

# Check valves



 **Castel<sup>®</sup>**

# CHECK VALVES

## APPLICATIONS

The check valves, shown in this chapter, are classified "Pressure accessories" in the sense of the Pressure Equipment Directive 97/23/EC, Article 1, Section 2.1.4 and are subject of Article 3, Section 1.3 of the same Directive. They are designed for installation on commercial refrigerating systems and on civil and industrial conditioning plants, which use refrigerant fluids proper to the Group II (as defined in Article 9, Section 2.2 of Directive 97/23/EC and referred to in Directive 67/548/EEC).

For heavy duty, about the operation temperature, for example installation on the discharge line close to the compressor, Castel has developed three new series of valves, types 3122, 3142 and 3182, equipped with special gasket for high temperature, between the body and its cover.

## MATERIALS

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

- hot forged brass EN 12420 – CW 617N for body and cover;
- copper tube EN 12735-1 – Cu-DHP for solder connections;
- austenitic stainless steel AISI 302 for the spring;
- chloroprene rubber (CR) for outlet seal gaskets. Metal-rubber laminated gaskets for the valves series 3122, 3142 and 3182;
- P.T.F.E. for seat gasket.

## INSTALLATION

The valves can be installed in any section of a refrigerating system, where it is necessary to avoid an inversion of the refrigerating flow, in compliance with the limits and capacities indicated in table 3.

Table 1 shows the following functional characteristics of a check valve:

- PS;
- TS;
- Kv factor;
- minimum opening pressure differential, that is the minimum pressure differential between inlet and outlet at which a check valve can open and stay opened.

Before connecting the valve to the pipe it is advisable to make sure that the refrigerating system is clean. In fact the valves with P.T.F.E. gaskets are particularly sensitive to dirt and debris. Furthermore check that the flow direction in the pipe corresponds to the arrow stamped on the body of the valve.

The allowed operating positions are:

- types 3122 and 3142 with horizontal axis and valve cover facing upward;
- types 3182 with inlet facing down and the valve cover facing upward;
- types 3110, 3130 and 3131, preferably with vertical axis and arrow upward. Sloping axis, up to horizontal position, are tolerable.

The brazing of valves with solder connections should be carried out with care, using a low melting point filler material. Before starting to braze, it's necessary to disassemble the valves series 3122, while this operation is not necessary with solder connection valves. In any case, it's important to avoid direct contact between the torch flame and the valve body, which could be damaged and compromise the proper functioning of the valve.

