FORUM™ B + V Oil Tools

Operation Manual • Rig Floor Equipment

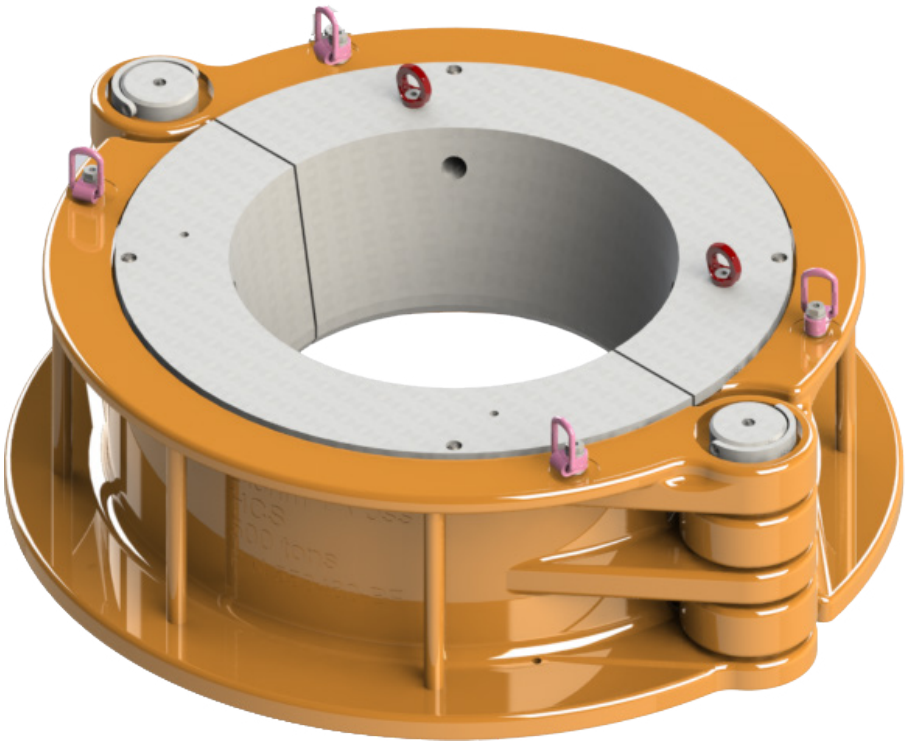
Hinged Casing Spider

Type Series HCS 200-500 sh tons Manual Operated

P/N	
553480	Hinged Casing Spider (HCS200) 30", 200 sh tons with 4" API-Taper
553650	Hinged Casing Spider (HCS 200) 42", 200 sh tons with 4" API-Taper
553470-3TPF	Hinged Casing Spider (HCS 200) 13.3/8", 200 sh tons with 3" API-Taper
553600	Hinged Casing Spider (HCS 200) 13.3/8"-11.3/4", 200 sh tons with 4" API-Taper
553600-3-TPF	Hinged Casing Spider (HCS 200) 13.3/8"-11.3/4", 200, 200 sh tons with 3" API-Taper
553490	Hinged Casing Spider (HCS 200) 20" - 18.5/8", 200 sh tons with 4" API-Taper
553492	Hinged Casing Spider (HCS 200) 36", 200 sh tons with 4" API-Taper
553670	Hinged Casing Spider (HCS 350) 36",350 sh tons with 4" API-Taper
553485	Hinged Casing Spider (HCS 500) 20" - 18.5/8", 500 sh tons with 4" API-Taper
553460	Hinged Casing Spider (HCS 500) 30", 500 sh tons with 4" API-Taper

Operating Instructions

Original Operating Instructions



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Forum B + V Oil Tools GmbH

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00	08-2011	B+V, ROK	Initial Release
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03	06-2013	B+V, ROK	Document Update
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Version	Author	Eng. Check	Appoval Check
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Table of contents

A. General

I Basic Information

This operating manual refers to the Hinged Casing Spider (HCS) from **Forum B + V Oil Tools** for use on oil drilling platforms and rigs.

The permissible range of application is specified in the technical data.

This manual covers several different Forum B + V Oil Tools models from the HCS type series that are all common in use and operation. Most assembly, disassembly, and inspection procedures are the same for all models. However, where there are differences, they are called out separately within the manual.

When installed in potentially explosive atmospheres, the instructions that follow the Ex symbol must be followed. Personal injury and/or equipment damage may occur if these instructions are not followed.

This operating manual is intended for the operator of the HCS. It is intended to ensure safe operation and must be read carefully and kept where it is accessible for HCS users at all times.

This operating manual contains all information on safe and proper operation of the HCS. Observance of these instructions is the prerequisite for safe operation.

In addition it is necessary to observe all applicable national and local regulations, e.g. accident prevention regulations and environmental regulations as well as the company's own internal safety regulations.

For installation, maintenance and repair work and proper training of the operating personnel Forum B + V Oil Tools recommends requesting service from Forum B + V Oil Tools itself.

II Intended Use

The Hinged Casing Spider (HCS)are specially designed for drilling operations to handle pipes. In addition to observing all instructions in this operating manual, intended use also includes observing all prescribed assembly, disassembly, startup, operating, repair and maintenance work at the specified intervals as well as all safety precautions.

The operation of the HCS is allowed for its intended use only.

INFO

In this documentation the abbreviation t and the word tons are used to describe short tons. If the metric ton is referred it will explicit be named in the text.
(1 tons = 2000 lb = 907,18474 kg)

III Improper Use

INFO

Improper use of the machine releases Forum B + V Oil Tools from any liability for personal injury or property damage resulting therefrom.

The HCS is intended exclusively for installation in Rotary Tables and to hold specified pipes in conjunction with approbate hoisting devices. Always observe the specifications in chapter „Technical Data“ on page 16.

The following is specifically prohibited:

- Installation and operation in environments for which use is not specified.
- Increasing the load limit of the HCS.
- Every use of the HCS which is not intended.

Moreover operation of the HCS is prohibited under the following conditions:

- When the machine is used for applications other than intended.
- When the machine or parts thereof are damaged or when the additional equipment is not installed properly.
- When protective or safety equipment is damaged, unusable, improperly installed or not present.
- When the HCS is not operating properly.
- When humans or foreign objects or personnel are located in the hazard area of the HCS.

When conversions or modifications have been performed without previous, written approval by Forum B + V Oil Tools.

When tools not approved by Forum B + V Oil Tools are used.

- When the prescribed maintenance intervals have been exceeded.

When replacement parts not approved by Forum B + V Oil Tools are used.

When repair or service work has been performed on the machine by companies not authorized by Forum B + V Oil Tools.

Observe also the chapter “Warranty and Liability”

IV Warranty and Liability

Liability

The technical information, data and instructions for operation contained in this operating manual correspond to the status at the time of print and are provided according to the best of our knowledge in consideration of our previous experience and know-how.

We reserve all rights to make technical modifications within the scope of technical development of the Hinged Casing Spider (HCS) treated in this operating manual. Claims or entitlements cannot be deduced or derived from information, illustrations and descriptions in this operating manual.

Forum B + V Oil Tools is liable for all warranty obligations made within the scope of the contract for any faults or omissions on our part, excluding further claims. Claims for damages suffered are excluded regardless of the legal grounds.

Translations are complete according to best knowledge. We cannot assume any liability for translation errors, even when the translation was accomplished at our order. Only the original text is binding.

The descriptions and illustrations do not necessarily reflect the scope of delivery or any parts orders. The drawings and illustrations are not to scale.

Warranty

Forum B + V Oil Tools general terms of purchase and delivery apply. Purchasers recognize these conditions on the day the contract is signed at the latest.

The terms and duration of Forum B + V Oil Tools warranty are specified in the sales documents as well as the order confirmation. These will be submitted to the operating company as information at the time the contract is signed at the latest.

The manufacturer assumes no warranty whatsoever for damage or interruptions in operation resulting from failure to observe the operating instructions.

The operating manual is to be supplemented by the operating company with operating instructions based on existing national regulations on accident and environmental protection, including information on supervisory and reporting obligations taking into consideration operating peculiarities, e.g. in regard to work organization.

Warranty claims, complaints within the scope of the guarantee and liability for personal injury and property damage are excluded, when such result from any of the following causes:

- Any use other then intended;
- Improper installation, operation, maintenance or repair;
- Operation with defective safety equipment or improperly attached or non-operational safety or protective equipment or devices;
- Failure to observe the instructions in the operating manual regarding safe conduct;
- Impermissible structural modifications;

Use of replacement parts not approved by Forum B + V Oil Tools;

- Normal wear or insufficient inspection of components subject to wear;
- External effects or force majeure.

Greasing the Hinged Casing Spider (HCS) with other greases as recommended by Forum B + V Oil Tools

Info

Any structural modification to the machine by the operating company requires previous written approval by Forum B + V Oil Tools. Failure to obtain such approval voids the warranty and releases Forum B + V Oil Tools from any product liability.

Following modifications or installation of optional equipment all safety equipment must be reinstalled and checked by the operator for proper function.

V Obligations of the Operating Company

Planning and Checking Safety Measures

The obligation of the operating company to due diligence includes planning safety measures and supervising their observance.

All personnel performing work on or with the HCS must be trained by the operating company for the work performed on the HCS.

The personnel must have read and understood the operating manual.

Minimizing Risk of Injury

The following principles apply to minimize the risk of injury:

- Ensure that work on the HCS is performed only by qualified personnel.
- The personnel must be authorized for such work by the operating company.
- The personnel must wear the prescribed protective equipment.
- Procedures, competencies and responsibilities must be clearly defined and established in the area of the HCS. Proper behaviour in the event of a malfunction must be clear for everyone. The personnel must be given regular training.
- All warning signs and information on the HCS must be complete and easily legible. For this purpose warning signs and information are to be cleaned regularly and replaced as required.

Trouble-free Operation

The following principles apply for trouble-free operation:

- Keep the complete operating manual at the location where the HCS is in operation where it is easily accessible for everyone and in an easily legible condition.
- Use the HCS exclusively for its intended purpose.
- Use the HCS only when it is in a perfect operating state.
- Before starting work, check to ensure that it is in a safe operating state and functioning properly.

Requirements for Operator

Basic knowledge of safe handling and use of the HCS includes knowledge of the general safety precautions.

Ensure that the Hinged Casing Spider (HCS) is operated only in compliance with the general safety precautions and other instructions in this manual.

Training

The operating company is obligated to organize and hold regular training to ensure that all personnel involved with transporting, installing, operating and/or servicing the HCS is familiar with the required procedures and safety precautions.

Minimum Qualifications

All work on the machine requires special knowledge and qualifications on the part of the operating personnel.

All personnel working on HCS must have the following qualifications:

- Personal suitability for the work performed.
- Suitable qualifications for the work performed.
- Familiarity with the safety equipment and its function.
- Familiarity with this operating manual – particularly the safety precautions – and all chapters relevant for the work to be performed.
- Familiarity with the elementary instructions on operating safety and accident prevention.

In general all employees must have one of the following minimum qualifications:

- Technical training for independent work on the Hinged Casing Spider (HCS).
- Sufficient qualifications for working on the Hinged Casing Spider (HCS) under supervision and at the instructions of a trained specialist.

User Groups

This operating manual is subdivided into the following user groups:

Personnel	Qualifications
Operating personnel	Sufficiently trained in Functional procedures on the machine Operating procedures
	Knowledge: Competency and responsibility in regard to the work to be performed Behaviour in emergencies
Service personnel	Sound knowledge of Mechanics Electrical engineering
	Authorizations (according to standards of safety engineering): Starting up machines Grounding machines Marking of machines
	Sound knowledge of installation and operation of the Hinged Casing Spider (HCS).

