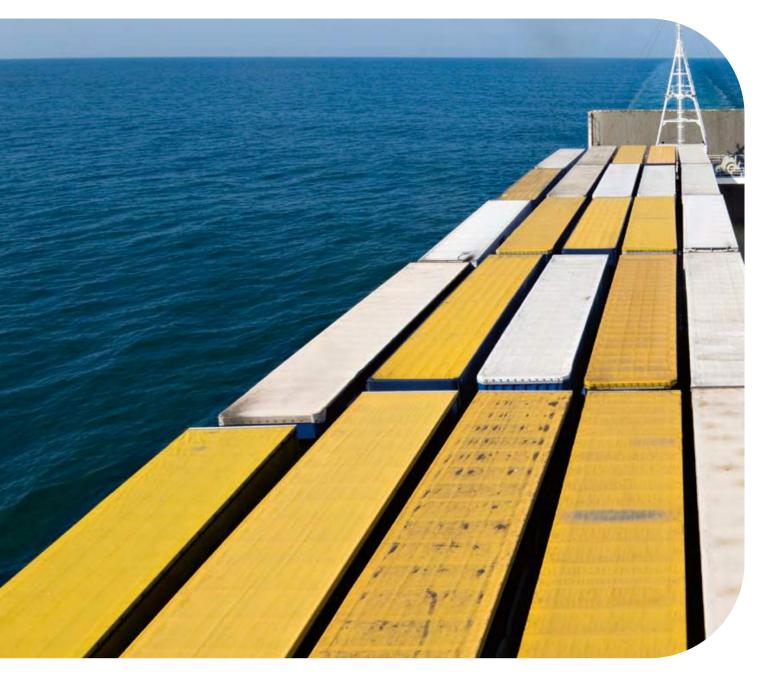


To be successful in global trade you need to expand your horizons.



The Power of Knowledge Engineering



Are you looking for a shipbuilding supplier that you can rely on in terms of consultancy, product quality and service?

Welcome to SKF Marine. Wherever in the world you need us, we're close by, straightforward and a trustworthy partner. We're on your wavelength, we're people with plenty of heart and soul and we'll do everything in our power to support the success of your business with the products and support we offer.

SKF Marine has just the right product.

We can provide you with tailored solutions that are just right for the type of ship in question, whatever area of the world you are sailing in. Our ship components boast outstanding quality and are both reliable as well as durable. We take the operational safety of your fleet extremely seriously. So don't settle for less.

Service is our forte.

High-quality products are only one side of the coin. Excellent service is also part and parcel of successful ship operation and, with our global service network, that is exactly what we have to offer. Our staff is available 24 hours a day to give you the benefit of their all-round expertise – whether at our headquarters in Hamburg, at our overseas subsidiaries or at our global sales agents and service stations. We're always on hand – even before your project gets under way – to offer you a truly personal service. You'll soon notice the difference.

On your side, available with good advice, on course for success: put your trust in the experience and expertise of SKF Marine.



At home on the seven seas, and on any kind of ship.

We have a long tradition of innovation. As a pioneer in the development and implementation of cutting-edge ship's components in the areas of drives, stability, safety and environmental protection, we have been continuously developing innovative products and solutions that prove their worth in the market – since 1925. Fulfilling the high expectations of our components resides in the details, because taking care of the small things, makes the decisive difference in everyday operations. With each product you will become part of this fascinating story. Welcome to the future.

1948

Simplex sterntube seal. The world's first lip seal for oil-lubricated sterntubes.

Still in use today and replacement parts still available.

1960

Production of retractable fin stabilizers under license

1972Development of non-retractable fin stabilizer

1973

Turbulo-Systems
Turbulo TE 10-i
bilge water separator,
Complies with
MARPOL Resolution
A.233 (VII) – 100 ppm.

1983

2nd generation of retractable fin stabilizer, Type SK 1985

Simplex SC-1 seal for water-lubricated sterntubes

1925

1925

Launch of first Turbulo bilge water separator 1948

Simplex white metal sterntube bearing for oil-lubricated sterntubes. Simplex pedestal bearing: plummerblock and tunnel bearing 1953

Simplex thrust bearing

stock seal

1970

Simplex rudder

1970 Simplex SC-1 seal for oil-lubricated sterntubes 1974

Simplex high-load thrust bearing 1976

Turbulo-Systems
Turbulo TEF
(filter plant) bilge
water separator.
Complies with
MARPOL Resolution
A.393 (X) – 15 ppm.

1984

Simplex white metal sterntube bearing with active hydrostatics

1984

Rotary vane steering gear



1992 Simplex

SC-2 seal, new generation of SC-1 seal

1994 Simplex airspace non-pollution

1998

Simplan mechanical face seal for waterlubricated sterntubes

sealing ring material VitonPOD for all Simplex seal types to facilitate use with sensitive oils, such as hydraulic oil, and biodegradable oils (EALs).

2002

FlexiTube

complete

solution

fin stabilizers

2006

Turbulo-Systems Turbulo MPB Ex. Explosion-proof bilge water separator, complies with MARPOL MEPC 107 (49).

2008 Development of retractable zero speed stabilizer, Type Z

SC-2 seal

2013

Development of non-retrectable zero speed stabilizer, Type FZ

Within 2015 further innovative products will be launched.

