

# EcoGuard™

Total Emission Solution



## Industries

- Oil & Gas Production
- Gas Transportation & Storage
- Petrochemical
- Refineries
- Chemical Production
- Fertilizer Production



## Reduce & Eliminate Emissions from Gas Compressors

The EcoGuard™ rotary compressor system has been developed to offer a robust solution to emission focused challenges arising from the operation of centrifugal compressors.

The latest environmental innovation from AESSEAL®, provides an innovative platform for operators to actively reduce the release of harmful Greenhouse Gases.

EcoGuard™ can be easily retrofitted into existing equipment and offers multiple emission mitigation modes, enabling operators to capture gases that would otherwise be flared or vented into the atmosphere.

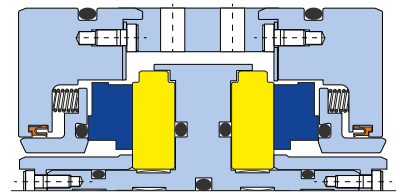


## Zero Emission Double Seal Technology

AESSEAL® has developed a unique, true zero-emission sealing solution for centrifugal compressors using their Double Dry Gas Seal design.

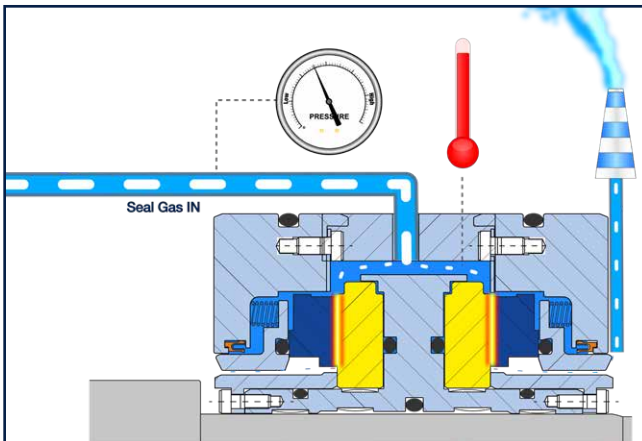
Double Dry Gas Seals utilize the injection of an inert gas, such as Nitrogen, as a seal gas. Due to the design of the seal, this gas is the only gas that leaks during operation, enabling Double seals to be true zero emission solution.

However, due to the low flows through the seal when compared to other seal arrangements, Double Dry Gas Seals can be prone to excessive generation of heat and subsequent reliability issues, which limits their maximum capability.

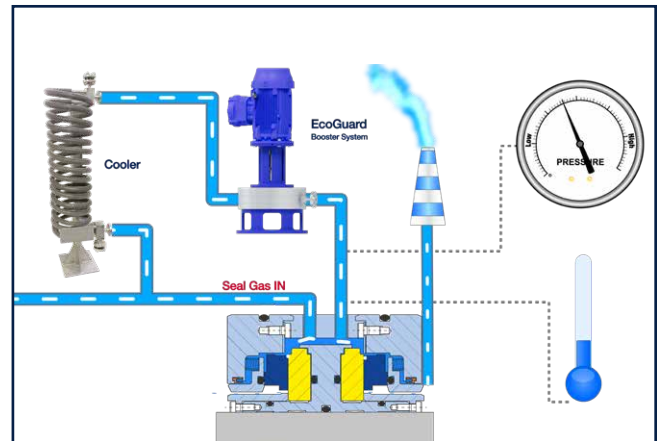


**Double DGS Arrangement**

By using EcoGuard™, the seal gas is circulated through a cooling system, which lowers its temperature and prevents overheating issues during operation. This ensures safe and reliable performance for most turbo gas compressor applications.



