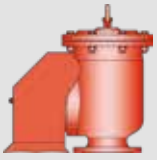
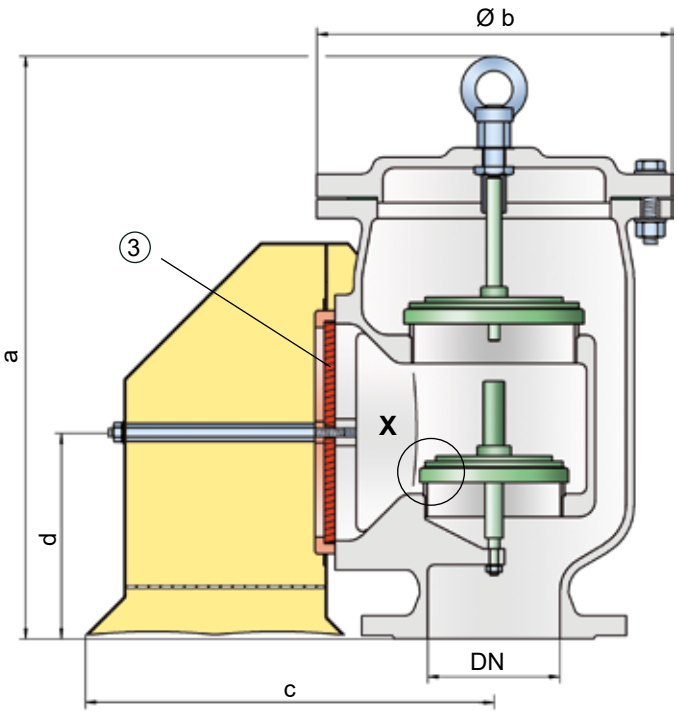


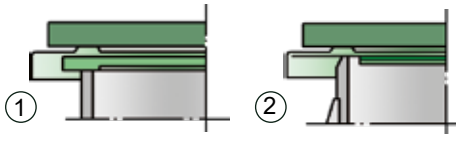
Pressure/Vacuum Relief Valve

Atmospheric Deflagration-proof

PROTEGO® VD/TS



Detail **X**



Settings:

pressure:	+3.5 mbar	up to	+50 mbar
	+1.4 inch W.C.	up to	+20 inch W.C.
vacuum:	-2.0 mbar	up to	-25 mbar
	-0.8 inch W.C.	up to	-10 inch W.C.

Higher and lower settings upon request.

Function and Description

The atmospheric deflagration-proof VD/TS 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. The PROTEGO® flame arrester unit is designed to achieve minimum pressure drop with maximum safety. The PROTEGO® VD/TS device is available for substances from explosion groups IIA to IIB3 (NEC group D to C MESG ≥ 0.65 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 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 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.

The standard design is tested at an operating temperature up to +60°C / 140°F and meets the requirements of European tank design standard EN 14015 (Appendix L) and ISO 28300 (API 2000). In addition, numerous versions for higher operating temperature are available.

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

Special Features and Advantages

- 10% technology for minimum pressure increase up to full lift
- extreme tightness, resulting in lowest possible product losses and reduced environmental pollution
- 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 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
- FLAMEFILTER® provides protection against atmospheric deflagrations
- integrated flame arrester unit saves space and reduces costs
- PROTEGO® flame arrester unit is protected from clogging and sticky products caused by product vapors
- minimum pressure loss of the PROTEGO® flame arrester unit
- high flow capacity
- maintenance-friendly design
- sturdy housing design
- best possible technology for API tanks

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/TS-**

Additional special devices available upon request.

P/V-Valve with integrated Flame Arrester Many traditional configurations are a safety risk. (Flyer pdf)

Safety Risk (Video)

P/V-Valve with integrated Flame Arrester (Video)

Vents - 10% Technology (Flyer pdf)

Leak Rate/10% Technology (Flyer pdf)

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"	80 / 3"	100 / 4"	125 / 5"	150 / 6"	200 / 8"	250 / 10"	300 / 12"
a	340 / 13.39	430 / 16.93	490 / 19.29	610 / 24.02	610 / 24.02	705 / 27.76	765 / 30.12	930 / 36.61
b	210 / 8.27	280 / 11.02	310 / 12.20	390 / 15.35	390 / 15.35	445 / 17.52	505 / 19.88	560 / 22.05
c	206 / 8.11	277 / 10.91	347 / 13.66	427 / 16.81	427 / 16.81	534/ 21.02	604 / 23.78	823 / 32.40
d	125 / 4.92	150 / 5.91	180 / 7.09	230 / 9.06	230 / 9.06	270 / 10.63	310 / 12.20	445 / 17.52

