

HANDBOOK  
**VALVES**

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Ed. 2017

 **Castel**<sup>®</sup>  
Italian technology

# CHAPTER 3

## VALVES WITH SCREW SHUTTER

### FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT

#### APPLICATIONS

The valves illustrated in this chapter have been developed by Castel for all the applications that use the sub-critical or transcritical R744 refrigeration fluid belonging to Group 2, defined in Article 13, Chapter 1, Point (b) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

**CAUTION!:** Valves with screw shutter illustrated in this chapter cannot be used with other refrigerant fluids.

#### HERMETIC VALVES

Hermetic valves for CO<sub>2</sub> are two-way shut-off taps, type 6010E/2 and 6012E/22

The main parts are manufactured with the following materials:

- Hot forged brass EN 12420 – CW 617N for the body
- Steel, with proper surface protection, or brass for the spindle
- EPDM (ethylene propylene rubber) and aramid fibres for packing gland seal.
- Glass-reinforced PBT for the protective cap that covers the spindle.

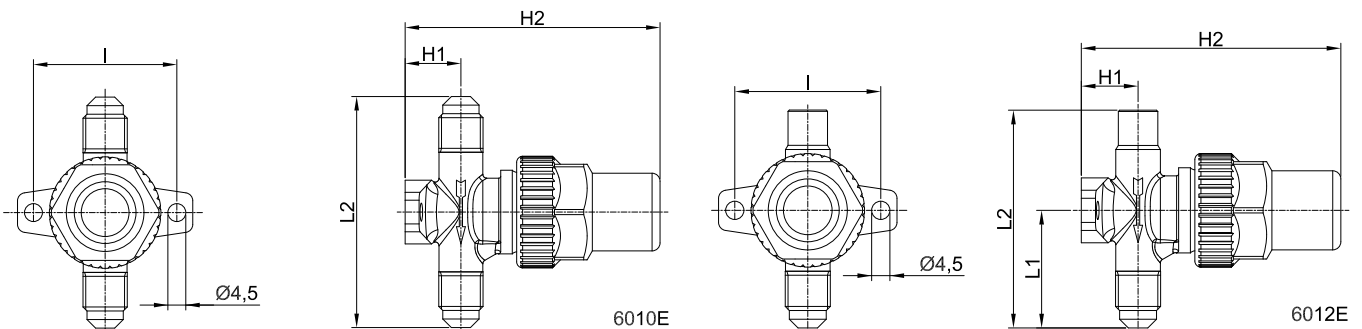


TABLE 21: General characteristics of valves for hermetic systems for R744

| Catalogue Number | Connections |      |                | Kv Factor [m <sup>3</sup> /h] | PS [bar] | TS [°C] |      | TA [°C] |      | Risk Category according to PED Recast |
|------------------|-------------|------|----------------|-------------------------------|----------|---------|------|---------|------|---------------------------------------|
|                  | SAE Flare   |      | ODS<br>Ø [in.] |                               |          | min.    | max. | min.    | max. |                                       |
|                  | 6010E/2     | 1/4" |                |                               |          |         |      |         |      |                                       |
| 6012E/22         | 1/4"        | –    | 1/4"           |                               |          |         |      |         |      |                                       |

TABLE 22: Dimensions and weights of valves for hermetic systems for R744

| Catalogue Number | Dimensions [mm] |                |    |                |                | Weight [g] |
|------------------|-----------------|----------------|----|----------------|----------------|------------|
|                  | H <sub>1</sub>  | H <sub>2</sub> | l  | L <sub>1</sub> | L <sub>2</sub> |            |
| 6010E/2          | 14              | 66             | 36 | –              | 58             | 160        |
| 6012E/22         |                 |                |    | 29             | 55,5           | 145        |



## RECEIVER VALVES

Receiver valves for CO<sub>2</sub> are two-way valves with 90° connections, types 6110E and 6120E.

The main parts are manufactured with the following materials:

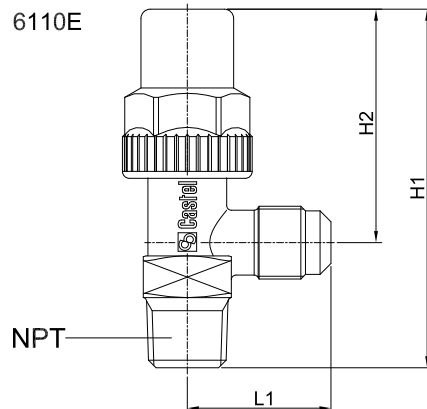
- Hot forged brass EN 12420 – CW 617N for the body
- Steel, with proper surface protection, for the spindle.
- EPDM (ethylene propylene rubber) and aramid fibres for packing gland seal.
- Glass-reinforced PBT for the protective cap that covers the spindle.

