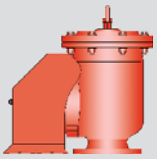
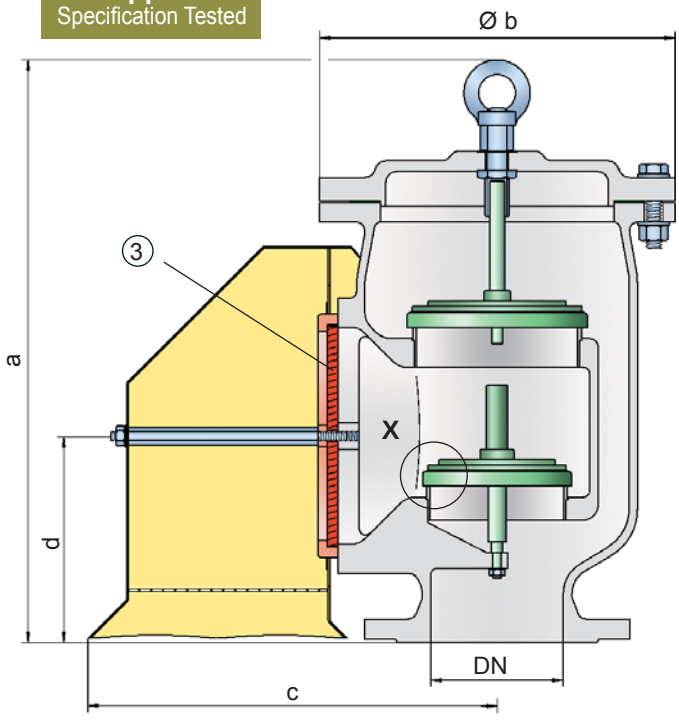


Pressure/Vacuum Relief Valve

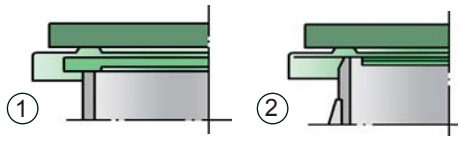
atmospheric deflagration-proof

PROTEGO® VD/TS

FM Approvals
Specification Tested



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- and outbreathing on tanks, containers and process engineering apparatus. The valve offers reliable protection against excess pressure and vacuum, prevents the inbreathing of air and product losses almost up to the set pressure and also 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 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.

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.

Type-approved according to ATEX Directive 94/9/EC and EN ISO 16852 as well as other international standards.

Special Features and Advantages

- requires only 10% overpressure to full lift
- extreme tightness and hence least possible product losses and reduced environmental pollution
- through 10% technology higher set pressures can be used which results in product loss reduction compared to conventional 80% and 100% overpressure technology vents (compare API 2000)
- the valve disc is guided within the housing to protect against harsh weather conditions
- can be used as protective system according ATEX in areas subject to explosion hazards (94/9/EC)
- FLAMEFILTER® provides protection against atmospheric deflagration
- FLAMEFILTER® integrated into the valve saves space and reduces cost
- FLAMEFILTER® protected from clogging through product vapour
- PROTEGO® flame arrester unit has low pressure drop
- optimized flow performance
- maintenance friendly design
- sturdy housing design
- superior technology for API tanks

Design and Specifications

Any combination of vacuum and pressure levels can be set for the valve. The valve discs are weight loaded.

Pressure/vacuum relief valve, basic design **VD/TS-**

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	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	higher operating temperatures upon request
T60	Tmaximum allowable operating temperature in °C

Table 4: Material selection for housing

Design	A	B	C	D	E
Housing	Aluminium	Cast Iron	Steel	Stainless Steel	Hastelloy
Valve seats	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Hastelloy
Gasket	WS 3822	WS 3822	WS 3822	PTFE	PTFE
Weather hood	Aluminium	Aluminium	Aluminium	Stainless Steel	Hastelloy
Flame arrester unit	A	A	A	A	C
Pressure valve pallet	A-F	A-F	A-F	A-F	G-I
Vacuum valve pallet	A-E	A-E	A-E	A-E	F-H

Special materials upon request

Table 5: Material combination of flame arrester unit

Design	A	C	
FLAMEFILTER® cage	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	Aluminium	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 as well as higher set pressure upon request

