



MARINE SERVICES

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FLENDER

MARINE SERVICES

Flender Netherlands B.V. is the global lifecycle support partner within Flender. We specialize in the worldwide supply of spare parts and field service engineers for the complete mechanical drive portfolio consisting; propulsion, generator and dredging gear units as well as clutches, couplings and shaft line bearings. With both the Lohmann & Stolterfoht and current Flender NAVILUS® brand, we serve ship owners and a wide range of vessels across the globe from our Rotterdam office.

1956	Bruinhof B.V. founded in Rotterdam (NL).	2016	Siemens Netherlands N.V. Bruinhof Marine has been assigned as global Center of Competence for marine services.
1998	Flender AG took over the Lohmann + Stolterfoht Marine Gearbox Division including Bruinhof B.V.	2018	After the global migration of the Mechanical Drive business into a standalone entity within Siemens AG in 2017, Siemens Netherlands N.V. Bruinhof Marine became Flender B.V. in September 2018.
2005	Siemens AG took over Flender Holding GmbH (incl. Bruinhof B.V.).	2021	The Carlyle Group is the new owner of the Flender Group.
2009	Bruinhof B.V. has been integrated into Siemens Netherlands N.V.		
2010	Siemens Netherlands N.V. Bruinhof Marine has been assigned as global Center of Competence for Service and Commissioning and for Europe as Spare Parts Quotation Center.		

THERE ARE FLENDER GEAR UNITS FOR:

- Propulsion drives
- Cutter head drives
- Suction and pump drives
- Jet pump drives
- Generator drives

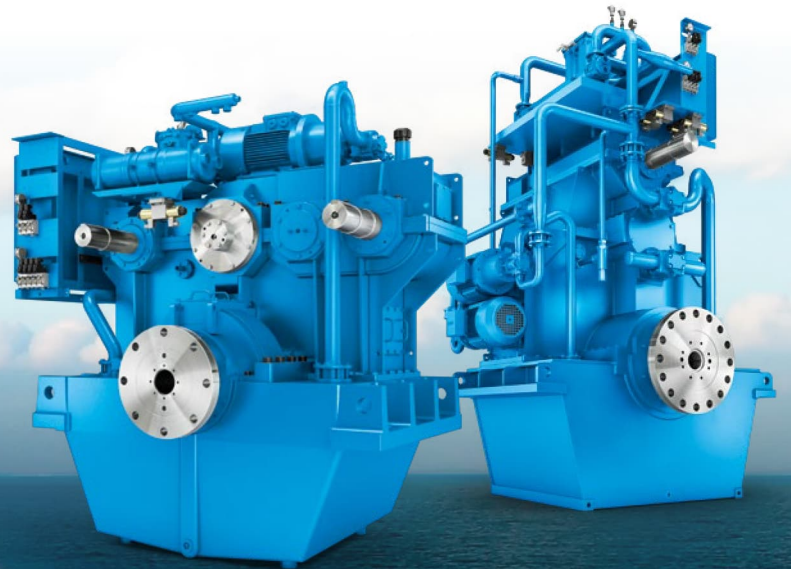


FLENDER NAVILUS MARINE GEARBOXES

Flender has been building high-quality, reliable, standard and customised gear unit solutions for a wide range of marine applications for decades. These are developed within the well-known and established modular gear unit system NAVILUS®.

We attach great importance to our dialogue with shipyards and operating companies. Our customers know that we take their requirements very seriously and we ensure, through our industry knowledge and expertise, that these are addressed in full when developing new solutions. At the heart of which is our tried and tested technology.

In the marine propulsion technology sector, it is important to operate a ship's main engine over long periods at the most efficient operating point possible and at the same time, reduce emissions to a minimum. This is especially important for applications with multiple uses, i.e. different propulsion profiles. The central objectives of which are; low operating and life-cycle costs, minimum environmental impact, as well as achieving the highest levels of reliability and safety.



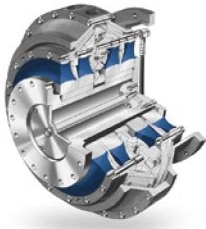
Your benefits at a glance

- Flexible drive concept
- Custom power ratings
- Low / minimal noise generation
- Low vibration
- High efficiency
- Optimum power-to-weight ratio
- High quality, availability and reliability
- Worldwide service
- Our industry experience and competence

Applications

- Single-engine ships
- Twin-engine ships
- (Two-gear) PTO, PTI, PTH
- Dredger (cutter head drives, suction and presser drives, jet pump drives)
- Ships with low-speed diesel engines (Generator)
- 2-Speed applications on chemical tankers, superyachts, seismic-, fishing-, and rescue vessels

Couplings and Clutches



PNEUMAFLEX

Experience since 1964 - Proven reliability

The PNEUMAFLEX clutch is a combination unit comprising a double conical friction clutch and highly elastic coupling. The clutch components comprise two inner friction cones which are pressed against two outer friction conical faces via the pneumatically actuated clutch cylinder. The elastic part comprises rubber elements arranged in parallel which are completely optimized enhancing the coupling's reliability and performance significantly.

