MAXIMATOR®
maximum pressure

A STRONG CONNECTION FOR EVERY TORQUE

PRESSURISED OIL ASSEMBLIES UP TO 4,000 BAR

Pressurised Oil Assemblies

Maximator has implemented a variety of solutions for this application for its customers worldwide. In addition to air-driven high-pressure pumps, we design smart system solutions and reliably supply you with accessories such as pressure gauges, adapters, high-pressure hoses and much more.

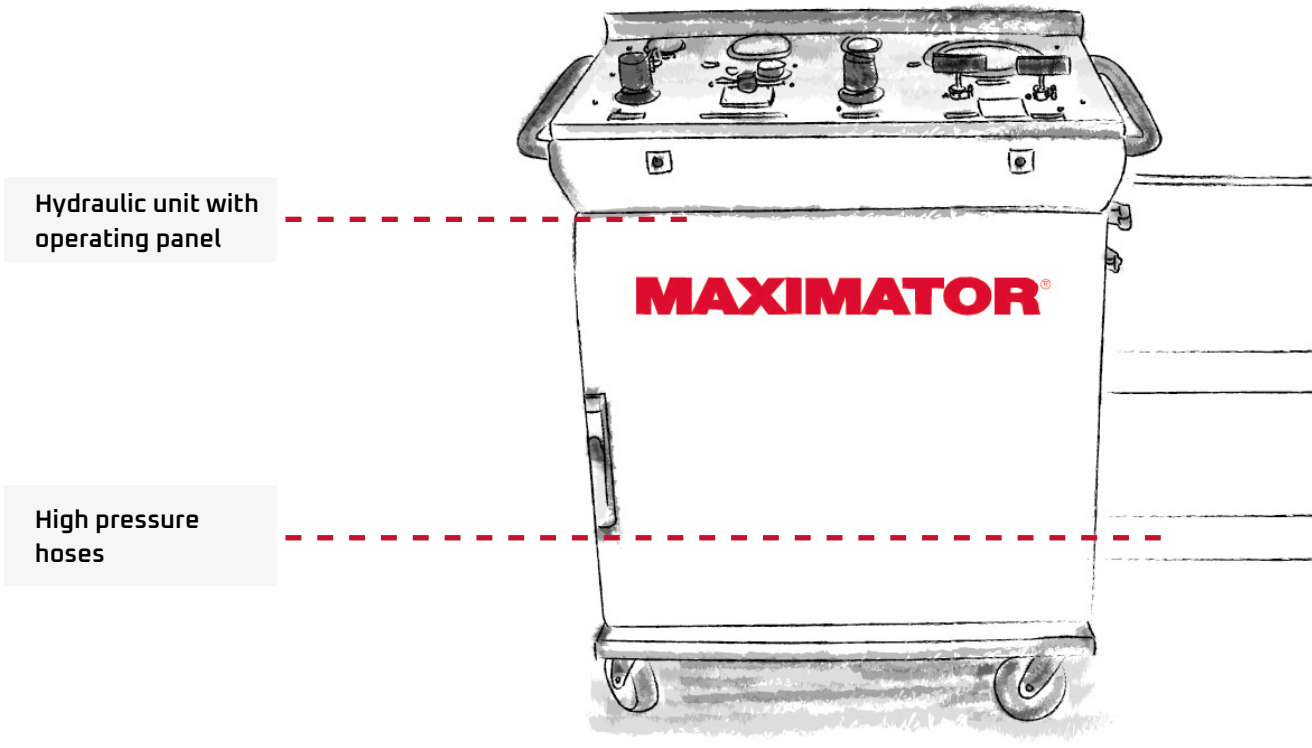
Pressurised Oil Assembly Procedure

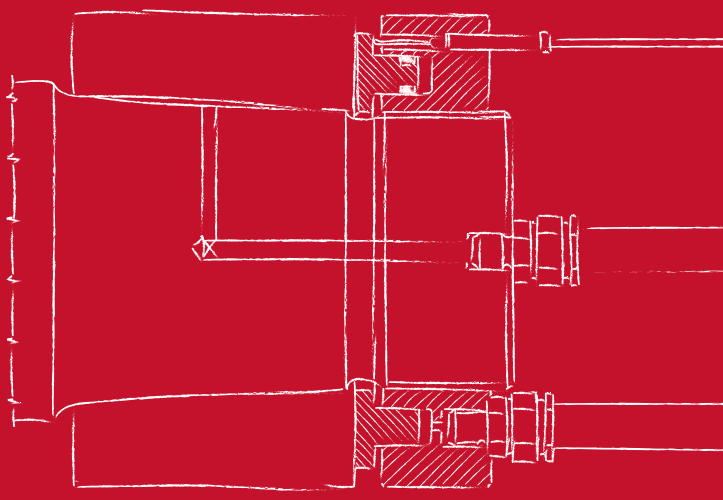
Pressurised oil Assembly is a technique for assembly of components with interference or close running fits. The parts to be assembled are manufactured in a way that after joining an interference fit between the mating surfaces is created. This enables the transmission of longitudinal and transversal forces. This joining method is especially suitable for assemblies containing bearings or shafts with interference fits.

