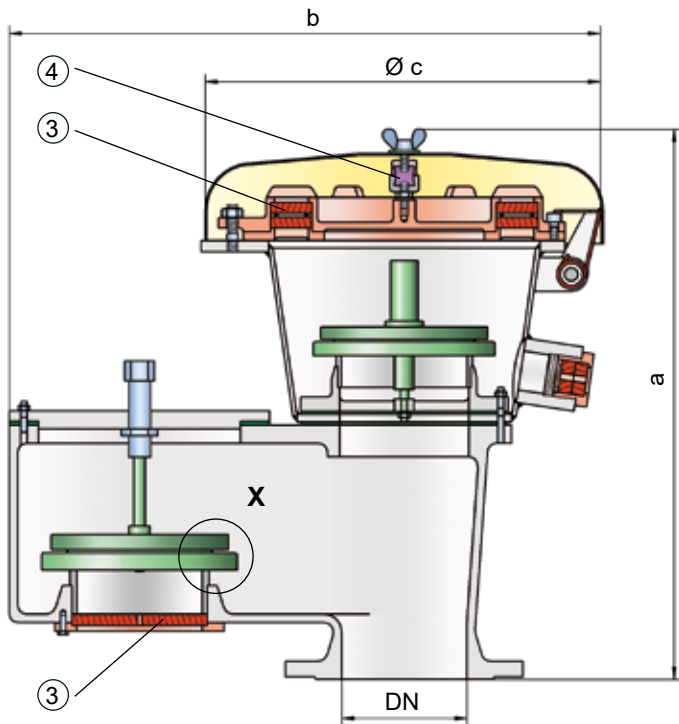


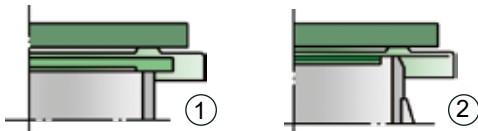
## Pressure/Vacuum Relief Valve

Deflagration-proof and Endurance Burning-proof

PROTEGO® VD/SV-HR



Detail X



### Settings:

<b>pressure:</b>	+3.5 mbar	up to +35 mbar
	+1.4 inch W.C.	up to +14 inch W.C.
<b>vacuum:</b>	-2.0 mbar	up to -35 mbar
	-0.8 inch W.C.	up to -14 inch W.C.

Higher and lower settings upon request.

### Function and Description

The deflagration-proof and endurance burning-proof VD/SV-HR type PROTEGO® valve is a highly developed combined pressure/vacuum relief valve for high flow capacities with an integrated flame arrester. It is primarily used as a safety device for flame transmission-proof in-breathing and out-breathing in tanks, containers, and process equipment. The valve offers reliable protection against overpressure and vacuum, prevents out-breathing of product vapor and in-breathing of air 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 deflagration and endurance burning-proof PROTEGO® VD/SV-HR device is available for substances from explosion groups IIA to IIB3 (NEC group D to C MESH  $\geq 0.65$  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 behavior (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 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 them 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 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).

EU conformity according to the currently valid ATEX directive. Approvals according to other national/international regulations on request.

### Special Features and Advantages

- extreme tightness, resulting in lowest possible product losses and reduced environmental pollution
- set pressure close to opening pressure for optimum pressure maintenance in the system
- due to 10% technology, set pressure is close to opening pressure for optimum pressure maintenance in the system as compared to conventional 40% or 100% technology
- valve opens later and closes earlier than conventional valves
- valve pallet is guided inside the housing to protect against harsh weather conditions
- PROTEGO® flame arrester unit provides protection against atmospheric deflagrations 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 vapors
- minimum pressure loss of the PROTEGO® flame arrester unit
- can be used as a protective system in areas with potentially explosive atmospheres in accordance with ATEX
- high flow capacity due to larger FLAMEFILTER® cross section
- flameproof condensate drain
- maintenance-friendly design
- modular design enables replacement of individual FLAMEFILTER® discs and valve pallet



Vents - 10% Technology  
(Flyer pdf)



Leak Rate/10% Technology  
(Flyer pdf)

## Design and Specifications

Any combination of vacuum and pressure levels can be set for the valve.

The valve pallets are weight-loaded.

Pressure/vacuum relief valve, basic design

**VD/SV-HR**

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	80 / 3"	100 / 4"
a	500 / 19.69	543 / 21.38
b	477 / 18.78	577 / 22.72
c	353 / 13.90	353 / 13.90

**Table 2: Selection of explosion group**

MESG	Expl. Gr. (IEC/CEN)	Gas Group (NEC)	Special approvals upon request.
> 0,90 mm	IIA	D	
≥ 0,65 mm	IIB3	C	

**Table 3: Material selection for housing**

Design	A	B	Special materials upon request.
Housing	Steel	Stainless Steel	
Valve seats	Stainless Steel	Stainless Steel	
Gasket	PTFE	PTFE	
Weather hood	Steel	Stainless Steel	
Flame arrester unit	A	A	

