HUNGER Hydraulik

EIN UNTERNEHMEN DER HUNGER-GRUPPE

Hydraulic Cylinders for Offshore Applications

Your Partner for Complete Solutions

Knuckle boom crane cylinders

Safe, lifting and handling of goods on drill ships and other offshore rigs. With this solution of knuckle boom cranes the risk of swinging loads especially under rough weather conditions will become minimized. The lifted loads are under permanent hydraulic control. Special load control valves directly mounted on the cylinders guarantee that there are no uncontrolled movements of main boom or knuckle boom arms. Typical knuckle boom crane is operated with four cylinders in total: two knuckle boom cylinders and two main boom cylinders.

Technical data:

Main boom cylinder (example)
- Bore diameter: 470 mm
- Stroke 5.080 mm
- Rod diameter 360 mm
- Load capacity: 600 t per cylinder

Knuckle boom cylinder (example)
- Bore diameter: 380 mm
- Stroke 3.800 mm
- Rod diameter 250 mm
- Load capacity: 350 t per cylinder

Main features of the Hunger offshore crane cylinders are:

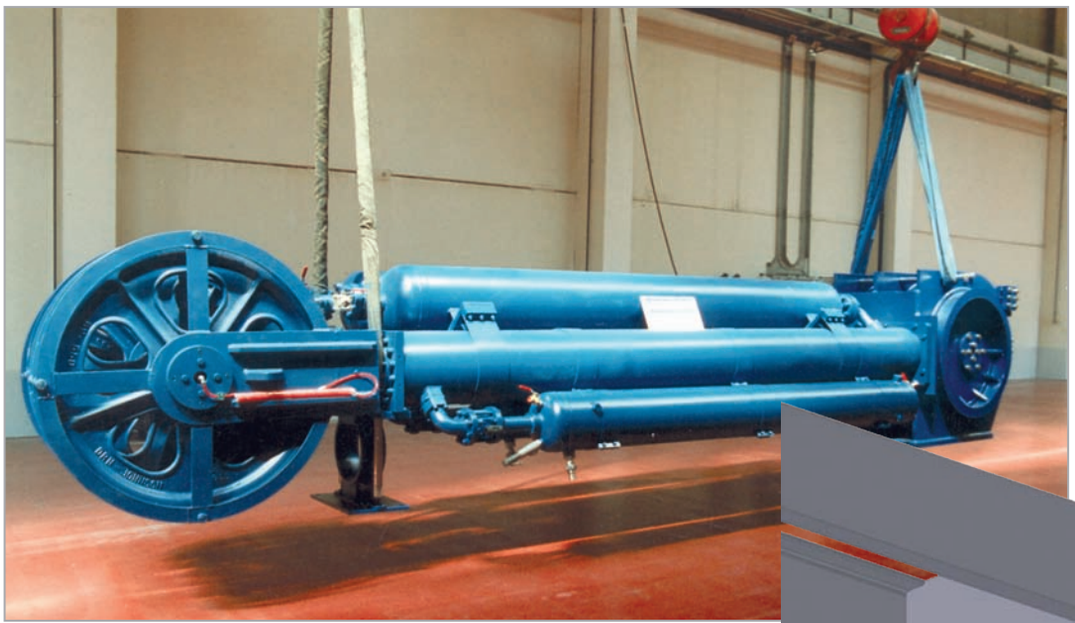
- Different corrosion resistant rod coatings are available, exactly adjusted to the application in question (Ceraplate or Ultraplate coating)
- Cylinder components, critical regarding corrosion, are special treated to optimize corrosion resistance
- Stainless steel piping and manifold block for safety and load control function
- Equipped with wear resistant Hunger seal and bearing elements for low wear and friction and stick-slip free crane movement
- Cylinders designed for high working pressure over 400 bar

