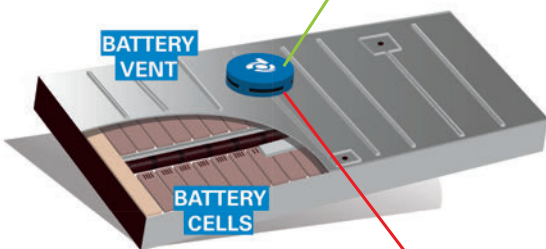
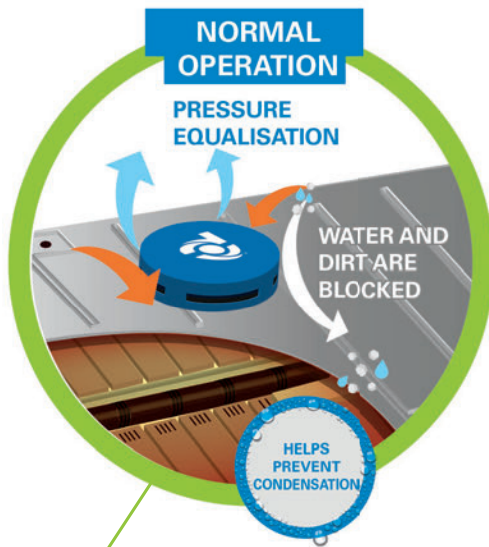
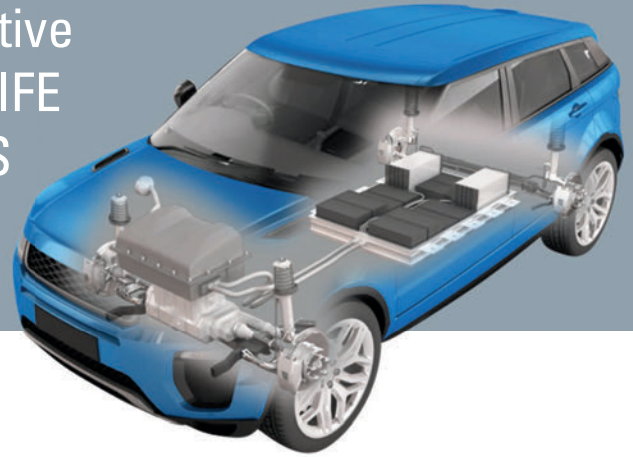


Dual-stage vents help PROTECT automotive battery packs and SUPPORT BATTERY LIFE and RELIABILITY with 4 KEY FUNCTIONS



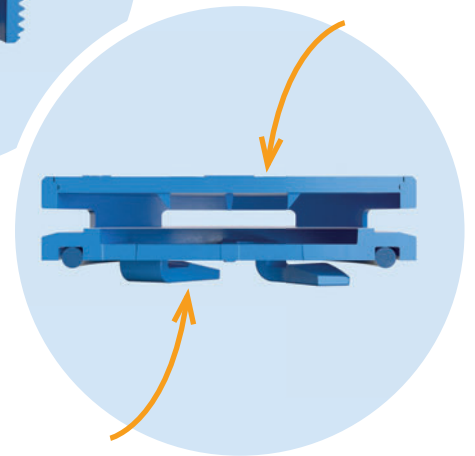
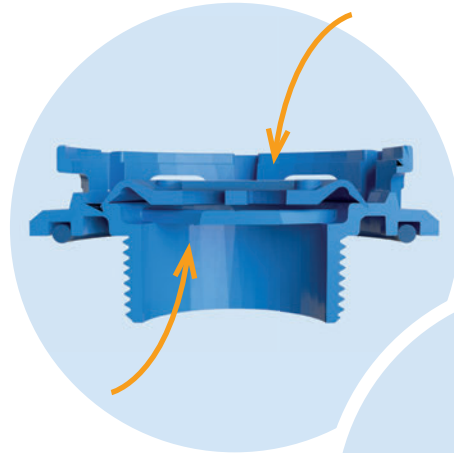
- 1 **Sealing and guarding** against water, dirt, contaminants and harsh automotive fluids.
- 2 **Continuous pressure equalization** to help protect the battery housing against excess over- or underpressure during the life of the battery.
- 3 **Effective ventilation**, allowing damp air which could accumulate inside the battery housing to be expelled with each warming-up cycle, helping to avoid potential internal condensation issues under certain atmospheric conditions.
- 4 **Helps ensure proper mitigation** in case of a thermal runaway event inside the battery, allowing large amounts of gasses to be expelled in a short timeframe.

HOW DOES IT WORK?

Properly designed venting systems provide protection from contaminants along with pressure equalization during normal operating conditions, helping lead to longer-lasting enclosures and battery life cycles. In the rare case of thermal runaway, the venting system must also be capable of providing immediate pressure relief, helping avoid component failure or propagation to additional cells.

1 The first stage of dual-stage battery venting is pressure equalization. A porous ePTFE membrane allows air and other gases to move in and out of the battery pack.

