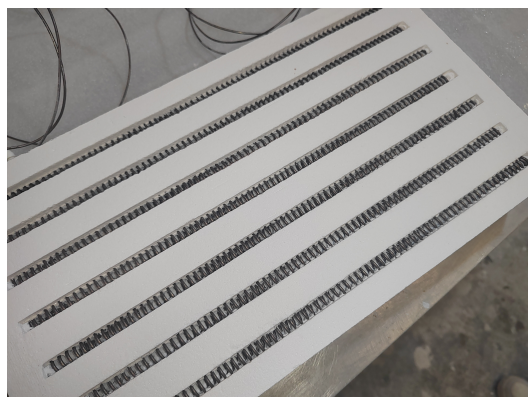


Ceramic Fiber Heaters - Thermalthal

Hngrui H-temperature heaters excel in high-temperature applications, offering rapid heating and cooling with their low mass and high insulation design. Constructed with advanced materials, they integrate heating elements and insulation into a lightweight, low-density package, ensuring energy efficiency and precise temperature control. Ideal for industrial furnaces, semiconductor manufacturing, and material processing, these heaters provide a durable and efficient solution for demanding environments.

● Thermalthal HEATING MODULES AND INSULATION SYSTEMS

Thermalthal -I module Heating modules with embedded heating elements made of Kanthal A-1 or Spark HRE alloys for a maximum operation temperature of **1100°C (2100°F)**



Ceramic fiber heating plate



HALF- Cylindrical Heater



Half - Cylindrical Heater



Full- Cylindrical Heater

● **TECHNICAL DATA OF Ceramic Fiber & Aluminum Fiber**

ITEM	Thermal	SIC-Heater chamber	Mo2Si –Heater chamber
Classification temp. °C (°F)*	1500(2730)	1600(2910)	1800 (3272)
Maximum continuous duty temperature, °C (°F)	1400(2550)	1500(2550)	1700(3092)
Continuous duty temperature, °C (°F)	1350(2462)	1450 (2642)	1650 (3002)
Density approx. kg/m ³ (lb/ft ³)	350(21.84)	350(21.84)	400(21.84)
Linear shrinkage, %(24 hours at max. continuous duty temperature)	1	1	1
Guide analysis, %			
Al ₂ O ₃	62	67	78
SiO ₂	37.5	32.5	21.5
Thermal conductivity, W/m.K			
At 200 °C (390°F)	0.07	—	—
At 400 °C (390°F)	0.10	0.09	0.09
At 600 °C (390°F)	0.14	0.13	0.13
At 800 °C (390°F)	0.20	0.19	0.19
At 1000 °C (390°F)	0.28	0.24	0.24
At 1200 °C (390°F)	0.39	0.35	0.35
At 1300 °C (390°F)	0.46	0.39	0.39
At 1400 °C (390°F)	0.54	0.46	0.46
At 1500 °C (390°F)	—	0.54	0.54

*Classification temperature of the fibers used

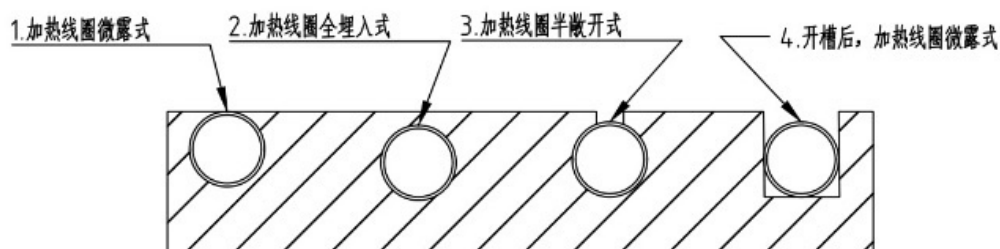
** The max. cont. duty temp. is reduced to 1100°C (1830°F) furnace temp. in O₂ atmosphere (also contents of it)

TOLERANCES

The tolerances shown in this chart are applicable to products that are formed, and dried. For more precise dimensions, drying fixtures or custom machining can be implemented.