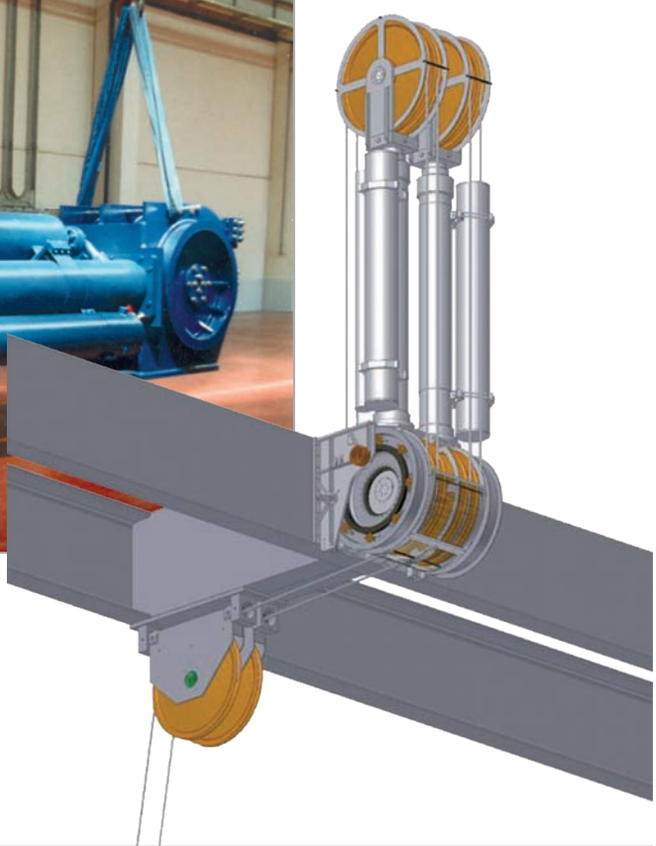
One of the world‘s largest drill ships, Stena Carron

Example for main boom cylinder

Certification according to DNV lifting appliances 2008, DNV standard for certification No. 2.9 hydraulic cylinders and DNV offshore standard E101/D101 or alternatively according to ABS rules for building and classing, steel vessel. Part 4, Lloyds register, GL or Bureau Veritas.

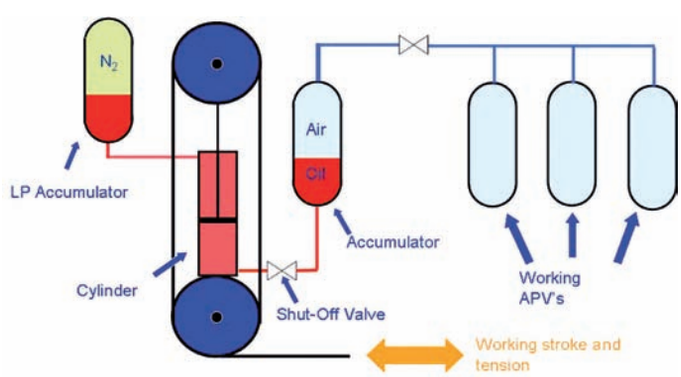
Wire line tensioner cylinders





Wire line tensioner cylinder with mounted accumulators and rolls

A wire line tensioner system is used to ensure a predefined tension to the marine riser and to compensate any rig motions like heave, roll or pitch. An accumulator loaded hydraulic cylinder generates the tension in a pulley system which is connected to the drill rig structure on one side and to the tension ring on the other side.

