

## VENTEX (ESI TYPE 6) – PASSIVE EXPLOSION ISOLATION VALVE



### DESCRIPTION

The risk of an industrial explosion occurs in many stages of production, transportation and storage of combustible dusts and gases. Apart from preventative measures to reduce the explosion risk, appropriate constructive explosion measures will protect against the effects of explosions.

Protective techniques are generally classified into explosion venting, explosion suppression, containment and explosion isolation. The safety function of explosion venting and suppression is to protect process vessels from explosion overpressurization, while explosion isolation will keep explosions from spreading throughout a process.

### EXPLOSION ISOLATION: SAFETY FUNCTION

The safety function of explosion isolation is to prevent flame propagation through interconnected pipelines to other process vessels and/or equipment or an unsafe explosion discharge into the workplace. Explosion isolation must be considered for all venting, suppression and containment explosion protection systems. Propagation of the explosion pressure and flame can occur even against the normal direction of process flow. The consequences of not giving full consideration to explosion isolation of interconnected vessels are flame jet ignition and pressure piling.



#### APPROVALS:

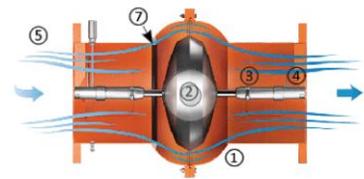
- ATEX
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## PASSIVE MECHANICAL ISOLATION BARRIER

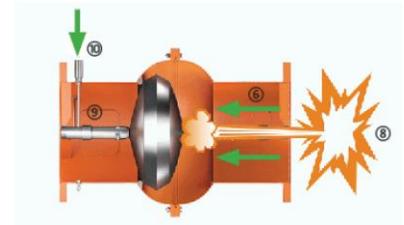
Unlike active explosion barriers, passive float valves are closed by the force of the explosion pressure wave itself and do not require an external energy supply, detectors or system controls. The valves are designed to close within milliseconds providing a mechanical barrier against flame and pressure.

### TYPE ESI-E SINGLE ACTING EXPLOSION BARRIER VALVE (FIG. 1 & 2)

This model consists of a valve body ① inside which a floating ball ② attached to the valve stem ③ moves within the valve stem guides ④. The floating ball is kept in the open (central) position by a spring which is set to keep the valve in the open position against a maximum process airflow of 20 m/s ⑤.



A minimum pressure differential across the valve of 0.05 bar (0.2 bar for DN600), for instance the flow of an explosion pressure wave ⑥, will drive the floating ball onto the valve seat ⑦, creating a barrier to the explosion pressure and flame ⑧. The floating ball is secured in the closed position by a locking cam ⑨; lifting the reset knob ⑩ will return the floating ball to the open position.

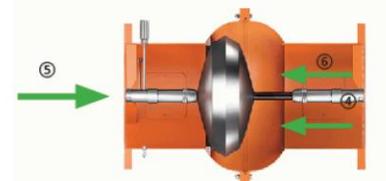


### TYPE ESI-D DOUBLE ACTING EXPLOSION BARRIER VALVE

This model is similar to the ESI – E, but is designed to prevent explosion pressure and flame from passing the valve in either direction. This is accomplished by the floating ball being bi-directional and having two seats. The floating ball is kept in the open position by a spring on either side. A locking cam on both ends of the valve will in the event of an explosion secure the floating ball against one of the seats.

### TYPE ESI-C EXPLOSION BARRIER CHECK VALVE (FIG. 3)

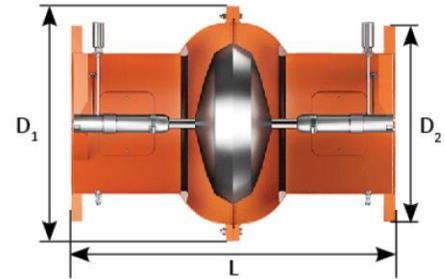
The action of the valve spring ④ makes this a normally closed valve. Under process working conditions the process airflow ⑤ forces the floating ball off its seat opening the valve. In the event of an explosion downstream of the ESI – C, the explosion pressure wave ⑥, assisted by the valve spring drives the floating ball back against its seat. The combination of the pressure wave and the spring force allow this valve to be positioned closer to the origin of the explosion.