TABLE 1: General Characteristics

| Catalogue number | Connections |         |        |         |        | Factor Kv [m <sup>2</sup> /h] | Minimum Opening Pressure Differential [bar] | TS [°C] |      | PS [bar] | Risk Category according to PED |
|------------------|-------------|---------|--------|---------|--------|-------------------------------|---|---------|------|----------|--------------------------------|
|                  | SAE Flare   | ODS     |        | ODM     |        |                               |   | min.    | max. |          |                                |
|                  |             | Ø [in.] | Ø [mm] | Ø [in.] | Ø [mm] |                               |   |         |      |          |                                |
| 3110/2           | 1/4"        |         |        |         |        | 0,4                           | - 40  | +105    | 45   | Art. 3.3 |                                |
| 3110/3           | 3/8"        |         |        |         |        | 0,1                           |   |         |      |          |                                |
| 3110/4           | 1/2"        | -       | -      | -       | -      |                               |   |         |      |          |                                |
| 3110/5           | 5/8"        |         |        |         |        |                               |   |         |      |          |                                |
| 3110/6           | 3/4"        |         |        |         |        |                               |   |         |      |          |                                |
| 3122/M22         |             | -       | 22     | -       | 28     |                               |   |         |      |          | 6,6                            |
| 3122/7           |             | 7/8"    | -      | 1.1/8"  | -      |                               |   | - 35    | +160 | 45       | Art. 3.3                       |
| 3122/M28         |             | -       | 28     | 1.3/8"  | 35     | 8,8                           |   |         |      |          |                                |
| 3122/9           |             | 1.1/8"  | -      | 1.3/8"  | 35     |                               |   |         |      |          |                                |
| 3122/11          |             | 1.3/8"  | 35     | 1.5/8"  |        | 15,2                          |   |         |      |          |                                |
| 3122/13          |             | 1.5/8"  | -      | 2"      |        | 25,0                          |   |         |      |          |                                |
| 3122/M42         |             | -       | 42     | 2"      |        |                               |   |         |      |          |                                |
| 3122/17          |             | 2.1/8"  | 54     |         |        | 40,0                          | - 40  | +105    | 45   | Art. 3.3 |                                |
| 3130/2           |             | 1/4"    | -      |         |        | 0,5                           |   |         |      |          |                                |
| 3130/3           |             | 3/8"    | -      |         |        | 1,6                           |   |         |      |          |                                |
| 3130/M10         |             | -       | 10     |         |        |                               |   |         |      |          |                                |
| 3130/M12         |             | -       | 12     |         |        | 1,8                           |   |         |      |          |                                |
| 3130/4           |             | 1/2"    | -      |         |        |                               |   |         |      |          |                                |
| 3130/5           |             | 5/8"    | 16     |         |        | 3,3                           | - 40  | +105    | 45   | Art. 3.3 |                                |
| 3130/M18         |             | -       | 18     |         |        |                               |   |         |      |          |                                |
| 3130/6           |             | 3/4"    | -      |         |        |                               |   |         |      |          |                                |
| 3130/7           |             | 7/8"    | 22     |         |        | 1,6                           |   |         |      |          |                                |
| 3131/M10         |             | -       | 10     |         |        | 1,8                           |   |         |      |          |                                |
| 3131/M12         |             | -       | 12     |         |        |                               |   |         |      |          |                                |
| 3131/5           |             | 5/8"    | 16     | -       | -      | 3,3                           | 0,3   |         |      |          |                                |
| 3131/7           |             | 7/8"    | 22     |         |        |                               |   |         |      |          |                                |
| 3142/7           |             | 7/8"    | 22     |         |        | 6,6                           |   |         |      |          |                                |
| 3142/M28         |             | -       | 28     |         |        | 8,8                           |   |         |      |          |                                |
| 3142/9           |             | 1.1/8"  | -      |         |        |                               |   |         |      |          |                                |
| 3142/11          |             | 1.3/8"  | 35     |         |        | 15,2                          |   |         |      |          | 0,1                            |
| 3142/13          |             | 1.5/8"  | -      |         |        | 25,0                          |   |         |      |          |                                |
| 3142/M42         |             | -       | 42     |         |        |                               |   |         |      |          |                                |
| 3142/17          |             | 2.1/8"  | 54     |         |        | 40,0                          |   |         |      |          |                                |
| 3142/21          |             | 2.5/8"  | -      |         |        |                               |   |         |      |          |                                |
| 3142/25          |             | 3.1/8"  | -      |         |        |                               |   |         |      |          |                                |
| 3182/7           |             | 7/8"    | 22     |         |        | 8,5                           | 0,1   | - 35    | +160 | 45       | Art. 3.3                       |
| 3182/M28         |             | -       | 28     |         |        | 9,5                           |   |         |      |          |                                |
| 3182/9           |             | 1.1/8"  | -      |         |        |                               |   |         |      |          |                                |
| 3182/11          |             | 1.3/8"  | 35     |         |        | 19,0                          |   |         |      |          |                                |
| 3182/13          |             | 1.5/8"  | -      |         |        | 37,0                          |   |         |      |          |                                |
| 3182/M42         |             | -       | 42     |         |        |                               |   |         |      |          |                                |
| 3182/17          |             | 2.1/8"  | 54     |         |        | 45,4                          |   |         |      |          | I                              |