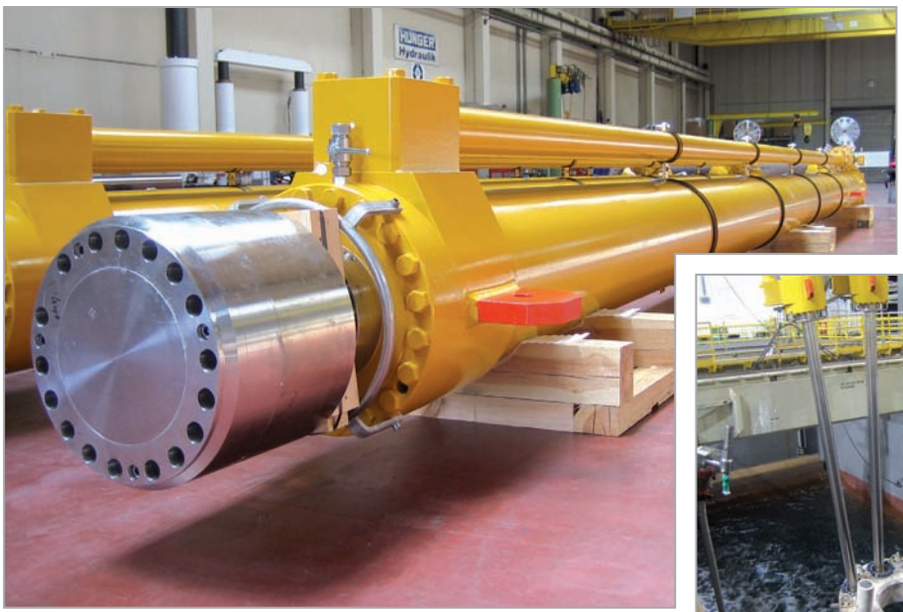


Block diagram and installation situation of a wire line riser tensioner system

Because the hydraulic cylinders are installed on the platform deck free access for service and maintenance is given. To protect the piston rod against corrosion, Nickel-Chrome layers or thermical sprayed coatings are used. Hunger DFE seal and guiding elements are used to provide long life properties. The cylinders can be delivered with mounted accumulators and piping.

Certification according to DNV lifting appliances 2008, DNV standard for certification No. 2.9 hydraulic cylinders and DNV offshore standard E101/D101 or alternatively according to ABS rules for building and classing, steel vessel. Part 4, Lloyds register, GL or Bureau Veritas.

N- line tensioner cylinders



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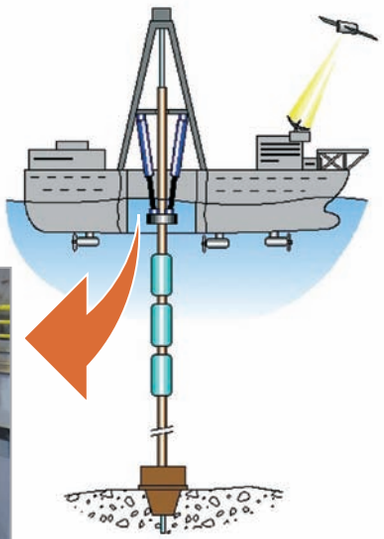
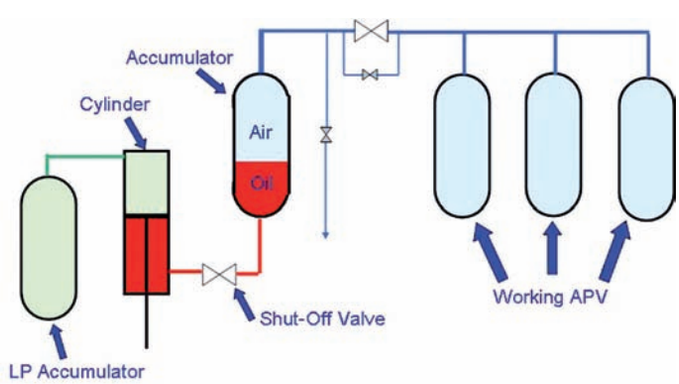


N- line tensioner cylinder

The modern N- line tensioner design is used to ensure a pre-defined tension to the marine riser and to compensate any rig motions like heave, roll or pitch. The system consist of accumulator loaded, long stroke hydraulic cylinders, which are directly mounted between the drill rig structure on one side and the tension ring on the other side.



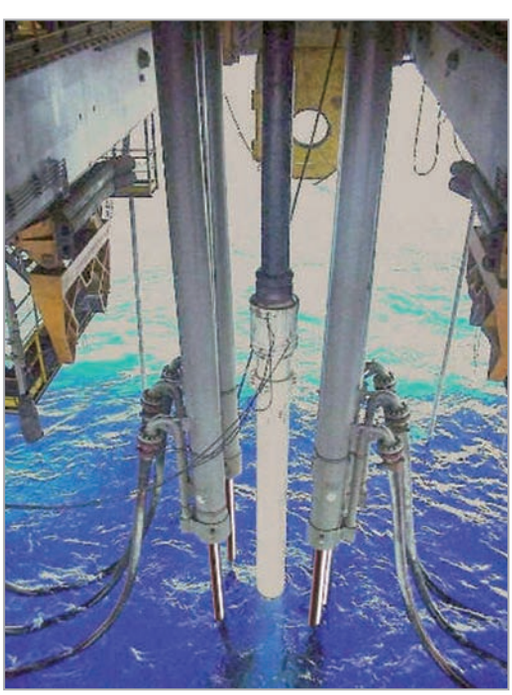
Block diagram and installation situation of a N- line riser tensioner system

Technical data:

- Bore diameter: 560 mm
- Rod diameter 230 mm
- Stroke 15.240 mm
- Load capacity: 350 t per cylinder

