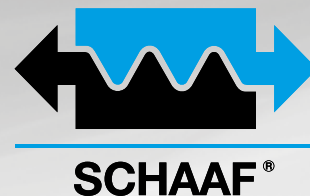


Leading joining technology



Ships

**Propulsion shaft and power generation solutions
for Ship Owners, Managers, Designers and Shipyards**



SCHAAF – Product quality and
cooperation just as you like!

Leading joining technology by SCHAAF

SCHAAF is an international group of enterprises with home-base in Germany that has specialised in the development and production of joining technologies since 1954. The globally active company thrives on its innovative system solutions and convinces with excellent quality. SCHAAF supplies bolt tensioning devices, hydraulic nuts, hydraulic high-pressure generators and accessories to more than 60 countries worldwide every year.

VISION

The Vision statement is focused on tomorrow and what we would like to become. It sets our company the direction where to go.

We develop world leading technology in the field of joining technique and thereby inspire our customers. Together we hereby create a future in which material will be saved, resources will be sustained and life will be easier.

MISSION

The Mission statement is focused on what, and why we are doing that today. It drives the company towards the Vision. Every piece of the mission is to stay on the track to reach our Vision.

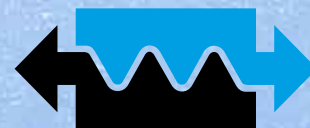
We create value to our customers in all kinds of industries and offer cooperation in the way they like it.