TABLE 2: Dimensions and Weights

| Catalogue number | Dimensions [mm] |                |       |                |      |      |      | Weight [g] |     |    |    |      |     |     |     |
|------------------|-----------------|----------------|-------|----------------|------|------|------|------------|-----|----|----|------|-----|-----|-----|
|                  | H               | H <sub>1</sub> | L     | L <sub>1</sub> | Q    | Ø D  | Ch   |            |     |    |    |      |     |     |     |
| 3110/2           | 84              | -              | -     | -              | -    | 23   | 20   | 150        |     |    |    |      |     |     |     |
| 3110/3           | 84,5            |                |       |                |      |      |      | 155        |     |    |    |      |     |     |     |
| 3110/4           | 83              |                |       |                |      |      |      | 165        |     |    |    |      |     |     |     |
| 3110/5           | 109             |                |       |                |      | 37   | 28   | 440        |     |    |    |      |     |     |     |
| 3110/6           | 108             |                |       |                |      |      |      | 460        |     |    |    |      |     |     |     |
| 3122/M22         | 84,5            |                |       |                |      | 28,5 | 100  | 60         | -   | -  | -  | 1180 |     |     |     |
| 3122/7           |                 | 1090           |       |                |      |      |      |            |     |    |    |      |     |     |     |
| 3122/M28         |                 | 1625           |       |                |      |      |      |            |     |    |    |      |     |     |     |
| 3122/9           |                 | 2955           |       |                |      |      |      |            |     |    |    |      |     |     |     |
| 3122/11          | 101,5           | 34             | 118   | 68             | 4225 |      |      |            |     |    |    |      |     |     |     |
| 3122/13          | 125,5           | 37             | 141   | 88             | 170  |      |      |            |     |    |    |      |     |     |     |
| 3122/M42         |                 |                |       |                | 201  |      |      |            |     |    |    |      |     |     |     |
| 3122/17          | 142             | 42,5           | 173   | 104            | 1320 |      |      |            |     |    |    |      |     |     |     |
| 3130/2           | 144             | -              | -     | -              | 23   | 20   | 170  |            |     |    |    |      |     |     |     |
| 3130/3           | 148             |                |       |                |      |      | -    | -          | -   | 37 | 28 | 185  |     |     |     |
| 3130/M10         |                 |                |       |                |      |      |      |            |     |    |    |      | 183 | 450 |     |
| 3130/M12         |                 |                |       |                |      |      |      |            |     |    |    |      |     |     | 198 |
| 3130/4           |                 |                |       |                |      |      |      |            |     |    |    |      | 148 |     |     |
| 3130/5           | 183             |                |       |                |      |      |      |            |     |    |    | 37   |     |     | 28  |
| 3130/M18         |                 |                |       |                | 198  | 450  |      |            |     |    |    |      |     |     |     |
| 3130/6           | 148             |                |       |                |      |      | 23   | 20         | 185 |    |    |      |     |     |     |
| 3130/7           |                 |                |       |                | 183  |      |      |            |     | 37 | 28 |      |     |     |     |
| 3131/M10         | 198             |                |       |                |      |      |      |            | 450 |    |    |      |     |     |     |
| 3131/M12         |                 |                |       |                | 148  |      |      |            |     |    |    |      | 23  | 20  |     |
| 3131/5           | 183             |                |       |                |      |      |      |            |     |    |    | 37   |     |     | 28  |
| 3131/7           |                 |                |       |                | 198  | 450  |      |            |     |    |    |      |     |     |     |
| 3142/7           | 84,5            |                |       |                |      |      | 28,5 | 170        |     |    |    |      |     |     |     |
| 3142/M28         |                 | 201            |       |                |      |      |      |            |     |    |    |      |     |     |     |
| 3142/9           |                 | 232            |       |                |      |      |      |            |     |    |    |      |     |     |     |
| 3142/11          |                 | 256            |       |                |      |      |      |            |     |    |    |      |     |     |     |
| 3142/13          | 125,5           | 37             | 256   | 88             | 3315 |      |      |            |     |    |    |      |     |     |     |
| 3142/M42         |                 |                |       |                |      | 4875 |      |            |     |    |    |      |     |     |     |
| 3142/17          | 142             | 42,5           | 285   | 104            | 5690 |      |      |            |     |    |    |      |     |     |     |
| 3142/21          |                 |                | 329   |                |      |      |      |            |     |    |    |      |     |     |     |
| 3142/25          |                 |                | 1280  |                |      |      |      |            |     |    |    |      |     |     |     |
| 3182/7           | 151             | 95             | 130,5 | 100,5          | 60   | 1295 |      |            |     |    |    |      |     |     |     |
| 3182/M28         |                 |                |       |                |      |      | 1855 |            |     |    |    |      |     |     |     |
| 3182/9           |                 |                |       |                |      |      | 3255 |            |     |    |    |      |     |     |     |
| 3182/11          | 177             | 109,5          | 150   | 116            | 68   | 4780 |      |            |     |    |    |      |     |     |     |
| 3182/13          | 221             | 123,5          | 195,5 | 143,5          | 104  | 1280 |      |            |     |    |    |      |     |     |     |
| 3182/M42         |                 |                |       |                |      |      | 1295 |            |     |    |    |      |     |     |     |
| 3182/17          |                 |                |       |                |      |      | 1855 |            |     |    |    |      |     |     |     |

