

GORE® Acoustic Vents
For Mobile Electronics



PROVIDING PARTICLES &
LIQUID PROTECTION,
CLEAR SOUND AND
RELIABLE SUPPLY

Together, improving life



GORE® Acoustic Vents: Clear Sound in Any Environment

Today's consumers demand durable electronics built to withstand our active lives. Whether you're using your phone for work calls, capturing memories outdoors, or enjoying immersive entertainment, your devices need to perform flawlessly. Dust and water ingress can damage sensitive components, leading to malfunctions and premature device failure. This not only impacts your experience but also contributes to climate change and environmental waste.

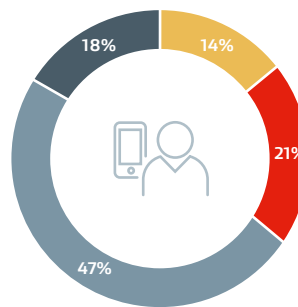
At the same time, clear sound is crucial for features like voice assistants and noise cancellation. Traditional protective measures often compromise audio quality by blocking sound waves along with contaminants. GORE® Acoustic Vents enable better solutions to design engineers.

Based on a survey, 82% of consumers are concerned about protecting phones from water damage and 74% believe improved water resistance in their next phone is key. After price and brand, a water resistance feature would drive more purchases than any other attribute.¹ Acoustic consistency is also more critical as voice recognition becomes an increasingly essential user experience.

1) Gore Smartphone Consumer Perceptions Research-August 2019

Normally, reliable water resistance involves a trade-off in audio quality since devices require apertures for efficient sound transmission that often let sound out and allow contaminants to enter which creates performance issues. Gore is the leading provider of acoustic vents to successfully resolve this trade-off with an optimum venting solution.

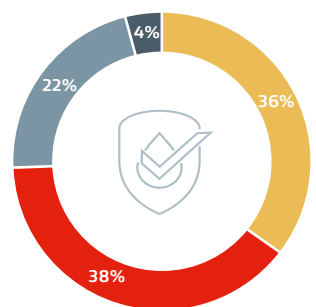
Concerns about protecting phones



Very worried
Quite worried
A bit worried
Not worried at all

82%

Improved Water Resistance Importance



Essential
Important
Nice
Don't care

74%

Our innovative vents deliver:

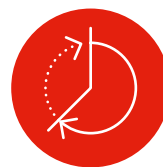


Unmatched Environmental

Protection: We go beyond industry standards with rigorous testing protocols to ensure your devices remain shielded from dust, water, and other damaging elements.



Crystal-Clear Audio: Experience exceptional sound transmission and clarity, ensuring seamless voice calls and flawless audio experiences.



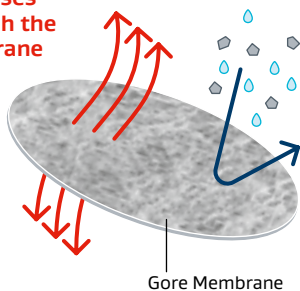
Sustainable Design: By extending device lifespan, GORE® Acoustic Vents contribute to a more sustainable future, reducing electronic waste.

By leveraging our deep understanding of acoustics and materials, we offer the industry's most comprehensive portfolio of acoustic venting solutions with unmatched technical support. This makes Gore the preferred choice for electronics manufacturers worldwide.

Gore ePTFE membrane Technology

Gore is the world leader in understanding ePTFE and its capabilities. Gore ePTFE is created when PTFE is expanded, producing a microporous structure, which allows bidirectional passage of gas and vapor molecules, while blocking ingress of particulates and liquids.

