Cast-In Heating Elements

for ATEX/IECEx hazardous areas or in non-ATEX version

HEATING SOLIDS

INDIRECT HEATING

The cast-in heating plates and heating bands consist of one or several electrical resistances embedded in a block of aluminum, brass, bronze or cupronickel alloy providing excellent thermal conductivity.

Advantages

- Gravity moulding ensures an excellent material homogeneity and thus a perfect heat transfer.
- Constant surface temperature is achieved through appropriate forming
- As this is indirect heating, the heating resistance is protected. The solid or fluid to be heated is not in contact with the resistance.
- High protection against corrosion
- The end-to-end control of the design and production chain allows us to deliver a product which suits your process perfectly

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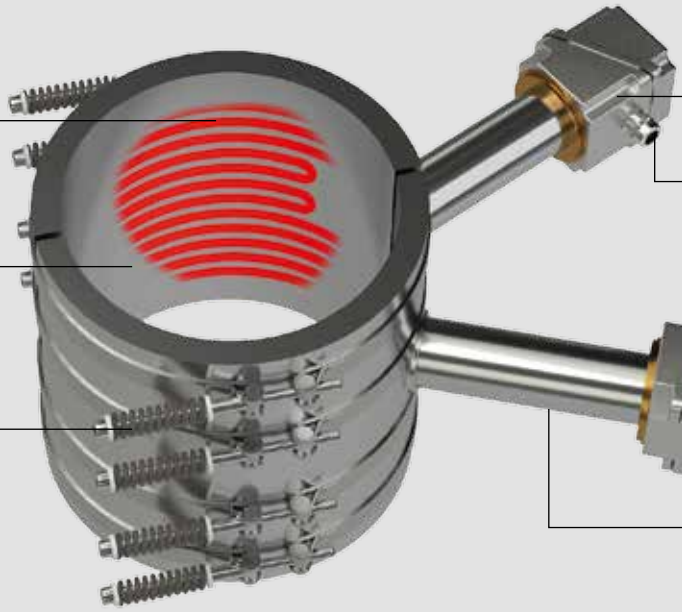

Cast-in heating elements are ideal for applications requiring homogeneous indirect heat. They consist of one or several electrical resistances embedded in a block of aluminum, brass, bronze or cupronickel alloy providing excellent thermal conductivity.

Applications

- Heating plates for presses
- Extruder dies and sheaths
- Heating plates for homogeneous heating (rubber, aerated concrete curing)
- Sealing on packaging lines
- Mills

They can be used at surface temperatures up to 750°C.
The electrical connection is made in a protected steel, stainless steel or aluminium enclosure.
The elements can be supplied without enclosure for cabling on the customer's premises.
They can be equipped with cooling circuits to optimize the industrial process.

Industrial sectors

- Plastics industries (extrusion, plastic film)
- Packaging
- Petrochemical
- Food industry
- Metallurgy
- Pharmaceutical industry
- Textile industry
- Semiconductor industry
- ...

Design and manufacturing

The heating assemblies are machined according to technical drawings and take into account tolerance values and surface finishing requirements. Manufactured according to specifications in small or medium-sized production runs.

Aluminum or other alloy

Up to temperatures of 400 °C, the most widely used alloy is aluminum. For higher temperatures or in case of mechanical stress, it is replaced by brass, bronze or cupronickel alloy.

ATEX/IECEx

The cast-in heating assemblies are available in ATEX/IECEx version for temperature classes T1 (450°C) to T6 (85°C).

Temperature control

Temperature sensors (thermostat, limiter, thermocouple or PT100) in the alloy block (process control) or on the heating elements (safety control).

