

Abnahmeprüfzeugnis DIN-EN 10204-3.1

Inspection Certificate

Besteller:
purchaser: Air Liquide AGS GmbH

Bestell-Nr.:
order-no.: 4500024842

Auftrags-Nr.:
your job-no.: /

Unsere Auftragsbestätigungs-Nr.: K-05/0.989-so
our acknowledgement-no.:

Werksnummer: 05-0989-02-01
serial-no.:

Pos. item	Anzahl quantity	Benennung description	Bemerkungen remarks
02	1	Über- und Unterdruckventil PROTEGO® VD/SV 150	Z87014 Geräte müssen öl- und fettfrei sein

Werkstoff

material

Gehäuse/Deckel 1.0619/1.0425
body/cover

Umfassungskäfig /
enclosing cage

Flammenfilter /
flame arrestor disc

Abdeckhaube Edelstahl
weather hood

Dichtung WS 3822
gasket

Schrauben/Muttern A2/A4
bolts/nuts

Ventilsitze 1.4571
valve seat

Ventiltellerhaube 1.4571
valve pallet hood

Ventiltellerführung 1.4571
valve guide

Ventiltellerdichtung metallisch/FEP
valve pallet gasket

Membrane /
diaphragm

Flanschanschluss Gehäuse DIN 2501 Form C, gebohrt nach
flange connection body

DN 150 PN 16

Flanschanschluss Heizmantel DIN 2501
flange connection heating jacket

DN PN

Prüfungen

tests

1 ☒ Bauprüfung
design test

2 ☒ Funktionskontrolle
function control

3 ☐ IBExU-Gutachten
IBExU-certificate

4 ☐ Sonstige Prüfungen
miscellaneous tests

5 ☐ Dichtheitsprüfung mit Luft / bar
tightness to air at

6 ☐ Festigkeitsprüfung mit Luft / bar
hydraulic/air test pressure at

7 ☒ Einstell-Überdruck 15,0 mbar
set pressure

8 ☒ Einstell-Unterdruck 5,0 mbar
set vacuum

Keine Beanstandung, die ermittelten Werte liegen in der zulässigen Toleranz.
No objections, stated values are within the allowable tolerances.

Die Prüfungen / wurden durchgeführt in Gegenwart eines Sachverständigen/Beauftragten des:
Tests witnessed by Surveyor / Inspector of:

Braunschweig, 25.05.2005
Ort/place Datum/date

Braunschweig,
Ort/place Datum/date

(Schlüter) *i.A. Schlüter*
.....
(Werksachverständiger)
Works Inspector

.....
(Sachverständiger/Beauftragter)
Surveyor/Inspector



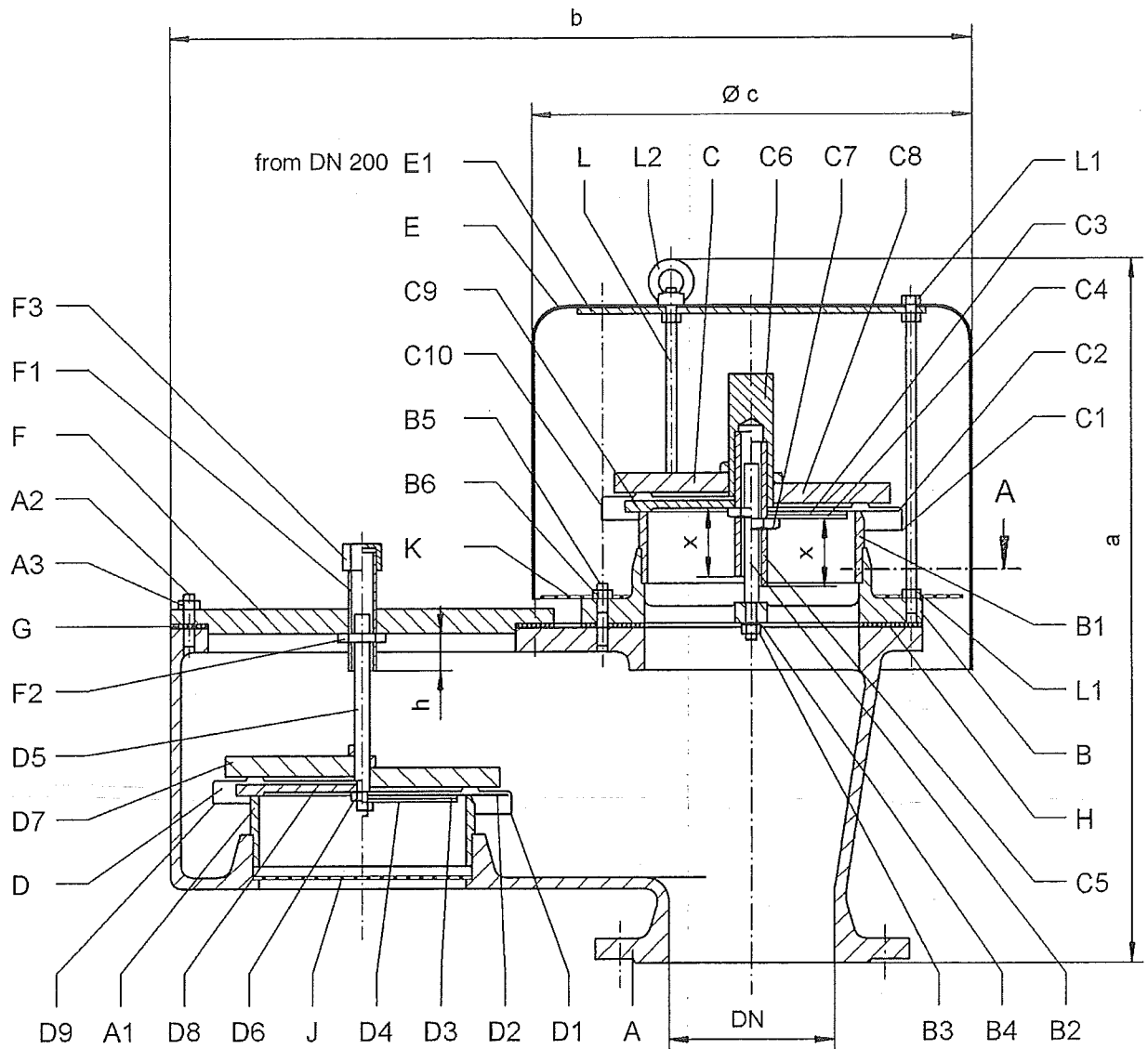
Instructions – Installation- and Maintenance Directions for Pressure and Vacuum Relief Valves

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PROTEGO® VD/SV

2013-B

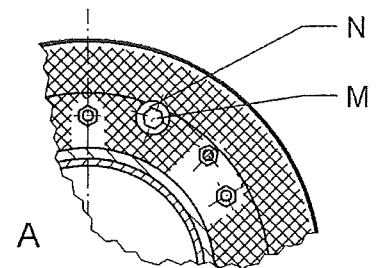
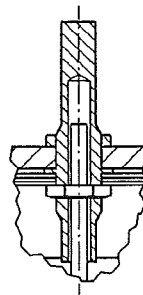


