VIGILEX ENERGY®
By STIF

FIRE AND EXPLOSION PROTECTION FOR BESS

(Battery Energy Storage System)

STIF
components for your success

English

STIF is a French company based in Maine et Loire and is the leading manufacturer of metallic components in the bulk product handling industry.

In 2009 the **VIGILEX** division was formed to specialize in passive protection solutions for dust explosions, primarily using deflagration vents, flame arresters, and non-return valves.

Innovation, which is the company's DNA, has enabled the **VIGILEX** division to experience rapid development in recent years for the **EXPLOSION PROTECTION** sector.

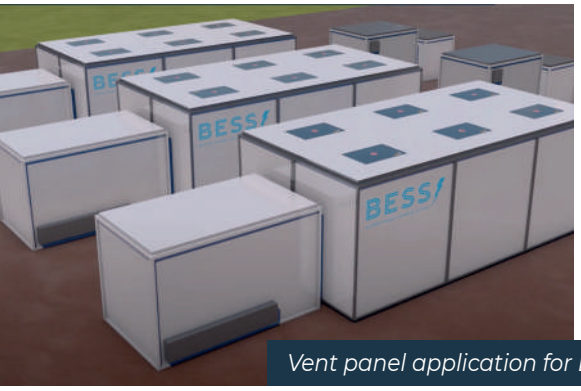
Constant monitoring of potential markets has led **STIF** to design solutions to protect against explosions and fires for **Battery Energy Storage Systems (BESS)**.

To engage as close as possible to **BESS** customers and provide them with a range of products adapted for their unique specifications, **STIF** created an additional division specifically for this market called:

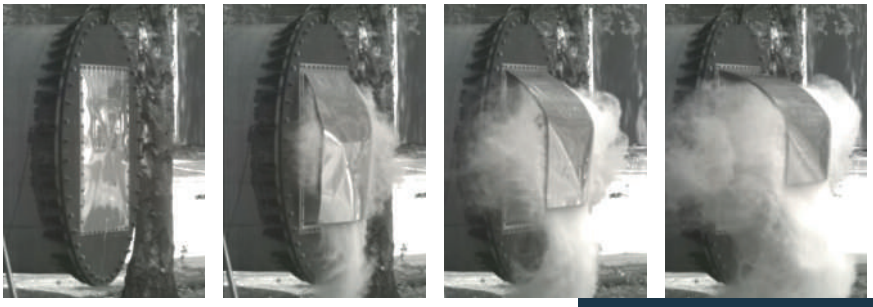
VIGILEX ENERGY

In this catalog you will find solutions to effectively protect **Battery Energy Storage Containers (BESS)** from explosions and fires.

We also can customize products based on customer applications.



Vent panel application for BESS



Explosion test on vent panel

BESS market:

Battery Energy Storage Systems (BESS) have become, in a few years, an unparalleled solution to remedy the intermittency of certain renewable energies, such as wind farms and photovoltaic solar panel farms.

Indeed, these battery systems (often Lithium-ion) make it possible, for several hours, to supply the electrical network, by acting as a relay, even when renewable energies are not active.

Like any system, it is necessary to protect and limit the risks of explosions and fires that may be caused by thermal runaway of the batteries.

THIS IS WHERE VIGILEX ENERGY COMES IN BY OFFERING YOU ITS EXPERTISE IN:

- The sizing of the necessary deflagration vents.
- Understanding and applying the standards in force.
- Technical support, the possibility of joint studies, research and tests in order to achieve the product you are looking for.
- A large choice of solutions including completely waterproof IP67 products, or a double action product (DUAL-VENT page 8) which will either release the gases at first stage of the thermal runaway or open to release the pressure of the explosion and keep the integrity of the container intact.
- Global coverage with factories in France (Europe), China (Asia) and USA.

www.vigilexenergy.com

UL 50E GASKETS APPROVED

VIGILEX ENERGY PRODUCTS

NFPA 855 v2023:

The development of BESS throughout the world has led to the occurrence of accidents resulting in electrochemical fires sometimes accompanied by explosions.

