

**GORE® Protective Vents**  
for Heavy-Duty Equipment



# THERE ARE NO BAD CONDITIONS

Experience Reliability.

*Together, improving life*



# How Do Your Electronics Survive in Harsh Environments?

Dirt, water, humidity, and high temperatures: Equipment used in heavy-duty industries must be able to attain peak performance even in the harshest conditions.

With the ongoing development of the Industrial Internet of Things (IIOT), agricultural, construction and material-handling machinery is advancing and becoming more efficient, more productive, and less labor-intensive. These effects are further increased by the evolution of autonomous solutions, automated processes, and electrification. From self-driving trucks to battery-powered machinery, heavy-duty industries are embracing the development toward efficiency, sustainability, and technical innovation.

However, these modern technologies rely heavily on sophisticated and complex electronics. As failure would result in costly repairs as well as reduced production, the electronics must be as robust and trustworthy as the machinery itself and must withstand the same harsh operating conditions. And like the equipment, the technology must meet customers' expectations for reliable performance over many years. That's where Gore and our future-proof venting solutions come in.

## **The Gore Membrane: The Heart of Our Technologies**

What gives our solutions their superior performance qualities is a remarkably versatile polymer: expanded polytetrafluoroethylene (ePTFE). Gore is the world leader in understanding this technology and its capabilities. For each implementation, we use the Gore Membrane to engineer an ePTFE membrane structure with a variety of different properties, tailored for various challenging applications.

Gore offers a variety of designs, sizes and product forms that are easy to integrate into your housings.



## GORE® Protective Vents Reduce Condensation Because Water Vapor Molecules Can Pass Through the Membrane.



Typical Electronic Control Units (ECU) for heavy-duty applications, outdoor cameras and radar systems rely on GORE® Protective Vents for longer product life, minimized condensation and protection against challenging environmental conditions.



## High-Quality Particle Protection Is Essential to Keep Heavy-Duty Equipment Running

To make sure you benefit from outstanding performance at any given time, we set up a long-term field study at our offices in Putzbrunn, Germany.

On the rooftop of the building,, we continuously test and evaluate the Gore venting portfolio. With the results gathered from our study, we further optimize our technology to provide you with superior protection for your electronics.



# Venting Solutions for a Variety of Heavy-Duty Applications

We offer you more than a venting product—we deliver a technologically sophisticated full-service solution.



## Application Types and Reliable Products

Gore offers high-quality venting solutions for a variety of applications. GORE® Protective Vents provide long-lasting performance for electronic control units, motors, drives, and gears. Combined with GORE® Acoustic Vents for Industrial Applications, they also enhance the service life of human machine interfaces.

In addition to their use in heavy-duty industry, our venting solutions also excel in protecting other outdoor equipment from various environmental influences. From security cameras that must quickly handle pressure differentials to maintain high quality in their captured images, to container tracking solutions that are exposed to ocean water and urban lighting installations that must withstand harsh weather conditions—Gore venting solutions are used in a variety of outdoor applications to guarantee the equipment's uncompromised performance.



### Material-Handling Equipment

- Cranes
- Forklifts
- Warehouse equipment



### Construction Equipment

- Earth-moving equipment
- Road construction equipment
- Mining equipment



### Agricultural Equipment

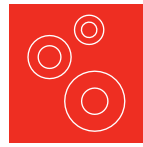
- Tractors
- Harvesting and cultivating equipment
- Forestry equipment

# Mastering the Challenges of Heavy-Duty Equipment



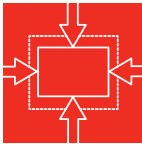
## Increased Life Expectancy

The significant capital investment your customers make in heavy-duty equipment brings with it the expectation of outstanding durability and reliable operation for many years. For this reason, Gore develops advanced venting solutions that keep your engines running even under the harshest conditions.



## Holistic Design Approach

Ruggedized housings are often used to protect electronics from liquids, contaminants, and condensation. However, the housing itself does not protect against pressure differentials. GORE® Protective Vents provide the perfect solution: Through their optimal combination of breathability and ingress protection, they prevent particle contamination while rapidly equalizing housing pressures.



## Space-Saving Components

With the increased amount of electronics in today's heavy-duty equipment, minimizing the size of each component is essential. With our expertise in ePTFE materials, we provide you with venting solutions that are fit for smaller housings and support you in optimizing the use of the limited space available in these machines.



## Improved Integration

Automation technology is changing rapidly, affecting the development of new products as well as the production cycle. With Gore's extensive capabilities, including the necessary prototyping, performance testing, and validation, we provide everything you need for a successful process.



## Rapid Pressure Equalization

Changes in the weather directly affect the internal pressure of a sealed enclosure. Such pressure changes put extreme stress on housing seals, as the resulting pressure differentials are sometimes as high as 350 mbar (5 psi). To protect seals from failing, our venting solutions ensure rapid pressure equalization.



## Superior Particle Protection

For pressure equalization, engineers must often integrate complicated paths and include exterior openings in electronic enclosures—which can lead to contamination from wind-driven rain or dust. Gore's venting solutions are highly effective at preventing dirt and other particles from entering through these openings.



## Reduced Condensation

Moisture can be drawn inside a housing through failed sealing or plastic components. Without proper venting solutions, this moisture cannot escape the housing—resulting in condensation that causes corrosion and degrades sensitive electronics inside the housing. GORE® Protective Vents enable the moisture to escape and help to prevent costly field failures.

# Technological Market Leader Expertise

## Responding to the Demands of the Heavy-Duty Vehicle Industry by Offering:

- Decades of experience and innovation in the market, as testified by hundreds of satisfied, long-standing customers
- Global R&D and engineering teams who work with you throughout the product life cycle
- A unique and comprehensive portfolio of reliable products
- A variety of designs, sizes and product forms that integrate easily into your housings and enclosures
- Tailored venting solutions that increase your product reliability, durability, and profitability
- Service and support from design to the manufacturing process
- Rapid sampling to shorten the product design process
- Rigorous performance testing that improves product reliability
- Production flexibility with multiple installation options



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