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DN	a	b	c	h	x
50	400	355	200	33	35
80	490	450	295	23	40
100	520	550	295	18	40
150	660	790	465	12	52
200	760	900	550	20	72
250	805	1030	650	17	135
300	805	1030	650	17	135

valve settings:
pressure + 2,0 mbar to + 60,0 mbar
vacuum - 2,0 mbar to - 60,0 mbar

Design only for:
DN 50 – DN 100
from 2 mbar to 14 mbar

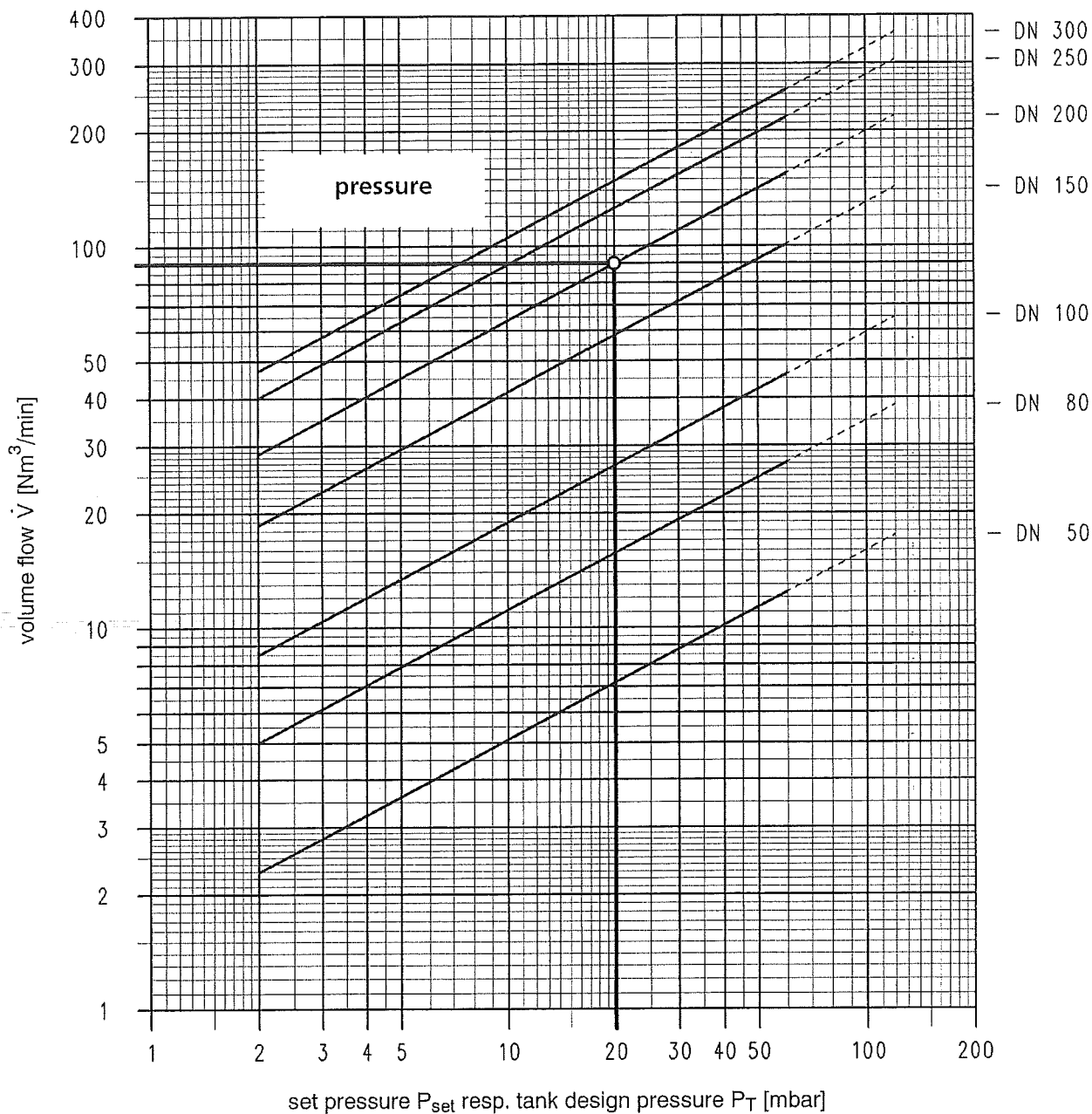


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PROTEGO® VD/SV

1495-L

Volume Flow / Pressure Drop Diagram – Pressure



This volume flow / pressure drop diagram has been measured on a calibrated and TÜV certified flow meter.

The volume flow \dot{V} in Nm³/min refers to air with density $\rho = 1,29 \text{ kg/m}^3$ at a temperature $T_n = 273 \text{ K}$ and pressure $p_n = 1,013 \text{ bar}$.