The **NFPA 855** standard, which is the standard for the Installation of Stationary Energy Storage System provides the minimum requirements for mitigating the hazards associated with **ESS**.

The **NFPA 855** has been revised in 2023, in order to better mitigate the risks of explosion and fire.

The extract of the standard (right) shows very clearly that from now each **ESS** should include deflagration panels:

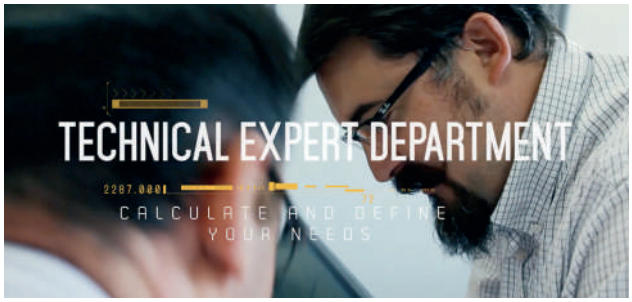
EXTRACT standard NFPA 855 v2023

9.6.5.6.3 ESS installed within a room, buiding, **ESS** cabinet, **ESS** walk-in unit, or otherwise nonoccupiable enclosure shall be provided with one of the following:

(1) Explosion prevention systems designed, installed, operated, maintained, and tested in accordance with **NFPA 69**

(2) Deflagration venting installed and maintained in accordance with **NFPA 68**

TABLE OF CONTENTS



Explosion Risk in BESS : THERMAL RUNAWAY

A **thermal runaway** is a phenomenon of chain reactions that is often uncontrollable, and which can lead to the explosion of the **BESS**.

It produces an exothermic reaction, which generates a strong production of heat **(up to 1000°C in certain cases)**and releases a high production of flammable gases such as hydrogen, as well as those of toxic fumes.

The power of a thermal runaway depends on the battery chemistry used, and its SOC (state of charge).

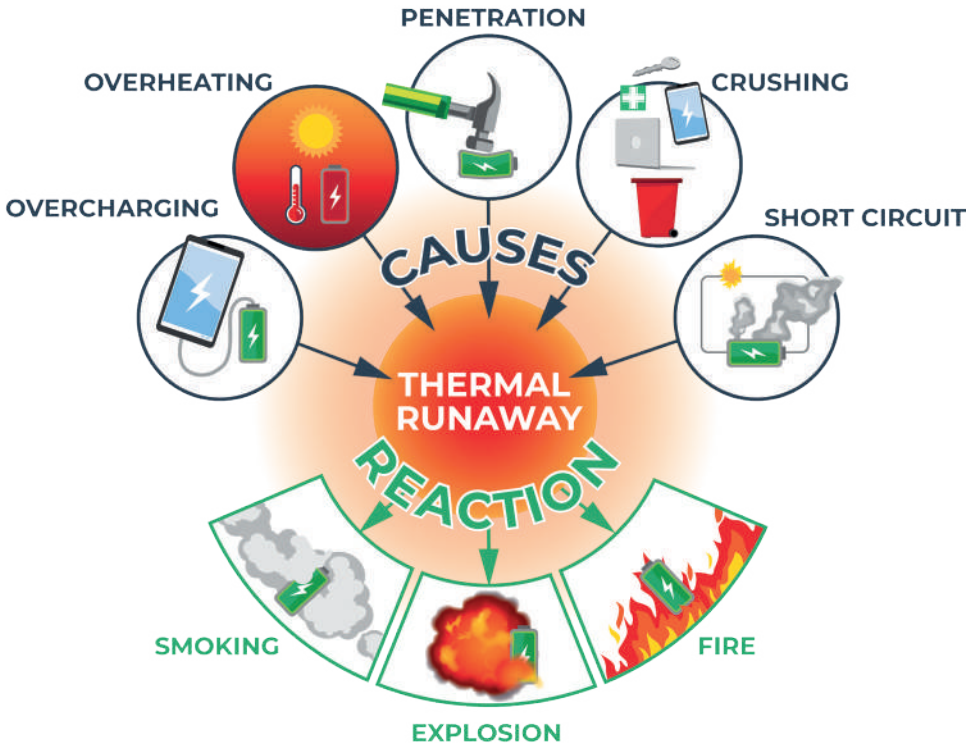
During thermal runaway, heat from the faulty cell can cause adjacent cells to fail and trigger the chain reaction that will spread throughout the battery and can quickly destroy the entire battery energy storage system along with nearby equipment.