1993/94

Turbulo-Systems Turbulo TCS – HD (high-density) bilge water separator, complies with MARPOL MEPC. 60 (33) - 15 ppm.

1996

3rd generation of retractable fin stabilizer, Type S

2000

Ultra high lift Simplex fin profile for retractable fin-stabilizer, sterntube Type S

2004

Turbulo-Systems Turbulo MPB Bilge water separator, complies with MARPOL MEPC107 (49).

2007

Turbulo-Systems Turbulo MPB booster tank arrangement for overcoming great heights, complies with MARPOL MEPC 107 (49).

2007

2rd generation of non-retractable fin stabilizer, Type F

2013

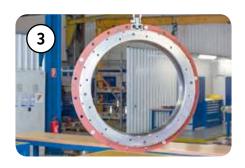
Simplex SternTube complete sterntube solution

2013

BlueMon -Environmental monitoring system. For use in line with MARPOL 73/78, Annex 1-6.







Aft seal Oil lubricated

• Airspace (SI/II)

Non-pollution aft lip seal for highest environmental requirements. Total separation of water and oil (four-ring seal). Designed to comply with the VGP2013 - No EAL required.

• Multisafe (BR)

Aft lip seal with double security against seawater infiltration (four-ring seal).

• Multisafe (M)

Aft lip seal with double security against sterntube oil discharge (four-ring seal).

· Advanced (B)

Standard aft lip seal with additional pressure control (three-ring seal).

• Basic (A)

Aft lip seal for most standard requirements (three-ring seal).

Net protection

• Simplex Net protector

Dirt, net and rope protection ring, effective aft seal protection against dirt, fishing nets and lines.

· Net cutter

Knife blades – basic aft seal protection against fishing nets and lines.

· Net pick-up

Net and rope collecting ring, advanced aft seal protection against fishing nets and

Fwd seal Oil lubricated

• Basic (Z)

Fwd lip seal for most standard requirements (two-ring-seal).

• CPP (ZL)
Fwd lip seal for oil lubricated sterntubes with additional oil supply for controlled pitch propellers (three-ring-seal).









Sterntube Oil lubricated

• FlexiTube

Complete sterntube with white metal bush bearings, completely piped and ready to install. Design allows compensation of axial movement.

SternTube

Complete sterntube with white metal bush bearings, completely piped and ready to install.

Sterntube bush

Oil lubricated

· Simplex sterntube bush

White metal bush bearing for fwd and aft position.

Intermediate shaftline bearing

Plummerblock

Self-lubricating radial shaft bearing with an upper and lower bearing shell.

· Tunnel bearing

Self-lubricating support shaft bearing with lower bearing shell.

Thrust bearing

· High load thrust bearing

Single-collar axial thrust bearing.







Bulkhead seal

• Centrax

Maintenance-free mechanical seal for watertight sealing of shafts leading through bulkhead openings.

Simplex

Lip seal designed for gas- and watertight sealing of shafts leading through bulkhead openings.

Bilge water separator

• Turbulo MPB

Turbulo-MPB designed for the treatment of bilge water on ships in accordance with the IMO Resolution MEPC107(49). Approved for 15 ppm/5 ppm requirements.

Environmental monitoring system

• BlueMon - Environmental monitoring systems

BlueMon monitoring system; comprehensive monitoring and mapping system for all emissions on vessels which are subject to MARPOL 73/78 Annex I – VI.







Rudder stock seal Grease lubricated

• Upper seal type

Upper rudder stock seal for installation at the top of the rudder stock trunk.

Lower seal type

Lower rudder stock seal against sea water for installation at the lower end of the rudder stock trunk.

• Lower seal type for coker unit installation Lower rudder stock seal against sea water for installation inside the coker unit.

