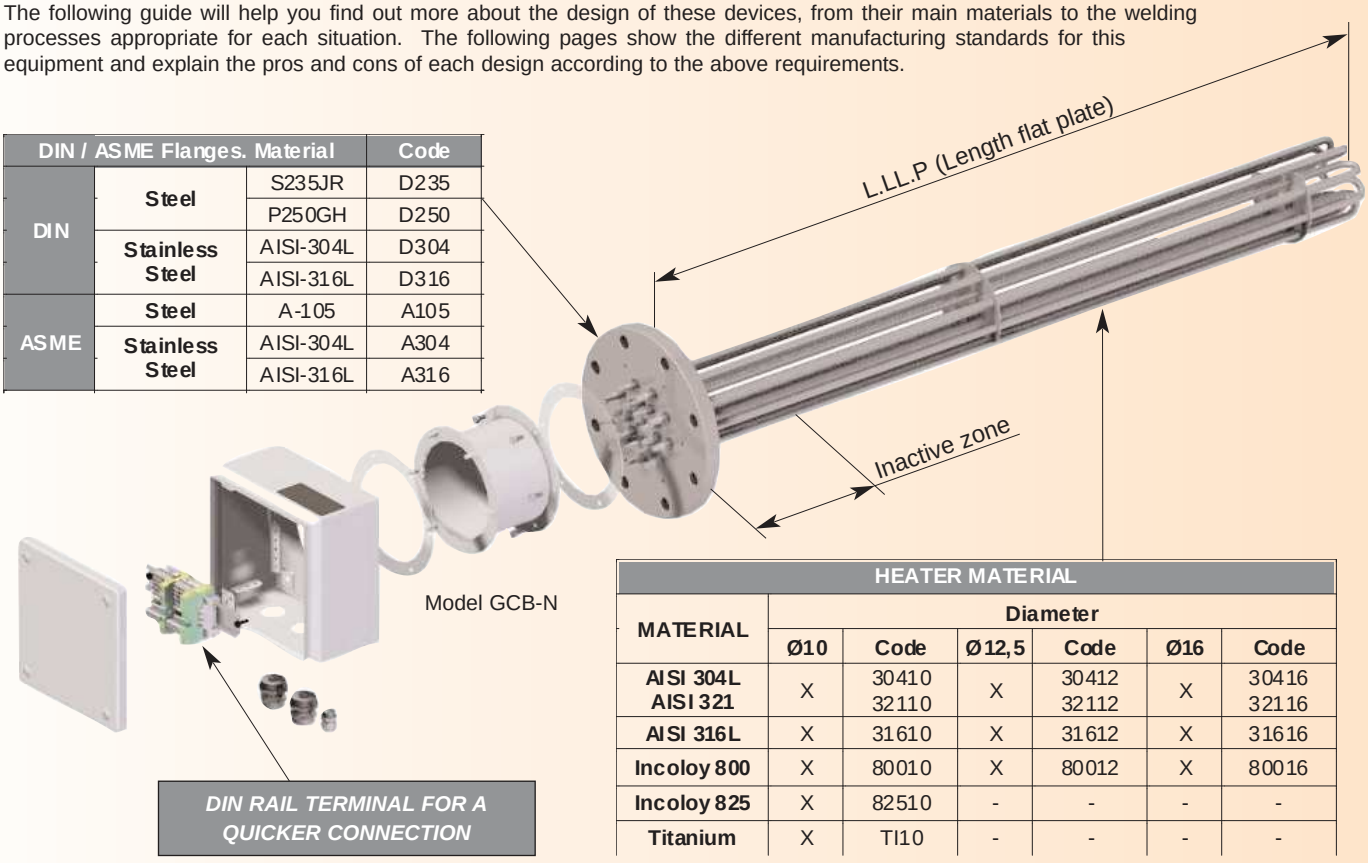
The GCB heaters (flange heaters) are heating units designed to work under pressure. They are constructed through the welding of various reinforced heating elements to a standard blind flange.

The design of a GCB can vary significantly. Working pressure, the desired temperature or the fluid to be heated are just some of the factors that can affect which system to design. This is why each case is assessed by our technical department in order to provide a product that meets the specific requirements of each of our customers.

