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Safety Valves 3030E for CO₂ system



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General description

The safety valves in series 3030E are safety devices according to the definition given in Article 2, Point 4 of 2014/68/EU Directive and are the subject of Article 4, Point 1.d) of aforesaid Directive.

The valves above mentioned are direct-loaded type, unbalanced, conveyed discharge. Valve opening is produced by the thrust the fluid under pressure exerts on the disc, when said thrust exceeds, under setting conditions, the opposing force of the spring acting on the disc.

The safety valves in series 3030E are manufactured in accordance with European standard EN ISO 4126-1: 2013, relative either to the design / construction of the valves or to the functional characteristics of the same.

Construction

Body: squared, obtained through hot moulding and subsequent machining. It houses the following elements:

- the nozzle with flat sealing seat
 - the shutter guide
 - the set spring slot
 - the threaded seat of the setting adjustment ring nut
- In the body, above the shutter guide, a small pressure relief hole is provided through which the spring slot communicates with the atmosphere. Material used: EN 12420-CW617N brass.

Shutter: obtained through machining from bar stock and fit with gasket, it ensures the required degree of tightness on the valve seat. The gasket is made from PTFE 50% stainless steel filled, a material that, during the valve's estimated service life, maintains good strength and does not cause the shutter to stick on the seat. The shutter is properly guided in the head and the guide action cannot fail. There are no glands or retaining rings that hamper its movement. Material used: EN 12164-CW614N brass.

Spring: it opposes the pressure and the fluid dynamic forces, and always ensures closing of the valve following pressure relief. When the shutter has reached the maximum height determined by the mechanical stop, the spring compression does not exceed 80% of the total compression. Material used: DIN 17223-1 steel for springs.

Calibration system: hex-head threaded ring nut to be screwed inside the upper portion of the head, compressing the spring below. When calibration is complete, the position of the ring nut is maintained unchanged by applying to the threaded coupling a high mechanical strength and low viscosity bonding agent. The low viscosity promotes penetration. The calibration system is protected against subsequent tampering by means of a threaded cap nut, screwed on outside the head and sealed with a Castel lead seal

Scope

Use: protection against possible overpressure of the apparatuses listed below, with regard to the operating conditions for which they have been designed:

Refrigeration system or heat pump components, for instance: condensers/gas coolers, liquid receivers, evaporators, liquid accumulators, positive displacement compressor discharge, heat exchangers, oil separators, or piping. (reference standard: EN 378-2:2016).

Fluids: the valves in series 3030E can be used with refrigerant fluid R744, in vapour or gaseous state, or other refrigerants belonging to Group 2 with reference to Article 13, Para. 1(b) of Directive 2014/68/EU (EC Regulation No. 1272/2008).

Valve selection

Directive 2014/68/EC requires that pressure equipment, in which permissible limits are reasonably likely to be exceeded, shall be fitted with suitable protection devices, for instance safety devices such as safety valves. Such devices shall prevent pressure from permanently exceeding the maximum allowable pressure (PS) of the equipment they protect. In any case, a short pressure peak limited to 10% of maximum allowable pressure is permitted.

As to the selection and sizing of the suitable protection device, users shall refer to the specific product and sector standards.

- EN ISO 4126-1: 2013: "Safety devices for protection against excessive pressure – Part 1: Safety valves" indicates the general requirements for safety valves regardless of the fluid for which they were designed.
- EN 378-2:2016: "Refrigerating systems and heat

pumps – safety and environmental requirements – Part 2: Design, construction, testing, marking and documentation" provides a general outline of the protection devices to be used in refrigerating systems and their characteristics (Para. 6.2.5) and the criteria for the selection of the device suitable for the type and size of the system component to be protected (Para. 6.2.6).

- EN 13136:2013: "Refrigerating systems and heat pumps – Pressure relief devices and their associated piping – Methods for calculation" highlights the possible causes of overpressure in a system and provides users with the tools for sizing pressure relief devices, among which safety valves.

Valve installation

Safety valves type 3030E guarantee repeatable performance. This means that, after the valves have operated, open/close, the initial setting conditions are maintained. Nevertheless, it is advisable to replace a 3030E valve once it has discharged as during release debris, such as metal shavings or solder impurities, can deposit on the valve gasket. This can inhibit the safety valve from returning to its original conditions.

As far as the installation of safety relief valves is concerned, the fundamental points listed below shall be taken into account:

- Safety valves shall be installed near an area of the system where vapors or gases are present and there is no fluid turbulence; the position shall be as upright as possible, with the inlet connector turned downwards.
- Vessels, joined together with piping rightly selected

by the manufacturer and without any stop valve between them, may be considered as only one vessel for the installation of a safety valve.

- The union between the valve and the equipment to be protected shall be as short as possible. Furthermore, its passage section shall not be narrower than the valve inlet section. In any case, EN 13136:2013 Standard states that the pressure loss between protected vessel and safety valve, at discharge capacity, shall not exceed 3% of the setting value, including any accessory mounted on the upstream line.
- When selecting the safety valve location, take into account that valve operation involves the venting of refrigerant fluid under pressure, sometimes even at high temperatures. If installed in closed rooms, where there is a risk of causing injury to persons nearby, it is a good practice to provide adequate ventilation of the room and indicate the presence of the relief outlet using dedicated signs.
- Avoid installing a pipeline to convey the vented fluid outside of the room as is possible. If this is indispensable, minimize both the length and the number of elbows. EN 13136:2013 Standard states that the pipeline shall not produce a backpressure at its discharge capacity that exceeds the set pressure by 10%. **NB: the discharge of carbon dioxide at temperatures below the triple point may result in the formation of solid carbon dioxide that could block exhaust pipes that are too long or too curvy.**

To calculate the pressure loss either in the upstream line (between vessel and safety valve) or in the downstream line (between safety valve and atmosphere) refer to EN 13136:2013 Standard, Chapter 7.4.

General Characteristics of valves 3030E

Catalogue Number	3030E/36C	3030E/46C	3030E/410C	3030E/610C	
Connections	Inlet male	3/8" NPT	1/2" NPT	1/2" NPT	
	Outlet male	3/4" G	3/4" G	1.1/4" G	
Inlet connection wrench torque [min/max] [Nm]		14/20	21/30	21/30	
Flow Diameter [mm]		7	7	11	
Flow Section [mm²]		38,5	38,5	95,0	
Lift [mm]		4,2	4,2	4,7	
Discharge Coefficient "Kd"		0,97	0,97	0,91	
PS [bar]		165			
TS [°C]		- 50 / + 150			
TA [°C]		- 40 / + 50			
Set Pressure Range at atmospheric back pressure Pset [bar]		60 / 150			
Overpressure		+ 10 % of Pset			
Blowdown		- 15 % of Pset			
Helium tightness		90 % di Pset			
Estimated service life		9 years			
Risk Category according to PED Recast		IV			

