

JMT

MARINE SEALS

Airguard 3AS
anti-pollution lip type sterntube sealing system



AIRGUARD 3AS anti-pollution lip type sterntube sealing system

The Airguard 3AS is an anti-pollution lip type sterntube seal. The concept was developed in the late 1980s upon the growing awareness of the environment and the wish of owners to reduce vessel downtimes. The Airguard 3AS is derived from the successful Sternguard MKII standard lip type sterntube seal.

Design and materials form part of our continuous research and development programme and are, therefore, under constant evaluation. This has led to the development of a reliable and cost effective sterntube seal for applications, whereby extra security against spill of oil into the seawater and minimal downtime because of seal failure, are required.

The Airguard 3AS sterntube sealing system is designed for use in combination with oil lubricated



sterntubes in conventional propulsion systems. Wärtsilä has supplied many hundreds of seals of this type since its introduction. For the forward seal, the Sternguard MKII(M) type seal is applied (see separate leaflet for details).

The most important parts of lip type sterntube seals are the seal rings and the liner. The design and materials of these major components incorporate Wärtsilä's extensive knowledge, built on both laboratory tests as well as knowledge gained from experience in the field over the past decades.

Design features

General

The Airguard 3AS sterntube sealing system comprises the aft and forward sterntube seals, combined with the necessary seal and sterntube tanks and system control components.

The aft sterntube seal is a multi-barrier lip type seal containing three seal rings; two seal rings, #2 and #3, face the sterntube oil side and provide active double security against oil spill, whilst the third seal ring #1 faces and seals off the water side. All seal rings run on a shaft liner to avoid grooving of the shaft. The seal is supplied as a cartridge, which includes the shaft liner, ready for installation without any further assembly work to be carried out.

Genuine anti-pollution sterntube sealing can only be achieved if the seawater and the sterntube oil are completely separated from each other by an air barrier.

System lay-out

Compressed air is blown into the air barrier chamber between seal rings #1 and #2. The air pressure, being automatically set slightly higher than the seawater pressure, by the function of a constant airflow into the air barrier chamber, forces the air to flow into the seawater underneath seal ring #1. This is thereby slightly lifted from the liner resulting in greatly reduced wear of seal ring and liner.

The air barrier chamber between seal ring #1 and #2 is connected to an inboard drain system. Any seawater and/or oil entering the air barrier chamber is automatically drained inboard.

The differential pressure of the air in the air barrier chamber, over the outside seawater pressure, is automatically kept at a constant value by a flow controller located in the engine room. The sterntube oil system is a closed and pressurised system. As a

function of the air pressure in the air barrier chamber, the sterntube oil system is maintained at a slightly higher pressure than the air pressure. This means that under all conditions (loaded draught, ballast draught, waves) the optimum lowest operating pressures for the total system are maintained resulting in an extreme low wear rate of both liner and seal rings.



The air barrier chamber also functions as a damper of the dynamic hydraulic pulsations present in an aft sterntube seal. Pressure fluctuations inside the seal caused by radial and/or axial shaft movements, are cushioned. This makes the Airguard 3AS aft seal much less sensitive to the so-called pumping effect due to shaft vibrations as encountered in conventional seals.

Air system

The air pressure and flow required to operate the system is low (normally 50 litres/min.). This is easily provided by the air system available on board.

Once the air system is set during installation, no further adjustments are needed.

Active double security against oil spill

In addition to the air control system, the Airguard 3AS seal system incorporates an active double security against oil spill. In normal operation only one oil seal ring (#2) is active, with the other oil seal ring (#3) running in an unloaded condition thereby acting as a standby seal ring. Because of the back pressure, a small amount of oil is constantly flowing from the seal chamber between seal rings #2 and #3, under seal ring #3, and into the sterntube. This is achieved by connecting the chamber between seal rings #2 and #3 via a pipe through the sterntube to the sterntube oil circulation system.