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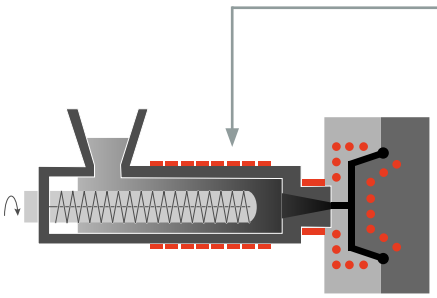
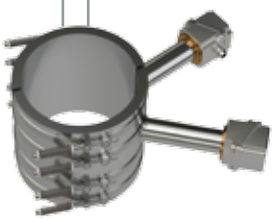
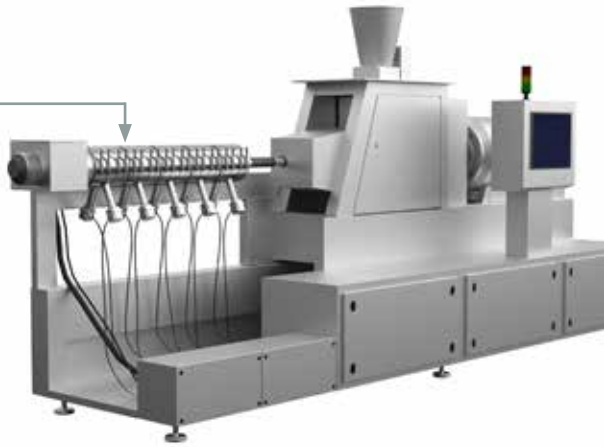
Injection / extrusion applications

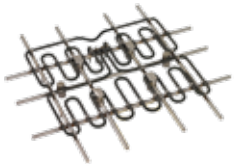




Heating band
with cast-in elements



Production stages of the cast-in heating elements



1
Forming of resistance
and support

2
Positioning
in the mold

3
Casting in the foundry

4
Finished product

CETAL heating elements

1. Connection terminals
2. Tube
3. Insulation : magnesia oxyde (Mg O), to secure optimized heat transfer and electrical insulation.
4. Resistance wire: Made of Nickel Chrome 80/20, it is the active part of the heating element (Joule effect)
5. Cold length
6. Sealing material: Keeps out external moisture. Different types (silicon, resins, cement) are used depending on the industrial application, the external medium and temperature.
7. Output insulation: Made of steatite ou corundum, it provides dielectric insulation (creepage distance, distance in the air).

CETAL manufactures their own heating elements which are the key components (active parts) of all electric heating systems. The design is defined according to customer specifications.
The watt density, tube diameter and the tube sheath are chosen to optimize the reliability and robustness (corrosion, temperature) of **CETAL** equipments.

Manufacturing

The electric heating resistance (sheathed heating resistance) consists of a Nickel Chrome 80/20 resistance wire placed in the middle of a protective tube (sheath). It is filled with high-quality magnesia oxyde enabling the optimized heat transfer and electrical insulation.
Each side of the heating element has a cold length depending on the type of use which is used for wiring.

Design of your cast-in heating element

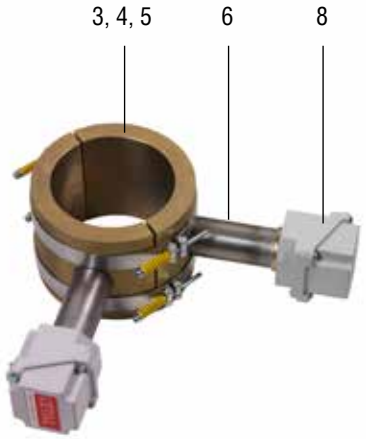
Input data

A. Technical drawing
B. Application
C. Application temperature
D. Environment of use
E. Alloy
F. Voltage (V)
G. ATEX/IECEx or not, temperature class
H. Directives, standards, construction codes

CETAL thermal design and offer

Design procedure to optimize your product

1. Power
2. Watt density (W/cm²)
3. Number of heating elements
4. Material / tube diameter
5. Type of alloy (we make sure that the selected alloy is adapted to the application)
6. Offset length (cooling)
7. Temperature control and safety, type of sensor
8. Connection box / Cable gland
9. Quotation: price and delivery time



Benefit from the CETAL advantages!

Design and manufacturing experts since 50 years!

Calculation and design tools specifically developed for industrial heating applications

End-to-end control of design and production chain for products which suit your process perfectly

Benefit from the CETAL know-how to optimize your process and reduce costs!

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Technical data

Tube materials

- Stainless steel
  - AISI 321 (1.4541)
  - AISI 316L (1.4404)
  - AISI 309 (1.4828)

Tube diameter

- 6.5 / 8.5 / 10 / 13.5 / 16 mm

Alloys for casting

- Aluminum
- Brass
- Bronze
- Cupronickel

Electrical

- Voltage: VAC or VCC
- Cabling according to main voltage VAC/VCC 1PH + N or 3PH

Connection box (non ATEX)

- IP 54 / IP 66 / IP 67
- Material: painted steel, stainless steel, aluminum
- Polyamide or nickel-plated brass cable gland