**Build up of heat / friction within Double Dry Gas Seal**



**EcoGuard™ Zero Emission Sealing Solution with Cooling**

# Zero Emission Double Seal Technology

The elimination of fugitive emissions via the installation and operation of the AESSEAL® Zero Emission Solution can result in the following benefits:

- Monetary value of recovered gas
- Avoidance of fees associated with emissions
- Compliance with environmental legislation
- Prevention of CO<sub>2</sub>e being released to atmosphere

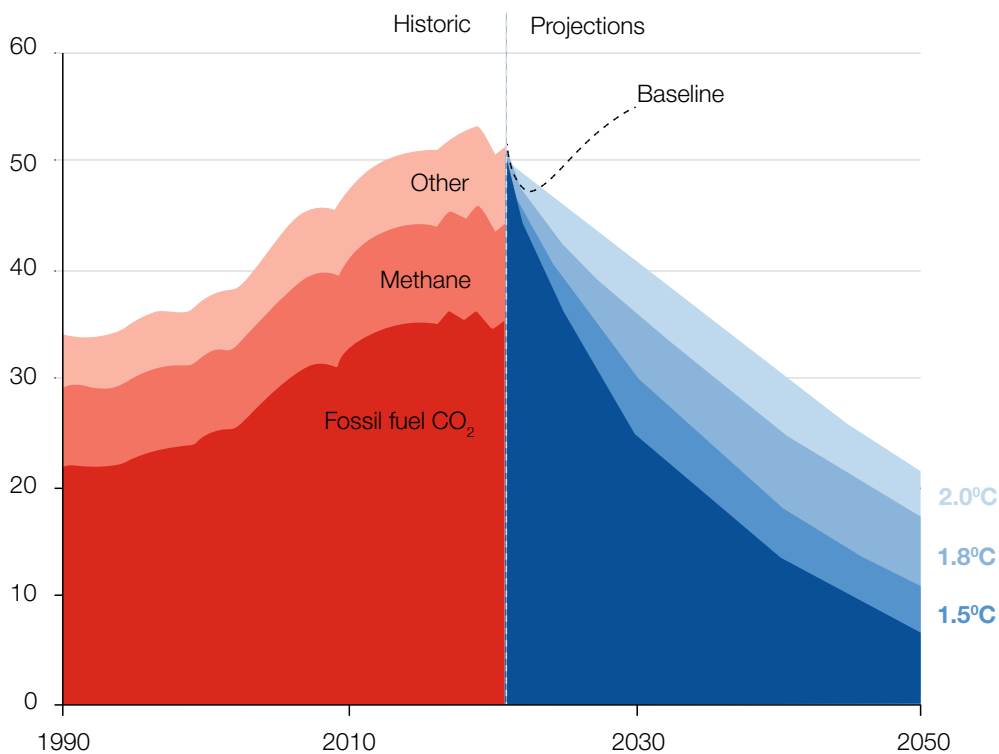
EcoGuard™ can prevent 271,776m<sup>3</sup> / 6,327 tons of CO<sub>2</sub>e of Greenhouse Gases from a typical compressor being released into the atmosphere each year.

Many countries and regions are implementing or have already introduced strict CO<sub>2</sub>e emission regulations. EcoGuard™ helps ensure compliance and avoid related penalties and fees.

Sources: Department for Energy Security & Net Zero, EPA and European Commission

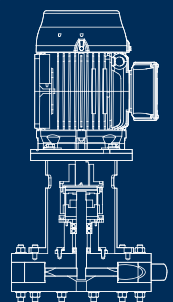
## Methane matters

Methane is second only to CO<sub>2</sub> emissions from fossil fuels as a cause of global warming. (Global GHG emissions, GtCO<sub>2</sub>e per year).



Source: IMF staff calculations.