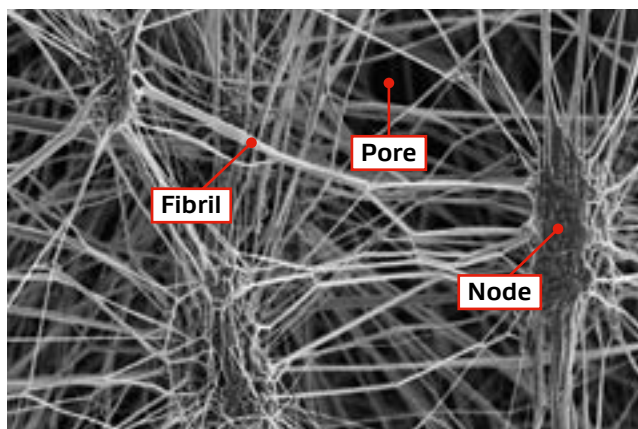
Air passes
through the
membrane

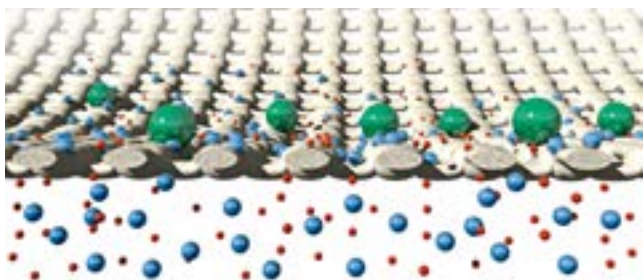


Liquid and
particles
are repelled

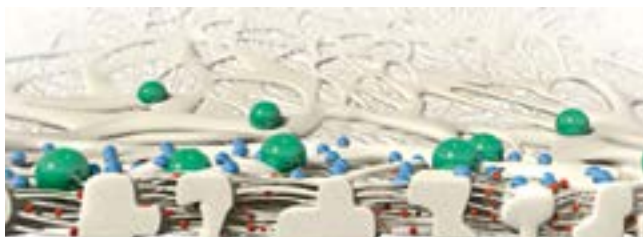
Gore Membrane

Functionalities of Gore membrane





Woven material captures particles equal to or greater than its nominal opening size.



GORE® Acoustic Vents have a three dimensional tortuous path structures, so they can capture particles of varied shapes and sizes.

Gore Membrane vs. Woven Material

Woven materials have a two dimensional structure with a nominal opening size, so they will block any spherical particle of that size or larger. But there are two issues with that:

First, as the blocked particles accumulate on the woven surface, they can block airflow and reduce venting effectiveness.

Second, non-spherical particles like human hair or metal fibers may be classified as “larger than” a specified nominal size . . . yet they can pass through pores of that size, due to their narrow shapes.

GORE® Acoustic Vents have a three-dimensional tortuous path structures, so they can capture particles of varied shapes and sizes. And this structure also means these particles are captured in a way that is more likely to maintain consistent airflow.