THE CAUSES OF TRIGGERING OF THIS EVENT CAN BE MULTIPLE:

Manufacturing defect of the cell, mechanical abuse such as crash or penetration, electrical abuse such as overloading or short circuit of the cell, thermal abuse related to the excessive temperature of the thermal runaway.

The severity of the risks associated to thermal runaway show the importance of implementing measures to **mitigate** the risks of **explosion and fire**, such as the use of explosion-proof panels.

Detecting and releasing flammable gases are two measures discussed in **NFPA 855 2023**.



BESS Explosion

BESS Fire

ARC-VENT®

APPLICATIONS

The new **ARC-VENT** is designed for installation in external walls of electrical switch rooms and in **BESS (Battery Energy Storage Systems)** to relieve overpressure caused by explosions due to arc flash or gas explosion.

These safety elements are certified and tested to open at the required pressure. They are generally installed on the roof of **BESS** containers to safely direct the explosion upwards and thus protect property and people. The **ARC-VENT** blast panel are **IP65** and **ATEX EN 14994** certified.

STANDARD CHARACTERISTICS

- Design: Single layer SST 304 L
- **Grey silicone gasket UL 50 E - UL157** (-55 °C +200°C)
- Flange + gasket included
- No water retention and vibration resistant system

OPTIONS

- Grey Silicone
- White Silicone (-60 °C +200°C)
- Black EPDM Gasket (-40°C +80°C)
- Flat Grid
- Inductive Burst Sensor

CERTIFICATIONS

Ex II GD

EN 14 994
EN 14 797
EN 1127.1

IP65

NF EN ISO 9227 : 2012
NF EN 10289 : 1999

EU Certificate : *INERIS 15ATEX0001X*

Production quality assurance notification : *INERIS 08ATEXQ406*

According to *NFPA 68*

TECHNICAL INFORMATION

STIF MODEL	Pstat @ 22 °C	EFFICIENCY RATIO	EXTERNAL WEIGHT RESISTANCE
ARC-VENT	100 ≤ Pstat ≤ 500 (±15%) Pstat < 100 (±20%)	80 % - 100 %	500 kg/m²
ARC-VENT INS⁻	100 ≤ Pstat ≤ 500 (±15%) Pstat < 100 (±20%)	80 % - 100 %	500 kg/m²
ARC-VENT INS⁺	200 < Pstat ≤ 500 (±20%) Pstat ≤ 200 (±25%)	80 % - 100 %	1000 kg/m²

ARC-VENT INS⊕ ARC-VENT INS⊖

APPLICATIONS

The new **ARC-VENT INS+** and the new **ARC-VENT INS–** are designed for installation in external walls and electrical switch rooms and in **BESS (Battery Energy Storage Systems)** to relieve overpressure caused by explosions due to arc flash or gas explosion. These safety elments are certified and tested to open at the required pressu. They are generally installed on the roof of **BESS** containers to safely direct the explosion upwards and thus protect property and people. The **ARC-VENT INS+** and **ARC-VENT INS–** blasts panels are **IP65** and **ATEX EN 14994 certified**.

