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COLLAR TYPE HYDRAULIC NUTS

Operation and Maintenance Instructions



www.boltup.com

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1. Introduction

In a world of rapidly increasing technological change, HYDRATIGHT SWEENEY LTD is at the forefront of bolt tightening development. It is only through extensive research together with accumulated experience that a more efficient customer service and a reputation for high quality products can be maintained.

HYDRATIGHT SWEENEY LTD has a policy of continual research and development, which enables us to offer innovative precision equipment that meets the rigorous demands of industry world-wide.

HYDRATIGHT SWEENEY series of collar type hydraulic nuts offer the following benefits:

ACCURACY	The method of tightening is independent of the frictional conditions of the bolted assembly, thereby giving accurate and consistent bolt loads.
UNIFORMITY	Any number of HYDRATIGHT SWEENEY collar type hydraulic nuts can be linked together for simultaneous bolt tightening. This is particularly beneficial on applications where uniform loading on the joint is essential.
TIME SAVING	By tightening many bolts simultaneously the time to make up multi-bolted connections is significantly reduced.
COMPACT, LIGHT WEIGHT TOOLS	Careful design has enabled the development of an effective yet lightweight and compact tool.
LABOUR SAVING	HYDRATIGHT SWEENEY collar type hydraulic nuts can be used easily by one operator with a minimum of effort.
SAFETY	Consistent quality control procedures ensure that HYDRATIGHT SWEENEY tools and equipment are safe in both design and use.
SIMPLICITY	A minimum of moving parts leads to trouble free, simple operation and easy maintenance.
RELIABILITY	All HYDRATIGHT SWEENEY tools and equipment are safety tested including a full pressure test prior to despatch.

2. Safety Notes For Use with Hydraulic Nuts

High Pressure Hydraulics should be treated with respect. Please ensure that the following basic rules are followed:

1. **ALWAYS WEAR SAFETY GLASSES** when working near a pressurised hydraulic system. Your eyesight is important - **PROTECT IT.**
2. **ALWAYS** check the following points before pressurising a hydraulic system:
 - (a) Check that the hydraulic harness is fully connected. There should be no loose ends and every male nipple should be connected to its corresponding female coupling.
 - (b) Check that each female coupling is securely locked in position on the corresponding nipple by physically pulling the connection.

IT IS DANGEROUS TO PRESSURISE THE BACK OF AN UNCOUPLED QUICK DISCONNECT NIPPLE OR COUPLING. ALL CONNECTIONS MUST BE CONNECTED OR BLANKED OFF BEFORE PRESSURISING.

- (c) Check that the bolt material is capable of taking the initial load to be applied. The tools are powerful and are capable of yielding or breaking studs/bolts if tensile/yield properties are not sufficient to support the load applied.
 - (d) Check that the threaded portion of the tensioning tool is screwed on the stud, and that the thread engagement is sufficient. (See Data Sheet)
NOTE: Thread engagement should usually be completely through the collar nut.
3. **NEVER** exceed the maximum working pressure specified for the equipment. (See Data Sheet)
NOTE: The maximum safe working pressure specified for the tool does not necessarily represent the maximum safe load, which may be induced into the bolt/stud.
4. **NEVER** exceed the maximum extension quoted for the equipment. (See Data Sheet)
NOTE: An indicator will appear when the tool is close to maximum extension.
5. **ALWAYS** take care when pressurising a system. Always observe the gauge and be ready. Pressure can rise faster than you think.
6. **NEVER** leave a pressurised system unattended. If you must leave the area release the pressure and ensure that the return to tank valve on the pump unit is fully open.
7. **NEVER** bend the hydraulic hoses less than six times their own diameter. Do not use kinked hoses.

8. **NEVER** stand in line with the bolt axis whilst tensioning is in progress.
NOTE: Personnel must be aware of this point at all times.
9. When working on site the work area should be roped off and all personnel not connected with the site operation should be kept clear of the working area.
10. High pressure hydraulic equipment can be very dangerous if misused. Keep away from oil leakages at high pressure. Liquid escaping from highly pressurised equipment has sufficient power to penetrate the skin, which can cause blood poisoning. In the case of such an accident **IMMEDIATE** medical attention must be sought.

REMEMBER :

TAKE CARE! HIGH PRESSURE HYDRAULICS ARE PERFECTLY SAFE IF THE BASIC SAFETY RULES ARE FOLLOWED.

