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
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 aluminum 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.

**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).
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 oxide 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

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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!
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

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. 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
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
All CETAL products can be adapted to your specifications.

Contact us!