	Dimension Range (MM)	Length (MM)	Width (MM)	Thickness (MM)
Ceramic fiber heating plate	<200	±2	±2	±2
	200to600	±2	±2	±1.5
	600to1000	±3	±3	±2
	>1000	±4	±4	±3
	Dimension Range (MM)	Inside Diameter (MM)	Outside Diameter (MM)	Length (MM)
Full- Cylindrica l Heater	<50	±3	±1	±1
	50to100	±4	±1	±1
	100to300	±5	±2	±2
	300to600	±6	±3	±3
	>600	±7	±4	±4
	Dimension Range (MM)	Inside Diameter (MM)	Outside Diameter (MM)	Length (MM)
Half - Cylindrica l Heater	<50	±3	±1	±1
	50to100	±4	±1	±1
	100to300	±5	±2	±2
	300to600	±6	±3	±3
	>600	±7	±4	±4

Resistance wire forming method



Advantages of the Third Type Semi-Open Heating Coil:

- Heating wire is securely fixed by vacuum adsorption, preventing the wire from popping out under high loads
- The heating wire is embedded without surface exposure, reducing the risk of electric shock
- Integrated heat dissipation slots effectively prevent overheating of the heating wire during high-load operation

Surface Load Design for Semi-Open Heating Coil Resistance Wire: $\leq 1000^{\circ}\text{C}$, $\leq 2.0\text{W}/\text{cm}^2$

Lead Wire Connection Methods



As shown above, double-twisted leads are a built-in feature of Thermalthal heaters. These leads support multiple installation methods, including wrapping around a terminal post, securing into a terminal block, or terminating with high-temperature crimped or welded connections



Featuring a bolt-friendly design, strip leads are tailored to handle the current draw of every custom RDI heating element. They come in thicknesses of 1mm (0.04") to 3mm (1.3") and widths of 12.5mm (0.5") to 25mm (1.0"), providing flexibility and reliability.



Solid rod leads, available with or without threaded ends, are securely MIG-welded to the FeCrAl resistance wire. Before the RDI heating element assembly is vacuum-formed, the welded leads are stress-annealed to ensure durability.

Resistance wire forming methods

Thermalthal –lmodule Heating modules with embedded heating elements made of Kanthal A-1 or Spark HRE alloys for a maximum operation temperature of 1150°C (2100°F).

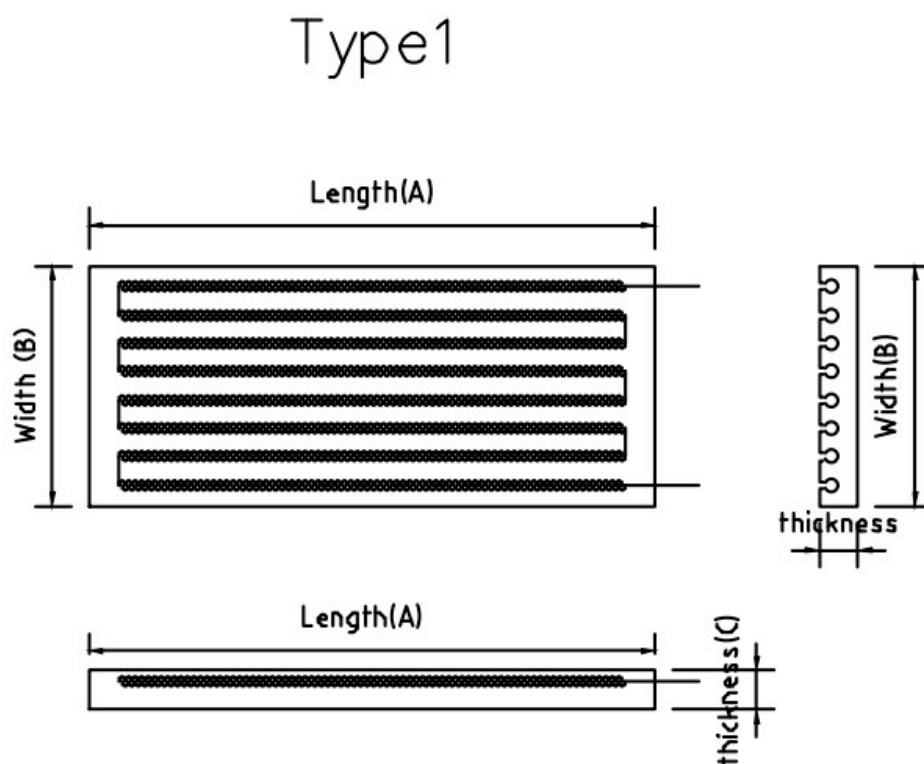
- Thermalthal products are crafted using premium polycrystalline mullite fibers and aluminum silicate fibers, meticulously processed through multiple slag removal steps, and formed with minimal binders via vacuum mold adsorption. The heating elements feature precision-calculated spiral-wound KANTHAL A-1 or SPARK HRE high-temperature alloy resistance wires. These products deliver exceptional heating efficiency and superior thermal insulation, providing stable and precise heating solutions for a wide range of equipment.
- Thermalthal heaters are available in various shapes, including flat plate, full circle, and semi-circle designs, catering to diverse application needs. Additionally, custom-shaped heaters can be tailored to meet specific client requirements, ensuring precise and efficient heating solutions for specialized equipment.