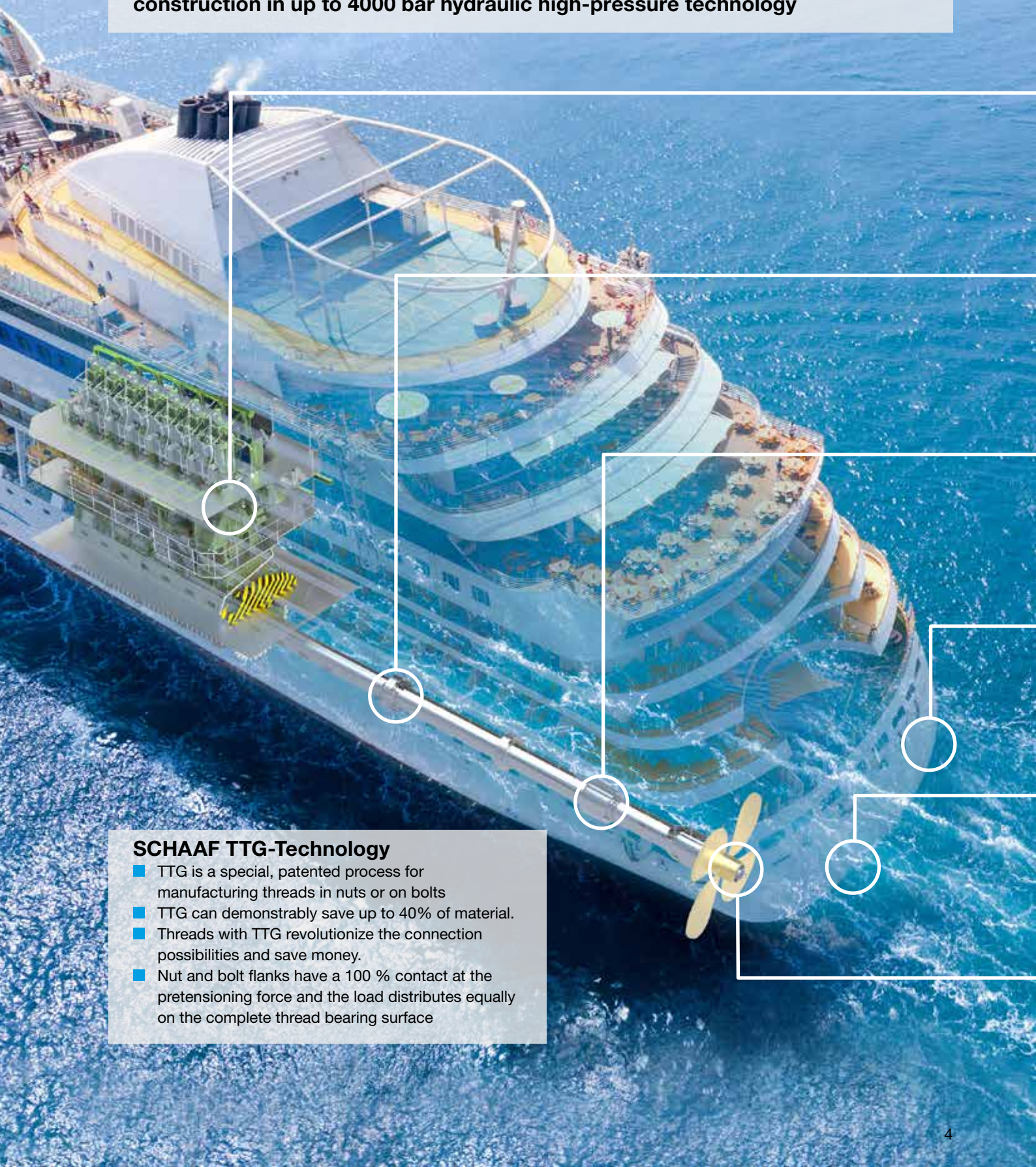
Joining Technology for ship technology

SCHAFF offers specially adapted products and assembly accessories with up to 4,000 bar hydraulic high-pressure technology for shipbuilding and the maritime industry (offshore drilling platforms) such as shaft connections, flange connections, propellers or POD drives, steering gear and engine construction. The system solutions are designed according to all standard classification society requirements as well as highest operational safety and operating economy. The accessories such as high-pressure pumps, hydraulic hoses and the connection couplings as well as the assembly documentation solutions are precisely matched to the functions and are thus a 100 % system solution.



Innovative solutions for the ship industry

Shaft and drive connections, oil press fits, assembly tools for engine and gear construction in up to 4000 bar hydraulic high-pressure technology



SCHAAF TTG-Technology

- TTG is a special, patented process for manufacturing threads in nuts or on bolts
- TTG can demonstrably save up to 40% of material.
- Threads with TTG revolutionize the connection possibilities and save money.
- Nut and bolt flanks have a 100 % contact at the pretensioning force and the load distributes equally on the complete thread bearing surface



Engine building

Robust, compact and durable solutions for the assembly of engines.

Bolt Tensioner

ExpaTen

Hydraulic Nuts

TTG Nuts

TTG Bolts

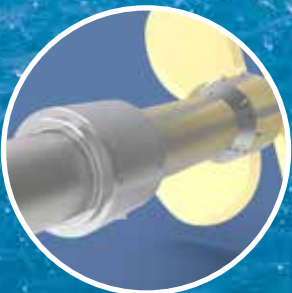


Flange connections

Reusable and rigid connections in the smallest of spaces.

ExpaTen

GripCon



Shaft connections

Shaft and axle connections for high loads in the smallest of spaces.

GripLoc



POD-Drives

Cost-reducing connections without protruding bolts.

GripCon



Steering gear

Reusable and rigid connections in the smallest of spaces.

Oil press fit

Hydraulic Nuts



Propeller


Robust, compact and durable solutions for the assembly of propellers.

Oil press fit

Hydraulic Nuts

Tooling



Bolt Tensioning techniques up to 4000 bar



SSV

Bolt Tensioner
Axial Bolt tensioning using a removable tool


Torsion-free generation of axial tensioning force – Economical use of bolt material capacity from size M8 to S1000 and bigger.



HM

Hydraulic Nuts
Axial Bolt tensioning using a hydraulic nut that stays on the bolt-connection.

Torsion-free generation of axial-tensioning force. Quicker tightening and loosening of your connection for regular maintenance – compared to Bolt Tensioner.