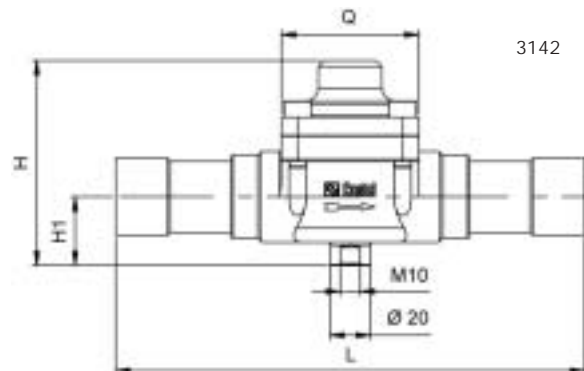
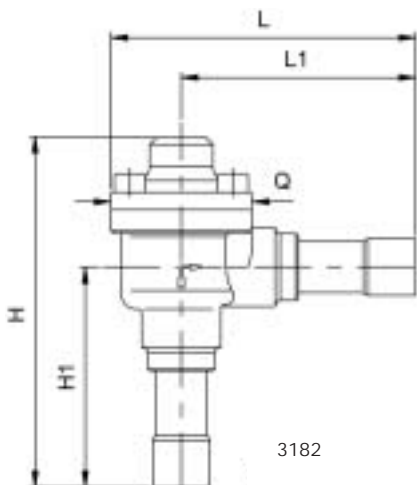
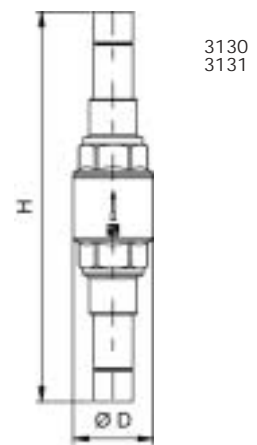
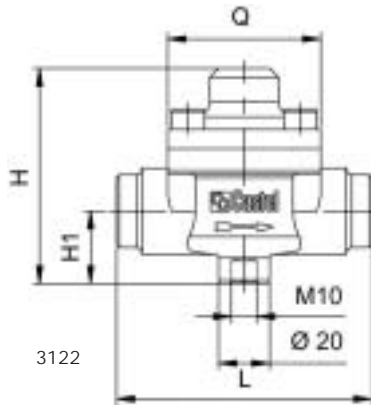
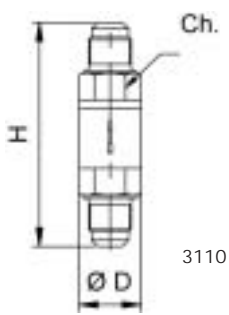