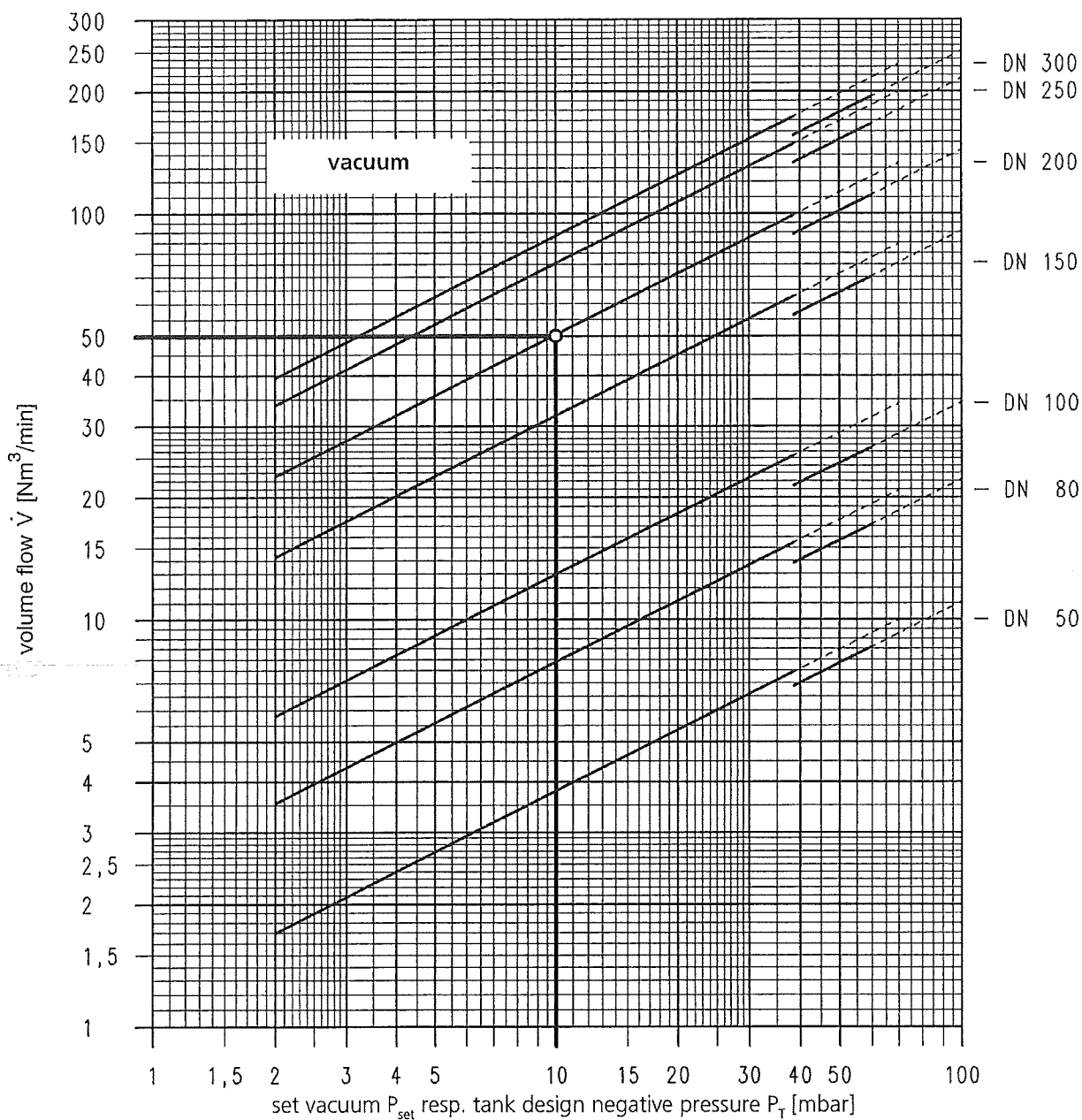


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PROTEGO® VD/SV

1496-L

Volume Flow / Pressure Drop Diagram – Vacuum



This volume flow / pressure drop diagram has been measured on a calibrated and TÜV certified flow meter.

The volume flow \dot{V} in Nm³/min refers to air with density $\rho = 1,29$ kg/m³ at a temperature $T_n = 273$ K and pressure $p_n = 1,013$ bar.



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**PROTEGO® VD/SV
as per data sheet 2013-B**

Field of Application – Limits of Application

Combined pressure/vacuum relief valves PROTEGO® VD/SV are used for out- and inbreathing of tanks and other appliances keeping a pressure/vacuum depending upon the adjusted valve setting.

When used for out- and inbreathing of storage tanks these valves fulfill the requirements of the European Tank Design Standard EN 14015 – Annex L – Venting Systems.

Valve design and selected materials – all valve function elements are made of stainless steel - are the basis for high functional safety and maximum valve performance.

For special operating conditions, that means for polymerizing products or for products forming other types of deposits which might lead to malfunction or for application during winter (frost), when it might be possible that the warm product vapours evaporate in the under cooled valve and might probably freeze, so that ice bridges could develop blocking the valve pallet, special heatable devices shall be used. Please ask for special constructions.

This type of valve is equipped with the new generation of special *full lift valve pallets*, that means the pressure accumulation between valve set pressure up to operating pressure during full lift (opening pressure) is very low and does not exceed 10% in general.

This is an *important advantage* in regard to competitor makes, because the valve setting can be adjusted 10% below the maximum allowable operating pressure (for example calculated tank pressure – refer to paragraph: Function and Sizing) reducing gas evaporation and emissions considerably. *PROTEGO® full lift valve pallets* guarantee optimum valve performance.

The device must have sufficient corrosion resistance with regard to the existing media. If necessary, models in special stainless steel quality should be selected.

As a standard valves are equipped with valve pallets for pressure range I and II (PTFE or FEP sealing) up to +60°C. Please consider that these sealings might have a reduced service time for operating temperatures higher than +60°C. For special cases the max. allowable operating temperature for these valves can be +150°C. The max. allowable operating temperature for valves with metallic sealing is +200°C.

These valves are *not* flashbackproof, that means they are not in the scope of the European Directive for Explosion Protection 94/9/EG (ATEX 95), when they are used within hazardous explosive atmosphere (internally zone 0 – externally zone 1 or 2).

According to a hazard analysis, which has been carried out with regard to selected material and function, these devices do not have any potential ignition source.



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as per data sheet 2013-B**

If these valves are used in combination with in-line deflagration flame arresters or in-line detonation flame arresters for the protection of hazardous explosive plants, the operating manuals of the mentioned flame arresters shall also be considered.

For heatable valves the maximum temperature shall be safe below the ignition temperature of the hazardous explosive mixtures. This is given for all mixtures, if the temperature does not exceed +85°C (standard heating jacket).

Function and Sizing

After exceeding the adjusted setting of pressure valve pallet the gas/air mixtures or product vapor/air mixtures discharge into the atmosphere or air is sucked in from the atmosphere when reaching the adjusted setting of vacuum valve pallet.

Required size of valve depends upon the max. allowable tank pressure and tank vacuum as well as on the required volume flow \dot{V} (Nm³/min). Please use the corresponding volume flow/pressure drop diagrams.

The full lift valve pallets allow the set pressure to be only 10% below the maximum operating pressure. After exceeding the set pressure with a pressure accumulation of only 10% the valve reaches full lift and the flow capacity stated in the curves.

Example – Valve DN 200:

Pressure:

maximum allowable tank design pressure: $P_T = + 20,0 \text{ mbar}$

valve set pressure: $P_V = 0,9 \cdot P_T = + 18,0 \text{ mbar}$

Please refer to capacity curves sheet 1495-L (page 2) showing the valve performance for outbreathing at the corresponding allowable operating pressure $P_T = +20 \text{ mbar}$: $90,0 \text{ Nm}^3/\text{min}$

Vacuum:

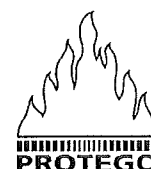
maximum allowable tank design negative pressure: $P_T = - 10,0 \text{ mbar}$

valve set vacuum: $P_V = 0,9 \cdot P_T = - 9,0 \text{ mbar}$

Please refer to capacity curves sheet 2274-L (page 3) showing the valve performance for inbreathing at the corresponding allowable operating vacuum $P_T = -10 \text{ mbar}$: $50,0 \text{ Nm}^3/\text{min}$

Required number and size of valves depend upon the max. possible volume flow \dot{V} (Nm³/min) for out- and inbreathing and the lowest operating pressure (e.g. calculated tank pressure).

Sizing of *combined* pressure/vacuum relief valves is done under consideration of the operating data for inbreathing (max. possible volume flow – max. operating vacuum).



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The range of tolerances depends upon the adjusted setting and is approx. $\pm 5\%$ (for valve settings $> 10,0$ mbar), $\pm 10\%$ (for valve settings $> 5,0$ mbar up to $10,0$ mbar), $\pm 15\%$ (for valve settings $> 2,0$ mbar up to $5,0$ mbar) and 25% (for valve settings $\leq 2,0$ mbar).