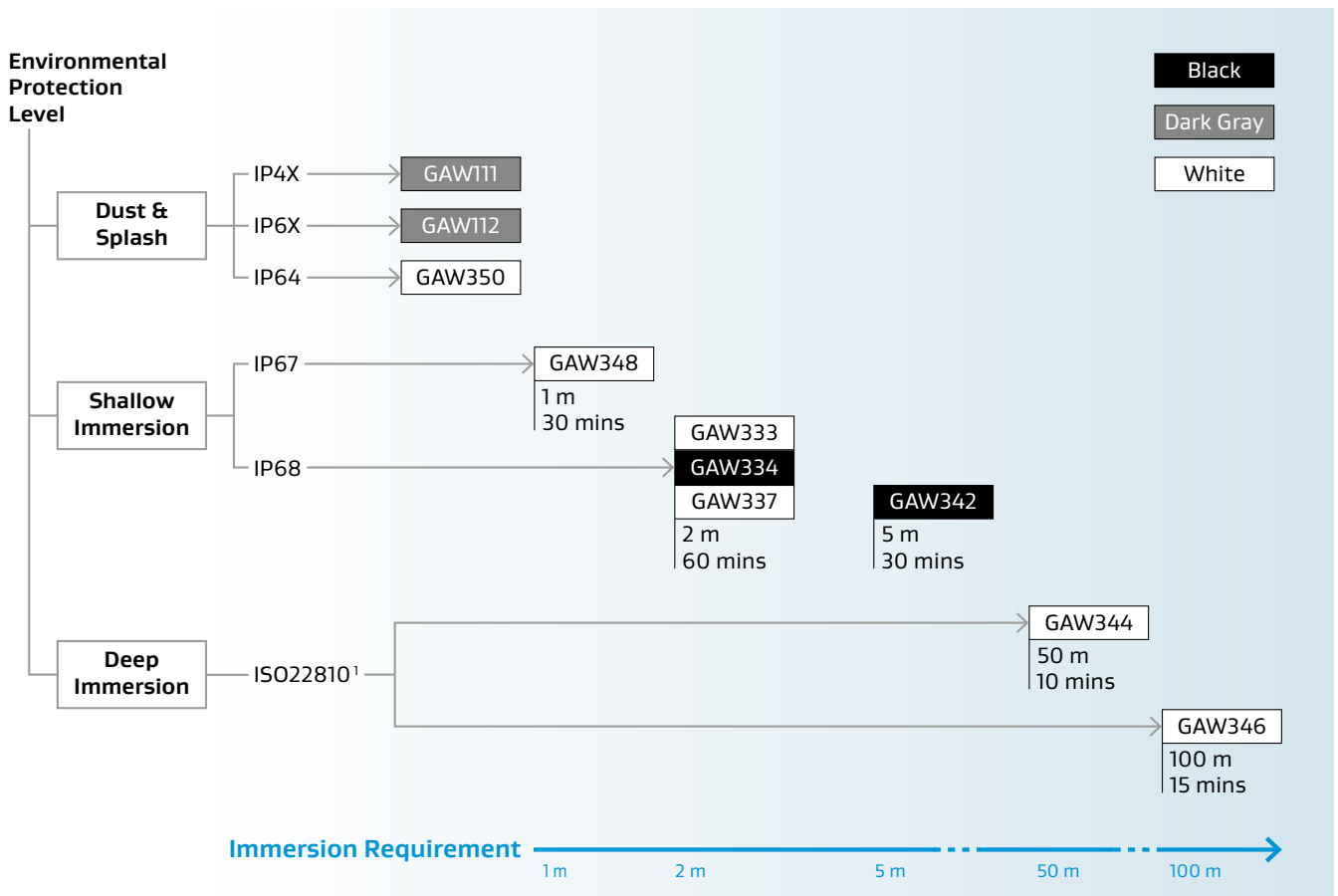
Improve Particle & Water Protection without Sacrificing Acoustic Quality

GORE® Acoustic Vents combine the latest technological advancements with the best design expertise to achieve a product that provides minimal acoustic loss and best-in-class environmental protection.

GORE® Acoustic Vents can effectively repel dust, liquids, and other contaminants. They can be customized in many ways — including size, shape, protection level, mechanical performance and installation options — to meet your acoustic system and installation requirements.

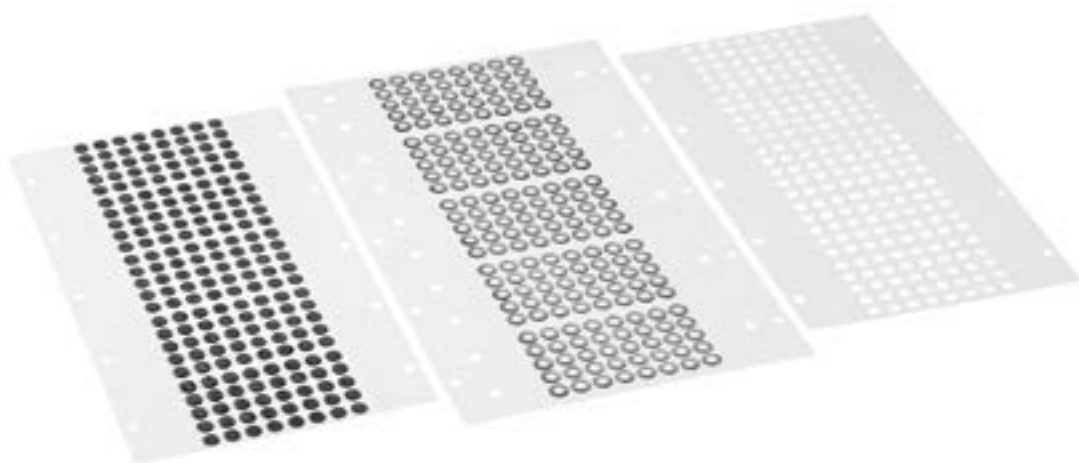
Our products are subjected to rigorous Extended Water Entry Pressure (eWEP) testing to help ensure deeper immersion protection. Smartphones can be protected from water as deep as 4–6 meters for as long as 30 minutes and wearables as deep as 100 meters for 15 minutes.