For this joining technique the shaft and the hub are manufactured slightly conical with one part being machined to create a pressure chamber which is used to pressurise the parts with oil during assembly process. The hydraulic pressure causes an elastic expansion of the hub which results in a gap of the mating parts that gets filled with the pressurised oil. A lubricating film is formed in between the parts which reduces the required axial assembly force.

When the required assembly position is reached, the oil pressure can be released. The elasticity of the materials causes the parts to flex back to their previous diameters. The lubricating and separating oil film gets squeezed out and the parts are tight. The assembly process is completed after the release of the axial holding pressure.

In order to accomplish an optimal distribution of the oil in between the mating parts, circular or spiral shaped grooves are used in addition to the pressurization chamber on one of the mating surfaces. This helps also to accelerate the release of the oil after the final assembly position has been reached.

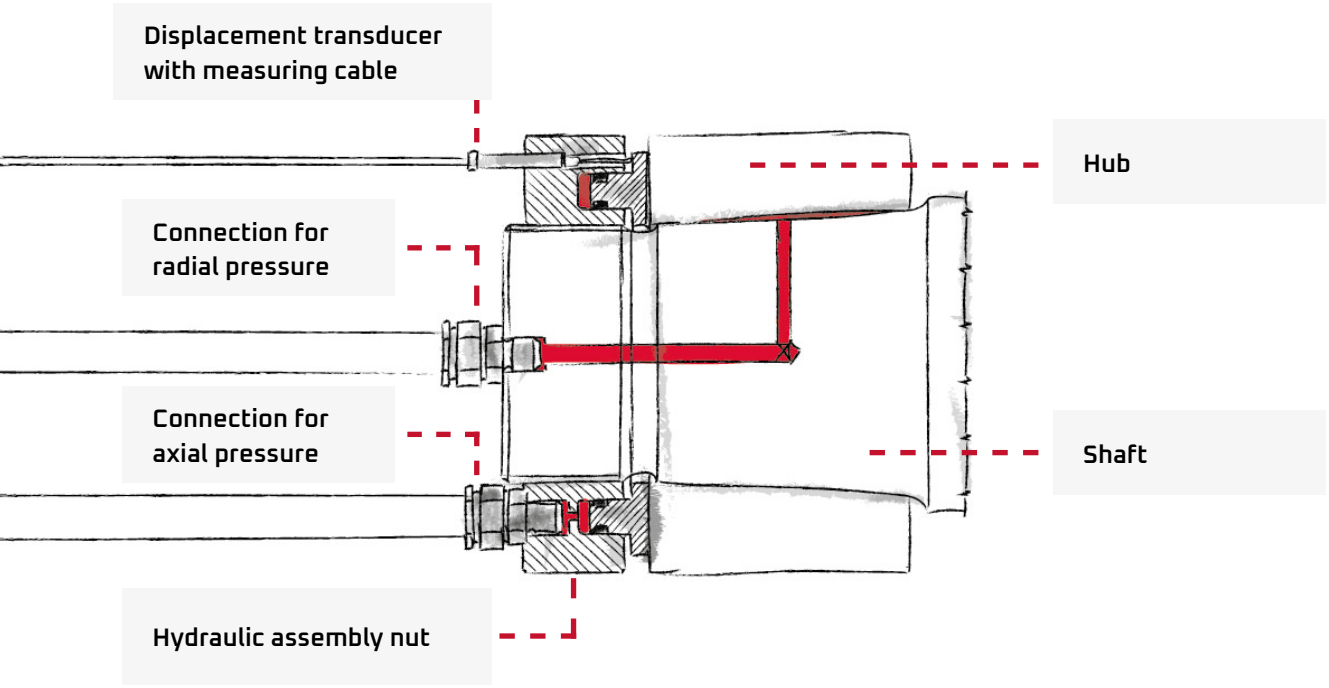




Your advantages

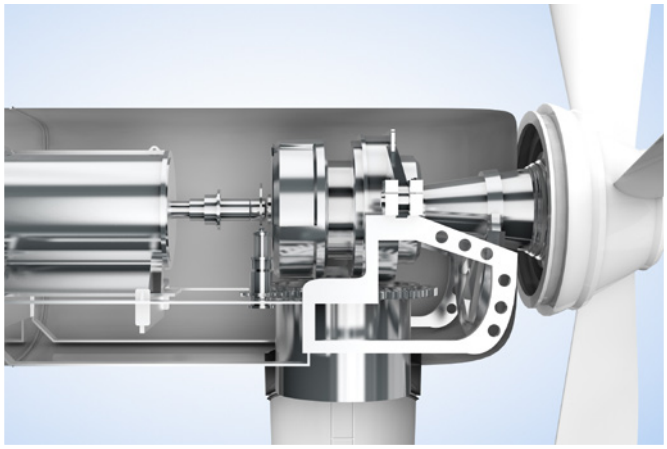
With technology from the market leader in high-pressure technology, you can create and maintain connections to meet the highest demands in just a few simple steps. Maximator's innovative high-pressure joining process, which allows you to create reliable pressurised oil assemblies, offers several advantages.

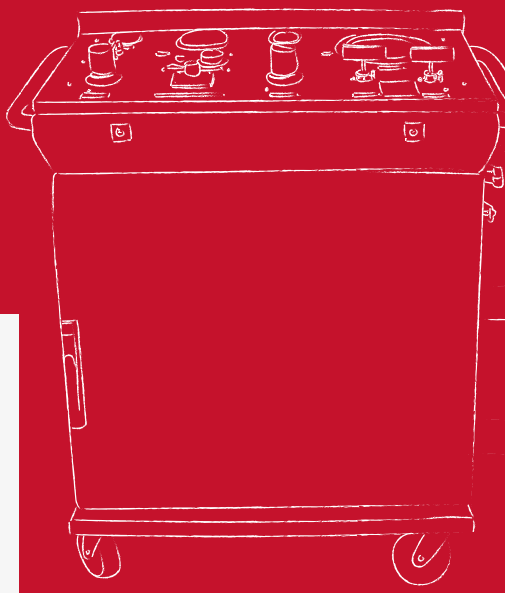
- Portable pressurization and pressure control units with robust enclosure
- Operational safety enhanced by intuitive controls and mimic panel
- No electric power supply for operation of hydraulic unit required
- Pump stops automatically when operational set pressure is reached
- Autonomous start-up in case of dropping set pressure
- Separate pressurization circuits for radial and axial pressure
- Multiple pressure outlets possible for more complex applications
- Hydraulic hoses with different types of couplings (reduced risk of confusion)



Gears & Turbines

