

Material properties elastomer and rubbers

Material abbreviation	Unit	CR/NBR	NBR	NBR	SBR
		Polychloroprene-nitrile rubber	Acrylonitrile butadiene rubber	Acrylonitrile butadiene rubber	Styrene butadiene rubber
Basic properties					
Halogen-free		no	n.i.	yes	n.i.
Phosphorous-free		n.i.	n.i.	yes	n.i.
Silicone free		n.i.	n.i.	yes	n.i.
Thermal properties					
UL-Test number		n.i.	n.i.	n.i.	n.i.
Combustibility		extinguishes	n.i.	n.i.	n.i.
Flame resistance		very good	unsatisfactory	n.i.	unsatisfactory
min. temporary application temperature	[°C]	-40	-40	-35	-40
min. sustained application temperature	[°C]	-20	-30	-30	-30
max. sustained application temperature	[°C]	100	110	80	100
max. temporary application temperature	[°C]	130	130	100	110
Mechanical properties					
Hardness	[Shore A]	30-90	70-80	70-80	30-90
Tensile strength	[N/mm ²]	7-25	7-12	≥ 10	7-30
Notched impact strength		good	good	n.i.	good
Abrasion resistance		very good/ good	very good/ good	n.i.	very good/ good
Gas permeability (Diffusion)		mediocre permeable	mediocre permeable	n.i.	good permeable
Electrical properties					
Dielectric strength		mediocre	mediocre	poor	very good
Resistance					
Weather		1-2	3	3	X
UV		1-2	2	2	3
Ozone		2	3-X	X	X
Ageing		1-2	1	1	2-3
Acetone		1	X	X	3
Ethanol		1	1	1	1
Ammonia water-free		2	1-2	1-2	2
Benzene		X	3-X	X	X
Petrol Normal/ Super fuel to DIN		3-X	2	2-3	X
Brake fluid		3	3	Z.e.	X
Steam		X	up to 100 °C	up to 80 °C	X
Diesel fuel to DIN		3	1	1	X
Crude oil		3	1	1-2	X
Faeces fluid		1	1	n.i.	1
Fuel oil		3	1	1	X
Hydraulic oil (mineral oil based)		3	1	1	X
Potassium hydroxide solution		1	1	2	1
Kerosene		3-X	2	2	X
Carbon dioxide		1	1	1	1
Paints		Z.e.	Z.e.	Z.e.	Z.e.
Glue		1	1	1	2
Air, atmospheric, oil-free		up to 90 °C	up to 90 °C	up to 80 °C	up to 70 °C
Air, containing oil vapor		up to 90 °C	up to 100 °C	up to 80 °C	X
Solvents for paints		Z.e.	Z.e.	Z.e.	Z.e.
Seawater		1	1	1	3
Methanol		1	1	1 (up to 20 °C)	2
Mineral oil		2-3	1	1	X
Sodium chloride (aqueous)		1	1	1	1
Oil (vegetable, etheric)		2	1	n.i.	3-X
Petroleum		3	1	1	X
Phosphoric acid (50 %)		1-2	2	X	2-3
Nitric acid (40 %)		X	X	X	X
Hydrochloric acid (38 %)		3	3	X	2-3
Sulphuric acid (30 %)		2	2	3	2-3

Key for resistance ratings:
 1 = very good resistance
 2 = good resistance
 ● = material used for article

3 = mean/conditional resistance
 X = not resistant

n.i. = no information
 Z.e. = determine precise composition

	SBR/NBR	MQV	EPDM	FKM	TPE	PE	Centellen
	Styrene butadiene rubber with nitrile	Silicone rubber	Ethylene Propylene Terpolymere rubber	Fluorinated rubber	Thermoplastic elastomer	Polyethylene	
	n.i.	n.i.	n.i.	no	yes	n.i.	n.i.
	n.i.	n.i.	n.i.	yes	yes	n.i.	n.i.
	n.i.	no	n.i.	yes	yes	n.i.	n.i.
	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.
	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.
	unsatisfactory	unsatisfactory	n.i.	very good	n.i.	n.i.	n.i.
	-40	-80	-60	-25	-40	-40	n.i.
	-30	-50	-50	-20	-30	-30	-200
	100	175	120	200	140	80	200
	110/120	230	130	220	n.i.	100	350
	50-60	20-80	25-90	65-75	61	15,7 (H10)	n.i.
	5-10	4-9	7-20	9-11	10	5	11
	good	unsatisfactory	n.i.	mediocre	n.i.	n.i.	n.i.
	good/mediocre	mediocre	n.i.	good	n.i.	n.i.	n.i.
	mediocre permeable	very good permeable	very good permeable	impermeable	n.i.	n.i.	impermeable
	mediocre	very good	good	good	n.i.	> 25 kV/mm	n.i.
	3	1	n.i.	1	n.i.	2	1
	2-3	1	n.i.	1	1 (for black)	n.i.	2
	3-X	1	2	1	no cracks	n.i.	2
	2-3	1	n.i.	1	n.i.	n.i.	n.i.
	2-3	2	1	X	n.i.	2-3	2
	1-2	2	1	1	2	1	2
	1-2	2	1	X	n.i.	1	2
	X	X	X	2	n.i.	X	2
	X	X	X	1	n.i.	3	2
	3-X	X	X	Z.e.	3	2	n.i.
	3-X	X	up to 130 °C	up to 80 °C	n.i.	X	up to 175 °C
	X	3	X	1	n.i.	2	2
	X	3	X	1	n.i.	2	2
	1	1	1	Z.e. (1)	n.i.	1	1
	3-X	3	X	1	n.i.	2	2
	3-X	2	X	1	n.i.	3	2
	1-2	3	1	3	n.i.	1	n.i.
	3-X	3	X	1	n.i.	X	2
	1	1	1	1	n.i.	1	n.i.
	Z.e.	Z.e.	Z.e.	Z.e.	n.i.	Z.e.	n.i.
	2	1	3	1	n.i.	Z.e.	n.i.
	70 °C	up to 230 °C	up to 120 °C	up to 200 °C	n.i.	up to 90 °C	n.i.
	3-X/Z.e.	up to 150 °C	X	up to 200 °C	n.i.	up to 90 °C	n.i.
	3-X/Z.e.	Z.e.	Z.e.	Z.e.	n.i.	Z.e.	n.i.
	2	3	1	1	2	1	n.i.
	1-2	2	1	1-2	3	1	2
	3-X	3	X	1	n.i.	2	2
	1	1	1	1	n.i.	1	2
	3-X	2	2-3	Z.e.	n.i.	2-3	2
	3-X	X	X	1	n.i.	2-3	n.i.
	2-3	1	1	1	n.i.	1	2
	X	X	2	2	X	X	X
	3	X	1	1-2	2-3	1	3
	3	3	1	1	2	1	3