Note: Excludes emissions from land use and changes to land use

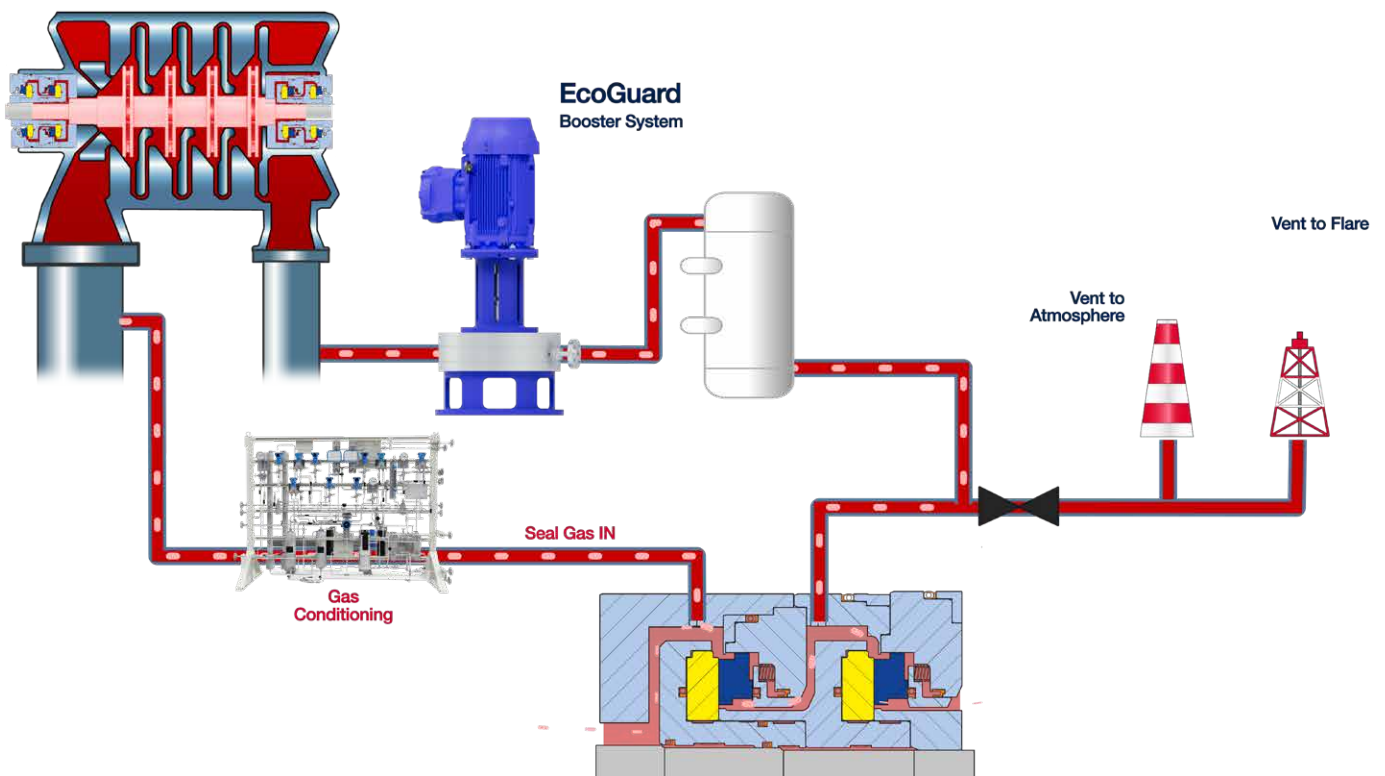


# EcoGuard™ Total Emission Solution

## Tandem Dry Gas Seal Vent Recovery

EcoGuard™ is designed as part of a vent capture system that reduces the release of fugitive gases, which would typically be vented into the atmosphere or burned off through a flare during normal operations.

EcoGuard™ increases the pressure of the captured gas, which is then either reinjected into the compressor's suction or used as fuel gas for turbines within the facility.