Huge torques, high centrifugal forces and changing operating temperatures are daily challenges on wind turbines and in power stations.
The use of Maximator hydraulic units makes the difference when it comes to a reliable joining process of the pressurised oil assembly.





Application

For the force-fit joining of shaft/hub assemblies which are used on wind generators and power plant turbines, precise and independent control of the hydraulic circuits is essential.

The Maximator hydraulic unit for press fitting and extracting is equipped with two air-driven high pressure pumps. These pumps provide the required pressures for the radial elastic expansion and the axial assembly force.

The function of the air driven Maximator high pressure pumps can be compared with an oscillating pressure intensifier.

The ratio of the effective surface areas of the air-drive piston versus the high pressure piston results in the pumps outlet pressure. The desired assembly pressure can be controlled by the individual setting of the pressure regulator for the drive air.

Typical hydraulic unit

Control panel for best possible overview and control

Assembly and extraction unit

Hydraulic pressure generation for pressures up to 4,000 bar

The hydraulic unit for assembly and extraction is integrated in a robust mobile enclosure with operating panel.

If required, the pressures and assembly movements can be detected with pressure transmitters and position sensors. The data can be documented with the Maximator measuring box and software.

The unit can be equipped with holders for the hydraulic hoses and adaptor fittings.

Technical data - typical hydraulic unit	
Pressure ratios	1:107 / 1:796
Radial pressure max.	4.000 bar
Axial pressure max.	500 bar
Air drive pressure min. *	5 bar
Media	Oil / Glycerin
Dimensions (W/D/H)	970 / 600 / 1160 mm

* for reaching the stated maximum fluid operating pressures

Wheelsets & Shafts

Longevity and reliability at high payloads and partially high velocities are the requirements that wheelsets of railed vehicles are facing every day. The use of wheelset presses in combination with Maximator hydraulic units makes this challenging joining operation a routine assembly operation.

