



# Special Documentation

## Application conditions for seals and plastics in the food sector

Level measurement, pressure measurement

### General information

The information in this document describes the material in general; some data may not be admissible for the measuring device. Product-specific information and application conditions in the Technical Information (TI) documents for the measuring devices must be observed!

### Elastomers

#### EPDM (ethylene propylene diene rubber)

##### General properties

- Good resistance to cold and heat:  $-50$  to  $+150$  °C ( $-58$  to  $+302$  °F)
- Very high abrasion performance
- Very good resistance to water, polar media and oxidative media
- Very good aging resistance
- Good cold flexibility

##### Area of application

- Hot water and steam: maximum  $180$  °C ( $356$  °F)
- Polar organic solvents
- CIP-media and SIP-media for continuous-operation facilities
- Fatty products with up to 8 % fat content
- Milk processing facilities
- Beverage industry with water-based media

##### Limitations

Not suitable for use in:

- Pure fats and oils, and essential oils
- Non-polar solvents
- Citrus juices and orange-flavored drinks
- Beverage industry with aroma compounds

## **NBR (nitrile-butadiene rubber)**

### ***General properties***

- Immunity to temperature change: -30 to +100 °C (-22 to +212 °F)
- Very good abrasion performance

### ***Area of application***

- Individual use in the food industry (e.g. in event of strong mechanical forces)
- Animal and vegetable oils and fats
- Meat-processing industry
- Diluted acids and alkalis at room temperature

### ***Limitations***

Not suitable for use in:

- Concentrated acids
- Concentrated oxidizing media
- Aromatic and chlorinated hydrocarbons
- Many CIP media (moderate stability)
- Steam sterilization (SIP)

## **HNBR (hydrogenated nitrile butadiene rubber)**

### ***General properties***

- Immunity to temperature change: -30 to +150 °C (-22 to +302 °F)
- Better resistance than NBR to aggressive media in some cases
- Better heat and oxidation stability than NBR
- Good mechanical properties
- Good abrasion performance

### ***Area of application***

- Dairy industry
- Animal and vegetable oils and fats
- CIP-media and SIP-media for continuous-operation facilities
- Beverage industry with essential oils (e.g. contained in hops)
- Continuous operation in production processes with higher temperatures

### ***Limitations***

Not suitable for use in:

- Concentrated acids
- Concentrated oxidizing media

## **FKM (fluorinated rubber)**

### ***General properties***

- Immunity to temperature change: -25 to +200 °C (-13 to +392 °F)
- High chemical stability
- Very good aging resistance
- Excellent resistance to oils and fats
- Very good resistance in non-polar media
- Low volume swell

### ***Area of application***

- Food industry at temperatures above +140 °C (+284 °F)
- Steam environments up to +170 °C (+338 °F)
- Contact with media that corrode EPDM or HNBR
- Animal and vegetable fats and oils
- Beverage industry with pure citrus juices, essential oils and alcohols
- Concentrated aromatic oils
- Dairy industry
- CIP-media and SIP-media for continuous-operation facilities
- High-vacuum applications

### ***Limitations***

Not suitable for use in:

- Facilities with highly oxidizing cleaning agents and disinfectants
- Permanent use with alkalis, e.g. alkali-based cleaning processes

## **FFKM (perfluor rubber)**

### ***General properties***

- Immunity to temperature change: -10 to +325 °C (+14 to +617 °F)
- Reliable properties in event of frequent temperature changes
- Inert material in numerous media:
  - Concentrated acids (e.g. 60 % nitric acid)
  - Amines (e.g. ethylenediamine)
  - Organic acids (e.g. acetic acid)
  - Ketones (e.g. methyl ethyl ketone)
  - Alkalis (e.g. sodium hydroxide solution, caustic potash)
  - Organic solvents (e.g. methanol)
  - Aroma concentrates

### ***Area of application***

- Suitable for use in water and water vapor
- Substitute for EPDM or FKM if immunity to temperature change or resistance to aggressive media is insufficient
- Steam environments up to +240 °C (+464 °F)
- Animal and vegetable oils and fats
- Aromatic media
- For very long periods of use
- CIP-media and SIP-media for continuous-operation facilities

### ***Restrictions***

Displays slight volume swelling in practically all media.

## **VMQ (silicone rubber)**

### ***General properties***

- Excellent thermal resistance and heat stability: -50 to +175 °C (-58 to +347 °F), with the exception of steam
- Best cold flexibility
- Technical properties not easily affected by temperature
- Physiologically inert
- Good resistance to synthetic, animal and vegetable oils

### ***Area of application***

- Animal and vegetable oils and fats
- Essential oils
- CIP-media for continuous-operation facilities

### ***Limitations***

Not suitable for use in:

- Water and steam above +100 °C (+212 °F)
- Acidic media
- Concentrated oxidizing media
- Steam sterilization (SIP)

## **FVMQ (fluorosilicone rubber)**

### ***General properties***

Immunity to temperature change: -50 to +175 °C (-58 to +347 °F)

### ***Area of application***

- Applications that require the dry heat resistance of silicone O-rings
- Resistance to oils and solvents
- Resistance to aggressive media (e.g. alcohol blends, aromatic oils)

### ***Limitations***

Not suitable for use in abrasive media.

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## Polymers or plastics

### PTFE (polytetrafluoro-ethylene)

#### *General properties*

- Immunity to temperature change: -180 to +260 °C (-292 to +500 °F)
- Chemical resistance to virtually all media including acids, alkalis and solvents
- Practically no material sticks to PTFE
- High mechanical durability
- Physiologically harmless
- Excellent aging resistance

#### *Area of application*

- Low-temperature environment and high-temperature environment
- Animal and vegetable oils and fats
- Beverage industry with acids and alcohols
- CIP-media and SIP-media for continuous-operation facilities
- General purpose facilities with mixed process flows (e.g. bottling plants)

#### *Limitations*

Not suitable for use in applications with many changes of temperature.

### PEEK (polyetheretherketone)

#### *General properties*

- Immunity to temperature change: -40 to +260 °C (-40 to +500 °F)
- Chemical resistance similar to that of PTFE
- Better mechanical properties than PTFE
- Good immunity to temperature change at high temperatures
- Resistant to water and steam
- Excellent abrasion performance at high temperatures

#### *Area of application*

- High-temperature environment
- CIP-media and SIP-media for continuous-operation facilities

#### *Limitations*

No known limitations with regard to applications in contact with foodstuffs.

## **PFA (perfluoroalkoxy polymer)**

### ***General properties***

- Immunity to temperature change: -260 to +260 °C (-436 to +500 °F)
- Chemically inert
- Solvent-resistant to almost all chemicals
- Excellent non-stick properties
- Plasticizer-free and physiologically harmless

### ***Area of application***

- Animal and vegetable oils and fats
- Dairy-processing industry
- Hot water applications
- CIP-media and SIP-media for continuous-operation facilities

### ***Limitations***

No known limitations with regard to applications in contact with foodstuffs.

## **ECTFE (ethylene chlorotrifluoroethylene)**

### ***General properties***

- Immunity to temperature change: -75 to +150 °C (-103 to +302 °F)
- Excellent chemical resistance
- High abrasion performance
- Good non-stick properties

### ***Area of application***

### ***Limitations***

No specific applications known with regard to use in contact with foodstuffs.