The following guide will help you find out more about the design of these devices, from their main materials to the welding processes appropriate for each situation. The following pages show the different manufacturing standards for this equipment and explain the pros and cons of each design according to the above requirements.

| DIN / ASME Flanges. Material | | | Code |
|---|---|---|---|
| DIN | Steel | S235JR | D235 |
| | | P250GH | D250 |
| | Stainless Steel | AISI-304L | D304 |
| | | AISI-316L | D316 |
| ASME | Steel | A-105 | A105 |
| | Stainless Steel | AISI-304L | A304 |
| | | AISI-316L | A316 |




| HEATER MATERIAL | | | | | | |
|---|---|---|---|---|---|---|
| MATERIAL | Diameter | | | | | |
| | Ø10 | Code | Ø12,5 | Code | Ø16 | Code |
| AISI 304L AISI 321 | X | 30410 32110 | X | 30412 32112 | X | 30416 32116 |
| AISI 316L | X | 31610 | X | 31612 | X | 31616 |
| Incoloy 800 | X | 80010 | X | 80012 | X | 80016 |
| Incoloy 825 | X | 82510 | - | - | - | - |
| Titanium | X | TI10 | - | - | - | - |

Electrical protection against outdoor conditions is through junction boxes or small control panels that prevent external elements getting inside (dust, water, etc.). This protection is calculated according to each application's special requirements.

## Separators / Deflectors

To prevent contact between the heating elements our units include separators (see figure 1). These consist of a sheet whose diameter is always less than the nominal diameter of the flanges and that stiffens the heating elements thus preventing buckling or contact with contaminants during the element's lifecycle.

When the equipment is for heating a fluid in constant circulation, in most cases the flow needs to be directed to aid contact with the heater. Deflectors are included in these units for this (see figure 2).