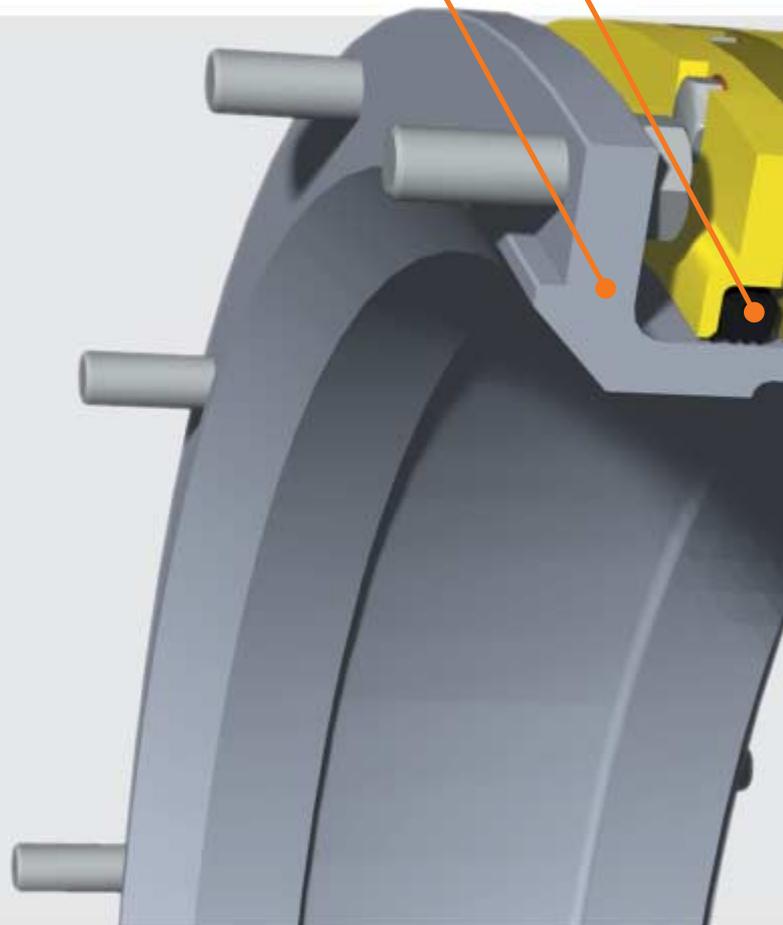
Because of the unloaded condition produced by the oil flow underneath seal ring #3, the seal ring remains in an optimum condition without any wear. In case of an emergency the standby seal ring (#3) is activated by simply closing a valve in the engine room.

Fail-safe

In the unlikely event of an air supply failure, the system can be operated as a conventional system.

P-ring (Unnet)

Liner

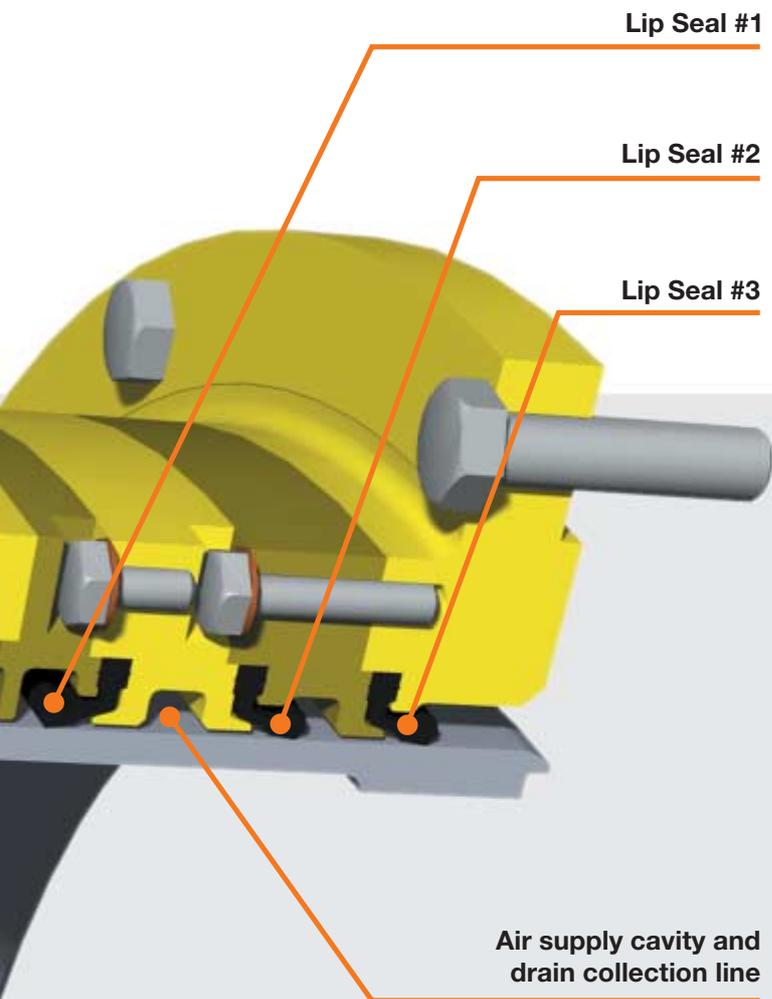


Available shaft diameters

The Airguard 3AS seal system is available for all shaft diameters above 400 mm at aft seal. For shaft diameters below 400 mm, examination of the sterntube and hull structure is necessary.

Seal rings

The seal rings are completely manufactured in-house under the most stringent production and quality control



Liners

The aft seal liner is made of a special type of high nickel chromium steel, offering the optimum combination of wear and corrosion resistance.

