

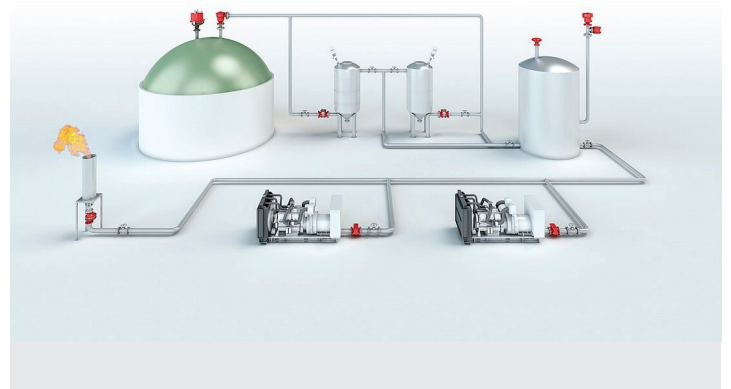
PROTEGO® Solutions for Wastewater Treatment Plants, Biomass Digesters & Landfills

SPECIAL SOLUTIONS FOR CHALLENGING APPLICATIONS

Waste to energy plants can have digesters, CHP units, flare systems, potentially with **complex piping arrangements**, **condensate management**, and the need for **emissions control**. As organic matter decomposes it produces methane-rich gas along with moisture and corrosive compounds. Seasonal temperature swings, freeze-thaw cycles, and heavy rain create vacuum fluctuations and condensate that can foul equipment and stress tanks. Operators are expected to recover energy, control odors and emissions, while staying compliant with international safety standards. Selecting **durable, maintenance friendly, type approved** safety devices is critical in challenging applications, such as waste to energy plants.

COMMON PROBLEMS

- Biogas systems face a unique combination of **environmental** and **operational stressors** that can compromise equipment and safety. Among the most common and critical issues are:
- Constant **risk of solid organic matter** within vapor and gas transmission lines
- **Corrosion** and **clogging** caused by condensate and organic compounds commonly present in biogas production.
- **Freezing temperatures** that can prevent valves from opening, risking dangerous overpressure and potential tank failure
- **Explosion hazards** due to the presence of natural gas in biogas mixtures



Our Solutions: FA-CN, DR/ES, UB/SF & FA-E

PROTEGO® FA-CN

The **PROTEGO® FA-CN** in-line Deflagration Flame Arrester is designed for high performance with **minimal maintenance**. Its easy-access cover allows quick removal of the **FLAMEFILTER®** unit without disassembling piping, significantly **reducing maintenance time and labor costs**. The unit's multi-disc-layer system can be fully disassembled, enabling fast, thorough cleaning and reducing the need for spare parts. Fewer **FLAMEFILTER®** discs not only streamline maintenance but also improve flow capacity. Additionally, an integrated condensate drain port helps to prevent buildup, reducing the risk of corrosion and clogging from condensation trapped within the Flame Arrester.



In-line Deflagration Flame Arrester with "easy access" cover



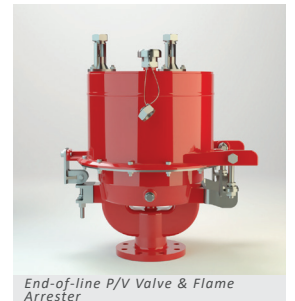
In-line Detonation Flame Arrester

PROTEGO® DR/ES

The **PROTEGO® DR/ES** in-line Detonation Flame Arrester is built for both **performance and convenience**. Its unique design allows maintenance and cleaning without removing the housing from the pipeline and vessel, saving time and simplifying service. Unlike many other arresters, a **90° elbow is not required for installation**, which reduces pressure loss and installation complexity. The specialized design also enables condensate to drain directly back into the tank, **lowering the risk of corrosion** while minimizing maintenance requirements and lowering operational costs. A hanging enclosing cage holds the **FLAMEFILTER®** discs, which can be disassembled individually for easy cleaning or single-disc replacement—**cutting spare parts costs and extending service intervals**.

PROTEGO® UB/SF

The **PROTEGO® UB/SF** end-of-line Pressure/Vacuum Relief Valve with Flame Arrester delivers **proven reliable performance** backed by over 30 years of field use. This frost-proof diaphragm valve can operate in temperatures as low as -40 °C without the need for external heating, helping prevent tank damage in **freezing conditions**. The design provides extremely **tight sealing** to minimize emissions enhancing odor control and maintaining environmental compliance. Built-in dynamic Flame Arresting capabilities offer explosion and endurance burning protection, eliminating the need for a separate static Flame Arrester. This state-of-the-art design removes the risk of clogged Flame Arresters in contaminated vent lines. A hinged valve top allows for **quick access** to the internal components, making operational checks and **routine maintenance fast and efficient**.



End-of-line P/V Valve & Flame Arrester



In-line Deflagration Flame Arrester

PROTEGO® FA-E

The **PROTEGO® FA-E** is a bi-directional in-line Deflagration Flame Arrester with an eccentric, **flat-bottom design** that solves a critical design challenge in saturated gas systems. Instead of pooling inside the housing, corrosive condensate, often containing hydrogen sulfide (H_2S), flows through the Arrester, significantly reducing internal corrosion and **extending service life**. The FA-E is especially suited for installations with limited space, as the eccentric body simplifies mounting near floors or walls. Designed for use in elevated temperature and pressure conditions, this device offers ATEX certified deflagration protection for explosion groups IIA1, IIA, IIB3, and IIC (NEC groups D, C, and B). Its **modular construction** supports fast, easy cleaning and single-disc replacement of **FLAMEFILTER®** elements, **cutting both downtime and spare parts costs**. This Arrester delivers robust protection and long-term durability in harsh operating environments.

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