**Table 4: Material combination of flame arrester unit**

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

**Table 5: Material selection for pressure valve pallet**

Design	A	B	C	D	Special materials and higher set pressures 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 +35 >+5.6 up to +14	>+14 up to +35 >+5.6 up to +14	
Valve pallet	Aluminum	Stainless Steel	Stainless Steel	Stainless Steel	
Sealing	FEP	FEP	Metal to Metal	PTFE	

**Table 6: Material selection for vacuum valve pallet**

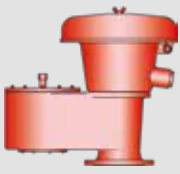
Design	A	B	C	D	Special material and higher set vacuum upon request.
Vacuum range (mbar) (inch W.C.)	-2.0 up to -3.5 -0.8 up to -1.4	<-3.5 up to -14 <-1.4 up to -5.6	<-14 up to -35 <-5.6 up to -14	<-14 up to -35 <-5.6 up to -14	
Valve pallet	Aluminum	Stainless Steel	Stainless Steel	Stainless Steel	
Sealing	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

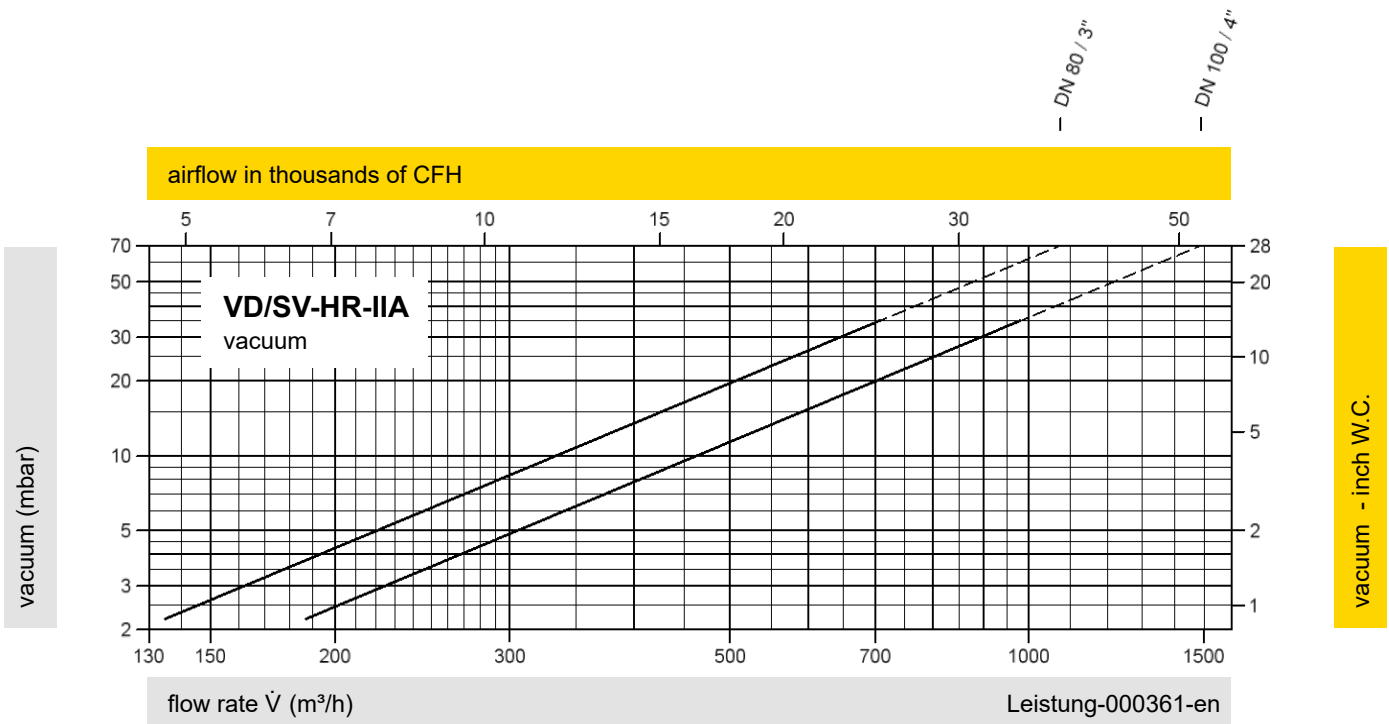
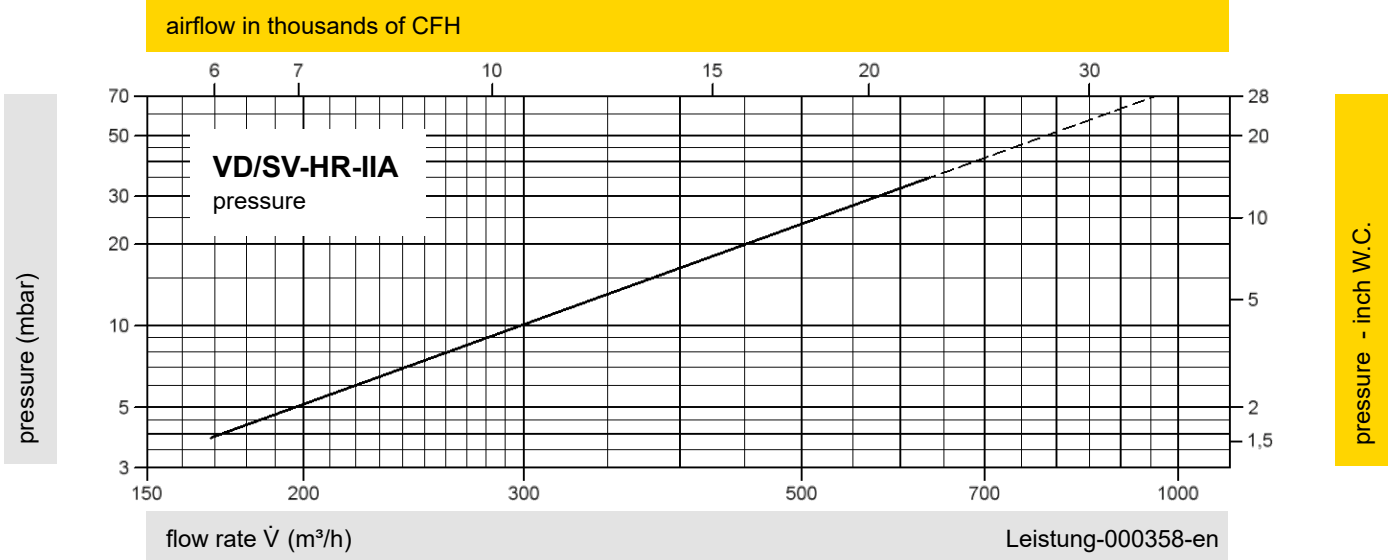