ARC-VENT INS+

Insulation protection above the vent panel (Exterior insulation)

ARC-VENT INS–

Insulation protection below the vent panel (Internal insulation)

STANDARD CHARACTERISTICS

- Design: Single layer SST 304L
- **Grey silicone gasket UL 50 E - UL157** (-55 °C +200°C)
- Flange with gasket included
- Insulation protection (above position) **INS+**
- Insulation protection (below position) **INS–**
- No water retention and vibration restant system

OPTIONS

- Grey Silicone
- White Silicone (-60 °C +200°C)
- Black EPDM Gasket (-40°C +80°C)
- Flat Grid (not for INS-)
- Inductive Burst Sensor

INS+ : POSSIBLE UPGRADE TO IP67
(Please contact our Technical Department)

CERTIFICATIONS

Ex II GD

IP65

EN 14994
EN 14797
EN 1127.1

NF EN ISO 9227: 2012
NF EN 8993: 2010
NF EN 10289: 1999

EU Certificate: *INERIS 15ATEX0001X*

Production quality assurance notification: *INERIS 08ATEXQ406*

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TECHNICAL INFORMATION

STIF MODEL	Pstat@22 °C	EFFICIENCY RATIO	EXTERNAL WEIGHT RESISTANCE
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EXPLESS® IP67

APPLICATIONS

The first explosion vent on the market to be IP67 rated. Its very special design, which incorporates a seal over the entire surface of the panel, has enabled the **EXPLESS** panel (patent pending) to meet the demanding tests allowing IP67 certification with, in particular, **resistance under 1.0 meters of water for more than 30 minutes**.

Installed on the roof of the **BESS**, it provides perfect sealing for a lifespan of at least 20 years.

STANDARD CHARACTERISTICS

- Design: Single flat SST 304 L
- **Grey silicone gasket UL 50 E - UL157** (-55 °C +200°C)
- Flange with gasket included
- No water retention
- Vibration resistant system

OPTIONS

- Grey Silicone
- White Silicone (-60 °C +200°C)
- Black EPDM Gasket (-40°C +80°C)
- Flat Grid
- Inductive Burst Sensor

CERTIFICATIONS

Ex II GD

EN 14 994
EN 14 797
EN 1127.1

IP67

NF EN ISO 9227: 2012
NF EN 10289: 1999

EU Certificate: *INERIS 15ATEX0001X*

Production quality assurance notification: *INERIS 08ATEXQ406*

According to *NFPA 68*

TECHNICAL INFORMATION

STIF MODEL	Pstat @ 22 °C	EFFICIENCY RATIO	EXTERNAL WEIGHT RESISTANCE
ARC-VENT	100 ≤ Pstat ≤ 500 (±15%) Pstat < 100 (±20%)	80 % - 100 %	500 kg/m²
ARC-VENT INS⁻	100 ≤ Pstat ≤ 500 (±15%) Pstat < 100 (±20%)	80 % - 100 %	500 kg/m²
ARC-VENT INS⁺	200 < Pstat ≤ 500 (±20%) Pstat ≤ 200 (±25%)	80 % - 100 %	1000 kg/m²

DUAL-VENT®

DOUBLE ACTION Product

APPLICATIONS

The greatest danger in a **BESS** is to have a thermal runaway due to a faulty battery. A single defective battery cell is enough to create a thermal runaway which can either result in a very severe uncontrolled fire or an explosion.

Fire extinguishing systems typically installed in **BESS** are not sufficient to protect against the phenomenon of thermal runaway.

Several expert reports demonstrate this very well.

It is imperative to "ventilate" the **BESS** sufficiently when a flammable gas is detected or during an explosion.

The **DUAL-VENT** precisely meets this need, with its ability to operate in both situations.

A VENTING BY GAS DETECTION

One of the ways to reduce hazards due to thermal runaway is to detect gas escaping from defective batteries early in the process with the help of suitable gas detectors.

Our **DUAL-VENT** solution allows us to activate the opening of our vent following the detection of these gases.