Your benefits at a glance

- Combination of a dry friction clutch and highly elastic coupling without short-lived idle bearing system
- Complete separation of primary and secondary sides
- Backlash-free, no wear of components subject to backlash
- Smooth and easily controllable engaging operation
- Protects the propulsion system against overloads if a slip monitoring unit is used
- Clutches of type KAP can be vertically removed



PNEUMASTAR

Smooth engagement

The PNEUMASTAR is a torsionally stiff, double-cone, friction clutch. Due to the high resilience of the rubber sleeve springs, the PNEUMASTAR clutch is capable of effectively compensating radial, axial and angular misalignments within predetermined limits. Moreover, as the clutching components are moved over the rubber sleeve springs during the actuation of the clutch, wear through axial sliding movement between the various contacting parts is avoided.

Your benefits at a glance

- For stiff, but interchangeable connections
- Backlash-free, no wear to components subject to backlash
- Smooth and easily controllable engaging operation
- A range of clutch types are available with different connections

CLUTCH CONTROL UNIT

Increasing operational reliability

An electro-pneumatically operated remote clutch control device is available for PNEUMAFLEX and PNEUMASTAR clutches. Control unit can lose a bit of functionality over time due to various ambient conditions on board. Therefore Flender Netherlands B.V. developed an interchangeable swivel panel which is cost effective and reduces down-time.

Your benefits at a glance

- Exchange program
- Plug-and-play design



SPIROFLEX

Flexible solution for shaft connections

The elastic rubber elements were completely optimized significantly enhancing the coupling's reliability and performance. The most significant feature of the coupling is its rubber high torsionally flexible elements. Moreover, the coupling compensates center mismatch, axial as well as angular misalignment of the shafts and machinery elements, to be connected (engines, gearboxes, generators etc.) within a predetermined tolerance range. The coupling is especially suited for use in diesel engine propulsion systems and installations where torsional vibration must be considered.

Various rubber hardness grades effectively address the natural frequencies arising in the respective drive system.

Your benefits at a glance

- Elements can be removed radially
- Exclusively features frictionally locked connection
- Backlash-free torque transmission
- Flywheel connecting dimensions acc. to DIN 6288



DENTILUS

High performance, low maintenance

DENTILUS gear couplings of the AS-, AG- and AV- type, formally branded as Lohmann & Stolterfoht, are designed with crowned teeth and are used where torques must be transmitted through shafts that are subject to movement in all axis's. The gear couplings can compensate angular, radial and axial misalignments.

Bruinhof Marine utilizes these couplings for marine applications such as generators, [dredge/jet] pumps, cutter drive shafts and other shaft-to-shaft connections.

Your benefits at a glance

- Suitable for reverse operations
- Quiet operation due to head centering
- Special design for vertical operation available
- Large permissible finish bore
- Easy replacement of seals with split cover
- High level of operational reliability due to high quality materials
- Long service life with low levels of maintenance
- High ambient temperatures possible
- Interchangeable with preceding series

THRUST- AND SHAFT BEARINGS

Absorbing the propeller thrust

The wide range of LRL/LRH RADILUS shaft bearings and LAR/LAK AXILUS thrust bearings, formally branded as Lohmann + Stolterfoht, are designed for either intermediate radial shaft support, or to take over axial thrust force out of the driven machine, or both at the same time.

Your benefits at a glance

- Self-lubricated
- Low maintenance
- Reliable

EXPERT COMMISSIONING

by Flender specialists for smooth operation of your installation

Complex equipment needs to be expertly installed and commissioned to ensure its long lifetime. Flender Netherlands B.V. offers an experienced commissioning team to provide customers with a service which covering; installation check, alarm testing, sensor calibrating and load- & performance trials.

Your benefits at a glance

- Highly flexible service and an excellent cost-benefit ratio thanks to specialized trained personnel
- Extensive product know-how

