MESICA ELEMENTS PRIVATE LIMITED

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About us

MESICA Elements Private Limited operates from the historic city of Mysuru – the cultural capital of the State of Karnataka, India. Established in 2023, MESICA is a premium manufacturer of Silicon Carbide heating elements that are used for industrial purposes and research, among others. Despite the relatively short duration since its inception, MESICA has developed both the capabilities of supplying for special-purpose orders as well as for general applications – having received appreciation from institutes of high standing in industry and engineering esp. from the leading IIT, for the efficacy of the product supplied.

As Indian furnace manufacturers not only suffer under a serious lack of production of indigenous SiC heating elements but also suffer from months-long delays in receiving imports of the same, all the while incurring damages in transit to the fragile elements, MESICA aims to contribute to the burgeoning furnace industries at home and abroad.

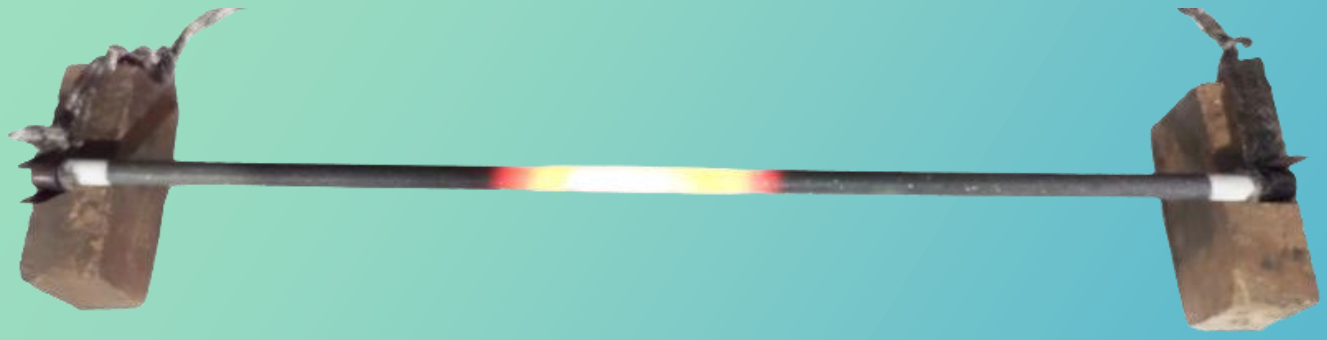
The intent to contribute to the supply globally is bolstered by the actual engineering prowess of MESICA which also has a revolutionary patent for producing "Modular Silicon Carbide Heating Elements" which cuts the cost of production as well as its time of production significantly. A week's time in dispatching orders received is revolutionizing the supply side of the Industry.

For a product that is both durable as well as quickly obtained and by far, the most cost effective – MESICA Elements Private Limited, Mysuru.

Product and Process

Silicon Carbide (SiC) heating elements are greenish-black, round and hollow tubes generally used as the main heat source in electrical resistance furnaces for achieving temperatures up to 1500 °C. MESICA uses high purity Green Silicon Carbide, a celebrated semiconductor material and extrudes it into the aforementioned round hollow tubes of specific dimensions in length (range: 250 mm to 2500 mm) and diameter (range: 10 mm to 54 mm).

The SiC mixture is extruded above 250 kg/cm^2 and is sintered at an extremely high temperature of 2200 °C. At this stage, the moulded SiC powder turns into a Silicon Carbide heating element. This occurs by acquiring the necessary physical and electrical properties as the sintering process recrystallizes the material permanently. The product now has a density between 2.5 – 2.8 g/cm^3. The element is metallised at the ends to enable ultimate electrical connectivity from the power source to the element. Each element is meticulously tested and calibrated twice at 800 °C to ensure the ideal resistance of the element.



The element itself has three distinct regions: the central region is referred to as the 'Hot zone'. The hot zone has the highest resistance in the element and this is the true region in the element which imparts the temperature to the furnace set-up by its high-temperature glow. Adjoining the hot zone at each of its ends are the 'Cold zones'. Cold zones are engineering marvels that do not glow hot and thus, critically protect the precious lining of any furnace.

Every SiC heating element in its lifetime gradually increases its ideal resistance value with usage, this phenomenon is known as 'Ageing'. After an element has sufficiently aged, it will be rendered unusable. This, however, is influenced by multiple physical and operational factors. Regardless, the best performance of the SiC heating element is achievable when the mean furnace temperature ranges around 700 °C - 1250 °C. Ageing is directly proportional to the mean surface temperature; ageing exacerbates when the mean surface temperature ranges from 1250 °C to 1500 °C.