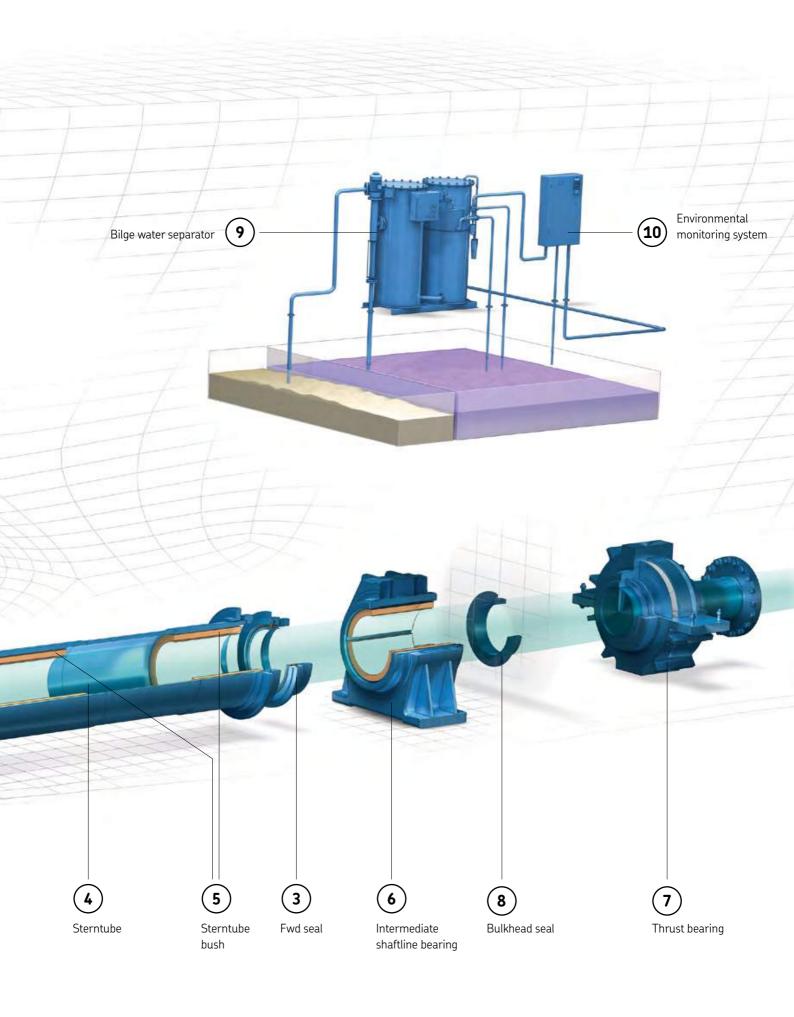
Steering gear

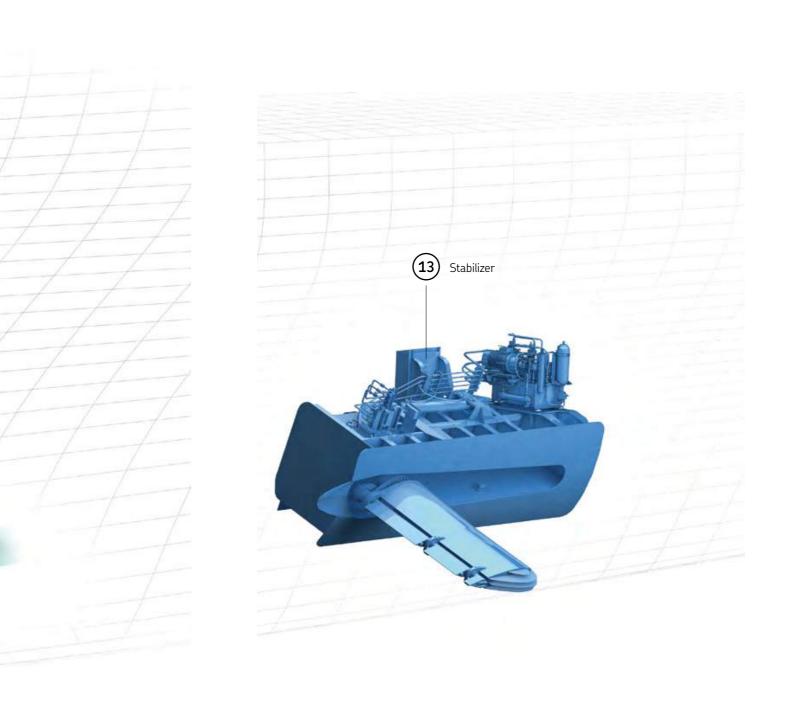
• Rotary vane steering gear system Compact rotary vane steering gear for any rudder design.

Fin stabilizer Retractable

• Type S

Completely retractable fin stabilizer for reducing any rolling movement.





Welcome aboard – quality from SKF Marine.

Our products offer the perfect solution for every kind of merchant vessel.

SKF Marine is a leading supplier of quality products in the merchant marine sector. With our innovative product solutions and systems – such as Simplex seals and shaft components, stabilization systems, steering gears and Turbulo Bilge water separators – we are the yard-stick when it comes to efficiency and operational safety. We are just as much at home with the largest container vessels as we are with feeder vessels, bulkers, tankers, gas carriers, Ro/Ros and car carriers.



Benefits

- · High-quality, customized components
- Client-specific drawings and complete technical documentation
- · Delivery on time
- Extensive quality controls prior to delivery
- · Worldwide network of technical experts
- Low installation and maintenance costs
- Reliable products with long service intervals
- Availability of individual ship history: project data, drawings, manuals and service reports
- Product and turn-key solutions with a proven track record
- · All class requirements fulfilled
- Commissioning service available worldwide

In the construction of your new vessel or modernising your fleet, you can rely on SKF Marine, to achieve your success on the seven seas.

We provide ship owners with expert and trustworthy advice to help them select the products they need for their new vessels, thus giving them the benefit of our extensive experience in all ship categories. We strive for efficiency, sustainability and operational safety when it comes to planning and precise implementation.

We produce standardised and individual solutions for shipyards that offer their customers unbeatable value for money and outstanding quality. We are there whenever and wherever you need us – across the globe.

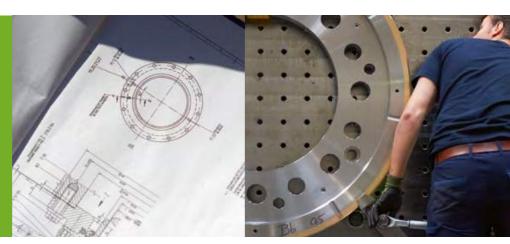
We are even on hand worldwide for complex retrofitting. Taking into account your individual goals and aims, together we'll find the best solution for you. It will be carried out quickly, efficiently and in a focused way. Our solutions are always in compliance with the latest rules and regulations.