Special Technical Knowledge

The following work should be performed only by specially trained personnel:

Work Performed	Qualifications
Work on hydraulic system	Special knowledge and experience with work on hydraulic systems.
Work on mechanical parts	Personnel qualified or trained in industrial mechanics; work is to be performed only under supervision and on instructions of a person qualified according to generally accepted codes of practice in industrial mechanics.

VI Safety Symbols

The safety precautions in this document contain standardized depictions and symbols. Four hazard classes are distinguished depending on the probability of occurrence and severity of the consequences.

Selection of the warning category depends on the probability of occurrence and the possible extent of damage.

NOTE

Situations which could result in damage to the machine or its surroundings or to tools are distinguished in this manner, supplemented, where applicable, by a pictograph.

⚠ CAUTION

Indication of recognizable hazard for humans or possible property damage.

Failure to observe can lead to reversible injuries or property damage!

The symbol as specified in ANSI Z535.6 emphasizes the cause.

Measures for avoiding are listed.

⚠ WARNING

Indication of recognizable hazard for humans.

Failure to observe can lead to irreversible injuries!

The symbol as specified in ANSI Z535.6 emphasizes the cause.

Measures for avoiding are listed.

⚠ DANGER

Indication of imminent hazard for humans.

Failure to observe can lead to irreversible or lethal injuries!

The symbol as specified in ANSI Z535.6 emphasizes the cause.

Measures for avoiding are listed.

Preliminary Safety Precautions

Safety precautions are given in the preceding form at the beginning of complete chapters or sections. They apply for the entire chapter or the entire subsequent section.

Safety Precautions Relevant for Action

If a safety precaution applies only for one single action or a short series of actions, it is integrated into the text preceding the possible hazard point.

For example:

1. Attach hoisting gear to eye bolts in cover.

⚠ CAUTION Danger of pinching/crushing hands! The cover can fall shut when the retainer is not engaged. Never open the cover by hand.

2. Open the cover with a crane and suitable hoisting gear.
3. Unscrew the M10 bolts on the hydraulic assembly with a 17 mm box wrench.
4. ..

Instructions for Safe Procedure

Special work steps to ensure Safe Procedure are depicted as follows (example):

Safe Procedure

1. Shut off machine.
2. Disconnect supply lines.
3. Attach machine to crane.
4. ..

Linguistic Conventions

This documentation uses terms and symbols intended to help you find information more easily, perform work steps more effectively and recognize dangerous situations more quickly. These symbols and terms are explained below:

All important text sections are printed in bold face.

- Lists without any necessary sequence are marked with a dash (-) at the left side of the column.
- Individual activities to be performed are indicated by a dot (•) to the left of the column.

Relevant consequences of an action or work step are marked with an arrow (→) in the left margin.

Enumerations in a certain sequence (e.g. a series of work steps) are indicated by sequential numbers (1, 2, 3,..) in the left margin.

For example:

1. Unscrew nuts on machine feet.
2. Lift machine.

For greater clarity the illustrations are located in the right column with the text opposite or directly below the associated text section. Larger illustrations extending over the entire width of the page are located before the explanatory text. The illustrations are provided with captions in telegraph style.

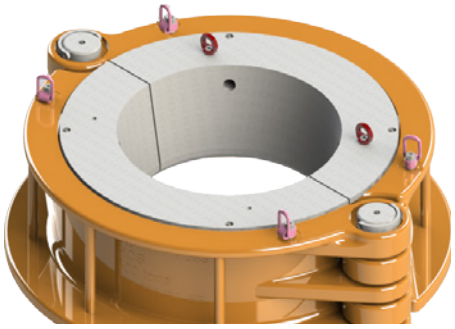

Fig. 1: Illustration Example Machine

INFO

Additional information and relationships requiring special attention are distinguished in this manner.

VII Personal Protective Equipment (PPE)

The following symbols located at appropriate points in the operating manual indicate that it is mandatory to wear personal protective equipment:

	WEAR PROTECTIVE GLOVES!
	WEAR EYE PROTECTION!
	WEAR SAFETY SHOES!
	WEAR PROTECTIVE HELMET!
	WEAR EAR PROTECTION!

VIII Conformity

The HCS satisfies all requirements in applicable directives and standards.
A sample of the EC Declaration of Conformity is given in the appendix.

Info

This operating manual is a part of the technical documentation for the Hinged Casing Spider (HCS).

The EC Declaration of Conformity is delivered together with the HCS.

Keep these instructions and the associated documents for later use.

IX Contact Forum B + V Oil Tools worldwide

In the event of problems that cannot be solved with the aid of this manual, please contact one of the following addresses.

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oiltools@f-e-t.com
www.blohmvoss-oiltools.com

Forum Energy Technologies Regional Drilling locations

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TX 77040
USA
fon: +1 71 36 09 98 08 – 24 hour hotline

Drilling Sales Headquarters
10344 Sam Houston Park Drive, Suite 300
Houston
TX 77064
USA
fon: +1 71 33 51 79 00

Drilling Regional Offices

Unit 7, Murcar Industrial Estate
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AB23 8JW UK
fon: +44 12 24 70 78 00

Oilfields Supply Center
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fax: +65 64 65 48 51

X Information on the Forum B + V Oil Tools homepage

Info

For further and actual information you can also visit our homepage in the internet.

A digital version of the operation instructions for this product as well as the operation instructions, safety- and update notes for other Forum B + V Oil Tools products can be reached via the Forum B + V Oil Tools homepage.

To join our internet Technical Documentation service with the latest updates on new technical documentation in a free and easy way, you must register to our service with your email-address and name in the customer-login area ① on **www.blohmvoss-oiltools.com** .

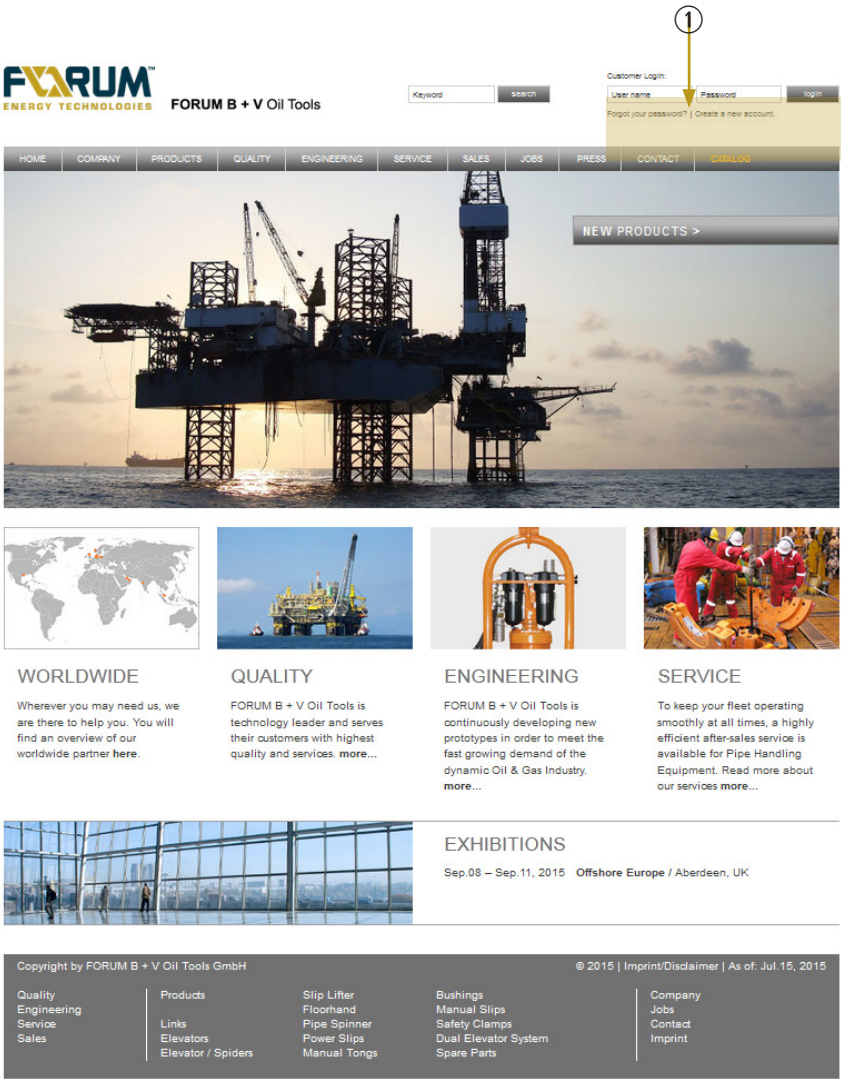


Fig. 2: Illustration Service - Homepage

DESCRIPTION

1 Description

The Forum B + V Oil Tools HCS is specially designed for drilling operations. The HCS will fit most casing handling operations. It can be placed on the rotary table or mounted on a platform which replaces the rotary table.

- The HCS is available for 200, 350 and 500 sh tons with API working capacities.
- Reducing bushings for other casing sizes are available.
- Various reducing bushing and body sizes available (see „1.8 Component Sizes and Drill Strings“ on page 27).

This manual covers following Forum B + V Oil Tools HCS:

PartNo.	HCS Type
553480	Hinged Casing Spider (HCS200) 30", 200 sh tons with 4" API-Taper
553650	Hinged Casing Spider (HCS 200) 42", 200 sh tons with 4" API-Taper
553470-3TPF	Hinged Casing Spider (HCS 200) 13.3/8", 200 sh tons with 3" API-Taper
553600	Hinged Casing Spider (HCS 200) 13.3/8"-11.3/4", 200 sh tons with 4" API-Taper
553600-3-TPF	Hinged Casing Spider (HCS 200) 13.3/8"-11.3/4", 200, 200 sh tons with 3" API-Taper
553490	Hinged Casing Spider (HCS 200) 20" - 18.5/8", 200 sh tons with 4" API-Taper
553492	Hinged Casing Spider (HCS 200) 36", 200 sh tons with 4" API-Taper
553670	Hinged Casing Spider (HCS 350) 36",350 sh tons with 4" API-Taper
553485	Hinged Casing Spider (HCS 500) 20" - 18.5/8", 500 sh tons with 4" API-Taper
553460	Hinged Casing Spider (HCS 500) 30", 500 sh tons with 4" API-Taper

The Forum B + V Oil Tools Hinged Casing Spider (HCS) will be delivered based on customer order.

A description of the optional accessories is given in the following chapters and in the parts lists. The materials used and the production processes satisfy API 7K standards. The machine is approved for operation in explosion hazard areas.

1.1 Assemblies and Components

The HCS consists of the described assemblies. A parts catalogue with general drawings and parts lists for all assemblies for the HCS is present in the „5.3 Drawing, Parts List and Spare Parts“ on page 41.

Info

Please note that this illustration does not reflect the scope of delivery (see also Chapter „Warranty and Liability“). Forum B + V Oil Tools offers slip assemblies and guide plates as accessories to match the specific pipe diameters.