Application

We configure the optimal technical solution for your application, whether you are assembling or disassembling wheelsets, gear parts or rotor shafts.

For the assembly of wheels on axles, Maximator's air driven hydraulic units are used for the radial expansion in combination with axial acting wheelset presses.

Hydraulic units for almost every application can be realized by combining the huge variety of pump versions with hydraulic tanks, valves, pressure gauges and frames or mobile enclosures.

Ease of operation, compactness and mobility are always the customer-oriented benefits of our solutions.

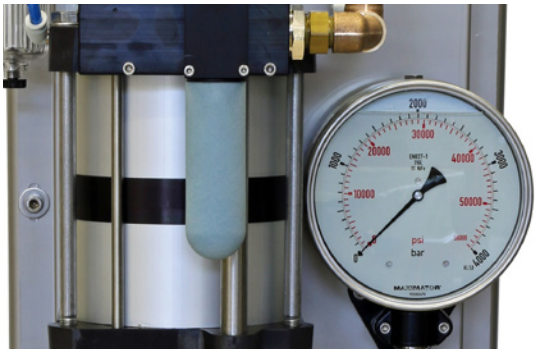
Typical hydraulic unit

Radial pressure generation

Mobile hydraulic unit for pressure generation up to 4,000 bar

The compact pressurization unit is characterized by its compact design and the ease of operation. The pneumatic pump drive doesn't require electrical energy.

The pump stops automatically when the operational set pressure is reached. It starts-up again autonomously when the set pressure drops.



Air drive and high pressure gauge

Technical data - typical hydraulic unit	
Pressure ratio	1:796
Operating pressure max.	4.000 bar
Air driven pressure min. *	5 bar
Media	Oil / Glycerin
Configuration	2 outlets with valves
Dimensions (W/D/H)	970 / 600 / 1160 mm

* for reaching the stated maximum fluid operating pressures

Propeller & Stearing Gear

The optimization of the fluid dynamics which have a significant impact on the efficient mobility on the oceans is essential for propellers used on modern vessels. Our robust and compact Maximator hydraulic units enable a problem-free assembly and disassembly process.

Application

For the assembly and disassembly process of marine propellers and stearing gears, hydraulic units with different levels of complexity can be used.

Our technical solutions can be as simple as a manually operated compact-unit or of high complexity with fully automated control and separate hydraulic circuits.

For the ease of start-up of our units and for a trouble-free operation, Maximator hydraulic units are equipped with all necessary components.

These include the drive air control unit with a combined filter, water separator and pressure regulator, a pressure gauge and a hand operated shut-off valve for the drive air.

Typical hydraulic unit

Radial pressure generation

Compact, portable hydraulic unit for pressure generation up to 3,000 bar

This portable hydraulic unit contains a hand operated pressure relief valve on the high pressure side. Configurations with manifold blocks and multiple pressure outlets are available on request.

In order to display the hydraulic operating conditions, liquid filled pressure gauges with accuracy class 1.0 are used.

Technical data - typical hydraulic unit	
Pressure ratio	1:350
Operation pressure max.	3.000 bar
Air drive pressure min *	8,5 bar
Media	Oil /Glycerin
Dimensions (W/D/H)	450 / 380 / 430 mm
Weight	25,5 kg

* for reaching the stated maximum fluid operating pressures

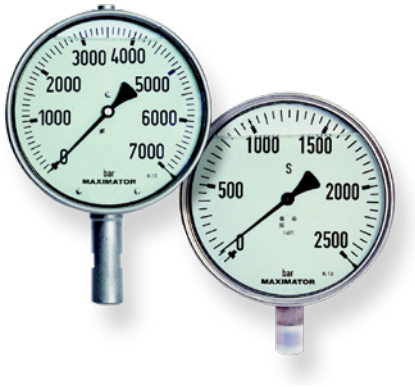
Accessories

We have selected the perfect accessories for your application, especially for pressurised oil assemblies technology.

Gauge

Maximator provides pressure gauges up to max. 101,000 psi (7,000 bar). A range of high pressure connections are available (see table).

All pressure gauges are liquid damped and conform to accuracy class 1.0.

