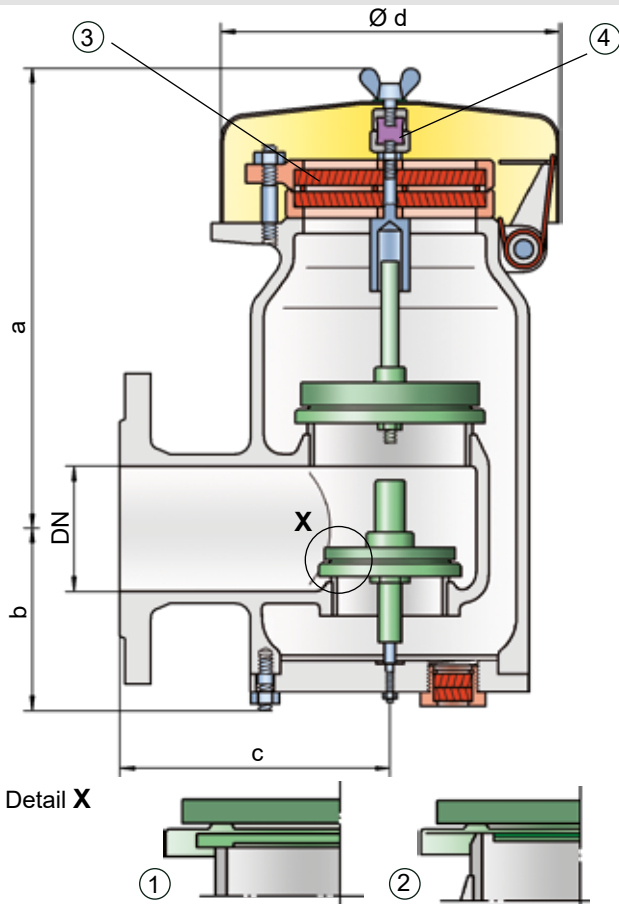


Pressure/Vacuum Relief Valve

Deflagration-proof and Endurance Burning-proof

PROTEGO® PV/EB



allowable working vacuum (MAWV) of the tank. After years of development, this typical opening characteristic of a safety relief valve is now also available for the low pressure range.

The tank pressure is maintained up to the set pressure with a tightness that is above the normal standards due to our state-of-the-art manufacturing technology. This feature is ensured by the valve seats made of high quality stainless steel and with individually lapped valve pallets (1), or with an air cushion seal (2), in conjunction with high quality FEP diaphragm. The valve pallets are also available with a PTFE seal to prevent the valve pallets from sticking when sticky substances are used and to enable the use of corrosive fluids. After the overpressure is released, the valve re-seats and provides a tight seal.

If the set pressure is exceeded, explosive gas/product vapor/air mixtures are released into the atmosphere. If this mixture ignites, the integrated PROTEGO® flame arrester unit (3) prevents flame transmission into the tank. If additional mixture continues to flow and stabilized burning occurs, the integrated PROTEGO® flame arrester unit prevents flashback as a result of endurance burning. The valve is protected and also fulfils its function under these severe conditions. The spring-loaded weather hood opens as soon as the melting element (4) melts.

The valve can be used at an operating temperature of up to +60°C / 140°F and meets the requirements of European tank design standard EN 14015 (Appendix L) and ISO 28300 (API 2000).

Type-approved in accordance with the current ATEX Directive and EN 12874, as well as other international standards.

Settings:

| | | | |
|------------------|----------------|-------|----------------|
| pressure: | +2.0 mbar | up to | +210 mbar |
| | +0.8 inch W.C. | up to | +84 inch W.C. |
| vacuum: | -14 mbar | up to | -35 mbar |
| | -5.6 inch W.C. | up to | -14 inch W.C. |
| vacuum: | -3.5 mbar | up to | -14 mbar |
| | -1.4 inch W.C. | up to | -5.6 inch W.C. |

For pressure up to max. + 150 mbar / 60.2 inch W.C.
Higher and lower settings upon request.

Function and Description

The atmospheric deflagration-proof and endurance burning-proof PV/EB type PROTEGO® valve is a highly developed combined pressure/vacuum relief valve for high flow capacities with an integrated flame arrester unit. It is primarily used as a safety device for flame transmission proof in-breathing and out-breathing on tanks, containers, and process equipment. The valve offers reliable protection against overpressure and vacuum, prevents the in-breathing of air and product losses almost up to the set pressure, and protects against atmospheric deflagration and endurance burning if stabilized burning occurs. The PROTEGO® flame arrester unit is designed to achieve minimum pressure drop with maximum safety. The PROTEGO® PV/EB valve is available for substances from explosion group IIA (NEC group D MESH > 0.9 mm).

