



# PRODUCT LINE FOR HYGIENIC PLANTS IN THE PROCESS INDUSTRY

FREUDENBERG  
SEALING TECHNOLOGIES

 **FREUDENBERG**  
INNOVATING TOGETHER

# EVERYTHING FROM A SINGLE SOURCE – YOUR BENEFITS



## MATERIAL EXPERTISE

- Extensive expertise in the area of premium quality elastomer and plastic materials
- In-house development and production of high-performance materials with all relevant approvals
- Own accredited test laboratory for analyses
- Extractables and Leachables studies



## DESIGN EXPERTISE

- Development and calculation based on the Finite Element Method (FEM)
- In-house test bench for perfect matching of valve seals to the respective CIP/SIP process
- Customer-specific solutions according to Hygienic Design



OUR KNOW-HOW  
ON HYGIENIC SEALING  
SOLUTIONS

## MANUFACTURING EXPERTISE

- Own production sites worldwide
- Production of prototypes without tool costs. Short-term requirements can be met and small series can be made available from original materials by the Freudenberg Xpress® Service



## CONSULTING AND SERVICE EXPERTISE

- Expertise on the selection of materials and the hygienic design of sealing solutions
- Application consulting through countless tests (CIP/SIP database) and cooperation with cleaning agent manufacturers
- Global stocking program allows for fast delivery
- Laser marking
- Individual packaging concepts (individual and kit packaging, customer-specific packaging bags)



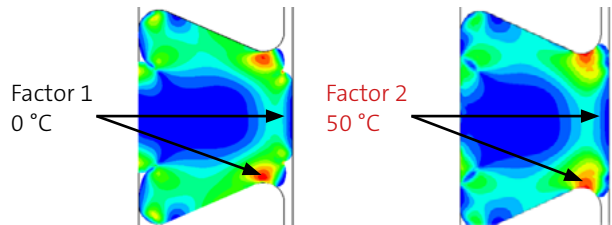
# HYGIENIC DESIGN OF SEALING SOLUTIONS AND PROCESS SYSTEMS

## Hygienic design using the Finite Element Method (FEM)

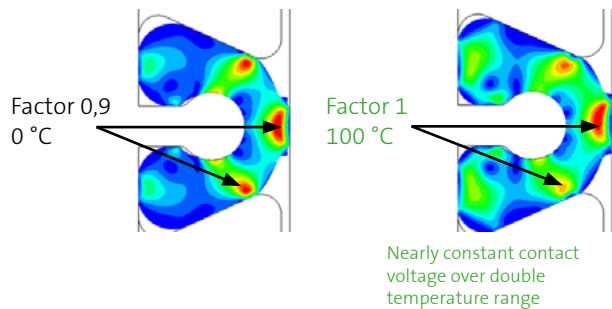
The Finite Element Method is a simulation method that virtually divides the seal into many small sub-bodies. These tiny elements have a simple geometry, so their physical behavior can be easily calculated and put in relation to each other. Freudenberg Sealing Technologies has modified this special material model for elastomers in order to meet customer requirements. It thus forms the interface between virtual component simulation and real component design. The advantages of the process are obvious: FEM allows seal designs to be varied and optimized on the computer. Components can be fitted, removed and modified virtually in a flash. This enables tests and analyses that are simply not possible on the actual component. Especially for sealing solutions that must conform to hygienic design, this method is ideal for preventing any dead spaces before the product is manufactured. This is particularly useful in the development of customer-specific sealing solutions, as development time and costs can be saved before the actual manufacture of the product. Possible design errors can be detected and avoided in advance.

### FEM-CALCULATION USING THE EXAMPLE OF A RADIAL SEAL

#### Standard design



#### Design by Freudenberg Sealing Technologies



## Hygienic design of process systems

The most important duties of every plant constructor are to consider and comply with legal requirements and to take all measures to ensure product quality. A plant constructed according to hygienic design is characterized by good cleanability, so that contamination by microorganisms, in the form of a biofilm, for example, can be ruled out. With the machine cleaning routine, you must always be able to rely on a perfect result, as the possibility of visual inspection is eliminated. Dead spaces in which product residues accumulate and microorganisms can develop must therefore be avoided. Automated CIP/SIP processes (Cleaning In Place/Sterilization In Place) are used to prevent bacterial growth. Freudenberg Sealing Technologies offers many specially developed sealing solutions designed according to hygienic design. As an active member of the European Hygienic Engineering and Design Group (EHEDG), Freudenberg is also involved in the further development of standards and recommended procedures.

### EXAMPLE FOR DEAD SPACE – STANDARD VS. HYGIENIC DESIGN

The figure shows two cross-sectional diagrams of a process system component being cleaned by a spray nozzle. The top diagram shows a standard design with a curved surface and a dead space where the spray cannot reach. The bottom diagram shows a hygienic design with a flat contact surface, allowing the spray to reach the entire surface.