The heating surface is designed to house the heating element. Standard module dimensions are determined by the heated surface size plus the minimum necessary unheated edge area. Panels can be produced with a maximum width or length of 1050 mm (41.4 inches). Unheated edges can be customized to any dimension, provided the total panel size does not exceed the specified maximum width or length. Additionally, standard modules can be equipped with extra 125 mm (4.92 inches) unheated edges on either the width or length (types SL or SB).

For mounting modules on roofs or side walls, a design featuring ceramic cup assembly mountings is available. For roof installations, we particularly recommend reinforcing the element anchorage with ceramic cement pins. The standard connection design includes an M8 threaded rod, 75 mm (2.95 inches) long, positioned at the back of the module. Alternative connection designs, such as flexible leads, can be provided upon

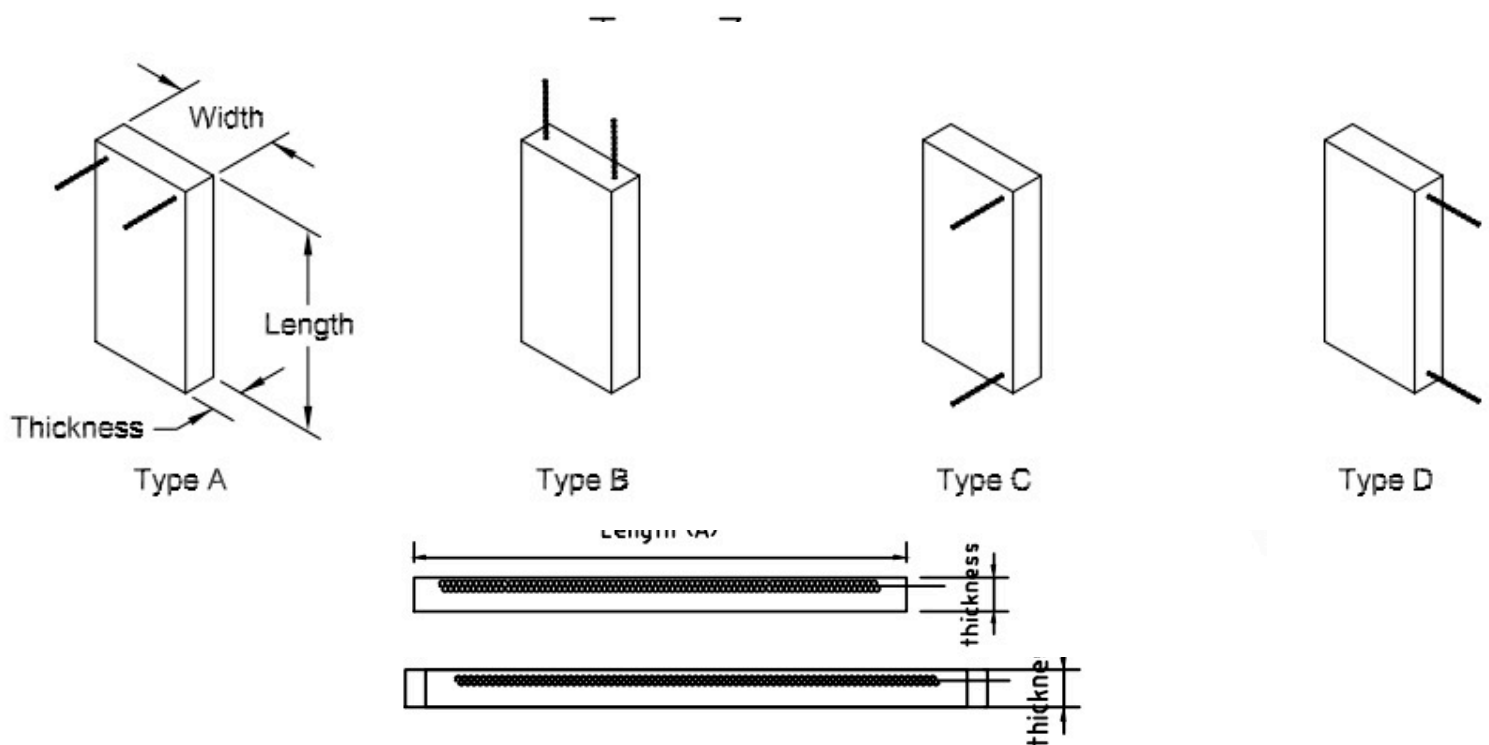
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Zheshang Industrial Park. Xiping county. Zhumadian City, China.
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request (see Accessories section).