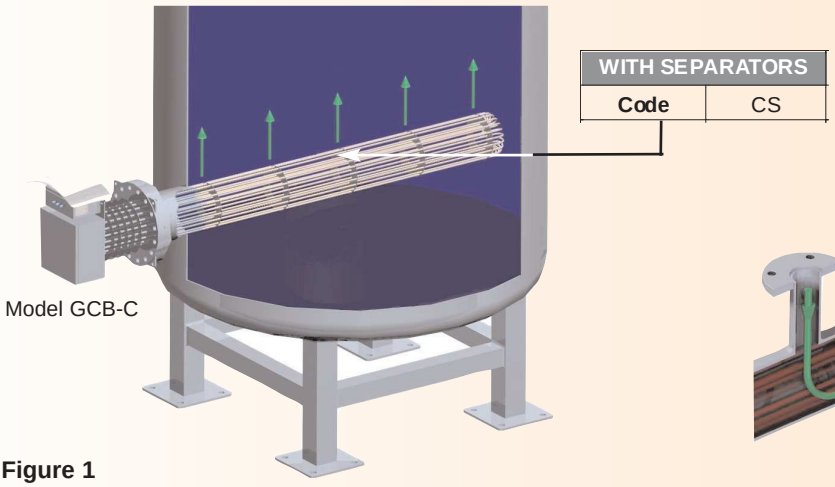



**Figure 1**

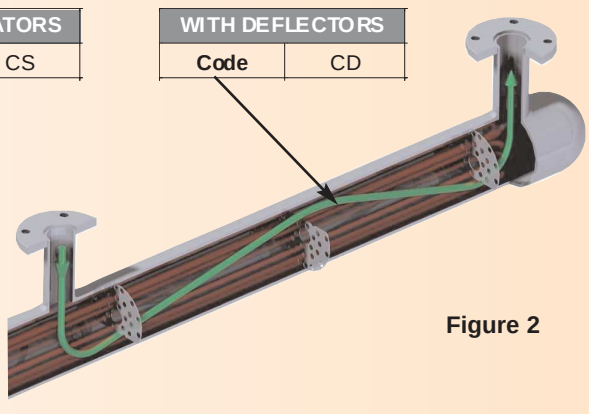


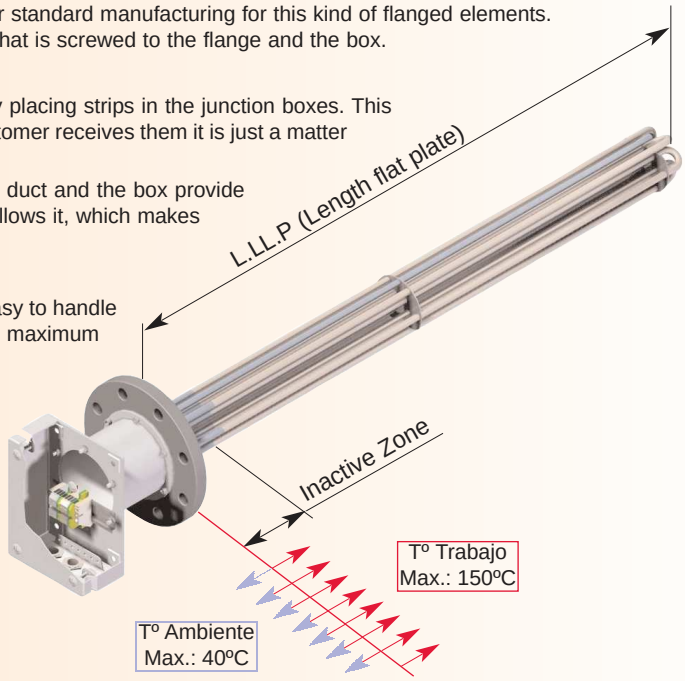

**Figure 2**

The GCB N heating units are the most frequently used and represent our standard manufacturing for this kind of flanged elements. They are constructed by coupling the junction box through a metal duct that is screwed to the flange and the box.

The heating elements remain near the flange and they are connected by placing strips in the junction boxes. This means the heating elements remain inter-connected so that once the customer receives them it is just a matter of the power reaching the strips.

Meanwhile, the seals between the flange and the duct, and between the duct and the box provide protection against dust and humidity of up to IP-66, as long as the box allows it, which makes them apt for working outdoors.

This kind of construction means the product is simple to assemble and easy to handle for practically anything. However, it is important to remember that the maximum heating temperature this composition permits is 150ºC.

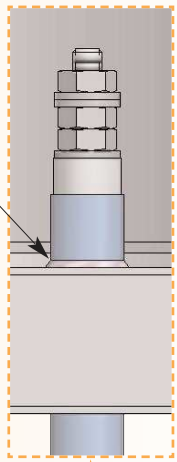


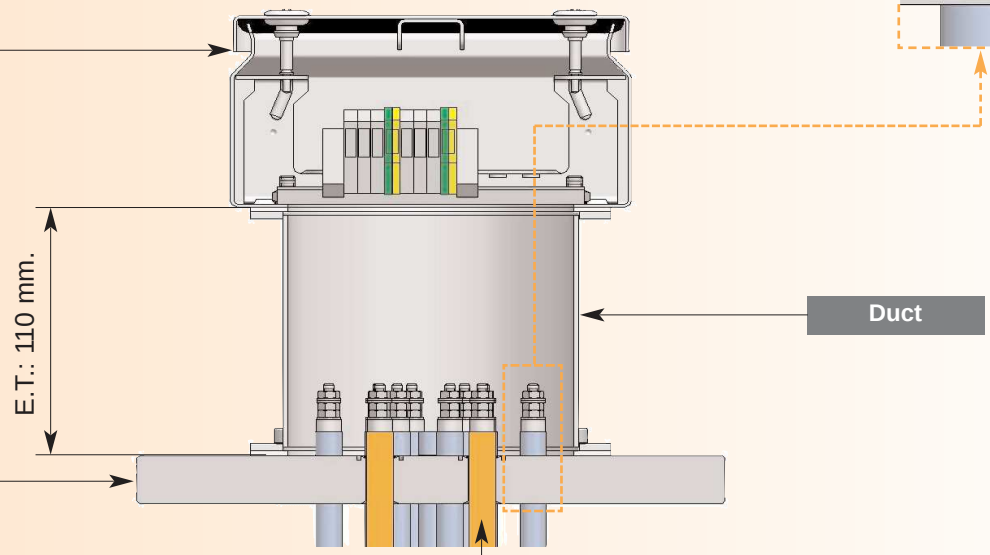

## CONSTRUCTION OF FLANGES WITH DUCT

| CONNECTION BOX | | |
|---|---|---|
| **IP** | **Material** | **Code** |
| 54 | Painted steel | A54 |
| 54 | S. Steel | I54 |
| 66 | Painted steel | A66 |