The valve leakage rates resulting from the tank operating pressure and the adjusted valve settings depend upon the type of valve pallet sealing and on customer's requirements. If the purchase order does not show any particular specification of leakage rate, the minimum requirement of the PROTEGO® works standard for leakage rates will apply, which is 30% of leakage rate 3 as per DIN 3230 – Part 3 – B0.

Considering the valve design PROTEGO® valve pallets can, of course, fulfill higher requirements as specified in DIN 3230 or other international standards (like API 527). Please do not hesitate to ask for further information.

Design

You may either purchase complete valves as final product, but you may also buy components like:

- housing
- valve seat support
- pressure valve pallet
- vacuum valve pallet

The modular system of the valve consists of several components like housing (A) with flange connection drilled to DIN 2501 – or to any other international standard – valve seat support (B), pressure valve pallet (C) and vacuum valve pallet (D) as well as weather hood (E), cover of housing (F) including valve pallet guide (F1-F3), gaskets (G, H), protective mesh screen (J), ring of protective mesh screen (K), distance bolt and nuts, bolts and washers (L1, L2, M, N).

The housing (A) module includes shrunk valve seat (A1), stud bolts (A2) and hexagon nuts (A3).

The valve seat support (B) includes shrunk valve seat (B1), spindle guide (B2) with hexagon nut (B3) and washer (B4) as well as stud bolts (B5) and hexagon nuts (B6).

The protective mesh screen (K) for pressure valve pallet (C) is fixed by hexagon bolts (M) and washers (N) at valve seat support (B). The protective mesh screen (J) for vacuum valve pallet is fixed below the valve seat (A1).

The weather hood (E) fixed by distance pin (L) and hexagon nuts (L1) or ring nuts (L2) at valve seat support (B).



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Depending upon the adjusted setting the pressure- and vacuum valve pallets (B, C) consist of the following parts:

pressure valve pallet (C):

- o full lift valve pallet (C1)
- o FEP diaphragm (C2)
- o supporting gasket (C3)
- o counter washer (C4)
- o guide pipe (C5)
- o distance pin (C6) – only by DN 150 – DN 300
- o pipe nut (C7)
- o dead weights (C8)
- o pallet disc (C9)
- o full lift disc (C10)

vacuum valve pallet (D)

- o full lift valve pallet (D1)
- o FEP diaphragm (D2)
- o supporting gasket (D3)
- o counter washer (D4)
- o spindle guide (D5)
- o hexagon nut (D6)
- o dead weights (D7)
- o pallet disc (D8)
- o full lift disc (D9)

Please refer to the spare parts lists stating which parts are required for the different pressure ranges.

The design of pressure- and vacuum valve pallet (C, D) depends upon the adjusted valve setting:

- o pressure range I 2,0 up to 3,5 mbar = pressure / vacuum
- o pressure range II $\geq 3,5$ up to 14,0 mbar = pressure / vacuum
- o pressure range III $\geq 14,0$ up to 35,0 mbar = pressure / vacuum
- o pressure range IV $\geq 35,0$ up to 60,0 mbar = pressure / vacuum

The FEP diaphragm with „air cushion“ (as shown on the right hand side of the sketch) is used as valve pallet sealing up to pressure range II.

The ground-in metallic sealing is used from pressure range III onwards (as shown on the left hand side of the sketch).

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PROTEGO® VD/SV
as per data sheet 2013-B

Installation and Commissioning

The type designation, nominal size and serial number, CE marking, EN standard as well as adjusted pressure setting and adjusted vacuum setting and outbreathing flow rate as well as inbreathing flow rate at maximum allowable operating pressure or operating vacuum are stated on manufacturer's tagplate.

The data on the manufacturer's tagplate shall neither be altered nor may the tagplate be removed. In case the tagplate becomes illegible or damaged for any reason, it shall be replaced by a new one. The tagplate should only be replaced by an authorized technician. In this case the device shall be checked for proper function.

Pressure- and vacuum relief valves PROTEGO® VD/SV are supplied with internal transport protection – particularly for higher settings – i.e. valve pallets are blocked, in order to avoid any damage of sealing elements in transit.

This transport protection shall always be removed before commissioning!

The red sticker and the small flag provided at each valve shall remind you of the transport protection. This is not applicable for valves with full lift valve pallet up to a pressure setting of 14 mbar. Special instructions for removal of transport protection as well as a check list for starting valve operation is enclosed to each supply of valve.

For pressure settings higher than 50 mbar – that means valve pallet with heavy dead weight – the serial number and the item number is marked on the valve pallet, which is supplied separately, in order to avoid any damage of sealing elements. The valve pallet then has to be installed. There is an additional tag provided at the valve.

Of course, you are allowed to copy the required number and to distribute the check list to the mechanical staff.

The check list for commissioning shall be filled in, signed and filed accordingly at the operator as confirmation of proper valve installation.

After removal of protective cap at flange connection, the valve is installed. Valve shall only be opened after installation, in order to remove the transport protection – plastic wrap between valve pallet and valve seat as well as packing material (refer to the sketches attached to the packing instruction and to the check list) – both for pressure- and vacuum valve pallet. Inspect valve to find out, if there are any transport damages.

This should be done as follows:

- Loosen hexagon nuts (L1) and ring nuts (L2) at weather hood (E). Lift off weather hood upwards. From DN 200 lift off disc (E1).
- Remove transport protections, take out pressure valve pallet (C) – take care of spindle guide (B2) – and verify condition of FEP diaphragm (C2) or metallic ground-in surface. Dead weights (D8) must be locked.



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- Check perfect condition of valve pallet (B1) sealing surface.
- Loosen hexagon bolts (M) with washers (N) and take off ring of protective mesh screen (K).
- Remove hexagon nuts (A3) from housing cover (F). Lift off cover upwards. Take care of valve pallet guidance (F1-F3).
- Check perfect condition of gasket (G).
- Remove transport protections, take out vacuum valve pallet (D) and verify condition of sealing surface (FEP diaphragm (D2) or metallic ground-in surface); dead weights (D7) must be locked.
- Check perfect condition of valve pallet sealing surface (A1).
- Place vacuum valve pallet (D) in the centre of the lower valve seat (A1). Guide housing cover (F) and valve pallet guidance (F1-F3) carefully from above over spindle guide (D5). Place it on the housing and retighten hexagon nuts (A3).
- Rescrew ring of protective mesh screen (K) with washers (N) and hexagon bolts (M) at valve seat support (B).
- Pull pressure valve pallet (C) carefully over spindle guide (B2) in the centre of the upper valve seat (B1). Place weather hood (E) – from DN 200 disc (E1) at first – on the distance pin (L) and retighten hexagon nuts (L1) and ring nuts (L2).

Attention:

During installation of pressure and vacuum relief valves PROTEGO® VD/SV the following shall be considered:

- The valve pallet is generally blocked by transport protection, which has to be removed before commissioning, otherwise valve will malfunction!
- Set pressure and/or set vacuum, max. allowable operating pressure and/or vacuum and the required valve capacities for outbreathing and/or inbreathing shall be compared to the operating data of the part of plant (tank).
- If there are special operating conditions (for example water vapour during evaporation of stored product) and extreme weather conditions (cold, frost, humidity around, white frost) ice bridges might develop blocking the valve pallet. Precautions like heating will prevent ice bridges.
- The free flow area at the entrance cross sections shall not be covered nor influenced negatively. If there is any doubt, please contact the manufacturer.
- ✘ The valves shall be installed perpendicularly both in regard to the vertical and the horizontal axis, otherwise valve will malfunction!