HCS Main Assemblies

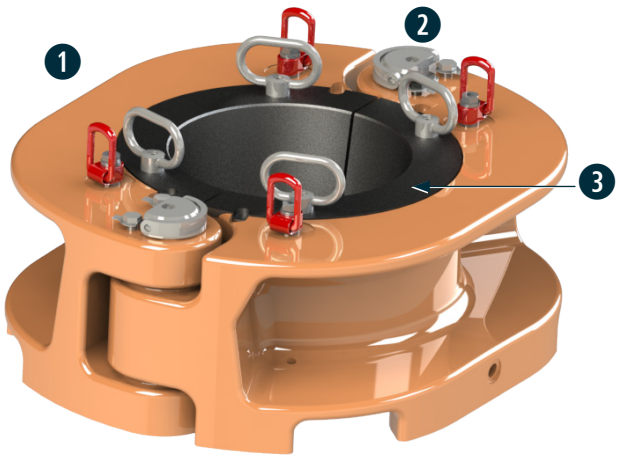


Fig. 3: HCS Main Assemblies

1 HCS Body
2 Hinge Pin
3 (Reducing) Bushing

1.2 Technical Data

1.2.1 Hinged Casing Spider (HCS) Type Series

Type Series		HCS-200	HCS-350	HCS-500
Load Capacity		200 sht	350 sht	500 sht
API test load		300 sht	525 sht	750 sht
Pipe Diameter Range [2]	min	11.3/4"	36	18.5/8"
	max	42"	36	30"
Weight		See chart size components		

Temperature working range ambient[1]	– 20° C to + 60° C – 4° F to 104° F

[1] Temperature working range -40°C to +45°C upon special request.

[2] Range available with component size bushing and reducing bushing

1.2.2 Recommended Lubricants

Forum B + V Oil Tools recommends use of the following lubricants for effective lubrication under various ambient conditions:

Brand	Name	Temperature range	Remarks
Finke	Aviaticon XRF Low-Viscosity Grease	-20 .. +29 °C (-4 .. +84.2 °F)	NLGI 0
Fuchs	NESSOS SF0 EP grease for non-oil tight gear trains	-20 .. +29 °C (-4 .. +84.2 °F)	NLGI 0 DIN 51826 GPOF-25 DIN 51502 GPOF-25

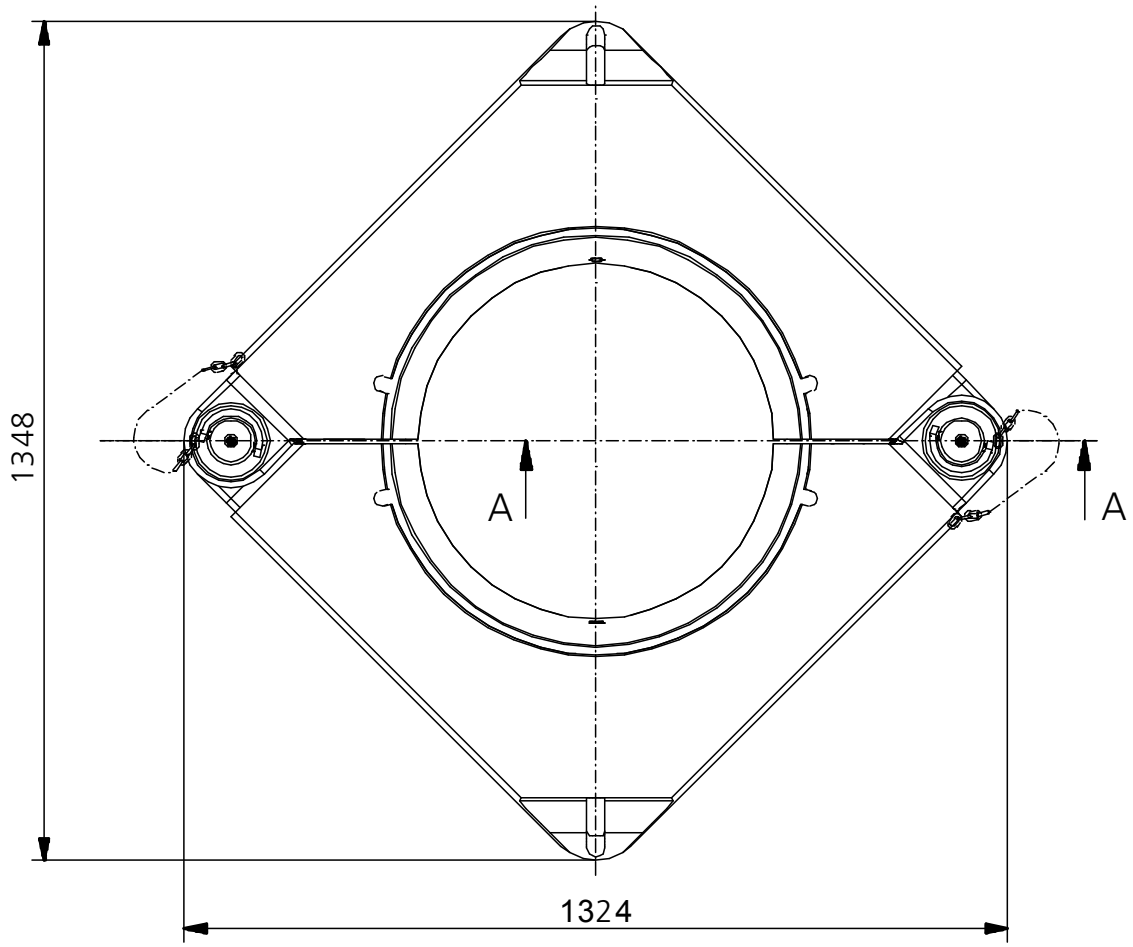
* For temperatures above +30 °C (+86 °F) Forum B + V Oil Tools recommends using lubricants in consistency class NLGI 2.

INFO

The specified lubricants can be obtained through Forum B + V Oil Tools **.** Contact your local representative.

1.3 Main Dimensions

1.3.1 Main Dimensions HCS 200-20”-18.5/8”



Section A-A

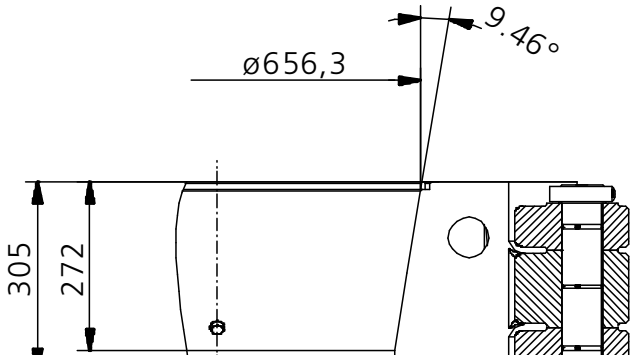
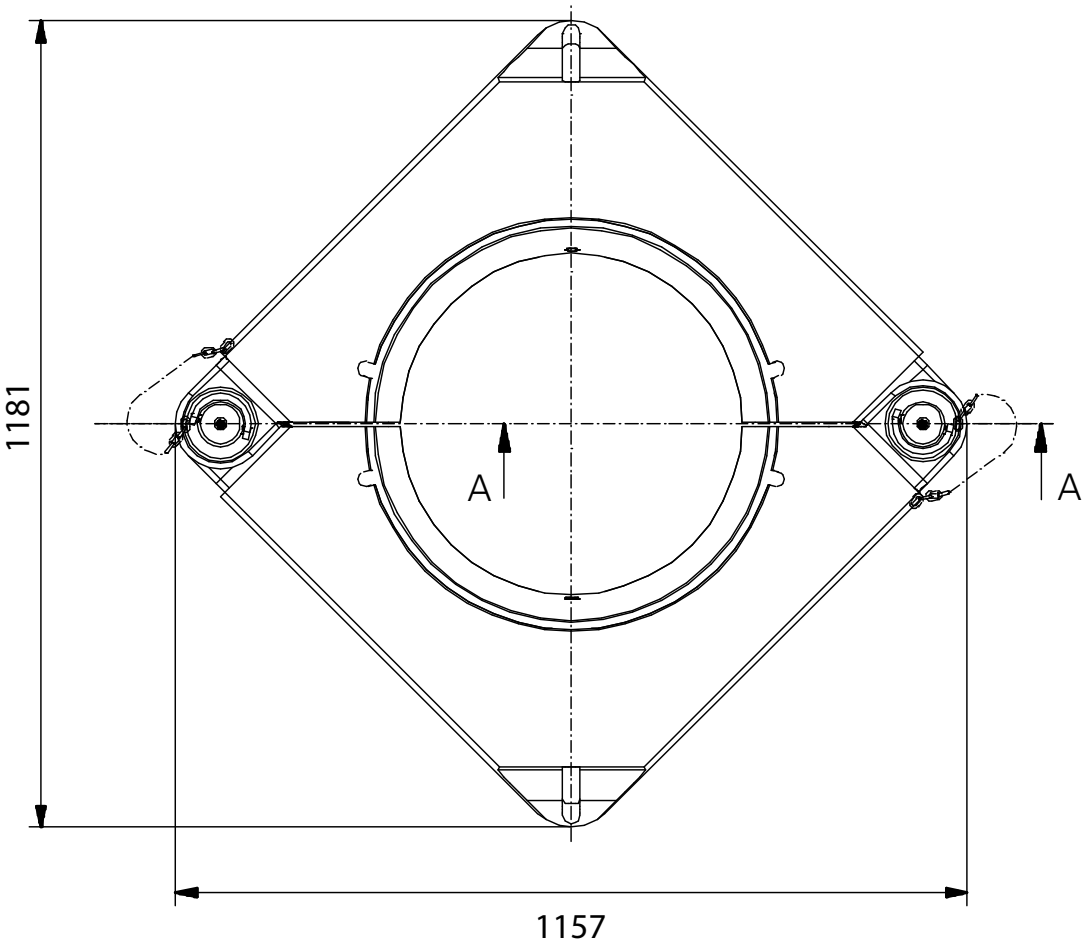


Fig. 4: Principle drawing of a HCS 200-20"-18.5/8" main dimensions

1.3.2 Main Dimensions HCS 200 - 13.3/8" with 3" API-Taper



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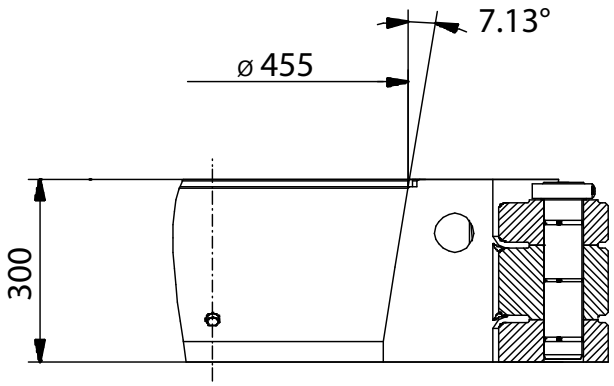


Fig. 5: Principle drawing of a HCS 200 - 13.3/8" with 3" API-Taper main dimensions