TABLE 3: Refrigerant Flow Capacity

| Catalogue Number | Refrigerant Flow Capacity [kW] |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
|------------------|--------------------------------|-------|-------|-------|-------|--------|-------|-------|-------|-------|---------|-------|-------|-------|-------|
|                  | Liquid                         |       |       |       |       | Vapour |       |       |       |       | Hot Gas |       |       |       |       |
|                  | R134a                          | R22   | R407C | R404A | R410A | R134a  | R22   | R407C | R404A | R410A | R134a   | R22   | R407C | R404A | R410A |
| 3110/2           | 6,7                            | 7,2   | 7,5   | 4,8   | 7,6   | 0,9    | 1,1   | 1,1   | 0,9   | 1,4   | 3,4     | 4,7   | 4,6   | 4,0   | 5,2   |
| 3110/3           | 27,0                           | 28,8  | 30,0  | 19,0  | 30,5  | 3,5    | 4,3   | 4,3   | 3,6   | 5,8   | 13,6    | 18,7  | 18,6  | 16,0  | 20,8  |
| 3110/4           | 30,3                           | 32,4  | 33,7  | 21,4  | 34,3  | 3,9    | 4,9   | 4,8   | 4,1   | 6,5   | 15,3    | 21,1  | 20,9  | 18,0  | 23,4  |
| 3110/5           | 55,6                           | 59,4  | 61,8  | 39,3  | 62,8  | 7,1    | 8,9   | 8,8   | 7,5   | 11,9  | 28,1    | 38,6  | 38,3  | 33,0  | 42,9  |
| 3110/6           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3122/M22         | 111,2                          | 118,8 | 123,7 | 78,5  | 125,7 | 14,3   | 17,8  | 17,7  | 14,9  | 23,8  | 56,1    | 77,2  | 76,7  | 66,0  | 85,8  |
| 3122/7           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3122/M28         | 148,3                          | 158,4 | 164,9 | 104,7 | 167,6 | 19,0   | 23,8  | 23,6  | 19,9  | 31,7  | 74,8    | 103,0 | 102,3 | 88,0  | 114,4 |
| 3122/9           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3122/11          | 256,1                          | 273,6 | 284,8 | 180,9 | 289,4 | 32,8   | 41,0  | 40,7  | 34,4  | 54,7  | 129,2   | 177,8 | 176,6 | 152,0 | 197,6 |
| 3122/13          | 421,3                          | 450,0 | 468,5 | 297,5 | 476,0 | 54,0   | 67,5  | 67,0  | 56,5  | 90,0  | 212,5   | 292,5 | 290,5 | 250,0 | 325,0 |
| 3122/M42         |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3122/17          | 674,0                          | 720,0 | 749,6 | 476,0 | 761,6 | 86,4   | 108,0 | 107,2 | 90,4  | 144,0 | 340,0   | 468,0 | 464,8 | 400,0 | 520,0 |
| 3130/2           | 8,4                            | 9,0   | 9,4   | 6,0   | 9,5   | 1,1    | 1,4   | 1,3   | 1,1   | 1,8   | 4,3     | 5,9   | 5,8   | 5,0   | 6,5   |
| 3130/3           | 27,0                           | 28,8  | 30,0  | 19,0  | 30,5  | 3,5    | 4,3   | 4,3   | 3,6   | 5,8   | 13,6    | 18,7  | 18,6  | 16,0  | 20,8  |
| 3130/M10         |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3130/M12         | 30,3                           | 32,4  | 33,7  | 21,4  | 34,3  | 3,9    | 4,9   | 4,8   | 4,1   | 6,5   | 15,3    | 21,1  | 20,9  | 18,0  | 23,4  |
| 3130/4           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3130/5           | 55,6                           | 59,4  | 61,8  | 39,3  | 62,8  | 7,1    | 8,9   | 8,8   | 7,5   | 11,9  | 28,1    | 38,6  | 38,3  | 33,0  | 42,9  |