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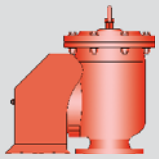

Pressure/Vacuum Relief Valve

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Table 7: Material selection for vacuum pallet

Design	A	B	C	E	F
Vacuum range [mbar]	-2.0 up to -3.5	<-3.5 up to -14	<-14 up to -25	<-14 up to -25	-2.0 up to -3.5
[inch W.C.]	-0.8 up to -1.4	<-1.4 up to -5.6	<-5.6 up to -10	<-5.6 up to -10	-0.8 up to -1.4
Valve pallet	Aluminium	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]	<-3.5 up to -14	<-14 up to -25	Special material as well as higher set vacuum upon request
[inch W.C.]	<-1.4 up to -5.6	<-5.6 up to -10	
Valve pallet	Hastelloy	Hastelloy	
Sealing	FEP	Metal to Metal	
Weight	Hastelloy	Hastelloy	

Table 8: Flange connection type

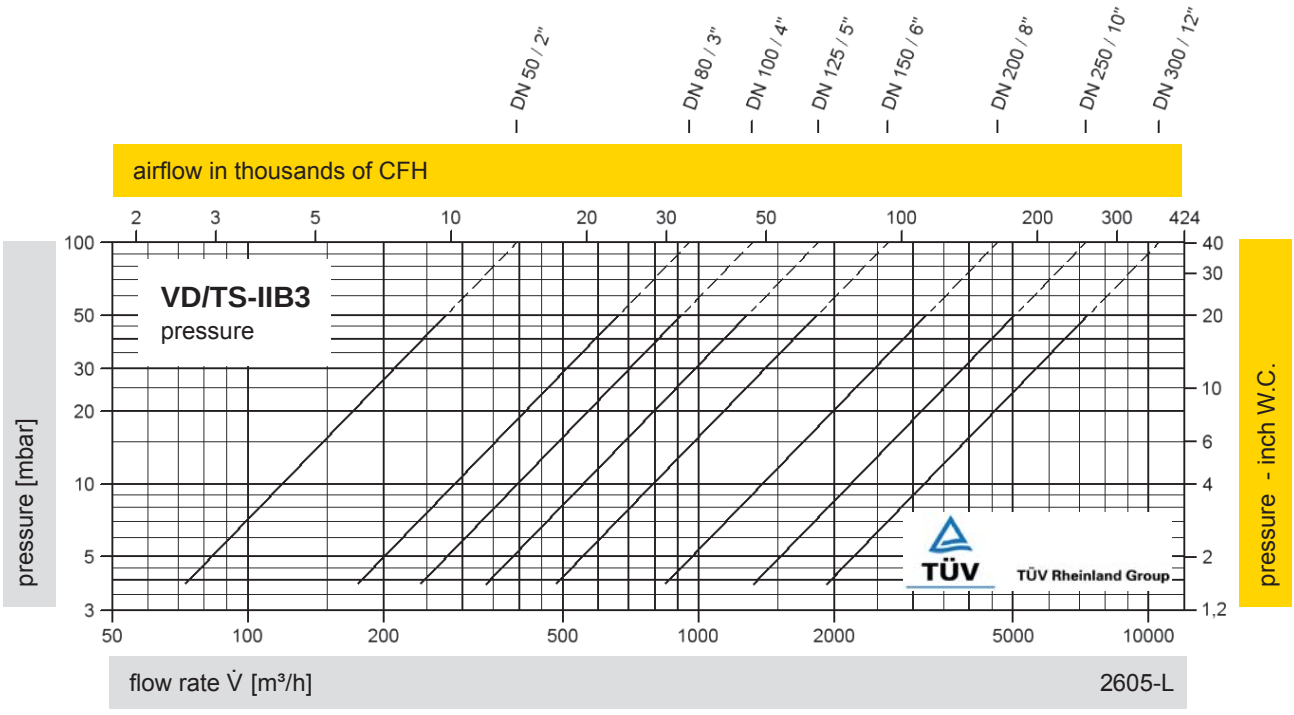
EN 1092-1, Form B1 or DIN 2501, Form C, PN 16; from DN 200 PN 10	EN or DIN	other types upon request
ANSI 150 lbs RFSF	ANSI	

