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TECHNICAL GUIDE

Selecting the correct explosion panel

Successful venting of an enclosure during deflagration is essential to the safety of all concerned. Providing an adequate vent area is one of the most important factors to be considered when sizing the vent area of an enclosure. The NFPA (National Fire Protection Association) has provided standards and proper sizing equations for relief areas for enclosures. This technical guide provides an overview of NFPA guidance, key definitions and a list of factors to consider when selecting and sizing an explosion panel.

NFPA GUIDANCE

NFPA 68, Sec. 2-2.6: "Deflagration venting is one means of controlling damage. By releasing expanding gases through an opening engineered for that purpose, it is possible to maintain a reduced maximum pressure (Pred) that is below that which would cause unacceptable damage."

NFPA 68, Sec. 1-1.2: "The choice of the most effective and reliable means for explosion control should be based on an evaluation that includes the specific hazard and objectives for protection."

Many of the applications for rupture panels and the venting of enclosures occur in the processing of grain and the associated dust. Grain dust is a highly explosive media and a natural occurrence in the pneumatic handling and conveying of grain.

NFPA 61 Bulletin *Standards for the Prevention of Fires and Dust Explosions in Agricultural and Food Products Facilities* provides guidelines for Starch, Grain Elevators, Feed Mills, and Agricultural Commodities.

DEFINITIONS

- **Deflagration:** A flame front propagating through unburned media less than the speed of sound (subsonic velocity).
- **Detonation:** A flame front propagating through unburned media greater than the speed of sound (sonic velocity).
- **Explosion:** A point after detonation occurs where the internal pressure exceeds the ultimate strength of the enclosure.
- **Pmax:** The maximum internal pressure which the enclosure can sustain.
- **Pred:** The maximum allowable internal pressure the enclosure will experience during a vented deflagration.
- **Pstat:** The designed pressure that the explosion panel opens and venting begins.
- **Explosion panel:** A pressure and temperature sensitive membrane designed to rupture at a predetermined pressure and temperature. Also known as an explosion vent, rupture panel or vent panel.

Selecting an explosion panel

The advantages of using explosion panels over other methods of venting are their economical cost and the fact they provide a leak-tight seal until activation.

Factors to consider when selecting an explosion panel for your facility include the following:

- Dust type or gas type / composition
- Dust Kst value
- Curved or flat surface
- Normal operating temperature
- Maximum temperature
- Nominal working pressure
- Rupture pressure required (Pstat)
- Static or cycling application
- Location of the vent (indoors or outdoors)
- New or retrofit application
- Are vacuum conditions ever present?
- Ideal construction material for the explosion panel
- Duct length
- Volume of vessel or area to be protected
- Vent area required - support is available for calculating this, please contact our engineers for further information.

OE'S PRODUCT LINE

OsecoElfab's explosion panels are dependable and efficient. The composite construction provides strength for static and high vacuum applications. We use laser scoring technology to achieve precision, dependability and repeatability in establishing set rupture pressures. The finished product is a pressure sensitive rupture panel that is accurate, dependable and provides rapid response venting in the event of deflagration. Features and options of an OE explosion panel include:

- Leak-tight seal
- Standard & special sizes
- Minimal or zero fragmentation
- Flat or crowned design
- Broad range or materials available
- Welded or bolted frames
- Square, rectangle, round and custom shapes available
- Insulated panels for elevated temperatures
- Rapid opening
- Maximum vent area
- Cycling or static service
- Test certifications
- Emergency service
- Complete in-house manufacturing

COMMON APPLICATIONS

- Dust Collectors & Arrestors
- Bucket & Drag Conveyors
- Blenders
- Mixers
- Crushers
- Grinders
- Pulverisers
- Driers
- Ovens & Furnaces
- Ducts
- Bins
- Silos
- Grain Elevators
- ... Any application where deflagrations are possible

OsecoElfab's explosion protection engineers are experts in using the industry standards and equations to consider all necessary variables when sizing an explosion panel for your applications.

Contact us today for a no obligation discussion of explosion protection for your facility or project.

Let us help you with all your explosion protection questions.

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