EcoGuard™ Tandem Vent Recovery System with Collection Vessel

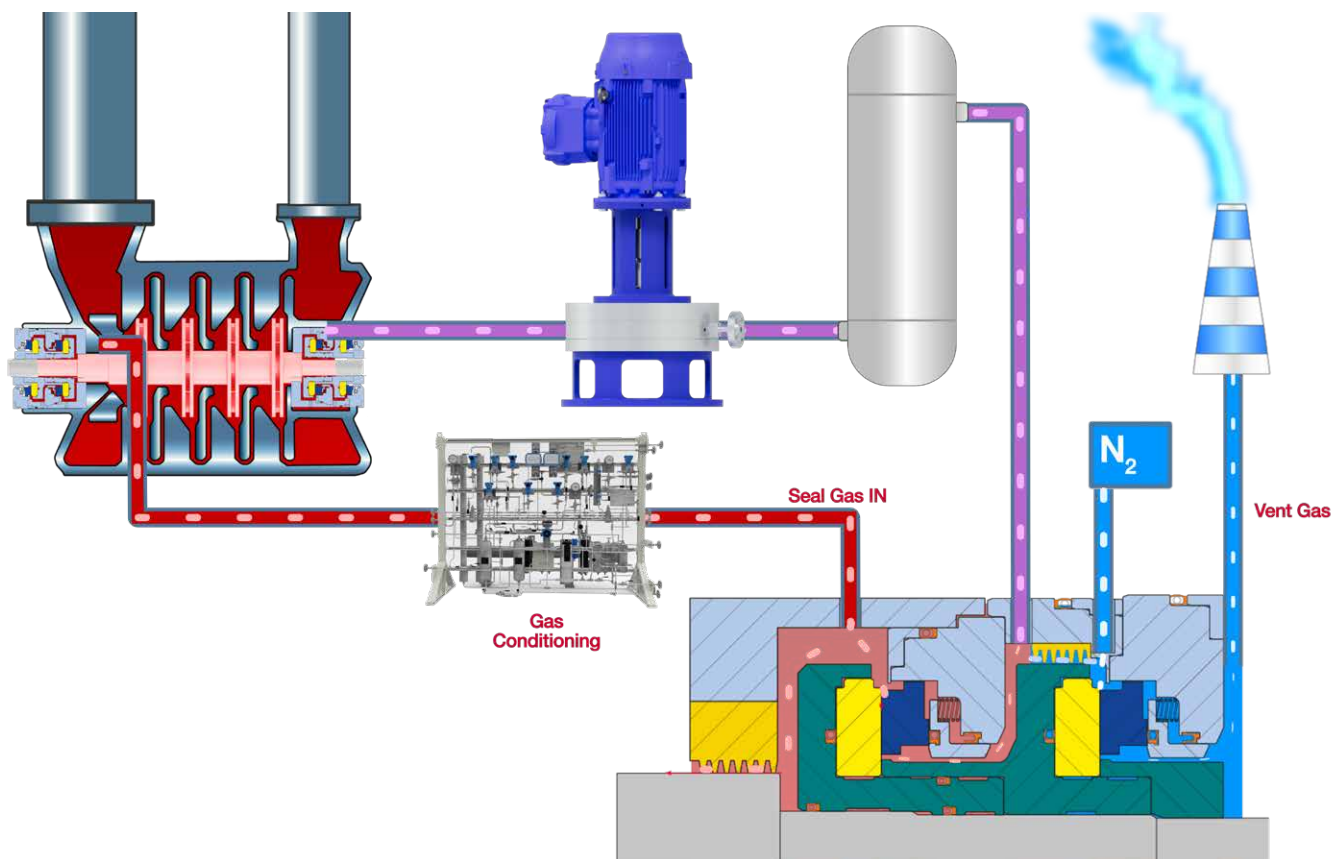


Leaked gas from Dry Gas Seals is usually vented directly into the atmosphere or burned through a flare. While these methods safely remove harmful gases from the facility, they also release CO<sub>2</sub> and methane into the environment. EcoGuard™ captures these gases, enabling their reuse.

## Tandem with Intermediate Labyrinth Dry Gas Seal Vent Recovery

EcoGuard™ can capture the primary vent gases released from Tandem with Intermediate Labyrinth Dry Gas Seals.