GORE® Acoustic Vents Selection General Guidelines



1) In compliance with ISO22810:2010(E) test method 4.3.2 Water resistance to overpressure.

GORE® Acoustic Vents



Product Information

Membrane Characteristics/ Performance	GAW111	GAW112	GAW350	GAW348	GAW333	GAW337	GAW334	GAW342	GAW344	GAW346
Application	Dust & Splash			Shallow immersion					Deep Immersion	
IP Rating ¹	IP4X	IP6X	IP64 ²	IP67 (1 m @ 30 min)	IP68 (2 m @ 60 min)	IP68 (2 m @ 60 min)	IP68 (2 m @ 60 min)	IP68 (5 m @ 30 min)	–	–
Comparative water spray efficiency	60%	75%	90%	100%	100%	100%	100%	100%	100%	100%
Typical acoustic impedance (Rayls MKS)	45	105	200	1300	28000	12000	109000	87000	73000	149000
ISO Rating ³ (ISO 22810)	N/A								50 m water @ 10 min ⁴	100 m water @ 15 min ⁵
Typical Insertion loss @1kHz ⁶ (I. D. 1.6 mm)	< 0.1 dB	< 0.1 dB	0.1 dB	0.4 dB	1.2 dB	0.5 dB	1.4 dB	0.7 dB	2.9 dB	< 4 dB (I.D. 2.0 mm)
Delta SNR	0.3 dB	0.6 dB	1.3 dB	4.2 dB	3.2 dB	1.1 dB	2.9 dB	1.6 dB	5.4 dB	13.2 dB
Typical Membrane Thickness (microns)	200	240	60	17	10	4	6	4	10	33
Membrane Characteristic	Oleophobic			Hydrophobic			Oleophobic			
Membrane Color	Dark gray	Dark gray	White	White	White	White	Black	Black	White	White
Membrane Type	Cellulose/ PET-Nonwoven		ePTFE laminated to PET-Woven	ePTFE						

1) Immersion/spray performance can depend upon part geometry and stack-up. GAW111 & GAW112 follow IED 529 standard, the others follow IEC 60529 standard.

2) When incorporated into most devices.

3) In compliance with ISO22810:2010(E) test method 4.3.2 Water resistance to overpressure. This information is based on our current level of knowledge and does not constitute a representation or warranty beyond those contained in our standard terms and conditions.

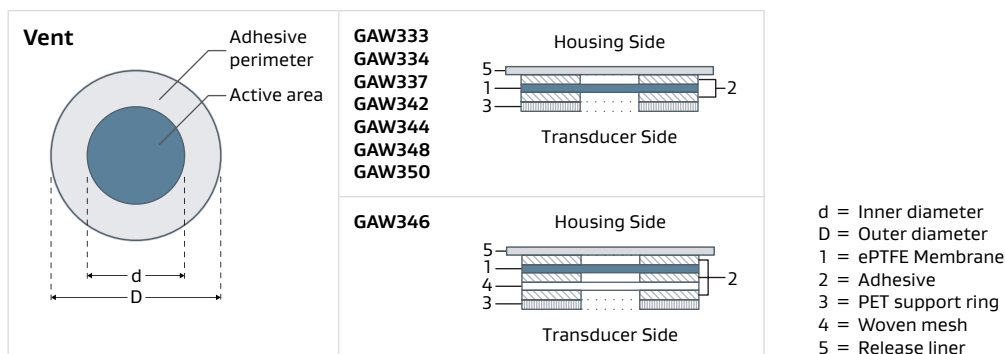
4) Part I.D. 1.6 mm/O.D. 3.8 mm with back pressure on captive ring.

5) Part I.D. 2.0 mm/O.D. 4.2 mm with back pressure on captive ring.