Following this opening, the ventilation of flammable gases to the outside will considerably reduce the risk of fire and explosion.

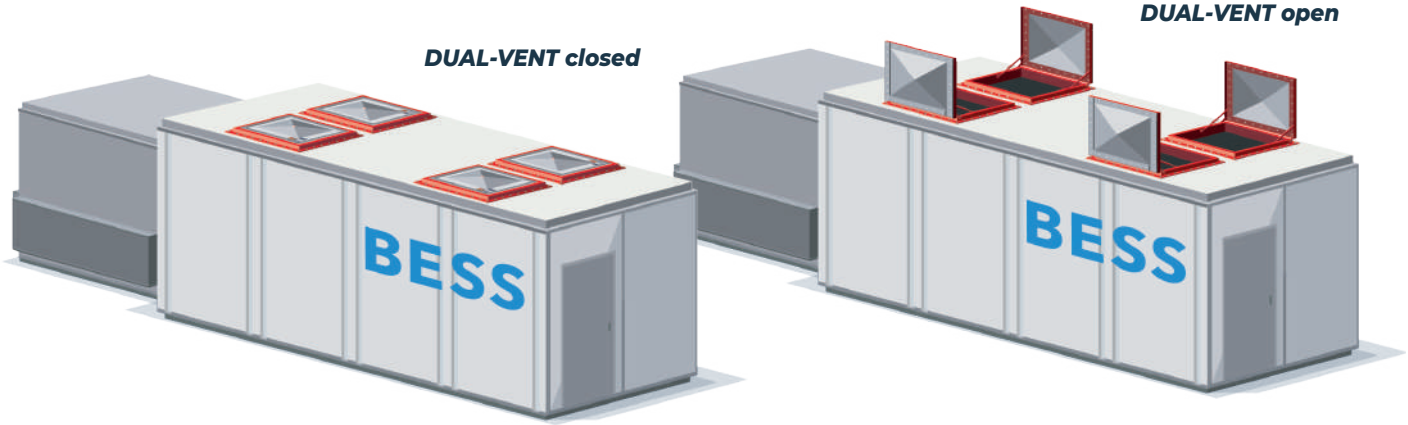
This protection meets the NFPA69 standard

B VENTING AFTER EXPLOSION

In the event that a thermal runaway cannot be controlled and the process turns into an explosion, the **DUAL-VENT**, which is dynamically tested and has a certified explosion vent, will open due to the overpressure created by the explosion.

This protection meets the NFPA68 standard

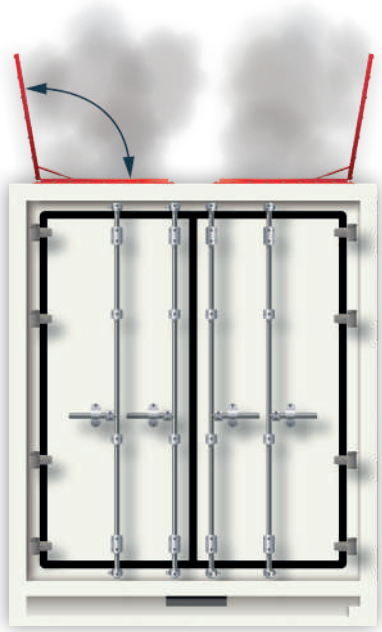
3 DIFFERENT OPENING SETTINGS : 14°, 30° OR 90°



