Pressure/Vacuum Relief Valve
deflagration- and endurance burning-proof

PROTEGO® PV/EB-E

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, 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 fulfills 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 and EN ISO 16852 as well as other international standards.

Special Features and Advantages

• selecting set pressure close to relieving pressure results in product loss reduction
• increased design flexibility through higher reseating pressures; vents reseat 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 of alcohol/air mixtures from explosion group IIIB1
• high flow capacity through large FLAMEFILTER® cross-section, results in low pressure drop
• FLAMEFILTER® provides protection against atmospheric deflagration and endurance burning
• FLAMEFILTER® 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
• special design with lifting gear can be purchased

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Design Types and Specifications

Almost any combination of vacuum and pressure levels can be set for the valve. The valve discs are weight loaded. When the difference between the pressure and vacuum exceeds 150 mbar / 60.2 inch W.C., special valve discs are used.

There are two different designs:

- Pressure/vacuum relief valve, basic design: PV/EB-E-  
- Pressure/vacuum relief valve with heating jacket (max. heating fluid temperature +85°C / 185°F): PV/EB-E- H

Additional special devices available upon request

### Table 1: Dimensions

To select the nominal size (DN), please use the flow capacity charts on the following pages.

<table>
<thead>
<tr>
<th>DN</th>
<th>50 / 2&quot;</th>
<th>50 / 2&quot;</th>
<th>80 / 3&quot;</th>
<th>80 / 3&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>308 / 12.13</td>
<td>443 / 17.44</td>
<td>308 / 12.13</td>
<td>443 / 17.44</td>
</tr>
<tr>
<td>c</td>
<td>165 / 6.50</td>
<td>165 / 6.50</td>
<td>167 / 6.57</td>
<td>167 / 6.57</td>
</tr>
</tbody>
</table>

### Table 2: Selection of explosion group

<table>
<thead>
<tr>
<th>MESG</th>
<th>Expl. Gr. (IEC/CEN)</th>
<th>Gas Group (NEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 0,85 mm</td>
<td>IIB1</td>
<td>–</td>
</tr>
</tbody>
</table>

### Table 3: Material selection for housing

<table>
<thead>
<tr>
<th>Design</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Steel</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Heating jacket (PV/EB-E-H-...)</td>
<td>Steel</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Valve seats</td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Weather hood</td>
<td>Steel</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

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

Design A: Special materials upon request

<table>
<thead>
<tr>
<th>Design</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLAMEFILTER® cage</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>FLAMEFILTER®</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Spacer</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

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

Design A: Special material as well as higher set pressure upon request

<table>
<thead>
<tr>
<th>Design</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure range (mbar)</td>
<td>+2.0 up to +3.5</td>
<td>+3.5 up to +14</td>
<td>+14 up to +210</td>
<td>+35 up to +210</td>
</tr>
<tr>
<td>(inch W.C.)</td>
<td>+0.8 up to +1.4</td>
<td>+1.4 up to +5.6</td>
<td>+5.6 up to +84</td>
<td>+14 up to +84</td>
</tr>
<tr>
<td>Valve pallet</td>
<td>Aluminium</td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Sealing</td>
<td>FEP</td>
<td>FEP</td>
<td>Metal to Metal</td>
<td>PTFE</td>
</tr>
</tbody>
</table>

### Table 6: Material selection for vacuum pallet

Design A: Special material as well as higher set vacuum upon request

<table>
<thead>
<tr>
<th>Design</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum range (mbar)</td>
<td>-3.5 up to -5.0</td>
<td>-5.0 up to -14</td>
<td>-14 up to -35</td>
<td>-14 up to -35</td>
</tr>
<tr>
<td>(inch W.C.)</td>
<td>-1.4 up to -2.0</td>
<td>-2.0 up to -5.6</td>
<td>-5.6 up to -14</td>
<td>-5.6 up to -14</td>
</tr>
<tr>
<td>Valve pallet</td>
<td>Aluminium</td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
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<tr>
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<td>FEP</td>
<td>FEP</td>
<td>Metal to Metal</td>
<td>PTFE</td>
</tr>
</tbody>
</table>

### Table 7: Flange connection type

<table>
<thead>
<tr>
<th>Design</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange connection type</td>
<td>EN 1092-1: Form B1</td>
<td>ASME B16.5: 150 lbs RFSF</td>
<td>other types upon request</td>
<td></td>
</tr>
</tbody>
</table>
**Pressure/Vacuum Relief Valve**

**Flow Capacity Charts**

**PROTEGO® PV/EB-E**

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**Remark**

- **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 \( V \) in \( \text{m}^3/\text{h} \) and CFH refer to the standard reference conditions of air ISO 6358 (20°C, 1 bar).

Conversion to other densities and temperatures refer to Vol. 1: "Technical Fundamentals".