6) Assumed Conditions:

- Back Cavity Length of 1 mm
- Back Cavity Aperture Diameter of 1 mm
- Insertion Loss measured at 1 kHz

Vent Design



Standard Parts

Transducer Type: Microphone

Dimension (mm)			Part Number								
Inner	Outer	Reference Thickness ¹	Series GAW112	Series GAW333	Series GAW334	Series GAW337	Series GAW342	Series GAW344	Series GAW346	Series GAW348	Series GAW350
1.0	2.6	0.23	–	–	–	–	–	–	–	GAW3481.02.6	–
1.0	2.6	0.25	–	–	–	–	–	–	–	–	GAW3501.02.6
1.4	3.0	0.36	–	–	–	GAW3371.43.0	–	–	–	–	–
1.4	3.0	0.31	–	–	–	–	GAW3421.43.0	–	–	–	–
1.6	3.2	0.23	–	–	–	–	–	–	–	GAW3481.63.2	–
1.6	3.2	0.25	–	–	–	–	–	–	–	–	GAW3501.63.2
1.6	3.2	0.31	–	GAW3331.63.2	GAW3341.63.2	–	GAW3421.63.2	–	–	–	–
1.6	3.8	0.31	–	–	–	–	–	GAW3441.63.8	–	–	–
1.6	4.2	0.28	–	–	–	–	–	–	–	–	–
2.0	3.6	0.23	–	–	–	–	–	–	–	GAW3482.03.6	–
2.0	3.6	0.25	–	–	–	–	–	–	–	–	GAW3502.03.6
2.0	3.6	0.31	–	GAW3332.03.6	GAW3342.03.6	–	GAW3422.03.6	–	–	–	–
2.0	4.2	0.31	–	–	–	–	–	GAW3442.04.2	–	–	–
2.0	4.2	0.40	–	–	–	–	–	–	GAW3462.04.2	–	–
2.4	5.0	0.31	–	–	GAW3342.45.0	–	–	–	–	–	–
3.0	6.0	0.31	–	–	GAW3343.06.0	–	–	–	–	–	–
3.0	8.0	0.24	GAW1120308	–	–	–	–	–	–	–	–
4.0	8.0	0.31	–	–	GAW3344.08.0	–	–	–	–	–	–
5.0	9.4	0.31	–	–	GAW3345.09.4	–	–	–	–	–	–
5.0	9.4	0.24	GAW1120509	–	–	–	–	–	–	–	–
6.4	12.7	0.24	GAW1120613	–	–	–	–	–	–	–	–
9.0	19.0	0.24	GAW1120919	–	–	–	–	–	–	–	–
12.7	25.4	0.24	GAW1121325	–	–	–	–	–	–	–	–
20.0	29.0	0.24	GAW1122029	–	–	–	–	–	–	–	–
2x2	4x4	0.31	–	–	GAW3342.04.0R	–	–	–	–	–	–