When the set pressure is reached, the valve starts to open and reaches full lift within 10% overpressure. This unique 10% technology enables a set pressure that is only 10% below the maximum allowable working pressure (MAWP) or maximum

Special Features and Advantages

- 10% technology for minimum pressure increase up to full lift
- due to 10% technology, set pressure is close to opening pressure for optimum pressure maintenance in the system as compared to conventional 40% and 100% technology
- valve opens later and closes earlier than conventional valves
- excellent tightness, resulting in lowest possible product losses and environmental pollution
- valve pallet is guided inside the housing to protect against harsh weather conditions
- can be used as a protective system in areas with potentially explosive atmospheres in accordance with ATEX
- PROTEGO® flame arrester unit provides protection against atmospheric deflagration and endurance burning
- integrated PROTEGO® flame arrester unit saves space and weight and reduces costs
- PROTEGO® flame arrester unit is protected from clogging and sticky substances caused by product vapor
- minimum pressure loss of the PROTEGO® flame arrester unit
- flameproof condensate drain
- maintenance-friendly design
- modular design enables replacement of individual FLAMEFILTER® discs and valve pallet
- available in a special design with lifting device



Vents - 10% Technology
(Flyer pdf)



Leak Rate/10% Technology
(Flyer pdf)



Demonstration of endurance burning
Video

Design Types and Specifications

Almost any combination of vacuum and pressure levels can be set for the valve. The valve pallets are weight-loaded. When the difference between the pressure and vacuum exceeds 150 mbar / 60.2 inch W.C., special valve pallets are used.

There are two different designs:

Pressure/vacuum relief valve, basic design **PV/EB-**

Pressure/vacuum relief valve with heating jacket **PV/EB-H**
(max. heating fluid temperature +85°C / 185°F)

Additional special devices available upon request.

Table 1: Dimensions

Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity charts on the following page.

| DN | 50 / 2" | 50 / 2" | 80 / 3" | 80 / 3" |
|--------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Set pressure | ≤ +60 mbar ≤ +24.1 inch W.C. | > +60 mbar > +24.1 inch W.C. | ≤ +60 mbar ≤ +24.1 inch W.C. | > +60 mbar > +24.1 inch W.C. |
| a | 308 / 12.13 | 443 / 17.44 | 308 / 12.13 | 443 / 17.44 |
| b | 108 / 4.25 | 108 / 4.25 | 108 / 4.25 | 108 / 4.25 |
| c | 165 / 6.50 | 165 / 6.50 | 167 / 6.57 | 167 / 6.57 |
| d | 218 / 8.58 | 218 / 8.58 | 218 / 8.58 | 218 / 8.58 |

Dimensions for pressure/
vacuum relief valve with
heating jacket upon request.

Table 2: Selection of explosion group

| MESG | Expl. Gr. (IEC/CEN) | Gas Group (NEC) | |
|-----------|---------------------|-----------------|---------------------------------|
| > 0,90 mm | IIA | D | Special approvals upon request. |

Table 3: Material selection for housing

| Design | B | C | |
|------------------------------|-----------------|-----------------|---------------------------------|
| Housing | Steel | Stainless Steel | Special materials upon request. |
| Heating jacket (PV/EB-H-...) | Steel | Stainless Steel | |
| Valve seats | Stainless Steel | Stainless Steel | |
| Weather hood | Steel | Stainless Steel | |

Table 4: Material combination of flame arrester unit

| Design | A | |
|---------------------|-----------------|---------------------------------|
| FLAMEFILTER® casing | Stainless Steel | Special materials upon request. |
| FLAMEFILTER® | Stainless Steel | |
| Spacer | Stainless Steel | |

Table 5: Material selection for pressure valve pallet

| Design | A | B | C | D | |
|--------------------------------------|------------------------------------|-------------------------------------|------------------------------------|-----------------------------------|--|
| Pressure range (mbar) (inch W.C.) | +2.0 up to +3.5 +0.8 up to +1.4 | >+3.5 up to +14 >+1.4 up to +5.6 | >+14 up to +210 >+5.6 up to +84 | >+35 up to +210 >+14 up to +84 | Special materials and higher set pressures upon request. |
| Valve pallet | Aluminum | Stainless Steel | Stainless Steel | Stainless Steel | |
| Sealing | FEP | FEP | Metal to Metal | PTFE | |

Table 6: Material selection for vacuum pallet

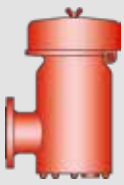
| Design | A | B | C | D | |
|------------------------------------|------------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|---|
| Vacuum range (mbar) (inch W.C.) | -3.5 up to -5.0 -1.4 up to -2.0 | <-5.0 up to -14 <-2.0 up to -5.6 | <-14 up to -35 <-5.6 up to -14 | <-14 up to -35 <-5.6 up to -14 | Special materials and higher set vacuum upon request. |
| Valve pallet | Aluminum | Stainless Steel | Stainless Steel | Stainless Steel | |
| Sealing | FEP | FEP | Metal to Metal | PTFE | |