360° project management, 100% understanding, 0 surprises

SKF Marine offers pioneering 360° project management that is sure to delight all customer groups. Whether you're an owner, a shipyard, a design agency or a system supplier, we are familiar with your requirements, understand your business and are ready to provide you with customised, reliable solutions. Trust is the basis for our shared success. You can reply on our people and benefit from their many years of experience.

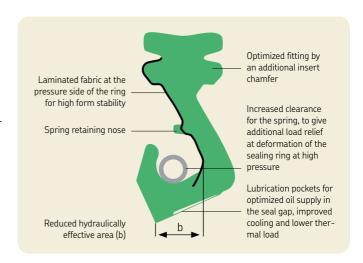
There are many potential obstacles on the journey from initial idea to finished ship – we'll help you overcome them



The SKF Marine technologies meet the ever-increasing demands of the marine industries while complying with the rules and regulations.

Simplex SC3 sealing ring

SC3 is the next generation of lip sealing rings for our Simplex sterntube seals. Thanks to the new shape, the ring is able to handle higher pressures. At the same time, friction – and asso-ciated heat generation – are reduced, without limiting the rings' performance. Further new features include lubrication pockets that have been embedded into the ring, which provides an additional cooling effect and leads to improved tribological performance.



Vessel General Permit (VGP) 2013

With the new VGP 2013, it becomes mandatory to use Environmental Acceptable Lubricants, EALs, in systems such as sterntubes, thrusters, pod drives and stabilizers – unless technically infeasible or where alternative solutions provide a non oil-to-sea interface. SKF Marine offers several options for new building or vessels in service that comply with VGP 2013.



Compliance with VGP 2013 requirements

Oil-to-sea interfaces Non oil-to-sea interfaces Environmental acceptable lubricant (EAL) non-mandatory Environmental acceptable lubricant (EAL) Simplex Solutions Water-lubricated seal and Conventional seal and Non-pollution air-seal and cathodic protection cathodic protection cathodic protection Use of special sealing ring material Simplex Simplex Simplan Simplex Airspace Standard Airspace Yacht face type seal lip type seal "Statement of Verification" by class

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Simplex Aluminium anode

Accessories for your needs

1) Simplex Active circulation unit

Equipment for continuous oil circulation and refreshment of the aft seal lube oil. The system provides optimized lubrication of the seal rings for enhanced aft seal performance. In addition, contaminants in the oil, such as water, air or particles, will be transferred from the aft seal to the aft seal tank for further lube oil maintenance and condition monitoring.

• Condition monitoring equipment for the lubricant is available upon request.

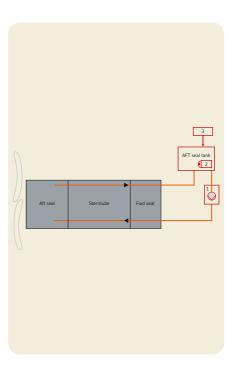
2) Simplex Oil dryer

The unit keeps the aft seal lube oil constantly at a good quality level by reducing the water content and provides an active lube oil circulation. Any accumulated water content in the aft seal lube oil will be vaporised. The separated water will be discharged automatically. This is a perfect add-on, for vessels operating with bio-degrable lubricants or EALs, as the oil dryer will reduce the effect of hydrolysis.

• Condition monitoring equipment for the lubricant is available upon request.

3) Air pressure control unit for aft seal tank

The unit regulates air supply to increase the head pressure of the aft seal tank – based on the vessel's draught. No manual changeover of tanks at different installation heights is required. The equipment is designed for vessels with high and variable draught, such as tankers.



4) Direct forced lubrication unit with cooler and filter

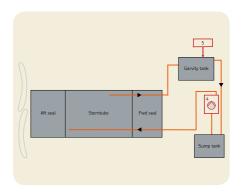
This system provides the constant oil circulation of the sterntube lube oil. The cooler and filter help to ensure optimal temperature and cleanliness of the lube oil before entering the sterntube.

• Unit available as loose supply or ready-mounted on a skid.

5) Air pressure control unit for gravity tank

The unit regulates air supply to increase the head pressure of the sterntube gravity tank. This equipment is standard design for vessels whose structure and layout do not allow for installation of the gravity tank at the required height.

• The unit is available as a basic version or an advanced system with redundancy control for twin shaft vessels.

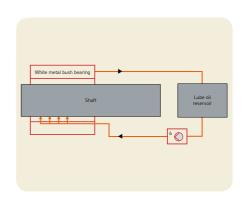


6) Lube oil unit for hydrostatic oil pressure support for bearings

The high pressure hydraulic pump provides the required hydrostatic oil pressure at the lubrication pockets of the bush and intermediate shaftline bearings. The combination of customised bearing design and directed oil pressure keeps the shaft floating in all bearings, even at very low speed or with frequent changes of the rotating direction, thus minimizing wear in the bearing.

