GASKET SELECTION GUIDE

STEEL CITY SUPPLY

EMKA®
Beschlagteile

GASKET BENEFITS

STRENGTH

· Some EPDM gaskets are UL Approved
· 1/4 less closing force required compared to foam gasket
· Sealing forces remain relatively constant over time
· Reduced deformation of gasket profile over lifespan
· Fire resistant and EMC/EMI/RFI available.

STANDARDS

Standard	Protection Against	Other
NEMA 4 & 4X / UL 50	Hosed and splashing water	4X 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	IP 65	Dust protected
IP 66	IP 66	Dust protected

LOWER INSTALLATION COSTS

· Does not require great care in order to minimize leaks at corners
· Does not require cutting to length 4 times
· Does not require careful cleaning of the surface
· Faster installation increases overall productivity

INCREASED SEALING

· EPDM (Ethylene Propylene Diene Monomer) is almost impervious to weathering - water, UV, ozone, high ambient temperatures
· Increased sealing can reduce warranty claims
· Many profiles have 3 sealing points
· Reduced need for leak testing

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

GASKET TYPES

SELF-GRIPPING

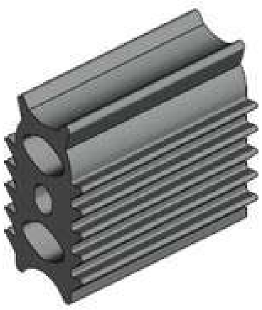
- Fast Push-On Installation
- Available in EPDM and natural rubber
- 3 Sealing surfaces with wire core for strength

EDGE PROTECTION

- Fast Push-On Installation
- Available in PVC
- Used to cover rough edges
- Wire core for strength

WINDOW

- 2 Piece Locking Installation
- Available in EPDM rubber
- Creates a seal between glass and other materials



U-CHANNEL

- Inexpensive
- Works well with right angles corners
- Requires welded flange for installation

FIRE RESISTANT

- UL94 VO and 94HB Ratings
- Good for working temps of +70°C to -30°C
- Resistance to many typical commercial/industrial chemicals and gases

EMC/EMI/RFI

- Reduces electronic noise
- Provides vibration damping and impact cushioning
- Good for working temps of +70°C to -30°C

MATERIAL REFERENCE TABLE

EMKA GASKET SERIES	1016	1030	1011 1074	1016	1003 1011 1038
Chemical Nomenclature	Natural Rubber	Styrol Butadien Rubber (Buna)	Nitrll Rubber (Perbunan)	Chloroprene Rubber (Neoprene)	Ethylene Propylene Dien Rubber
Abbreviations as per ASTM D 1418	NR	SBR	NBR	CR	EPDM
Shore A Hardness Range (#5)	40-90	45-90	45-90	40-90	40-90
Tensile Strength	4-15	4-15	4-14	5-15	6-13
Recoil Elasticity at 20° C	Excellent	Good	Satisfactory	Good	Good
Abrasion Resistance	Very good	Very good	Good	Good	Good
(1) Chemical Resistance	Good	Good	Satisfactory	Good	Very Good
(1) Oil Resistance	Low	Low	Excellent	Good	Low
(1) Petrol Resistance	None	Low	Good	Low	Low
(1) Solvent Resistance	Low	Low	Good	Good	(3) Satisfactory
(4) Temperature Stability in °C	-40 to +80	-30 to +80	-30 to +100	-25 to +100	-40 to +100
Ozone Resistance	Satisfactory	Satisfactory	Satisfactory	Very Good	Excellent
General Climate Resistance	Good	Good	Good	Very Good	Excellent
Gas impermeability	Satisfactory	Satisfactory	Good	Good	Satisfactory
(2) Resistance to permanent deformation	Very good	Good	Good	Good	Good
Adhesion to metal	Excellent	Very good	Satisfactory	Good	Satisfactory
Adhesion to textile	Excellent	Good	Satisfactory	Excellent	Satisfactory
Dielectric Properties	Very good	Good	Very Poor	Satisfactory	Very Good

(1) - In view of the multitude of chemicals, solvents, application temperatures and times the value quoted may vary in some cases. For Example, one type of elastomer which normally only has low resistance properties could show very good resistance to certain media.
(2) - At relatively high or low temperatures, resistance generally drops.
(3) - Good expansion resistance to various ester based plasticizers.
(4) - These are bordering values which, depending on the composition of the mixture, can vary. If used permanently in such borderline areas, this can lead to a change in physical values. For such extreme applications, it is advisable to use special elastomer mixtures.

MATERIAL TYPES

RUBBER TYPES

The most common chemical elements in rubber are carbon (C) and hydrogen (H). The polymers of natural rubber are mainly built of these elements. In synthetic rubber these elements are products from the petrochemical industry.

