# The EFA-E Deflagration Flame Arrester – Endurance Burning Proof

## Purpose of Installing the EFA-E

Loading a vessel can be carried out in two different ways.

The first method follows IMO/SOLAS regulations, where the loading process allows excess pressure to be vented directly to the atmosphere. This method results in the emission of vapour gases.

The second method complies with USCG-VECS 46 CFR 39, MARPOL Annex VI, and API 521, where the vapour return lines are connected to the refinery's vapour return system. In this case, loading is performed at a pressure of up to 80% of the pressure relief valve setting.

This enables loading to take place in a closed system, eliminating vapour emissions while maintaining pressure within the venting lines.

The pressure within the vent lines depends on the pressure relief valve setting, which typically ranges between 14 kPa and 60 kPa. Consequently, the pressure in the venting lines will generally range between 11 kPa and 48 kPa.

Once loading is completed, the vapour return system must be disconnected. If the system remains under pressure, appropriate safety precautions must be taken before disconnection.

This is where the EFA-E device becomes essential. The device safely releases the overpressure in the venting system, reducing it to ambient pressure and enabling the vapour return system to be disconnected safely.

Below is a sketch illustrating the recommended installation location onboard.



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## Installation

The EFA-E depressurisation deflagration flame arrester is installed on a branch line connected to the crossover manifold vapour return connection to shore. The EFA-E deflagration flame arrester is normally open. Therefore, a butterfly valve must be installed in-line immediately before the EFA-E. One EFA-E unit should be installed for each vapour return connection to shore.

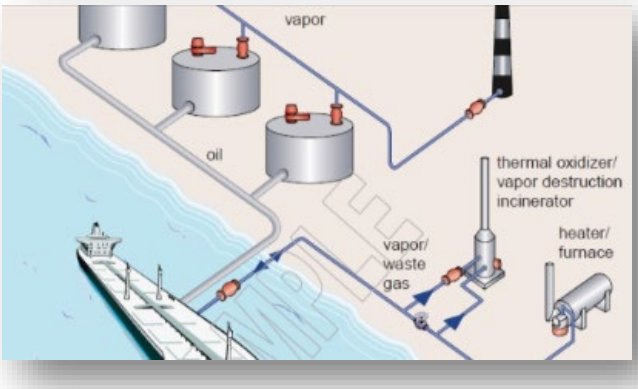
## Operation

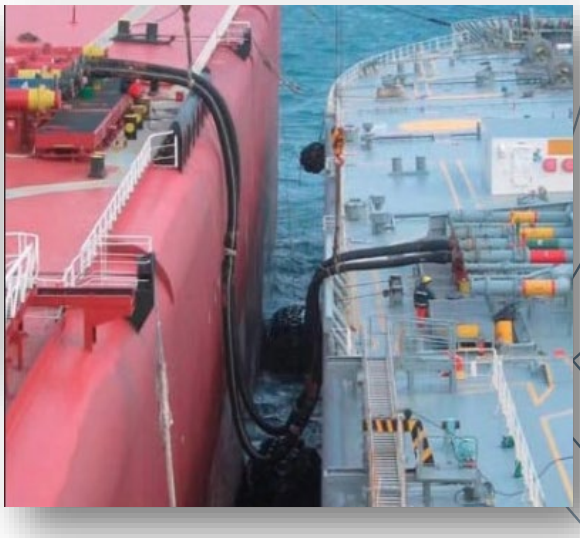
The vessel connects to the shore facility through the vapour return line located at the crossover manifold. During loading operations, the butterfly valve on the branch line remains closed.

Once loading has been completed and the crew needs to disconnect the vapour return system, the butterfly valve is opened. This allows the overpressure in the vapour return system to be safely released.

When the pressure has been reduced to ambient pressure, it is safe to disconnect the vapour return line from the refinery connection.

The device can also be used for depressurisation during ship-to-ship transfer operations.





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## Description of the EFA-E

The Pres-Vac End-of-Line Endurance Burning Proof Deflagration Flame Arrester (EFA-E) is designed for seagoing and inland tanker vessels as well as offshore applications.

The device is used when depressurisation of venting or vapour return lines is required, while simultaneously protecting the system against flame transmission caused by fire.

The EFA-E is designed to protect against endurance burning of alcohol. The unit is equipped with specially designed filter elements that prevent flame propagation through the system.

The device is protected by a weather hood, which automatically opens in the event of a fire. This prevents excessive pressure build-up around the filter elements.