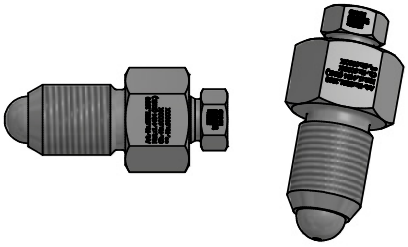


Pressure range psi [bar]	Catalog Number	Connection Type	Diameter in. [mm]	Accuracy class
14,500 [1,000]	3301.2107	1/2" BSP	2.48 [63]	1.0
14,500 [1,000]	3300.0152	1/2" BSP	3.9 [100]	1.0
23,200 [1,600]	3301.4414	1/2" BSP	3.9 [100]	1.0
36,000 [2,500]	3301.4249	1/2" BSP	3.9 [100]	1.0
36,000 [2,500]	3300.0153	4H (9/16"-18 UNF)	3.9 [100]	1.0
58,000 [4,000]	3300.0167	4H (9/16"-18 UNF)	6.3 [160]	1.0
87,000 [6,000]	3300.0168	4U (9/16"-18 UNF)	6.3 [160]	1.0
101,000 [7,000]	3300.3251	5U (5/8"-18 UNF)	6.3 [160]	1.0

Adaptors

Maximator offers a huge variety of adaptors for multiple pressurised oil seal applications. An overview of the most common versions can be found in the below table.

Additional versions are available on request.



Pressure rating psi [bar]	Catalog Number	Oil Assembly Connection Type	Orifice [mm]	Oil Assembly Thread	Hose connection	Screw-in-length [mm]
58,000 [4,000]	3300.9157	Ball	8	G 1/8"	4H (9/16"-18 UNF)	30
58,000 [4,000]	3300.9148	Ball	11	G 1/4"	4H (9/16"-18 UNF)	35
58,000 [4,000]	3300.9150	Ball	11	G 1/4"	4H (9/16"-18 UNF)	33
58,000 [4,000]	3301.1615	Ball	11	G 1/4"	4H (9/16"-18 UNF)	105
58,000 [4,000]	3301.4186	Ball	11	M 14x1,5	4H (9/16"-18 UNF)	35
58,000 [4,000]	3301.1994	Ball	12	G 3/8"	4H (9/16"-18 UNF)	36
58,000 [4,000]	3301.1991	Ball	14	G 1/2"	4H (9/16"-18 UNF)	36
65,000 [4,500]	3301.1618	Ball	15,88	G 3/4"	4H (9/16"-18 UNF)	48