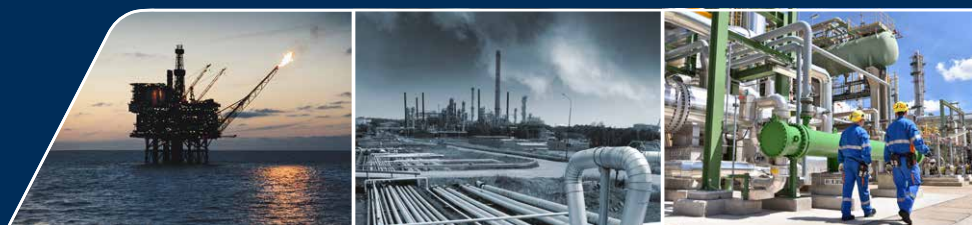
Although these seals are purged with an inert secondary seal gas, such as nitrogen or air, they still allow the same volume of fugitive greenhouse gases to be released into the atmosphere through venting or flaring as Tandem Dry Gas Seals.



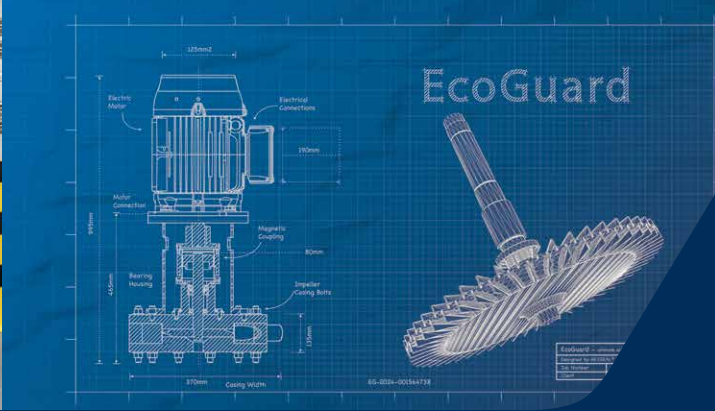
**EcoGuard™ Tandem with Intermediate Labyrinth Vent Recovery System with Collection Vessel**

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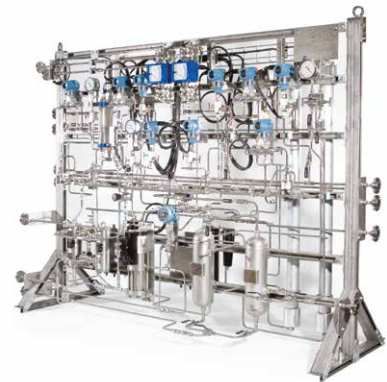




## Seal Gas Booster Capability

EcoGuard™ has been designed to operate as a Seal Gas Booster, allowing for the uninterrupted supply of seal gas to Dry Gas Seals.

Dry Gas Seals are typically supplied with gas sourced from the compressor discharge. This gas is conditioned before passing through the seals, creating a barrier between the compressor gas and the atmosphere.



During pressurized standstill or slow roll operation, the seal gas flow may be reduced or interrupted, allowing unconditioned gas to enter the Dry Gas Seals. This can lead to reliability issues and eventually cause seal failure.

EcoGuard™ can boost the reduced compressor discharge pressure present at these conditions and direct the gas via the Seal Gas Support System to the seals. This ensures a continuous flow of clean gas, preventing reliability issues caused by the ingress of unconditioned gases.



