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Pressure Relief Vent Plugs

Basics About Pressure Balance Elements (PBEs)

When we refer to "Vent Plugs" we should keep in mind that we are talking about "Pressure Balance Elements (PBEs)" because the main function of a PBE is to balance the pressure between the inside and outside of an enclosure. In other words, a PBE is used to maintain a differential pressure of ΔP = 0 between inner and outer atmosphere of an enclosure.

It is important to notice that a PBE does not provide the following effects:

- Permanent air circulation into the enclosure
- Cooling the enclosure
- Dehydration of enclosed air

The pressure inside an enclosure is directly proportional to the temperature. The maximum temperature of an enclosure depends on the following conditions:

- Environmental conditions
- Power dissipation of the (electronic) components inside
- Design of the enclosure
- Design of the heat exchanger

Consequently, the potential for a PBE to reduce the time to reach a ΔP = 0 will depend on the application conditions above. Reducing the maximum temperature of the system can only be done by improving the heat exchangers or by forced cooling (active cooling systems like air conditioners or Peltier elements).

Why use a PBE

First, a PBE or vent plug balances the pressure difference between the inside and outside of an enclosure and eases the strain on enclosure seals and gaskets, thus extending the lifetime of the complete system. Second, despite being permeable to gases, vent plugs are available in IP ratings from IP66-IP69K to align with the specifications of the enclosure. Finally, due to gas permeability, a PBE prevents corrosion and water condensation inside the enclosure.

How to use a PBE?

There are two parameters which define the performance of a PBE:

- Air Flow Rate (AFR)
- Water Intrusion Pressure (WIP)

Both parameters depend on each other and are determined by the PBE or vent plug membrane and design. A PBE should show a high AFR and the highest possible WIP. Generally, the AFR is determined at a differential pressure of ΔP=70 mbar (hPa). This is equal to ΔP=70 mbar=1 PSI (pounds per square inch; 1 Pa= 1 N/m2). Because most data is based on a differential pressure of ΔP=70 mbar, it is possible to compare different PBEs.

An increase of the AFR results in a decrease in the WIP when using the same PBE type. In other words, the Water Intrusion Pressure is lower for membranes showing higher Air Flow Rates. As a result, the WIP limits the IP rating of an enclosure when a PBE is used.

The following principle should be followed when selecting a vent plug(s) for a specific system and application conditions: The maximum differential pressure ΔP of the enclosure or system should not exceed the WIP value of the PBE – at least not during a negative pressure differential inside the enclosure (for example: cooling process after switching off the system) – as water could be sucked into the enclosure together with the ambient outside air.

Use these general guidelines for the selection of a PBE or vent plug(s) that meets your application conditions and system specifications.

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Pressure Relief Vent Plugs

Polyamide Pressure Relief Vent Plugs Features

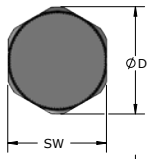
- Lock nut and washer included
- Operating temperature -20 to 100°C [-4 to 212°F]
- PA 6 (Polyamide 6) material
- UL94 V2
- O-ring and gasket NBR (nitrile butadiene rubber) material

MBVPG-11-L

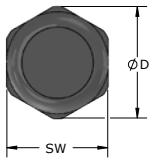
MBVPG-23-WNL

Polyamide Pressure Relief Vent Plugs

Thread (Metric EN 60423)	Thread Length (TL) (mm)	Part Number	Price	Qty	Color	Air Flow 70 mbar/1psi (mL/min)	Water Intrusion Pressure (bar)	Design Type	SW (mm)	D (mm)	H (mm)
M6 x 0.75 mm	10	MBVPG-11-L	$-645i:	2	Light Gray	133	0.5	D	10	11	6.15
		MBVPG-21-L	$-645j:		Black						
M12 x 1.5 mm	10	MBVPG-13-WNL	$645k:		Light Gray	417	0.5	D	17	18.8	6.15
		MBVPG-23-WNL	$-645l:		Black						
M12 x 1.5 mm	10	HBVPB-11L-WNL	$645n:		Light Gray	2,000	0.2	A	17	18.5	7.6
		HBVPB-21L-WNL	$645o:		Black						
M12 x 1.5 mm	10	UHBVPB-11L-WNL	$645p:		Light Gray	5,000	0.1	A	17	18.5	7.6
		UHBVPB-21L-WNL	$645q:		Black						
M20 x 1.5 mm	10	MBVPE-11-WNL	$645s:		Light Gray	2,000	0.5	E	24	26	11.7
		MBVPE-21-WNL	$;645t:		Black						
M40 x 1.5 mm	18	MBVPX-18-S	$645u:		Light Gray	6,250	0.5	F	—	55.5	15.5
		MBVPX-28-S	$645v:		Black						