Table 2: Selection of explosion group

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

Table 3: Specification of max. operating temperature

≤ 60°C / 140°F	Tmaximum allowable operating temperature in °C	Higher operating temperatures upon request.
-	Classification	

Table 4: Material selection for housing

Design	A	C	D	E
Housing	Aluminum	Steel	Stainless Steel	Hastelloy
Valve seats	Stainless Steel	Stainless Steel	Stainless Steel	Hastelloy
Gasket	PTFE	PTFE	PTFE	PTFE
Weather hood	Stainless Steel	Stainless Steel	Stainless Steel	Hastelloy
Flame arrester unit	A	A	A	C
Pressure valve pallet	A-F	A-F	A-F	G-I
Vacuum valve pallet	A-E	A-E	A-E	F-H

Special materials upon request.

Table 5: Material combination of flame arrester unit

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

Table 6: Material selection for pressure pallet

Design	A	B	C	D	E
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	>+35 up to +50 >+14 up to +20	>+14 up to +35 >+5.6 up to +14
Valve pallet	Aluminum	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Sealing	FEP	FEP	Metal to Metal	Metal to Metal	PTFE
Weight	Stainless Steel	Stainless Steel	Stainless Steel	Lead	Stainless Steel

Design	F	G	H	I
Pressure range (mbar) (inch W.C.)	>+35 up to +50 >+14 up to +20	+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
Valve pallet	Stainless Steel	Titanium	Hastelloy	Hastelloy
Sealing	PTFE	FEP	FEP	Metal to Metal
Weight	Lead	Hastelloy	Hastelloy	Hastelloy

Special material and higher set pressure upon request.

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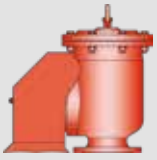


Pressure/Vacuum Relief Valve

Atmospheric Deflagration-proof

PROTEGO® VD/TS

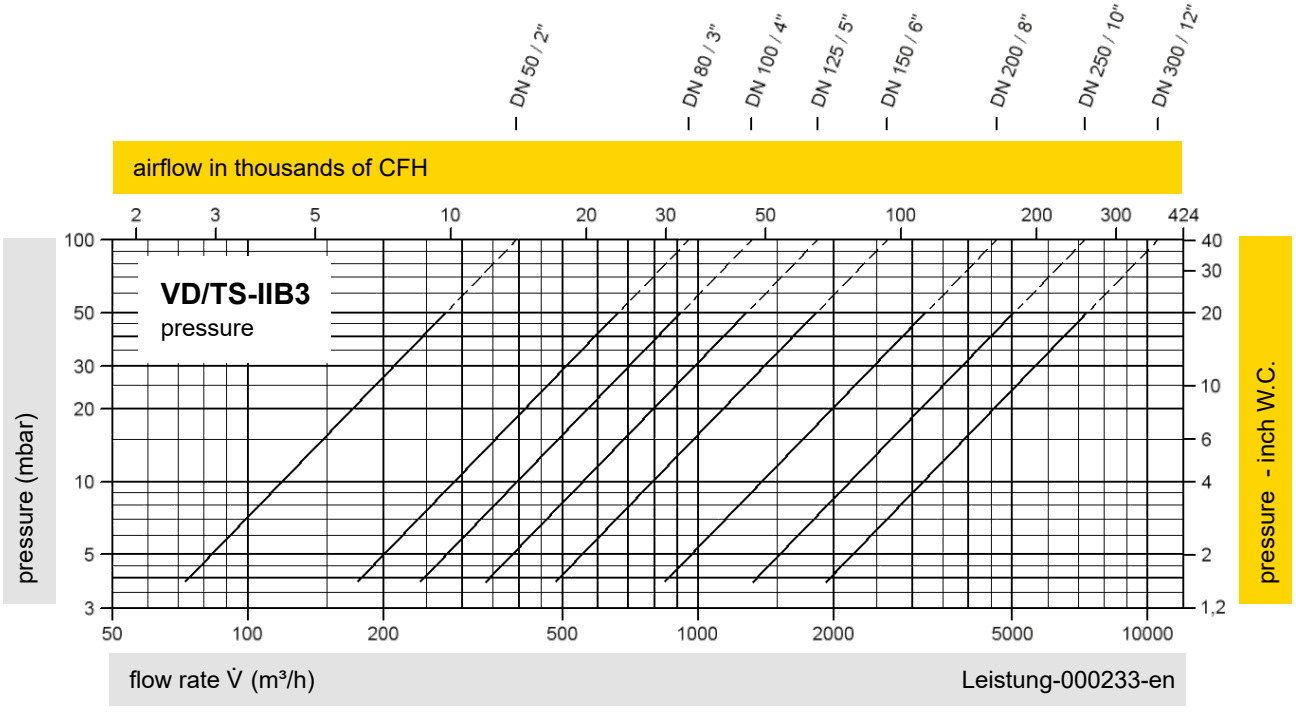
Table 7: Material selection for vacuum pallet