PG 48

Multiple Stud Nut
Axial bolt tensioning using torque (MSN)

Simple option to achieve torsion-free axial tensioning force with increased mounting effort. The MSN replaces the standard nut in a bolted connection.



Tool sets

Individual tool sets for mounting large 2- and 4-stroke engines, propellers, rudders and much more

In addition to a number of standardized Bolt Tensioners and Hydraulic Nuts, SCHAAF has already delivered thousands of customized Tool sets. The Design on Demand CAD system allows us to realize customer solutions very quickly. All Bolt Tensioners and Hydraulic Nuts represent a 100% system solution with SCHAAF's accessories such as high-pressure hoses and high-pressure generators.

Design

- Single stage, "large" outer diameter, small installation height
- Multi-stage, small outer diameter, "large" installation height

Threads to match all individual screws to be pre-tensioned

- All thread types, all thread sizes, all standards

Stroke limiting device

- Mechanical stop (up to full operating power)
- Over stroke valve (hydraulic limited stroke through internal pressure bleeding)

Surface treatment

- Gun metal finished, blackened, varnished, chemically nickel-plated, as per customer's specification

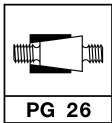
Connector variations

- Various thread sizes and types, axial and / or radial connecting, screw-type connector, quick coupling nipple, rotary connection, serial connections

Saving of time

Bolt Tensioners (SSV) and **Hydraulic Nuts (HM)** will dramatically save the time required for tensioning applications. This effect increases for higher tensioning forces, larger bolt thread diameters and also the installation of several SCHAAF **SSV** or **HM**. It is no longer necessary to apply large torque by hand. There is a number of handling features available, designed to simplify working with SCHAAF **SSV** and **HM**.



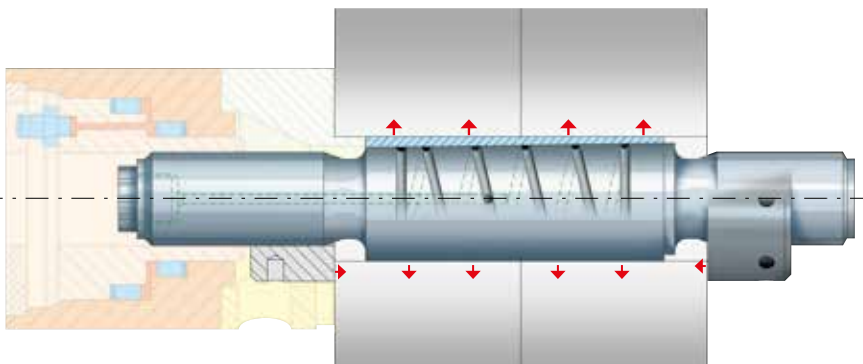


ExpaTen

100% positive locking in the flange bores plus frictional connection between flanges with guaranteed dismounting and remounting

ExpaTen – Safety and cost reduction

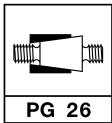
Due to patented technology within the ExpaTen design, the radial expansion and axial pretensioning achieved, guarantees a 100% form and friction fit. High torque values can then be transferred via the coupling whilst remaining completely free from backlash. ExpaTen Bolts have revolutionised the removable flange connection of drive shafts, as a result of high pressure hydraulic technology, improving safety and giving recognised time and cost reductions. ExpaTen installation and removal is guaranteed and can be done within 10 – 15 minutes per bolt. ExpaTen is certified by well-known buyers.