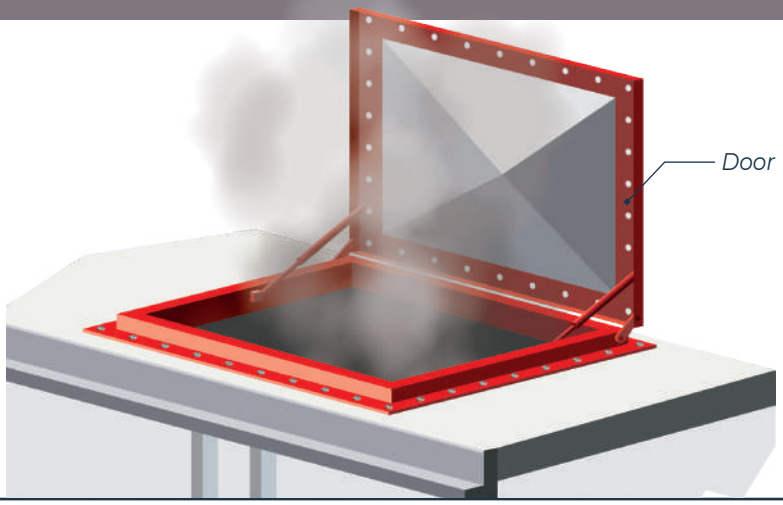
VIGILEX ENERGY® STIF

A GAS VENTING

NFPA® 69

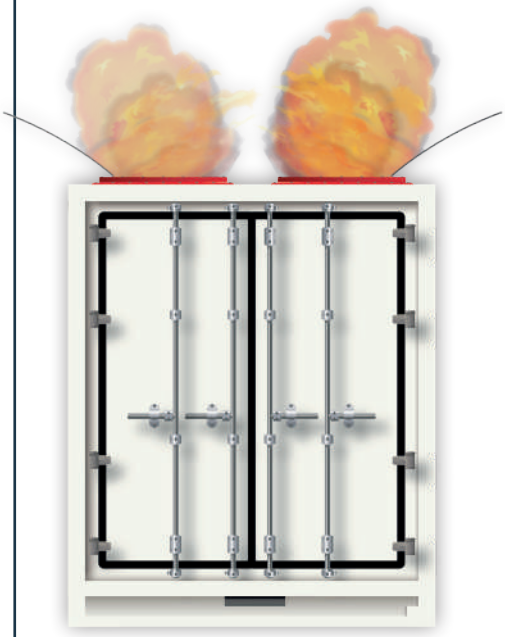


Door activated by gas detection

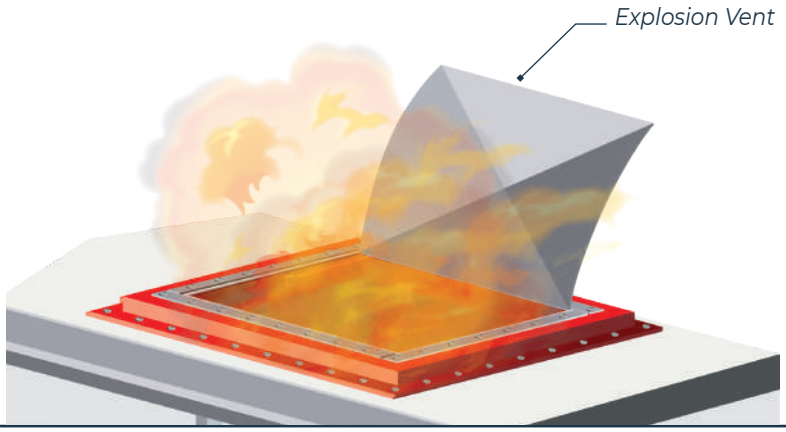


B EXPLOSION VENTING

NFPA® 68



Integrated vent panel activated by explosion pressure



The **DUAL-VENT** is definitely the solution to reduce the risks and consequences of the thermal runaway of the **BESS**. It is the only product on the market to meet both **NFPA 68 and 69** standards. It is a very reasonable and competitive investment compared to inefficient alternative systems.

DEFLECTOR VIGI*SPACE*®

APPLICATIONS

in case it is not possible to locate the explosion vents on the roof of the **BESS**. The ideal solution is to use **VIGISPACE**, as a deflector that can be placed on the walls of the **BESS**.