Standard Thermal HEATING PANEL Product Illustration Example



*Special dimensions and specifications can be tailored to meet customer requirements.

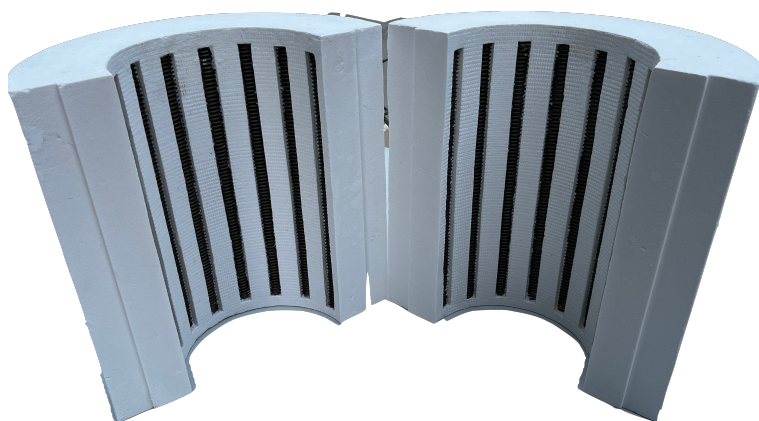
STANDARD Thermal HEATING PANEL Lead Location



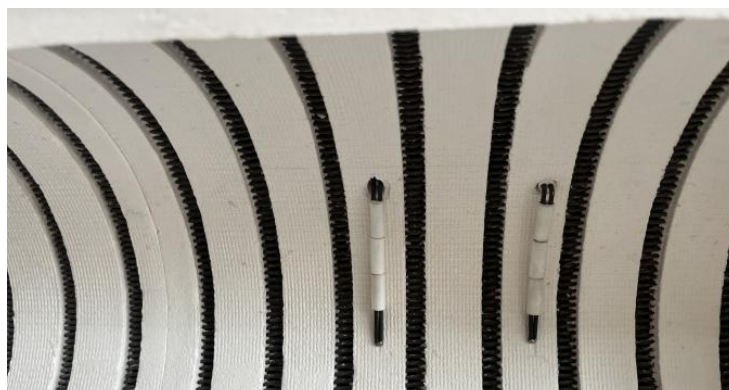
L W THK (INCH)			L W THK (MM)			Powder W	Voltage V
L	W	T	L	W	T		
6	4	1	152	102	25	250	60
12	4	1	305	102	25	500	60
6	6	2	152	152	51	375	60
12	6	2	305	152	51	750	120
18	6	2	457	152	51	1125	120
24	6	2	610	152	51	1500	120
12	8	2	305	203	51	1000	120
18	8	2	457	203	51	1500	120
24	8	2	610	203	51	2000	120
12	12	2	305	305	51	1500	120
18	12	2	457	305	51	2250	120
24	12	2	610	305	51	3000	240
36	12	2	914	305	51	4500	240
18	18	3	457	457	76	3375	240
24	18	3	610	457	76	4500	240
36	18	3	914	457	76	6750	480
24	24	4	610	610	102	6000	480
36	24	4	914	610	102	9000	480

