

FIREFLY EXsolvo[®]

Explosion protection for your process



EXPLOSION PROTECTION AT FIREFLY

A dust explosion is the rapid combustion of fine particles suspended in the air within an enclosed location.

Dust explosions are common in most industries handling dry and finely divided material. Dust explosions can occur where dispersed powdery combustible material is present in sufficiently high concentrations in the atmosphere or its oxidizing gaseous medium, for example pure oxygen in an enclosed space.

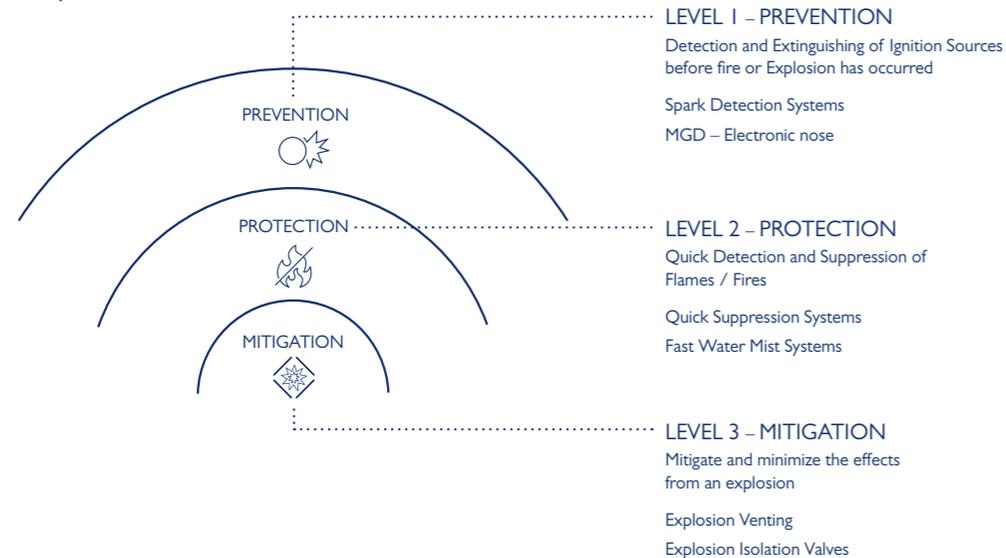
The explosion damage is directly related to factors such as explosive characteristics of the material, the volume and geometry of the vessel.

The strength or 'pressure enclosure strength' of the weakest section of the vessel is another factor. The consequences of an explosion can be extremely serious and industries are therefore often obliged to handle the risk in order to prevent human losses and major damages to the whole industrial plant.

” Firefly has been on our side since day one, we have worked with their team during the project definition to get the best ratio between risk management and CAPEX optimization. Firefly keeps our people safe while we concentrate on improving our performance standards in the alternative fuel industry.

NICOLAS AL HOUAYEK
Corporate Manager, Promotora Ambiental, S.A. de C.V.

THERE ARE SEVERAL METHODS TO HANDLE RISKS
Firefly offers all three levels



A UNIFIED PROTECTION SOLUTION

With the combination of Firefly's prevention, protection and mitigation solutions you can secure your complete process protection. Each safety solution is connected to one system platform; Firefly EXIMIO™.

The fire prevention platform has a modular and decentralized system architecture that gives you, as a Firefly customer, great flexibility. EXsolvo® explosion venting products are easily added to the existing system. If using burst sensors, the system user interface, IntuVision™, indicates status and product activation which enables you to monitor your explosion protection.



FIREFLY EXsolvo®

CERTIFIED EXPLOSION PROTECTION

Firefly's method for handling risks is taking a comprehensive approach to prevent, protect and mitigate fires and dust explosions. While our methods are science based we also rely on 50 years of experience and know-how of industrial fire and explosion safety globally.

With our explosion mitigation called Firefly EXsolvo®, Firefly offers a complete solution for your entire process.

EXsolvo® has the latest third party approvals and certifications according to ATEX:

INERIS 21ATEX0018X Ex II D
EN 16447 : 2014
EN 15089 : 2009

INERIS 21ATEX0019X
Ex II GD and Ex II 2 D
or
Ex II GD and Ex II 3 D
EN 16009:2011

INERIS 21ATEX0020X
Ex II GD
EN 14797 : 2006
EN 14491 : 2012
EN 14994 : 2007



PATENTED TRUE IR DETECTORS
Millisecond detection of hot particles, sparks and flames. Firefly's spark detectors are FM approved and insensitive to daylight.



FIREFLY FLAME DETECTORS
Fast-acting flame detectors, highly immune to external disturbances and designed to withstand tough industrial environments. Firefly Flame detectors are FM approved.