(*) It is recommended that the exterior zone should always remain under a covered area. If this is not possible, the unit should be protected from direct water and wind, even if only with IP-66 protection.

| FLANGE-HEATER WELDING | |
|---|---|
| **Type** | **Code** |
| Brazing silver alloy | P1 |
| Welding TIG without contibution | T1 |

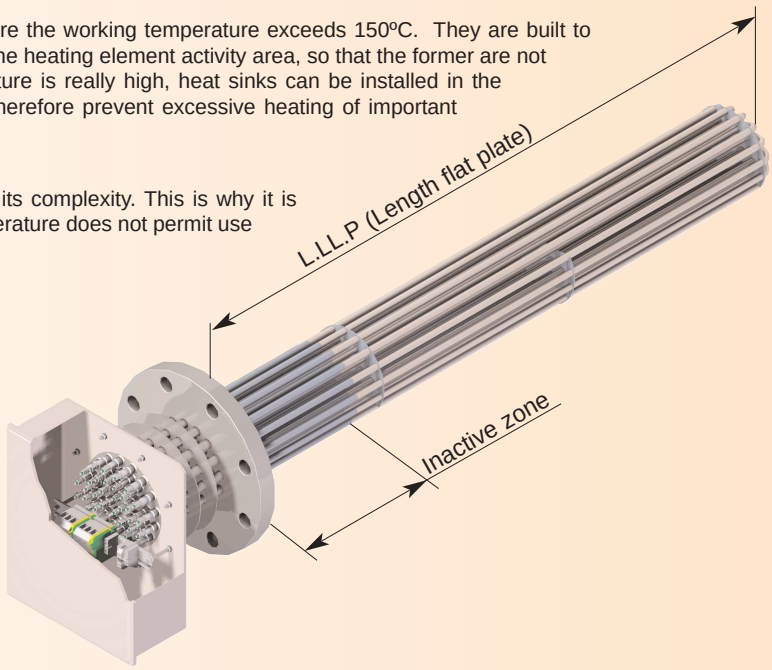





| MAIN FLANGE | |
|---|---|
| **Standards** | **Code** |
| DIN | D |
| ASME | A |

The GCB-C heating units are mostly used for facilities where the working temperature exceeds 150ºC. They are built to separate the terminals area and electrical connection from the heating element activity area, so that the former are not affected by the high temperature. Also, when the temperature is really high, heat sinks can be installed in the Thermal Zone to encourage temperature dissipation and therefore prevent excessive heating of important areas.

This kind of construction is always the most costly due to its complexity. This is why it is recommended for use only in cases when the working temperature does not permit use of a standard manufacturing model (GCB-N).




## CONSTRUCTION OF FLANGES WITH THERMAL ZONE (TZ) AND BUSHING

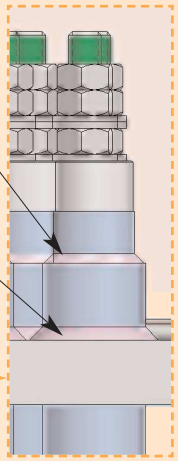
| CONNECTION BOX | | |
|---|---|---|
| **IP** | **Material** | **Code** |
| 54 | Painted steel | A54 |
| 54 | S. Steel | I54 |
| 66 | Painted steel | A66 |