Thermalthal – Ceramic Fiber Half Cylindrical Heaters

Cylindrical Heaters can be categorized into two forms based on the orientation of the resistance alloy wires: one with the wires running parallel to the circumferential direction, and the other with the wires arranged perpendicular to it. Vertical & Horizontal moldings.



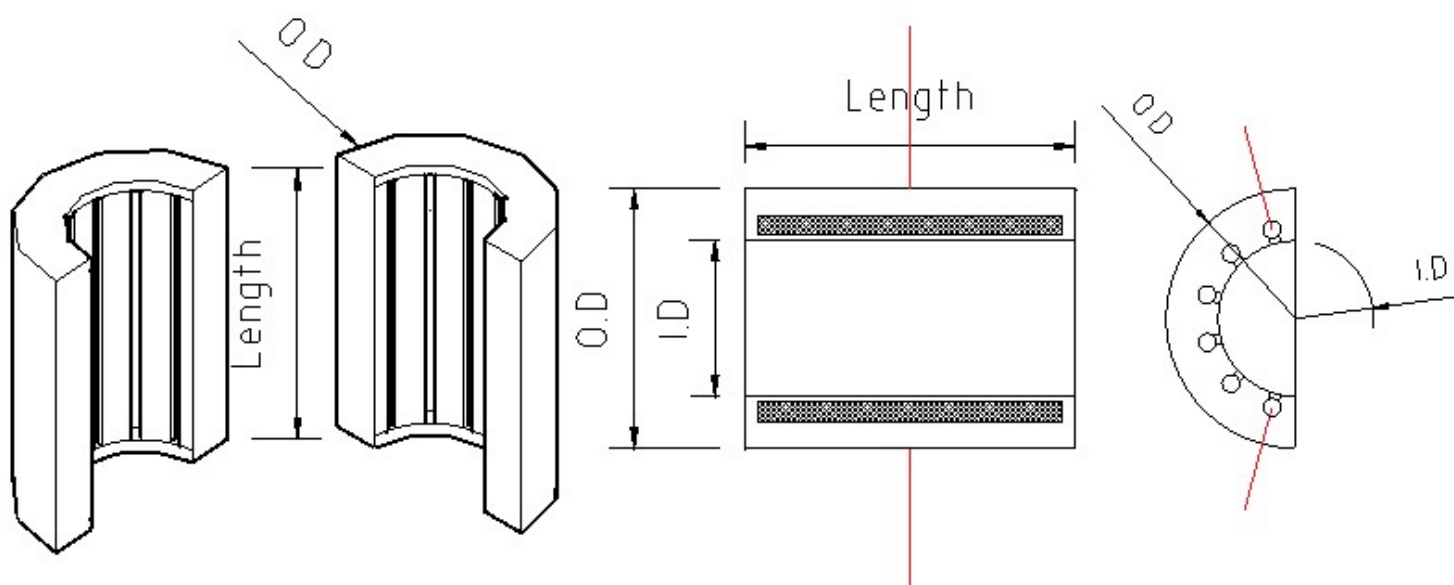
Thermalthal Ceramic Fiber HALF Cylindrical Heaters-Vertical molding



