Zoppas Industries
Heating Element Technologies

BOILERS

Hot water & steam generator

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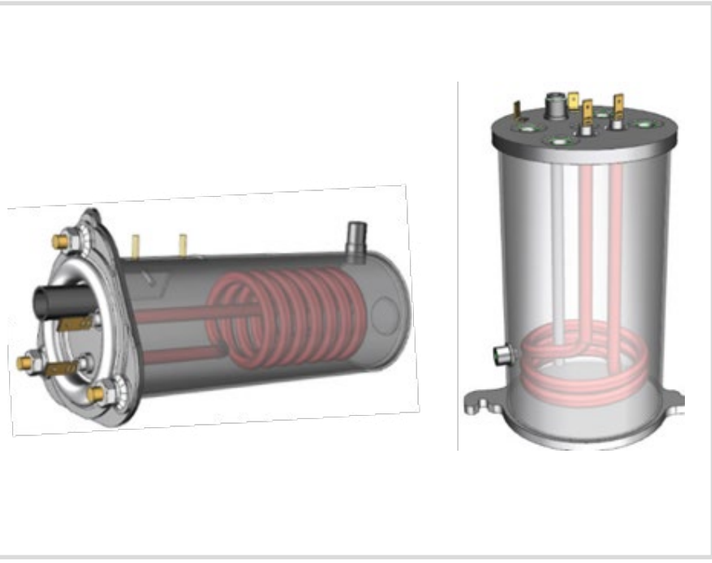
BOILER SOLUTIONS FOR HOT WATER & STEAM GENERATION

Zoppas Industries Heating Element Technologies (ZIHET) is a global provider of heating solutions and systems for coffee machines, offering direct engineering support to meet customer needs. Our range of coffee machine solutions includes a platform of hot water and steam generators.

Our boilers generate hot water and steam using stainless steel tanks equipped with heating elements. Depending on the operating temperature, these boilers can produce either hot water or steam, and in some builds, both.

ZIHET's boilers provide a compact, safe, and reliable solution within a scalable platform.

Reliability and food compliance are key features, and we offer a wide range of adaptation options. Our standard range of solutions allows for thousands of different configurations.



A common application is hot water and steam generation for household and professional coffee machines. Other applications include steam irons, spa equipment, sterilisers, tumble dryers, dishwashers, and washing machines, among others.

We can integrate thermal insulation, mechanical fixings, and fluid management accessories (for both operation and thermal safety) to meet specific customer needs. Upon request, we can also supply a system capable of controlling our assembly via the customer's electronics, and incorporate advanced features powered by artificial intelligence.

WHAT IS LEAN DEVELOPMENT

ZIHET specialises in designing and manufacturing a wide range of heating elements and systems for coffee machines, including those used in traditional vending machines, commercial coffee and vending machines, high-end home coffee machines, and more. When time-to-market is a key driver, ZIHET supports customers with a dedicated tailored experience, co-defining the product based on a range of available characteristics. Our Lean Development process is the ideal way to reduce development time for bespoke solutions, leveraging standard components only.

To experience our Lean Development process, contact Zoppas Industries Heating Element Technologies and co-design your solution with the support of an expert application engineer.

LEAN DEVELOPMENT ENABLERS

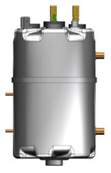
Customised solutions encompass a range of features that enable ZIHET to deliver the project within a limited timeframe.
When it is possible to pick the desired feature within the range of the most common ones, the Lean Development is enabled.

