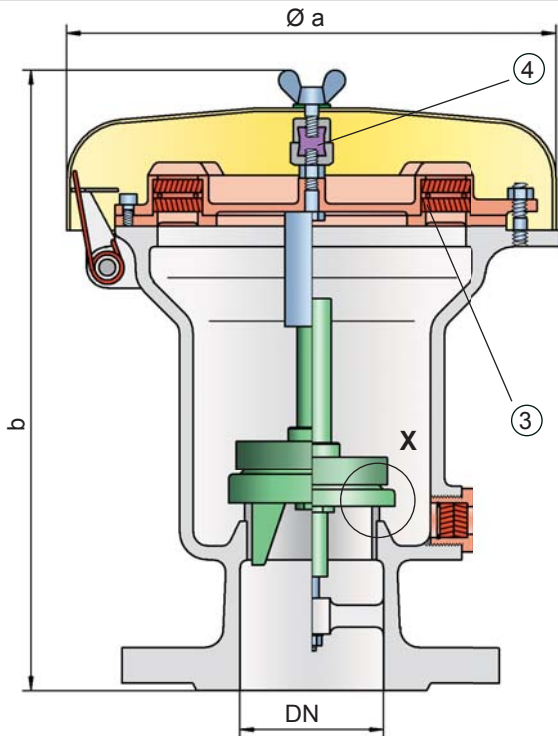




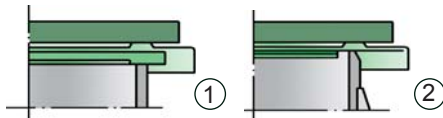
Pressure Relief Valve

deflagration- and endurance burning-proof

PROTEGO® P/EBR



Detail X



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/EBR type PROTEGO® valve is a highly developed pressure relief valve for large flows with an integrated flame arrester unit. 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. P/EBR valves are available for substances from explosion groups IIA and IIB3 (NEC group D and C MESH ≥ 0.65 mm).

If the set pressure is reached for a valve approved for explosion Group IIA (NEC group D), 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) 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. Valves approved for explosion group IIB3 (NEC group C) function proportionally, 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 the set pressure with a tightness that is far superior to the conventional standard 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 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 as well as other international standards.

Special Features and Advantages

- requires only 10% overpressure to full lift for group IIA (NEC group D >0.9 MESH) vapours
- through 10% technology higher set pressures can be used which results in product loss reduction compared to conventional 40% and 100% overpressure technology vents (compare API 2000)
- 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 for explosion group IIA and IIB3 (NEC group D and C) vapours
- 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



Vents - 10% Technology
(Flyer pdf)



Leak Rate/10% Technology
(Flyer pdf)



Demonstration of endurance burning
Video

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/EBR -

Pressure relief valve with heating jacket

P/EBR -

(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 pages

DN	80 / 3"	80 / 3"	100 / 4"	100 / 4"
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	353 / 13.90	353 / 13.90	353 / 13.90	353 / 13.90
b	345 / 13.58	505 / 19.88	345 / 13.58	505 / 19.88

Dimensions for Pressure 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
> 0,65 mm	IIB3	C	

Table 3: Material selection for housing

Design	B	C	
Housing	Steel	Stainless Steel	Special materials upon request
Heating jacket (P/EBR-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	
FLAMEFILTER® cage	Stainless Steel	Special materials upon request
FLAMEFILTER®	Stainless Steel	
Spacer	Stainless Steel	

Table 5: Material selection for valve pallet

Design	A	B	C	D	
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	Special materials and higher pressure settings upon request
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	