SERVICE & REPAIR

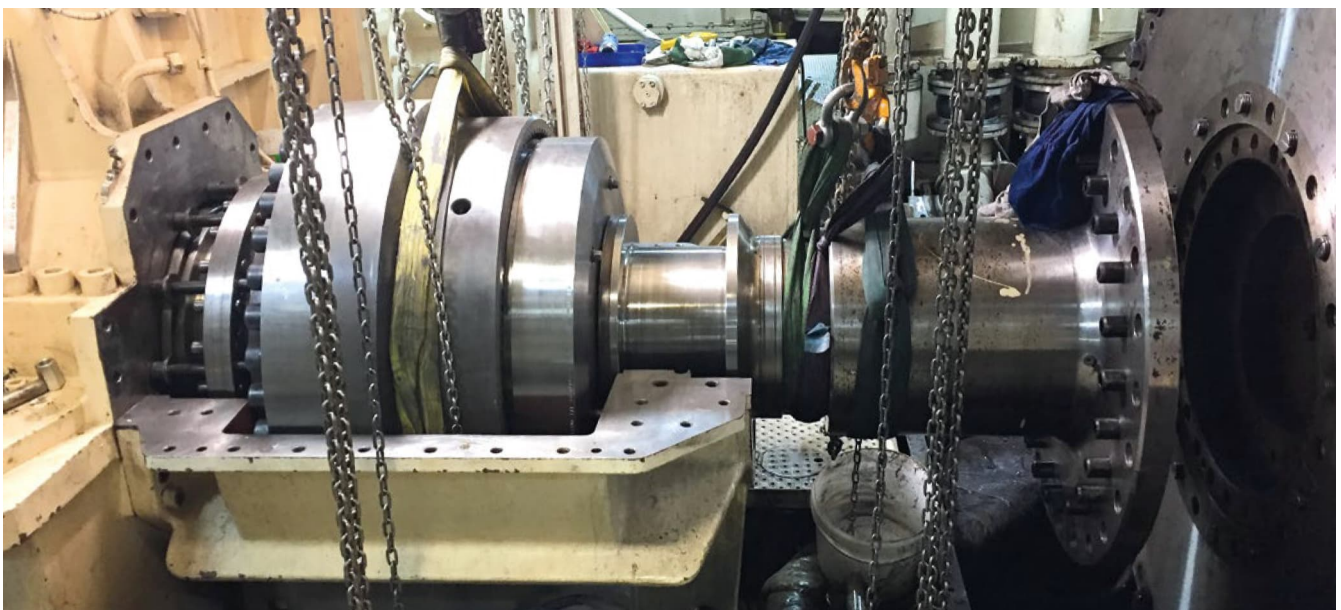
Maintenance ensures optimum availability of your installation around the world

Inspection and preventive maintenance need to be carried out regularly, especially on machinery operating continuously in a harsh environment. The goal of inspection service is to identify and assess the actual equipment condition by either visual inspection or endoscopic inspection of the internals. A final report with recommendations is included.

To resolve unplanned equipment downtimes as quickly as possible, we are offering a fault correction service for your equipment worldwide – in the form of a team of experienced service specialists. The scope of the service includes troubleshooting, error cause identification, repair or replacement of defective components and the provision of a final report.

Your benefits at a glance

- Improved plant availability
- Repairs on the high-quality level of the manufacturer
- Transparency of services carried out and the parts used through repair reports



DIAGNOSTIC SERVICES

Monitoring your gear unit

To avoid damage to gear units and to prevent failures, the first symptoms should be detected early. Therefore, for optimal reliability of your drive, we offer you our condition monitoring, DIAGNOSTEX®. As a specialist for gear units we will ensure your drive is well maintained through means of analysis, diagnostics and inspection.

We apply the following possible methods: whether telediagnosics, mobile vibration analyses, acceptance measurements or load and torque measurements, inspections, endoscopy – condition monitoring means above all to have the right feeling for your operation.

We offer you the best technologies for condition-oriented maintenance of your drive to prevent problems before they can exist. Continuously online with remote assistance and analysis from our side or offline upon a visit from one of our engineers, all depending on your level of participation.

Your benefits at a glance

- Qualified data evaluation and diagnostics by competent experts
- Specific recommendations for action as well as early warnings in the event of a fault
- Reduced maintenance costs through early detection of wear-related anomalies
- Ability to schedule repairs



PREVENTIVE MAINTENANCE

Optimized reliable operation

Maximize your equipment availability by choosing our preventive maintenance service. Regular maintenance measures based on the products' age and operating hours, will help you to keep equipment in the optimal operating condition.

Your benefits at a glance

- Scheduled maintenance downtime instead of unscheduled production outages
- Planning of inspection and preventive maintenance intervals to suit operating conditions
- Optimum plant and machine
- Performance

RETROFITS

During the lifetime of a vessel the operation profile may be changed and we offer upgrade solutions and advanced customized retrofits.

New tasks and purposes, increasing environmental regulations or new technology with changes in class requirements may cause need for an upgrade/retrofit in order to optimize the vessel's efficiency.

Our experienced engineering team can assist you in finding the best solution for either a modification of the existing gearboxes or a replacement of the complete units.

Your benefits at a glance

- Optimized reliability, efficiency and performance
- Lower maintenance costs
- Add operational flexibility
- Comply with increasing environmental regulations



For more information about NAVILUS gear units:
www.flender.com/en/industry/marine

Further information on the subject of
application-specific gear units:
www.flender.com/application-specific-gear-unit

Further information on the subject of marine services:
www.flender.com/en/bruinhofmarine

Further information on the subject of couplings:
www.flender.com/couplings



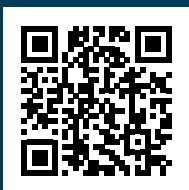
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Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.



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