### DIMENSIONS FOR VENTEX TYPE ESI-E, ESI-D & ESI-C

| Size  | L (mm)                  | D <sub>1</sub> (mm) | D <sub>2</sub> (mm) | Weight (kg) |
|-------|-------------------------|---------------------|---------------------|-------------|
| DN100 | 350<br>400 <sup>1</sup> | 215                 | 220                 | 30          |
| DN150 | 500                     | 315                 | 285                 | 35          |
| DN200 | 610                     | 417                 | 340                 | 53          |
| DN300 | 780                     | 550                 | 445                 | 84          |
| DN400 | 940                     | 682                 | 565                 | 133         |
| DN500 | 1300                    | 814                 | 670                 | 213         |
| DN600 | 1420                    | 929                 | 780                 | 305         |

(1) for type ESI-D.



### EXPLOSION PRESSURE VENTEX TYPE ESI-E, ESI-D & ESI-C (AT 22°C)

| Size               |           | DN100 |      | DN150 |      | DN200 |      | DN300 |      | DN400 |      | DN500 |      | DN600 |
|--------------------|-----------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|
| Max. Air Speed     | m/s       | 20    | 25   | 20    | 25   | 20    | 25   | 20    | 25   | 20    | 25   | 20    | 25   | 25    |
|                    |           |       |      |       |      |       |      |       |      |       |      |       |      |       |
| Explosion Pressure | Min. barg | 0.05  | 0.05 | 0.05  | 0.05 | 0.05  | 0.05 | 0.05  | 0.05 | 0.05  | 0.12 | 0.05  | 0.06 | 0.2   |
|                    | Max. barg | 14    | 14   | 14    | 14   | 14    | 14   | 14    | 14   | 14    | 14   | 14    | 14   | 13    |

### MAXIMUM EXPLOSION PRESSURE WITH DIFFERENT PROCESS TEMPERATURES

| Dimension                   | DN100 | DN150 | DN200 | DN300 | DN400 | DN500 | DN600 |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|
| P <sub>max</sub> (bar abs)  | 14    | 14    | 14    | 14    | 14    | 14    | 13    |
| P <sub>max</sub> 120°C barg | 11    | 11    | 11    | 11    | 11    | 11    | 10.2  |
| P <sub>max</sub> 150°C barg | 10.5  | 10.5  | 10.5  | 10.5  | 10.5  | 10.5  | 9.7   |
| P <sub>max</sub> 250°C barg | 8.6   | 8.6   | 8.6   | 8.6   | 8.6   | 8.6   | 7.9   |
| P <sub>max</sub> 300°C barg | 7.6   | 7.6   | 7.6   | 7.6   | 7.6   | 7.6   | 8     |