1.3.3 Main Dimensions HCS 200-36"

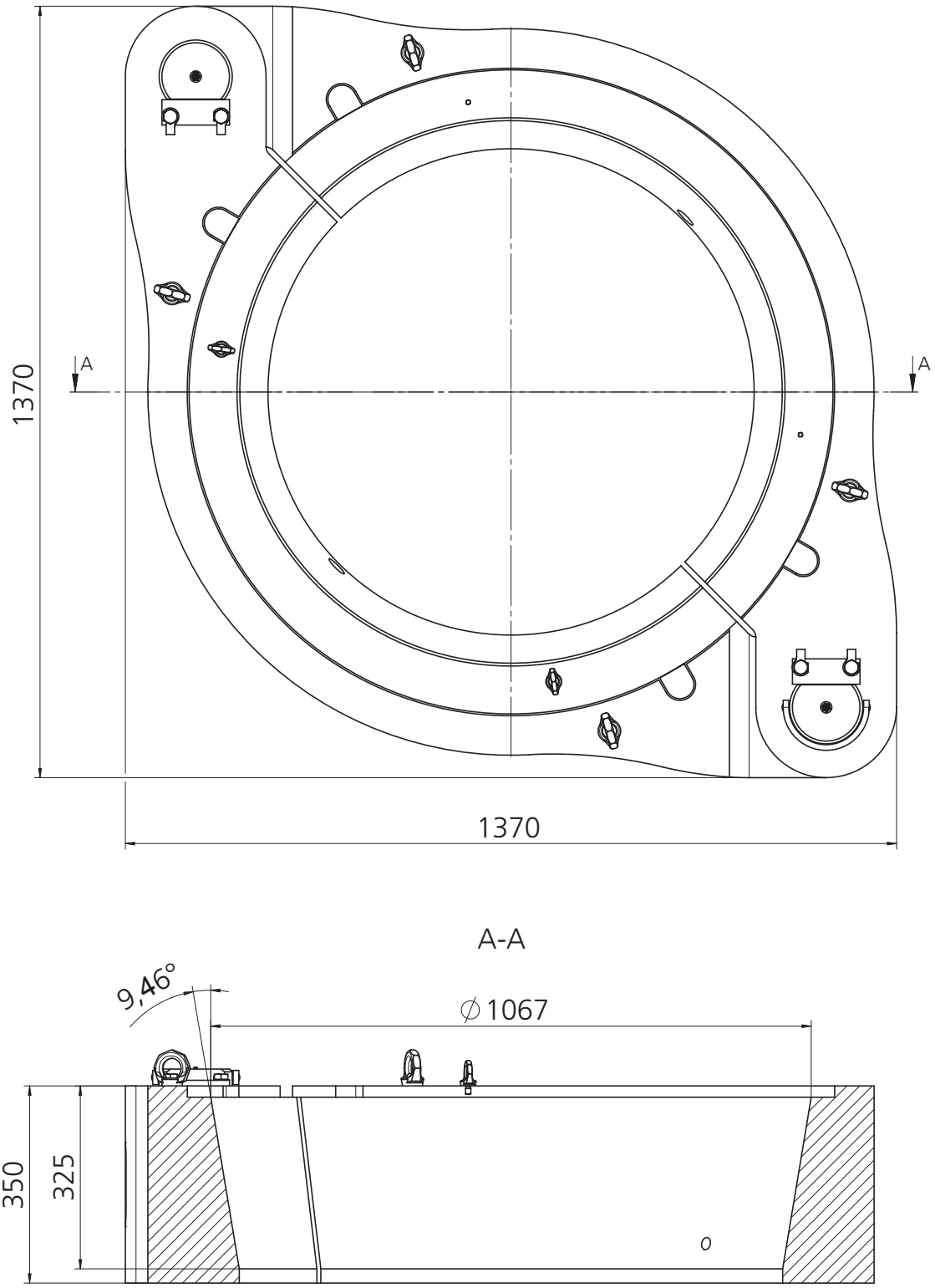


Fig. 6: Principle drawing of a HCS 200-36" main dimensions

1.3.4 Main Dimensions HCS 200-13.3/8"-11.3/4"

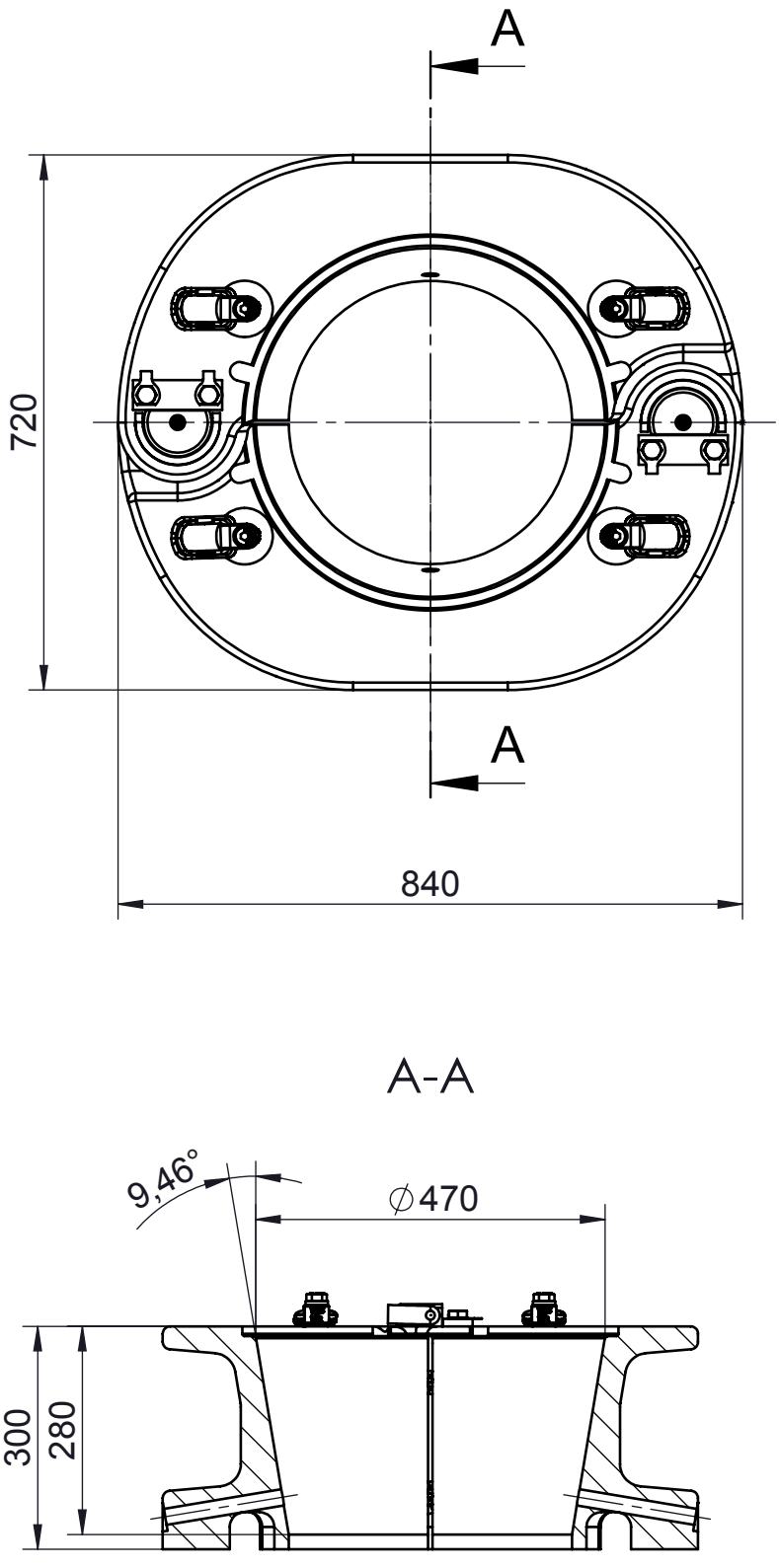
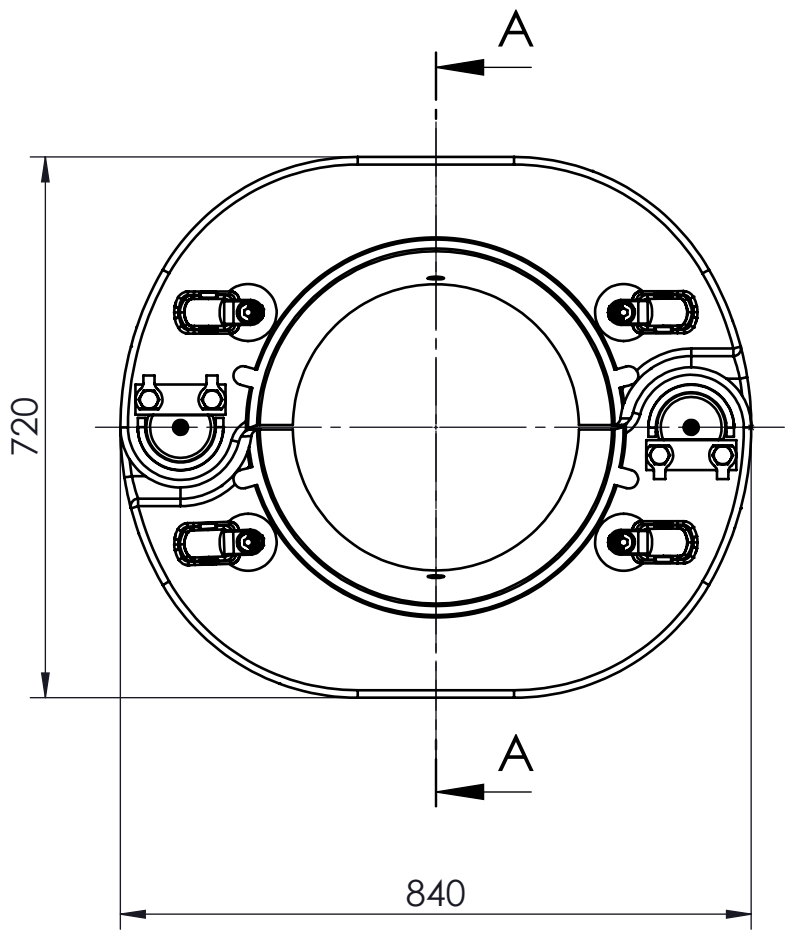


Fig. 7: Principle drawing of a HCS 200-13.3/8"- 11.3/4" main dimensions

1.3.5 Main Dimensions HCS 200-13.3/8"-11.3/4" with 3" API-Taper



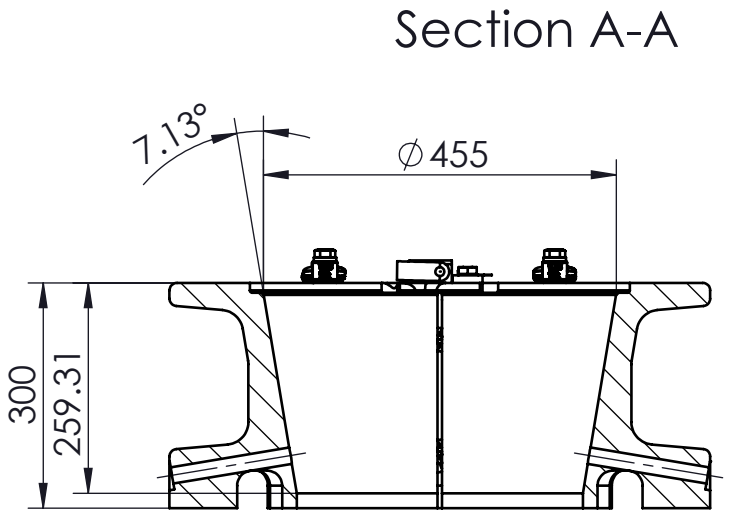


Fig. 8: Principle drawing of a HCS 200-13.3/8"-11.3/4" with 3" API-Taper main dimensions