Lean Development enablers

Materials	Body: AISI-304L - 316L	
	Heating element: Alloy 800 – AISI316L (The element can be UL &/or VDE certificate)	
Body shape	Circular cross section Ø54,70,76.1,88.9,101.6,114.3,140,152.4,160,180mm outer diameter	
Voltage (1)	110V , 120V , 230V , 240V	
Power	Up to 6.5Kw	
Working conditions	**Water**	**Steam**
	Up to 12bar Temperature range of 5-98°C	Up to 3 bar Temperature range of 5-130°C
Inlet/Outlet Layout	Any, depending on available space and according to standard processes	
Inlet/Outlet Fittings	Male cylindrical gas thread (M6,G1/8",G1/4",G3/8",G1/2"); Female cylindrical gas thread (M4, M6, G1/8"for probe, G1/8"for fluid diffusion, G1/4"for probe, G1/4",G3/8",G1/2"); Integrated female cylindrical gas thread ISO 228-1 (G1/8",G1/4",G3/8",G1/2"), Straight tubes (Ø6 for fluid diffusion,Ø8,Ø10,Ø12)	
Connections Area	Faston 0-45-90° or threaded pins with or without heat shrink and plastic cover(1)	
Thermal Safety	Thermal fuse integrated on the heating element (when applicable) Bimetal cut-off (115°C) for hot water application Bimetal cut-off (145°C) for steam generator application Arrangement for 1 or 2 thermostat bulbs on heating element flange (bulbs not included)	
Thermal Insulation	Melamine (temperature up to 150°C,thickness 6-10mm with Velcro for closing EPDM (temperature up to 150°C,thickness 6-10mm)	
Mechanical Fixing	Fixing bracket, Male M5, M6, M8/ Brushed M4 female	
Temperature control	NTC 1/8"G connection	
Level control	Level probe, Specific 1/8"G connection	
Other options	Up to 3 exchanger Ø30,Ø40(1)	
	Separator/baffle, sheet metal or tube	
Compliance	Low voltage directive 2014/35/UE (LVD) Regulation (EC) No 1907/2006, Regulation (EU) 2019/1021, Directive (EU) No 2011/65 (1) , Regulation (EC) No 1935/2004 (2) according to Italian law, Regulation (EC) No 2023/2006	

(1) Some options might not be available as values are mutually dependent.
It is recommended to experience Customization with the support of an Application Engineer of Zoppas Industries Heating Element Technologies.

CONFIGURATION TYPES

				LEAN DEVELOPMENT	
CONFIG. 1	CONFIG. 2	CONFIG. 3	CONFIG. 4	CONFIG. 5	CONFIG. 6
					
MOLDING FLANGE (2X)	MOLDING FLANGE (2X)	MOLDING FLANGE (1X)	MOLDING FLANGE (1X)	FLAT FLANGE	FLAT FLANGE WITH GASKET
	TUBE	MOLDING FLANGE OR TUBE	TUBE	TUBE	TUBE
		FLANGE WITH GASKET	FLAT FLANGE	FLAT FLANGE	FLAT FLANGE
• HIGH VOLUMES / LOW WEIGHT • LOW CONFIGURATION • HIGH CAPEX / LOW COST				• LOW VOLUMES / HIGH WEIGHT • HIGH CONFIGURATION • LOW CAPEX / HIGH COST	
VOLUME RANGE: 0.5l - 15l POWER RANGE: UP TO 6.5 kW					

NOTE:

- Configurations are subject to feasibility of configuration and compatibility between the selected components
- Feasibility must be assessed by a ZIHET internal personnel.

HEATING ELEMENT MATERIALS

Incoloy-800 and AISI-316L are two different types of materials commonly used in various industrial applications, included for coffee machines:

Material	Incoloy-800	AISI-316L
Composition	Iron-nickel-chromium alloy with the addition of small amounts of other elements like aluminum and titanium.	Stainless steel known as austenitic stainless steel. It mainly contains iron, chromium, and nickel and molybdenum.
Temperature and Corrosion Resistance	This alloy is specifically designed for high-temperature applications. It is also highly resistant to acid and chloride stress corrosion cracking, due to the high nickel content.	It is a versatile stainless steel known for its excellent corrosion resistance in various environments. It provides good resistance Pitting corrosion, making it suitable for applications involving exposure to chloride containing environments due to the addition of Molybdenum.

In summary, Incoloy-800 is a high-temperature alloy that offers excellent resistance to oxidation and carburisation, making it suitable for demanding, heat-related applications.

AISI-316L, conversely, is a corrosion-resistant stainless steel commonly used across various industries where resistance to corrosive environments is essential.

Choosing between these materials depends on the specific requirements of the application, including temperature, corrosion resistance, and manufacturing considerations.

Material	Applications
Incoloy-800	Due to its high-temperature strength and corrosion resistance, Incoloy-800 is commonly used in applications such as hot water boilers, steam generators, ovens, and others
AISI-316L	It is widely used in industries such as food processing, pharmaceuticals, chemical processing, marine applica tions, and architectural structures. It is suitable for equipment and components that require resistance to corrosion and ease of fabrication.

Choosing the right material for a project is crucial for ensuring optimal performance and long-term durability.

Contact your Zoppas Industries Heating Elements sales representative for more information.

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BODY MATERIAL

The boiler/steam generator body can be made from AISI-304L or 316L stainless steel, common alloys that offer several advantages over copper and other materials for water boiler applications.