**Standard design**

- Creation of dead spaces
- CIP process is not enough

**Hygienic design**

- Flat contact surface to the process medium, thus avoiding dead spaces
- CIP process is sufficient

# MATERIALS FOR HYGIENIC APPLICATIONS

Applications in the food, beverage and pharmaceutical industries require specific know-how and in-depth knowledge of materials due to their special requirements in terms of hygiene and process reliability. Freudenberg

offers specially developed sealing materials that have all the necessary certifications and meet all national and international conformity requirements.

MATERIAL			PRODUCT							CONFORMITIES/APPROVALS										
MATERIAL NAME	COLOR	CROSS-LINKING	HYGIENIC PRESSURE SEAL AND HYGIENIC FORSEAL	RADIAL SEAL	RADIAMATIC® HTS II 19539 VL	SHAFT SEAL	BUTTERFLY VALVE SEAL	HYGIENIC USIT®	CLAMP SEAL WITH SUPPORT RING	ASEPTIC O-RING	FOOD & BEVERAGE INDUSTRY						PHARMA			
											EU (REG.) 1935/2004	EU (REG.) 2023/2006	EU (REG.) 10/2011	FDA	NSF 51	3-A® SANITARY STANDARDS	ADI FREE	GB 4806 / GB 9685	USP CLASS VI CH. 88 (IN VIVO)	USP CHAPTER 87 (IN VITRO)
70 EPDM 291	black	peroxide	●			●		●	●	●	●	●	●	●	●	●	●	●	●	●
85 EPDM 292	black	peroxide	●			●					●	●	●	●	●	●		●	●	
85 EPDM 302	black	peroxide	●	●		●					●	●	●	●	●	●		●	●	
85 EPDM 332	black	peroxide	●						●		●	●	●	●	●					
70 EPDM 335	black	peroxide							●		●	●	●	●	●					
70 EPDM 382	black	peroxide							●		●	●	●	●	●	●				
70 EPDM 217676	blue	peroxide							●		●	●	●	●	●					
75 EPDM 253356	black	peroxide						●			●	●	●	●	●					
70 EPDM 253815	white	peroxide		●		●	●	●	●		●	●	●	●	●	●		●	●	
88 NBR 436	black	peroxide	●								●	●	●	●	●					
70 NBR 438	black	peroxide							●		●	●	●	●	●					
85 HNBR 216553	green	peroxide	●	●		●					(●)	(●)	●	●	●					
70 HNBR 254067	green	peroxide					●		●		(●)	(●)	●	●	●					
70 VMQ 117055	transp.	peroxide							●		●	●	●	●	●	●	●	●	●	●
76 VMQ 176643	red	peroxide				●	●		●		●	●	●	●	●	●				
75 Fluoroprene® XP 41	light blue	peroxide	●						●	●	●	●	●	●	●	●		●	●	
85 Fluoroprene® XP 43	light blue	peroxide	●	●		●					●	●	●	●	●	●		●	●	
75 Fluoroprene® XP 45	light blue	peroxide						●			●	●	●	●	●					
PTFE E202	beige	–			●						●	●	●	●	●		●			
PTFE G223	white	–			●						●	●	●	●	●		●			
PTFE Y002	beige	–			●						●	●	●	●	●		●	●	●	●
PTFE G116	white	–			●						●	●	●	●	●		●			
Quantum® PTFE F18245	brown	–	●								●	●	●	●	●		●			
Quantum® PTFE F52819	white	–	●								●	●	●	●	●		●			
Quantum® PTFE F53722	white-opaque	–	●								●	●	●	●	●		●			

(●) Limitations

# OUR PRODUCT PORTFOLIO

Freudenberg Sealing Technologies develops innovative sealing solutions with international industry-specific approvals, especially according to hygienic design standards. All products are resistant to the process medium itself and to all cleaning media used in CIP/SIP processes.

We also develop customer-specific solutions made of high-performance materials depending on the application and challenge. Thus, we offer you a unique product portfolio for hygienic plants in the process industry.

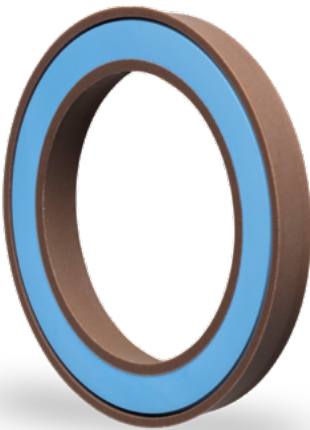


## HYGIENIC PRESSURE SEAL

The Hygienic Pressure Seal is the optimal solution for applications where high temperatures and pressures prevail. The combination of the high-performance elastomers Fluoroprene® XP or EPDM and the premium PTFE Quantum® makes this product absolutely unique.