1.3.6 Main Dimensions HCS 200-42"

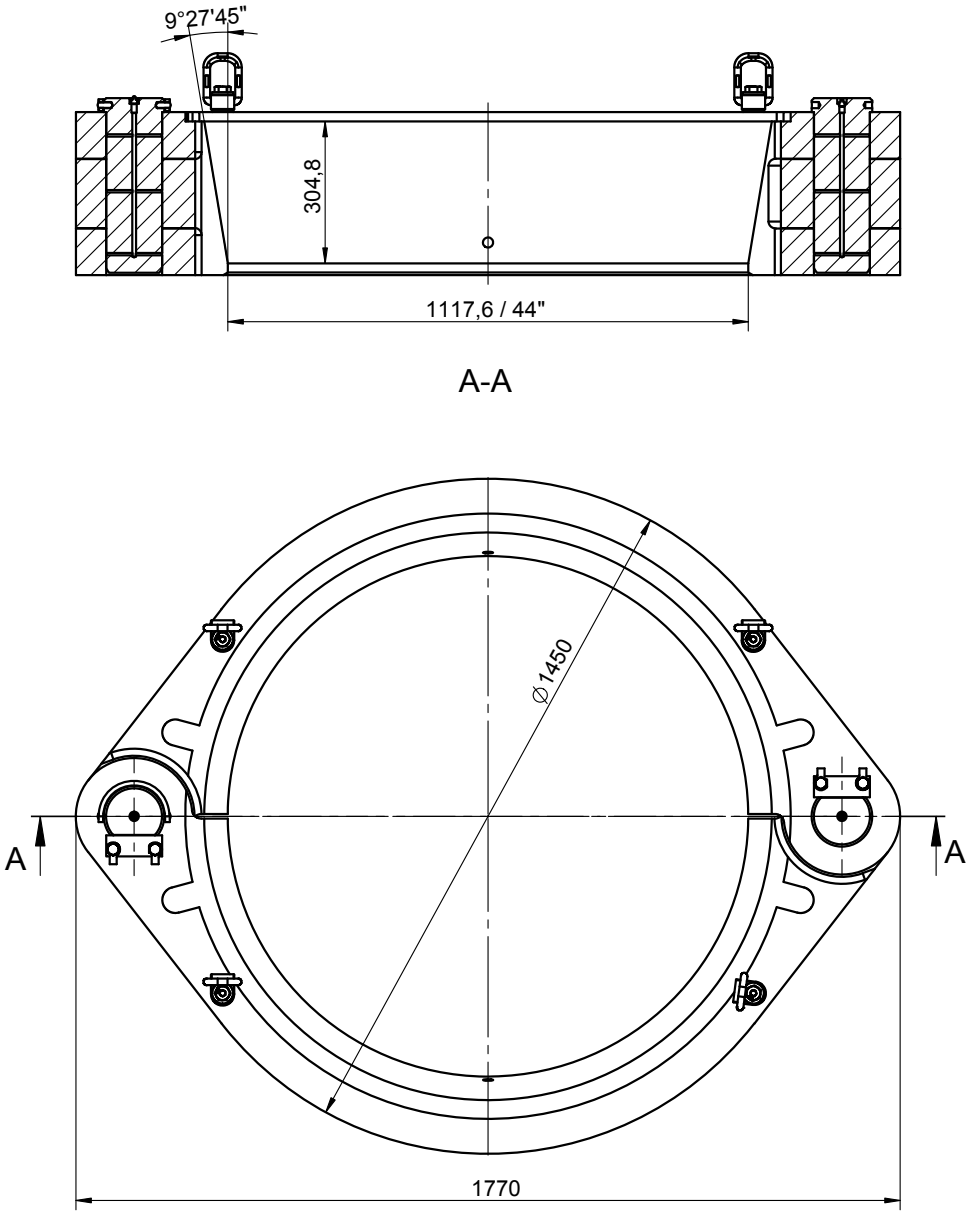


Fig. 9: Principle drawing of a HCS 200-42" main dimensions

1.3.7 Main Dimensions HCS 350-36"

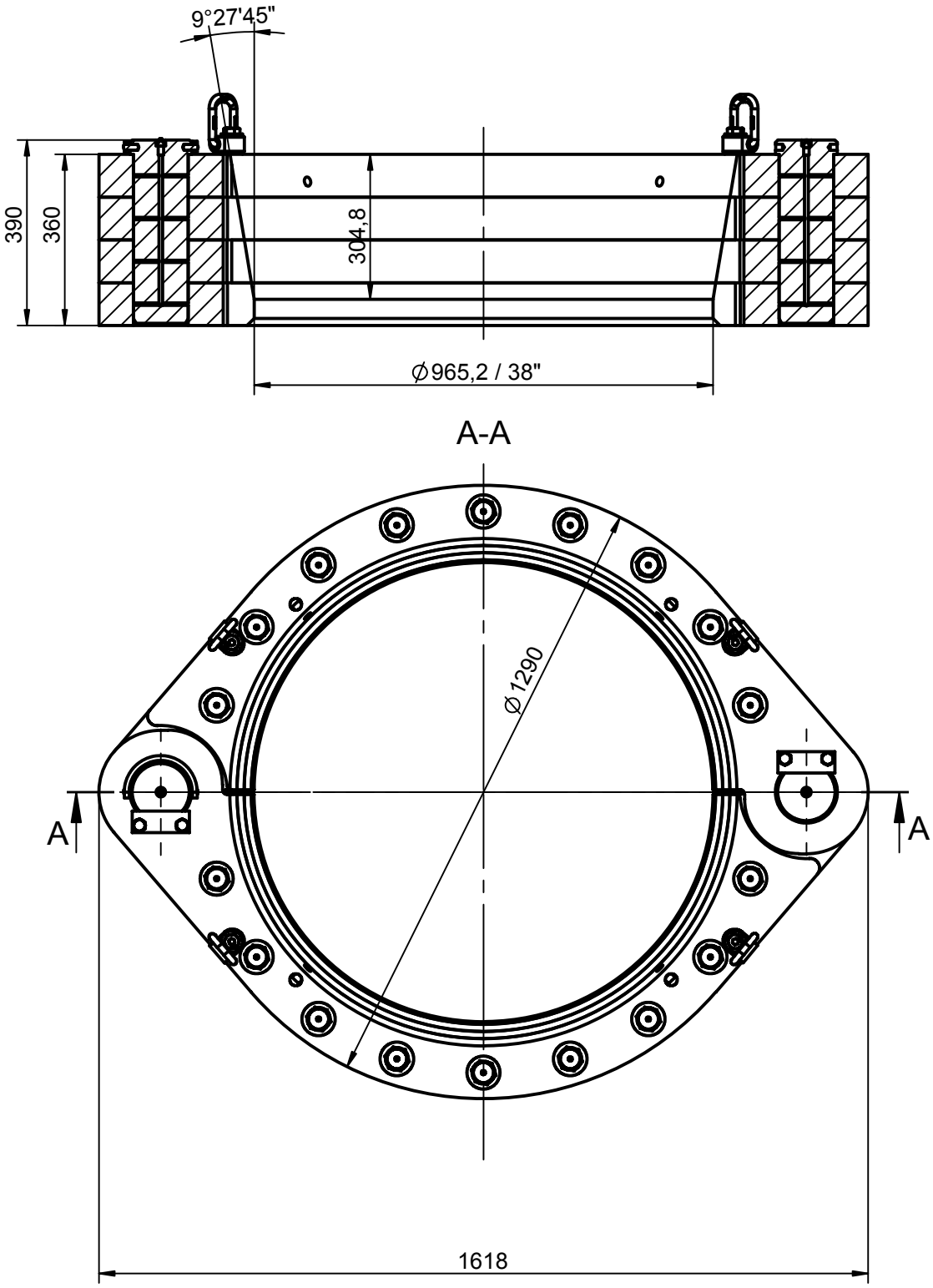
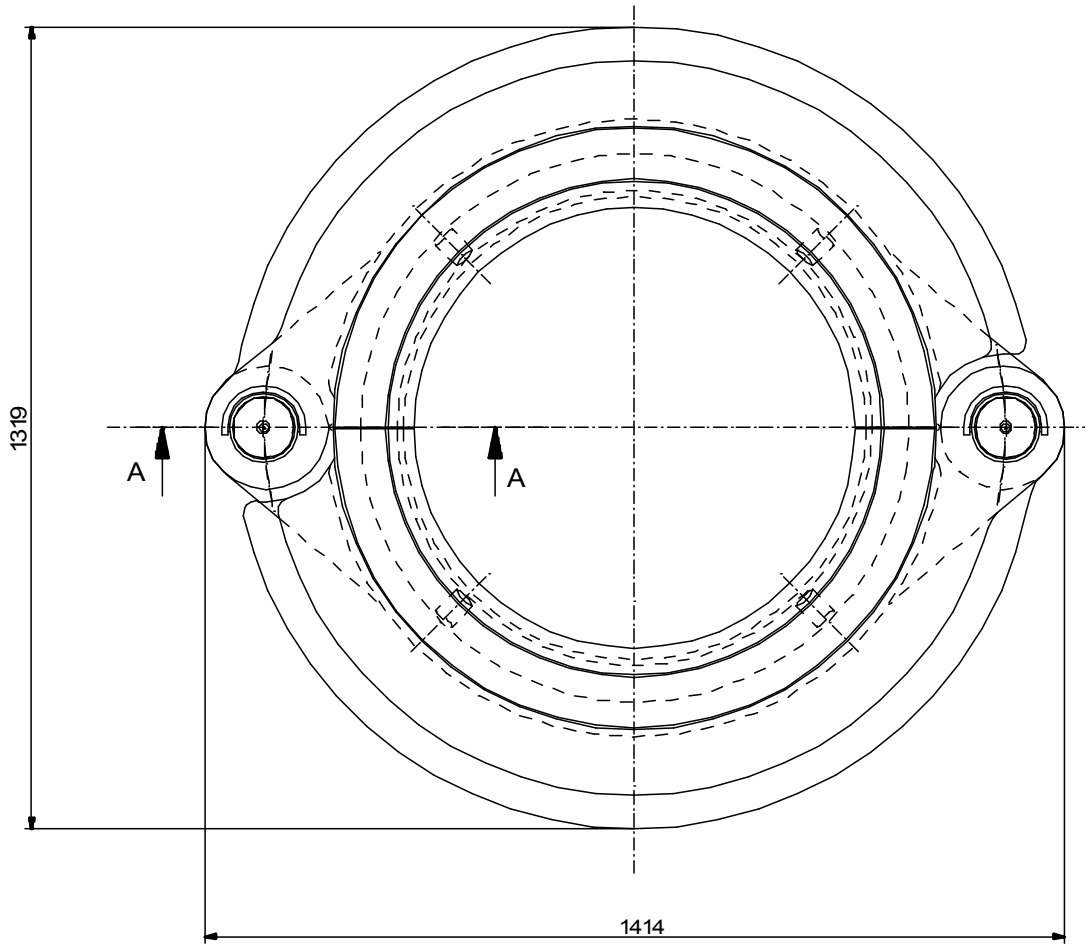