Certification according to DNV lifting appliances 2008, DNV standard for certification No. 2.9 hydraulic cylinders and DNV offshore standard E101/D101

Because N- line tensioner cylinders are installed directly in the splash zone with partly submerged piston rods an excellent corrosion protection is necessary. The Ultraplate coating guarantees premium corrosion protection as well as high wear resistance for the continuously moving rods. Hunger DFE seal and guiding elements are used to provide long life properties. Other special features are an externally adjustable seal which can improve the reliability of the whole system, an absolute position measuring system, special ball joints allowing a tilt movement in any direction and the Nitrogen loaded accumulators with rupture disc and temperature safety valve.



DPACs and piston accumulators

The DPACs for cranes with a heave compensation are designed as four chamber accumulators with high and low pressure oil and gas sides.

An integrated and redundant position measuring system delivers always the information about the current piston position to the system control.

Seal elements from Hunger guarantee with their low friction properties a fast reaction to all fluid requirements and with it for a safe and accurate control of the handled load.

For cylinders running with fast speed piston accumulators are used to deliver the required high flow rates to the cylinders. Typical applications are knuckle boom cranes with a heave compensation or CMCE systems.

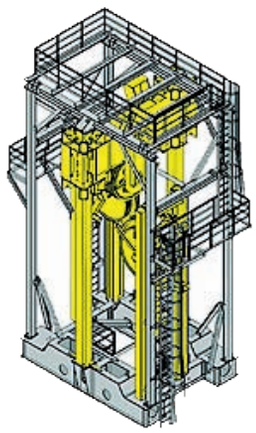
Four chamber piston accumulator for heave compensation

The CMCE accumulators are designed with two chambers, one for gas and one for the water based fluid, separated by a piston. The typical volume is about 3.300 liter. These accumulators are equipped with special seals, dessigned for high speed and low friction.

General technical data:

• Bore diameter up to:	610 mm
• Stroke up to:	11.292 mm
• Pressure range:	207 bar

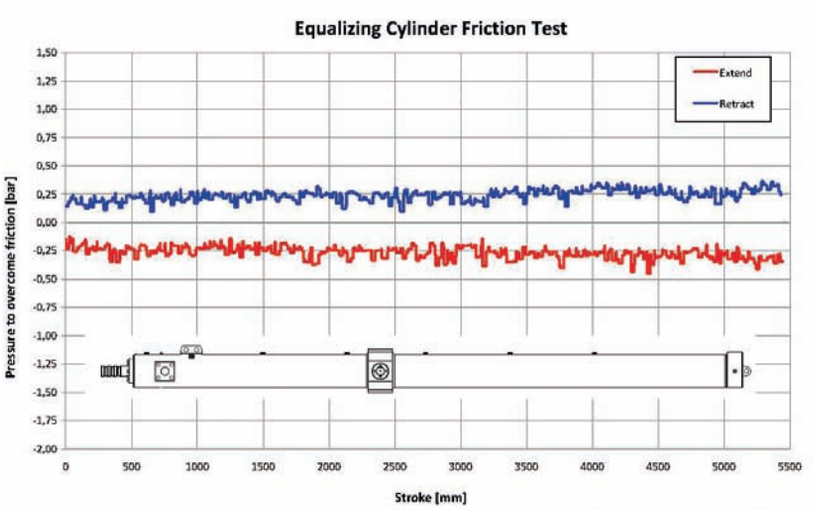
CMCE cylinders



The CMCE- (Crown Mounted Compensation and Equalization) cylinders are installed in the top of the derrick where they compensate vertical movements of the drilling rig relative to the ground fixed and standing still drilling rod.

Two main and two equalizing cylinders are always working parallel which requires identical friction behavior of each cylinder couple. Depending on the wave run the maximum moving speed of these cylinders can go up to 2 m/sec.

Because the cylinders have to realize this high speed movement with water based hydraulic fluid a special Hunger seal and bearing arrangement is considered in the design.
In case of the CMCE- main cylinders also some special features are integrated into the cylinder design. Their cylinder body is equipped with supports for an external guide rail where the middle beam of a pulley runs. And in the main cylinder itself the oil feeder for the above installed equalizing cylinder is integrated. The equalizing cylinders are designed as three chamber cylinders with a pretension piston which always guarantees a minimum tension in the connected tightrope.