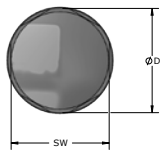
Type A



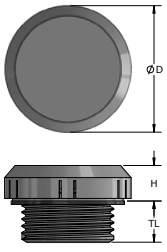
Type D

Polyamide Pressure Relief Vent Plugs Additional Info

Part Number	Recommended Tightening Torque	Recommended Wrench Size	Ingress		Agency Approval And Standards	Drawing Link
			IP Rating	UL50E/ C22.2 No.14-2010		
MBVPG-11-L	0.2 N•m ± 0.1 2 ± 1 ft•lb	10mm	IP67 IP68 IP69K	—	CE	PDF
MBVPG-21-L						PDF
MBVPG-13-WNL	0.5 N•m ± 0.1 4 ± 1 ft•lb	17mm				PDF
MBVPG-23-WNL						PDF
HBVPB-11L-WNL			IP67 / IP68	Type 4X / 12 / 13	CE UR File E350312 UL508A UL50E CAN/CSA C22.2 No.14-2010	PDF
HBVPB-21L-WNL						PDF
UHBVPB-11L-WNL						PDF
UHBVPB-21L-WNL						PDF
MBVPE-11-WNL	1.0 N•m ± 0.5 9 ± 4 ft•lb	24mm		—	CE	PDF
MBVPE-21-WNL						PDF
MBVPX-18-S	5.0 N•m ± 0.5 44 ± 4 ft•lb	51mm		Type 4X / 12 / 13	CE UR File E350312 UL508A UL50E CAN/CSA C22.2 No.14-2010	PDF
MBVPX-28-S						PDF



Type E



Type F

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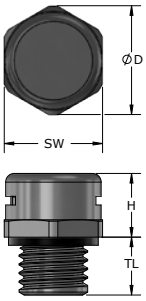
Pressure Relief Vent Plugs

Stainless Steel Pressure Relief Vent Plugs Features

- Lock nut, O-ring, and gasket included
- Operating temperature -20 to 100°C [-4 to 212°F]
- Stainless steel
- O-ring NBR (nitrile butadiene rubber) material

MBBVP-01L-WNL

Stainless Steel Pressure Relief Vent Plugs										
Thread (Metric EN 60423)	*Thread Length (TL) (mm)*	*Part Number*	*Price*	*Qty*	*Air Flow 70 mbar/1psi (mL/min)*	*Water Intrusion Pressure (bar)*	*Design Type*	*SW (mm)*	*D (mm)*	*H (mm)*
M12 x 1.5 mm	10	***MBBVP-01L-WNL***	$645x:	1	417	0.5	C	17	18.8	11
M12 x 1.5 mm	10	***HBBVP-01L-WNL***	$645y:		2,000	0.2		17	18.8	11
M20 x 1.5 mm	10	***HBBVP-03-WNL***	$645z:		2,000	0.2		22	24.5	13



Type C

Stainless Steel Pressure Relief Vent Plugs Additional Info						
Part Number	*Recommended Tightening Torque*	*Recommended Wrench Size*	*Ingress*		*Agency Approval And Standards*	*Drawing Link*
			IP Rating	*UL50E/ C22.2 No.14-2010*		
MBBVP-01L-WNL	0.5 N•m ± 0.1 4 ± 1 ft•lb	17mm	IP67 / IP68	Type 4X / 12 / 13	CE UR File E350312 UL514B CSA22.2 No 18.3-12 CSA22.2 No 94.2-1S	PDF
HBBVP-01L-WNL						PDF
HBBVP-03-WNL	1.5 N•m ± 0.5 12 ± 4 ft•lb	22mm		—	CE	PDF