FULL-CONE WATER SPRAY EXTINGUISHING
Powerful extinguishing with a unique nozzle design and placement aimed to penetrate and cover the entire material flow. Activated within milliseconds after detection.



WATER MIST SUPPRESSION
Firefly low pressure Water Mist Suppression is efficient for suppression of flames in machines or in open areas with minimal water usage and quick reaction time.



EXsolvo® VENT PANELS
The vent panels are designed to evacuate the pressure in order to protect both the people and avoid total damage of the equipment.



EXsolvo® FLAMELESS VENTING
The Exsolvo Flameless is a fast and easy solution that vents the explosion without flame propagation or glowing particles that can hurt people or equipment in the surrounding area.



EXsolvo® ISOLATION VALVES
The Exsolvo isolation valve is an ATEX protective device equipped with a flap which will close under explosion overpressure to minimize the risk of propagation of the flame and explosion to other process parts.



A UNIFIED CONTROL SYSTEM
Enabling a good overview of all protected zones. Operators will control the system via IntuVision™, an intuitive user interface with a colour touch screen, which comes as a standard in every Firefly System.





FIREFLY EXsolvo® VENT PANELS

In the event of an explosion the vent panels are designed to evacuate the pressure in order to protect both the people and avoid total damage of the equipment.

The EXsolvo® explosion vent panels are suitable for all applications with low vacuum or working pressure (up to 50% of static burst pressure) such as elevators, conveyors, silos and cyclones.

KEY BENEFITS

- Always in stainless steel
- Multiple options and accessories
- Curved models for round vessels
- Multiple sizes and models
- Panels are tested with real life conditions, including curved panels
- Low Pstat pressures for fast opening
- Included Flanges with quality EPDM wide gaskets



Ask your Firefly representative for guidance on product sizes and customization.

FIREFLY EXsolvo® VENT PANELS

EXsolvo® EXV-x AND ITS CURVED VERSION EXV-C
These are explosion panels fitted with an integrated flange and a wide quality gasket bonded to the panel. The gasket insures the sealing of the weakening groove as well as the seal between the panel and the mounting flange.

Available shapes:
Square, Rectangular, Trapezoidal, Circular

STANDARD SPECIFICATIONS

Design : Single flat SST 304 L
EPDM foam gasket Temperature range: -40° to +80°C
Integrated flange in stainless steel 304L
Prepared for mounting of an EXA-S type burst sensor.



EXsolvo® Vent
EXV-x



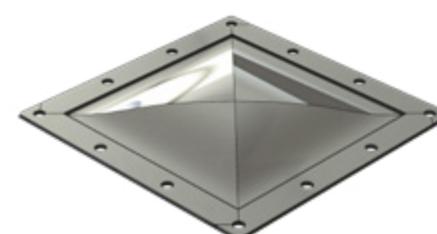
EXsolvo® Vent Curved
EXV-C

EXsolvo® DOMED OR MULTI-DOMED EXV-D EXPLOSION VENT PANELS C

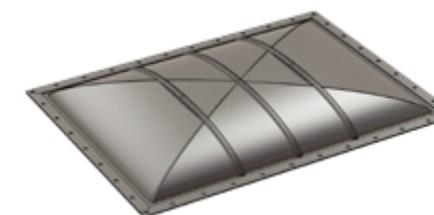
EXsolvo® domed or multi-domed EXV-D explosion vent panels has a vacuum resistance of 200 mbar. EXsolvo® domed or multi-domed high vacuum EXV-DHV explosion vent panels has a vacuum resistance of 800 mbar. The EXsolvo® domed panels are as standard fitted with an integrated flange and a wide gasket.

The gasket insures the sealing of the weakening groove as well as the seal between the panel and the mounting flange. The curved or multi-domed structure gives the panel a good resistance to negative pressure, which is necessary in processes with high vacuum.

Available shapes:
Square, Rectangular, Circular



EXsolvo® Vent Domed
EXV-D



EXsolvo® Vent Domed High Vacuum
EXV-DHV

EXsolvo® HIGH VACUUM EXV-HV AND
HIGH VACUUM CURVED EXV-HVC
These are flat explosion vent panels reinforced to be suitable for applications with high vacuum or working pressure (50 % of static burst pressure) such as cyclones,

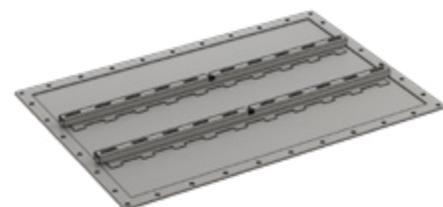
dust collectors. The EXV-HV and EXV-HVC panels are as standard fitted with an integrated flange. A wide gasket is bonded to the panel. The gasket insures the sealing of the weakening groove as well as the seal between the panel and the mounting flange.