**PRESSURE DROP FOR HORIZONTAL INSTALLATION FOR VENTEX (EXECUTION 20 M/S)**

| Size  | ESI-E                |                |                |                | ESI-D                |  |           |  | ESI-C                |  |           |  |
|-------|----------------------|----------------|----------------|----------------|----------------------|--|-----------|--|----------------------|--|-----------|--|
|       | Pressure Drop (mbar) |                |                |                | Pressure Drop (mbar) |  |           |  | Pressure Drop (mbar) |  |           |  |
|       | at 15 m/s            |                | at 20 m/s      |                | at 15 m/s            |  | at 20 m/s |  | at 15 m/s            |  | at 20 m/s |  |
|       | A <sup>1</sup>       | B <sup>2</sup> | A <sup>1</sup> | B <sup>2</sup> |                      |  |           |  |                      |  |           |  |
| DN100 | 4.25                 | 6.90           | 7.55           | 12.23          | 4.25                 |  | 7.55      |  | 6.90                 |  | 12.23     |  |
| DN150 | 4.31                 | 5.59           | 8.77           | 9.89           | 4.31                 |  | 8.77      |  | 5.59                 |  | 9.89      |  |
| DN200 | 2.32                 | 3.73           | 3.85           | 6.47           | 2.32                 |  | 3.85      |  | 3.73                 |  | 6.47      |  |
| DN300 | 2.48                 | 3.74           | 4.43           | 6.49           | 2.48                 |  | 4.43      |  | 3.68                 |  | 6.26      |  |
| DN400 | 4.20                 | 5.56           | 8.15           | 9.58           | 4.56                 |  | 7.73      |  | 5.40                 |  | 8.17      |  |
| DN500 | 4.49                 | 5.44           | 8.41           | 9.77           | 4.36                 |  | 8.04      |  | 5.44                 |  | 9.77      |  |
| DN600 | 4.26                 | 5.44           | 7.57           | 9.51           | 4.26                 |  | 7.57      |  | 5.49                 |  | 9.54      |  |

(1) A: with explosion  
 (2) B: against explosion flow

**PRESSURE DROP FOR VERTICAL INSTALLATION FOR VENTEX (EXECUTION 20 M/S)**

| Size  | ESI-E                |           |                       |           | ESI-D                |           |                       |           | ESI-C                |           |                       |           |
|-------|----------------------|-----------|-----------------------|-----------|----------------------|-----------|-----------------------|-----------|----------------------|-----------|-----------------------|-----------|
|       | Pressure Drop (mbar) |           |                       |           | Pressure Drop (mbar) |           |                       |           | Pressure Drop (mbar) |           |                       |           |
|       | Explosion from top   |           | Explosion from bottom |           | Explosion from top   |           | Explosion from bottom |           | Explosion from top   |           | Explosion from bottom |           |
|       | at 10 m/s            | at 15 m/s | at 10 m/s             | at 15 m/s | at 10 m/s            | at 15 m/s | at 10 m/s             | at 15 m/s | at 10 m/s            | at 15 m/s | at 10 m/s             | at 15 m/s |
| DN100 | 1.89                 | 4.25      | 1.90                  | 4.54      | 1.89                 | 4.25      | 1.90                  | 4.54      | 3.08                 | 6.90      | 3.08                  | 6.90      |
| DN150 | 1.57                 | 4.31      | 1.57                  | 4.31      | 1.57                 | 4.31      | 1.57                  | 4.31      | 2.50                 | 5.59      | 2.50                  | 5.59      |
| DN200 | 1.03                 | 3.25      | 1.14                  | 2.32      | 1.03                 | 3.25      | 1.14                  | 2.32      | 1.71                 | 3.73      | 1.71                  | 3.73      |
| DN300 | 1.55                 | 3.39      | 1.22                  | 3.07      | 1.84                 | 3.80      | 1.16                  | 3.01      | 4.40                 | 6.04      | 2.68                  | 4.73      |
| DN400 | 2.06                 | 4.63      | 1.65                  | 4.20      | 2.06                 | 4.63      | 1.65                  | 4.20      | 2.58                 | 5.56      | 2.58                  | 5.56      |
| DN500 | 1.85                 | 4.49      | 2.29                  | 5.28      | 1.85                 | 4.49      | 2.29                  | 5.28      | 2.39                 | 5.44      | 2.39                  | 5.44      |
| DN600 | 1.89                 | 4.26      | 1.89                  | 4.26      | 1.89                 | 4.26      | 1.89                  | 4.26      | 2.47                 | 5.44      | 2.47                  | 5.44      |

