


GORE® Protective Vents
for Heavy-Duty Equipment

A John Deere tractor is shown from a front-three-quarter perspective, driving through a muddy field. The tractor's headlights are on, illuminating the path ahead. The ground is very muddy and wet, with large splashes of mud being kicked up by the tires. The background is dark and rainy, with rain falling heavily. The overall scene conveys a sense of ruggedness and reliability in adverse conditions.

THERE ARE NO BAD CONDITIONS

Experience Reliability.

Protect Your Electronics, Power Your Performance

Harsh environments demand robust solutions. Dirt, water, humidity, and extreme temperatures are constant challenges for heavy-duty equipment. As technology advances, with increased reliance on electronics and the rise of IIoT (Industrial Internet of Things), the need for reliable protection is paramount.

Traditional venting methods often fall short in these demanding conditions. Openings and tortuous paths may equalize pressure, but they also invite contaminants like dirt and water, leading to costly equipment failures. Condensation, a silent threat, can corrode sensitive electronics, resulting in downtime and increased maintenance costs.

Gore offers a superior solution. Our innovative vents provide a robust barrier against environmental threats while effectively equalizing pressure. By preventing condensation and contamination, we extend the life of your equipment, reduce downtime, and improve overall performance.

Key benefits of GORE® Protective Vents:

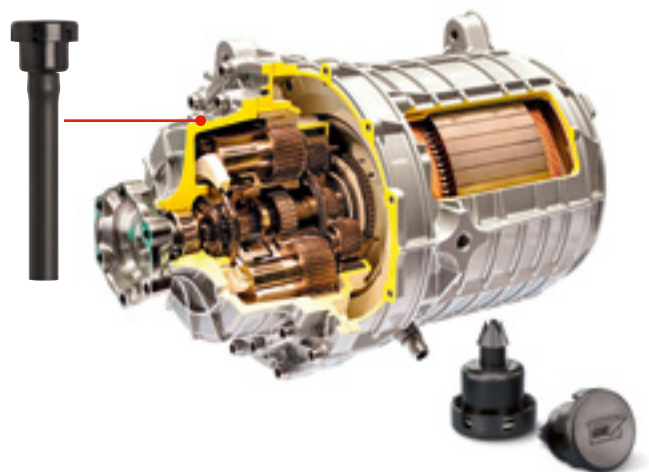
- **Unmatched protection:** Our advanced technology shields your electronics from harmful elements.
- **Optimal performance:** Ensure peak equipment operation in any environment.
- **Cost savings:** Reduce maintenance costs and extend equipment life.
- **Reliability:** Proven performance in the harshest conditions.

Our team of experts is dedicated to partnering with you to develop the perfect venting solution for your application. From design to installation, we provide comprehensive support to ensure your success.

Choose Gore for a future-proof investment in your equipment's protection.



Gore offers a variety of designs (image left), sizes and product forms that are easy to integrate into your housings. Just for example the GORE® Protective Vent for Gearboxes (image right) has an integrated membrane that effectively blocks contaminants - like water,



dust, and dirt - that can degrade the performance of oil cooled traditional and e-motors and other e-drivetrain components as well as gearboxes. The breathable GORE Membrane equalizes pressures under both normal and extreme operating conditions, to avert stress on seals.

GORE® Protective Vents: Ingress Protection for Electrified Components



Various Heavy-Duty Vehicle electronics and applications found in e.g. (from left clockwise) Electronic Control Units (ECU), radar systems and outdoor smart cameras rely on GORE® Protective Vents for longer product life, minimized condensation and protection against challenging environmental conditions.

GORE® Protective Vents: a Lasting Safeguard

To ensure you consistently experience optimal performance, Gore conducts rigorous long-term field tests in addition to numerous outdoor and laboratory evaluations. These tests replicate the effects of weather and UV radiation on our materials. They have a common objective: to demonstrate that GORE® Protective Vents reliably protect the enclosure from contaminants and water ingress over the long term and prevent any loss in performance.

Gore installed enclosures on the rooftop of our Putzbrunn, Germany facility (images below) and conducted tests for the past eight years to evaluate the performance over time of GORE® Protective Vents. The results are summarized in our Field Study whitepaper, which can be downloaded via QR code or here: www.gore.com/8YS



Venting Solutions for a Variety of Heavy-Duty Applications



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

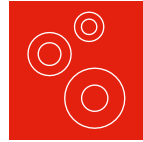
- Tractors
- Harvesting and cultivating equipment
- Forestry equipment

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.



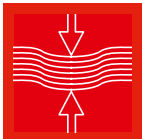
Space-Saving Components

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 in the Heavy-Duty Vehicle Industry

- 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 and technically traceable 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
- Global Supplier and Production flexibility with installation options



For specifications and detailed information on GORE® Protective Vents for Heavy Duty Equipment, please visit our [website](#)

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