Wärtsilä Enviroguard Seals are pollution free forward water lubricated sterntube seals suitable for any commercial or military application. They are designed to maintain watertight integrity over all operating profiles and parameters. The Wärtsilä Enviroguard range is a low maintenance, high performance sealing solution which has an extensive fitted history spanning many years and numerous different vessel types. Although primarily used for open water applications, they can be adapted for closed water systems, too.

**PRODUCT FUNCTIONALITY**

A spring loaded (non-rotating) face operates against a shaft mounted (rotating) seat. These interfaces form the actual seal. A combination of spring and hydraulic load maintains the closing force between them. In conjunction with a hydraulic opening load, the Enviroguard range of seals are mechanically balanced for optimum sealing capability under varying operating conditions.

There are three types of standard seals in the Enviroguard range:
- Small range WFS1R
- Large range WFS10
- Large range WFS1H
### SMALL RANGE WFS1R

- WFS1R-F (Bronze – Assembly fully replaceable and serviceable in-situ)
- WFS1R-P (Bronze – Wearing components fully serviceable in-situ)
- WFS1R-P-L (Composite – Wearing components fully serviceable in-situ)

A water lubricated face seal with an elastomeric (rubber) spring that can be supplied as fully split, partially split or partially split lightweight, allowing replacement and maintenance with the shaft in-situ. So no dry dock is required. Available for 70–450 mm shafts, the design incorporates an inflatable seal for emergency conditions or in-water seal maintenance.

**FEATURES AND BENEFITS**
- Silicon carbide sealing contact materials for abrasive water
- Can accommodate large and repeated shaft movements
- Virtually no leakage – clean compartment
- Maintenance & overhaul periods comply with class survey requirements
- No costly shaft or liner replacement
- Vibration tolerant
- Shock options available

### LARGE RANGE WFS10

- WFS10-F-M (Assembly fully replaceable and serviceable in-situ)
- WFS10-P-M (Wearing components fully serviceable in-situ)
- WFS10-F-EM (Assembly fully replaceable and serviceable in-situ + with emergency packing)

A water lubricated face seal with an omega spring that can be supplied as fully split and partially split, allowing replacement and maintenance with the shaft in-situ. So no dry dock is required. Also available with an emergency packing facility.

**FEATURES AND BENEFITS**
- Robust and reliable solution
- No shaft or liner wear
- Minimal seal leakage
- High shaft movement allowance
- Long life/low risk operation

### LARGE RANGE WFS1H

- WFS1H-P-L (Composite – Wearing components fully serviceable in-situ)

A water lubricated face seal with helical springs that is supplied partially split, allowing maintenance with the shaft in-situ. So no dry dock is required. Available for 460–820 mm shafts, this product is aimed at the larger vessels in commercial applications. The design uses structural composite materials specifically to reduce weight and eliminate corrosion. In addition, the lightweight composite makes installation and maintenance much quicker and easier.

**FEATURES AND BENEFITS**
- Lightweight composite components allowing easy installation and on board servicing
- Sealing interfaces designed to withstand abrasive water conditions
- Composite materials ensure light weight, low cost and prevention of galvanic corrosion
- Easily installed as a cartridge with required compression tooling supplied
- Proven capability in aggressive environmental conditions
### Applicability
- Suitable for new build and retrofit applications (without shaft removal)
- Suitable for any commercial vessel (can be adapted for military)
- Compliant to all major classification societies where required

### Shaft Sizes
<table>
<thead>
<tr>
<th>WFS1R-F</th>
<th>WFS1R-P</th>
<th>WFS1R-P-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 – 450 mm (2.75 – 17.7 inch)</td>
<td>70 – 450 mm (2.75 – 17.7 inch)</td>
<td>110 – 410 mm</td>
</tr>
</tbody>
</table>

### Shaft Speed
- Up to 1872 RPM

### Sealed Medium
- Water

### Axial Movement
- +/- 8 mm

### Radial Movement
- Up to 5 mm

### Serviceability
- Assembly is replaceable and serviceable with shaft in situ

### Abrasion Resistance
- Very High

### Angular Alignment
- Up to 0.5 mm FIM acceptable

### Operating Pressure
- From slight vacuum to 1.2 Bar *

### Cooling Flush Requirement
- 1 litre / hour / mm shaft

*higher pressure for special applications

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### Shaft Sizes
<table>
<thead>
<tr>
<th>WFS1O-F-M</th>
<th>WFS1O-P-M</th>
<th>WFS1O-F-EM</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 – 1040 mm (5.9 – 41 inch)</td>
<td>150 – 1040 mm (5.9 – 41 inch)</td>
<td>250 – 900 mm (9.8 – 35.4 inch)</td>
</tr>
</tbody>
</table>

### Shaft Speed
- 670 RPM – Ø150 mm
- 190 RPM – Ø1040 mm

### Sealed Medium
- Water

### Axial Movement
- Up to ± 19.05 mm

### Radial Movement
- ± 10 mm

### Serviceability
- Assembly is replaceable and serviceable with shaft in situ

### Abrasion Resistance
- No

### Operating Pressure
- 1.0 Bar Max

### Cooling Flush Requirement
- 1 litre / Hour / mm of Shaft

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### Shaft Sizes
<table>
<thead>
<tr>
<th>WFS1H-P-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>460 – 820 mm (18.11 – 32.28 inch)</td>
</tr>
</tbody>
</table>

### Shaft Speed
- 380 – 146 RPM

### Sealed Medium
- Sea Water / Fresh Water

### Axial Movement
- ± 10 mm

### Serviceability
- Wearing components are serviceable with shaft in situ

### Abrasion Resistance
- Yes

### Operating Pressure
- 1.0 Bar Max

### Cooling Flush Requirement
- 2.5 litre / Hour / mm of Shaft

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*For all Wärtsilä Enviroguard seals there are bespoke designs available, for example non standard sizes or compliance to other operating parameters.*
Wärtsilä is passionate about optimising lifecycle value by delivering whatever you need from the only total marine offering.

Wärtsilä supports its customers throughout the lifecycle of their installations by optimizing efficiency and performance. We offer expertise, proximity and responsiveness for all customers regardless of their equipment make in the most environmentally sound way.

You can have the entire power or propulsion system fully serviced by one global supplier. We are continuously developing our global service network, solutions, products and specialist services worldwide to support equipment on board your vessels or power plant installations.

Our Services & Support solutions range from basic support, installation and commissioning, performance optimization, upgrades, conversions and environmental solutions to service projects and agreements focusing on overall equipment performance and asset management.

We deliver our services through our service stations, workshops and ship repair centres that form our service network in 70 countries worldwide.