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**PROTEGO® VD/SV
as per data sheet 2013-B**

Maintenance

Maintenance shall only be done under strict observation of the relevant safety instructions. Only trained experts shall do the maintenance. Generally maintenance should only be done, if the tank or the part of plant is not under pressure and neither filled nor emptied.

Before starting the maintenance turn, always make sure that the gas/air mixtures or product vapor/air mixtures are not dangerous to health, otherwise protective measures are to be taken, e.g. breathing apparatus should be used.

Proper function requires regular inspection and maintenance of devices. The suitable time intervals mainly depend upon the consistency of the products in the plant and upon the mixtures that flow through the devices.

„Clean products“ (like solvents, alcohols, fuels etc.) in general only need one check per year.

Product contamination or possible polymerization or any other types of deposits could lead to much shorter maintenance intervals, in order to prevent a hazardous blocking of elements, which are important for proper function (valve pallet).

In case the operator does not have any experiences with regard to the process, the operator shall carry out regular inspections during plant start-up, in order to determine the time intervals, which are suitable for the existing process with regard to contamination.

Then the future maintenance intervals, which are necessary to provide safe operation, shall be fixed and shall be documented accordingly within the operating instructions.

All parts which are essential for proper valve function have to be verified, cleaned or exchanged as follows:

1. Remove hexagon nuts (L1) and ring nuts (L2) from weather hood (E) and lift off weather hood upwards. From DN 200 lift off disc (E1).
2. Take out pressure valve pallet (C) – take care of valve pallet guidance (B2).

Check valve pallet sealing surface and valve pallet guidance and clean with solvent, if necessary. The gaskets made of FEP or PTFE have to be renewed in case of damage. The metallic sealing may be repaired by lathing and lapping.

Check fixing of dead weights (C8), rescrew adjusting screw, if necessary.

When disassembling the pressure valve pallet for exchange of parts or repair work, all screwings have to be releaded by Loctite after assembly.

3. Loosen hexagon bolts (M) with washers (N) and take off and clean ring of protective mesh screen (K).
4. Remove hexagon nuts (B6) and lift off valve seat support (B) upwards.

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5. Remove hexagon nuts (A3) from housing cover (F). Lift off cover upwards. Take care of valve pallet guidance (F1-F3).

6. Take out vacuum valve pallet (D).

Check valve pallet sealing surface and valve pallet guidance and clean with solvent, if necessary. The gaskets made of FEP or PTFE have to be renewed in case of damage. The metallic sealing may be repaired by lathing and lapping.

Check fixing of dead weights (D7), rescrew adjusting screw, if necessary.

When disassembling the vacuum valve pallet (D) for exchange of parts or repair work, all screwings have to be releaded by Loctite after assembly.

7. Clean valve seats (A1, B1). Any damages can be repaired by lathing or lapping, which is only possible after disassembly of valve.
8. Clean protective mesh screen (J).
9. Verify perfect condition of gasket (G), exchange it in case of damage.
10. Control stud bolts (A2), retighten the bolts, if necessary.
11. Place vacuum valve pallet (D) in the centre of the lower valve seat (A1). Check and rescrew, if necessary, housing cover (F) and valve pallet guidance (F1-F3) (when disassembling all screwings have to be releaded by Loctite after assembly) and guide carefully over spindle guide (D5). Place it on the lower part of housing and retighten hexagon nuts (A3).
12. Verify perfect condition of gasket (H), exchange it in case of damage. Control stud bolts (B5), retighten the bolts, if necessary.
13. Place valve seat support (B) on the lower part of housing (A1) and retighten hexagon nuts (B6). Control distance bolts (L) and hexagon nuts (L1), retighten if necessary.
14. Rescrew ring of protective mesh screen (K) with washers (N) and hexagon bolts (M) at valve seat support (B).
15. Pull pressure valve pallet (C) carefully over spindle guide (B2) in the centre of the upper valve seat (B1). Place weather hood (E) on the distance pin (L) and retighten hexagon nuts (L1) and ring nuts (L2).

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ATTENTION – Most Important!

- If valves combined with flame arresters are used within hazardous explosive areas (zone 0, 1, 2), only antistatic cloths for cleaning of valves and valve parts shall be used - otherwise you face the risk of an ignition induced by electrostatic load.
- If valve is cleaned by "evaporation" (in combination with tank cleaning) all functional parts shall be dried again afterwards.
- Valve seats and valve guidance may not be greased or oiled.
- Original PROTEGO® spare parts shall be used only.
When placing the spare parts purchase order, we kindly ask you to state *all* details noted on the manufacturer's tagplate as well as the full type designation.
- ✕ For reinstallation the valves shall be installed perpendicularly both in regard to the vertical and the horizontal axis (refer to assembly instructions).
- In case of improper installation, putting into operation or maintenance as well as technical modification or in case of not using PROTEGO® spare parts the manufacturer will not grant any guarantee or warranty.
- Installation as well as repair and maintenance shall only be done by qualified mechanics of the PROTEGO® After Sales Service Team or by staff which has been trained and certified by PROTEGO®.

Remark:

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Spare Parts Lists

Final Product VD/SV

item	qty.	part
A	1	housing
A1	1	valve seat
A2	*	stud bolt
A3	*	hexagon nut
B	1	valve seat support
B1	1	valve seat
B2	1	spindle guide
B3	1	hexagon nut
B4	1	washer
B5	*	stud bold
B6	*	hexagon nut
C	1	pressure valve pallet – refer to specific below
D	1	vacuum valve pallet – refer to specific below
E	1	weather hood
E1**	1	disc
F	1	housing cover
F1	1	guide pipe
F2	1	pipe nut
F3	1	hexagon cap
G	1	gasket
H	1	gasket
J	1	protective mesh screen
K	1	ring of protective mesh screen
L	4	distance bolt
L1	10	hexagon nut
L2	2	ring nut
M	2	hexagon bolt
N	2	washer

* depends upon nominal size

** not applicable for DN 50 up to DN 150

Modular component: housing – A

see spare parts list of final product – items A1 through A3

Modular component: valve seat support – B

see spare parts list of final product – items B1 through B6

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Component: Pressure Valve Pallet – C

Different designs are available on request.

item.	qty.	part	pressure range [mbar]			
			I	II	III	IV
			2-3,5	≥3,5-14	≥ 14-35	≥ 35-60
C1	1	full lift pallet	aluminium/HC	stainless steel	—	—
C2	1	diaphragm	FEP	FEP	—	—
C3	1	supporting gasket	WS 3822	WS 3822	—	—
C4	1	counter washer	stainless steel	stainless steel	—	—
C5	1	guide pipe	aluminium/HC	stainless steel	stainless steel	stainless steel
C6	1	distance pin **	aluminium/HC	stainless steel	stainless steel	stainless steel
C7	1	pipe nut	A4	A4	A4	A4
C8		*dead weight	stainless steel	stainless steel	stainless steel	stainless steel
		*adjusting ring	stainless steel	stainless steel	stainless steel	stainless steel
		*threaded pin	A4	A4	A4	A4
C9	1	pallet disc	—	—	stainless steel	stainless steel
C10	1	full lift disc	—	—	stainless steel	stainless steel