### BENEFITS:

- Prevention of dead space by a flat contact surface to the process medium
- Low friction, reduced wear and increased service life
- Resistant to high pressures up to 150 bar
- Secure fit and minimum contact surface with the medium
- Good dry running properties
- High media and temperature resistance



## HYGIENIC FORSEAL

The Hygienic Forseal is a combination of a groove ring made of the premium PTFE Quantum®, activated by a pressure ring made of Fluoroprene® XP or EPDM.

### BENEFITS:

- Replacement of the conventional stainless steel spring with principle-dependent dead space by an elastomer contact pressure element
- Flat contact surface to the process medium prevents dead space
- Low friction, reduced wear and increased service life
- Good dry running properties
- High media and temperature resistance
- Mounting in undivided installation space possible
- Customer-specific designs, such as a double seal and an anti-rotation device possible



## RADIAL SEAL FOR SEAT VALVES

Radial seals designed by Freudenberg Sealing Technologies offer optimal sealing of process media without dead space or back migration. The radial seal leaves and enters the seat during each cycle of the valve. This means that the seal must be hygienically aligned on both sides as it seals two process media from each other.

### BENEFITS:

- Separation of the dynamic and static functions, resulting in an independent and optimal adjustment of the sealing function
- Minimized temperature dependence of the seal by reducing the elastomer volume and creating displacement spaces
- Wear resistant and low friction



#### **RADIAMATIC® HTS II 9539 VL**

The Radiamatic® HTS II is a high-performance radial shaft seal made of PTFE that has been specially developed for the process industry. In addition to its high resistance, it is characterized by low friction and contact pressure of the lip on the shaft. The design 9539 VL sets standards in the hygienic sealing of rotating shafts and spindles.

##### **BENEFITS:**

- Dead space free version made of food grade PTFE
- Advanced sealing lip for applications according to hygienic design
- Secure fit through clamping ring technology
- Good wear resistance and dry running properties
- Low friction
- High media and temperature resistance



#### **SHAFT SEAL**

The designs of our shaft seals are specially adapted to the respective customer-specific operating conditions and tasks in the sealing system. For example, they are used to seal the shaft in seat valves against the environment. Only one side comes into contact with the process medium and needs to be hygienic.

##### **BENEFITS:**

- Easy assembly
- Durability, low friction and high temperature resistance

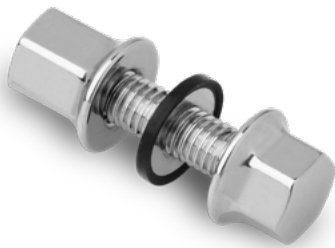


#### **BUTTERFLY VALVE SEAL**

To meet hygienically demanding applications, Freudenberg Sealing Technologies offers butterfly valve seals in accordance with hygienic design. Thanks to a wide range of materials, they offer high resistance to a wide variety of challenges, such as aqueous media, high temperatures and aggressive media.

##### **BENEFITS:**

- Compression only in the areas required for sealing
- Reduced mechanical stress in the seal
- Better hygienic behavior, as fewer cracks occur
- Longer service life



#### HYGIENIC USIT®

Freudenberg's Hygienic Usit® reliably prevents contamination at the screw connection point in open and closed manufacturing processes in the food and pharmaceutical industries. Metal washers that are not food-compliant due to gap formation can thus be completely replaced. As an option, we offer specially developed hygienic NOVOnox screws with a flange, as well as cap nuts from HEINRICH KIPP WERK that are made of stainless steel.

#### BENEFITS:

- Suited for screw connections with direct product contact
- Prevention of germ formation under the screw head
- EHEDG certified (Type EL Class I AUX)
- Optimally matched screw, cap nut and usit composite



#### CLAMP SEAL WITH SUPPORT RING

The clamp seal from Freudenberg Sealing Technologies is designed for flanges according to ISO 2852 and DIN 32676. The integrated insert ring made of robust plastic prevents overpressing of the seal due to excessive force during assembly, thereby setting a defined compression. This avoids potential dead spaces caused by sealing not being flush with the product. This prevents microfilm formation and contamination of the process medium transported in the pipe with bacteria.

#### BENEFITS:

- Defined compression during installation due to the integrated support ring
- Prevents destruction of the sealing ring by overpressure
- No projections or recesses, but a surface flush with the product to avoid dead spaces



#### ASEPTIC O-RING

Freudenberg Sealing Technologies offers O-rings for aseptic flange connections according to DIN 11864 especially for the requirements of the process industry. These combine the advantages of easy assembly with a dead-space-free seal and thus ensure hygienically perfect manufacturing processes. Aseptic O-rings are available in high-performance materials and have the relevant approvals for the pharmaceutical and food industries.

#### BENEFITS:

- Precise customized O-ring calculation
- Flush termination with the inside pipe diameter
- Easy assembly

**Freudenberg**

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