GORE® Packaging Vents
For Industrial, Agricultural
and Household Chemicals

FOCUS ON THE ESSENTIAL

The venting solution.
For millions of liquids.
Invented by Gore.

Together, improving life

Focus on Package Integrity

"We had a proven technology partner in Gore. We know that we can rely on their people and products. When you have all those elements in place, it is not surprising that excellence is the result."

Packaging Manufacturer
(Gore Customer since 2014)

Venting solutions are essential to safely equalize pressure differences that could cause containers of liquid chemicals to deform, leak or burst.

It's important to maintain package integrity all along the supply chain, from manufacturers of liquid chemicals or caps and containers, through transport and storage, to end-users. Nobody wants their brand image represented by leaky or damaged packaging . . . nor the costly, time-consuming efforts of dealing with returns, spills or clean-ups.

GORE® Packaging Vents are a safe, reliable solution to these problems. For more than 25 years, leading chemical manufacturers and cap and container companies worldwide have purchased hundreds of millions of our vents for applications where container integrity is paramount.

Hazardous Chemicals and Institutional Cleaners

Our vents enable U.N. Orange Book[1] compliance, which specifies that if dangerous goods (e.g.: bleaches, peroxides and peracetic acid mixtures) are vented, NO leaks are allowed.

Agrochemicals

The U.N. Orange Book[1] recommends venting any formulation that could cause package deformation — for example, highly concentrated pesticides, fertilizers or active biostimulants that are likely to off-gas or scavenge oxygen.

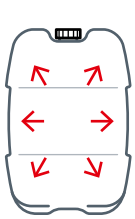
Household Chemicals

Venting is increasingly necessary for today's more-concentrated formulas for stain or pipe-clog removal, and bleach- or chlorine-based surface cleaners — especially because consumers are quick to associate deformed or label-damaged containers with a poor-quality or low-value brand.

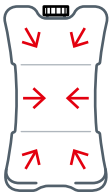
1. United Nations Recommendations on the Transport of Dangerous Goods Model Regulations, a guidance document to harmonize transport regulations for dangerous goods. Most dangerous goods regulations (ADR, IMDG Code, IATA and other national regulations) are based on the U.N. Orange Book.

GORE® Vents solve the Problem at the Source

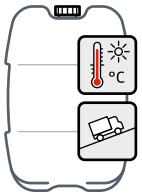
The problem — container deformation that can lead to leaks or bursting — arises when the pressures inside and outside the container are not balanced. GORE Packaging Vents safely and reliably relieve these imbalances, whatever their source:



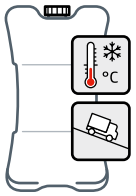
Releasing gases (off-gassing)



Consuming gases (oxygen scavenging)



Increasing altitude
Rising temperatures



Decreasing altitude
Decreasing temperatures

Original state

After dispensing

Active Ingredients that Release or Consume Gases

Many chemical formulations include active ingredients that either off-gas (release gases within the container) or scavenge (consume) free oxygen within the container.

- Off-gassing builds up pressure within the container. If those gases can't escape through a vent, the container will bloat, leak or burst.
- Oxygen scavenging creates an under-pressure within the container. Unless the under-pressure is relieved by venting, the container can collapse.

Changes in the External Environment

During shipment or warehousing, changes in the external environment (such as increasing or decreasing temperatures or altitudes) also create pressure imbalances that can deform unvented or poorly-vented containers — and sudden or extreme changes will accelerate the deformation.

Containers Designed to Dispense Liquids

In these containers, the dispensing action automatically creates an under-pressure condition within the container, which will happen repeatedly with use. Without venting that continuously re-balances the internal and external pressures, the dispensing container may collapse.

Advanced Technology passes Real-World Tests

Why the GORE Membrane matters

Today's GORE Membrane capitalizes on nearly 50 years of experience in customizing membrane properties and behavior to meet specialized performance requirements. In each GORE Packaging Vent, the microporous structure of the thin GORE Membrane protects liquid chemical formulations and their containers in two ways:

- It lets gases pass through in both directions, to rapidly equalize pressures.
- It blocks the passage of larger molecules (like liquids, dust or dirt), to prevent both leaks and contamination.

Why vent performance must exceed test standards

Laboratory tests used to quantify vent performance typically include Initial Airflow, and Water Entry Pressure (WEP) Resistance. But those tests don't reflect how the vent will actually perform during manufacturing, packaging, transporting and handling of liquid chemical formulations.

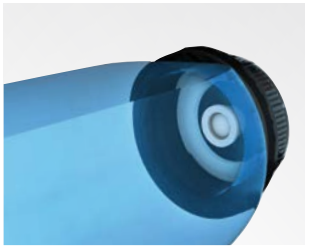
Only Residual Airflow can accurately predict a vent's breathability

- Initial Airflow measures how much air/gas can pass through a dry membrane, with no liquid contact. But in the real world, the vent membrane won't stay dry: inevitably, liquid will splash onto the membrane during container transport or handling.
- Residual Airflow is the metric that predicts real-world vent performance, because it measures how much gas can pass through after liquid has contacted, and been repelled by, the membrane.

Only LEP Resistance can accurately predict a vent's leak potential

- Water Entry Pressure (WEP) Resistance measures how much water pressure a membrane can withstand before it leaks. However, most chemical formulations have a surface tension much lower than water, so they can more easily penetrate the vent membrane, and leak out. For vent membranes, "water-tight" test results are meaningless — unless you are packaging plain water.
- Liquid Entry Pressure (LEP) Resistance is the metric that predicts real-world vent performance, because it measures the vent's leak resistance to "non-water" liquids whose surface tension is typically much lower (thus more leak-prone) than water.