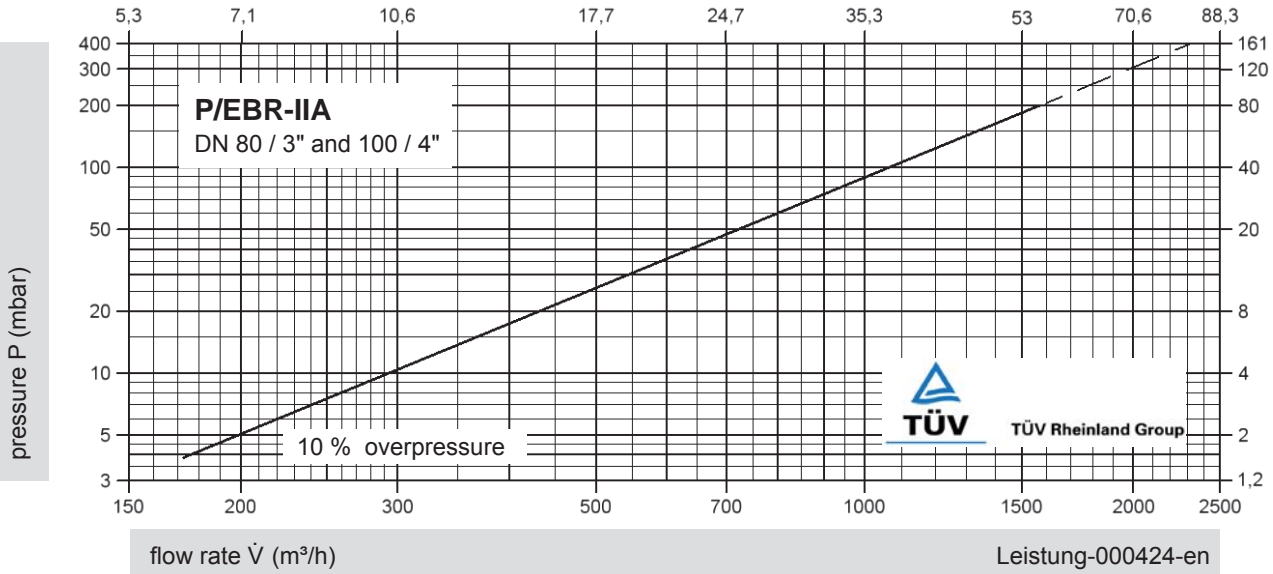


Pressure Relief Valve

Flow Capacity Charts

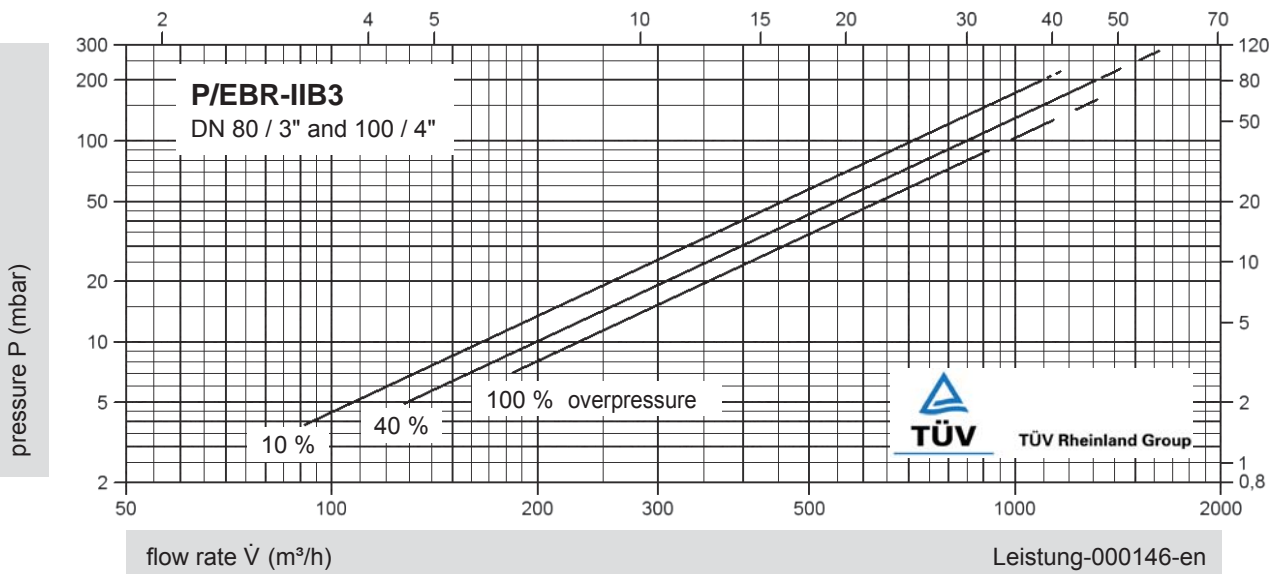
PROTEGO® P/EBR

airflow in thousands of CFH



pressure - inch W.C.

airflow in thousands of CFH



pressure - inch W.C.

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".