Application:

- Sterntube bush bearing
- Intermediate shaft bearing
- Radial bearing of thrust bearing



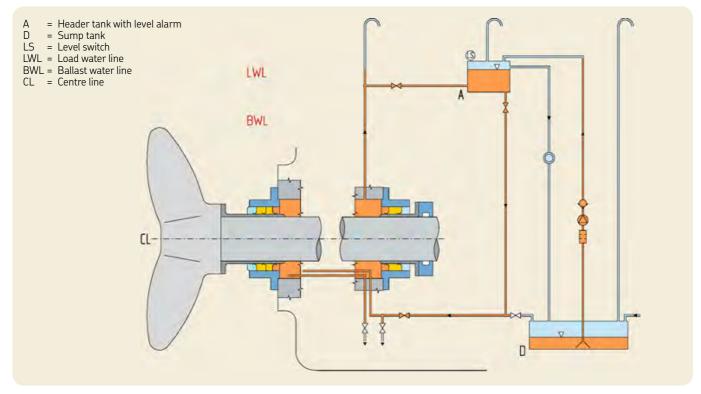
Simplex sterntube lubrication

Sterntube lubrication has a significant influence on the correct functioning of the sterntube sealing system.

The required oil pressure depends on various parameters and has to be calculated by SKF Marine for each application individually. The optimal layout of the sterntube and shaft seal lubrication will be designed for each individual installation and the specific equipment documentation provided. The following overview shows three well-approved designs for sterntube lubrication:

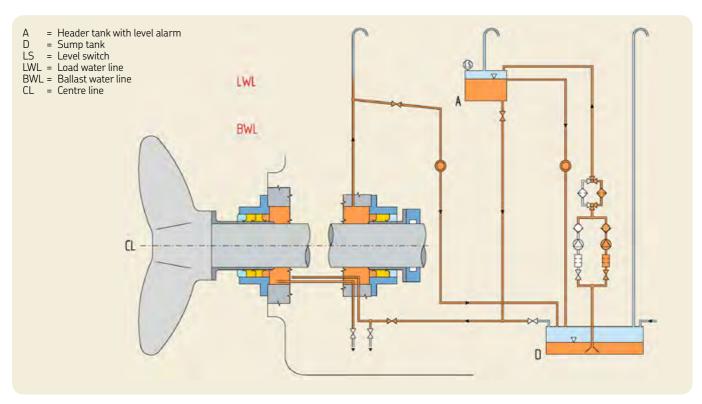
A separate lube oil sampling line is recommended for optimal analysis of the sterntube lube oil condition. In addition, SKF Marine offers solutions for active condition monitoring of the sterntube lube oil.

Please feel free to contact us.



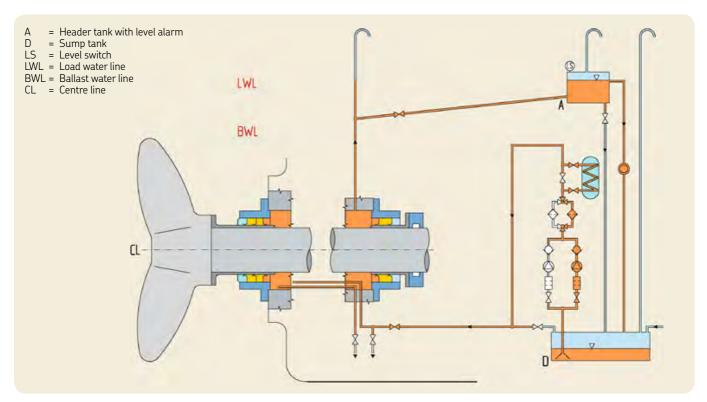
Sterntube with natural oil circulation

The pressure inside the sterntube is defined by the height of the sterntube header tank. The oil, warmed by the friction losses of the propeller shaft bushes, flows upwards to the gravity tank, where it is cooled down by convection. Cooled lube oil is transferred downward to the sterntube. This system allows for a basic level of oil circulation and cooling by means of natural circulation with easy installation.



Sterntube with forced lubrication

The pressure inside the sterntube is defined by the height of the sterntube header tank and the oil return line, which is located one metre below the sterntube header tank. External pumps continuously fill the header tank, with lube oil from the sump tank, which passes through an optional cooler and filter. From the gravity tank, cooled lube oil flows into the sterntube, entering near the aft sterntube bearing where most heat will be generated. From there the heated oil returns through the vent pipe and return line (located one metre below the oil level in the header tank) back to the sump tank. The forced circulation allows for optimal oil circulation and cooling of the bush bearings but also provides a high level of safety by static pressure settings.