Here are some key reasons why AISI-304L or 316L might be preferred:

- **Corrosion resistance:** AISI 304L stainless steel offers excellent corrosion resistance, making it suitable for boiler applications. Water, particularly at high temperatures, can be corrosive to many materials. For enhanced protection against corrosion in challenging environments, AISI 316L is recommended. Its molybdenum content provides superior resistance to water corrosion, helping to prevent leaks and prolonging the boiler's lifespan.
- **Hygiene and safety:** Stainless steel is non-reactive and doesn't impart any taste, odour, to the water. It's also easy to clean and maintain, ensuring high hygiene standards.
- **Strength and durability:** Both AISI-304L and 316L stainless steel possess excellent mechanical properties, including high strength and durability. They can withstand high pressures and temperature fluctuations without deforming or failing, making them suitable for water boilers subjected to varying operating conditions.

It's important to note that the optimal material choice for a boiler body depends on several factors, including operating conditions, budget, and specific application requirements.

For expert guidance in selecting the right material for your needs, consult with our team at Zoppas Industries Heating Elements.

BODY SHAPES

ZIHET offers a range of boiler/steam generator bodies with varying circular cross-sections, providing flexibility to meet the specific needs and requirements of different applications.

Circular Shape available	
Outer diameter	**Length**
Ø54mm	100mm
Ø60mm	150mm
Ø70mm	200mm
Ø76,1mm	250mm
Ø88,9mm	300mm
Ø101,6mm	350mm
Ø114.3mm	400mm
Ø140mm	450mm
Ø152.4mm	500mm
Ø160mm	550mm
Ø180mm	

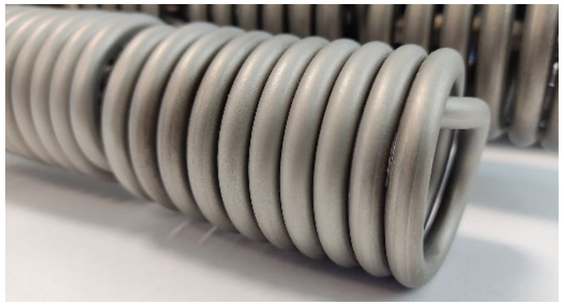
We recommend discussing your customisation options with your Zoppas Industries Heating Element Technologies sales contact.

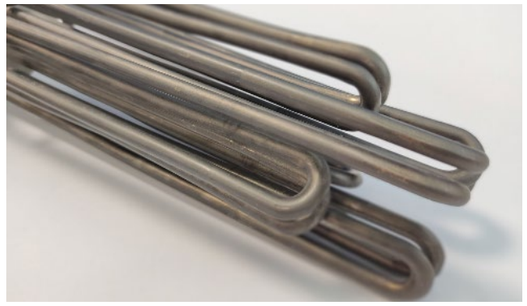
POWER LAYOUT

The most common configuration for water heater heating elements is a single unit. Dual elements are used where space permits. These elements are typically shaped as a "soffietto" ("U" bent) or "torciglione" (twisted).

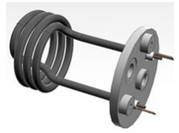
The choice between these shapes depends on several factors, including whether the unit is installed vertically or horizontally, the available space, the type of temperature control system, and the water level monitoring system.

The heating elements can be integrated directly into the water heater or mounted on specific flanges to facilitate replacement or internal inspection of the boiler (configurations 3 and 6, according to platform rules).





The coiled shape is ideal to comply with all these factors for 2 and 3 stages power, whereas the Refolded U-bend shape is the best compromise when a high power and fine adjustment are requested:



1 coiled

With 1 Coiled element the available power reaches up to 3Kw. The elements can have UL and/or VDE certification depending on the specific characteristics. Power supply voltages vary from 110V to 240V

2 coiled

TWith 2 Coiled elements the available power reaches up to 6.5Kw. The elements can have UL and/or VDE certification depending on the specific characteristics.. Power supply voltages vary from 110V to 240V

U-shaped heating element

The hydraulic seal in products with removable heating elements is ensured by a gasket.

Zoppas Industries also offers heating elements for coffee applications in a variety of other bent shapes.

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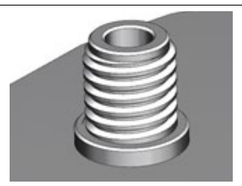
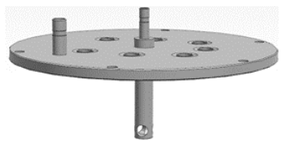
INLET/OUTLET FITTINGS

The number and position of fittings/tubes on a coffee machine boiler/steam generator can be highly customised, as they vary depending on the specific installation requirements and necessary connections. The location and size of accessory/inlet/outlet interfaces on the boiler/steam generator are largely flexible.