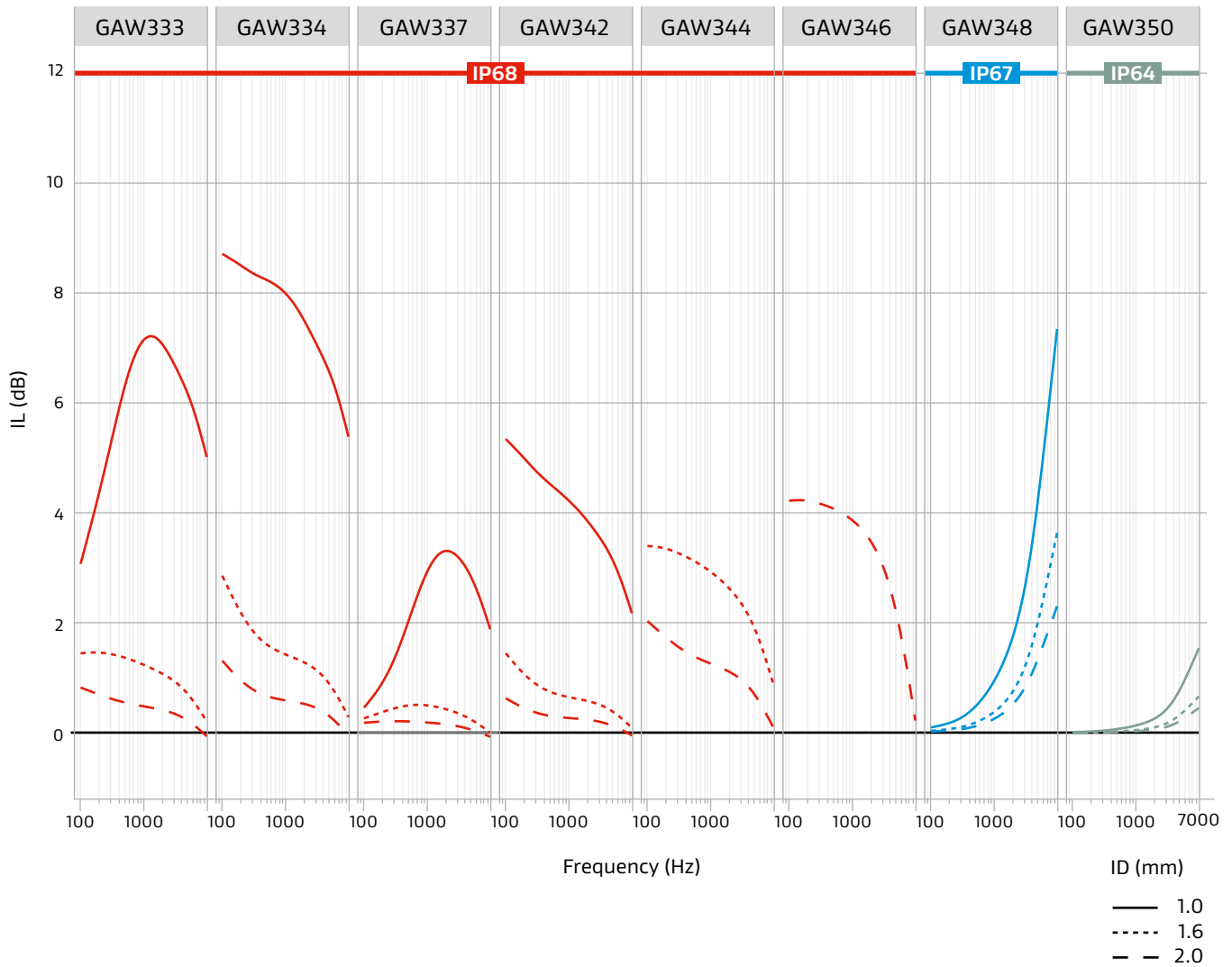
Note: • For all the standard parts, the support ring material is PET, and the adhesive is acrylic.
 • To the best of our knowledge, all the standard parts do not have any restricted substances above the maximum concentration values listed in RoHS Directive 2011/65/EU.

1) Nominal aggregate thickness of all layers (adhesive/membrane/support material) of finished part. Actual thickness may vary due to construction of finished part and compressibility of materials.

Unparalleled Acoustic Performance

Acoustic Response Comparison at Different I.D. Sizes & Frequency

Insertion Loss (dB) by IP Rating: Material vs. ID Size



Leading OEMs trust our mic vents for impeccable performance and reliability, ensuring superior acoustics especially in high fidelity devices where sound is paramount. In line with our commitment to pushing boundaries and igniting innovation, we offer primarily reactive materials and primarily resistive materials that set new standards for performance and reliability.

Our acoustic vents ensure:

- Consistent, low acoustic loss
- Improved contamination resistance
- Higher IP ratings
- Reduced complaints and returns

Acoustics Expertise



Mobile electronics acoustics are at the core of our venting business with over **30 years of experience**.



Better **measurement of acoustic part** performance in design and mass production phase.



Proven **acoustic modeling capabilities** to support your design process.

Acoustic Measurement

We continuously invest in expanding our knowledge and testing capabilities. Our dedication is showcased through our significant investments in acoustic capabilities, ensuring we adhere to the highest testing standards, guaranteeing the inherent reliability of our products.



Acoustic testing inside Gore's anechoic chamber

Acoustic Design Guide

Gore's design and engineering team utilize their market-leading expertise to create an acoustic design guideline, in which we explained how to effectively optimize mechanical, acoustic, environmental and other requirements to ensure the best possible balance of protection and acoustic performance for your device. To learn more, check out the "Gore Acoustic Design Guide": gore.com/acoustic-design-guide



Installation Guide

Integrating portable vents with your products can be a technical nightmare since all the requirements make installation costly and time consuming. Gore drives down development time with easy and reliable vent installation all backed by the fact we currently support over 1 billion installations globally. Please follow the "Installation and Handling Guidelines on GORE® Portable Electronic Vents" to maximize the performance of the vents for the lifetime of your product: gore.com/pev-installation-guidelines



The Gore Way of Testing

Particle Testing

IP6X defines “dust tight” as no ingress of particles. The Gore test evaluates how our vents protect against all common sizes of indoor and outdoor particulates, with a focus on particles between 1–10µm — a size range common in environments where mobile electronics are used.