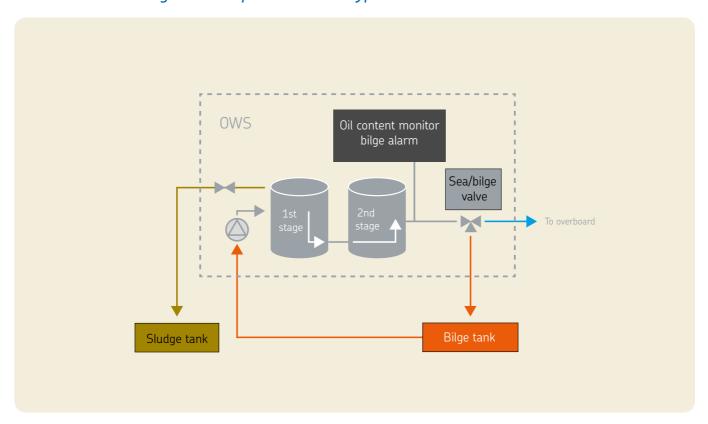


Sterntube with direct forced lubrication

The sterntube lube oil that is pumped from the sump tank, passes through an cooler and filter directly into the sterntube, entering near the aft sterntube bearing where most heat will be generated. Heated oil returns through the vent line to the sterntube header tank and overflows into the sump tank. The direct forced circulation results in optimal cooling of the sterntube bush bearings and lube oil lubrication. Since the lube oil is fed directly into the sterntube by a pump, care must be taken to avoid any over-pressure inside the sterntube. If required, our specialist engineers are on hand to advise on these technical matters, and on selecting the appropriate pump and cooling equipment.

Turbulo-Systems Turbulo Bilge water separators

SKF Marine has been building Turbulo Bilge water separators for more than 80 years. With this wealth of experience and our proven track record, we are able to supply re-liable, trouble-free, low-maintenance bilge water separators for all types of vessels.



Based on years of experience, our engineers have developed the bilge water separator series type Turbulo-MPB (Mechanical Phase Breaker). The Turbulo-MPB is designed for the treatment of bilge water on ships required to comply with IMO Resolution MEPC107 (49). The operator friendly, compact system meets the most stringent international regulations.

IMO Certificate

Type approval according to MEPC.107 (49) issued by:

- USCG
- CCS
- MRS
- BG-Verkehr

Class approval

Turbulo-MPB are class approved by all major classification societies.

Marine Equipment Directive (MED)

- Module B
- Module D

Special requirements

5PPM criteria confirmed by:

- Environmental passport (GL)
- Clean Design (DNV)
- Canadian Coast Guard (CCG)
- RINA/MRS/LR/BV

18 **5KF**

BlueMon – Environmental monitoring systems

As part of our commitment towards helping our worldwide clients to protect the environment, we have adapted the latest technologies in developing a special environmental monitoring system called BlueMon.

Sensor Data Input

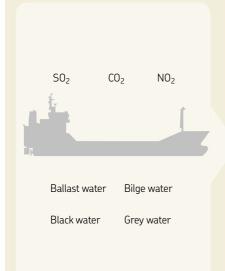
- Emission value of sensors complies with MARPOL (Annex I – VI)
- · Optional customized sensor

BlueMon

- Data processing unit
- Data control
- Data logging/storage

Emission value output

- · Visualisation and live mapping
- Visualisation of required emission values
- Data logging/storage



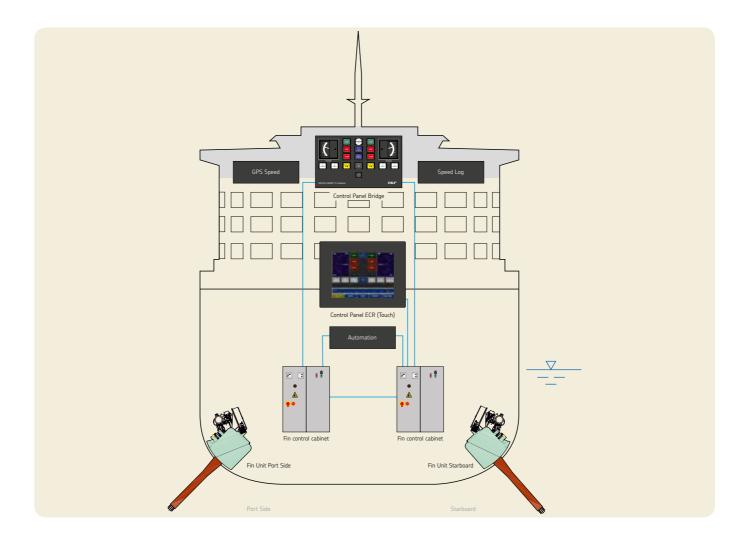




The BlueMon – Environmental monitoring system is the first comprehensive system on the market to enable the crew to collect and record automatically, all connected incoming/outgoing signals of the ship's emissions in one centralised system on a 24/7 basis. The special software assists in the visualisation of the collected information and stores the data for 24 month.

The system enables the crew to comply with regulations set by authorities and classification societies such as SEEMP (Ship Energy Efficient Management Plan), the Environmental Passport and the Clean Shipping Index. Additionally, it is an important tool in the preparation of reports such as the EEOI (Energy Efficiency Operational Indicator) by means of the integrated calculation sheet.

Stabilization systems - fin stabilizers



When it comes to securing loads and efficient working on board, the fin stabilizer from SKF Marine is in demand. With this completely retractable fin stabilizer, type S, the ship's stability is guaranteed. In addition, its use helps to ensure safe and efficient working on board – no matter what the weather. And when not needed, the fin retracts completely into the fin box, thus minimizing resistance and con-serving resources.