In theory, fittings or threaded holes can be positioned anywhere on both the body and flanges of the water heater, provided there is sufficient space for assembly and manufacturing.

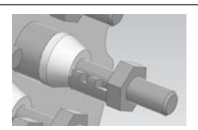
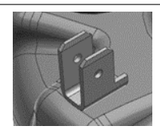
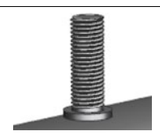
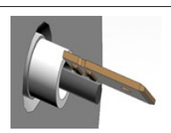
However, the available fitting options are listed below:

	**Male Thread**
	Male cylindrical gas thread (M6,G1/8",G1/4",G3/8",G1/2", or special)
	**Female Thread**
	Female cylindrical gas thread (M4 x th, M6 x th, G1/8"x probe, G1/8"x diffusion, G1/4"x probe, G1/4",G3/8",G1/2")
	**Integrated Thread**
	Female cylindrical gas thread (G1/8",G1/4",G3/8",G1/2")
	**Tube**
	Straight tubes (Ø6x spreader,Ø8,Ø10,Ø12)

ELECTRICAL CONNECTIONS AREA

Beyond the specific type of connectors or wiring harness, the connection area layout encompasses several aspects (electrical insulation, IP rating, etc.) to ensure a safe and reliable electrical interface.

The available layouts are as follows:

	Earth Faston 6.3X0.8 (single)		Threaded pin M4
	Earth Faston 6.3X0.8 (double)		Faston or welced cables with or without heat shrink
	Earth threaded pin · M4 · M5		Faston 6.3x0.8 · Straight · Bended 45° · Bended 90°

While the proposed layouts comply with the regulations and safety standards mentioned earlier in this document, **please contact your Zoppas Industries Heating Elements sales representative for further information.**

CABLE HARNESS

The heaters can be supplied complete with a cable kit, wired, or directly welded to the heater. Possible cable options are listed below.

Materials	Silicon PVC Fiberglass Silicon
Section	From 1 to 4mm2
Lenght	Up to 3mm
Optional	Cables can be covered by additional sleeve to obtain 2° electrical insulation layer

MECHANICAL PROTECTION

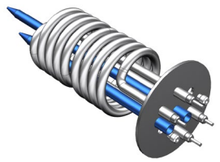
Heater electrical connections can be mechanically protected from accidental damage using protective covers.

	Cover in polyester material Ø49 e Ø65 e Ø40

THERMAL SAFETY

Thermal safety systems within boilers and steam generators are engineered to prevent overheating and maintain safe operation, thereby mitigating potential hazards under abnormal conditions. These systems may incorporate thermal switches, thermostats, and thermal fuses, and may be tested and validated by ZIHET's laboratories under specific application conditions, in accordance with European standards.

The available components are as follows:

	**Thermal fuse**
	Thermal fuse integrated on the heating element (for immersed heaters only)
	**Control Bimetal (set point 115°C)**
	Bi-metal thermostat (manual reset) with fixed set point at 115°C to use in hot water applications
	**Safety Bimetal (set point 145°C)**
	Bi-metal thermostat (manual reset) with fixed set point at 145°C to use in steam generators applications
	**Arrangement for 1 or 2 thermostat bulbs**
	The flange can be designed with 1 or 2 two housings arranged to host 1 or 2 Thermostats Ø7.5, Ø8 (bulb type, not included).

Safety is paramount in any heating system, including coffee machine boiler/steam generators. Equipping the heater with appropriate safety and protection devices and validating them against applicable standards is highly recommended.

THERMAL INSULATION

Insulation is crucial in heating systems, playing a key role in ensuring thermal efficiency. It reduces heat loss, maintaining the temperature within the boiler body and improving overall system performance.

Melamine and EPDM (Ethylene Propylene Diene Monomer) are two common thermal insulation materials used in various applications, including heating systems.

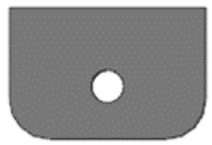
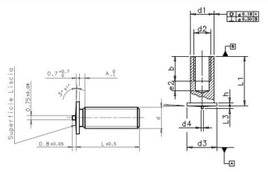
They have some key differences:

Material	MELAMINE	EPDM
Chemical composition	Flexible spongy thermal insulation.	EPDM is a copolymer of ethylene, propylene and diene.
Heat resistance	Good heat resistance, tends to degrade at high temperatures (up to 150°C).	Better heat resistance and can handle higher temperatures without significant deterioration (up to 150°C).
Flexibility and resilience	More flexible and resilient than EPDM	Average flexibility.
Thermal conductivity	At 10°C λ <0,035W/m*k (DIN 52612)	At 40°C λ<0,042W/m*k (EN12667/EN ISO 8497)
Fire behaviour	B1 (DIN 4102) (classified UL94) V0/HF1	E (DIN EN 13501-1)

When required, thermal insulation is applied directly to the metal body using a double-sided adhesive, or as a removable cover secured with Velcro.