Splash Testing

Gore engineers developed a rigorous “moving showerhead” test that increases the likelihood of water directly splashing on device openings, like it would happen under real-world conditions.

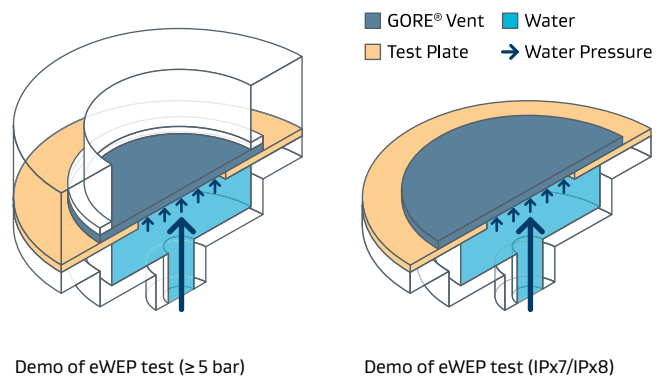
For devices designed to have openings near the transducers, this test can help to predict how well such devices will function and maintain sound quality in the consumer’s hands.

Using these Gore protocols, design engineers can now evaluate potential housing solutions during the development process, instead of after the device has been completed and assembled.

Finally, every GORE® Acoustic Vent provides oleophobic protection. Therefore, they help keep your device protected, whether it’s splashed by water or by low surface-tension liquids such as soapy water.

eWEP (extended Water Entry Pressure) Testing

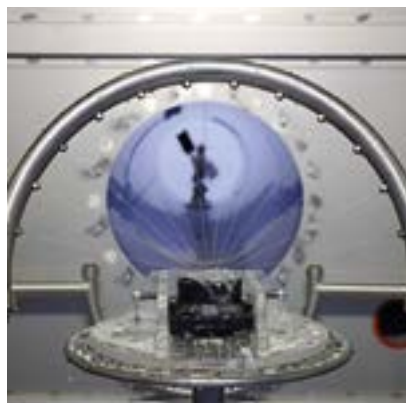
Gore conducts an in-depth waterproof test twice at the membrane and part level, a step that supplements and solidifies the reliability testing done by customers. eWEP testing is conducted to simulate waterproof performance in an immersion environment. The vent is installed on a test plate, secured in a fixture, and tested under water pressure for a specified time.



IP6X test



IPX4 test



Waterproof test



Why Choose GORE® Portable Electronic Vents for Your Electronic Devices?

Leading OEMs have specified over 10 billions of GORE® Portable Electronic Vents because they know our products and services can help accelerate their development of innovative and differentiated devices in fast-paced, highly competitive markets.



Product & Application Leadership

Grounded in a deep understanding of material science and acoustics, Gore can provide the optimum venting solution. We balance trade-offs between diverse problems such as adverse operating environments, immersion events and acoustic performance.



Reliable Performance

To ensure products are “fit for use”, every Gore product must adhere to the highest standards of quality, performance and reliability. Through a comprehensive understanding of end-use applications and requirements, our products do what they say they will do.



Fast Development

The mobile electronics industry develops and releases new products quickly. Our fast response to customer requests during the development process sets us apart. Gore supports this need for quickness with designs and prototypes to ensure engineering teams can meet their project timelines and their application requirements.



Supply Security

Leading OEMs specify Gore because we have consistently proven our ability to quickly ramp up to supply vents for projects of over 10 million devices per year and to continue to supply high quality products on-time without disruption.



Material Science

Gore is a global materials science company dedicated to transforming industries and improving lives. Gore develops materials with microporous structures that provide desirable attributes and performance characteristics to engineer vents and other products used in a variety of markets and industries.



Global Support

Our global teams of sales associates, application engineers, manufacturing engineers, and research personnel enable us to provide agile and robust support to customers around the world.



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 13,000 Associates and a strong, team-oriented culture, Gore generates annual revenues of \$4.8 billion.

Learn more at gore.com/portableelectronics

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