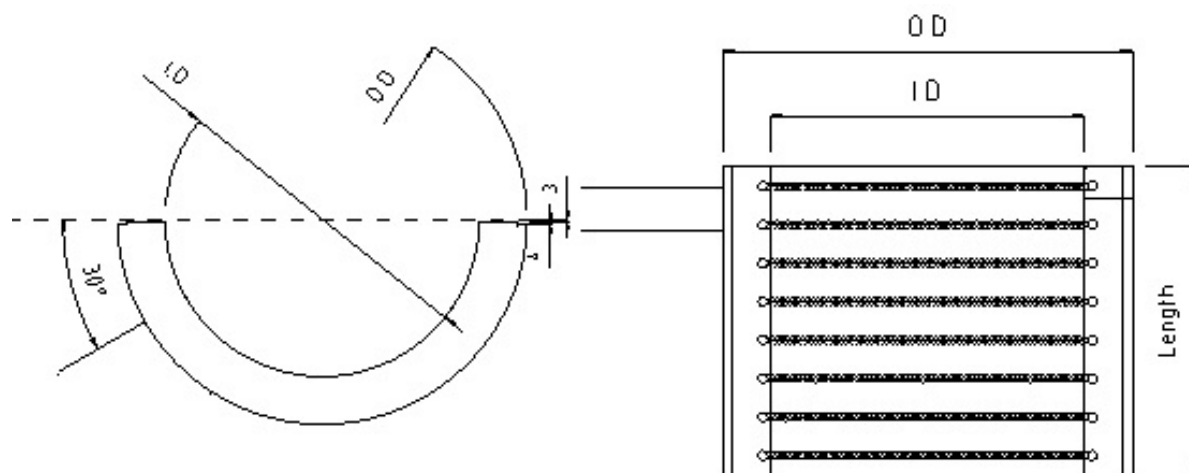
Thermalthal Ceramic Fiber HALF Cylindrical Heaters-Horizontal



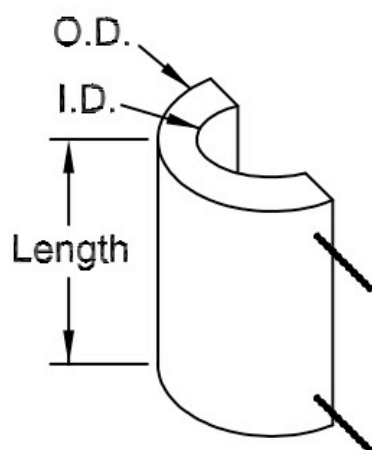
Thermalthal Ceramic Fiber HALF Cylindrical Heaters-Vertical molding Illustration Example



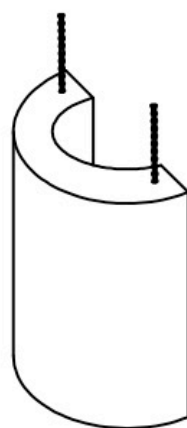
Thermalthal Ceramic Fiber HALF Cylindrical Heaters-Horizontal Illustration Example



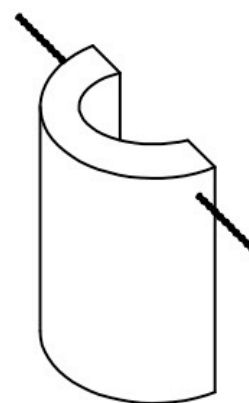
STANDARD Thermalthal Ceramic Fiber HALF Cylindrical Heater Lead Location



Type A



Type B



Type C

STANDARD Thermal Ceramic Fiber HALF Cylindrical Heater Designs

L W THK (INCH)			L W THK (MM)			Powder W	Voltage V
I.D	O.D	L	I.D	O.D	L		
2	6	6	50.8	152.4	152.4	200	60
2	6	12	50.8	152.4	304.8	400	120
2	6	18	50.8	152.4	457.2	600	120
2	6	24	50.8	152.4	609.6	800	240
3.5	7.5	6	88.9	190.5	152.4	350	60
3.5	7.5	12	88.9	190.5	304.8	700	120
5	9	6	127	228.6	152.4	500	60
5	9	12	127	228.6	304.8	1000	120
5	9	18	127	228.6	457.2	1500	240
5	9	24	127	228.6	609.6	2000	240
5	9	30	127	228.6	762	2500	240
5	9	36	127	228.6	914.4	3000	240
6.5	10.5	6	165.1	266.7	152.4	650	120
6.5	10.5	12	165.1	266.7	304.8	1300	240
6.5	10.5	18	165.1	266.7	457.2	1950	240
6.5	10.5	24	165.1	266.7	609.6	2600	240
8	12	12	203.2	304.8	304.8	1600	240
8	12	18	203.2	304.8	457.2	2400	240
8	12	24	203.2	304.8	609.6	3200	240