PLEASE NOTE:

MODIFICATION TO ANY EQUIPMENT COVERED BY THIS MANUAL SHOULD NOT BE ATTEMPTED BY THE CUSTOMER

IF MODIFICATIONS ARE REQUIRED TO SUIT A SPECIFIC APPLICATION, CONSULT HYDRATIGHT SWEENEY LTD BEFORE MAKING THEM.

INAPPROPRIATE MODIFICATIONS MADE RENDER THE EQUIPMENT DANGEROUS.

3. Tightening Procedure for Hydraulic Nut

Proceed as follows to install the Collar Type Hydraulic Nut:

1. Check that the stud has been installed correctly and that there is sufficient stud extension to engage with the nut. Stud extension is stated on the Data Sheet.
2. Screw the fully assembled Hydraulic Nut onto the stud and nip down tight. A small boss with 6 holes in is provided on the top face of the nut and a suitable tommy bar should be used for this purpose. To check the nut is tight, back off the collar one half turn and ensure that the insert is fully screwed down using the tommy bar. Once this has been done screw down the collar to make contact with the body. This will enable you to observe the extension. See (7).
3. Check that the nut is seated squarely on the mating component. If the nut is not seated squarely this must be investigated and corrected. Out of squareness will result in uneven loading and higher load losses.
4. Assemble any further nuts in the system in the same manner.
5. Screw the snap nipple and adaptor into the hydraulic nuts, then, connect the hydraulic hoses to the snap nipples checking that the coupling is securely connected.

If all of the nuts in a given system are not being tightened simultaneously then a sensible tightening sequence should be used. If in doubt consult Hydratight Sweeney for further information.

6. Check that the Hydraulic Harness has been assembled correctly. There should be no loose ends in the system and each female coupling should be connected to a corresponding male nipple.
7. Operate the Hydraulic Pump to pressurise the Nuts. Observe the extension and operating pressure constantly during this operation

ALWAYS ENSURE THAT THE MAX. OPERATING PRESSURE AND EXTENSION STATED ON THE ENCLOSED DATA SHEET ARE NOT EXCEEDED.

8. When the desired operating pressure is reached stop the pump and whilst holding the pressure constant tighten down the load retaining collar using a tommy bar, and tap down with a copper hammer. Check that the collar is properly seated
9. Release the oil pressure slowly and remove the Hydraulic Harness and fit protective cap to snap nipple. If desired the snap nipple can be unscrewed and removed and the hydraulic connection plugged. This will provide added protection for the snap nipple.
10. Connect the harness to any other nuts in the system and proceed as above.

3.2. Release Procedure for Hydraulic Nut

Proceed as follows to remove Collar Type Hydraulic Nuts.

1. Remove plug (if fitted) and screw in hydraulic connector (snap nipple).
2. Connect the hydraulic hoses and check that the coupling is securely connected to the corresponding nipple.
3. Operate the pump unit to pressurise the nut. As pressure increases fit tommy bar to the load retaining collar and continually check to see if the collar can be unscrewed. As soon as the collar can be released stop the pump and screw the collar back sufficiently to allow the tension in the bolt to be released.

**ALWAYS ENSURE THAT THE MAX. OPERATING PRESSURE AND EXTENSION
STATED ON THE ENCLOSED DATA SHEET IS NOT EXCEEDED.**

4. Release the oil pressure slowly.
5. The nut should now be free to be unscrewed. If the collar is still screwed down onto the body and the nut cannot be unscrewed then it is likely that you have not screwed the collar far enough back in Operation 3. In this case repeat Operation 3, 4 and 5.

3.3. Trouble Shooting Guide

PROBLEM/ SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Oil is leaking from the hydraulic connection.	The connection is not seating properly.	Tighten the connection. Where applicable replace connection components, see GA.
Oil is leaking from the Nut body.	Seal failure.	Change the seals - See Section 4
When de-tensioning the bolt, the tool becomes stuck on the stud.	Thread damage or corrosion above the nut.	Turn the nut down and clean up threads above the nut.
When de-tensioning the bolt, the tool becomes locked onto the stud.	On an application that has been tensioned simultaneously and nut are being removed individually the last few nuts may lock on.	Refit several nuts around the join and pressureise until the locked nut become loose.
The pump is not building pressure with oil Return-To-Tank valve closed.	<ol style="list-style-type: none"> 1. The oil Return-To-Tank valve may be defective. 2. The check valve may be sticking inside the pump head. 	<ol style="list-style-type: none"> 1. Replace the Return-To-Tank valve. 2. Tap the pump head lightly with a hide hammer. If this fails, pump must be stripped down.
The nut is not extending when the system is under pressure.	<ol style="list-style-type: none"> 1. The hydraulic hose is not connected properly to the tool. 	<ol style="list-style-type: none"> 1. Release the pressure and check the hose connection.
The nut body will not retract	<ol style="list-style-type: none"> 1. The oil Return-To-Tank valve is not open. 2. One of the connections is not connected properly. 	<ol style="list-style-type: none"> 1. Ensure that the oil Return-To-Tank valve is open fully. 2. Check that the hydraulic connections are secure.

