Flameless Explosion Venting Device
Manual Instruction

Model Number: FEVDS135

Dongguan Villo Environmental Protection Inc.

Contents

1 Important Warning

- **Misuse may lead to dust explosion accidents, resulting in casualties and property losses!**
- **Ensure that the explosivity of process dust on site is not higher than the applicable dust specified in the product, including explosive power and ignition sensitivity!**
- **Ensure that the total effective pressure relief area of the product is not less than the required pressure relief area of the protected container!**
- **Ensure that the maximum explosion relief pressure is not higher than the specified value of this product!**
- **Warning signs should be set up in dangerous areas outside this product to restrict the entry of personnel, and no combustibles should be placed!**

2 Working Principle

Flameless explosion venting device, also known as flameless pressure relief device or flameless pressure relief valve, which is a kind of protection device that can be used for indoor dust explosion pressure relief. The unique screen structure can effectively extinguish the flame released by the explosion and reduce the temperature of the airflow and dust, so as to achieve the purpose of safe explosion.

The Flameless explosion venting device is composed of a pressure relief component and a fire extinguishing component. Pressure relief components usually use blasting plates (also known as venting rupture discs, rupture discs or rupture discs, etc.), and select the appropriate pressure relief area and static opening pressure according to site conditions or process requirements. In the hazardous area of flammable dust explosion in the industry and trade industry, the static opening pressure is usually 0.01 MPa (ie 0.1 bar, or 0.1 kg). The fire extinguishing element is usually a porous multi-layer structure with a large surface area, which not only reduces the flame temperature by heat absorption, but also captures dust to achieve the effect of extinguishing fire.

Optional accessories for flameless explosion relief include back pressure support and explosion sensor, the back pressure support device is installed between the venting piece and the protected container to prevent damage of the venting piece that caused by negative pressure inside the container.

The venting detector is a detecting device mounted on the venting piece for detecting whether the venting piece is open.

3 Performance Parameter

Table 1. Performance parameter of Flameless explosion venting device

Function	Parameter
Model	FEVDS135
Static cracking pressure	Relevant to the selection of pressure relief components, standard static cracking pressure p_{stat} of this product =0.01MPa±25%
Maximum relief pressure	$p_{red,max}$≤0.0451MPa
Pressure relief efficiency	66%
Flameless performance	No Mars or Flames
Re-usability	Not reusable
Installation location	No combustibles within 4 meters of the vicinity, restricted access, with warning signs
Applicable technology	Oxygen content is not higher than that in air (21%); working pressure is not higher than one atmospheric pressure (0.1 MPa)
Applicable dust	Category: Non-metallic Dust for Air Supply in Combustion Maximum explosion pressure: Pmax < 0.73 MPa Explosion index: KSt < 28.77MPa.m/s Explosion grade: <St2
Optional accessories	Back pressure support device, explosion relief detector
Consumables	Blasting Plate (venting rupture disc)
Product execution standards	GB/T15605 Dust explosion pressure relief guide, EN16009 Flameless explosion venting devices
Test report	Pass the certification of the third party authority in China

4 Product Specifications

Table2. Product specifications of Flameless explosion venting device

Specifications（mm）	Geometric relief area（m^2）	Peripheral length（mm）	Bolt midline（mm）	Bolt hole		Weight（kg）
				Number	Diameter（mm）	
310*240	0.074	400*335	375*300	18	12	28
410*240	0.098	500*335	470*300	20	12	32
410*310	0.127	500*400	470*375	22	12	44
410*410	0.168	500*500	470*470	24	12	58
580*410	0.238	670*500	640*470	28	12	68
690*690	0.476	800*800	750*750	20	12	120
910*410	0.373	1000*500	970*470	36	12	82
910*580	0.528	1000*670	970*640	40	12	110
840*840	0.706	950*950	900*900	36	12	162
1090*690	0.752	1200*800	1150*750	26	12	146
910*910	0.828	1000*1000	970*970	48	12	178

Note: Other specifications and sizes can be customized

5 Installation and Maintenance

5.1 Installation requirements

1. This product is a non-integrated Flameless explosion venting device. Fire extinguishing elements should be used in conjunction with pressure relief elements and installed outside the protected container. The installation schematic diagram is shown in Figure 1. The installation sequence from inside to outside:

According to the working condition, it can also be integrated with the installation flange.