| 3130/M18         |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3130/6           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3130/7           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3131/M10         | 27,0                           | 28,8  | 30,0  | 19,0  | 30,5  | 3,5    | 4,3   | 4,3   | 3,6   | 5,8   | 13,6    | 18,7  | 18,6  | 16,0  | 20,8  |
| 3131/M12         | 30,3                           | 32,4  | 33,7  | 21,4  | 34,3  | 3,9    | 4,9   | 4,8   | 4,1   | 6,5   | 15,3    | 21,1  | 20,9  | 18,0  | 23,4  |
| 3131/5           | 55,6                           | 59,4  | 61,8  | 39,3  | 62,8  | 7,1    | 8,9   | 8,8   | 7,5   | 11,9  | 28,1    | 38,6  | 38,3  | 33,0  | 42,9  |
| 3131/7           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3142/7           | 111,2                          | 118,8 | 123,7 | 78,5  | 125,7 | 14,3   | 17,8  | 17,7  | 14,9  | 23,8  | 56,1    | 77,2  | 76,7  | 66,0  | 85,8  |
| 3142/M28         | 148,3                          | 158,4 | 164,9 | 104,7 | 167,6 | 19,0   | 23,8  | 23,6  | 19,9  | 31,7  | 74,8    | 103,0 | 102,3 | 88,0  | 114,4 |
| 3142/9           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3142/11          | 256,1                          | 273,6 | 284,8 | 180,9 | 289,4 | 32,8   | 41,0  | 40,7  | 34,4  | 54,7  | 129,2   | 177,8 | 176,6 | 152,0 | 197,6 |
| 3142/13          | 421,3                          | 450,0 | 468,5 | 297,5 | 476,0 | 54,0   | 67,5  | 67,0  | 56,5  | 90,0  | 212,5   | 292,5 | 290,5 | 250,0 | 325,0 |
| 3142/M42         |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3142/17          | 674,0                          | 720,0 | 749,6 | 476,0 | 761,6 | 86,4   | 108,0 | 107,2 | 90,4  | 144,0 | 340,0   | 468,0 | 464,8 | 400,0 | 520,0 |
| 3142/21          |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3142/25          |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3182/7           | 143,2                          | 153,0 | 159,3 | 101,2 | 161,8 | 18,4   | 23,0  | 22,8  | 19,2  | 30,6  | 72,3    | 99,5  | 98,8  | 85,0  | 110,5 |
| 3182/M28         | 160,1                          | 171,0 | 178,0 | 113,1 | 180,9 | 20,5   | 25,7  | 25,5  | 21,5  | 34,2  | 80,8    | 111,2 | 110,4 | 95,0  | 123,5 |
| 3182/9           |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3182/11          | 320,2                          | 342,0 | 356,1 | 226,1 | 361,8 | 41,0   | 51,3  | 50,9  | 42,9  | 68,4  | 161,5   | 222,3 | 220,8 | 190,0 | 247,0 |
| 3182/13          | 623,5                          | 666,0 | 693,4 | 440,3 | 704,5 | 79,9   | 99,9  | 99,2  | 83,6  | 133,2 | 314,5   | 432,9 | 429,9 | 370,0 | 481,0 |
| 3182/M42         |                                |       |       |       |       |        |       |       |       |       |         |       |       |       |       |
| 3182/17          | 765,0                          | 817,2 | 850,8 | 540,3 | 864,4 | 98,1   | 122,6 | 121,7 | 102,6 | 163,4 | 385,9   | 531,2 | 527,5 | 454,0 | 590,2 |

Refrigerant flow capacity referred to the following operating conditions:

- Evaporating temperature: +4 °C
- Condensing temperature: +38 °C
- Pressure drop: 0,15 bar

Particularly for hot gas:

- Suction temperature: +18 °C
- Pressure drop: 1 bar