Technical data:

CMCE main cylinder (example)

• Bore diameter:	480 mm
• Rod diameter	420 mm
• Stroke	8.890 mm

CMCE equalizing cylinder (example)

• Bore diameter:	280 mm
• Rod diameter	100 mm
• Stroke	8.100 mm

Certification can be done according to:
- DNV standard for certification no. 2.9 hydraulic cylinders and DNV offshore standard E101 “Drilling Plant”
- ABS / CDS (Classification of Drilling Systems)
- Lloyds register

Piling barge cylinders

Piling barge cylinders are used for operating ram-cranes on working barges. With these barges, concrete-steel pillars with lengths up to 100 m get rammed in the sea ground used for construction of bridges, quay walls or harbour walls. By the bi-directional working cylinder the mast can be adjusted to different angles to get higher stiffness from the lightly crossed pillars.

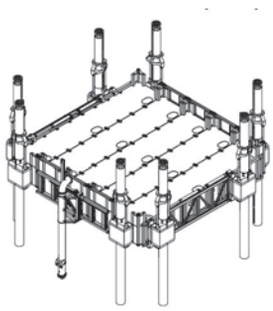
Technical data:

- Bore diameter: 800 - 1.210 mm
- Rod diameter: 500 - 750 mm
- Stroke: 12.000 - 14.500 mm
- Load capacity: up to 1.600 t
- Cylinder weight: up to 110 t

Piling barge cylinder with 900 mm piston diameter

The cylinders are certificated according to CCS standard or DNV lifting appliances 2008, DNV standard for certification No. 2.9- hydraulic cylinders. Main features of the cylinders are the Ceraplate rod coating, stainless steel spherical bearing, offshore plastic compound bushings at rod end for automatic locking function and friction and wear optimized Hunger seal and bearing elements. The cylinders are equipped with manifold block providing all safety and load control functions.

Walking platform

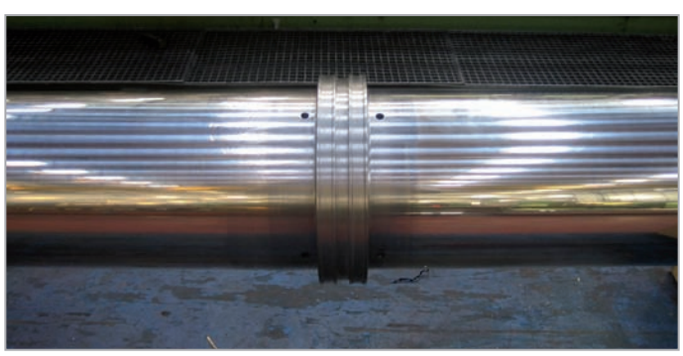


SeaWalker, the first of a new range of innovative 8 legged, self-contained walking jack-up platforms, capable of walking and safely operating in water depths up to 30 metres. The new versatile walking jack-ups can move and operate completely independently in rough seas, strong currents or on beaches and other intertidal locations, considerably boosting the productivity of a variety of traditional jack-up platform operations. Including geotechnical site investigation drilling, trenching, pipeline and cable laying, drilling, blasting and other underwater work.

32 hydraulic cylinders with Ceraplate rod coating are used to move the legs of the platform. The cylinders are equipped with spherical bearings in stainless steel / plastic compound design and with Hunger DFE special seal elements to guarantee a leakage free hold of the load.

Hydraulic cylinder for winch / rope control

To lead the rope of large winches of ocean-going tug boats hydraulic cylinders with clamped double piston rod and moving cylinder body are used. Because of the permanent exposure of the piston rod to the sea atmosphere the Ultraplate layer is used to avoid any kind of corrosion and to provide a polished and wear resistance rod surface to the seal and guiding elements.