Advantages

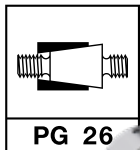
Expansion and pretensioning result in the following advantages compared to conventional bolts:

- 100% positive locking and frictional connection all the time after mounting, no slipping between the flanges
- Simple and quick installation and removal of ExpaTen even after years of use – nearly unlimited times
- Reusable after removal, again and again – no sparebolts required
- Torsionally and flexurally rigid connection even with sudden changes in the rotational speed, torque, or direction of rotation
- Torsionally and flexurally rigid connection even with sudden changes in the rotational speed, the torque, direction of rotation or direction of load
- No jammed or oversized bolts any longer
- High torque transmission, completely free from backlash
- Reduction of flange dimensions possible due to fewer number of bolts
- Maximum torque and shear force transmission in minimum space
- Tolerance for mounting is 0.05 to 0.2 % of the bore diameter
- Simple machining of the flange holes is sufficient



ExpaTen product family

Expa = Expansion = 100% positive locking in the flange bore
Ten = Tension = frictional connection for the joint



ExpaTen 2

Ideal flange connection for misaligned flange bores and / or unequal bore diameters

- Inner bores which are exactly centric to another
- Maximum misalignment of 2 mm
- Different bore diameters in the flanges
- Different diameters and misalignment of the bores in the flanges

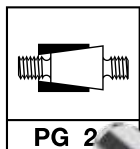
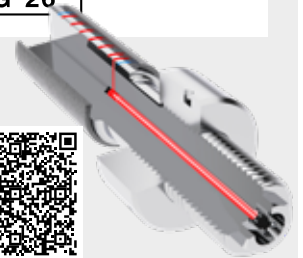
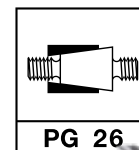


ExpaBolt

ExpaBolt for flange-component-connection

- Full expansion for press fitting
- Free from backlash

SCHAFF **ExpaBolt** provide 5 times higher safety than standard "friction" bolts.

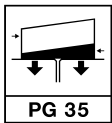


ExpaTen QL

Quick form and force fit connections with detachable axial tensioning system (Quick Locking)

- Quick radial and axial tensioning for components, which cope with torque / shear force, axial force and / or side load
- 100 % form fit and friction fit
- Simple and quick installation and removal of ExpaTen QL even after years of use – nearly unlimited times





GripLoc

Shaft and axle connections for various applications

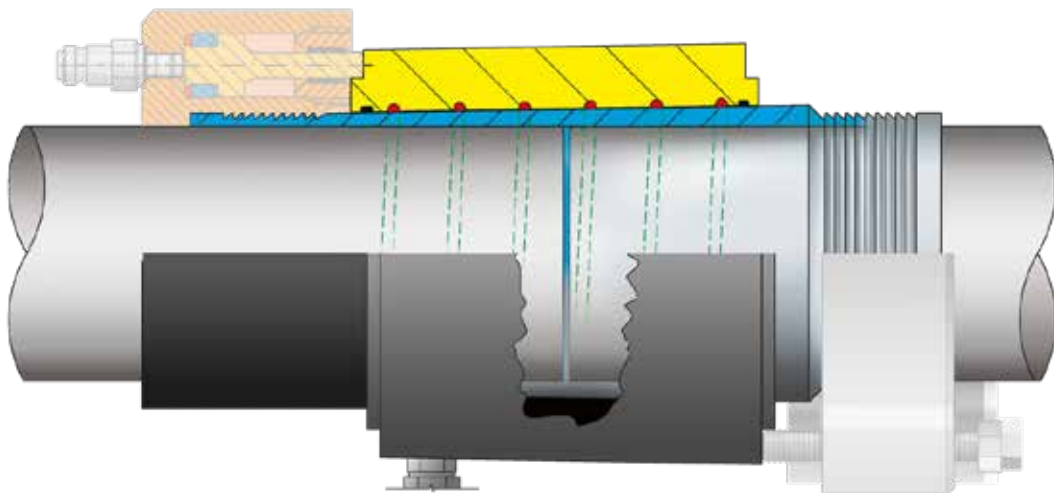
GripLoc creates radial pressure on the two shaft or axle stubs to be connected by radially shrinking a previously hydraulically expanded outer body. **GripLoc** can be quickly tightened and loosened. **GripLoc** is versatile, reusable and absolutely reliable, even with high-temperature fluctuations.