* depends upon pressure setting

** only by DN 150 – DN 300

Component: Vacuum Valve Pallet – D

Different designs are available on request.

item	qty.	part	pressure range [mbar]			
			I	II	III	III
			2-3,5	≥3,5-14	≥ 14-35	≥ 14-35
D1	1	full lift pallet	aluminium/HC	stainless steel	—	—
D2	1	diaphragm	FEP	FEP	—	—
D3	1	supporting gasket	WS 3822	WS 3822	—	—
D4	1	counter washer	stainless steel	stainless steel	—	—
D5	1	spindle guide	stainless steel	stainless steel	stainless steel	stainless steel
D6	1	hexagon nut	stainless steel	stainless steel	stainless steel	stainless steel
D7		*dead weight	stainless steel	stainless steel	stainless steel	stainless steel
		*adjusting ring	stainless steel	stainless steel	stainless steel	stainless steel
		*threaded pin	A4	A4	A4	A4
D8	1	pallet disc	—	—	stainless steel	stainless steel
D9	1	full lift disc	—	—	stainless steel	stainless steel

* depends upon vacuum setting

Finished products are available in different standard materials. Special materials are available on customer's request and for special designs. Please refer to material stamping and supplied material documentation / general arrangement drawings, which will be provided upon request.

When placing the spare parts purchase order, we kindly ask you to state *all* details noted on the manufacturer's tagplate – particularly the serial number and the full type designation.



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- **General:**
PROTEGO® type: _____ serial no. _____
valve setting: _____
pressure _____ mbar vacuum _____ mbar
- **Packing Instructions**
Did you read and observe the packing instructions within the packing of the device?
- **Instructions**
Are you in possession of the Instructions – Installation and Maintenance Directions for the valve?
- **Protective Cap**
Did you remove protective cap from flange? Has the valve been installed vertically?
- **Cardboard Ring**
Did you remove cardboard ring from valve spindle?
- **Rubber Protection**
Did you remove rubber protection or air cushion foil below valve pallet?
- **Valve Pallet Surface**
Did you make sure that the valve pallet surface is not damaged?
- **Protective Rubber Collar**
Did you remove protective rubber collar (only for sizes ≥ DN 125) from valve seat?
- **Valve Seat Surface**
Did you make sure that the valve seat surface is not damaged?
- **Valve Pallet**
Did you install valve pallet properly?
- **Valve Pallet Guidance**
Did you check valve pallet guidance?
- **Separate Valve Pallet**
Did you remove transport protection packing from valve pallets being supplied separately?
Did you install these valve pallets properly?
- **Bolts and Nuts**
Did you rescrew tightly all bolts and nuts?
- **Transport Protection Sign**
Did you remove the small sign which refers to transport protection?
- **Sticker – Installation Instructions**
Did you remove the sticker which refers to installation instructions?
- **Tag „Separate Valve Pallet“**
Did you remove the tag which refers to necessary installation of separately supplied valve pallet?
- **Release for Commissioning**
Is the valve ready for commissioning?

Transport protection must be removed from *both* pallets (either side-by-side arrangement or one pallet installed on top of the other) of combined pressure/vacuum relief valves.

Date

Name / Dept.

