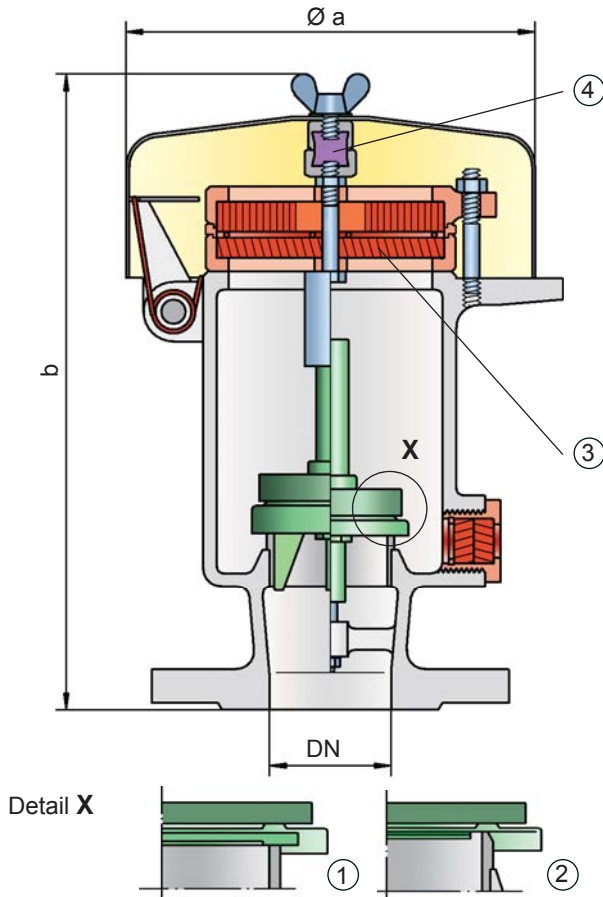


Pressure Relief Valve

deflagration- and endurance burning-proof

PROTEGO® P/EB-E



state of the art manufacturing. 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 products are used and to enable the use of corrosive fluids. After the excess pressure is discharged, the valve reseats and provides a tight seal.

If the set pressure is exceeded, explosive gas/product-vapour air mixtures are released to 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 flame arrester unit prevents flashback as a result from endurance burning. The valve is protected and also fulfils its function under this severe service conditions. The spring loaded weather hood opens as soon as the fusible element (4) melts.

The valve can be used up to an operating temperature of +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 ISO 16852 as well as other international standards.

Special Features and Advantages

- selecting set pressure close to relieving pressure results in product loss reduction
- more design flexibility through higher reseating pressures; vents reseal when conventional vent is still discharging costly product or nitrogen
- the valve disc is guided within the housing to protect against harsh weather conditions
- high performance seal reducing product loss below EPA's 500ppm rule preventing environmental pollution
- can be used as protective system according to ATEX in areas subject to explosion hazards
- safe against deflagration and endurance burning of alcohol/air mixtures from explosion group IIB1
- high flow capacity through large FLAMEFILTER® cross-section, results in low pressure drop
- PROTEGO® flame arrester unit provides protection against atmospheric deflagration and endurance burning
- flame arrester unit integrated into the valve saves space, weight and reduces cost
- FLAMEFILTER® protected from clogging caused by product vapours
- flame transmission proof condensate drain
- maintenance friendly design
- modular design enables individual FLAMEFILTER® and valve pallets to be replaced

Pressure settings:

+3.5 mbar up to +210 mbar
 +1.4 inch W.C. up to +84 inch W.C.
 Higher pressure settings upon request.

Function and Description

The deflagration proof and endurance burning-proof P/EB-E type PROTEGO® valve is a highly developed pressure relief valve for large flows with an integrated flame arrester unit that is specially used for applications handling ethanol. It is primarily used as a safety device for flame transmission proof outbreathing on tanks, containers and process engineering apparatus. The valve offers reliable protection against excess pressure and prevents product losses almost up to the set pressure; it also protects against atmospheric deflagration as well as endurance burning if stabilized burning occurs. The PROTEGO® flame arrester unit is designed to achieve minimum pressure drop with maximum safety. The P/EB-E valve is available for substances of explosion group IIB1 (MESG ≥ 0.85 mm) and provides specific protection against deflagration and endurance burning of alcohol/air mixtures (such as ethanol/air).

The valve functions proportional, so the set pressures should be selected in relation to the proportional behaviour (such as a 10%, 40%, or 100% overpressure from the set pressure to the relieving pressure at which the required flow performance is reached).

The tank pressure is maintained up to set pressure with a tightness that is far superior to the conventional standard due to our

Design Types and Specifications

The valve disc is weight-loaded. At set pressures >80 mbar (32.1 inch W.C.), an elongated design is used

There are two different designs:

Pressure relief valve, basic design **P/EB - E -**

Pressure relief valve with heating jacket **P/EB - E -**

(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 chart on the following page | | | | |
| DN | 50 / 2" | 50 / 2" | 80 / 3" | 80 / 3" |
| Set pressure | ≤ +80 mbar ≤ +32.1 inch W.C. | > +80 mbar > +32.1 inch W.C. | ≤ +80 mbar ≤ +32.1 inch W.C. | > +80 mbar > +32.1 inch W.C. |
| a | 218 / 8.58 | 218 / 8.58 | 218 / 8.58 | 218 / 8.58 |
| b | 288 / 11.34 | 453 / 17.83 | 290 / 11.42 | 455 / 17.91 |