The different **GripLoc** characteristics by SCHAFF can be combined among each other. So for example **GripLoc** can be built integrated together with the SafeLoc mechanism in a removable Hydraulic Nut. An optimal solution is therefore guaranteed for each application.



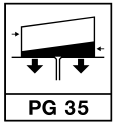
The SCHAFF GripLoc coupling consists of the following components on a standard basis:

- Use of corrosion-resistant materials for use in different media
- Inner and Outer tapered sleeves made from high tensile strength steel for maximum strength and durability
- Combination of GripLoc with a wide variety of mounting tools for optimum design of the assembly process
- Design depending on application with split, removable Hydraulic Nut or permanently installed annular piston
- Mechanical, axial slide-on by means of torque (MSN) optionally possible SafeLoc for safe installation



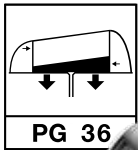
Advantages

- Patented GripLoc sliding-on procedures for destruction-free interference fit assembling
- GripLoc can be removed simply and quickly even after years of use – again and again wearless
- High torque transmission, completely free from backlash
- Torsionally and flexurally rigid connection even with sudden changes in the rotational speed, torque, or direction of rotation
- Maximum torque transfer even in minimum installation space thanks to SCHAFF friction increase
- No risk of detachment in case of a defective seal of the hydraulic nut
- Saves assembly and disassembly time



GripLoc product family

Individual solutions



GripLoc Flow caps

Shaft and axle connection with matched flow caps

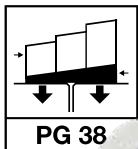
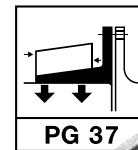
GripLoc is equipped with flow caps that allow the coupling to be used in a flowed-through space. This can be the use under water, but also in another medium such as oil. Corrosion-resistant stainless steels can also be used as the material of the coupling, which makes additional cladding of the coupling unnecessary.



GripLoc Flange

Shaft and axle connection with integrated flange element

By radial shrinking of a hydraulically pre-extended external body, GripLoc generates a radial stress on the two shaft or axle stubs to be connected. GripLoc is connected to a mating flange by the integrated flange. Integrating the flange into the inner sleeve allows precise alignment of the flange prior to assembly.

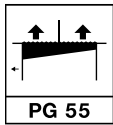


GripLoc Special solution

Shaft and axle connection for customized in various applications

GripLoc can be quickly clamped and released. For every area of application can be found the optimum solution and adapted in type of construction with the help of GripLoc technology.



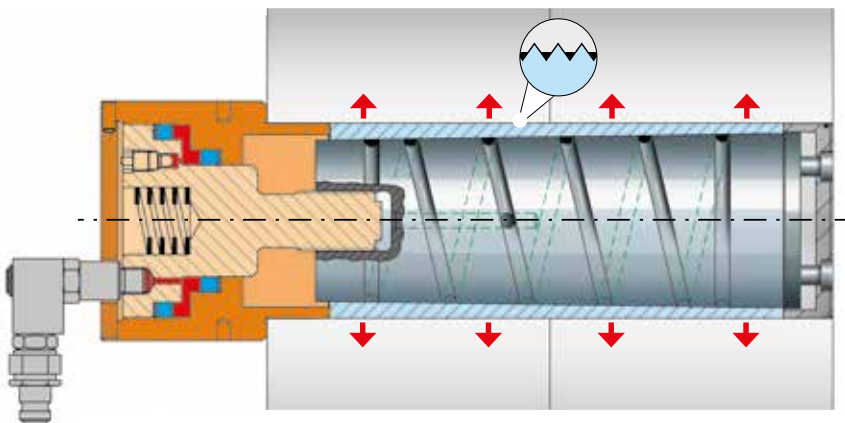


GripCon

Form fit component connection which takes up highest axial and radial loads

Cost reducing – Powerful – Unique

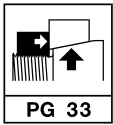
SCHAFF GripCon takes all of the leading design principles and advantages of ExpaTen and raises hydraulic coupling bolt design and performance levels to a new level. Designed for weight, cost and space saving applications, GripCon offers maximum product safety, cost saving, reliability and total performance for all power bolt connections. The patented SCHAFF design technology offers a complete lifetime guarantee even after a multiple installations and removals.