EXSOLVO® HYGIENIC EXV-HY FLAT EXPLOSION VENT PANEL

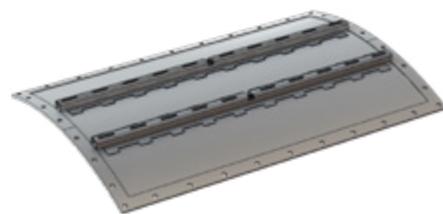
EXsolvo® Hygienic EXV-HY flat explosion vent panel are to be installed in Hygienic applications in food or pharmaceutical industries for example. The EXV-HY Hygienic panel comply with hygienic EHEDG design. It meets CIP/CIP cleanability requirements for nonremovable equipment for the food and pharmaceutical industries.



EXsolvo® Vent Hygienic
EXV-HY



EXsolvo® Vent High Vacuum
EXV-HV



EXsolvo® Vent High Vacuum Curved
EXV-HVC

FIREFLY EXsolvo® FLAMELESS VENTING

The EXsolvo® Flameless Venting consists of a housing with a flame arrestor and a standard internal mounted EXsolvo® Vent panel. It can be mounted both indoors and outdoors. The EXsolvo® Flameless Venting is a fast and easy solution that vents the explosion without flame propagation or glowing particles that can hurt people or equipment in the surrounding area.



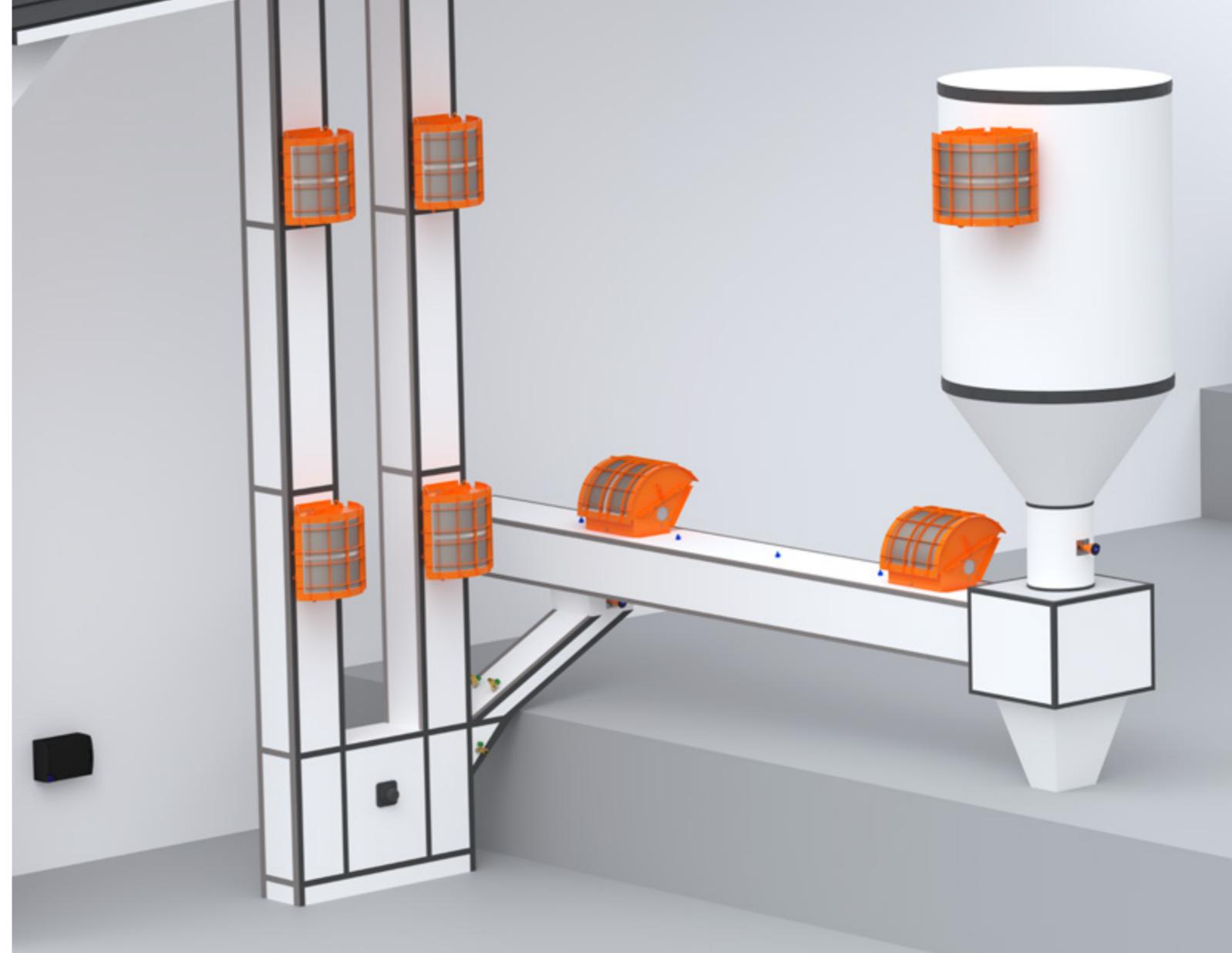
EXsolvo® Panel straight or domed is included