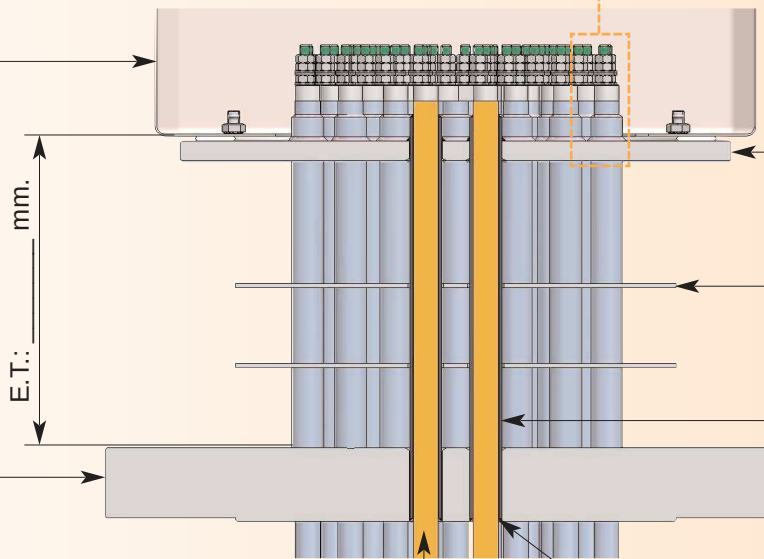
(*) It is recommended that the exterior zone should always remain under a covered area. If this is not possible, the unit should be protected from direct water and wind, even if only with IP-66 protection.

| SHELL – HEATER WELDING | |
|---|---|
| **Type** | **Code** |
| Brazing silver alloy | P3 |
| TIG welding without contribution | T3 |

| SHELL – PLATEN WELDING | |
|---|---|
| **Type** | **Code** |
| Brazing silver alloy | P2 |
| TIG welding without contribution | T2 |

Note: the combination of T3 and T2 is not recommended in the same element.






| DISSIPATORS | |
|---|---|
| | **Code** |
| WITH | Nx |
| WITHOUT | N0 |

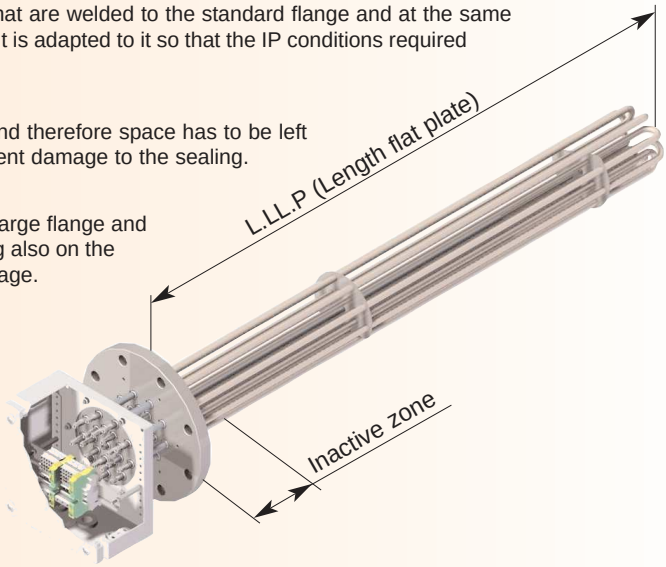
| MAIN FLANGE | |
|---|---|
| **Standards** | **Code** |
| DIN | D |
| ASME | A |

| SHELL – FLANGE WELDING | |
|---|---|
| **Type** | **Code** |
| Brazing silver alloy | P1 |
| TIG welding without contribution | T1 |

The heating units GCB-ET are made up of a group of heating elements that are welded to the standard flange and at the same time to a platen. This platen is what keeps the junction box fastened and it is adapted to it so that the IP conditions required in each case can be maintained.

This type of construction is used when the temperature exceeds 150ºC and therefore space has to be left between the connection flange and the heating element terminals to prevent damage to the sealing.

They are a good option for equipment that does not have an excessively large flange and the number of rods to be welded is not that high. In this case, or depending also on the application, the GCB-C can also be used, as explained on the following page.