Advantages

Due to expansion and interlocking of the sleeve into the bore surfaces, the following advantages are given compared to normal bolt connections:

- 100 % form fit and frictional connection anytime after mounting, no slipping of flanges
- No nuts for flange connections, thus significant cost reduction
- An approximate 50 % weight reduction
- Lower manufacture investment for significantly less connection elements
- No more thread cutting in stud holes necessary
- No protruding threads or nuts – better design and higher efficiency of rotation machines
- No conventional bolt connection elements
- Significant mounting time reduction because of less connection elements
- Significant less mounting and dismounting space needed
- Simple and quick installation and removal of GripCon even after years of use
- Reusability after removal again and again – no spare parts necessary

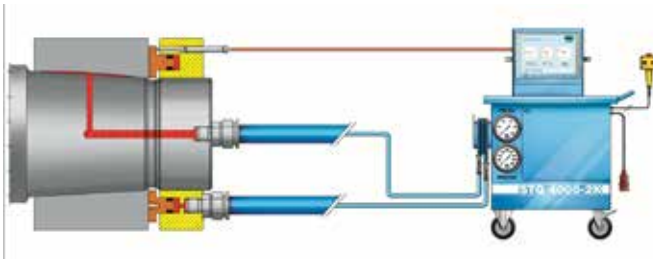


Oil press fit

The Hydraulic Nut for mounting and dismantling roller bearings and oil-pressure mountings

Cost-reducing - Powerful - Reusable

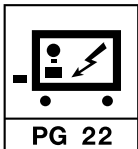
100% compatibility with solutions offered by bearing manufacturers in terms of function, connection geometry and component geometry. Should this series not meet your requirements, please inform us of your needs. Since we have our own design department and production facility, we can manufacture any Hydraulic Nut in the A 55 Series to customer's requirements. Special solutions up to a hydraulic pressure of 4000 bar are possible.



Advantages

SCHAAF A 55 Series Hydraulic Nuts offer you many advantages compared to conventional fixing devices and methods of mounting:

- Robust, durable and lightweight mode of construction
- Ready for immediate use, fully assembled and oil filled
- All parts sealed leaktight from -30 °C to +100 °C
- Purely axial pressure force, independent of stroke
- Uniform distribution of pressure forces
- No torsion under load (no thread wear)
- Wide choice of Hydraulic Nut sizes and designs
- Several Hydraulic Nuts can also be operated uniformly due to the pressure build-up
- Repeat accuracy even after a long period of use
- Simple and easy to maintain
- Treated surfaces
- Special designs of any type available upon request



STG 4000-2K

Electro-hydraulic two-circuit high-pressure automatic control system for fully automatic pressing of hubs onto shafts and separating

The STG convinces with its reliability. The pump delivers a operational reliability with a 100% accuracy and repeatability during assembly.



Product Extensions

Pumps and High-Pressure Units, Accessories



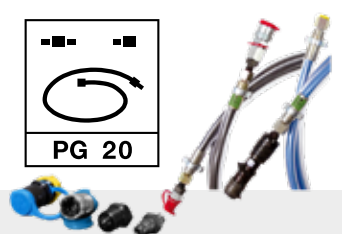
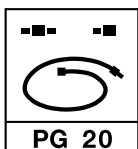
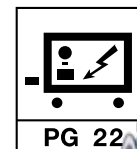
Hand Lever Pumps up to 4000 bar hydraulic pressure

All Hand Lever Pumps are of an extremely rugged design. All high-pressure valves are manufactured with hardened valve seats. This ensures exceptional long service life and ruggedness with regard to contaminants in the hydraulic circuit. All pumps are therefore perfectly suited for rough conditions at construction sites.