## SPECIFICATIONS

| Revision   | Ventex Type 6   |                             |              |               |
|--|---|-----------------------------|--------------|---------------|
| Types  | ESI-E Single Acting Explosion Isolation Valve<br>ESI-D Double Acting Explosion Isolation Valve<br>ESI-C Explosion Isolation Check Valve with locking device   |                             |              |               |
| Explosion Hazard   | K <sub>st</sub> (Dust hazard) ≤ 400 bar.m/s (DN500 25m/s K <sub>st</sub> ≤ 300)<br>K <sub>g</sub> (Gas hazard) ≤ 100 bar.m/s<br>K <sub>H</sub> (Hybrid) ≤ 400 bar.m/s (DN500 25m/s not certified)<br>K <sub>st</sub> (Metallic dust) ≤ 400 (DN100), 450 (DN150-300),<br>DN400 not certified, 300 (DN500-600)  |                             |              |               |
| P <sub>EX</sub> at 20°C                                      | DN100-500 13 barg maximum<br>DN600 12 barg maximum  |                             |              |               |
| In combination with venting                                  | P <sub>stat</sub> ≥ 0.100 bar (0.200 for DN600)   |                             |              |               |
| In combination with suppression                              | P <sub>act</sub> ≥ 0.100 bar (0.200 for DN600)  |                             |              |               |
| Explosion tested at  | FSA, Mannheim   |                             |              |               |
| ATEX certification   | Zone inside: Certificate CE <sub>0081</sub> Ex II 1GD IIB / Zone 0, 1, 2, 20, 21, 22<br>The outside zone is depending on the execution of the mounted parts<br>(e.g. Switch) <br>Protective system GD IIB<br>DN100 - FSA 12 Atex 1622 X<br>DN150 - FSA 12 Atex 1623 X<br>DN200 - FSA 12 Atex 1624 X<br>DN300 - FSA 12 Atex 1625 X<br>DN400 - FSA 12 Atex 1626 X<br>DN500 - FSA 12 Atex 1627 X<br>DN600 - FSA 14 Atex 1646 X |                             |              |               |
| Maximum Operating Temperature                                | EPDM Gaskets (FDA) T <sub>max</sub> 120°C<br>Silicone Gaskets (FDA) T <sub>max</sub> 150°C<br>VITON Gaskets T <sub>max</sub> 150°C  |                             |              |               |
| Minimum Ambient / Operating Temperature                      | +5°C, no icing allowed  |                             |              |               |
| Maximum Flow Velocity  | V <sub>max</sub> = 20 m/s, optional 25 m/s  |                             |              |               |
| Dust Load  | Dust / Air Concentration ≤ 50 g/m <sup>3</sup> , ESI-C no dust load allowed<br>Min. Flow Velocity ≥ 12 m/s<br>Particle Size ≤ 0.5 mm<br>Dry Air, no condensation allowed  |                             |              |               |
| Material Specification                                       | Type  | A                           | C            | E             |
|  | Housing   | Mild steel painted (orange) | 1.4301 (304) | 1.4404 (316L) |
|  | Internal and wetted parts   | 1.4301 (304)                | 1.4301 (304) | 1.4404 (316L) |
| Flanges  | DIN EN 1092-1   |                             |              |               |
| Leakage  | Type ESI-C gastight 2 bar standard  |                             |              |               |
| Position Indicators (valve open / valve closed) <sup>1</sup> | Namur or Inductive  |                             |              |               |



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| <p style="text-align: center;"><b>Options</b></p> | <p style="text-align: center;">Flange ANSI 150<br/>Material Stainless Steel (1.4404/AISI 316)<br/>Surfaces Special Treatment (hot-dip galvanized up to 200°C, Epoxy)<br/>Gasket Ceramic Fiber 300°C (DN300-DN500)<br/>High Temperature Silicone T<sub>max</sub> 250°C<br/>CIP version, polished surfaces<br/>Switch cover, condensate drain<br/>Gastight 2 bar<br/>Food grade: EC1935/2004 (just for 1.4301/1.4404)<br/>3.1/2.2 Certificate</p> |
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(1) Also available for use in Ex classified areas.