### Product and chemical resistance of flexible rubber materials

The information below is intended as an aid in selecting the best rubber quality for an actual application. It is not possible to state any general lifetime of rubber seals as many factors influence it: chemical attack, temperature, mechanical wear etc. Extreme temperatures, even within the generally accepted limits, may worsen other kinds of attack and thus reduce the lifetime.

### Ratings

1 = Unsuitable.
2 = Limited suitability.
3 = Normal suitability.
4 = High suitability.
- = Not recommended for other reasons.

The table contains data which have been complied from the results of our own tests and the recommendations of our raw material suppliers. The data should be considered as recommendations only and will be brought up-to-date from time to time. They are based on constant contact with the specified product.
In case of doubt or lack of information it would be advisable to consult us directly, which will enable us to investigate specific applications.

| Product or process | | NBR[1)] | HNBR[2)] | EPDM[3)] | Q[4)] | FPM[5)] | PTFE[6)] |
|---|---|---|---|---|---|---|---|
| Dairy products (milk, cream) | | 3 | 3-4 | 3-4 | 3-4 | - | 3-4 |
| Dairy products (sour milk products) | | 3 | 3-4 | 3-4 | 3-4 | - | 3-4 |
| Brewery products (beer, hops etc.) | | 3 | 3-4 | 3-4 | 1-2 | 2-3 | 3-4 |
| Wine and yeast | | 3 | 3-4 | 4 | 4 | 2-3 | 3-4 |
| Animal and vegetable fats | 100°C | 3 | 4 | 1-2 | 3 | 4 | 3-4 |
| Water and water solutions | < 70°C | 3 | 4 | 4 | 3 | 2-4 | 3-4 |
| Hot water and steam | < 130°C | 1 | 4 | 4 | 2 | - | 3-4 |
| Concentrated fruit juices and etheral oils | < 100°C | 1 | - | 1 | 1 | 3 | 3-4 |
| Non-oxydising acids | < 80°C | 1-2 | 2 | 3 | 1-2 | 2 | 3-4 |
| Oxydising acids | < 80°C | - | 2 | 3 | 1 | 2 | 3-4 |
| Weak concentrate of lye | < 100°C | 2 | 3-4 | 4 | 2 | 2 | 3-4 |
| Strong concentrate of lye | < 100°C | 1 | 2-3 | 3 | 1 | 1 | 3-4 |
| Mineral oils | < 110°C | 3 | 4 | - | - | 4 | 3-4 |
| Aliphatic carburetted hydrogen (hexane) | | 3 | 3 | 1 | 1 | 4 | 3-4 |
| Aromatic carburetted hydrogen (benzole) | | 1 | 2 | 1 | 1 | 3 | 3-4 |
| Alcohols | | 1-3 | 2-3 | 2-3 | 3-4 | 3-4 | 3-4 |
| Ester and ketones | | 1-2 | 1-2 | 1-2 | 1-2 | 3-4 | 3-4 |
| Ether | | 1 | 2 | 1 | 1-3 | 3-4 | 3-4 |
| Methylene chloride | | 1 | 2 | 1 | 2-3 | 3-4 | 3-4 |
| Ozyne and atmospheric conditions | | 1-2 | 3 | 4 | 4 | 3-4 | 3-4 |

International designation of flexible rubber materials according to ISO R 1629.

ISO = International standard.

### Notes

| | Designation of flexible rubber materials | Abbreviation symbol |
|---|---|---|
| 1) | Nitrile rubber | N |
| 2) | Hydrogenated actylonitrile rubber | H |
| 3) | Ethylene propylene rubber | E |
| 4) | Silicone rubber | Q |
| 5) | Fluorinated rubber | F |
| 6) | Polytetraflour ethylene | |

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## Elastomers

The usage of different elastomers for sanitary flow equipment depends upon process requirements and requirements from standards, directives and customers.

### Nomenclature according to ISO 1629

| Elastomer | Characteristics |
|---|---|
| NBR<br>(Nitrile rubber) | Resistant to fluids like oil and grease.<br>Sufficiently resistant to diluted lye and diluted nitric acid.<br>Temperature range: -40°C to +100°C.<br>Is attacked by ozone. |
| HNBR<br>(Hydro generated actylonitrile) | Most characteristics as NBR.<br>Temperature up to +140°C.<br>More resistant to wear than NBR. |
| EPDM<br>(Ethylene propylene) | Resistant to most fluids in the food industry.<br>Resistant to ozone.<br>Temperature range: -40 °C to +150 °C.<br>Is attacked by organic and non-organic oils and fats. |
| FKM, FPM*<br>(Fluorine rubber)<br>E.g. brand name:<br>-Viton | Often used when other elastomers are unsuitable.<br>Resistant to ozone and chemicals.<br>Temperature range: -20 °C to +200 °C.<br>Is attacked by fluids like water, steam, lye, acid and alcohols – if they are hot. |
| Q (Silicone rubber) | Also known as MVQ<br>Resistant to ozone, alcohols, glycols and most fluids used in the food industry.<br>Temperature range: -50 °C to +230 °C.<br>Is attacked by steam, inorganic acids, mineral oils and most organic solvents. |
| PTFE, (Teflon)<br>(Polytetraflouro Ethylene) | Often used as cover for O-rings of EPDM.<br>Resistant to almost all fluids.<br>Temperature range: -30 °C to +200 °C.<br>Not elastic – tendency to compression set. |
| PFA<br>(Perfluoroalkoxy polymer) | Similar to PTFE |
| FEP<br>(Fluorinated Ethylene Propyle) | Also known as Teflon® FEP<br>FEP o-rings = FEP covered (vulcanized) FPM or silicone o-rings<br>Resistant to almost all fluids.<br>Temperature up to +200 °C.<br>More elastic than PTFE. |

**FPM is an old name still in use, FKM is the proper name.*