# Pressure/Vacuum Relief Valve

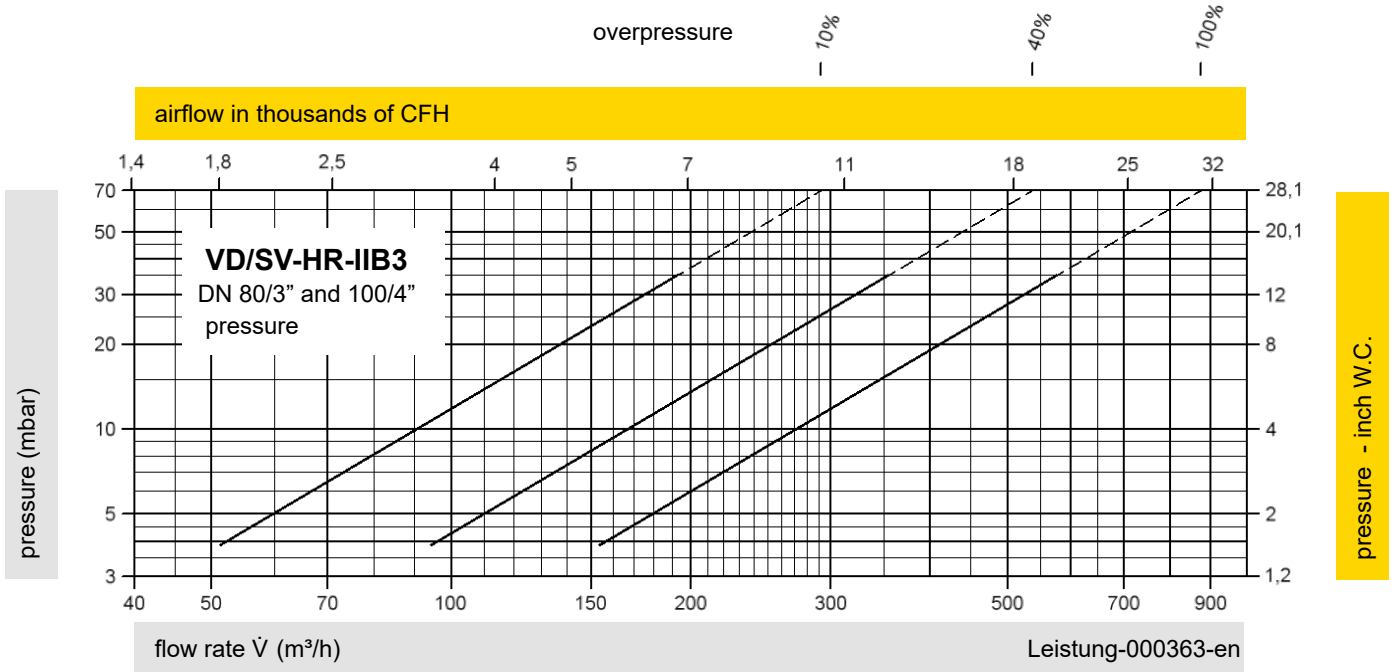
## Flow Capacity Charts

### PROTEGO® VD/SV-HR

DN 80 / 3"  
DN 100 / 4"



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."



**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