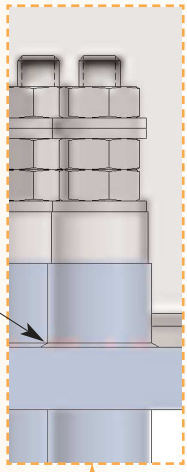


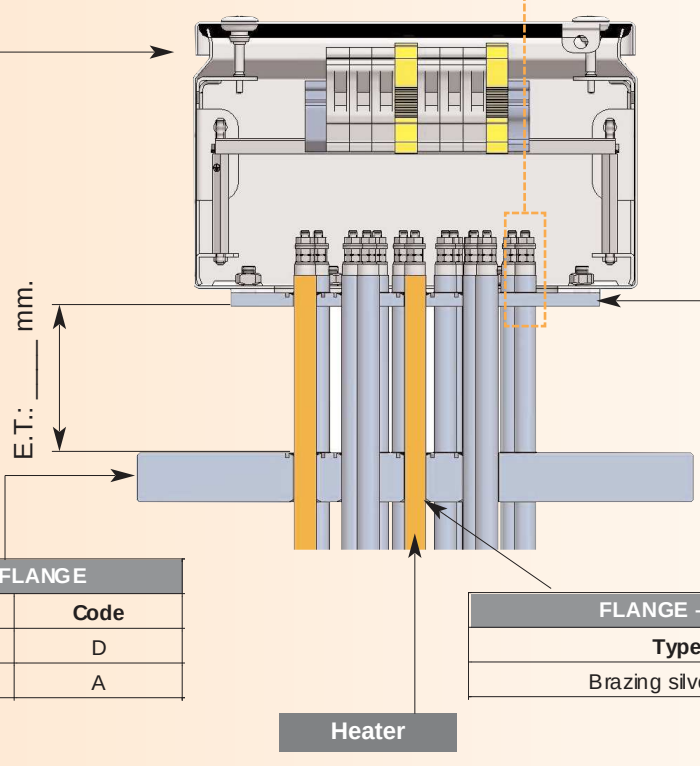

## CONSTRUCTION OF FLANGES WITH THERMAL ZONE (ZT) WITHOUT BUSHING

| CONNECTION BOX | | |
|---|---|---|
| **IP** | **Material** | **Code** |
| 54 | Painted steel | A54 |
| 54 | S. Steel | I54 |
| 66 | Painted steel | A66 |

(*) It is recommended that the exterior zone should always remain under a covered area. If this is not possible, the unit should be protected from direct water and wind, even if only with IP-66 protection.

| SHELL – PLATEN WELDING | |
|---|---|
| **Type** | **Code** |
| Brazing silver alloy | P2 |
| TIG welding without contribution | T2 |






| MAIN FLANGE | |
|---|---|
| **Standards** | **Code** |
| DIN | D |
| ASME | A |

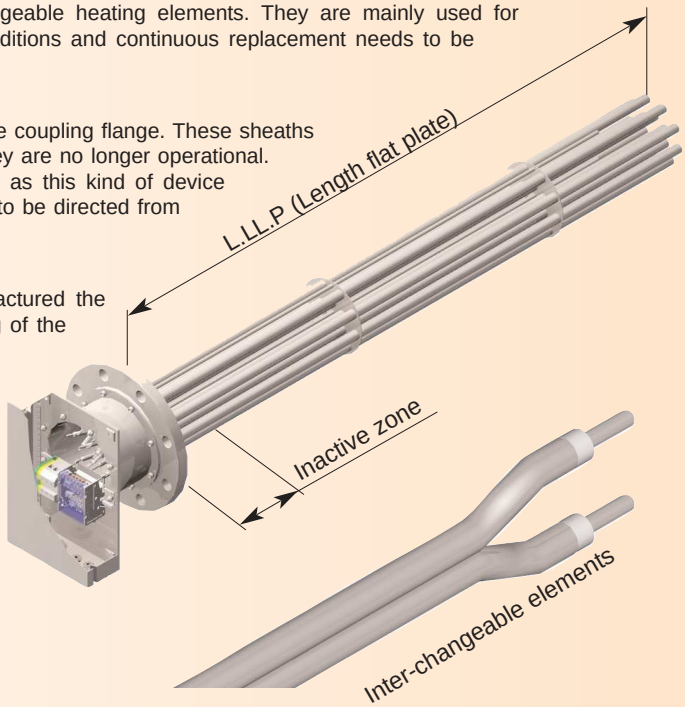
| FLANGE – HEATER WELDING | |
|---|---|
| **Type** | **Code** |
| Brazing silver alloy | P1 |

The heating units GCB-R are reinforced elements with inter-changeable heating elements. They are mainly used for applications when the heating elements are exposed to strong conditions and continuous replacement needs to be anticipated.