4. Maintenance

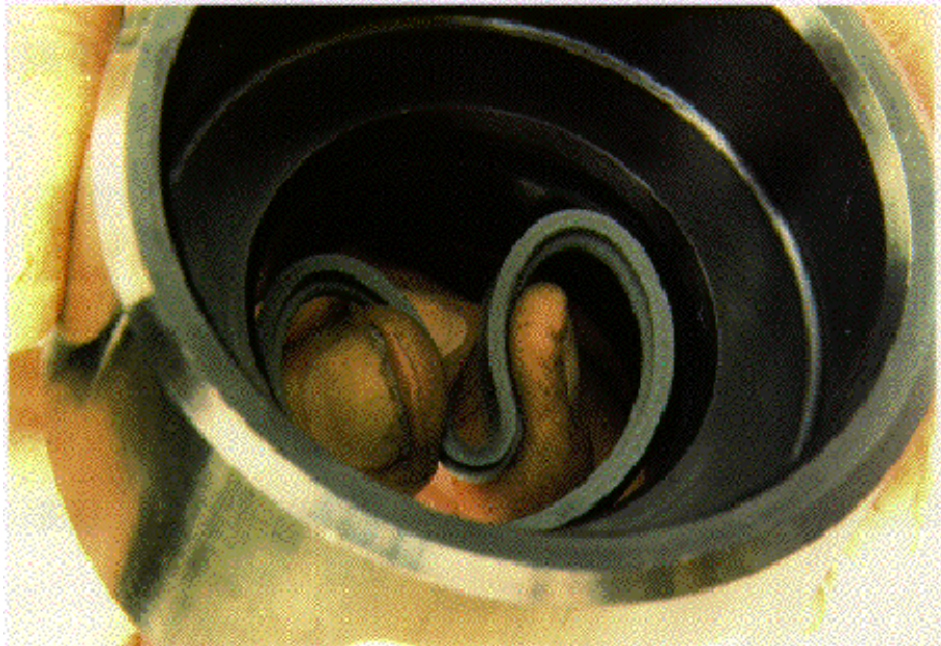
4.1 Replacement of hydraulic Seals

The following precautions must be taken with assembly of both inner and outer seals:

1. Avoid sharp edges (cover threaded areas).
2. Remove all dust, dirt, swarf and foreign particles.
3. Do not use sharp-edged tools.
4. Lubricate all components before assembly.

1.a. Inner Seal (PTFE)

- (a) Insert rubber 'O' ring into groove.
- (b) Insert inner seal as shown in illustration below with chamfer adjacent to tool chamfer, i.e. facing pressure. Fold out on top of 'O' ring removing any kinks in seal.