The vent is placed first, then the deflector is mounted.

In the event of an explosion, the opening of the vent will be limited on the deflector and the fireball will be directed upwards.

It should be noted that there is a lower efficiency of the system than positioning on the roof and that it will therefore be necessary to install additional or larger panels on the walls.

The **VIGISPACE** is a product tested and certified for explosions.

CERTIFICATIONS

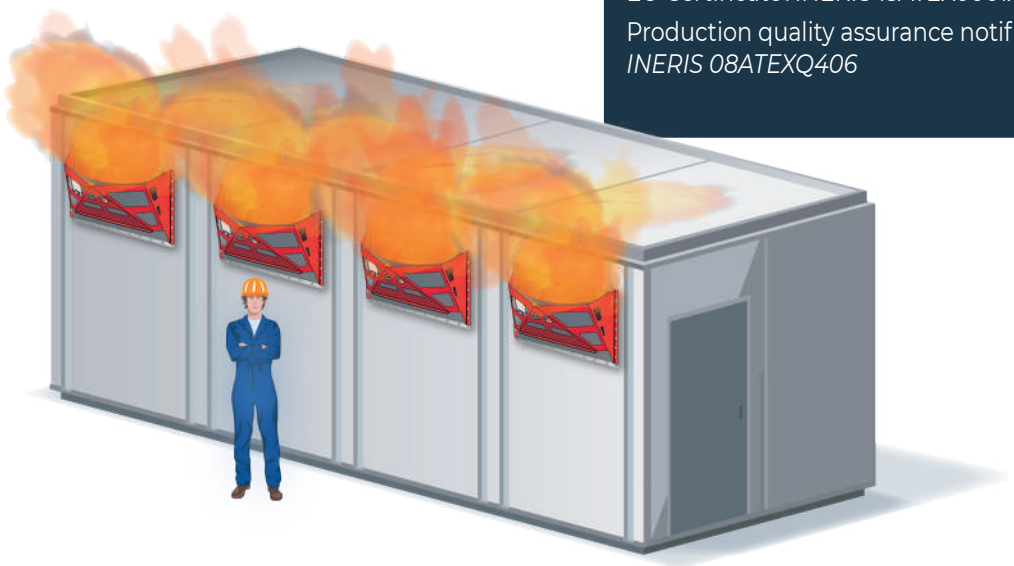
Ex II D

EN 14 491
EN 14 797

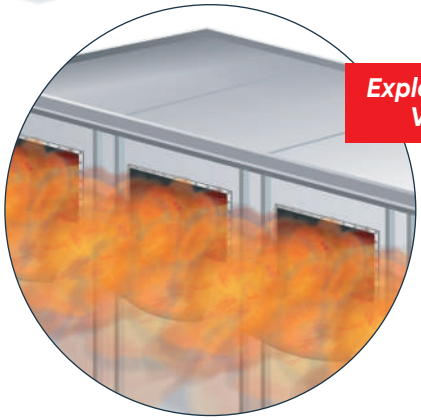
EU Certificate: *INERIS 15ATEX0001X*

Production quality assurance notification: *INERIS 08ATEXQ406*

Vigispace for BESS



Explosion with VIGISPACE



Explosion without VIGISPACE