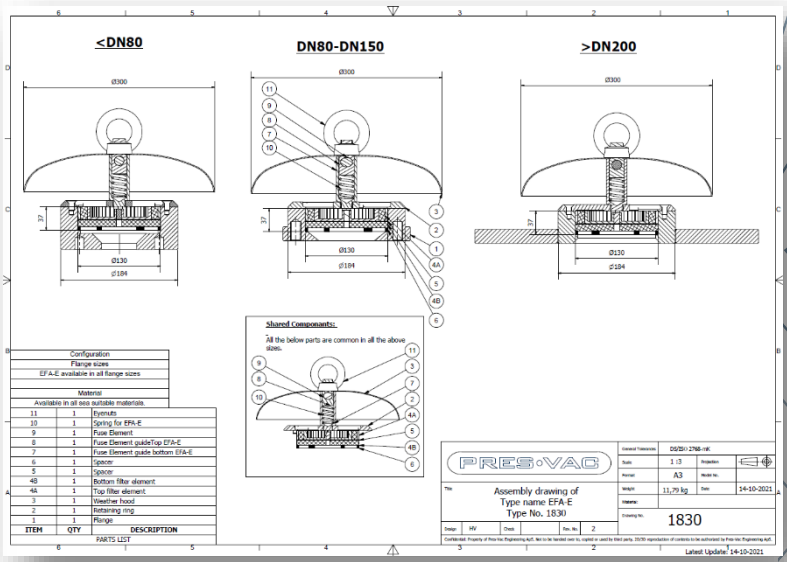
## Design

The EFA-E is manufactured entirely from AISI 316 stainless steel with a high molybdenum content, ensuring excellent corrosion resistance and durability in demanding marine environments.

Due to the safety-critical performance requirements of this equipment, high-quality materials are essential.

The flame-arresting filter elements are manufactured from high-tensile stainless steel and are hand-assembled to ensure optimal performance.

The design is mechanically straightforward but incorporates precision-machined components that enable the device to operate reliably during deflagration and endurance burning conditions, as required by applicable standards.



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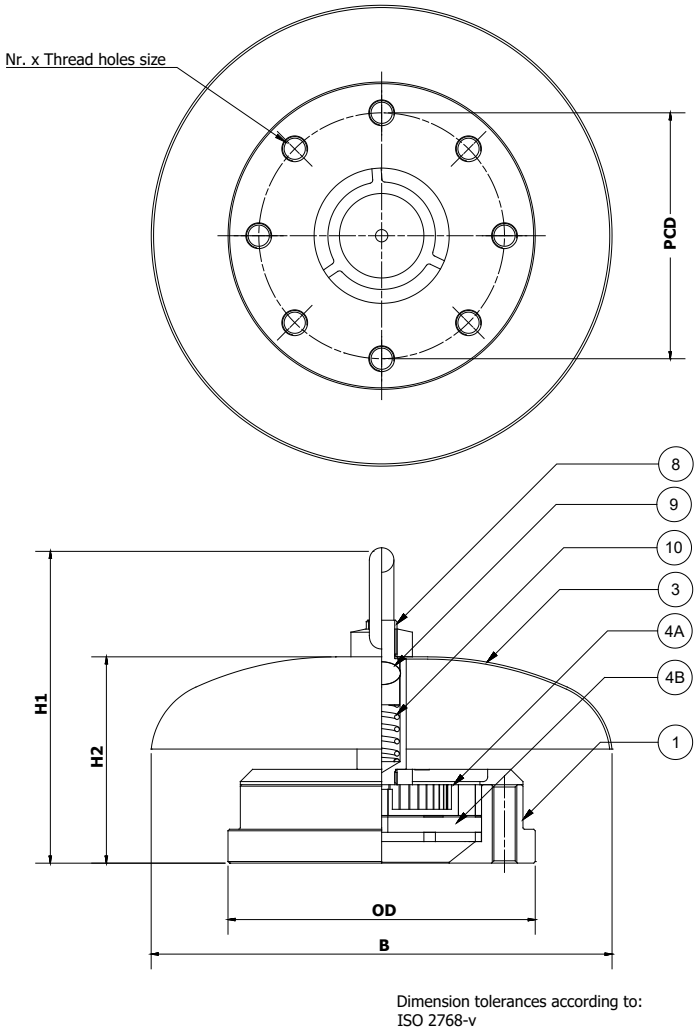
# EFA-E Material Specification and Key Features

- Certified for endurance burning protection for alcohols and hydrocarbons, explosion group MESG IIB (0.5 mm)
- Equipped with a weather hood that automatically opens in case of fire
- Easy maintenance and replacement of filter elements
- Operates in any installation orientation
- Materials can be upgraded to higher-grade stainless steel, Duplex, or Hastelloy if required
- Enables safe and rapid pressure reduction in vent lines, allowing safe disconnection of vapour return lines
- Highly suitable for ship-to-ship transfer operations
- Mandatory installation for inland tanker fleets in Europe