MECHANICAL FIXING

Bracket fixing and threaded pin fixing are two distinct methods for securing or attaching components in various applications.

	**Bracket**
	Provides a reliable and sturdy connection, especially with heavy loads or applications where vibration or movement is a concern. One or more bracket with nut M4/M5/M6 or hole Ø3.5,5.5,6,5 with customizable position.
	**Threaded Pin**
	Male M5, M6, M8/ Brushed M4 female / special.

TEMPERATURE CONTROL

To optimise performance and energy efficiency within boilers and steam generators, accurate control of water/steam temperature is essential. ZIHET offers NTC temperature sensors that are easily integrated or added to your system.

	NTC
	An NTC sensor is a resistor with a negative temperature coefficient, specifically encapsulated to meet the operational requirements of a boiler. It also offers excellent long-term stability in high-temperature applications, such as those found in coffee machines.
	1/8”G connection

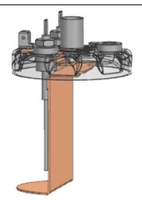
LEVEL CONTROL

Water level control is of paramount importance in the use of steam generators for steam applications. Proper level control ensures optimal performance of the coffee machine. Zoppas Industries can provide up to 2 level sensors, either installed in its steam generator or separately.

	NTC
	A water level probe is an electrical device used to detect liquid presence at a set level. The probe is screwed to the top lid, with the tip accurately positioned at the level that triggers boiler refill, and/or the level that prevents the heating element from running dry. Customers can choose up to two probes, for single or multi-probe systems. The first probe signals a low water level, while the second can stop the refill.
	1/8”G connection

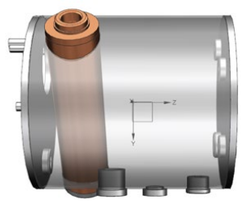
STEAM OUTPUT AND LEVEL CONTROL OPTIMISATION

Certain premium applications require extremely high-quality steam and accurate liquid level control.
The use of specialised separators/baffles allows steam generators to satisfy these stringent demands.

	SEPARATOR/BAFFLE
	Depending on the size and positioning of the steam outlet, various options exist to protect the level probes and steam outlet nozzle. These can be made from sheet metal or tube.

OTHER OPTIONS

ZIHET offers steam generators with one or more heat exchangers, designed to heat water and provide separate coffee and steam, hot water services. The heat exchanger allows for hot water generation while keeping steam and hot water production in separate chambers. The heat exchanger’s internal pressure can reach 12 bar, while the maximum steam pressure is 3 bar.

	EXCHANGER
	Up to one longitudinal heat exchanger per body and a maximum of three heat exchangers at right angles to the body axis can be accommodated, depending on the space available (Ø30, Ø40).
	1/8”G, 1/4”G, female connection

Your global strategic partner

Zoppas Industries
Heating Element Technologies

60
Years of experience

>8000
Employees of the group

15
Countries with **offices**

Why to choose us

- Increasing efficiency using lean enterprise across all facilities and departments.
- State-of-the-art laboratory facilities with over 30 years' design experience.
- Manufacturing and design facilities which maintain Quality Management Systems according to ISO 9001, EN 9100 and IATF 16949, Environmental Management System according to ISO 14001 and Energy Management System according to ISO 50001.
- One of the widest product portfolios in the World, including completely integrated thermal assemblies with sensors, connectors, enclosures, etc.
- Global presence through design and manufacturing facilities across Europe, North America, South America and Asia - lowering your Total Cost of Ownership (TCO) including reduced logistics, design, communication and support costs.
- In-house design, development and R&D capabilities, such as CAD 3D design, FEA, DOE, FMEA.
- Third-party certifications, such as UL and VDE: marking applied on customer's request.

COMPANY CERTIFICATIONS

IT-75.12-6975 12/054P_IND EN 15085-2

IT-75.12-6975 12/055P_IND ISO 3834-3

9191.IRCR 9196.IRC8

PRODUCT TRADEMARKS

Compliance with the mark of each specific product must be properly reviewed with our Sales Department.

NOTE:

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