Every fin stabilizer is specially calculated and adjusted for the ship. The rolling motion is therefore reduced by up to 90%, and control of the system is set up such that simple start/stop commands from the bridge are sufficient for operation of the stabilization system. By this means a sensor measures the ship's movements during operation, and automatically adjusts the fin angle. The control system design enables single fin operation or standard twin fin operation depending on the type of sea conditions, the ship's crew selects, in order to prioritize either maximum performance or best fuel economy.

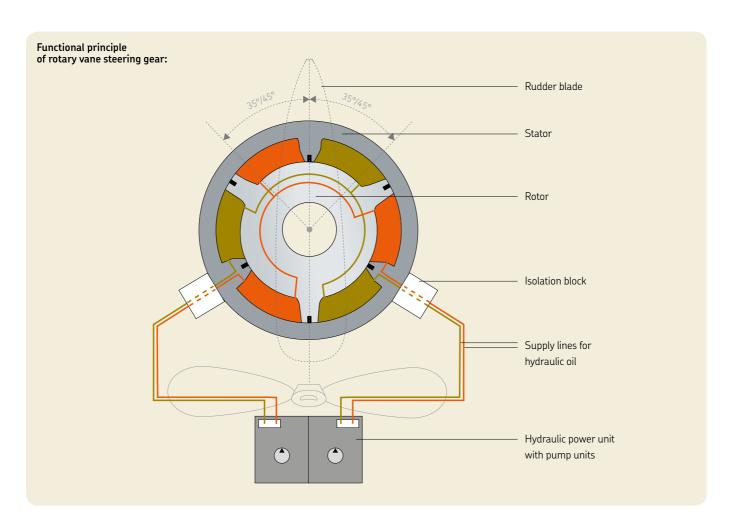
Rotary vane steering gears, V-series

The newly developed V-series of the rotary vane steering gear is the optimum solution for keeping your merchant vessel reliably on course. Thanks to the new design principle, the weight is reduced and the maximum rudder angle is up to 45°.

The compact and light construction of the system requires only a small amount of space in the ship, and no additional machining of the foundation is necessary when installing on board ship. It is sufficient to simply weld the foundation stopper onto the base plate. The whole system operates reliably and with minimal wear.

Special requirements:

- SOLAS
- MARPOL 73/78 convention specifications





Time is money in the world of shipping. High-quality products are the foundation of our success, whilst the excellent service we provide is the best possible guarantee of minimum downtime, operational readiness and maximum return on your investment. We provide advice that's spot on, we're on alert around the clock with a global service network and experienced experts, and we offer a replacement parts service that is second to none. In other words, we're there when you need us with the parts you require.

Benefits

- Worldwide service network for maritime customers
- Available 24 hours a day, 365 days a year
- Service email address: service@skf-marine.com
- Qualified SKF service stations with trained and certified experts
- Highly professional staff for efficient service and customer support
- Life cycle support (services, ship history and service reports)

360° customer service

- 360° approach: from installation and maintenance to training the crew
- Expert consulting, even before the project begins
- Collection of core data related to the vessel's history
- Efficient familiarisation training for our clients
- Individual up-grades, modifications and retrofits

Regular docking service

- Optimal replacement parts based on the ship's history
- · Outstanding OEM quality
- High availability of replacement parts and express delivery
- · Qualified service technicians worldwide
- Standardised service reports worldwide

Vessel operation service

- Maintenance and functional checks for all components
- Technical advice, fault diagnostics and system optimisation
- Service information provided on a regular basis

Emergency service

- 24/7 hotline with technical support
- Emergency service support
- Highest availability of standard components and spare parts
- · Additional express production capacities
- Underwater repair service

Find your local contact

This QR code will take you directly to our global sales and service network.







Multi-purpose heavy-lift vessel

The world heavyweight champion: with its two 700 t cranes, the HHL Tokyo can easily lift even the heaviest loads with maximum precision. As a ship-loader, it is capable of transporting two ship-loading systems at once.

Selected supplied product: Aft seal: Simplex Advanced (B)



Very large container vessel

It all stacks up: with a length of 366 metres and a cargo capacity of 13,169 TEU, the Hamburg Express was one of the first vessels to belong to the post-Panamax class. Up to 20 containers can be stacked one on top of the other and safely transported across the seven seas, whatever the weather.

Selected supplied product:

Aft seal: Simplex Airspace, including Airspace 5000 Touch and Simplex Active circulation unit



Car carrier

Car-carrying champion: the impressive and aptly named Monza Express can transport up to 4,870 cars across its twelve decks, with larger vehicles accommodated on the two height-adjustable decks. The vessel has a total capacity of 12,303 tonnes and a maximum draught of 8,77 metres.

Selected supplied product:

Oily water separator: 2.5 m³ Turbulo MPB



Heavy-lift vessel

Flying high: with its impressive lifting height of 41 metres above the main deck, the Happy Sky can lift even the heaviest loads higher than virtually any other ship. A recent retrofit resulted in the crane pedestal being raised by an additional four metres.