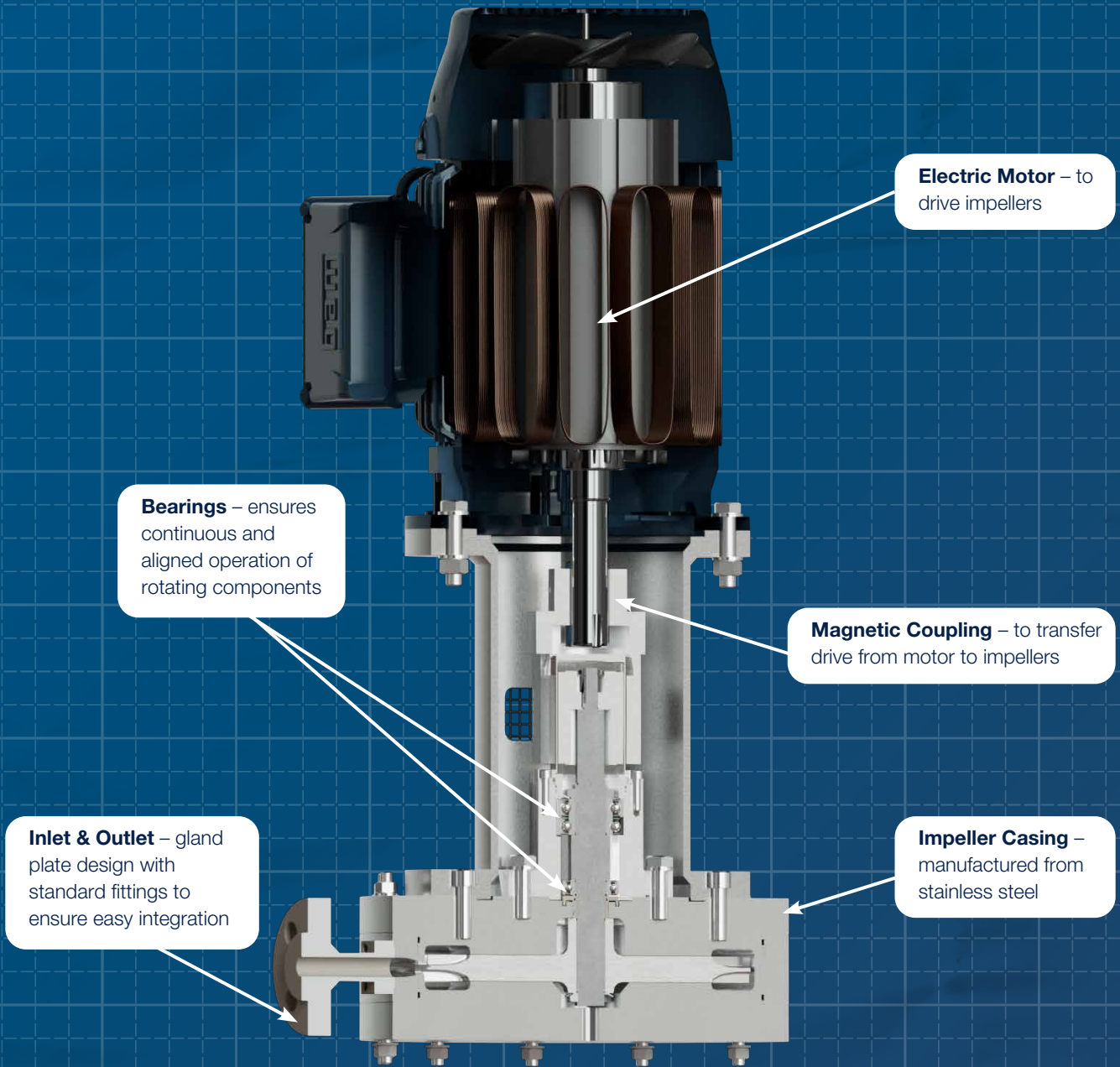
**Dry Gas Seal contamination caused by ingress of unconditioned seal gas**



EcoGuard™ ensures a continuous flow of clean gas, preventing reliability issues caused by the ingress of unconditioned gases.

## EcoGuard™ Design

EcoGuard™ has been designed to operate continuously for 5 years. This aligns with the API recommended operational lifespan of compressor Dry Gas Seals.



# EcoGuard



## EcoGuard™ Technical Overview

EcoGuard™ can operate with a variety of gases at a wide range of temperatures. Each application is evaluated by the AESSEAL® engineering team and a bespoke solution is provided.