The values provided here are guideline values only, based on our current state of knowledge and cannot be used as the basis for any legally binding assurance of certain characteristics or concrete cases of application. To ascertain the concrete suitability of a particular product, a test of the finished part under the specific application conditions is necessary.

Levelling elements

Material abbreviation	Unit	CR/NBR	NBR	NBR	SBR
		Polychloroprene-nitrile rubber	Acrylonitrile butadiene rubber	Acrylonitrile butadiene rubber	Styrene butadiene rubber
Soap solution		1	1	1	1
Silicon oils and greases		1	1	1	n.i.
Turpentine (oil)		X	1	3 (up to 60 °C)	X
Transformer oil (Pyranole)		X	1	1	X
Drinking water		2 (up to 70 °C)	1 (up to 100 °C)	1 (up to 100 °C)	1 (up to 70 °C)
Detergent solution		2	1	1	1
Sugar (aqueous)		1	1	1	1

Key for resistance ratings:
 1 = very good resistance
 2 = good resistance
 ● = material used for article

3 = mean/conditional resistance
 X = not resistant

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Explanation of the material tables

The tables provide summarized non-binding guideline values. The information supplied is intended as an aid to working with the equipment and permits only an initial selection to be made. It refers to parts not subjected to load. The list of materials makes no claim to completeness, and was drawn up largely on the basis of documentation provided by the raw material manufacturers. No legally binding assurance of certain characteristics or concrete case of application may be derived from the information provided. No warranty is accepted for the workmanship of raw materials used in our products. To ascertain their suitability in concrete cases, a product test under specific application conditions and qualified advice by material engineers and designers is necessary.

Notes on the different levels of resistance:

- 1 Very good resistance: Material is unlikely to be destroyed by the chemical product in question.
- 2 Good resistance: Material may be expected to demonstrate good to fair serviceability. After exposure to the relevant chemical product, it may be destroyed in time.
- 3 Medium/conditional resistance: Material is likely to demonstrate limited serviceability when coming into sporadic contact with the relevant chemical product. Continuous contact destroys the material.
- X Not resistant: The material cannot be recommended for this application.

Free of silicone and PWIS

The usage of silicone and other paint-wetting impairment substances is being vastly used in the production of our cable glands and accessories. Nevertheless we are unable to provide the assurance of absolute silicone- and PWIS-free execution as a residual risk of diffusion or contamination from the environment caused by PWIS and silicone-like products cannot be ruled out.

Weather resistance

External exposure to weather is caused by a combination of chemical effects (oxygen, water, ozone, atmospheric pollution) with simultaneous exposure to heat and UV radiation. This interaction places a considerable strain on plastics. An unsuitable choice of materials can lead to destruction of products within a short period.

Sustained application temperature

Temperature resistance over years. Within this time, the physical properties of the material alter due to heat ageing to a degree considered reasonable for technical components in accordance with experience values.

	SBR/NBR	MVQ	EPDM	FKM	TPE	PE	Centellen
	Styrene butadiene rubber with nitrile	Silicone rubber	Ethylene Propylene Terpolymere rubber	Fluorinated rubber	Thermoplastic elastomer	Polyethylene	
	1	2	1	1	n.i.	1	n.i.
	1-2	1	1	1	n.i.	1	n.i.
	X	3	X	1	n.i.	3	2
	X	3	X	1	n.i.	3	2
	1 (up to 70 °C)	2	1 (up to 120 °C)	1 (up to 80 °C)	2	1	1
	1	2	1	n.i.	n.i.	1	n.i.
	1	1	1	1	n.i.	1	n.i.

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Temperature range

Dynamic: In the specified temperature range, the cable gland is capable of resisting a shock with an energy value that must not exceed the equivalent value in the shock impact category classified by the manufacturer in accordance with EN 50262.

Static: In the specified temperature range, the correctly fitted cable gland with its lead installed as per specifications must not be subjected to any further forces (shock, tension, pressure, etc.). The fastening place (e.g. housing), the cable gland and the inserted lead must be in a position of rest. A fixed lead must be in a position of rest. Fixed cable routing must be complied with. The cable gland should not be regarded as a single component. Instead, the user must consider the sum of all predominant ambient conditions at the site of installation.

Literature sources

Technical data sheets – guideline values for materials of different raw material manufacturers, Compendium of plastics, Franck, Vogel-Verlag, Plastic polymer materials, Krebs/Anvodet, Rubber-cautschouc-elastomers, Krebs