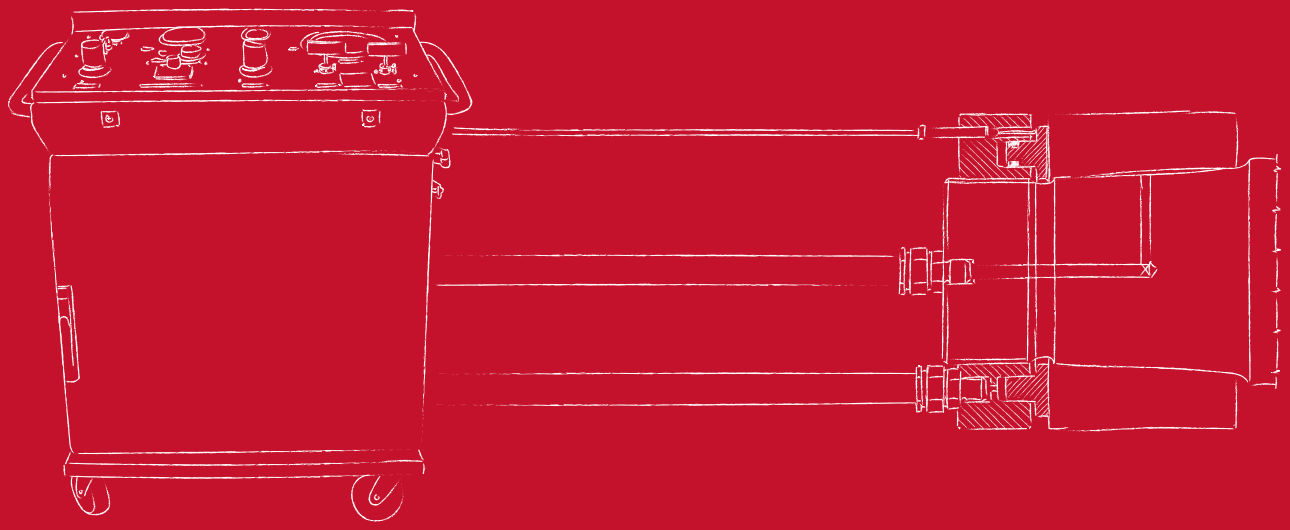
High Pressure Hoses

Maximator provides a comprehensive range of HP hoses in high-quality thermoplastic synthetic materials. Pressure substrates are of steel and compatible materials. These flexible connections are suited for max. operating pressures of 58,000 psi (4,000 bar).
Upon request, Maximator also supplies HP hoses with glands and collars to make them fit for integration into high pressure systems up to 65,000 psi (4,500 bar). Hoses for other operating pressures and nominal widths as well connection combinations can be supplied upon request.

High Pressure Connection

DKR Connection

Pressure range	Catalog Number	Connection Type	Type	Diameter in. [mm]		Length
psi [bar]				outside	inside	in. [mm]
14,000 [1,000]	3300.0233	DKR 1/4" Union Nut	SK2005St	0.37 [9.4]	0.20 [5]	39 [1,000]
14,000 [1,000]	3300.4073	DKR 1/4" Union Nut	SK2005St	0.37 [9.4]	0.20 [5]	79 [2,000]
14,000 [1,000]	3300.0235	DKR 1/4" Union Nut	SK2005St	0.37 [9.4]	0.20 [5]	118 [3,000]
26,000 [1,800]	3300.0191	DKR 1/4" Union Nut	SK4005St	0.44 [11.2]	0.20 [5]	39 [1,000]
26,000 [1,800]	3301.9489	DKR 1/4" Union Nut	SK4005St	0.44 [11.2]	0.20 [5]	79 [2,000]
26,000 [1,800]	3300.2082	DKR 1/4" Union Nut	SK4005St	0.44 [11.2]	0.20 [5]	118 [3,000]
26,000 [1,800]	3302.0522	1/4"-28UNF-LH	SK4005St	0.44 [11.2]	0.20 [5]	39 [1,000]
26,000 [1,800]	3300.3987	1/4"-28UNF-LH	SK4005St	0.44 [11.2]	0.20 [5]	79 [2,000]
26,000 [1,800]	3300.3815	1/4"-28UNF-LH	SK4005St	0.44 [11.2]	0.20 [5]	118 [3,000]
36,000 [2,500]	3300.0206	DKR 1/4" Union Nut	SK6005St	0.53 [13.4]	0.20 [5]	39 [1,000]
36,000 [2,500]	3300.0207	DKR 1/4" Union Nut	SK6005St	0.53 [13.4]	0.20 [5]	79 [2,000]
36,000 [2,500]	3300.0208	DKR 1/4" Union Nut	SK6005St	0.53 [13.4]	0.20 [5]	118 [3,000]
36,000 [2,500]	3300.1278	1/4"-28UNF-LH	SK6005St	0.53 [13.4]	0.20 [5]	39 [1,000]
36,000 [2,500]	3300.2384	1/4"-28UNF-LH	SK6005St	0.53 [13.4]	0.20 [5]	79 [2,000]
36,000 [2,500]	3300.3423	1/4"-28UNF-LH	SK6005St	0.53 [13.4]	0.20 [5]	118 [3,000]
36,000 [2,500]	3300.5599	3/8"-24UNF-LH	SK6005St	0.53 [13.4]	0.20 [5]	39 [1,000]
36,000 [2,500]	3300.5887	3/8"-24UNF-LH	SK6005St	0.53 [13.4]	0.20 [5]	79 [2,000]
36,000 [2,500]	3300.5416	3/8"-24UNF-LH	SK6005St	0.53 [13.4]	0.20 [5]	118 [3,000]
58,000 [4,000]	3300.6042	1/4"-28UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	39 [1,000]
58,000 [4,000]	3300.1641	1/4"-28UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	79 [2,000]
58,000 [4,000]	3301.3738	1/4"-28UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	118 [3,000]
58,000 [4,000]	3300.3081	3/8"-24UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	39 [1,000]
58,000 [4,000]	3300.5712	3/8"-24UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	79 [2,000]
58,000 [4,000]	3300.3069	3/8"-24UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	118 [3,000]
58,000 [4,000]	3300.5713	9/16"-18UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	39 [1,000]
58,000 [4,000]	3300.5988	9/16"-18UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	79 [2,000]
58,000 [4,000]	3300.2048	9/16"-18UNF-LH	SK8005St	0.55 [14.0]	0.18 [4.6]	118 [3,000]



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