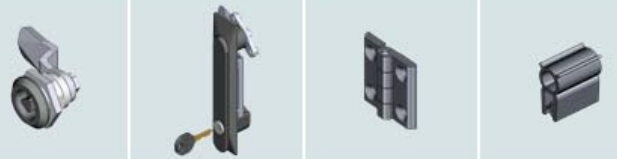
ENCLOSURE GASKETING



EMKA Gaskets

Gasketing Fundamentals

Typical Requirements

1. Sealing (water) - Most commonly gaskets are used to keep water from damaging the contents of an enclosure.

   - Several standards exist for different degrees of protection.

2. Sealing (other fluids) – Compatible material is needed

3. Shielding - Prevent EMI radiation from either entering or leaving an enclosure.

4. Life – The gasketing should last the expected life of the enclosure.

GASKET **Bubble Vs. Foam**

PRO

- Better sealing
- Lower installation costs
- Lower closing force
- More compliant
- Long life
- Foolproof installation

CON

- Needs radiused corners – this does increase the cost of manufacture and must be weighed against all the benefits
- More expensive per foot

Fundamentals of Sealing

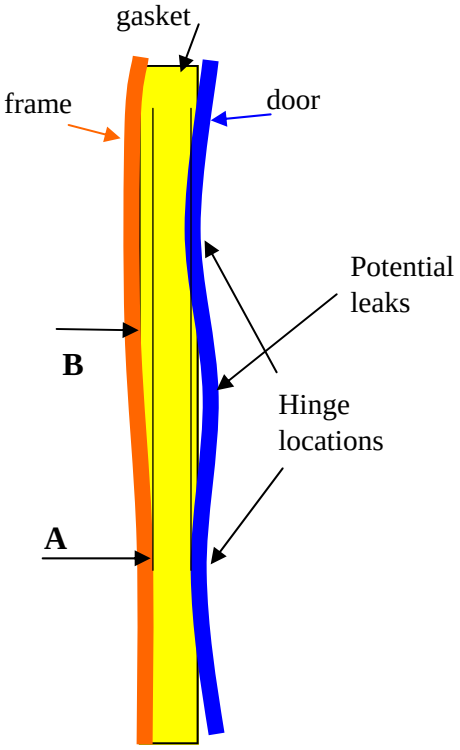
Compression Force – In order to seal; a gasket must exert some force on the surfaces to be sealed.

A minimum force is required to provide sealing

The force the gasket exerts on the door is generated by compressing the gasket.

This force is proportional to the compression, therefore the force varies along the gasket.

This compression force bends the door.