ATEX/IECEx connection box

- Explosion-proof connection box, aluminum, stainless steel or painted steel, Ex d IIC
- Stainless steel increased security enclosure, Ex e IIC
- Nickel-plated brass cable gland (stainless steel as option)

Standard documentation

- EU Certificate of Compliance
- Heater wiring cabling
- Instruction manual

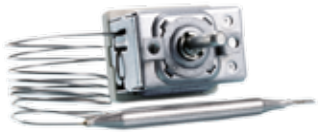
On-request documentation

- Certificate of conformity to the order
- Supplied according to directives, standard and construction codes
- Material certificate 3.1 acc. to NF EN 10204

Certifications (if requested)

- According to standard to comply with
- ATEX/IECEx certificate for component or system
- EAC CU&TR, c CSA us

ATEX IEC IECEx EAC



Options

- **Temperature control**
  Temperature sensors (thermostat, limiter, thermocouple or PT100) in the alloy block (process control) or on the heating elements (safety control).
- **Separated connection box for temperature control**
  out of the power connection box
- **Stainless steel cable gland for ATEX/IECEx equipment**
- **Space heaters against moisture**
  inside the connection box
- **Coating** for the connection box, customized specifications and colors
- **Tropicalization**: Adapted materials and components, terminals insulated with heat-shrink sleeves for extreme atmospheres (moisture, temperature)

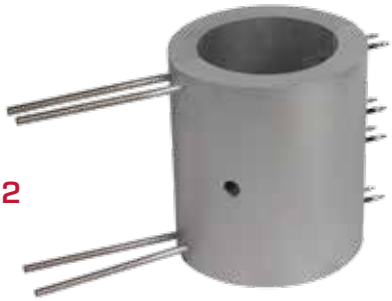
New!

Standard power control panels

CETAL offers a large range of cost-effective power control panels.

Réalisations

1



2

1. Extruder sheath heating
2. Extruder sheath heating with cooling circuit
3. Extruder sheath heating in ATEX/IECEx hazardous areas
4. Heating element for sealing
5. Heating plate for presses
6. Reactor heating in petrochemical plant, ATEX/IECEx hazardous area

3

6

4

5

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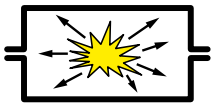
ATEX/IECEx versions

In addition to heater design, the use of specifically developed connection boxes allows to install the products in hazardous areas.
The increased safety protection mode “e” (EN 60079-7) or the explosion-proof protection mode “d” (EN 60079-1) together with temperature control acc. to EN 60079-0 make it possible to operate the equipments in hazardous area (zone 1 and zone 2) for gases of the A-B-C groups.

ATEX housings, types of protection “d” and “e”



Type of protection “d” explosion-proof housing

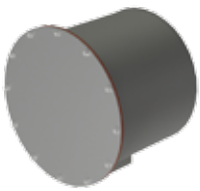
With this method, the housing (casing):

- Must contain the explosion within the enclosure
- Make sure that the ignition cannot reach the hazardous area
- Always keep an external temperature lower than the auto-ignition temperature of any surrounding

The following factors are selected depending on the internal free volume of the enclosure and the gas present in the area.

- Type of seal (cylindrical, flat, threaded)
- Seal length
- Gap length

The power and temperature control circuits can be accommodated in separate housings.



Type of protection “e” increased safety

Method: To prevent the occurrence of any accidental ignition source (electric arcs, heating).

This mode of protection is achieved by:

- Selecting high-quality insulating material
- Defining the right creepage distances
- Ensuring the quality of electrical connection
- For all classes of gases and vapours
- Suitable for connection housings

Design and manufacturing of electrical heating equipment for your industrial process

for use in ATEX/IECEx harzardous areas or in non-ATEX version

All CETAL products can be adapted to your specifications.

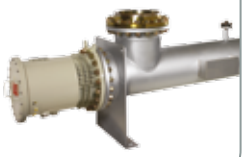
Contact us!

Flange immersion heaters

Screw plug immersion heaters

Removable immersion heaters

Circulation heaters



Cast line heaters

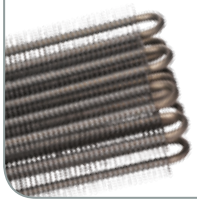
Air duct heaters

Industrial convectors

Formed elements

Cast elements

Ribbed heaters



Anti-condensation heating elements

Bolt heaters

Power control panels – Standard range

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