8	12	36	203.2	304.8	914.4	4800	240
10	14	12	254	355.6	304.8	2000	240
10	14	18	254	355.6	457.2	3000	240
10	14	24	254	355.6	609.6	4000	240
12	16	12	304.8	406.4	304.8	2400	240
12	16	18	304.8	406.4	457.2	3600	240
12	16	24	304.8	406.4	609.6	4800	240
15	19	12	381	482.6	304.8	3000	240
15	19	18	381	482.6	457.2	4500	240
15	19	24	381	482.6	609.6	6000	240
15	19	30	381	482.6	762	7500	240
15	19	36	381	482.6	914.4	9000	240

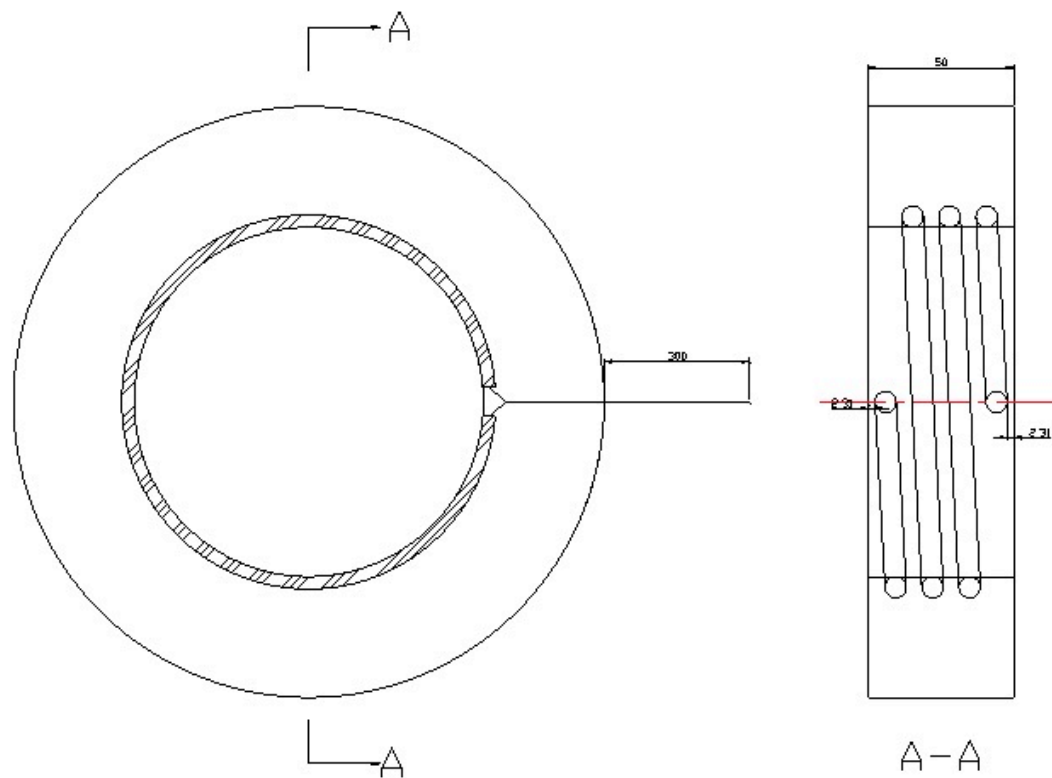
*Special dimensions and specifications can be tailored to meet customer requirements.

Thermalthal – Ceramic Fiber Full Cylindrical Heaters

Full-circle heaters, similar to semi-circular heaters, can also be divided into two forms based on the orientation of the resistance alloy wires: one with the wires running parallel to the circumferential direction, and the other with the wires arranged perpendicular to it.