Manufacturing this kind of element consists of welding sheaths to the coupling flange. These sheaths hold the heating elements and enable them to be replaced when they are no longer operational. Connecting and disconnecting the heating elements is very simple as this kind of device includes power distributors. These distributors enable the electricity to be directed from the customer's connection to all the heating elements.

This design with interchangeable heating elements can be manufactured the same as the GCB-C manufacturing process but without the welding of the heating element.

Optionally other kinds of interchangeable heating elements can be manufactured, (glow plugs, one-pipe, etc.)

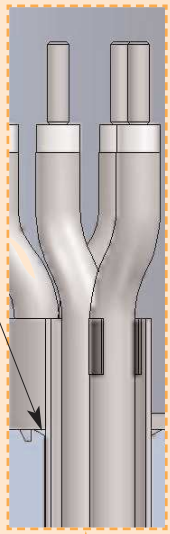


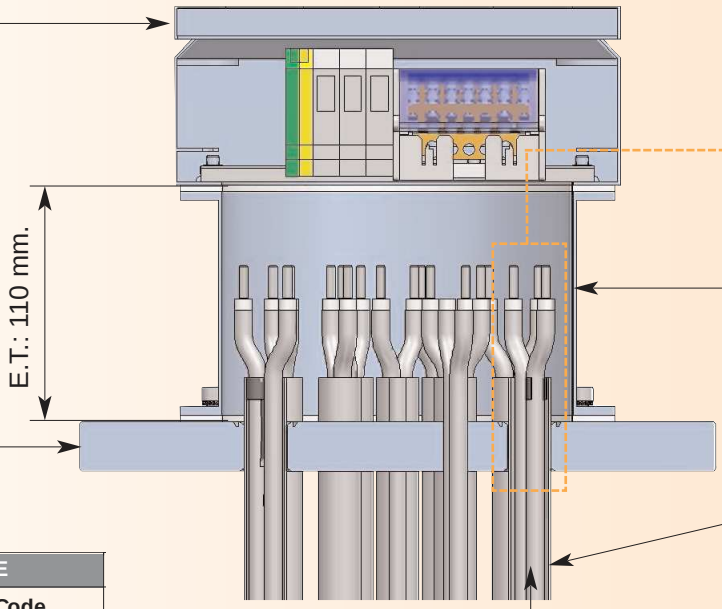

## CONSTRUCTION OF FLANGES WITH INTERCHANGEABLE HEATING ELEMENTS

| CONNECTION BOX | | |
|---|---|---|
| **IP** | **Material** | **Code** |
| 54 | Painted steel | A54 |
| 54 | S. Steel | I54 |
| 66 | Painted steel | A66 |

(*) It is recommended that the exterior zone should always remain under a covered area. If this is not possible, the unit should be protected from direct water and wind, even if only with IP-66 protection.

| FLANGE – SHEATH WELDING | |
|---|---|
| **Type** | **Code** |
| Brazing silver alloy | P1 |
| TIG welding without contribution | T1 |






| MAIN FLANGE | |
|---|---|
| **Standards** | **Code** |
| DIN | D |
| ASME | A |