Dimensions for Pressure Relief Valve with heating jacket upon request

| Table 2: Selection of explosion group | | | |
|---------------------------------------|---------------------|-----------------|--------------------------------|
| MESG | Expl. Gr. (IEC/CEN) | Gas Group (NEC) | Special approvals upon request |
| ≥ 0,85 mm | IIB1 | – | |

| Table 3: Material selection for housing | | | |
|---|-----------------|-----------------|--------------------------------|
| Design | B | C | Special materials upon request |
| Housing | Steel | Stainless Steel | |
| Heating jacket (P/EB-E-H-...) | Steel | Stainless Steel | |
| Valve seat | Stainless Steel | Stainless Steel | |
| Weather hood | Steel | Stainless Steel | |

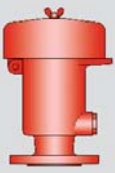
| Table 4: Material combination of flame arrester unit | | |
|--|-----------------|--------------------------------|
| Design | A | Special materials upon request |
| FLAMEFILTER® cage | Stainless Steel | |
| FLAMEFILTER® | Stainless Steel | |
| Spacer | Stainless Steel | |

| Table 5: Material selection for valve pallet | | | | | |
|--|------------------------------------|-------------------------------------|------------------------------------|------------------------------------|---|
| Design | A | B | C | D | Special materials and higher pressure settings upon request |
| Pressure 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 +210 >+5.6 up to +84 | >+14 up to +210 >+5.6 up to +84 | |
| Valve pallet | Aluminium | Stainless Steel | Stainless Steel | Stainless Steel | |
| Sealing | FEP | FEP | Metal to Metal | PTFE | |

| Table 6: Flange connection type | |
|---------------------------------|--------------------------|
| EN 1092-1; Form B1 | other types upon request |
| ASME B16.5; 150 lbs RFSF | |



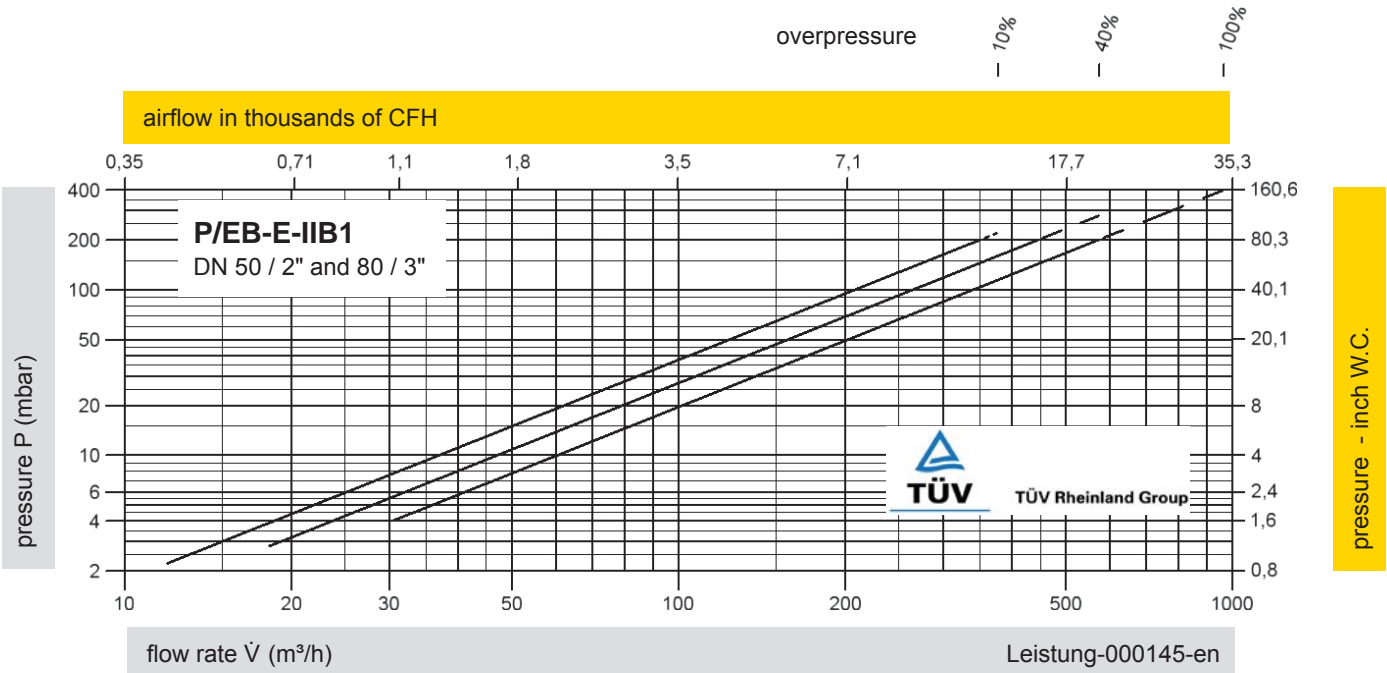
for safety and environment



Pressure Relief Valve

Flow Capacity Chart

PROTEGO® P/EB-E



Remark

$$\text{set pressure} = \frac{\text{opening pressure resp. tank design pressure}}{1 + \frac{\text{overpressure \%}}{100\%}}$$

Set pressure = the valve starts to open

Opening pressure = set pressure plus overpressure

Overpressure % = percentage pressure increase over the set pressure

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 ISO 6358 (20°C, 1bar). Conversion to other densities and temperatures refer to Vol. 1: "Technical Fundamentals".