Fig. 10: Principle drawing of a HCS 3500-36" main dimensions

1.3.8 Main Dimensions HCS 500-30"



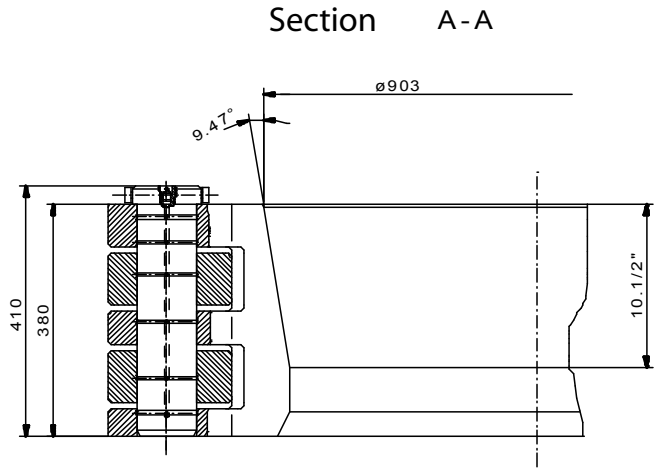


Fig. 11: Principle drawing of a HCS 500-30" main dimensions

1.3.9 Main Dimensions HCS 500-20"

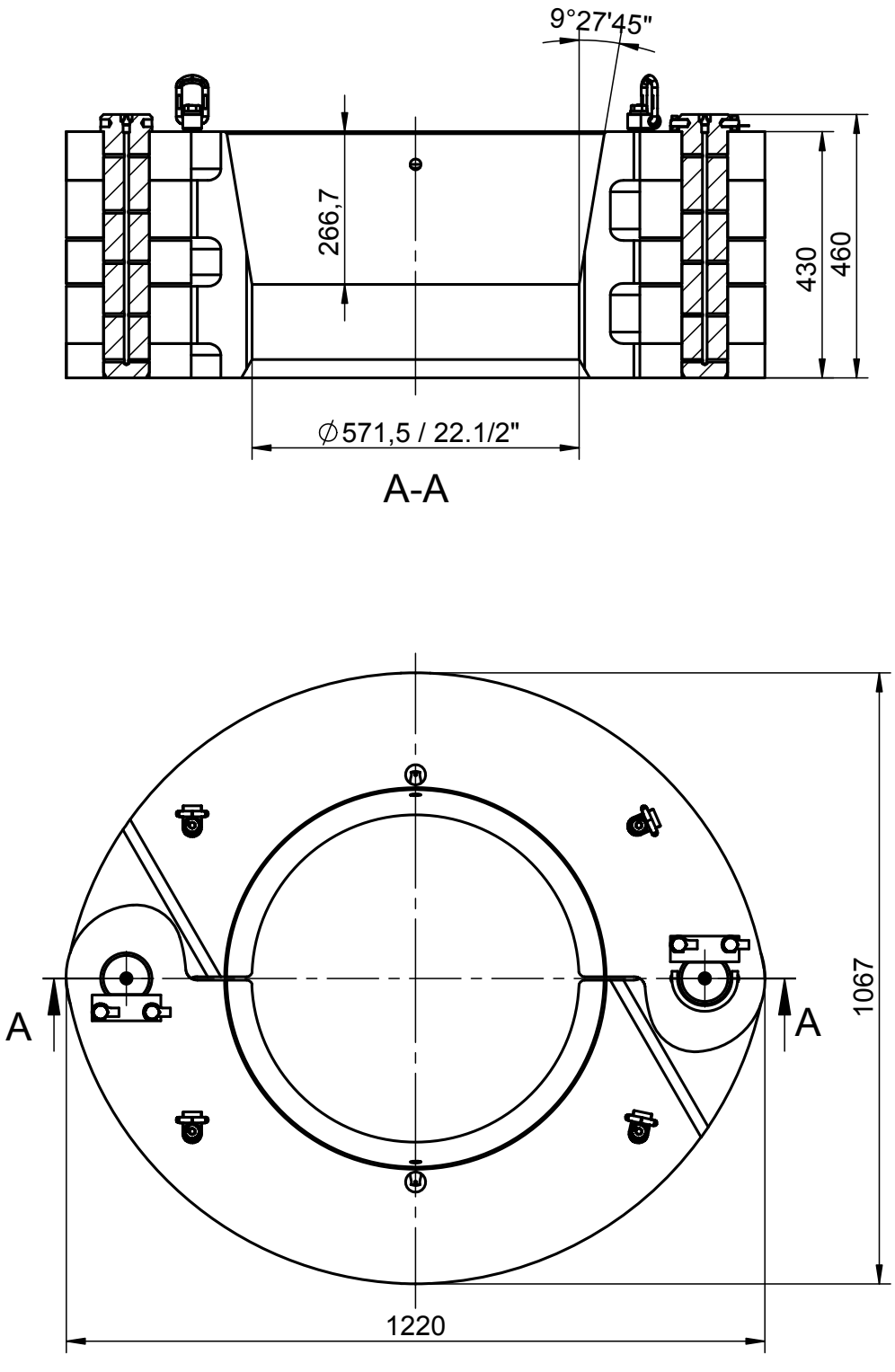


Fig. 12: Principle drawing of a HCS 500-20" main dimensions

1.4 Functional Description

The Hinged Casing Spider (HCS) is located directly in the rotary table. It is designed to be operated in conjunction with hoisting devices to hold tubulars, tubing and drill collars.

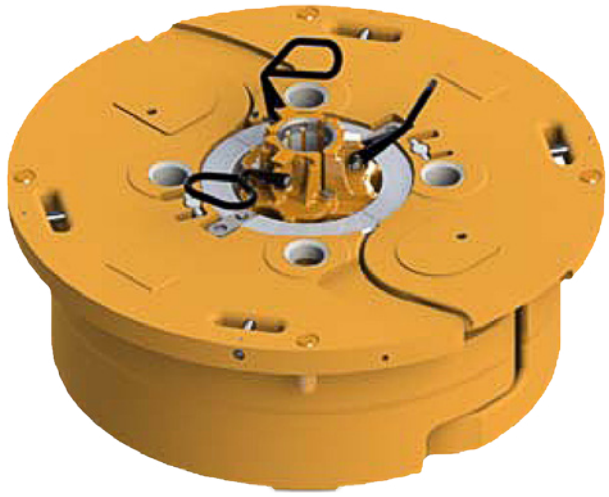


Fig. 13: HCS in conjunction with hand slips

1.5 Operational Environment

The HCS is designed and constructed for use in the drilling industry on ships and platforms.

The tool complies with the Machinery Directive 2006/42/EC.

The machine is approved for operation in explosion hazard areas.
For machines containing any hydraulic powered parts, the directive 2014/34/EU "Equipment and protective systems in potentially explosive atmospheres" applies.

The corresponding ATEX certificates are present in the Data book.

The Classification according to CE (with reference to the ATEX guideline) is as followed:

CE Ex II 2G IIB T5 for hydraulic and P/Neumatic tools

or

CE Ex II 2G IIB T6 for manual tools

with

CE	CE- marking (with reference to the ATEX guideline)
Ex	Marking of the equipment for the Ex- range
II	Equipment Group (II)
2	Equipment Category
G	For explosive mixtures of air and combustible gases, mists or vapors (G)
IIB	Categorie for Gases
T5/T6	Temperature class

1.6 Machine Markings

The rating plate indicates all relevant information for distinct identification of the machine:

- Manufacturer
- Machine model
- Production date
- Part number
- Design Load
- Size
- Serial number

It is important to keep this information ready for the purpose of servicing and repair work.

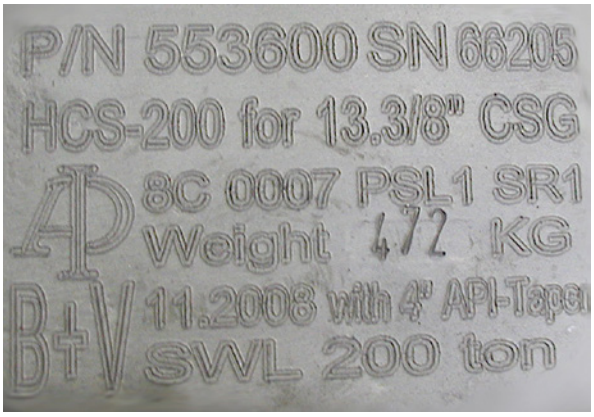


Fig. 14: Field of identification on HCS

The email address of the manufacturer is given on the support sticker if service is required.

Fig. 15: Contact with Technical Support

1.7 Optional Accessories

The To ease the handling and to support the device functions following accessories are available from Forum B + V Oil Tools for the HCS. Please contact your local Forum B + V Oil Tools representant for detailed information.

- Grease Pump, manual P/N 775810
  Manual grease pump to apply grease on the device grease points.

Fig. 16: Manual Grease Pump

1.8 Component Sizes and Drill Strings

The pipe diameters and matching components are listed with part numbers below for precise layout of the HCS with the desired drill string. To order components please contact the Forum B + V Oil Tools Service Department at the address given under Contact.

⚠ CAUTION Always ensure that the right size of components are installed for each pipe diameter.

1.8.1 Hinged Casing Spider 200 shtons

Part No.	Type	Size	Weight	Comments
553650	HCS	42"	1830 kg	
553651	Bushing	42"x36"	746 kg	
553492	HCS	36"	1890 kg	
553497	Bushing	36"x32"	455 kg	
553493	Bushing	36"x30"	644 kg	
553494	Bushing	36"x26"	750 kg	
553498	Bushing	36"x20"-18.5/8"	900 kg	
553480	HCS	30"	820 kg	
553463-1	Bushing	30" x 20"	690 kg	
553463-6	Bushing	30" x 26"	300 kg	
553490	HCS	20" x 18.5/8"	820 kg	
553630	Bushing	20" x 16"	254 kg	
553475	Bushing	20" x 13.3/8" - 11.3/4"	497 kg	
553610	Bushing	13.3/8" x 10.3/4" - 9.5/8"	88 kg	used with 20" x 13.3/8" bushing
553611	Bushing	13.3/8" x 8.5/8" - 2.3/8"	148 kg	used with 20" x 13.3/8" bushing
553600	HCS	13.3/8" - 11.3/4"	440 kg	
553610	Bushing	13.3/8" x 10.3/4" - 9.5/8"	98 kg	
553611	Bushing	13.3/8" x 8.5/8" - 2.3/8"	163 kg	

1.8.2 Hinged Casing Spider 350 shtons

Part No.	Type	Size	Weight	Comments
553670	HCS	36"	2710 kg	
553675	Bushing	36" x 32"	460 kg	

1.8.3 Hinged Casing Spider 500 shtons

Part No.	Type	Size	Weight	Comments
553460	HCS	30"	3350 kg	
553462	Bushing	30" x 26"	697 kg	
553463	Bushing	30" x 24"	745 kg	
553464	Bushing	30"x 20	690 kg	
553485	HCS	20" x 18.5/8"	2350 kg	
552465	Bushing	20" x 16"	254 kg	
553736	Bushing	20" x 13.3/8" - 11.3/4"	497 kg	
553737	Bushing	13.3/8" x 10.3/4" - 9.5/8"	88 kg	used with 20" x 13.3/8" bushing

SAFETY

2 Safety

The HCS was designed and produced according to the state-of-the-art and in consideration of all required safety precautions.

Failure to observe the safety precautions and operating instructions specified in the present operating manual, can lead to hazardous situations when operating the machine. Notwithstanding the fact that it is not possible to completely exclude hazardous situations during operation.

Use the machine only for the intended purpose when it is in a technical safe state.

Rectify all faults immediately which could have a negative effect on the machine safety.

2.1 General Safety Precautions

Ensure that work on the machine, particularly installation, maintenance and repair work, is performed only by personnel with the necessary qualifications and who are familiar with the associated risks (see Chapter „V Obligations of the Operating Company“ on page 7).

For safe and proper operation of the machine it is essential that all personnel working on the machine take the prescribed safety measures and observe the safety precautions specified in this operating manual.

Before switching on and before working on the machine always ensure that no one is put in a hazardous situation.

All safety features must be installed completely before switching on the machine.

Safety features may be released only when:

1. The entire machine is switched off and
2. switching back on unintentionally is not possible.

The machine contains components subject to wear (e.g. Bushings, Hinge Pins). After longer periods of operation the safety can be reduced due to wear. Service the machine regularly in compliance with the maintenance chart (see Chapter „6.2 Inspections“ on page 52) to ensure that all safety requirements are always fulfilled. Check the specified wear limits regularly. Replace worn or defective parts immediately with new parts.

If safe operation is no longer guaranteed, take machine out of operation and secure it unintentional reuse. Advise the responsible service organization.

Rectify every fault, which affects the safety, immediately.