Pressure equalization is needed during normal vehicle operation, due to changes in altitude and temperature.



BURST VENT



FLEX VENT

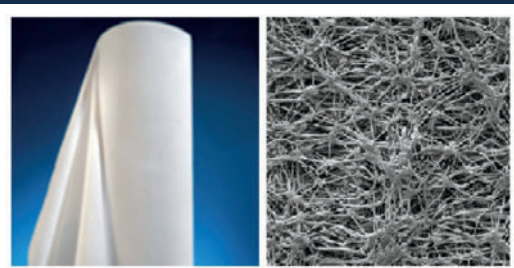


2

In the case of rapid pressure and heat buildup, the second stage helps maintain internal enclosure pressures by allowing gases to escape by either bypassing the membrane with the umbrella flex or bursting the membrane.

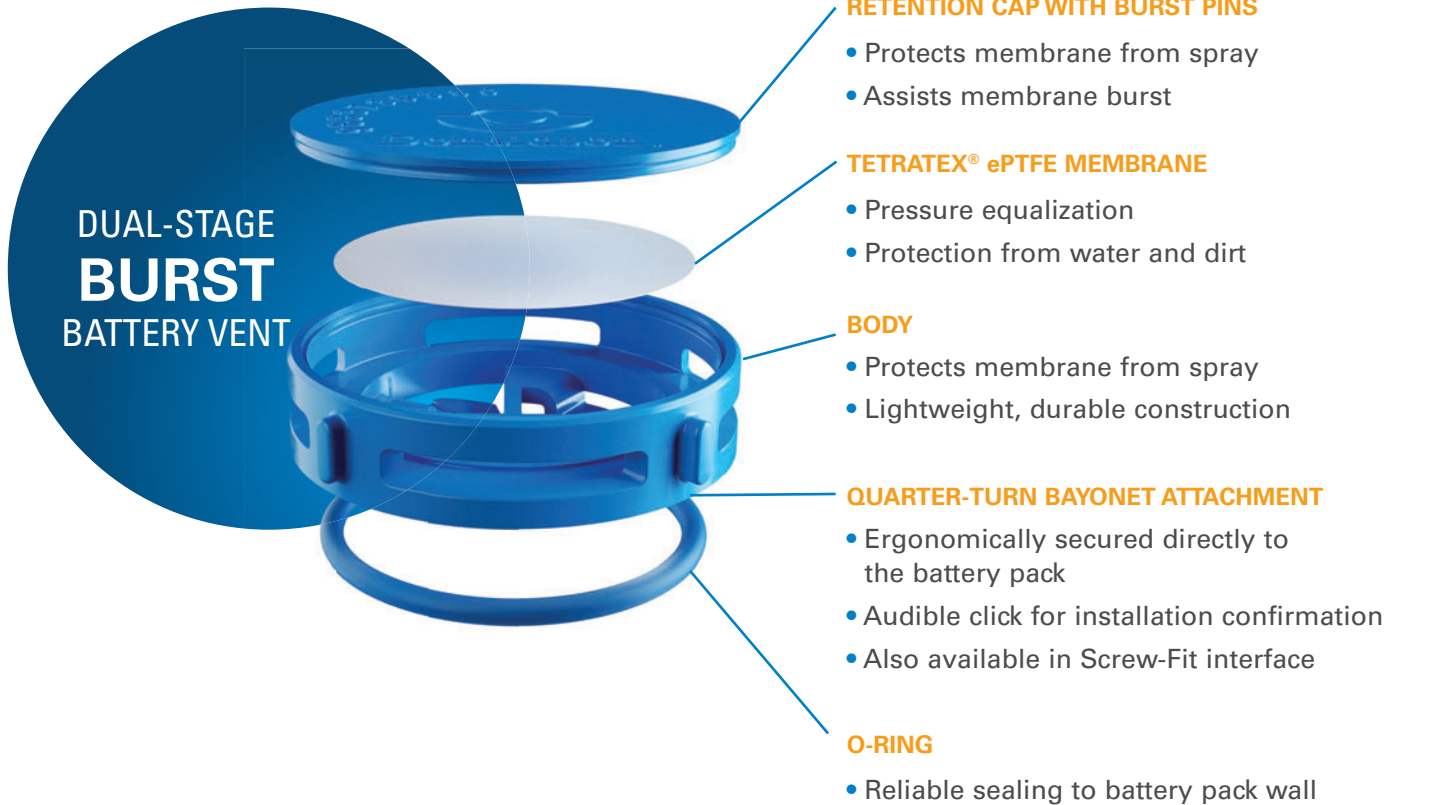
THE DONALDSON DIFFERENCE

Donaldson's proprietary Tetratex® ePTFE membrane is the core technology behind our vents. Tetratex® membrane has a unique microporous structure and is comprised of small, randomly connected fibrils that can be used as permeable water barriers for venting enclosures. Donaldson's proprietary oleophobic treatment process also helps the filter media repel oils.