High-pressure Units up to 4000 bar

Electrohydraulic High-pressure Units that are coordinated best with our high pressure tools.



Accessories Nipples, Adapters, Hoses, Gauges

We design and manufacture hydraulic high pressure accessories to special requirements such as special adaptors which are tailored exactly to your application. Please, tell us your requirements; we will be pleased to submit a quick quotation without obligation for you.



SCHAAF TTG-Technology

Bolts and nuts of the future

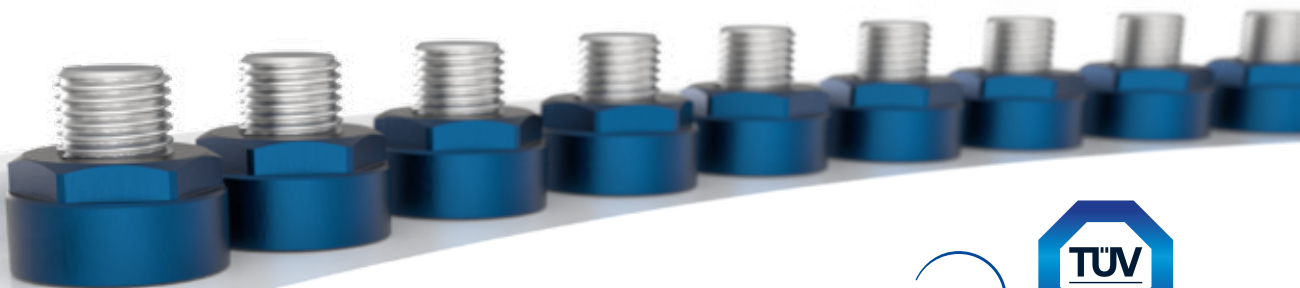
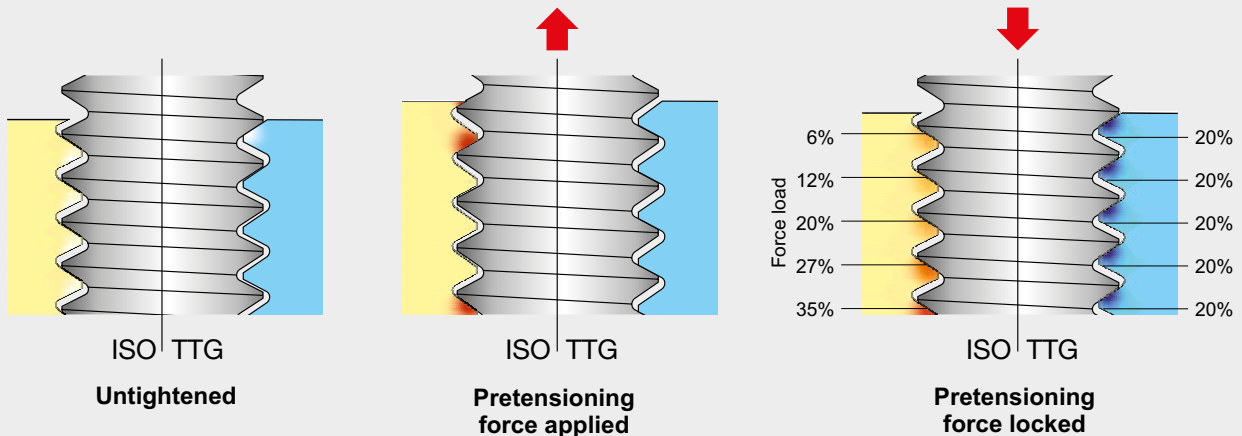
The TTG patented by SCHAAF has been studied extensively in several test procedures by the Fraunhofer-Gesellschaft as part of its technology research and has been awarded internationally valid certificates.



