



# PITCH & YAW BEARING SEAL

Freudenberg Sealing Technologies produces Pitch & Yaw Bearing Seals with a new generation of materials that provide excellent reliability and functional consistency, as well as considerable cost advantages to our customers.

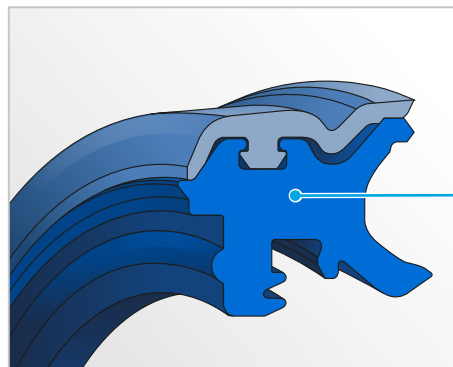
**Extreme climatic conditions** in diverse regions of operation, combined with the effects of lubrication media, airborne salt particles and ozone, expose the seals in outdoor applications, such as wind turbines, to exceptional stress and wear. Our new generation of high-quality Ventoguard® materials is specifically tailored to combat harsh conditions and deliver a longer service life, excellent reliability, and functional consistency. Ventoguard's cutting-edge durability proves a particular value for Pitch & Yaw Bearing seals.

## VALUES FOR THE CUSTOMER

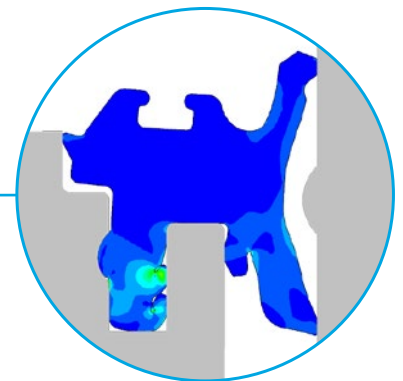
- Catalogue designs and customized seal concepts (rad-rad/rad-ax) according to application requirement (e.g., bearing gap movement, pressure resistance) available
- Optional disposable roof profile with optimized clip feature for protection during surface treatment
- FEA supported design (used for catalogue seals and customer specific seals)
- Very good abrasion resistance
- Improved long-term relaxation behavior, over a wide temperature range
- Particularly resistant to climatic conditions, ozone, and lubricating media (no degradation)



**RAD-AX-Concept**  
The choice for compensating axial and radial displacement at high pressure



**RAD-RAD Concept**  
Safe operation for large axial displacements



**FEA Simulation**  
of RAD-RAD Concept

## FEATURES & BENEFITS

### Ventoguard 453

Incorporating our premium material with excellent cold-temperature performance, Ventoguard 453 seals keep their cold-flexibility in temperatures as low as  $-55^{\circ}\text{C}$  (static range). Ventoguard 453 seals also exhibit outstanding compressive stress relaxation, as well as a remarkable long-term resistance to a wide range of lubricants, e.g., Klüberplex BEM 41-141, Fuchs gleitmo 585K, STABYL EOS E2, Mobil SHC Grease 460 WT.

### Ventoguard 454

Characterized by its dependable resistance to all common lubricants, including Shell Rhodina BBZ, 454 materials have a cold temperature range to  $-45^{\circ}\text{C}$  (static range). It fulfills high demands regarding ozone resistance, and it exhibits a significantly better compressive stress relaxation when compared to a standard NBR material leading to a doubling of the service life.

### FEA-supported Research & Development

Freudenberg Sealing Technologies offers FEA-supported research and development to meet the requirements of every specific bearing design. By using state-of-the-art CAE technology and incorporating Freudenberg material models into the simulation, it is possible to predict the seal behavior for various operating and worst-case conditions.

Moreover, it helps to

- optimize designs to reduce friction and bearing torque & increase pressure resistance
- eliminate weak spots before prototype or serial production
- maximize service life

### Properties Ventoguard Material

Typical Application Properties	Profiles for pitch & yaw bearings	
	Ventoguard 453	Ventoguard 454
Density, g/cm <sup>3</sup>	1.20	1.24
Hardness, Sh A	72	75
Modulus 100%, N/mm	6.4	6.1
Tensile Strength, N/mm <sup>2</sup>	16.3	19.0
Elongation at break, %	225	270
Compression Set (24 hours @ 70°C), %	15	14
Ozone resistance (50 pphm), cracking	0	0
Glass Transition, temperature Tg (DSC), °C	-49	-38
Operating conditions, static, °C	-55 to +80	-45 to +80
Operating conditions, dynamic, °C	-45 to +80	-35 to +80

The information contained herein is believed to be reliable, but no representation, guarantees or warranties of any kind are made to its accuracy or suitability for any purpose. The information presented herein is based on laboratory testing and does not necessarily indicate end product performance. Full scale testing and end product performance are the responsibility of the user.

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