The text on the sign is directed towards the pressure relief device of flameless explosion. The uncut side is installed under the hanger ring of the flameless pressure relief device.

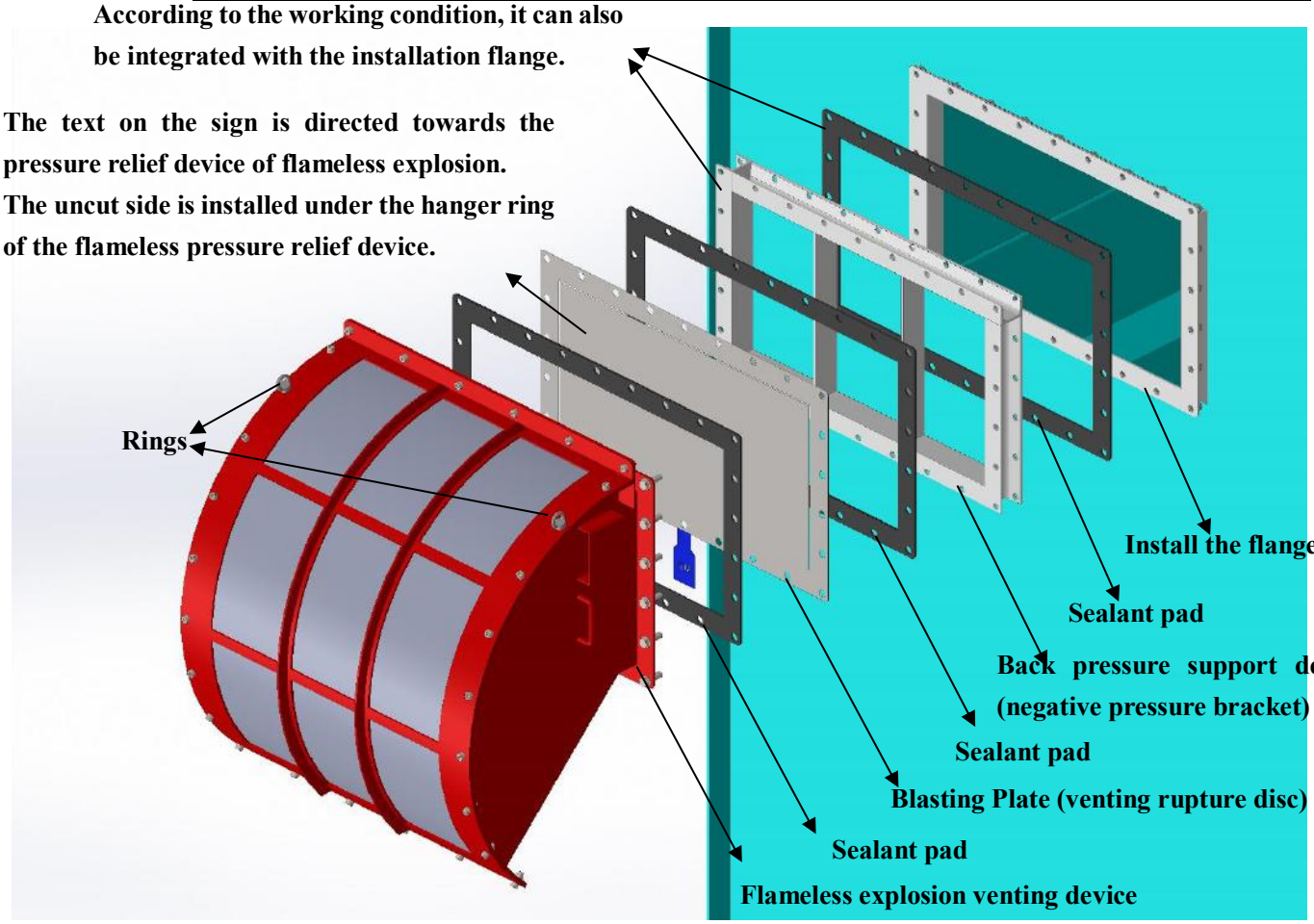

Chart 1 Installation Diagram

—— Install flange and weld with protected container.