Note:

MESICA manufactures the following broad categories of SiC heating elements:

- Conventional Elements (3-piece joint elements as available in the market)
- Jointless Elements (Superior strength with improved performance)
- Patented Modular Heating Elements (Revolutionary technology & performance)
- Spiral elements
- Dumbbell Shaped Elements

* All the pictures in this document are real images from the manufacturing facility of MESICA Elements Private Limited, Mysuru.

The MESICA Advantage

MESICA clientele stands to gain the following benefits:

Sl. no.	Parameter	MESICA Elements	Other SiC Heating Element Suppliers
1	**SiC Heater**	**Single piece element; manufactured without joints and is resilient to breakage**	**Elements are constituted by 3 different pieces welded together – weak at the joints and more prone to breakage**
2	**Electrical Resistance**	**± 10 % on the element's ideal resistance specifications**	**± 20 % on the element's ideal resistance specifications**
3	**Cold zone to Hot zone electrical resistance ratio**	**1:200; highly efficient heat generation and power utilisation**	**1:35 (maximum); poorer efficiency in both thermal and electrical parameters**
4	**Power losses in cold zone length**	**~ 0 %**	**5 – 6 %**

MESICA also undertakes Furnace servicing requests

DATA SHEET

(Physical and Electrical Properties)

Sl. no.	Diameter (in mm)	Weight /100 mm (in gm approx.) Based on Density – 2.5 g/cm^3	Ideal Electrical Resistance /100 mm (In Ω approx.)	Surface Area /100 mm (In cm^2)	Surface Wattage Loading/100 mm (In watt)
1	**10**	**16**	**1.25**	**32**	**168**
2	**12**	**25**	**0.80**	**38**	**200**
3	**14**	**28**	**0.70**	**44**	**231**
4	**16**	**38**	**0.52**	**50**	**262**
5	**18**	**50**	**0.45**	**57**	**300**
6	**20**	**62**	**0.40**	**63**	**330**
7	**25**	**102**	**0.20**	**79**	**415**
8	**28**	**136**	**0.18**	**88**	**462**
9	**30**	**158**	**0.15**	**95**	**499**
10	**32**	**170**	**0.13**	**100**	**525**
11	**35**	**197**	**0.11**	**110**	**577**
12	**38**	**230**	**0.095**	**120**	**630**

*Recommended Surface Wattage Loading – between 4.5 to 6 W/cm^3

Referring to the above table, parameters for any length/dimensions of elements can be obtained. For instance,
If the Net Weight, Recommended Wattage Loading and Ideal Electrical Resistance of a 25mm diameter with a total length of 1200 mm having a hot zone (HZ) of 500 mm is to be obtained:

- Net Weight (1200 mm element) = $^{102\ g}/_{100\ mm}$ x 1200 mm = 1224 gm
- Recommended Wattage (500 mm HZ) = $^{415\ W}/_{100\ mm}$ x 500 mm = 2.07 kW
- Ideal Electrical Resistance (500 mm HZ) = $^{0.20\ \Omega}/_{100\ mm}$ x 500 mm = 1 Ω

*The elements supplied can vary nominally by ±10% from ideal/expected values.
*The diameters of the elements can vary nominally by ±1 mm from the ordered specification.
*The lengths of the elements supplied can vary nominally by ±5 mm from the ordered specification.

MESICA's Patented
MODULAR HEATING ELEMENT

Generational challenge:

Cold Zones are certainly useful and critical in an element but they get discarded along with the hot zone when ageing surpasses a threshold. Generally, twice the size of a hot zone, cold zones make up the bulk of any given element and its price. Yet, it is the hot zone that imparts temperature and the basis for its capacity. Regardless, the cold zones are scrapped together with the hot zone, despite them being perfectly operational. It seems like an inefficient method of utilising a product where more than 2/3rd needs to be discarded as there is no other way of recovering.

Game Changer:

MESICA produces a product that it patented specifically to solve this seemingly unavoidable wastage. The solution is that of a "Modular heating element" arrangement. Here, the cold zones are detachable from the hot zone and the hot zone alone can be replaced while retaining the cold zones and thus, saving them. This process can be repeated any number of times as long as the cold zones are not physically damaged. Thus, the end users need only pay for the cold zone once. Time to change the cold zone categorisation from expenditure to investment. In addition, MESICA's patent also allows its element's hot zone to not surpass its boundaries into cold zones by utilising one specific conventional SiC heating element manufacturing method as manufactured in typical SiC heating elements. Commercial production is scheduled soon as the elements in field trials have been running successfully for the past 6 months.

The benefits are immense:

- Dramatic reduction in purchase costs
- Enhanced heat generation with the same power
- Massive improvement in cold zone to hot zone resistance ratio
- Efficient power utilisation owing to metallic cold zones (~0 power losses)

A video of the modular heating element's demonstration at our facility can be accessed through the following link:
https://drive.google.com/file/d/1Ciwqrqi_KQCX6DTqBE6ReGNQQP21LGZY/view?usp=drivesdk