Design	A	B	C	E	F
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 -25 <-5.6 up to -10	<-14 up to -25 <-5.6 up to -10	-2.0 up to -3.5 -0.8 up to -1.4
Valve pallet	Aluminum	Stainless Steel	Stainless Steel	Stainless Steel	Titanium
Sealing	FEP	FEP	Metal to Metal	PTFE	FEP
Weight	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Hastelloy

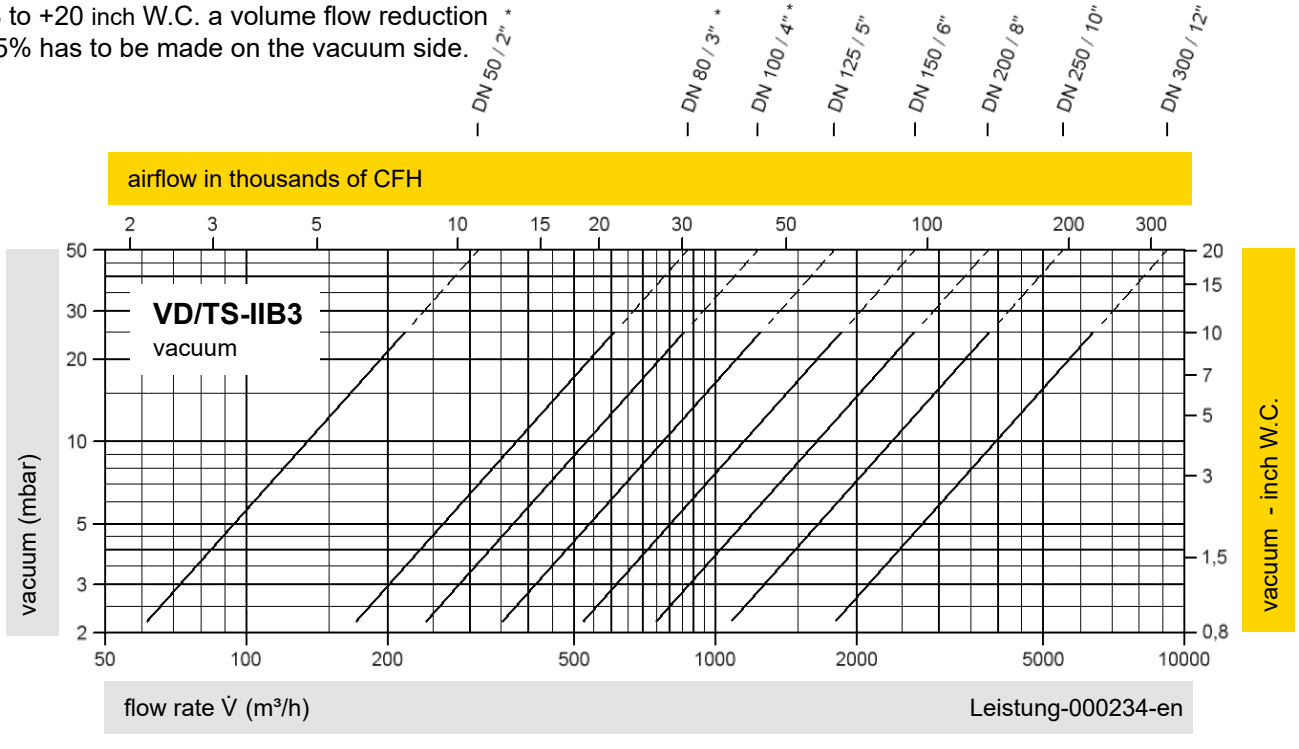
Design	G	H	
Vacuum range (mbar) (inch W.C.)	<-3.5 up to -14 <-1.4 up to -5.6	<-14 up to -25 <-5.6 up to -10	Special material and higher set vacuum upon request.
Valve pallet	Hastelloy	Hastelloy	
Sealing	FEP	Metal to Metal	
Weight	Hastelloy	Hastelloy	

Table 8: Flange connection type

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



* at set pressure of +22 to +50 mbar / +8.8 to +20 inch W.C. a volume flow reduction of 15% has to be made on the vacuum side.



The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.
Volume flow V̇ 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.”

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