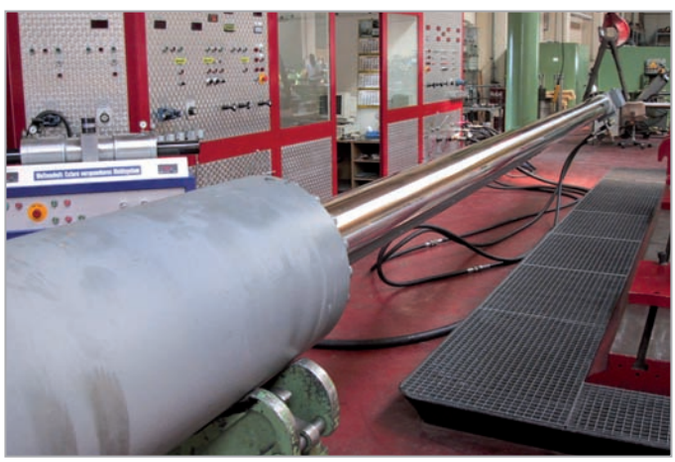
Double piston rod with centred piston, Ultraplate coating and oil feeding through the rod

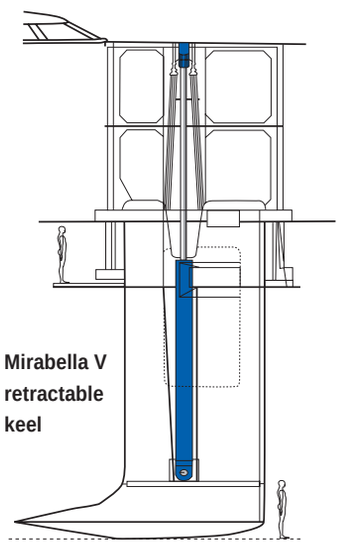
Keel lift cylinder

The Mirabella V is with a length of 75 m and a mast height of 90m the currently biggest single mast sailing ship in the world. To allow the ship to enter in smaller harbours a hydraulic cylinder can lift up the 150 t heavy retractable keel by approximately 6.000 mm.

Because the hydraulic cylinder is always sub-merged or in the splash zone the Ultraplate rod coating was selected to provide a long life corrosion protection.

To put the weight as deep as possible in the keel, the cylinder is installed with rod side up. Therefore the hydraulic oil is feeded through the rod in the cylinder.





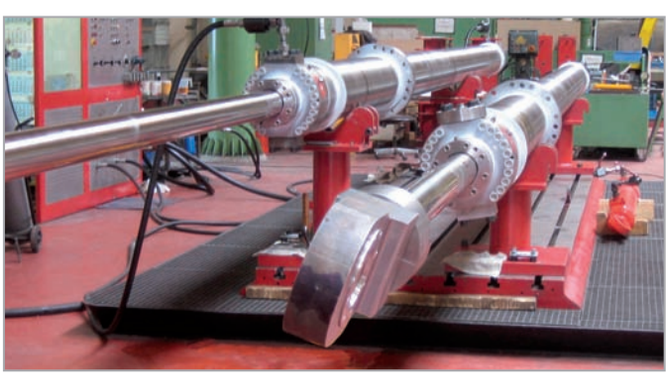
Mirabella V retractable keel

Technical data:

- Bore diameter: 320 mm
- Rod diameter: 190 mm
- Stroke: 6.000 mm

Motion compensator

To produce raw material from the sea ground conveyor belts or remote controlled moveable units are used. In the motion compensator unit a hydraulic cylinder is used to stabilize all vertical movements during operation or set down of the production unit. The cylinder rod is always exposed to the sea atmosphere and therefore the Ultraplate rod coating is used.



Hydraulic cylinder for dredger application

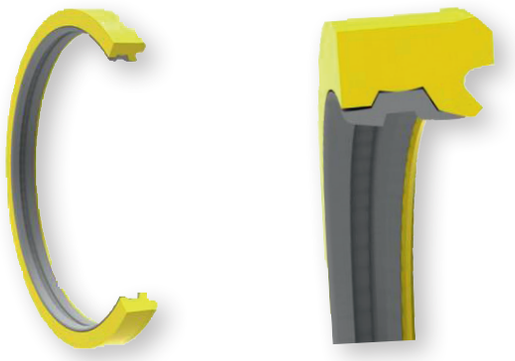
With a retracted overall length of 25,6 m, a bottom flange of 2,15 m and a weight of over 200 t the most enormous cylinder of the company history has been built. The special cylinder with its tensile force of 1.500t and its stroke of 20 m is one of the biggest so far built cylinders in the world and it will be used for an offshore excavator. By means of steel cables the cylinder will lift and lower a huge excavator shovel, within two coaches could easily have room.