——Sealant cushion and back pressure bracket (negative pressure bracket) can be selected according to working conditions, and can also be integrated with installation flange. They are generally used in renovation projects (for example, flanges have been installed, but negative pressure brackets need to be re-installed);

—— Sealant pad and Blasting Plate(venting rupture disc), the label text of bursting disc shall face to the Flameless explosion venting device, and the unsealed side shall be installed under the lifting ring of flameless pressure relief device;

—— Sealing pad and pressure relief device without flame explosion.

2. Pressure relief design of protected container should be carried out before installation, and pressure relief design document should be archived. The pressure relief design shall include the followings:

—— The structure size, strength and position of the protected container (indoor or outdoor);

——The parameters of dust explosivity in the protected container include maximum explosion pressure p_{max}, explosion index K_{St}, minimum ignition energy of dust cloud MIE and minimum ignition temperature of dust cloud MIT .

—— Maximum relief pressure $p_{red,max}$;

—— The required relief area and basis;

—— Number of pressure relief devices.

3. Before installation, ensure that the product is a completely new product that has not been used and has not undergone explosion and pressure relief.

4. Bolts of strength not less than 8.8 should be used in installation. Violent loading and unloading are strictly prohibited.

5. This product is only for indoor installation and use. There should be no covering on the surface of the product.

6. The size of the pressure relief port of the protected container shall be the same as the nominal size of the product.

7. When using back-pressure support device, the effective relief area should be subtracted from the relief area covered by the support device.

5.2 Requirements for Use and Maintenance

1. Periodically review the breakage of pressure relief components (blasting discs), and the inspection period should be no more than 1 month.

2. Check regularly whether the fire extinguishing components are blocked or not, and the inspection period should be no more than 1 month.

3. If the pressure relief components are found to be damaged, they should be replaced immediately after shutdown. In the process of replacement, ensure that no residual dust or effective ignition source.

4. This product is a non-reusable product. It should be repaired or replaced immediately after explosion and pressure relief. Users should not open the pressure plate privately. If the anti-theft bolt on the pressure plate is damaged, it will not be guaranteed and the function of the product will not be guaranteed.

6 Appendix Functional Test Reports

Test Report

Report code：Villo&envsafeFevd-20181113-1

Entrust organization	Villo Envsafe Environmental Safety Research Institute(Suzhou) Co., Ltd	**Address**	26-1, No.52 Huoju Road, Huqiu District, SuzhouSuzhou F3, GH Plant, New Area Science and Technology Industrial Park Co., Ltd.
Manufacturer	Villo Envsafe Environmental Safety Research Institute(Suzhou) Co., Ltd	**Address**	26-1, No.52 Huoju Road, Huqiu District, SuzhouSuzhou F3, GH Plant, New Area Science and Technology Industrial Park Co., Ltd.
Model	FEVDS135	**Specs**	580×410
Sample source	☑Sample sending □Sampling	**Sample Quantity**	1set of mainframe, 3set of screen meshes
Production date	Oct.13rd, 2018	**Manufacturing No.**	FEVDS135-580*410-20181013-1
Re-usability	Not reusable	**Drawing No.**	HY-W5841-00
Test location, condition	Test location: Northeast University experimental base Environment temperature：1~10 ℃ Relative humidity：39~44%		
Test date	Nov.13rd, 2018		
Test basis	EN 14797-2006 Explosion venting devices EN 16009-2011 Flameless explosion venting devices		
Test items	Flameless performance, pressure relief efficiency, environmental impact		
Testers	Miao Nan, Chen Ran, Xing Yu		
Test reviewer	Zhong Shengjun		
Test conclusion	**The test item is qualified, and the performance is as follows:** ● **Flame free performance: no Mars or flame emission, no secondary explosion** ● **Geometric pressure relief area: 0.41 × 0.58 = 0.2378m^2** ● **Pressure relief efficiency: 66%** ● **Maximum temperature of external surface after pressure relief: 105 ℃** ● **Instantaneous maximum temperature of pressure relief cloud: 158 ℃** ● **Estimated cloud size: 4 × 2 × 3m (length × width × height)** Northeast University（stamp） Date：11/20/2018		
Remark	Test condition: Test vessel volume 1m^3; Dust explosion grade St2; Dust explosion index K_{St}=28.77MPa·m/s; Static opening pressure of pressure relief element p_{stat}=0.01MPa±25% ● Dust density：500g/m^3 ● Dust density：250g/m^3 ● Dust density：100g/m^3		

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