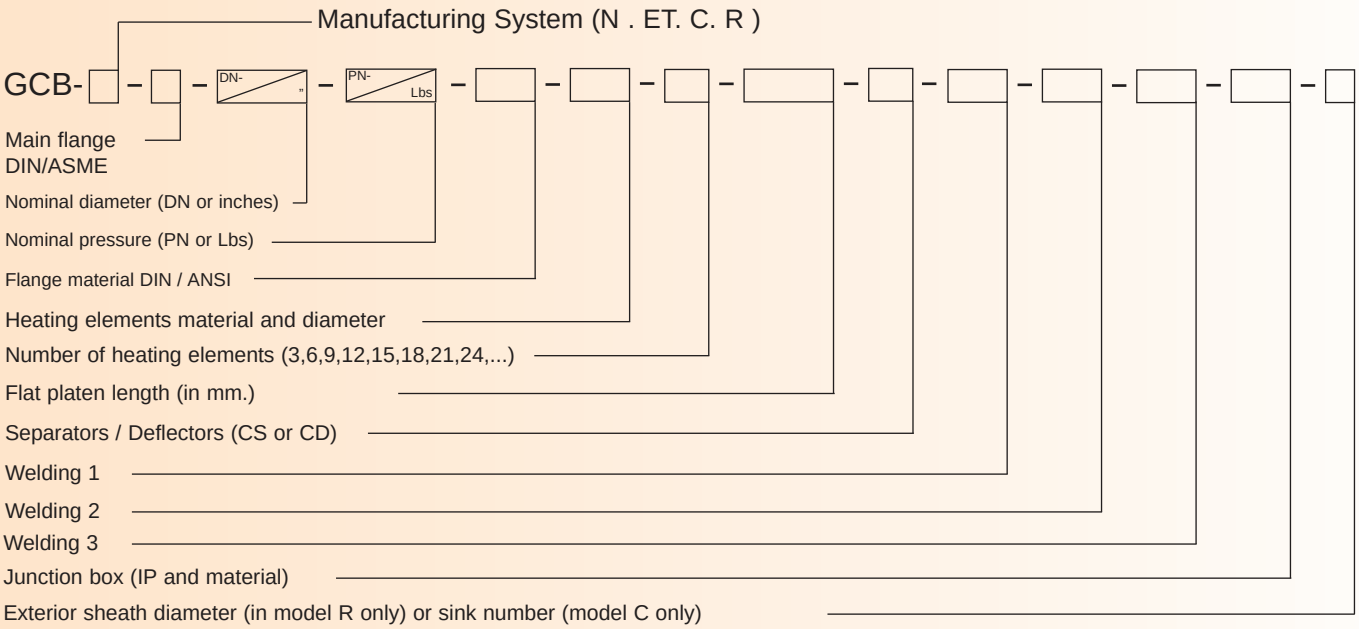
| SHEATHS | |
|---|---|
| **ØExt. sheath** | **Code** |
| Ø19 | V19 |
| Ø25 | V25 |

# GROUP 1 - Immersion heaters

Flange Heating Unit - Codifying

The different codifying modes of the GCB are shown below. To fill in the fields you just have to choose the most appropriate manufacturing system for each case and fill in the gaps with the information shown.

When the code has been filled in, don't forget to fill in the equipment's working conditions and its electrical data as well as the control elements you wish to add.




| WORK CONDITIONS | |
|---|---|
| **Fluid** | |
| **Flow** | m³/h |
| **Volumen** | m³ |
| **Inlet temperature** | ºC |
| **Outlet temperature** | ºC |
| **Work pressure** | Bar |
| **TS (Design temperature)** | ºC |
| **PS (Design pressure)** | Barg |
| **Test pressure** | Barg |

| ELECTRICAL DATA | |
|---|---|
| **Voltage** | V |
| **Watts** | W |
| **Nº Steps** | |
| **Max. load** | W/cm² |
| **Connection (star / delta)** | |

| TEMPERATURE CONTROLS (OPTIONALS) | | |
|---|---|---|
| **Thermostat. Automatic reset** | 0-40ºC | |
| | 0-90ºC | |
| | 0-120ºC | |
| | 0-200ºC | |
| | 0-300ºC | |
| | 30-160ºC | |
| **Sensors** | PT-100 | |
| | Tipo "K" | |
| | Tipo "J" | |
| **Limitter. Manual reset** | 55ºC | |
| | 100ºC | |
| | 230ºC | |

*Remarks:*

**Special manufacturing**

If your requirements are not included in our standard manufacturing, please contact our technical department.

**La Grand E.V.O**

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