Maximum compression ratios, temperature and pressure parameters will be defined on an individual application basis.

### Key Technical Information:

- Rated to 200 bar MAWP
- ATEX certified
- IECEx certified
- Magnetic coupling
- Max speed 3,600 rpm
- -30°C to 200°C
- 11 kW motor
- 5 years operation
- Variable Speed Drive
- API 692 Compliant
- Low maintenance

EcoGuard™ has been developed in conjunction with Torishima with manufacturing and testing conducted at Torishima's European Headquarters in Glasgow, United Kingdom and AESSEAL Global Technology Centre, United Kingdom.

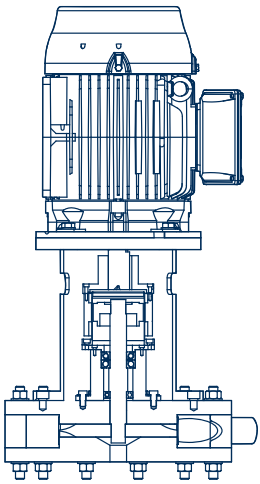


AESSEAL Global Technology Centre

Torishima's European Headquarters







## EcoGuard™ Integral Cooling Technology

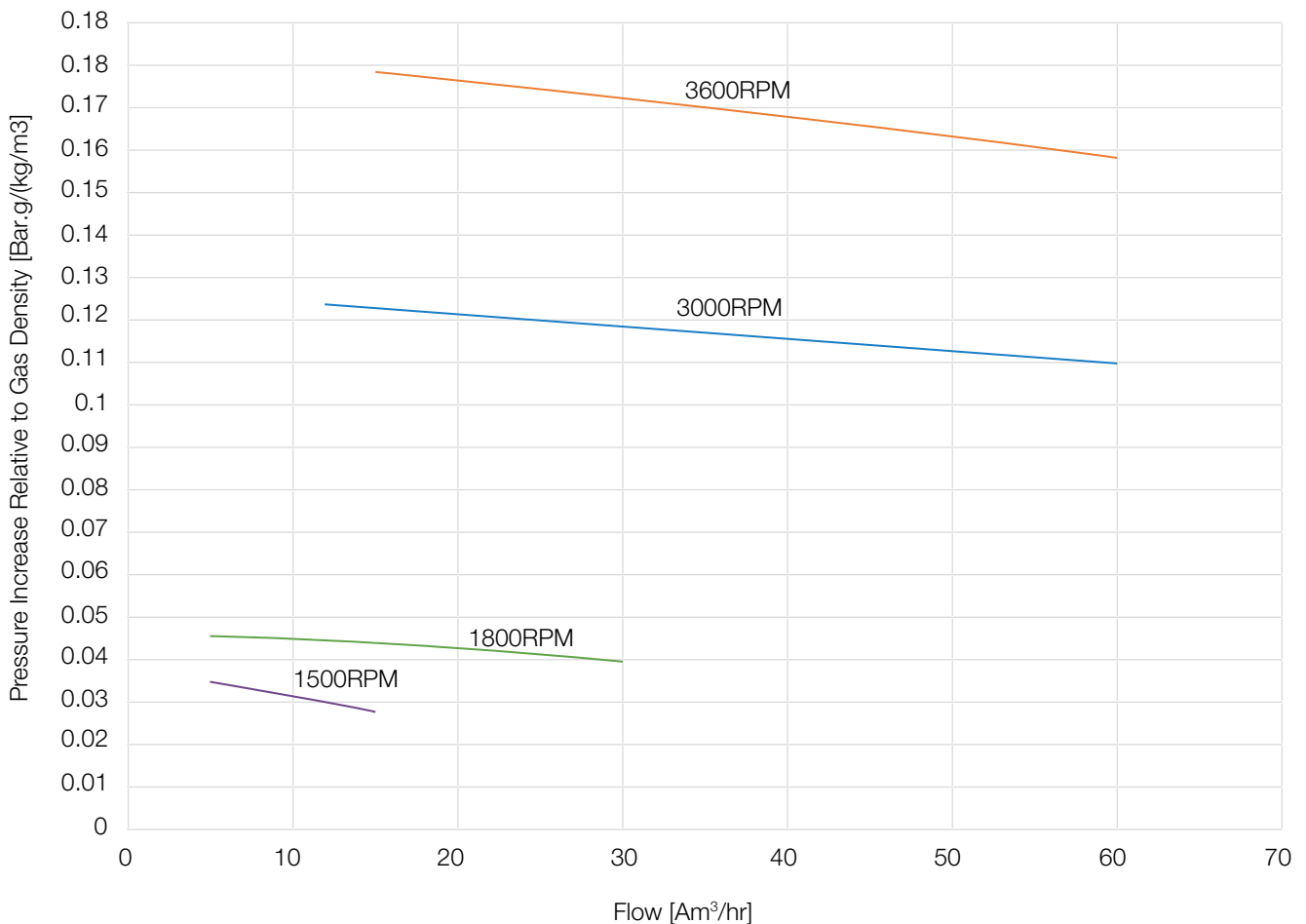
The pioneering design incorporates patented integral cooling technology, enabling EcoGuard™ to operate at higher duties and for longer durations than alternative seal gas booster products.