NATURAL RUBBER (NR) - production and properties The rubber tree grows in tropical climates and is cultivated in many countries. The biggest producers are Thailand, Indonesia and Malaysia, which combined produce 80% of world consumption. Plantations can also be found in South America and Africa. When tapping the tree, a cut is made through the bark and the latex drips down into a cup. A tree with a good yield can give 30-35 grams of rubber per day. The contents of the cups are emptied into containers and transported to a rubber factory. Acetic acid is added to promote coagulation. To manufacture smoked sheets, the rubber is made into sheets in a mill, washed, dried, smoked and finally classified. With the exception of butadiene rubber, natural rubber has the best elasticity of all rubber types. It has very good resistance to abrasion and fatigue. Among the drawbacks are the material's poor resistance to ozone (weather) and oils and fuels. Natural rubber is mainly used in the production of heavy-duty tires, vibration dampers, springs and bearings. For special purposes it is used in hoses seals, conveyor belts, coated fabrics and other products.

STYRENE-BUTADIENE RUBBER (SBR) - the most common type of synthetic rubber.
When the automobile industry developed, demands for rubber increased sharply. Many trials were made to produce a man-made rubber. The first synthetic rubber could not match natural rubber, but in the course of time several rubber types were developed that had many properties comparable with natural rubber, in some cases even better.

ISOPRENE RUBBER (IR) - very much as natural rubber.
Isoprene rubber has the same chemical structure as natural rubber (polyisoprene). However, it does not contain proteins, fatty acids and the other substances that are present in natural rubber. The physical properties of isoprene rubber are in general somewhat inferior to those of natural rubber but, in principle, the two types are very alike. Isoprene rubber is used in the same type of products as natural rubber.

MATERIAL TYPES

STYRENE-BUTADIENE RUBBER - the most common and cheapest synthetic rubber, serves as an example of the manufacturing principles. The basic material is derived from petroleum (oil) 2 which is a fossil formation from organisms that have been dead for millions of years. In the distillation process at the oil refineries, styrene and butadiene are produced, which are then used as raw materials for the production or styrene-butadiene rubber. The first step is to let styrene and butadiene react together. The new material consists of about 25% styrene, with butadiene making up the remainder. The result is a synthetic rubber that in principle has the same properties as natural rubber. Heat resistance is better but low temperature flexibility and tensile strength are less than for natural rubber. In general, around 60% of the polymers used are synthetic, while 40% is natural rubber. Styrene-butadiene rubber is used in many of the same products as natural rubber. It is also used to cover different types of hose and in a number of other products. For practicalreasons, abbreviations of the various rubber types have been internationally approved. These abbreviations are used in this presentation.

BUTADIENE RUBBER (BR) - the most elastic rubber type Butadiene rubber is polymerized butadiene. It is used in blends with other rubber types for improved elasticity, wear resistance and low temperature properties. A typical application is a blend of butadiene rubber and natural rubber in truck tires.

SPECIAL RUBBER TYPES

The above mentioned rubber types are so-called general purpose. Many other types are available, each with their own special properties. The most common special types in our products are ethylene-propylene, butyl, chloroprene and nitrile rubber.

ETHYLENE-PROPYLENE RUBBER (EDM/EPDM) - for manufacture of profiles at high temperatures, ethylene-propylene rubber, with the abbreviation EPDM, is used. The first two letters mean that the rubber consists of ethylene and propylene, but the letter D tells us that a diene is also present. That third monomer makes it possible to cure the rubber with sulphur since it introduces double bonds in the structure, thereby changing the structure to an unsaturated polymer. Since ethylenepropylene rubber does not crack outdoors (good ozone resistance) it is widely used for glazing seals in buildings and in the automotive industry. Steam hoses, high temperatureresistant seals and roll covers are other applications.

MATERIAL TYPES

BUTYL RUBBER (IIR) - when low gas permeation is needed Products used to prevent gases from passing through the material are based on butyl rubber. The polymer consists of isobutene with a minor part of isoprene. The isoprene makes the rubber unsaturated and possible to vulcanize. The gas permeability increases with increased temperature for all rubber types, but for butyl rubber it is very low, up to 160-175 F. Tyre inner tubes are made of butyl rubber.

CHLOROPRENE RUBBER (CR) - resistant to oil and weather. Most chloroprene rubber types consist solely of polymerized chloroprene monomers. The polymer has a good resistance to the outdoor climate and reasonable oil resistance. It is used in profiles and products which may be exposed to oil-based fuels.

NITRILE RUBBER (NBR) - for use with oil Nitrile rubber is a copolymer of acrylonitrile and butadiene. It is the most common polymer for products that are in contact with oil and fuel. Nitrile rubber is used in inner tubes for fuel and oil hoses, for example.