2.2 Safety Equipment

The HCS is equipped with various safety features for protection of the operating personnel:

- During operation all moving parts are secured against reaching in by screwed covers.
- Hazard points on the machine are marked with signs (see Chapter 2.3), indicating the type and consequences of a hazard as well as measures to prevent it.
- All components, particularly parts requiring replacement during conversion work when changing pipe sizes, are equipped with threaded holes for screwing in load bolts or with fixed load bolts.
- External hoses are provided with a chafe guard.

Never put the safety equipment out of operation or replace it with equipment not approved by Forum B + V Oil Tools. Failure to observe can lead to hazardous situations, for which Forum B + V Oil Tools cannot be held responsible.

Always keep all safety equipment in perfect condition and check regularly.

2.3 Safety Precautions

⚠ Warning

Reuse of safety components can cause accidents.

Never reuse safety-relevant parts (such as securing cables or plates, discs or washers).

Replace such components with new safety parts.

⚠Caution

The operating company is responsible for ensuring safe and correct use of the equipment within the sense of the hazard and risk analysis.

The operating company is also obligated to issue and supervise observance of operating instructions on safe use as well as to observe the instructions in this operating manual.

2.3.1 Operating Manual and Machine

The safety precautions in this operating manual are indicted using standardized depictions and symbols. Chapter 1 describes general depiction of safety precautions.

Concrete examples of the symbols and terms used in this manual are explained below. These are used in the form shown wherever possible hazards are present.

⚠ DANGER

Suspended load!

This indicates injury risks from transporting heavy components.

⚠ DANGER

Tipping hazard for components!

This indicates injury risks from tipping components.

⚠ WARNING

Danger of pinching/crushing hands!

This indicates injury risks from moving parts, which pose a hazard of pinching or crushing hands.

⚠ WARNING

Danger of pinching/crushing feet!

This indicates injury risks from moving parts, which pose a hazard of pinching or crushing feet.

⚠ WARNING

Danger of pinching/crushing body!

This indicates injury risks from moving parts, which pose a hazard of pinching or crushing the body.

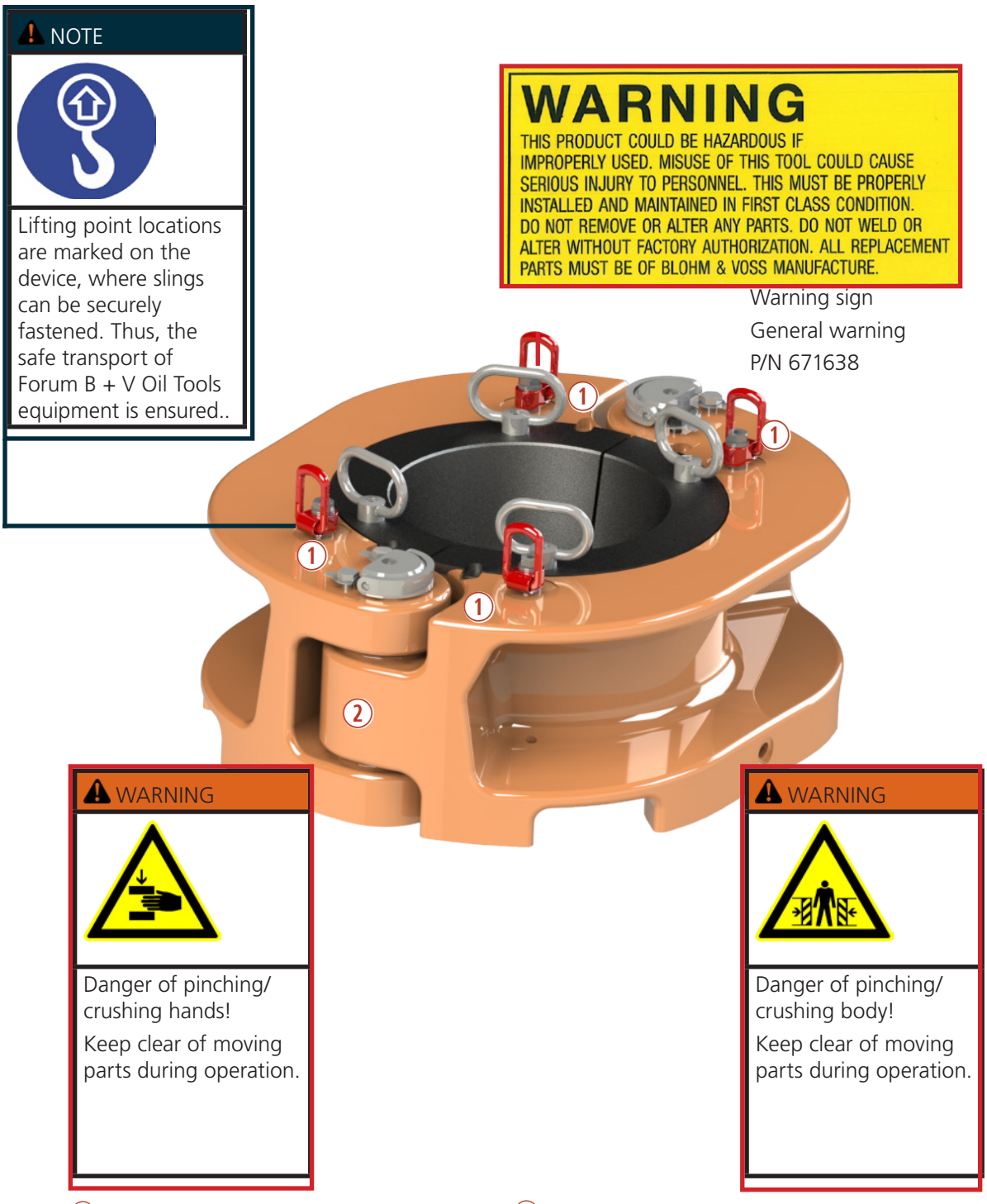
⚠ Caution

Risk of stumbling/tripping!

This symbol warns of tripping hazards, which can lead to stumbling resulting in injuries.

2.3.2 Warning and Safety Instructions on Machine

Hazard points are indicated by special stickers on the machine. Ensure that these are always kept in an easily legible state and replaced as required.



Warning sign
General warning
P/N 671638

①

Warning sign
"Hazard – Hand Injury"
ANSI Z535.4
P/N 671640-1

②

Warning sign
"Pinching/crushing hazard for body"
ANSI Z535.4
P/N 671641

Fig. 17: Safety Precautions on Machine

2.4 Organisational Measures

The operating company is responsible for ensuring that all legally and officially prescribed approvals for operation of the machine are present in compliance with national laws and regulations.

The required personal protective equipment (see Chapter „VII Personal Protective Equipment (PPE)“ on page 10) must be provided by the company operating the machine.

All safety features present must be checked regularly in compliance with national and local requirements.

Warning signs and safety notices on the machine must be easily legible at all times and replaced as required.

The operating instructions must be kept so that they are available to those operating the machine at all times.

Personal Protective Equipment

The required **P**ersonal **P**rotective **E**quipment (PPE) must be used when operating the machine. This is to be provided by the operating company.

The following PPE is recommended:

- Oil resistant protective clothing,
- Protective gloves,
- Eye protection,
- Safety shoes,
- Protective helmet.

All parts of the protective equipment must be checked regularly for damage in compliance with the specific national regulations and replaced as required.

2.5 Safety Precautions for Protection against Remaining Hazards

This machine was designed and produced according to the state-of-the-art in consideration of the safety precautions specified in EC Directive 2006/42/EC on Machinery.

The machine may be used only for:

- Its intended purpose (see Chapter 1).
- When it is in a technically safe state.

Nevertheless it is not possible to completely exclude all hazardous situations which could arise when the machine is used. Reference is made to these remaining risks at the beginning of each chapter and at the corresponding points in the description and measures for avoiding these risks are explained.

⚠ WARNING

Mechanically generated sparks

In the processing of incidents such as clamping components, sparks can be generated with the use of metal hammers.

- The use of metallic hammers in hazardous areas has therefore be prohibited by the operating company.

» For loosening of clamping components only nonmetallic (plastic) hammer, which are approved for use in hazardous areas, may be used.

Info

The operating company is responsible for ensuring that all personnel working on the machine is familiar with the remaining risks and observe the appropriate safety precautions.

2.6.1 Risk of Stumbling/Tripping

⚠ Caution

Risk of stumbling/tripping!

When HCS is installed, be aware of stumbling/tripping.

DO NOT run.

The HCS is working above the rig floor in the installed state. Nevertheless the after installation the HCS could pose a stumbling/tripping hazard.

Never run during work.

2.6.2 Danger of Pinching/Crushing

⚠ WARNING

Danger of pinching/crushing hands!

Moving parts pose a hazard during assembly, set-up and conversion work as well as during operation.

NEVER reach between moving components.

⚠ WARNING

Danger of pinching/crushing feet!

Moving parts pose a hazard during assembly, set-up and conversion work as well as during operation.

NEVER stand below moving components.

⚠ WARNING

Danger of pinching/crushing body!

Moving parts pose a hazard during assembly, set-up and conversion work as well as during operation.

NEVER stand between moving components.

During assembly, set-up and conversion work as well as during operation pinching/crushing hazards can be posed.

Pay attention to hands, feet and body when performing the work specified. Always ensure that no one is in a hazardous position.

Always wear your personal protective equipment.

2.5.1 Human Error

Ignorance of hazards, inattentiveness and limited reactions can lead to hazard situations while working with the HCS.

Safe Work

1. All personnel working on the machines are responsible for paying attention to their colleagues.
2. Consumption of alcohol and drugs is prohibited.
3. Work on the HCS is not permissible after taking medication which reduces reactions.
4. The personal protective equipment must always be kept and used in perfect condition.
5. All personnel working on the HCS, must be familiar with and observe the safety precautions in this instruction manual and on the machine.
6. The instructions for handling and maintenance intervals specified in this operating manual must be observed.
7. Keep a copy of this operating manual in the vicinity of the machine, where it is accessible at all times.

2.6 Accidents, Fire

⚠ WARNING

Health endangering fluids / lubricants!

BEFORE performing first-aid following contact with service products observe the safety data sheet published by the manufacturer.

Basic rules in event of accidents or fire

1. Move accident victims out of hazard area and switch off machine immediately.
2. Administer first-aid.
3. Alarm rescue services and fire department immediately and inform supervisor.

In addition all national, local and internal plant regulations for fire fighting in explosion hazard areas apply.

TRANSPORT / SET-UP

3 Transport / Setup

	Ensure that setup and installation work are accomplished only by sufficiently qualified and trained personnel.
	Read these instructions carefully before setting up the machine and putting it into service.

3.1 Delivery

The HCS and all accessory parts are shipped in a transport crate. Instructions for safe transport are attached to the transport crate. Transport the packed machine as specified in these instructions.

3.1.1 Scope of Delivery

Info

The contract documents and shipment papers specify the precise scope of delivery. Check these documents carefully on delivery. In the event of any discrepancies please contact the Forum B + V Oil Tools representative specified in chapter „Contact with Forum B + V Oil Tools worldwide“ on page 11 immediately.

The scope of delivery includes all components required for the intended operation of the Hinged Casing Spider (HCS) as described in chapter „1 Description“.

3.1.2 Unpacking and Disposal of Packing Material

Remove the transport packaging and transport aids before hoisting the machine.

NOTE

» Do not remove transport retainers.

» The transport retainers should be removed only at the installation site just before startup.

Check scope of delivery.

1. Is any transport damage visible?
2. Is the shipment complete? Compare the scope of delivery with the specifications in the shipping documents.