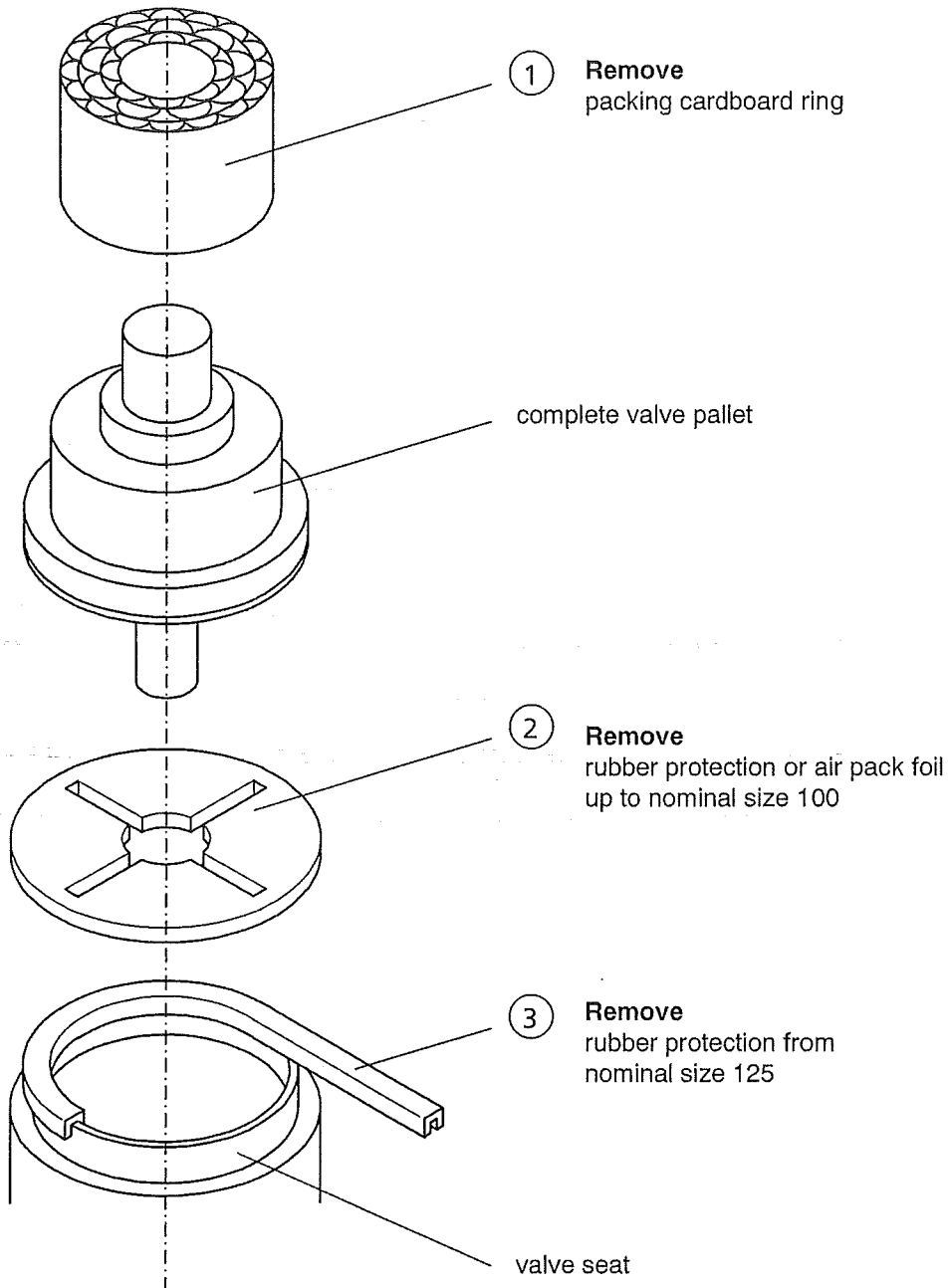
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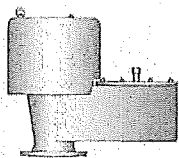
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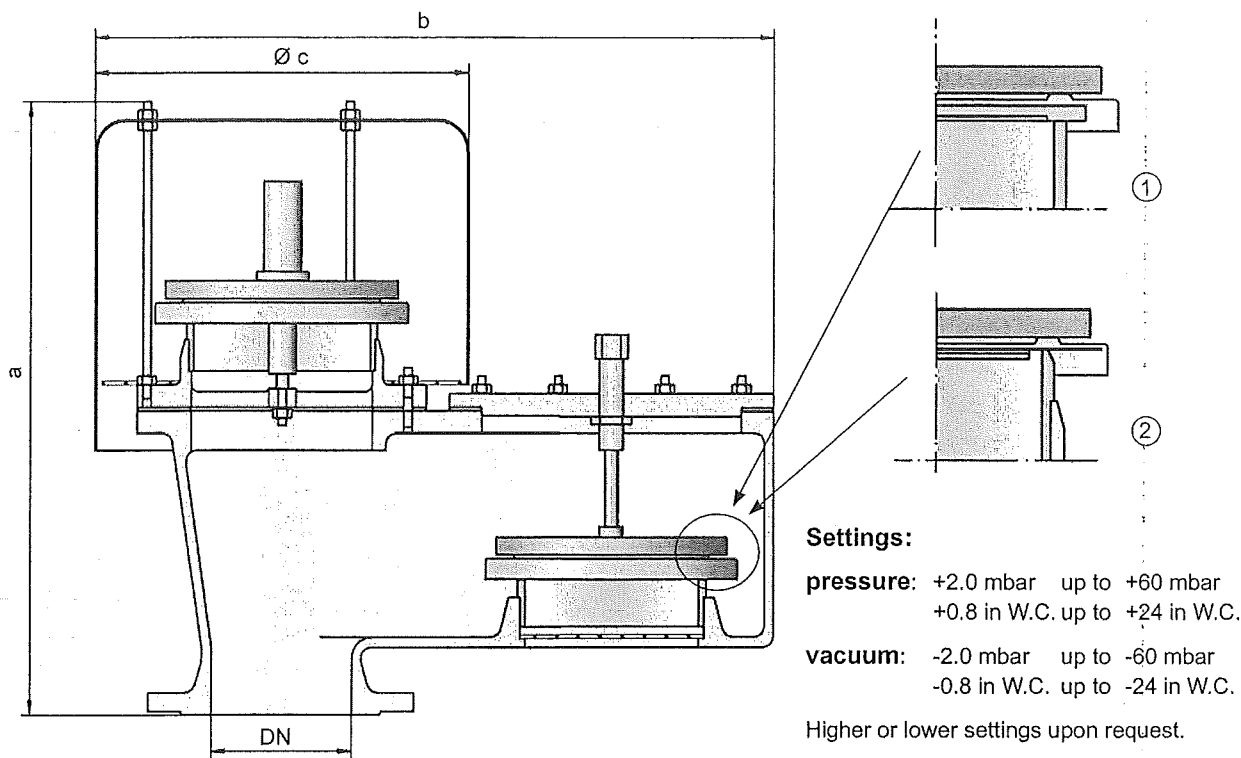
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Pressure and Vacuum Relief Valve

PROTEGO® VD/SV



Function and description

The VD/SV type PROTEGO valve is a highly developed pressure and vacuum relief valve with excellent flow performance. It is primarily used as a safety device for relieving pressure and vacuum in tanks, containers and process engineering equipment. The valve offers reliable protection against overpressure and excessive vacuum. It prevents also the impermissible loss of product vapors close to the set pressure as well as the intake of air on the vacuum side close to set vacuum.

When the set point is reached, the valve starts to open and is fully open within 10% pressure increase. This unique 10% "full lift type technology" enables a pressure setting that is only 10% below the maximum allowable working pressure or maximum allowable working vacuum of the tank. Even in the low pressure range the vent has the opening characteristic comparable to a typical high pressure safety relief valve. The full lift type pallets are a result of many years of development. The reliable engineering enables stable valve disc operation.

Due to the highly developed manufacturing technology, the tank pressure is maintained up to the set point, with a seal that is far superior to the conventional standard. This feature is achieved by valve seats made of high grade stainless steel with precisely lapped valve discs and seats (1) or with an air cushion seal and precisely lapped seats (2). The valve discs are also available with a PTFE seal to prevent the valve disc from sticking when sticky products are used, and they enable the use of corrosive media.

After the excess pressure is discharged or the vacuum is compensated, the valve reseats and again provides a tight seal.

Special Features and Advantages

- 10% technology for minimum pressure rise up to full lift
- Excellent seal for reducing product losses and emissions
- Set pressure is close to full lift pressure, which results in high level of design freedom and product savings
- High flow capacity
- The valve disc is guided within the housing to protect against freezing in cold weather
- Can be used as an ATEX device in areas subject to explosion hazards (94/9/EC)
- Self draining

Design Types and Specifications

Any combination of vacuum and pressure levels can be set for the valve. The valve discs are weight-loaded. Higher pressures can be achieved upon request with a special spring-loaded design. When the difference between the pressure and vacuum exceeds 150 mbar / 60.2 in W.C., special valve discs are used.

There are two different designs:

Pressure/vacuum valve in basic design **VD/SV- ☐**

Pressure/vacuum relief valve with heating jacket **VD/SV- ☐ H**

Additional special devices available upon request.

Table 1: Dimensions

Dimensions in mm / inches

To select the nominal size (DN), use the flow capacity curves on the following pages

DN	50 / 2"	80 / 3"	100 / 4"	150 / 6"	200 / 8"	250 / 10"	300 / 12"
a	400 / 15.75	490 / 19.29	520 / 20.47	660 / 25.98	760 / 29.92	805 / 31.69	805 / 31.69
b	355 / 13.98	450 / 17.72	550 / 21.65	790 / 31.10	900 / 35.43	1030 / 40.55	1030 / 40.55
c	200 / 7.87	295 / 11.61	295 / 11.61	465 / 18.31	550 / 21.65	650 / 25.59	650 / 25.59

Dimensions of pressure and vacuum relief valves with heating jacket upon request

Table 2: Material selection for housing

Design	A	B	C	
Housing	Aluminium	Carbon Steel	Stainless Steel	Option: Housing ECTFE-coated Special materials upon request
Heating jacket (VD/SV-H-...)	—	Carbon Steel	Stainless Steel	
Valve seat	Stainless Steel	Stainless Steel	Stainless Steel	
Sealing	WS 3822	WS 3822	PTFE	
Cover	Stainless Steel	Stainless Steel	Stainless Steel	