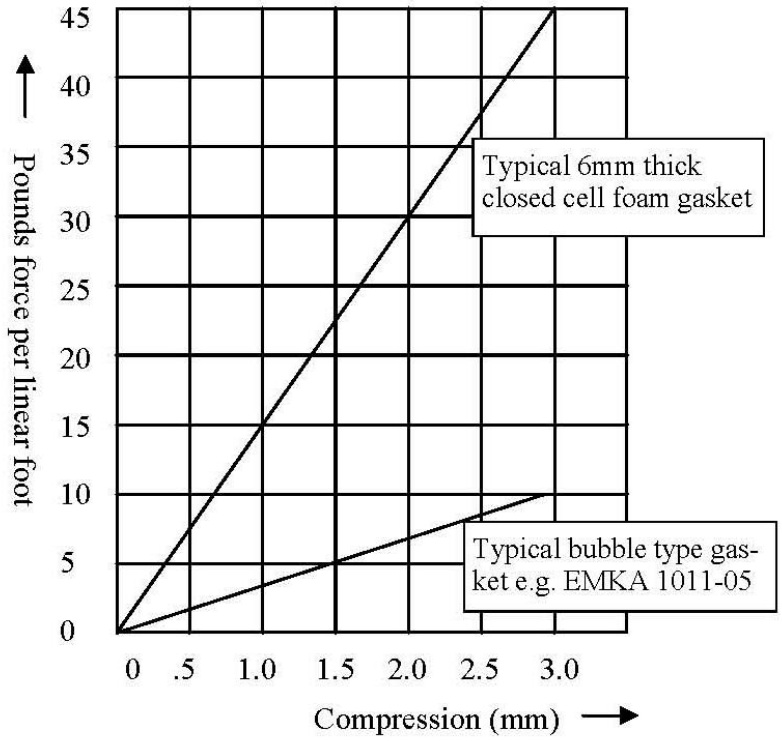
A – maximum force
B – Minimum force

Fundamentals of Sealing

Force Vs Compression

The graph shows how force on the door increases as the percentage the gasket is compressed increases.

This shows the great advantage in using a low compression force gasket compared with a conventional (or Foam-in-Place) type.



Gasketing Sealing

Standards

Standard	Protection against	Other
NEMA 4 & 4X / UL 50	Hosed and splashing water	4X includes corrosion resistance
NEMA 3	Rain	Dust protected
NEMA 12	Dripping liquids	Dust protected
GR 487	70 MPH wind-driven rain	Dust protected
IP 54	Splashing water	Dust protected
IP 65	Water jets	Dust protected
IP 66	Powerful water jets	Dust protected

Gasketing – Clip-on

No Adhesive:
therefore no surface cleaning, no uncertainty

Only one joint - Reduced chance of leaks

Low compression force to seal

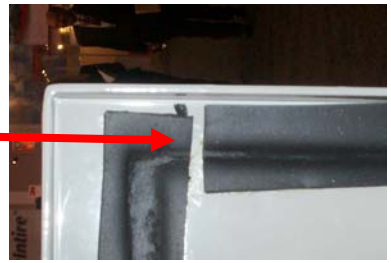
EPDM is best material available for long life (no oil) – used on roofs guaranteed for 30 years.

NBR excellent material for oil resistance plus weathering

No “pull back” at the corners

Side bubble

Top bubble



Gasketing – UL

Some of our EPDM gaskets are UL (and CSA) listed (see catalog); this is printed on the side of the gasketing.

Those gaskets listed by UL have passed a heat aging test (UL file #MH13838 for UL 50 and UL 50-E). This is 7 days at 70ºC (158ºF) without deterioration and is accepted as a good indicator of long life. They also have passed the UL 94-HB test for self extinguishing when in a horizontal position (UL file #E206536).

To verify our UL status go to UL.com and search for “emka*” the asterisk is important.

Gasketing – Oil Resistance

EPDM is excellent is harsh outdoor environments including the occasional splash of oil, but where significant oil is present **Nitrile rubber** (also known as NBR, Buna N, and Perbunan) is the material of choice. Machine tool coolant is typically oil based and requires Nitrile.

Top bubble

Side bubble

Gasketing – Material Properties

Operating Temperatures	EPDM	Nitrile (NBR)	Chloroprene (Neoprene)
Minimum °F / °C	-40 / -40	-40 / -40	-45 / -42
Maximum °F / °C	250 / 120	250 / 120	250 / 120
Chemical Resistance			
Weathering	E	G	G - E
Ozone	E	P	G
Oils	P	E	G - E
Acids	F	G	F - G
Alcohols	E	G – E	G - E
Polar Solvents (ketones)	P	E	P
Water	E	G	G
Mechanical Properties			
Compression set	G	G	F – G
Abrasion resistance	G	G - E	G – E

“Weathering” includes UV resistance. EPDM is inherently resistant because it is a saturated compound with few double bonds for the UV to attack. Also the carbon black in the mix is an excellent absorber of UV.

Gasketing – Material Properties

The preceding table is a guide only. For the following reasons we strongly advise rigorous testing under actual conditions.

- Many industrial fluids contain an unknown mixture of chemicals.

•Temperature and concentration of the chemical and any stress may make a significant difference to its effects on the gasket.