DUAL-VENT® + VIGISPACE®

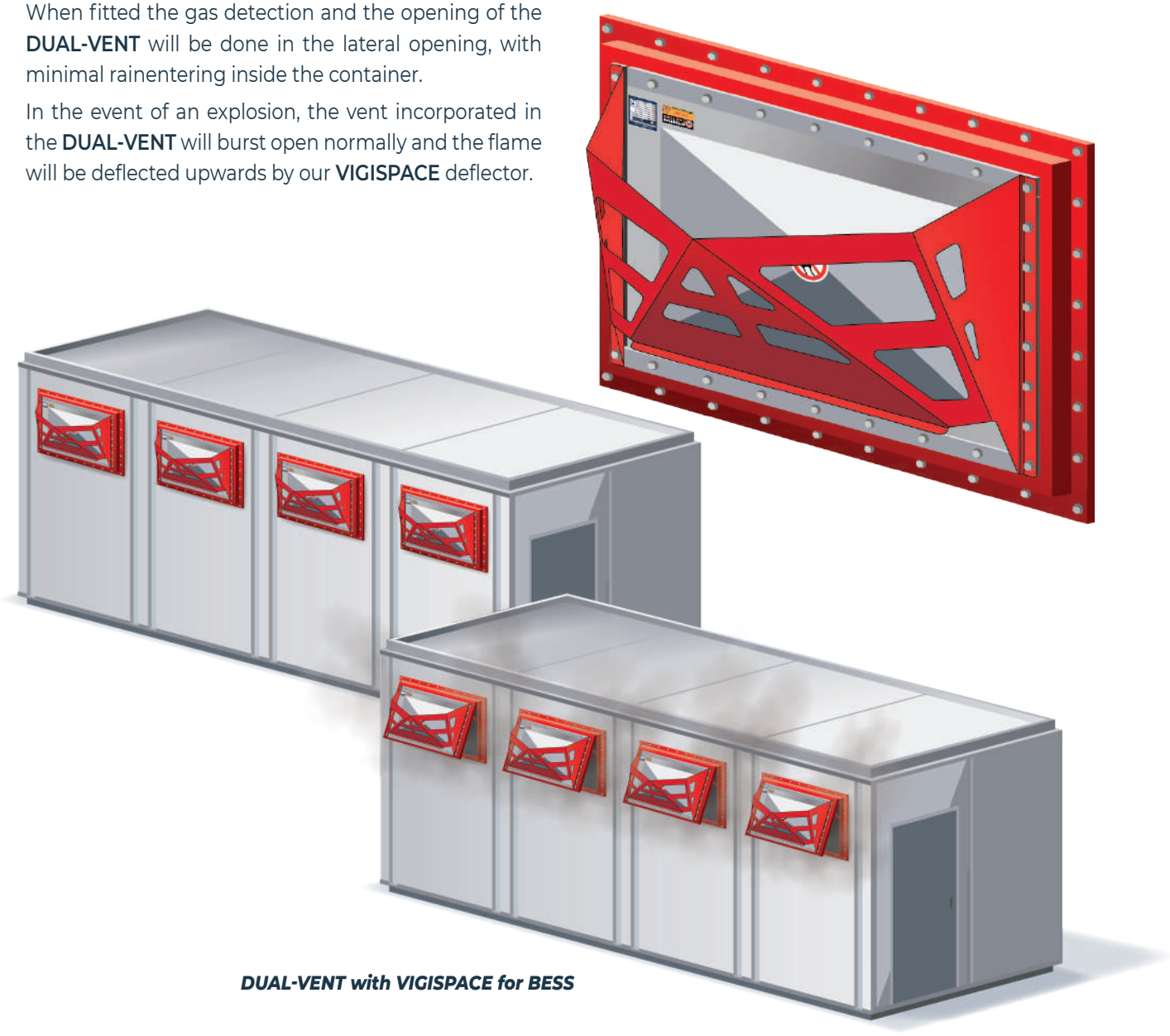
The innovative combination of our DUAL-VENT solution (opening with gas detection + blast panel) with our VIGISPACE certified deflector.

APPLICATIONS

In order to minimize the risk of ingress of rainwater inside the **BESS**, consider our **DUAL-VENT + VIGISPACE** solution.

When fitted the gas detection and the opening of the **DUAL-VENT** will be done in the lateral opening, with minimal rainentering inside the container.

In the event of an explosion, the vent incorporated in the **DUAL-VENT** will burst open normally and the flame will be deflected upwards by our **VIGISPACE** deflector.



DUAL-VENT with VIGISPACE for BESS

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