Tab. 1	Tab. 2	Tab. 3	Tab. 4	Tab. 5	Setting [mbar] / Setting [inch W.C.]	Tab. 6	Setting [mbar] / Setting [inch W.C.]	Tab. 7	Tab. 8
Nominal size	Explosion group	Max. operating temperature (°C/°F)	Material (housing)	Material (flame arrester unit)	Pressure	Material (pressure pallet)	Vacuum	Material (vacuum pallet)	Flange connection type
VD/TS –	–	–	–	–	– /	–	– /	–	–

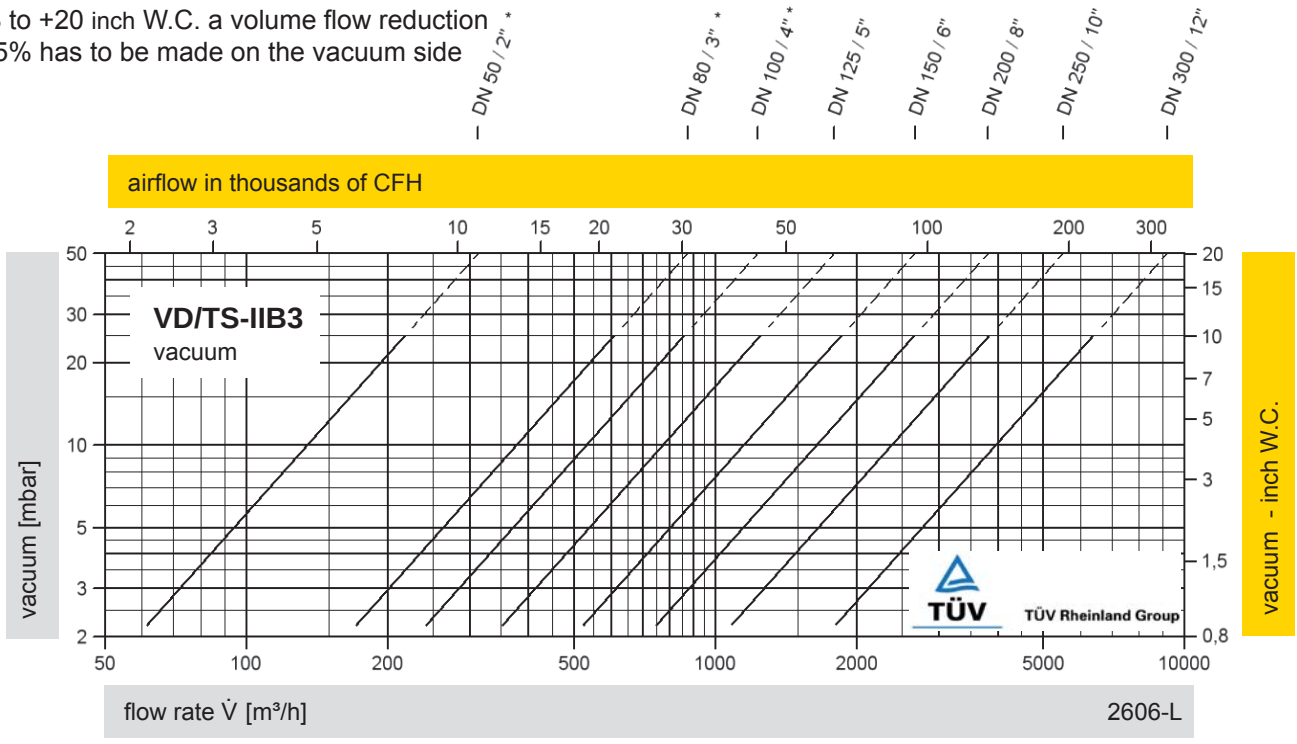
Order example

VD/TS	– 100	– IIB3	– T60	– A	– A	– 30 / –	– C	– -10 / –	– B	– DIN

Materials and chemical resistance: See Vol. 1 “Technical Fundamentals”



***** 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 chart has 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 ISO 6358 (20°C, 1bar).
Conversion to other densities and temperatures refer to Vol. 1: “Technical Fundamentals”.

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