The cooling system requires no additional supply of liquids or gases, keeping operating costs low while maintaining superior performance.

## Compression Ratios

EcoGuard™ has undergone rigorous theoretical and physical testing at both Torishima and AESSEAL's technology and development facilities, ensuring effective operation at 200 bar of pressure and at speeds of 3,600 rpm.

EcoGuard™ provides effective compression ratios using commonly used gases such as Natural Gas, Nitrogen and Methane, across a wide range of operating conditions.



## EcoGuard™ versus Piston Boosters

The AESSEAL® EcoGuard™ solution has been developed to act as a Seal Gas Booster to ensure an uninterrupted supply of seal gas to Dry Gas Seals.

Piston / reciprocating boosters have traditionally been used however EcoGuard™ provides some distinct advantages:



### Piston Boosters

- Rod seals generate leakage
- Low reliability
- Fast wearing parts
- Maximum life of 8,000 hours
- More than one unit required



### EcoGuard

- Zero Leakage
- Operates for 5 years
- Low maintenance
- Continuous Operation
- Variable Speed Drive

## Compressor Dry Gas Seals

It is recommended to install EcoGuard™ with a pair of AESSEAL® Compressor Dry Gas Seals.

This coordination ensures that the critical components of the vent recovery system are designed and supplied together, providing our customers with the most robust solution and comprehensive aftermarket service capability.



AESSEAL Global Technology Centre

## AESSEAL® – Net Zero Emissions

AESSEAL®, part of the AES Engineering Group, set a target to achieve group wide Net Zero Emissions by the 1st April 2029. This target was surpassed and achieved in 2021 when Net Zero in Scope 1, 2 and 3 emissions was confirmed by the BSI in accordance with ISO 14064-1.



## AESSEAL® – Net Zero Achievements

- **433,879 tonnes of CO2e** avoided in 2023 through sale of water management systems and steam turbine seals
- **£29 million** commitment in the environment from 2021 to 1st April 2029
- **£16,487,167.80** (\$21,600,000) invested up to September 2024
- **Solar energy farm** completion in India
- **3000 solar panels** and 2.2 mega-watt battery storage utilized at UK Global Technology Centre







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**AESSEAL plc is certified to:**

ISO 9001, ISO 14001, ISO/IEC 20000, ISO/IEC 27001,  
ISO/TS 29001, ISO 37001, ISO 45001 & ISO 50001

Use double mechanical seals with hazardous products.

Always take safety precautions:

- Guard your equipment
- Wear protective clothing



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Net Zero champions globally



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