Four single pipe segments were welded and formed together at the Hunger plant to a perfect one-piece cylinder tube. To protect the cylinder against the extreme corrosive sea atmosphere the contact surface of the piston rod was coated with Ceraplate and the cylinder was colored with a special painting. The huge spherical plain bearing that was required for mounting to the excavator as well as the seal- and bearing elements of the hydraulic cylinder were parts of the delivery program of the Hunger Hydraulik Group. Before shipment of the hydraulic cylinder, it was checked regarding functioning on the test bench in the presence of the client and the safety and quality execution was certified by the external surveillance society Bureau Veritas.

Technical data:

- Piston diameter: 970 mm
- Rod diameter: 660 mm
- Stroke: 19.800 mm
- Cylinder weight: 200 t

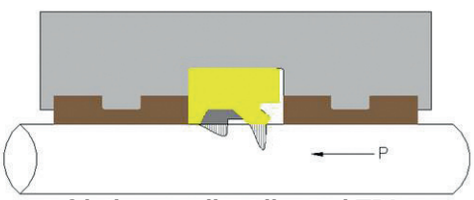
Special seal and bearing elements for high dynamic movements



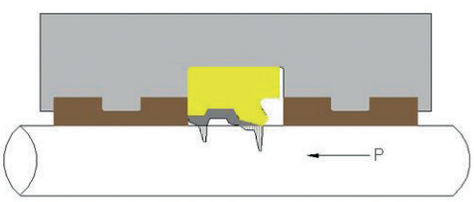
Our sister company Hunger DFE is an experienced hydraulic seal system provider and parter of customers in the oil and gas industry since several years.

Hunger DFE offers a large range of PTFE-Compounds, elastomer, rubbers and molded thermoplatics - each grade adapted to the demands of the application. Hydraulic equipment and seals in oil and gas industry have to bear hardest climatic and geologic conditions and must operate successfully at any time. To secure these properties and guarantee a safe, efficient and economic production, different solutions special adapted to the application are offered.

Accumulator loaded, high dynamic long stroke cylinders need a special taylor made sealing and bearing system to cope with extraordinary system loadings and operational speeds. Only highest quality engineering plastics, elastomers and PTFE-based compounds can guarantee low friction grades and stick slip free movements.
Special developed Hunger DFE components like friction reduced lip seal TRO-I can improve the reliability of the whole cylinder system remarkably. For these demanding applications piston rods often come with coatings consisting of carbides, oxides or stainless steel in order to improve service life under operation – Hunger seals can be adapted to these hard wearing surfaces



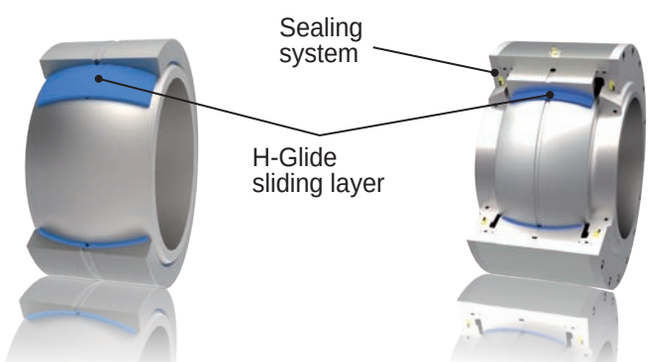
friction gradient lip seal TDI



friction gradient TRO-I

For more details about this type of seals and further offshore sealing solutions please see Hunger DFE brochure „OFFSHORE TECHNOLOGY“

Bearings for Offshore



GE...HS **GE...HS with sealing system**

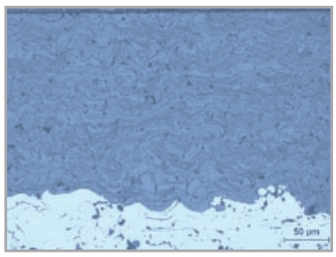
The self-lubricant, maintenance-free Hunger Maschinen radial spherical plain bearing of the series GE...HS were specially developed for offshore applications. They are characterized by a particularly wide, compact construction for achiving: increased axial and radial loading capacity and dimensions that are optimized for the installation area.