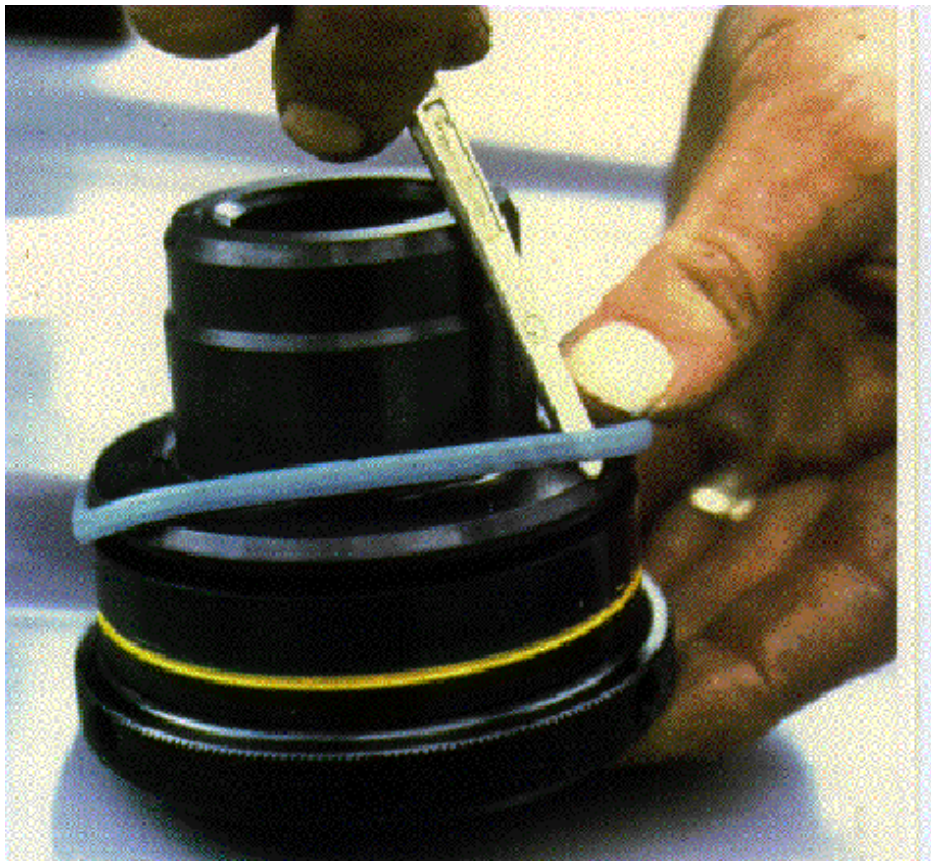
1.b. Inner Seal (OILON)

- (a) Insert rubber 'O' ring into groove.
- (b) Insert the Oilon seal into the seal groove on one side of the hydraulic head, feed in the around the groove and snap into place.

IMPORTANT: DO NOT BEND THE SEAL.

2. Outer Seal (PTFE & OILON)

The outer seal is in two parts. The rubber 'O' ring is simply stretched over the boss of the insert onto the groove. The outer seal can be chamfered on one face or both faces. In the case of one chamfer the seal must be inserted with the chamfer adjacent to the tool insert chamfer, i.e. facing pressure. If the seal is chamfered on both faces then the seal can be inserted either way. Locate part of the outer sleeve in the groove and work around the O.D. (see illustration below) stretching the sleeve over the box until it finally slips completely into the groove.



4.2. Re-assembly of Nut Body & Insert

- (1) Ensure that all inner faces are free from dirt and other foreign particles.
- (2) Using preferably hydraulic oil, lubricate all inner faces concentrating on seals and seal contact faces.
- (3) Position the insert into nut body and apply pressure ensuring that squareness between the components is maintained. On smaller tools it may be possible to clamp the components together by hand. On larger tools a small bench press will be required.

4.3. Hydraulic Connections

Hydraulic connections are of the following types: -

The connection into the tool is a threaded hole, its size and type depend on the pressure rating of the hydraulic nut. Hydraulic nut have one or two hydraulic connections depending on the harness arrangement to be used.

- a. CONNECTIONS WITH CONES. – These depend on a mating cone in the base of the threaded hole and the adaptor to create a seal. If this is damaged the nut body may need replacing.
- b. CONNECTIONS WITH BONDED SEALS. – These depend on a bonded seal between the adaptors and the nut body and sometimes between the adaptor and quick disconnect to create a seal.
- c. CONNECTIONS ON THE HOSE. - The hose end connection is a 1/4" BSP female swivel with a male cone. A seal is created, by screwing down on to the mating adaptor with sufficient pressure to form a seal.

**IN THE EVENT OF ANY PROBLEMS
PLEASE CONSULT HYDRATIGHT SWEENEY LTD.**

5. Storage of Equipment

Hydraulic Nuts

1. Store tools fully retracted.
2. The finish will protect the tools from rust etc, but for added protection a light coating of oil or rust inhibitor should be applied to all plated surfaces.
3. Cover the internal threads on the inside of the inserts with Rocol Rustshield or similar rust inhibitor.
4. Store tools upright.
5. Keep dust caps on the oil inlet nipples when not in use.

Hydraulic Harness & Hoses

1. Wipe all hoses clean and apply a light coating of oil or suitable rust inhibitor to all nipples, couplings, tee blocks.
2. Always keep dust caps fitted to nipples and couplings when hoses are not in use.

