

EXTRA-LONG MONOTUBE HEATING ELEMENTS, MODELS CM**General characteristics**

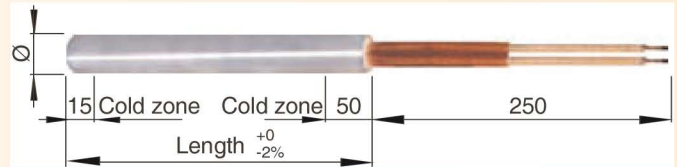
The extra-long monotube heating elements support a surface temperature of up to 600 °C maximum.

The maximum working temperature is directly related to the heating density (in this case up to 12'2 W/cm²) and the maximum ease of fit of the hole where it is lodged in the heating element. Thus, we can say that the greater the working temperature, the better the fit should be.

In the case of the monotube heating elements, for a working temperature in the mould of 400 °C it will be necessary to make a hole with minimum tolerance H11 (+0 +0'09 mm). For more information consult our catalogue nº 841, Graph 1.

General characteristics

- Stainless Steel tube with TIG welding.
- Tube laminated and calibrated WITHOUT shaving.
- Tolerance in tube Ø10 -0,02 -0,09 mm.
- Braided nickel cables, covered with siliconized fiber glass, clamped with stainless steel tubular terminal on pure nickel wires that lead from the cartridge, 250 mm long.
- Insulated with electromelted and lamination-compressed magnesium oxide.
- Ni-Cr 80/20 Resistance coil.
- Standard voltage ~230 V.
- If you require, we can supply monotube heating elements of Ø10 mm up to 1300 mm length. Also to order on other voltages..

**Tolerances**

- **Diameter:** -0,02 mm
-0,09 mm
- **Length:** +0 %
-2%

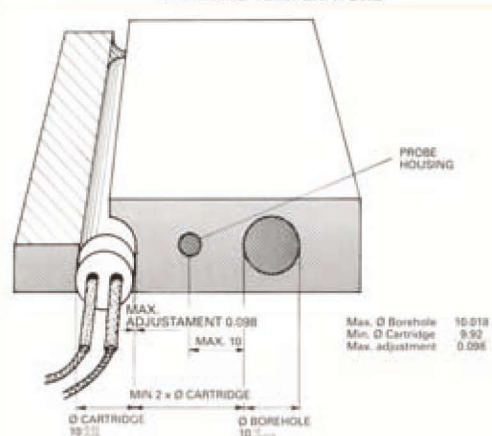
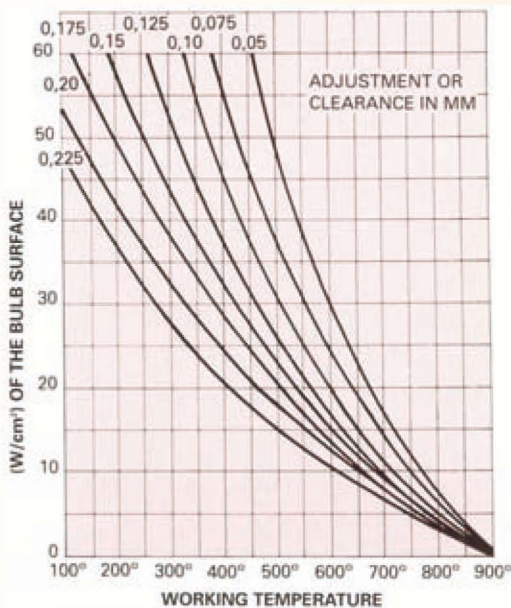
Code	Dimensions in mm		Watts	W/cm ²	Santi Escoin's constructive thermic class	Weight in Kg
	Diameter	Length				
CM10x250-800	10	250	800	12	T-600-T	0,08
CM10x300-1000	10	300	1000	12	T-600-T	0,11
CM10x350-1200	10	350	1200	12	T-600-T	0,15
CM10x400-1400	10	400	1400	12	T-600-T	0,13
CM10x500-1750	10	500	1750	12	T-600-T	0,17
CM10x600-2100	10	600	2100	12	T-600-T	0,20
CM10x750-2750	10	750	2750	12	T-600-T	0,25
CM10x1000-3500	10	1000	3500	12	T-600-T	0,33

**NEVER-SEEZ® LUBRICANT****General characteristics**

120 gr. tins of NEVER-SEEZ lubricant, which simplifies the installation and removal of the cartridges while enhancing thermal conductivity. NEVER-SEEZ® lubricant prevents formation of oxide and galvanic rust, seizures and corrosions in tools and metal parts. Applied to the metal parts, it prevents imperfections and dead periods due to repairs

VERY IMPORTANT: Do not use on cartridges with unwelded cap or when the cartridges are to be installed with the connections facing down. Do not moisten within 10 mm of the connections as this could contaminate the whole insulation.

Code: 580000000

**GUIDELINES FOR OBTAINING OPTIMUM PERFORMANCE IN HIGH HEATING DENSITY ELECTRIC HEATING CARTRIDGES**

- Strategically select the location and number of cartridges to be installed with a view to obtaining a good distribution of heating. Take these three factors into consideration:
 1. Heat rises
 2. At equal distances, heat concentrates in the center because there is no lateral dissipation.
 3. For the same reason, the outer edges of the periphery are heated less, above all if the block to be heated is not insulated from the outside.
- Try to choose cartridges of 8 to 11 W/cm² range or, at most, of the 12 to 19 W/cm² range, and install them in scratch-free boreholes with a tolerance of H7.
- Consider using cartridges of Ø3/8" or Ø10 mm, they provide the highest performance at the lowest price.
- In event it is necessary to use cartridges of over 20 W/cm², carefully follow (applying safety margins, if possible) the assembly instructions
- To simplify the insertion-adjustment and withdrawal of the cartridge, the borehole should have an outlet. The lubricating compound NEVER-SEEZ®, which withstands a temperature of up to 1100 °C, also simplifies installation and removal in addition to improving thermal conductivity.
- Do not leave the cables inside the housing or leave the heating zone outside of the housing since the connections of the element could burn out.
- Protect the unwelded end and the connections against liquids, moisture, metallic particles, plastics, etc, which could produce leakage currents. Likewise, protect the cables against vibrations and mechanical friction.
- The temperature detection probe should be set at a maximum distance of 10 mm from the cartridge. It is recommended to use P.I.D. control temperature. Consult our catalogue pages nº 98, 99 and 100
- The minimum distance between the cartridges is equivalent to two diameters.

Example

An aluminium block should be heated to 250 °C. The required heating is of 500 W; for measurement reasons, only two cartridges of 250 W, Ø10 x 80 mm may be installed. These cartridges are within the range of 12 to 19 W/cm², so applying a density of 20 W/cm² in Graph 1 and a safety temperature of 400 °C for the part to be heated, we find that the tolerance or adjustment could be 0.25. However, the borehole is made with a precision as per ISA H7, so the adjustment calculation is as follows:

- Hole diameter: $10^{+0}_{-0.018}$, so the maximum diameter may be Ø10.018 mm.

- Cartridge diameter: $10^{+0.02}_{-0.08}$, so the minimum diameter may be Ø9.92 mm.

- Maximum adjustment or clearance: $10.018 - 9.92 = 0.098$ mm. We round off to 0.10 mm

According to Graph 1, between 0.25 and 0.10 there is a safety margin of 300 °C. The maximum load of W/cm² at 400 °C with an adjustment of 0.10 mm would be 45 W/cm², and since we have chosen from 12 to 19 W/cm², we are covered by over 25 W/cm².