DONALDSON DUAL-STAGE BATTERY VENTS

FEATURES & BENEFITS



RETENTION CAP

- Protects membrane and umbrella from spray
- Provides compression for umbrella valve seal

TETRATEX® ePTFE MEMBRANE

- Pressure equalization
- Protection from water and dirt

ELASTOMER UMBRELLA VALVE

- No airflow under external pressure
- High airflow under internal pressure

BODY

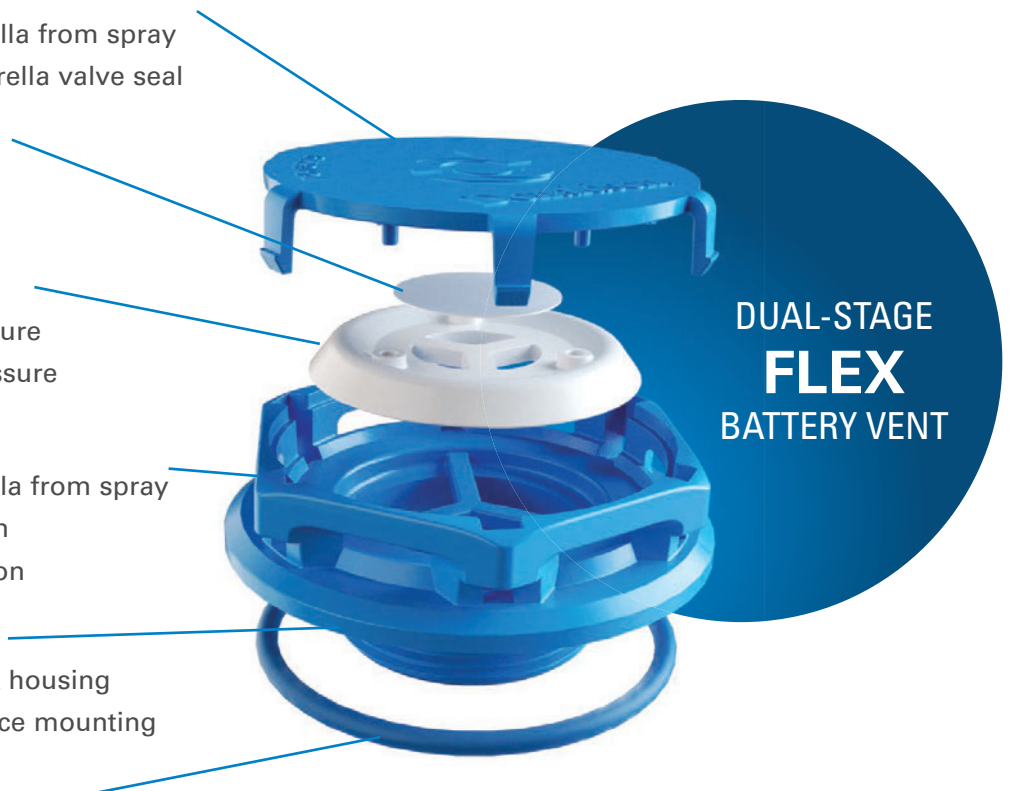
- Protects membrane and umbrella from spray
- Hex feature for quick installation
- Lightweight, durable construction

SCREW-FIT ATTACHMENT

- Easy attachment to battery pack housing
- Lock nut available for thin surface mounting

O-RING

- Reliable sealing to battery pack wall



PRODUCT SPECIFICATIONS

DUAL-STAGE BURST



DUAL-STAGE FLEX



MINIMUM AIRFLOW (during normal operation)	17.8 liters/hour @10 mbar		
RELEASE PRESSURE	< 350 mbar burst		Dual-Stage Flex is a custom development project.
DEGASSING AIRFLOW*	> 30 liters/second @300 mbar		Please contact us to discuss your specific application.
INGRESS PROTECTION (IP) GRADE	IP 67, IP 68, IP 69K*		
MEMBRANE	Hydrophobic & Oleophobic Tetratex® ePTFE		Hydrophobic & Oleophobic Tetratex® ePTFE
INTERFACE OPTIONS	Bayonet: Quarter turn - various enclosure thicknesses	Screw-Fit	Screw-Fit
DIMENSIONS: DIAMETER	Bayonet: 51 mm	Screw-Fit: 58 mm	Screw-Fit: 58 mm
HEIGHT (above enclosure)	Bayonet: 11 mm	Screw-Fit: 13 mm	Screw-Fit: 13 mm

*Degassing airflow is dependent on application conditions. IP 69K is dependent on vent location/placement on the battery pack.

Donaldson is IATF 16949 certified and our focus is on high quality manufacturing, responsive customer service, and tailored solutions that can be easily integrated into our customer's device or application. Our unique, proprietary membrane and oleophobic treatment processes allow us to select the best types of materials to meet your application requirements. Donaldson Company is a leading global provider of filtration products, with sales and manufacturing of venting products in the U.S., Europe and Asia.

LET DONALDSON BE YOUR PARTNER IN PROBLEM SOLVING.

www.donaldsonventing.com

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