Air/Hand Driven Pump

1. Always store the pump upright.
2. Apply a light oil coating or suitable rust inhibitor to all the exposed un-plated metal items.
3. Leave the oil return to tank valve in the open position.
4. Always keep dust covers on inlet/outlet hydraulic fittings.
5. Leave the air control valve in the open position. (Air Pump Only)



6. Attachments

Technical Data Sheet

General Assembly Drawing

Pressure/Load Graph

TECHNICAL DATA SHEET

CUSTOMER:	ALSTOM	
TOOL SIZE:	1.3/4" 8UN	
TENSIONER ITEM No.	HNIC6091800D	
TENSIONER O.D.	87 mm	3.43 in
SEAL O.D.	72 mm	2.83 in
SEAL I.D.	56 mm	2.20 in
HYDRAULIC AREA:	1608 mm²	2.49 in²
MAX OPERATING PRESSURE:	1241 bar	18000 psi
MAX INITIAL LOAD:	200 kN	20.0 tons
MAX STROKE:	12 mm	0.47 in
MIN THREAD ENGAGEMENT:	32 mm	1.26 in

CALCULATION OF REQUIRED OPERATING PRESSURE

$$\text{Operating Pressure} = \frac{\text{Initial load}}{\text{Hydraulic Area}}$$

$$\text{Initial load} = \text{Residual Load} \times \text{Load loss Factor}$$

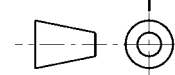
Note: The Load Loss Factor is based on a theoretical approximation of the amount of load lost when the pressure in the hydraulic head is released, and the load is transferred to the permanent nut. The main variable which affects the load loss factor is the grip length of the application.

IF IN DOUBT CONSULT HYDRATIGHT SWEENEY LTD FOR FURTHER INFORMATION

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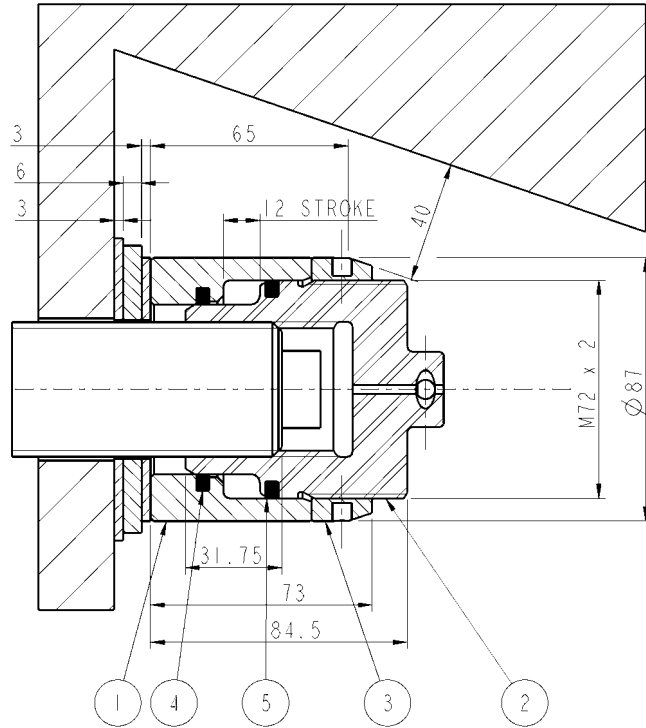
ALL DIMENSIONS IN MILLIMETERS UNLESS STATED

IF IN DOUBT ASK



THIRD ANGLE PROJECTION

WEIGHT (kg)
2.98

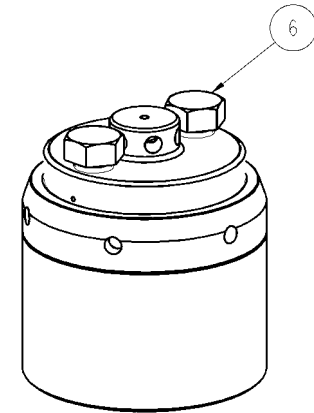


SECTION B-B

TECHNICAL DATA

- HYDRAULIC PRESSURE AREA = 1609 mm² (2.49 in²)
- MAX WORKING PRESSURE = 1241 bar (18000 psi)
- MAX LOAD CAPACITY = 20356 kgf (20.0 tonf)
- MAX RAM STROKE = 12 mm (0.47 in)
- MINIMUM STUD PROTRUSION REQUIRED ABOVE TOP WASHER = 32 mm (1.25 in)