KEY BENEFITS

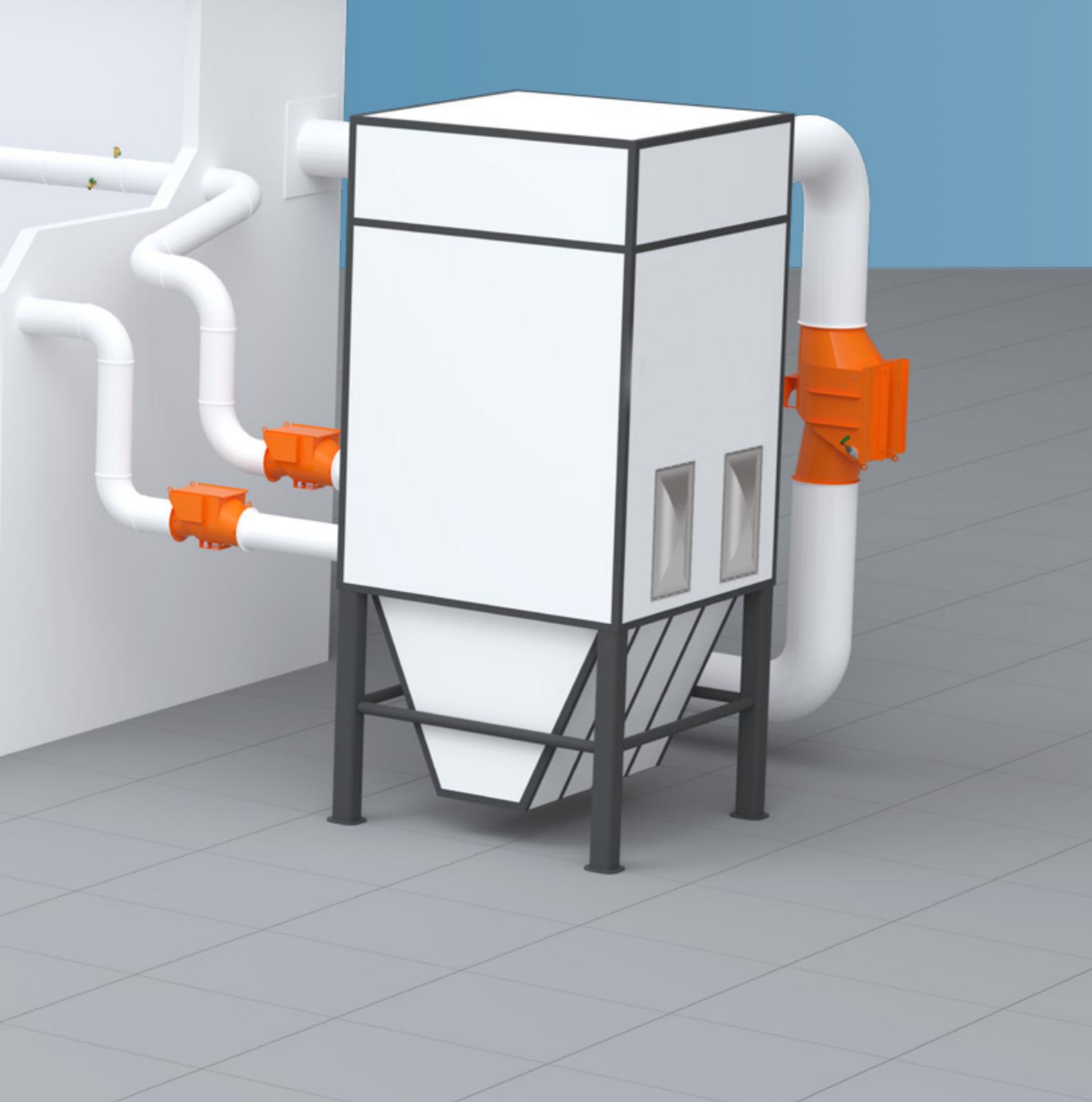
- Best cost-effective solution in the market
- Larger quench area that enables higher energy dissipation
- Access door for easier inspection of the EXsolvo® panel
- Inspection window in light weight versions
- Burst sensor included
- Multiple sizes
- Curved models suitable for round vessels