GORE Packaging Vents maintain high Residual Airflow, because the membrane is optimized for high roll-off — and fast airflow recovery — even after contact with high-viscosity or low surface-tension liquid formulations.



Gore LEP-tests its oleophobic vent membranes using a wide range of chemicals with varying viscosities and surface tensions, to ensure our vents will perform as predicted, even if containers fall over in transport or handling.

Why choose Gore as Your Packaging Partner

Application Expertise

- >25 years experience in venting packaging for industrial and agricultural chemicals, institutional and household cleaners.
- Deep technical knowledge of off-gassing and oxygen-scavenging chemicals, and of the ways fluid viscosity and surface tension affect venting.
- Proprietary test methods (Residual Airflow, LEP) assess vent response to real-world challenges.

Membrane Technology Leadership

- Ongoing development of proprietary membrane technologies.
- Capability to further customize membrane structure and properties for specific applications.
- Unlike competitors, we design, manufacture and use only GORE Membranes in all our vents.
- Global supply chain ensures access to the products and expertise you need.

Commitment to Excellence

- GORE Packaging Vents pass rigorous approval tests for dangerous goods, and meet DOT and ADR standards.
- Consistent product quality assured through multiple in-line manufacturing tests that verify each vent's structural and membrane integrity.
- Laser-marked tracking code enables 100% traceability (individual vent level) for three Series of our Plug-In Vents; all other Series enable lot-level traceability.

Competitive Vents

GORE® Vents

The GORE® Packaging Vents Portfolio

Prevent leaks and deformations, and enhance container safety

GORE Packaging Vents come in two styles, each offering performance options. All incorporate the GORE Membrane: a breathable barrier that maintains the integrity of the container and its contents.

Gore Plug-In Vents are designed for use with hazardous chemicals, agrochemicals, biostimulants, organic fertilizers, institutional cleaners and household chemicals.

Gore Plug-In Vents

Gore Plug-In Vents fit containers of all sizes, from very small up to 1,500 liters. They are designed to withstand a wide range of chemical formulations and rugged use: They consistently demonstrate compliance with the UN Orange Book test standards, including the Stacking Test and Drop Test, as well as Dangerous Goods regulations like ADR and DOT. Most Plug-in Vents are individually laser-marked for 100% traceability. Choose Standard Series, High Airflow Series, or High Repellency Series.

Gore Liners

Gore Foam Liners and Gore Pulp Induction Liners easily convert non-vented containers into vented containers — without modifying the cap or closure! Both styles are designed for cap-thread venting or hole-in-cap venting. All liners are available in various widths.

Gore Foam Liners reliably vent hazardous chemicals, agrochemicals, liquid fertilizers, institutional cleaners and household chemicals. Gore Pulp Induction Liners provide reliable venting and tamper-evidence for agrochemicals including organic biostimulants.

Foam Liners
Unlike single-point foam liners that provide only a small venting surface, Gore Foam Liners have a full-surface membrane. This construction improves liquid repellency and enables higher residual airflow.

Pulp Induction Liners
Gore's Pulp Induction Liners feature a composite structure that welds to the bottle's neck to provide both venting and tamper-evidence. They are easy to install using any existing induction welding equipment. Choose High Repellency Series or High Airflow Series for highly reactive or off-gassing chemistries that require greater airflow.

Plug-In Vents

Typical Application		Packaging Size	Product Series	Packaging Content/ Application	
IBCs/Drums		50 – 1500 liters	**D38** Standard Series	Hazardous Chemicals and Agrochemicals	
			D38 High Airflow Series		
Drums/Containers		5 – 60 liters	**D17** Standard Series	Hazardous Chemicals and Agrochemicals	
			D17 High Airflow Series	Biostimulants, Organic Fertilizers	
Containers/Bottles		1 – 30 liters	**D15** High Repellency Series	Agrochemicals	
			D15 Standard Series	Hazardous Chemicals	
Cartridges		1 – 5 liters	**D15 Converse** High Repellency Series	Institutional Cleaners and Domestic Appliance	
			D15 Converse Standard Series		
Trigger Sprayers/ Dispensers/Bottles		0.2 – 2 liters	**D10** High Repellency Series	Household Chemicals, Institutional Cleaners and Domestic Appliance	
			D10 High Airflow Series		
Specialities		0.2 – 1 liters	**D3** Standard Series	Applications requiring underpressure-compensation or vacuum-elimination	

Liners

Typical Application		Packaging Size	Product Series	Packaging Content/ Application	
Bottles		Up to 10 liters	**Foam Liners**	Hazardous Chemicals and Agrochemicals	
Bottles		Up to 20 liters	**Pulp Induction Liners**	Agrochemicals	

Then ask us how our focus on the essential could benefit your next packaging project

Contact your local Gore representative or email us from the GORE Packaging Vents web page for your application:

- For Industrial Chemicals and Cleaners
- For Agricultural Applications
- For Household Chemicals and Cleaners

gore.com/packvents

A materials science company dedicated to transforming industries and improving lives

About Gore

W. L. Gore & Associates is a global materials science company dedicated to transforming industries and improving lives. Since 1958, Gore has solved complex technical challenges in demanding environments — from outer space to the world's highest peaks to the inner workings of the human body. With more than 12,000 Associates and a strong, team-oriented culture, Gore generates annual revenues of $4.5 billion.

gore.com

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