NOTE:
ITEMS 7 AND 8 ARE SUPPLIED SEPERATELY

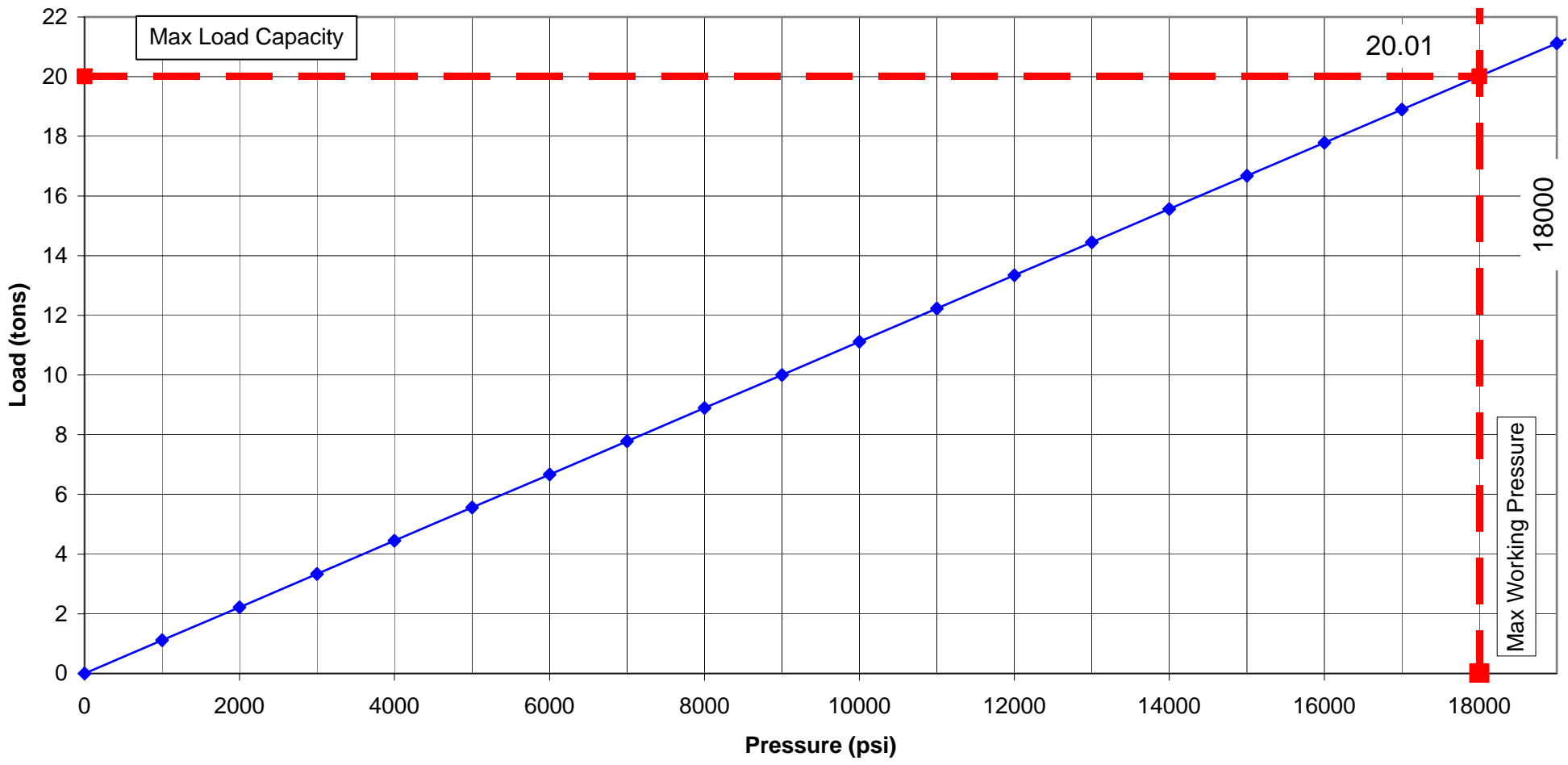


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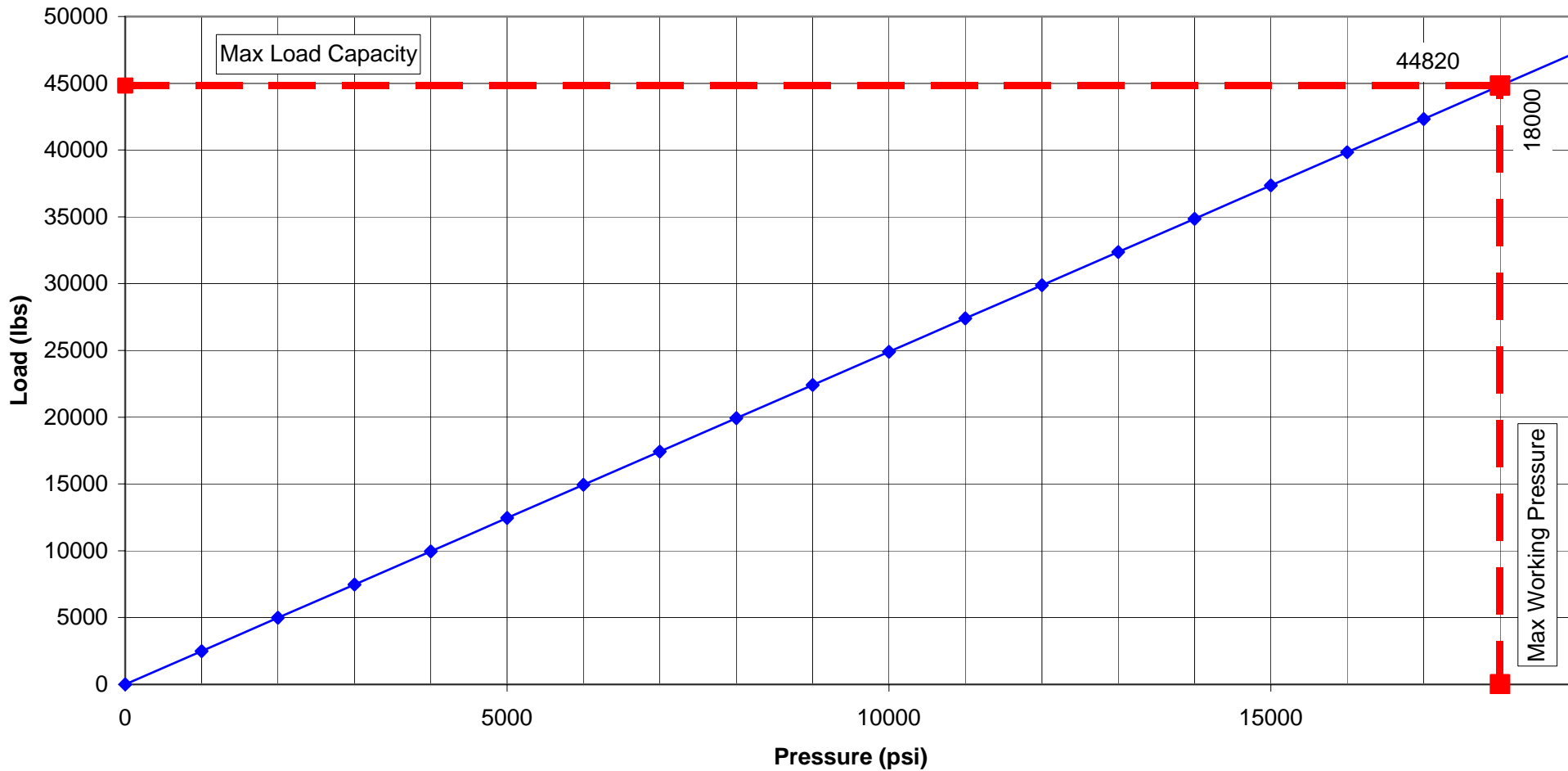
8	QUICK DISCONNECT NIPPLE	2	STEEL	QDCJN1161500
7	ADAPTOR 1/4" BSP x 9/16" UNF	2	ST. ST.	ADMMBCDC2275
6	9/16"UNF BLANKING PLUG	2	STEEL	EPLGDCXX2275
5	OUTER SEAL SET	1	PTFE	SLSTPTOD0720
4	INNER SEAL SET	1	PTFE	SLSTPTID0560L
3	COLLAR	1	NITRONIC	HNIC6091803D
2	INSERT	1	NITRONIC	HNIC6091802D
1	BODY	1	NITRONIC	HNIC6091801D
ITEM	DESCRIPTION	QTY	MATL	ITEM NUMBER

A3 COMPUTER ORIGINAL	ALTERATIONS	DRAWN	MH	DATE	25-FEB-2004	LIMITS U.S.O.	-	MATERIAL	-	THIS DRAWING AND THE DESIGN IS THE PROPERTY OF HYDRA-TIGHT LTD AND MUST NOT BE COPIED OR DISCLOSED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF THE COMPANY	HYDRATIGHT SWEENEY	DRAWING No.	HNIC6091800D	ISSUE	A
		SALES ORDER No	SA460497	CHECKED	MER	SURFACE FINISH	-	HEAT TREATMENT	-			TITLE	1.3/4"-8UN TOP COLLAR HYDRAULIC NUT		
		SALES QUOTE No	QA460091	SCALE	0.65 : 1										

