

## Thread seals: O-ring vs. flat gasket

PMA fittings for IP68 rating are delivered with a conduit sealing cap NVN3 and a thread sealing device.

There are two available types of thread seals: O-rings and flat gaskets. Sometimes just one of them is included in the packing units of PMA male thread adaptors sometimes both. This has caused numerous questions in the past.

When only one type of seal is included its use is recommended by PMA. The use of the respective other seal type would be technically inappropriate or insecure due to constructive details and PMA will reject responsibility for such installations.

When both sealing devices (O-ring and flat gasket) are delivered with the threaded adaptor the customer can choose at his own discretion his preferred sealing device.

- **O-rings** provide good sealing performance on smooth, even surfaces with limited contact area. The correct use of O-rings requires special constructive measures (grooves) at the thread flange. See more information below under "O-rings".
- Due to their larger contact area **flat gaskets** also provide good sealing on slightly uneven surfaces. Erratic cavities will more likely be covered and sealed the wider the surface over which the gasket is fitted.
- The combined use of both an O-ring and a flat gasket does not provide better sealing performance. On the contrary – if the two devices physically overlap the sealing performance might even decrease.

### **O-rings OR**

O-rings are bi-directional seals, circular in shape and cross-section. They are generally made of elastomeric materials but may be made of other materials as well. This information deals entirely with elastomeric O-rings and stationary applications where neither the seal nor the sealed surfaces will move after installation.

An O-ring seals through elastic-plastic deformation of the cross-section of the O-ring material. The deformation is caused either by media pressure or by mechanical pressure created by the surrounding geometry through special constructive measures, e.g. standardised O-ring positioning grooves. When the depth of the O-ring groove is shallower than the O-ring's diameter, the O-ring will be deformed and compressed to close off the gap between mating components.

However, if the pressure becomes too high in relation to the material's deformability, the O-ring might get pressed into the gap and destroyed. In static applications the recommended compression of the O-ring is usually between 15-30%. Care should be taken when designing the grooves to ensure correct compression of the O-ring for good sealing performance.

Furthermore parts should be assembled with care so that the O-ring is properly placed in the foreseen groove and not damaged when the gland is closed:

- metal parts and counterparts should be rounded and free from sharp edges
- the roughness of the mating surface has to be checked to avoid O-ring damage during installation
- twisting of the O-ring during installation should also be avoided

The subsequent PMA fittings can be used with an O-ring as a thread sealing device:

- Male metric metal thread fittings (N/MVNV-M, N/MVWV-M, N/MVBV-M, N/MVAV-M)
- Metal thread swivel fittings (NSBV)
- Metal adapters like: SWA, SCA, MAVI

The following PMA fittings should be used with an O-ring as a thread sealing device:

- Strain relief fittings: NVNZ-P/P, NVNZ-M/P (Pflitsch system) – exclusively with O-ring  
NVNZ-P, NVNZ-M (Jacob system)
- Female thread fittings: BVIDG, BVIVG, NVIVG

#### **Flat gaskets SVN4**

PMA flat gaskets are produced from aramide-fibre reinforced synthetic rubber (NBR). They cover the flange at the bottom of the thread and are squeezed between the fitting and the mating surface when the fitting is fixed.

Flat gaskets achieve the best sealing performance when compressed equally across their entire surface. However, due to their relatively large surface area compared to O-rings they can provide good sealing also on slightly uneven surfaces.

If used with fittings equipped with an O-ring groove at the thread flange flat gaskets must be correctly centred.

During installation flat gaskets are less sensitive to damage, pollution or being crushed. Furthermore the requirements upon the geometry of the mating components are less stringent than for O-rings.

Flat gaskets are specially recommended for use with all fittings without an O-ring groove:

- all male plastic threaded IP68 fittings  
(B/SVNV-P/M, B/SVWV-P/M, B/SVAV-P/M,...)
- male PG metal thread fittings  
(N/MVNV-P, N/MVWV-P, N/MVBV-P, N/MVAV-P)

### **Sealing with paste or glue**

For some products the counterpart is undefined in a way that a sealing can not be foreseen from the side of PMA (e.g. female threads BVIR, BVIRA, connections to solid tubes BVNR-RE).

If no O-ring is provided on the mating part of the PMA fitting the customer has to take care of the sealing during installation (e.g. with special sealing paste or glue).

In the documentation these items will be indicated with "IP68 on conduit side").