Dimension tolerances according to:
ISO 2768-v

| Item | Description | Material |
|---|---|---|
| 1 | Flange | Stainless steel 316 |
| 3 | Weather hood | Stainless steel 316 |
| 4A | Filter Element top | Stainless steel 316 |
| 4B | Filter element bottom | Stainless steel 316 |
| 8 | Fuse Element Guide | Stainless steel 316 |
| 9 | Fuse Element | Plexiglass |
| 10 | Spring | Stainless steel 316 |
| | | |

| **Main dimensions** | |
|---|---|
| DN mm | 80 |
| H1mm | 230 |
| H2 mm | 135 |
| B mm | 300 |
| **Flange details:** | PN 10 |
| PCD mm | |
| OD mm | |
| Bolt holes Size (threads) | |



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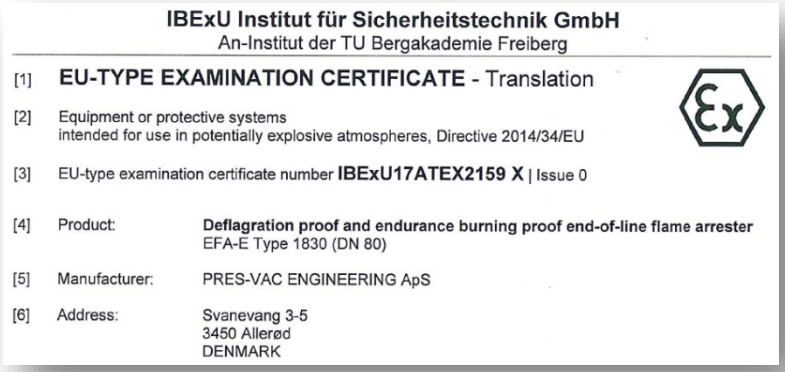
## Certification:

The EFA-E is tested for Endurance burn protection for alcohols and hydrocarbons up to explosion group IIB (0.5mm).

The EFA-E is approved in accordance with ATEX directive and EN ISO 16852 and complies with IMO/MSC/Circ. 677 and IMO/MSC/Circ. 1324 & 1325.



**IBExU Institut für Sicherheitstechnik GmbH**
An-Institut der TU Bergakademie Freiberg

[1] **EU-TYPE EXAMINATION CERTIFICATE** - Translation

[2] Equipment or protective systems
intended for use in potentially explosive atmospheres, Directive 2014/34/EU

[3] EU-type examination certificate number **IBExU17ATEX2159 X** | Issue 0

[4] Product: **Deflagration proof and endurance burning proof end-of-line flame arrester**
EFA-E Type 1830 (DN 80)

[5] Manufacturer: PRES-VAC ENGINEERING ApS

[6] Address: Svanevang 3-5
3450 Allerød
DENMARK

## Data sheet:

| | | | |
|---|---|---|---|
| **General Information** | | | |
| | Manufacturer: | **Pres-Vac Engineering A/S** | |
| | Type: | **End of Line Endurance Burning Proof Deflagration Flame Arrester** | |
| | Model: | **EFA-E-1830** | |
| | Service: | **Vapour Gas Systems** | |
| **General Service Conditions** | | | |
| | Pressure range: | kPa | 0 - 75 |
| | Vacuum range: | kPa | 0 - 75 |
| | Temperature range: | deg. Celsius | ÷ 60°C to + 85°C |
| | Flange connecting range: | mm | Minimum DN50 |
| | Flange connection types: | | ASME, ANSI, JIS, DIN, GB |
| | Location: | | Venting lines and Vapour return system |
| | Fluid state: | | Air and gases |
| | Design: | | End of line. Built up design |
| | Operating limitations: | m/s | no flow velocity limitations |
| **Performance** | | | |
| | Flange size: | mm | 80 |
| | Capacityair | $Nm^3/h$ | 550 |
| **Material** | | | |
| | Material body | | AISI 316 (all grades), Titanium grade 1-2, Super duplex, Inconell |
| | Bolt material: | | AISI 316 or equivalent |
| | Gaskets/Seat material: | | IIB compliant gaskets and o-rings |
| | Flange face finish: | | FF, RF |
| | Flow direction: | | In/Out |
| | Paint specification: | | N/A for stainless steel |
| | Float material: | | N/A |
| **Certification test standards** | | | |
| | Type approval: | | EN-ISO-16852 (2016), alcohol, hydrocarbons IMO/MSC/Circ. 677 and IMO/1324-1325 |
| | MESG compliance: | | IIB = 0.50 mm |
| | ATEX: | | Directive 94/9/EC (ATEX) EN13463, EN1127 Part I |
| | NORSOK: | | Compliance |
| | Fire safe: | | YES |
| | Flow test: | | According to IMO/MSC/Circ. 677 |
| | FAT QC test | | According to Pres-Vac ISO 9001 (2015) QC system |



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