STANDARD CHARACTERISTICS

- Exsolvo flat or domed vent panel included
- Mild steel body + orange coating
- Stainless steel mesh 304L
- Silicon Gaskets for the flameless filter
- Burst sensor included
- Access door

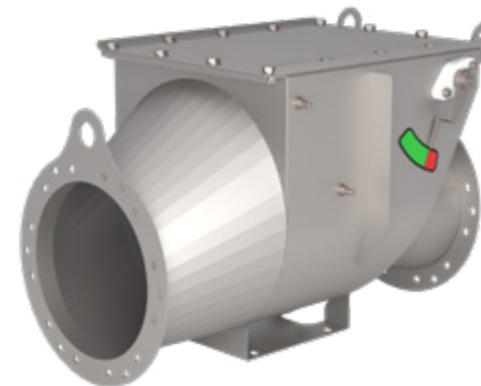


| MODEL | SHORT NAME | KST | PRED | PSTAT | ADDITIONALS |
|--|------------|---------|-----------------|----------------|-------------------|
| EXsolvo® Flameless | EXF-x | Max 500 | Pred ≤ 2,3 bar* | 0,1 to 0,3 bar | |
| EXsolvo® Flameless Light Weight | EXF-Lx | Max 500 | Pred ≤ 0,5 bar | 0,1 to 0,5 bar | Inspection window |
| EXsolvo® Flameless Hygienic | EXF-HYx | Max 500 | Pred ≤ 2,3 bar* | 0,1 to 0,3 bar | |
| EXsolvo® Flameless Hygienic Light Weight | EXF-LHYx | Max 500 | Pred ≤ 0,5 bar | 0,1 to 0,5 bar | Inspection window |



FIREFLY EXsolvo® ISOLATION VALVES

The EXsolvo® isolation valve is an ATEX protective device equipped with a flap which will close under explosion overpressure, and will lock in closed position to minimize the risk of propagation of the flame to other process parts.



Ask your Firefly representative for guidance on product sizes and customization.

KEY BENEFITS

- Certified for PUSH and PULL flow installations
- Unique design that avoids dust accumulation
- Design that enhances aerodynamics and significantly reduce pressure drop
- Possible to install in vertical or horizontal position
- Tested with real life conditions

STANDARD CHARACTERISTICS

- Body: Painted steel
- Flap: Round domed flap: Stainless steel
- Diameter: $\varnothing 160$ mm to $\varnothing 800$ mm
- EPDM Gasket: -30°C to $+70^{\circ}\text{C}$ / -22°F to 158°F
- Flanges: ISO and ANSI flanges design
- Inductive Sensor: Non ATEX closing indication sensors in case of explosion or overpressure

ABOUT FIREFLY

Firefly is a Swedish company that provides industrial fire prevention and protection systems to the process industries worldwide. Since 1973, Firefly has specialized in creating customized system solutions of the highest technical standards and quality. Based on customer needs and research, Firefly has developed and patented products and solutions, creating a unique portfolio of innovative products and system solutions to increase the level of safety and production output.

The Firefly quality management system is certified according to ISO 9001 and EN ISO/IEC 80079-34. Firefly's products hold national and international third-party certifications through FMG, VdS, CSA, DNV, LCIE Bureau Veritas, Delta, and RISE among others.

For more information on our certifications and approvals, please visit: www.firefly.se/about-us/certifications-approvals/

Please contact us if you have questions about fire and explosion risks within your process, our fire preventive and protection team will be happy to share their knowledge and experience.

AS A FIREFLY CUSTOMER YOU RECEIVE



A partnership with our fire prevention teams around the world.



Technical innovation in fire prevention and protection.



Digital progression based on robust safety systems.



Fire prevention and protection through certified technology.

JOIN THE FIREFLY CIRCLE OF SAFETY



The Firefly Circle of Safety

WE HAVE FIREFLY USERS FROM MULTIPLE INDUSTRIES ALL OVER THE WORLD



Firefly users in over 80 countries



■ Firefly users

Firefly's products are available with the following certifications and approvals:



For information on the certifications and approvals each product holds please visit:

www.firefly.se/about-us/certifications-approvals/



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