**Thermalthal Ceramic Fiber
Full Cylindrical Heaters-Vertical molding**



Thermal Ceramic Fiber Full Cylindrical Heaters Illustration Example

STANDARD Thermal Ceramic Fiber Full Cylindrical Heater Lead Location

Thermal Ceramic Fiber Full Cylindrical Heaters DESIGNS

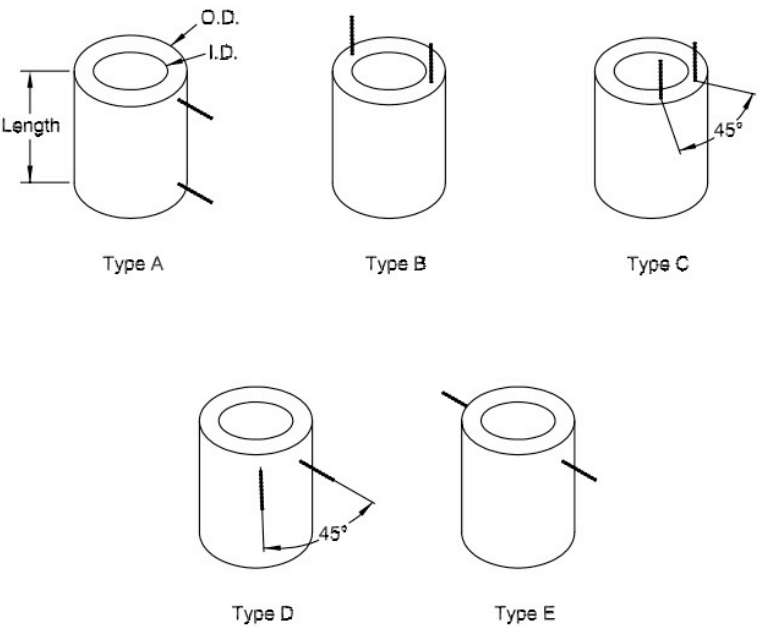
L W THK (INCH)			L W THK (MM)			Powder W	Voltage V
I.D	O.D	L	I.D	O.D	L		
1.5	3.5	12	38.1	88.9	304.8	600	120
2	5	6	50.8	127	152.4	400	60
2	5	12	50.8	127	304.8	800	120
3	6	6	76.2	152.4	152.4	600	120
3	6	12	76.2	152.4	304.8	1200	120
4	8	6	101.6	203.2	152.4	800	120
4	8	12	101.6	203.2	304.8	1600	120
5	9	6	127	228.6	152.4	1000	120
5	9	12	127	228.6	304.8	2000	120
6	10	6	152.4	254	152.4	1200	120
6	10	12	152.4	254	304.8	2400	120
6	10	18	152.4	254	457.2	3600	240
8	12	6	203.2	304.8	152.4	1600	120
8	12	12	203.2	304.8	304.8	3200	240
10	16	6	254	406.4	152.4	2000	120
10	16	12	254	406.4	304.8	4000	240
10	16	18	254	406.4	457.2	6000	240
12	18	12	304.8	457.2	304.8	4800	240
12	18	18	304.8	457.2	457.2	7200	240
14	20	18	355.6	508	457.2	8400	240
18	24	12	457.2	609.6	304.8	7200	240

*Special dimensions and specifications can be tailored to meet customer requirements.

Muffle Furnace Chamber Heater

Thermalthal – II Muffle furnace Heater with embedded heating elements made of Kanthal® or Spark HRE alloys for a maximum element temperature of 1150°C (2100°F).

The muffle furnace chamber heater is specifically designed for use in box-type laboratory furnaces and muffle furnaces. Utilizing high-quality refractory fibers and precise electric heating alloy calculations, it can be vacuum-formed as a single unit based on specific dimensions or designed as heating panels that are assembled to create the furnace chamber. This versatile and efficient solution ensures optimal performance and durability for a wide range of heating applications.



W	D	High	Capacity	KW	V	Hz
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130	250	90	2.925	1.4	220	50/60
150	300	100	4.5	1.6	220	50/60
200	300	200	12	3.3	220	50/60
250	350	160	14	4.0	220	50/60
300	300	300	27	4.6	220	50/60

STANDARD Thermalthal Ceramic Fiber Muffle Furnace Chamber Heater Designs