TTG

Targeted equal force in the thread area

TTG, a patented manufacturing process for creating threads in nuts or on bolts ensures optimum fitting accuracy in the thread when tightened. This innovative method not only enhances durability but also enables bolts with TTG to withstand significantly higher loads. Consequently, the connection diameter can be reduced, leading to substantial material savings. Threads featuring TTG revolutionize connection possibilities and offer cost-saving benefits.



SCHAAF References

A small selection of our products supply references



MSC Cruises

Confidential

ExpaTen

GripLoc

Navy vessel

Confidential

GripLoc



Crude Oil Tanker

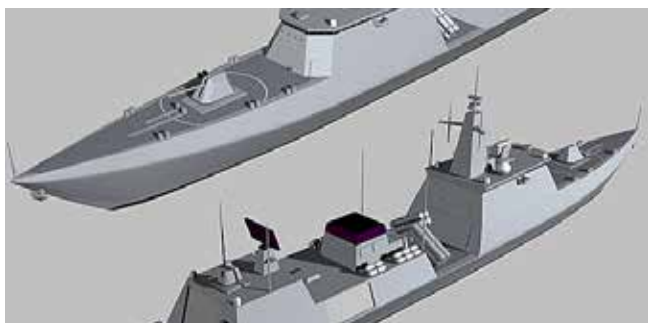
“Yuan Peng Yang”

ExpaTen

RoPax-ferry

“Akka”

GripLoc



Frigate

Confidential

ExpaTen



Chilean Icebreaker
"Antártica 1"

GripLoc

Multiple purpose lifting vessel
"Zea Future"

ExpaTen



Cruise Vessel
"MSC Seaside"

GripLoc
ExpaTen

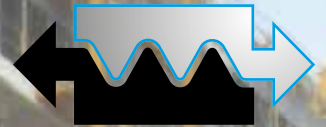
Well Stimulation Vessel
"Siem Helix 2"

ExpaTen



Rail Container Carrier
"Balaken"

GripLoc



Service by SCHAAF

- Worldwide support
- Quality, reliability and precision
- More than 50 years experience with hydraulic high-pressure tools
- Mounting, demounting, maintenance, installation and repairs
- Instructions and trainings for safely and highly efficient operation

SCHAAF worldwide

International production and installation

SCHAAF is an international group of enterprises with home-base in Germany that has specialised in the development and production of joining technologies since 1954. The globally active company thrives on its innovative system solutions and convinces with excellent quality. SCHAAF supplies bolt tensioning devices, hydraulic nuts, hydraulic high-pressure generators and accessories to more than 60 countries worldwide every year.



SCHAAF Germany

What originally started with a modest production facility and just three office rooms has evolved into an impressive manufacturing of over 20,000 m² over the past forty years. Our highly modern machinery, in-house testing facilities and an efficient dispatch centre form the backbone of our manufacturing processes. In addition, our in-house joinery and high volume production capabilities give us the flexibility and versatility needed to meet the demands of the future.



SCHAAF China

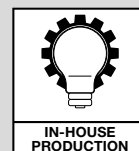
After the successful expansion of the sales network in the Near East, SCHAAF (Taicang) Co. Ltd was founded in 2007. Under strict quality requirements according to German standards, SCHAAF products have been produced especially for the Chinese market since 2011 on around 700 m². This reduces the costs because there are no transports from Germany and the express delivery capability in Asia is increased.



FASTEC Switzerland

The SCHAAF Group has included FASTEC AG, based in Altdorf, since 2010. The production facility is equipped with the precision of state-of-the-art machines that is well known in Switzerland. FASTEC specialises primarily on the SCHAAF TTG-Technology, which is a patented process for manufacturing threads in nuts or on bolts with 100% flank contact over the complete area.

Excerpt of the certificates:



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Internet: www.schaaf-gmbh.com



Several customer awards confirm again and again, that SCHAAF comes to mind due to innovative developments and dozens of patents worldwide regarding optimised processes and quality the addition “Leading joining technology” is right.

Follow us!



www.schaaf-gmbh.com

SCHAAF develops and produces world leading technology in the field of joining technique in all sectors of the industry.