TABLE 23: General characteristics of receiver valves for R744

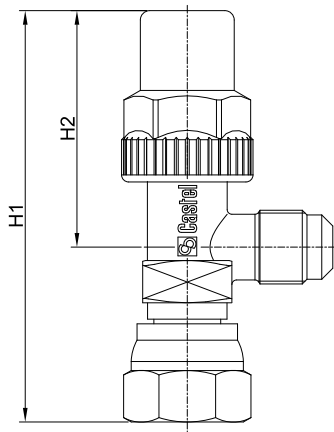
| Catalogue Number | Connections |      | Kv Factor [m <sup>3</sup> /h] | PS [bar] | TS [°C] |      | TA [°C] |      | Risk Category according to PED Recast |
|------------------|-------------|------|-------------------------------|----------|---------|------|---------|------|---------------------------------------|
|                  | SAE Flare   | NPT  |                               |          | min.    | max. | min.    | max. |                                       |
| 6110E/22         | -           | 1/4" | 1/4"                          | 120      | -40     | +130 | -40     | +50  | Art. 4.3                              |
| 6110E/X15        | 1/4" F      | 1/4" | -                             |          |         |      |         |      |                                       |
| 6110E/33         | -           | 3/8" | 3/8"                          |          |         |      |         |      |                                       |
| 6110E/X13        | 3/8" F      | 3/8" | -                             |          |         |      |         |      |                                       |
| 6110E/44         | -           | 1/2" | 1/2"                          |          |         |      |         |      |                                       |
| 6120E/22         | -           | 1/4" | 1/4"                          |          |         |      |         |      |                                       |
| 6120E/33         | -           | 3/8" | 3/8"                          |          |         |      |         |      |                                       |
| 6120E/44         | -           | 1/2" | 1/2"                          |          |         |      |         |      |                                       |

TABLE 24: Dimensions and weights of receiver valves for R744

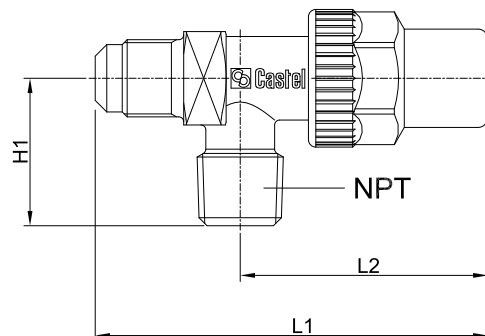
| Catalogue Number | Dimensions [mm] |                |                |                | Weight [g] |
|------------------|-----------------|----------------|----------------|----------------|------------|
|                  | H <sub>1</sub>  | H <sub>2</sub> | L <sub>1</sub> | L <sub>2</sub> |            |
| 6110E/22         | 72              | 48             | 27,5           | -              | 110        |
| 6110E/X15        | 83              |                |                |                |            |
| 6110E/33         | 77              | 50             | 31             |                | 140        |
| 6110E/X13        | 87              |                |                |                |            |
| 6110E/44         | 92              | 55,5           | 34,5           |                | 235        |
| 6120E/22         | 27,5            | -              | 72             | 48             | 110        |
| 6120E/33         | 30              |                | 80             | 50             | 140        |
| 6120E/44         | 33              |                | 93             | 55,5           | 305        |



6110E/X13  
6110E/X15



6120E



## CAPPED VALVES

The main parts of the capped valves are made with the following materials:

- Hot forged brass EN 12420 – CW 617N for the body
- Steel, with proper surface protection, for the spindle.
- EPDM (ethylene propylene rubber) and aramid fibres for packing gland seal.
- Glass-reinforced PBT for the protective cap that covers the spindle.

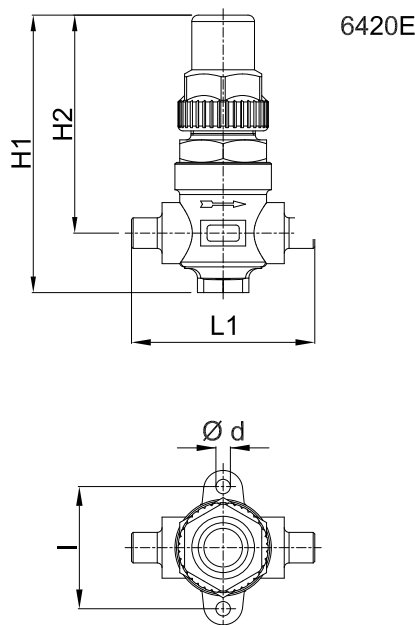
The brazing of capped valves, type 6420E, should be carried out with care, using a low melting point filler material. It is necessary to remove the spindle assembly, including the packing gland before brazing the body. It is important to avoid direct contact between the torch flame and the body, which could be damaged and compromise the proper functioning of the valve.

TABLE 25: General characteristics of capped valves for R744

| Catalogue Number | Connections |                | Kv Factor [m <sup>3</sup> /h] | PS [bar] | TS [°C] |      | TA [°C] |      | Risk Category according to PED Recast |
|------------------|-------------|----------------|-------------------------------|----------|---------|------|---------|------|---------------------------------------|
|                  | SAE Flare   | ODS<br>Ø [in.] |                               |          | min.    | max. | min.    | max. |                                       |
| 6420E/2          | -           | 1/4"           | 0,40                          | 120      | 120     | +110 | -40     | +110 | Art. 4.3                              |
| 6420E/3          |             | 3/8"           | 1,00                          |          |         |      |         |      |                                       |
| 6420E/3S3        | 3/8" - OUT  | 3/8" - IN      |                               |          |         |      |         |      |                                       |
| 6420E/4          | -           | 1/2"           | 1,45                          |          |         |      |         |      |                                       |

TABLE 26: Dimensions and weights of capped valves for R744

| Catalogue Number | Dimensions [mm] |                |                |     |    | Weight [g] |
|------------------|-----------------|----------------|----------------|-----|----|------------|
|                  | H <sub>1</sub>  | H <sub>2</sub> | L <sub>1</sub> | d   | l  |            |
| 6420E/2          | 85,5            | 67             | 57             | 4,5 | 38 | 300        |
| 6420E/3          |                 |                | 61             |     |    | 305        |
| 6420E/3S3        |                 |                | 67,5           |     |    |            |
| 6420E/4          |                 |                | 70             |     |    |            |



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