- Elastomers become softer at higher temperatures and more brittle as temperatures fall, how cold is too cold depends on the amount of flexing and shock loading; how hot is too hot depends on how much stress and what chemicals (e.g. O_3) the gasket is subject to.

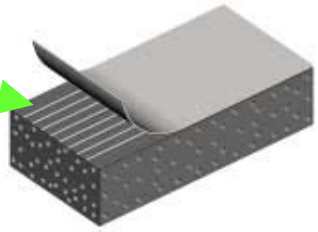
The other two gasket material that will be encountered are Urethane (PU) and Silicone. Urethane is available in many different varieties with a great range of properties, it is impossible to know how it will perform without more details. Silicone is resistant to most common chemicals and high temperatures, however its combination of poor tear strength and high coefficient of friction mean that it is easily damaged, it is quite expensive.

Gasket – Self adhesive

Two materials – EPDM / SBR blend for non-oily applications and Neoprene (Chloroprene) for where oil is present.

Fabric backing – the main reason self-adhesive gaskets leak is that in order to apply them without wrinkles they have to be stretched, so when they are released a gap forms as shown.

EMKA gasket has a non-stretch fabric back which overcomes this.



The photo also shows where the gasket has taken a “set.”

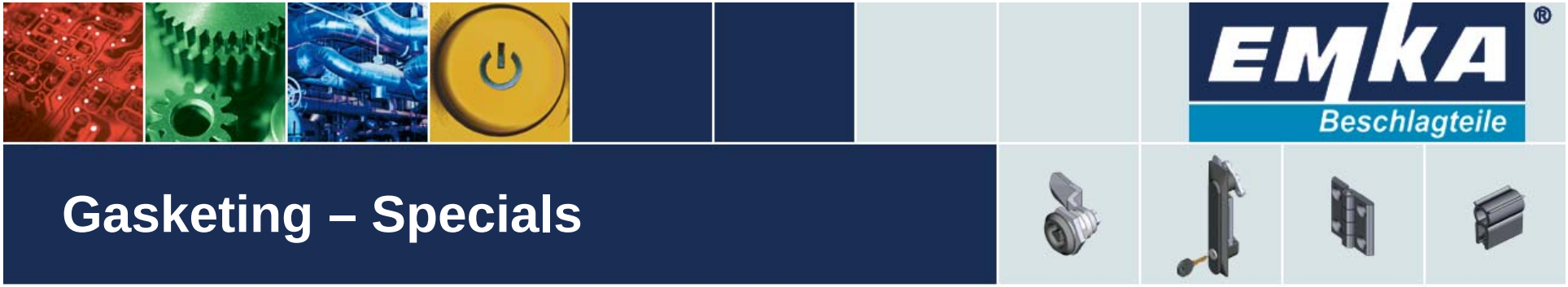
Gasketing – Channel

1. Inexpensive
2. Good for Right Angle corners
3. Needs a channel – a flange welded on as a stiffener allows the use of this type of gasket and lighter gauge steel for the whole door.

Gasketing – Window

1. Two piece – EPDM only, great outside no good for machine tool guards if coolant is present. Use the tool for easier installation

2. “S” type not as good a seal as the two piece, but easier to install and available in NBR



Gasketing – Specials

1011-S19 Fire resistant gasket (1011-05 profile). Typically 5,000m MOQ, this is not always required. Other profiles are tooled. The rubber (EPDM) is a softer compound than standard.

1011-XX-09 For HVAC applications. The surface is designed to inhibit the growth of bacteria and other pathogens which can spread infection and death (Legionnaires' Disease). The rubber (EPDM) is a softer compound than standard.

Gasketing – Joining

If the clip-on gasket is cut on site it can easily be compressed and installed leaving no gap.

If joining the ends is essential Black Max from Loctite will give a good, but inflexible, bond. If flexibility is required a two component urethane is suggested.

Gaskets can be vulcanized endless at the factory, this may require some tooling investment for profiles other than 1011-05, 1011-06 and 1011-10.

Gasket “frames” with molded corners can also be vulcanized.