Compared to the conventional materials used for liners, this results in reduced risk of pitting corrosion and, in combination with the flexible design of the seal rings, lower wear of the running surface.

Ceramic coating

In order to extend normal life, an optional ceramic coating can be applied to the running surface of the liners.

Sterntube oils

The Viton elastomer has been developed to cope with most of the oils normally used in sterntubes. We have tested our seal rings in combination with many different types and brands of oils. An approved oil list is available. On request we can test any oils not included on our oil list.

Type approvals

Type approvals are available from most of the major classification societies.

Seal ring renewal

The seal rings of the Airguard 3AS can be renewed simply in situ, without any further special requirements such as split parts and without the need to remove the propeller and/or tailshaft. This can be done by Wärtsilä specialist service engineers, who are located at strategic locations all around the world. For this activity Wärtsilä has developed its own bonding equipment. In special cases it is even possible to renew the seal rings whilst afloat, either by ballasting or by using a 'habitat'.

procedures. The sophisticated flexible shape, in combination with the particular material characteristics, ensures a long trouble-free service life.

For the Airguard 3AS seal we apply our Viton material as standard. In this material, excellent wear and heat resistance, as well as excellent chemical resistance properties, are combined.

Standard technical specification

Items included in the standard supply

- Forward seal included
(For the forward seal specification please refer to the Sternguard MKII(M) leaflet)
- Cartridge seal supply
- Split seal cover
- UNNET aft seal protector (see separate leaflet)
- Split spacer ring for aft seal
- Wear-down gauge for bearing wear-down measurement
- All mounting bolts and locking materials
- Propeller o-ring
- All gaskets
- Mounting brackets
- Lifting eyes

Standard materials aft seal

- Housing parts: Bronze
- Seal liner: High nickel chromium steel
- Gaskets: Non-asbestos compressed fibre
- Seal rings: Viton

Included system components

- Air control unit
- Pressurised sterntube tank
- Drain collection unit
- Flow meter

Options

Optional extra's

- Split housing parts
- Split base flange
- Fully split design
- Sterntube oil circulation unit
- Alarm panel unit
- Pressure gauge unit

Optional materials

- Ceramic coating on liner running surface

Optional items

- Zinc anodes on seal liner
- In-water bearing wear-down measurement system (IWS)

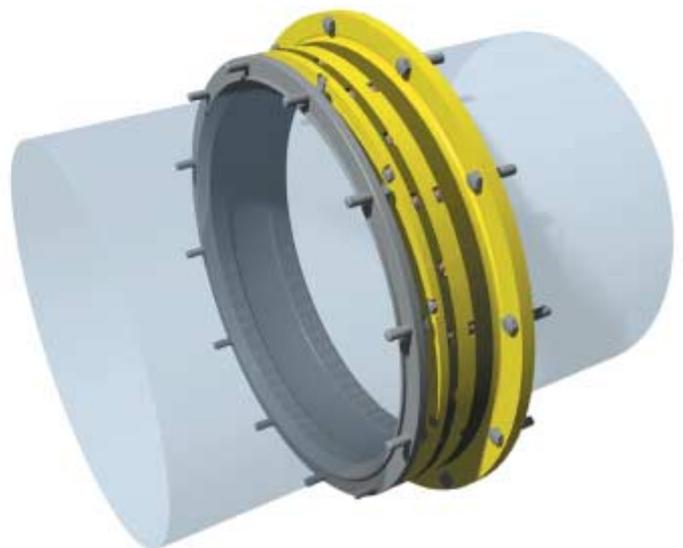
Features & benefits

Features

- Anti-pollution
- Automatic pressure balanced
- Low optimum system pressures
- Complete system supply
- Designed for purpose
- Proven design
- Standardised wearing parts
- Hundreds of units supplied
- Active standby seal ring
- Seal rings renewable in situ
- Cartridge design
- Flexible seal rings
- Special grade of chromium steel liners
- UNNET net and line protector included as standard

Benefits

- Environmentally friendly
- Reduced seal sensitivity for axial and radial shaft vibrations
- "Fit and forget" system
- One point of contact
- Low initial cost
- Low operational cost
- Fast ex-stock supply of spare parts
- Reliability
- Double security against oil spill
- Low repair cost
- Simple and low cost installation
- Minimised wear of seal rings and liner
- High resistance to wear and pitting of liner
- Reduces number of non-scheduled docking





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Wärtsilä enhances the business of its customers by providing them with complete lifecycle power solutions. When creating better and environmentally compatible technologies, Wärtsilä focuses on the marine and energy markets with products and solutions as well as services.

Through innovative products and services, Wärtsilä sets out to be the most valued business partner of all its customers. This is achieved by the dedication of more than 12,000 professionals manning 130 Wärtsilä offices in over 60 countries around the world.

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