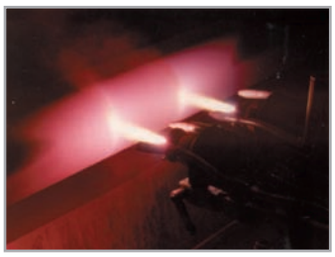
Technical data:

- Outer and inner bearing ring made of stainless steel (by request, special steels are also available)
- H-Glide: sliding layer glued to the outer ring
- Optional: special seal with high-performance plastics
- Operating temperature range: -30 to +90°C

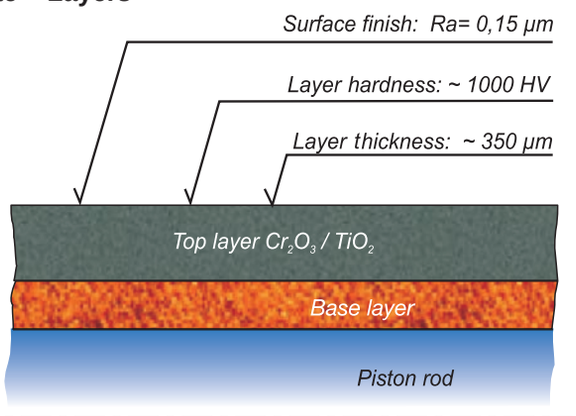
For more details about this type of bearings and further offshore solutions please see Hunger Maschinen brochure „BEARINGS FOR OFFSHORE / CIVIL ENGINEERING“

Ceraplate rod coating



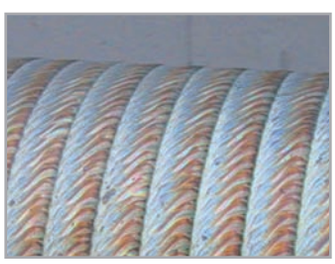


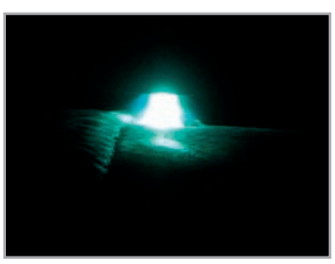
Ceraplate – Layers



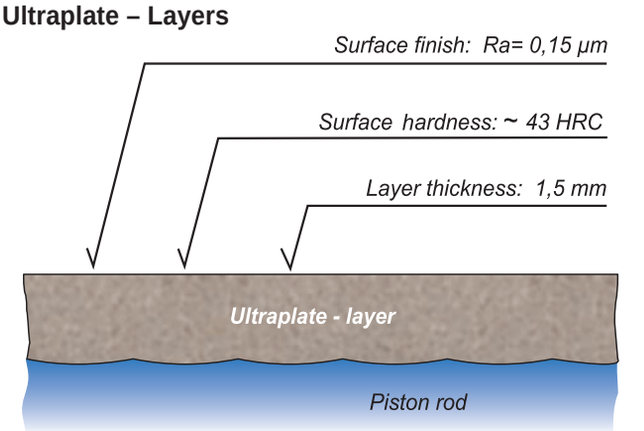
- Thermically sprayed base layer and Cr_2O_3 / TiO_2 top layer
- Other materials (metallic or carbide) on request
- Suitable for on deck installations with normal working cycle

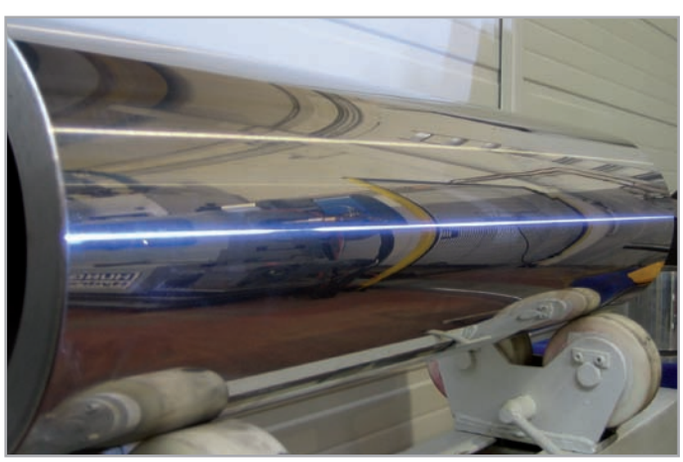
Ultraplate rod coating





Ultraplate – Layers





- Plasma welding technology (P.T.A.) for stainless steel layers
- Different sea water resistant materials available
- Suitable for marine atmosphere, splash zone or submerged condition

For more details please see our brochure SURFACE COATING SYSTEMS.

Die HUNGER-Gruppe - The HUNGER Group

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