ADDITIONAL RESOURCES

EMKA UK - The What, Why and How of Rubber Specifications for Sealing Profiles
http://www.emkablog.co.uk/wp-content/uploads/2014/04/EMKA2278-rubber-materials-and-specifications-used-in-sealing-profiles.pdf

EMKA UK - Extrusion processes and terminology used in specification of standard and custom sealing profiles
http://www.emkablog.co.uk/wp-content/uploads/2014/04/EMKA2279-sealing-profiles-extrusion-processes-and-terminology.pdf

EMKA UK - Materials, Properties and Testing of Sealing Profiles
http://www.emkablog.co.uk/wp-content/uploads/2014/04/EMKA2277-materials-properties-and-testing-of-sealing-profiles.pdf

MATERIAL PROPERTIES

FLUID IMMERSION

NATIONAL AND INTERNATIONAL TEST METHODS

BS 903: Part A16:1987 & ISO 1817 'Method for the determination of the effect of liquids'

ASTM D471 'Rubber property - effect of liquids'

The action of a liquid on a rubber will generally result in [a] absorption of the liquid by the rubber [b] extraction of soluble ingredients from the rubber [c] a chemical reaction with the rubber.

The rate at which absorption takes place will depend upon the thickness of the rubber and the temperature of the liquid. The resistance of the rubbers to liquids depends on [a] the compatibility of the liquid with the rubber [b] the state of cure [c] the amount of contact i.e.> immersion or splash contact only.

The effect of a liquid can be measured by the change in properties such as tensile strength, hardness, volume and weight.

BRITTLENESS

NATIONAL AND INTERNATIONAL TEST METHODS

BS 903: Part A6:1992 & ISO 815:1991 'Method for the determination of compression set at ambient, elevated or low temperature'

ASTM D395 'Rubber property - Compression set'

This test measures the residual deformation of a rubber test piece after a compression period at a given test temperature. Typical test times would be 24, 72 &168 hours at temperatures of 23, 70, 100, 150C etc. The compression is normally 25% of the initial thickness. At the end of the test time the samples are released and allowed to recover for 30 minutes at room temperature before the final thickness is measured The result is calculated as % compression set = Deformation [set] x 100 Compression

Compression set and, in a similar manner, stress relaxation, can be influenced to a considerable extent by the crosslinking structure and the compunding (choice of cross linking systems, fillers etc.) as well as the vulcanisation time.

Low temperature Flexibility	Rubber
-75C	Q
-55C	NR, IR, BR, CR, SBR, (X)IIR, EP(D)M, CM, CSM, FVMQ, PNF
-40C	ECO, NBR, EP(D)M, CSM, FKM, AU, EU
-25C	ACM, NBR, OT, FKM
-10C	ACM, CO, FKM, TM, NBR

MATERIAL PROPERTIES

HARDNESS

NATIONAL AND INTERNATIONAL TEST METHODS

BS 903: Part 26:1995 & ISO 48:1994 'Method for the determination of hardness'

ASTM D1415 'Rubber property - International hardness'

ASTM D2240 'Rubber property - Durometer hardness'

The hardness of vulcanised rubber is normally measured in International Rubber Hardness Units [IRHD], however, sometimes American Durometer [Shore A] are used. The IRHD method of test is based on measuring the depth of indentation by a rigid ball under a dead load. The indentation depth is then converted into International Rubber Hardness Degrees on a scale of 0 [infinitely soft] to 100 [infinitely hard]. Results of any indentation test depend on the thickness of the test piece unless this is considerably greater than 8mm. Micro hardness testers are available which are useful for checking hardness of finished products to 2mm. 'Pocket hardness' gauges are used for taking measurements on line or on very large products but their accuracy is poor due to hand pressure application, Only the dead load type instruments or stand mounted Shore meters should be used for official reference.

HEAT RESISTANCE AND AGING

NATIONAL AND INTERNATIONAL TEST METHODS

BS 903: Part A19:1986 & ISO 188 'Heat resistance and accelerated ageing tests'

ASTM D573 'Rubber - Deterioration in an air oven' Heat will increase the risk of oxygen attack. When accelerated ageing tests are conducted the concentration of oxygen must be maintained by good air circulation through the oven. Rubbers are normally assessed for ageing performance at temperatures above their normal service temperature for a short period. This will give a measure of their performance. Change in physical properties are usually measured and reported as a percentage of their original values.

Heat resistance up to	Elastomer
100C	AU/EU, NR (IR), OT, SBR, PNR
125C	CR, NBR, X-NBR
150C	CO, ECO, EP(D)M, EVM, CM, CSM (X)-ITR, H-NBR
175C	COACM, EAM, PNF
200C	FVMQ
225C	MVQ
250C	FKM

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