1 & FURNA -TPM

Temp °C	50	600	800	1000	1200	1400
W m^{-1} K^{-1}	11	20	22	26	27	35

High temperature Deformation resistance graph for different Temperature & Grade



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PRODUCTION GALLERY

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