Table 3: Material selection for pressure pallet

Design	A	B	C	D	E	F
Pressure range [mbar]	+2.0 up to +3.5	>+3.5 up to +14	>+14 up to +35	>+35 up to +60	>+14 up to +35	>+35 up to +60
[in W.C.]	+0.8 up to +1.4	>+1.4 up to +5.6	>+5.6 up to +14	>+14 up to +24	>+5.6 up to +14	>+14 up to +24
Valve pallet, pressure	Aluminium	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Sealing	FEP	FEP	Metal to metal	Metal to metal	PTFE	PTFE

Special material as well as higher set pressure upon request

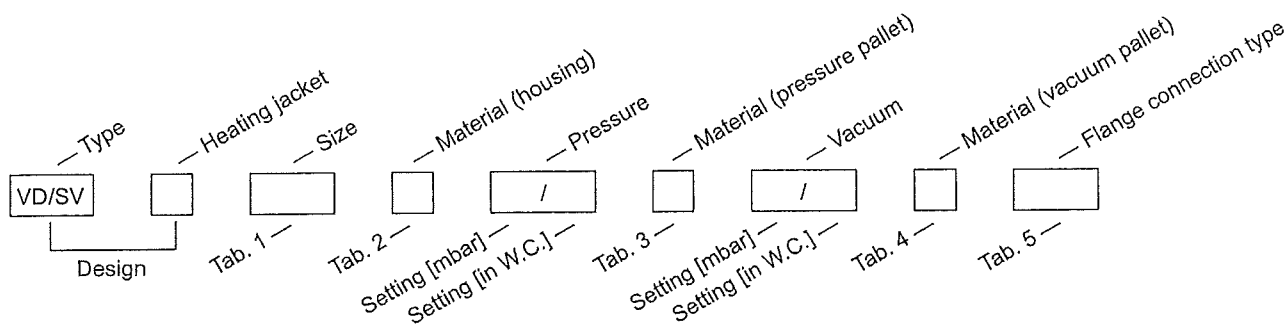
Table 4: Material selection for vacuum pallet

Design	A	B	C	D	E	F
Vacuum range [mbar]	-2.0 up to -3.5	<-3.5 up to -14	<-14 up to -35	>-35 up to -60	>-14 up to -35	>-35 up to -60
[in W.C.]	-0.8 up to -1.4	<-1.4 up to -5.6	<-5.6 up to -14	>-14 up to +24	<-5.6 up to -14	>-14 up to -24
Valve pallet, vacuum	Aluminium	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Sealing	FEP	FEP	Metal to metal	Metal to metal	PTFE	PTFE

Special material as well as higher vacuum upon request

Table 5: Flange connection type

DIN 2501, Form C, PN 16; from DN 200 PN10	DIN	other types upon request
ANSI 150 lbs RFSS	ANSI	

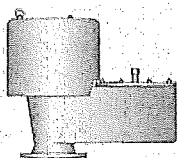
**Order example**

VD/SV - H - 200 - B - 30 / - C - -4,0 / - B - DIN

Materials and chemical resistance: Technical Information upon request

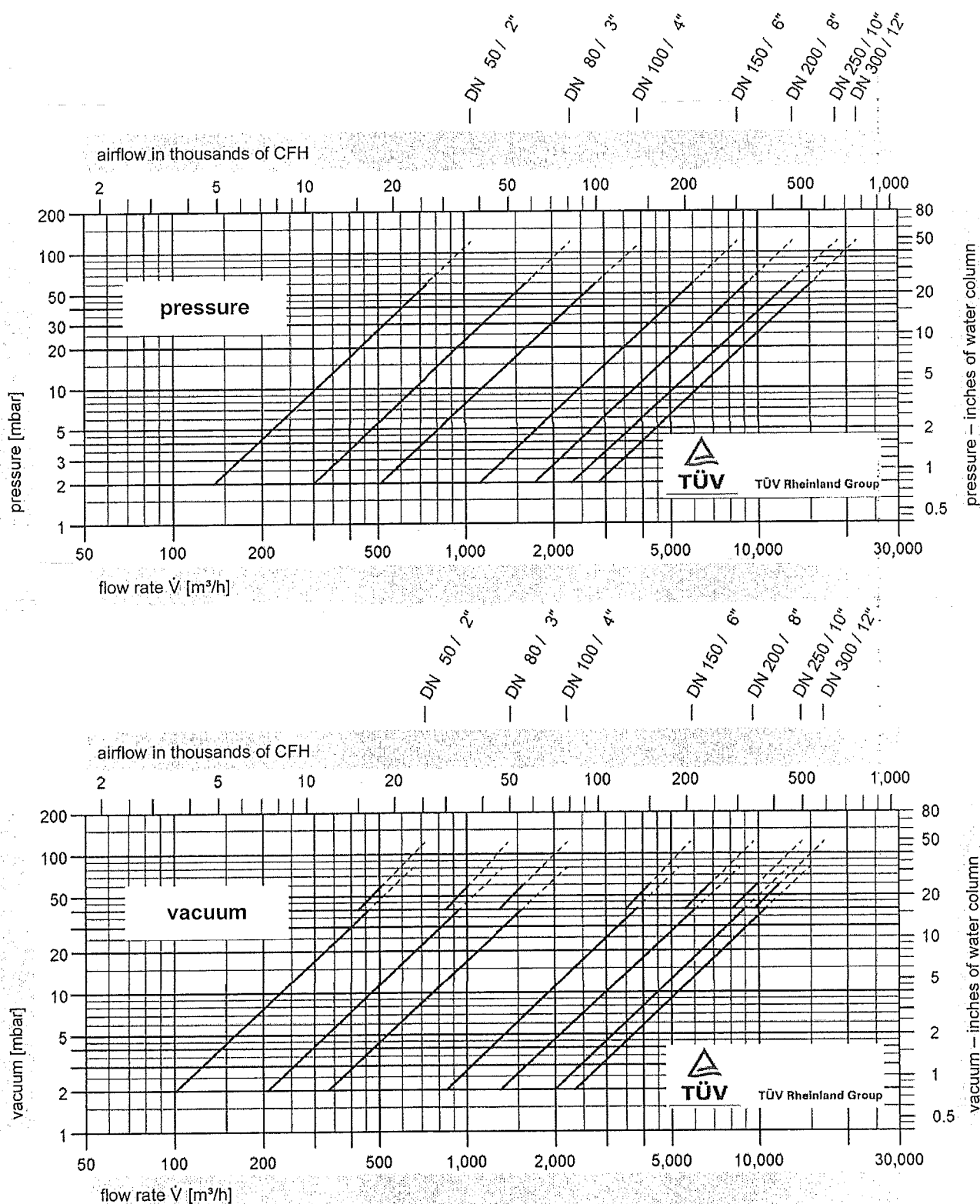


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Pressure and Vacuum Relief Valve Flow Capacity Chart

PROTEGO® VD/SV



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 SCFH refer to the Technical Standard ISO 6358 (20°C, 1bar). Conversion to other densities and temperatures refer to Technical Fundamentals.

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