PRESSURE LOAD GRAPH
HNIC6091800D 1.3/4"-8UN

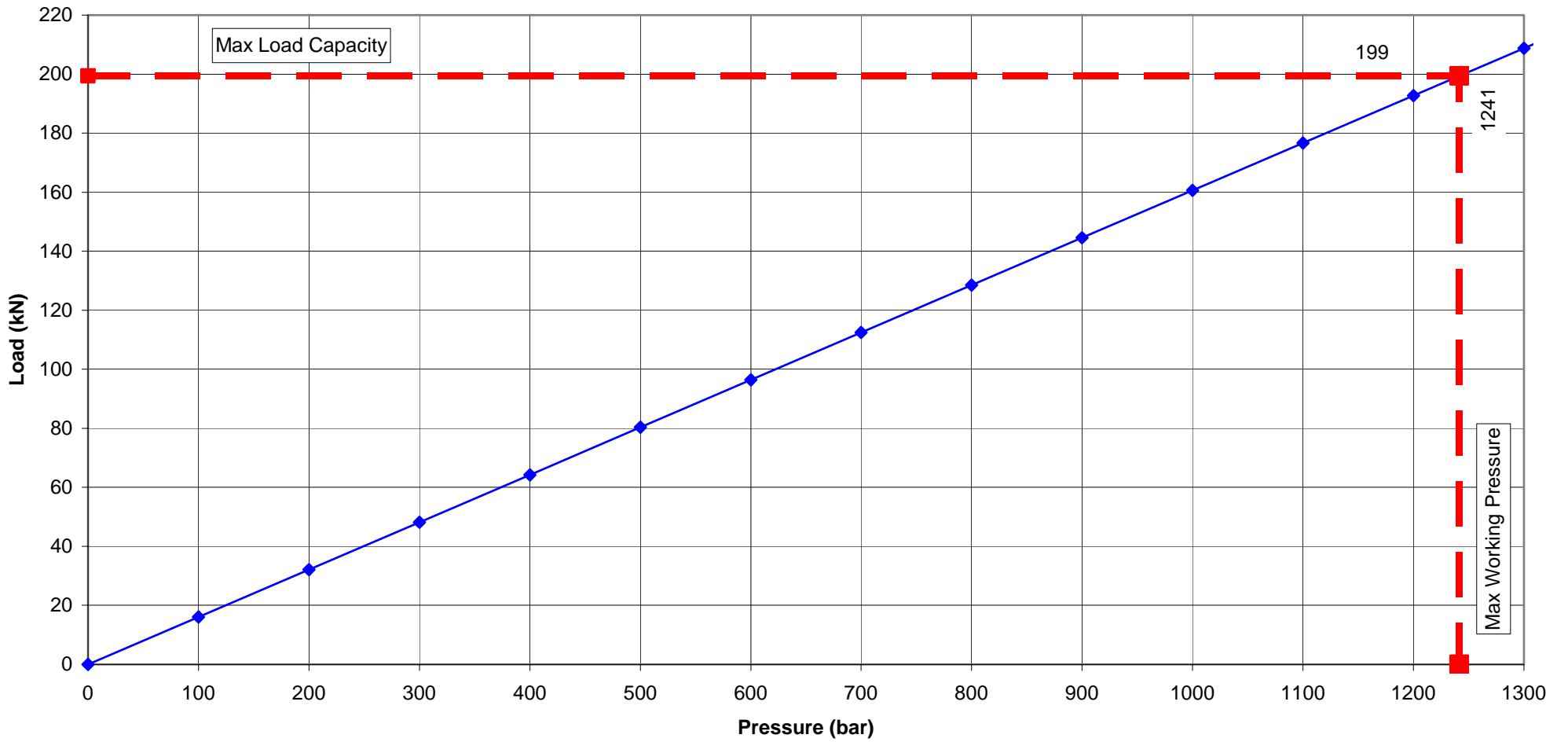


PRESSURE LOAD GRAPH
HNIC6091800D 1.3/4"-8UN



PRESSURE LOAD GRAPH

HNIC6091800D 1.3/4"-8UN



PRESSURE LOAD GRAPH
HNIC6091800D 1.3/4"-8UN