Table 7: Flange connection type

| | |
|------------------------|---------------------------|
| EN 1092-1; Form B1 | Other types upon request. |
| ASME B16.5 CL 150 R.F. | |



for safety and environment

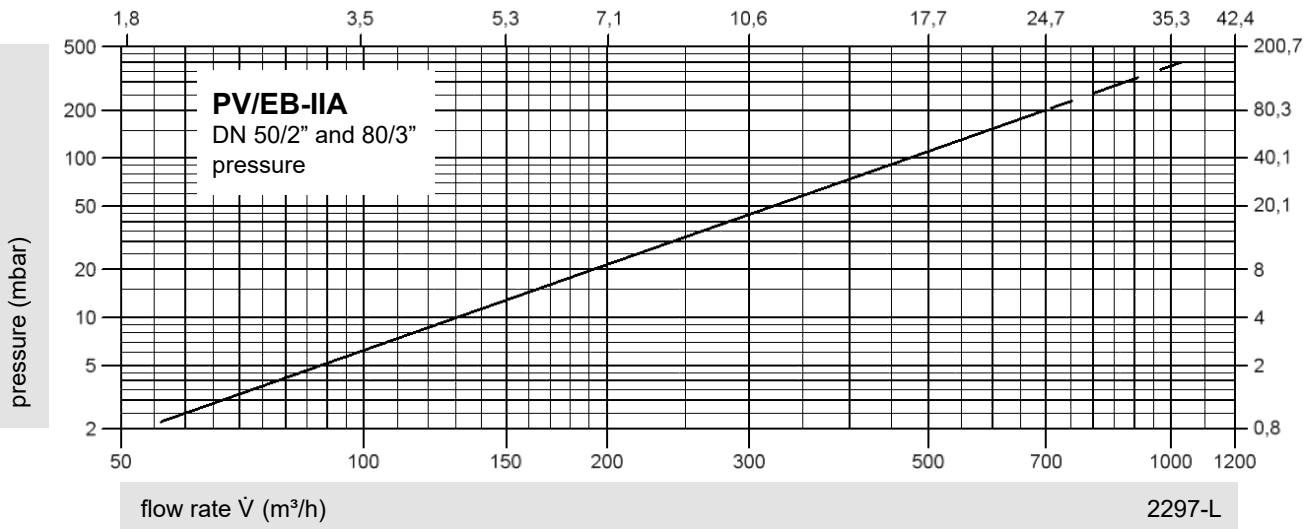


Pressure/Vacuum Relief Valve

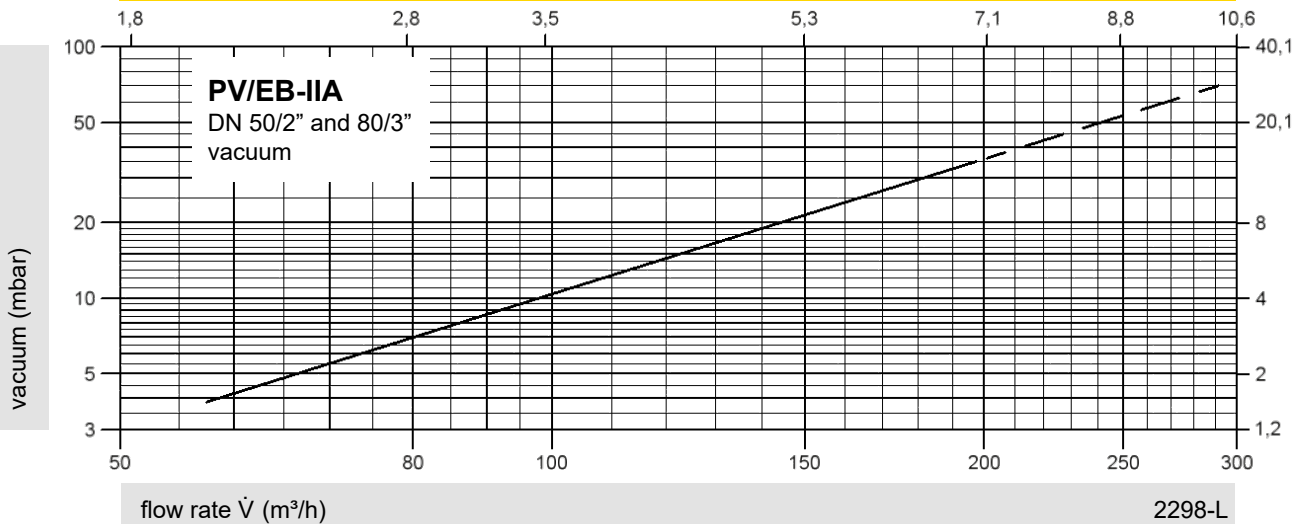
Flow Capacity Charts

PROTEGO® PV/EB

airflow in thousands of CFH



airflow in thousands of CFH



The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig. Volume flow \dot{V} in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar). For conversion to other densities and temperatures, refer to Sec. 1: "Technical Fundamentals."