Selected supplied product:

Aft seal: Simplex Advanced with ceramic coated liner (BC)

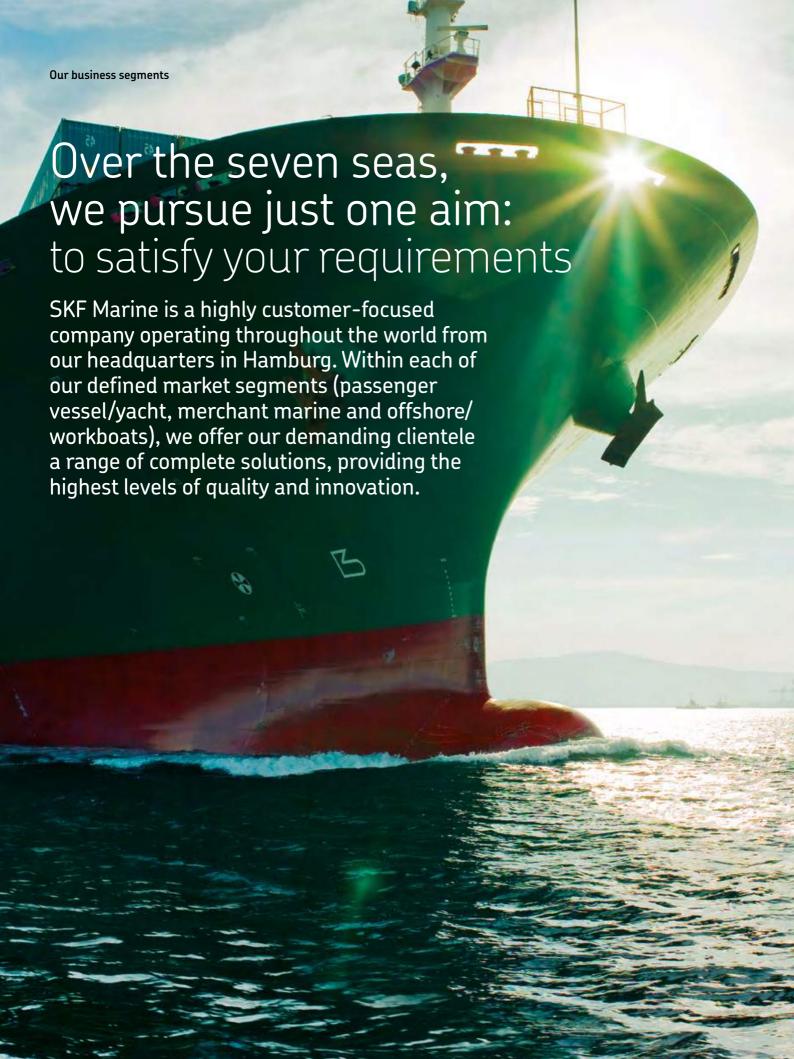


RoRo vessel

The 210 metre long Connaigra has an area of $13,700 \text{ m}^2$ that can hold a load of 19,300 tonnes. Not only can it transport containers measuring up to 53 feet, but this ice class vessel and eco-friendly clean ship can accommodate up to 95 articulated lorries and 500 cars.

Selected supplied product:

Stabilizer: Retractable fin stabilizer Type S600







Passenger Vessels/Yachts:

The range of vessels with which SKF Marine is active worldwide extends to yachts, ferries, cruise ships and specialist expedition ships. Wherever people wish to reach their destination safely over the water, with trouble-free operation and the highest possible levels of comfort, they turn to us. We are always ready with the optimum

solution for them, including zero-speed stabilisation.

Our products are pioneering, eco-friendly, and capable of being specifically adapted to your particular needs. We have applications for use in arctic waters, and for yacht builders, we offer special paints and various installation options. And of course, we satisfy the regulations for the port authorities, MARPOL and all classification societies.





Offshore/Workboats:

SKF Marine has provided a whole range of new solutions for offshore applications and workboats. Offshore applications include offshore supply vessels, drilling ships, oil rigs and offshore production vessels. Workboats include dredgers, tugs, towboats and river-going and fishing vessels. We are leaders when it comes to individually-de-

veloped solutions for a wide range of vessels.

The reliability of our products speaks for itself. We offer specially designed components for every conceivable application – from equipment in hazardous areas (such as gas-tight bulkhead seals and explosion-protected bilge water separators), to components suitable for dynamic positioning demands, solutions to specific docking interval requirements (such as FSO/FPSO) and for extreme draughts. And, of course, we satisfy the regulations for port authorities, MARPOL and all classification societies. Call us for a consultation – together we can work to find the right solution for your individual needs.



The Power of Knowledge Engineering

Combining products, people, and application–specific knowledge, SKF delivers innovative solutions to equipment manufacturers and production facilities in every major industry worldwide. Having expertise in multiple competence areas supports SKF Life Cycle Management, a proven approach to improving equipment reliability, optimizing operational and energy efficiency and reducing total cost of ownership.

These competence areas include bearings and units, seals, lubrication systems, mechatronics, and a wide range of services, from 3-D computer modelling to cloud-based condition monitoring and asset management services.

SKF's global footprint provides SKF customers with uniform quality standards and worldwide product availability. Our local presence provides direct access to the experience, knowledge and ingenuity of SKF people.

What can we do to help? We look forward to hearing from you.

Please contact:

SKF Marine Singapore Pte Ltd

20 Toh Guan Road, #01-01 Singapore-608839 Phone: +65 66863373

E-mail: simplex.marine.sg@skf.com

Internet: www.skf.com

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	FSC® C004867		