If the machine has been damaged during transport or the shipment is incomplete, please notify the manufacturer immediately (see Chapter „VIII Contact with Forum B + V Oil Tools worldwide“).

Dispose of the packaging material ecologically in compliance with all applicable regulations.

3.1.3 Intermediate Storage

If intermediate storage of the machine is necessary, observe the following:

- Leave the machine it its transport packaging. This provides sufficient protection against external influences.
- Secure the machine to prevent it from slipping or falling due to motion.

3.2 Transport

⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

NEVER loiter beneath or in the swing area of lifted loads or loads suspended from a crane.

WEAR PROTECTIVE HELMET!

WEAR PROTECTIVE GLOVES!

WEAR SAFETY SHOES!

Principles for transport

1. Ensure that transport routes are sufficiently dimensioned.
2. Always use pallets for longer transport distances.
3. The total weight (object to be transported + means of transport, e.g. forklift) must not exceed the supporting capacity of the subsurface.
4. Ensure that such work is performed only by sufficiently qualified personnel.
5. Always shut off machine before transport and secure against starting back up unintentionally. Start deinstallation only after residual energy has been dissipated.
6. Ensure that visual and audio contact exists between the crane operator and operating personnel.
7. Secure the area against unauthorized entry. If necessary mark the area with information signs to warn of maintenance and repair work.
8. Secure moving parts in suitable manner
9. Use only approved slinging and transport equipment, which is in perfect condition and suitable for the intended purpose. Observe specified load rate.

Principles for transport

10. Secure machine against slipping/sliding. Observe machine weight. Observe center of gravity.
11. Never loiter under suspended loads.
12. Transport the machine carefully. Do not fasten, lift or pull machine on parts, that could be damaged. Avoid sudden stops.
13. Always use hoisting equipment (slings, hoisting cables, shackles, etc.), which has been inspected and is sufficiently dimensioned.
14. Ensure that all installation and hoisting procedures are accomplished in compliance with recognized rules of practice and industrial standards.

3.3 Setup and Installation

⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

NEVER loiter beneath or in the swing area of lifted loads or loads suspended from a crane.

WEAR PROTECTIVE HELMET!

WEAR PROTECTIVE GLOVES!

WEAR SAFETY SHOES!

The HCS is completely preassembled before shipment, so that it can be installed immediately after unpacking at the installation site.

3.3.1 Transport to Installation Site

Hoist the machine safely

1. Attach the HCS only at the lifting ears provided for transport.
2. Use wire ropes with circular slings with a load carrying capacity appropriate to the weight of the HCS.
   The use of the Lifting Sling is advised.
3. Attach the hoisting ropes so that they are tensioned straight without kinks.
4. Use hoisting cables and load hooks with sufficient supporting capacity.

1. Fasten the lifting ropes on HCS lifting ears.
2. Lift the HCS slightly to tension the hoisting cables.

⚠ WARNING Danger of collision with swinging loads! Ensure that no one is present in the swing range of the machine.

3. Lift the HCS.
4. Move the HCS to the installation location.
5. Set the HCS down carefully on a suitable subsurface.

⚠ NOTE

Lifting Points!

Lifting point locations are marked on the device, where slings can be securely fastened. Thus, the safe transport of Forum B + V Oil Tools equipment is ensured.

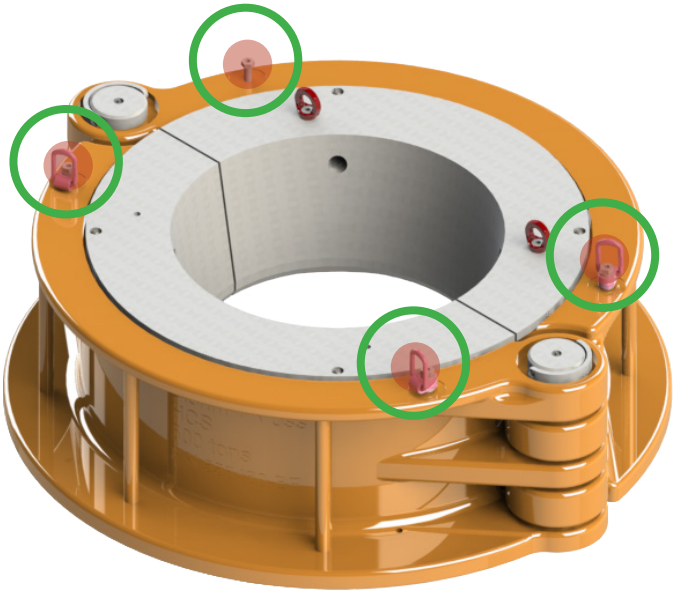


Fig. 18: Hoisting Eyes for Transport

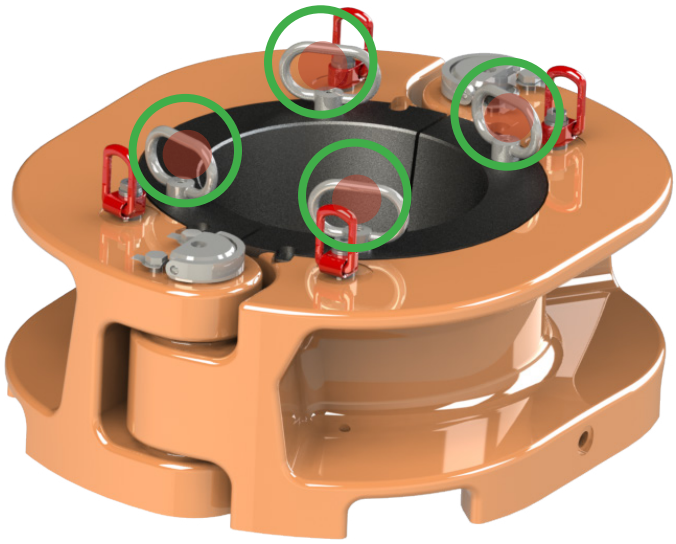


Fig. 19: Hoisting Eyes for Transport

3.4 Installation Checklist

The HCS has to be installed as shown in the manual.

☐	Make sure the HCS is sitting correctly in the rotary table
☐	Make sure the correct Bushings are installed before use
☐	Make sure the Bushings are fixed and locked.

COMMISSIONING / OPERATION

4 Operation

Ensure that the Hinged Casing Spider (HCS) is operated only by personnel trained for this work and familiar with the risks involved in operating the machine.

Read these instructions carefully before setting up the machine and putting it into service.

4.1 Safety Considerations

Safety considerations for operation

1. Do not touch the HCS in operation.
2. During operation keep a safe distance from the HCS.
3. Place HCS on top of Rotary Table and Master Bushing (if applicable)
4. Ensure there is no risk of dropping objects in the hole.
5. Ensure no person can drop into the hole.
6. Ensure the hinge pins are placed correctly.
7. Ensure no excessive clearance is in the hinged pins prior to commencing operation.
8. Ensure to have the inner bore of the cones greased with the appropriate grease at all times.
9. Ensure the required bushing size is installed

4.2 Initial Operation

Safety checks before initial operation

1. All covers attached and completely screwed down.
2. All screw connections tightened properly.
3. All screw retainers present.
4. All lubrication points lubricated properly (see Chapter „Lubrication“ on page 51).

Perform following function tests:

1. Remedy all defects noted during checks.

Caution Never attempt to start up when defective.

Info

Forum B + V Oil Tools recommends having the HCS put into service by Forum B + V Oil Tools.

OPERATION

4.3 Operation of the HCS

⚠ DANGER

Suspended load!

The falling load can cause severe, even lethal injuries.

NEVER loiter under suspended loads.

NEVER loiter in the swing area of suspended loads.

⚠ WARNING

Danger of pinching/crushing body!

DO NOT step between the unsecured shells of the open body.

DO NOT stand within the opening range of the door while it is being opened or closed!

⚠ WARNING

Danger of pinching/crushing hands!

Cover assembly can fall shut.

DO NOT open cover assembly manually.

ALWAYS open the cover assembly so that the safety engages.

WEAR PROTECTIVE HELMET!

WEAR PROTECTIVE GLOVES!

WEAR SAFETY SHOES!

1. Before operation ensure HCS Clean the bore and protrusions of the bushing..
2. Thoroughly apply plenty of grease to the back taper before use.
3. Check correct fit of different tapers of equipment. Especially if equipment of different vendors are mixed for operation.

4.4 Opening the HCS

1. Make sure pipe load is held by approbate pipe holding equipment.
2. Remove installed equipment above HCS o, if applicable.
3. Remove bushing.
4. Remove hinge pin with proper lifting equipment (hinge pin weight = 30kg).
5. Install lifting sling to HCS and lift HCS from rotary table.
6. Open HCS using the stationary hinge pin as a rotating axis.
7. Remove HCS from the pipe.
8. Place on a safe location.
9. Close both HCS halves and re-install removed hinge pin.

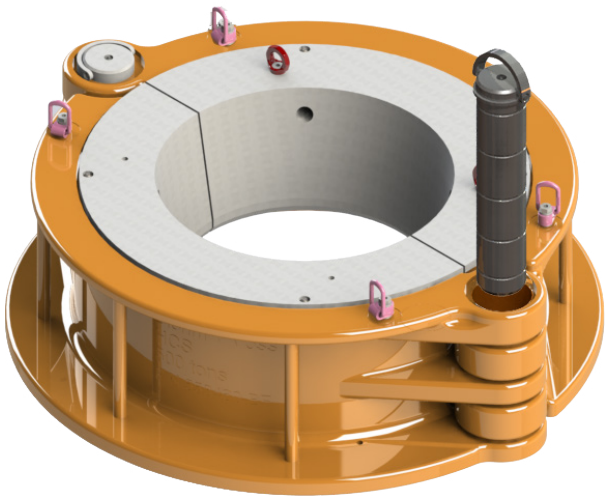


Fig. 20: Opening HCS

4.5 Commissioning Checklist

Forum B + V Oil Tools strongly recommends to accomplish the HCS commissioning with the Forum B + V Oil Tools Commissioning Service.

Prior to use of the Forum B + V Oil Tools HCS following checks must be carried out :

OK	☐	Check crew is aware of all danger regarding handling the Forum B + V Oil Tools tool.
OK	☐	Go through manual with crew.
Scope of supply		
OK	☐	Cross check all delivered parts
Lubrication		
OK	☐	Check that all lubrication points lubricated properly.
OK	☐	Apply grease to all greasing points until grease is visibly coming out of the bores
Installation		
OK	☐	Check the Hinge Pins for correct seating and securing.
OK	☐	Make sure the required Bushing is installed and secured.

SERVICE

5 Service

INFO

Operational safety and readiness of the machine do not only depend on your skill, but also on maintenance and servicing of the machine.

Insist on using original spare parts when carrying out maintenance and repair work. This ensures operational safety and readiness of your machine, and maintains its value.

5.1 Malfunction

If a malfunction occurs or the HCS does not operate as expected, trouble shoot as follows:

If the cause of the malfunction cannot be determined and remedied, contact Forum B + V Oil Tools Technical Support.

1. Check hydraulic connections and hydraulic lines.
2. Check whether the hydraulic unit is switched on.
3. Check whether the component size assemblies have been installed for the size/type of pipe used.
4. Check for proper lubrication of the HCS.
5. Check both feedback valves for proper function.
6. Collect all information on the malfunction and define the problem.
7. Attempt to find a quick solution to the problem.
8. Check the last changes/modifications.
9. Isolate the problem.
10. Replace any defective components.

INFO

In the event of problems, which cannot be remedied with the aid of this manual, please contact the Forum B + V Oil Tools Technical Support or one of the authorized service companies specified in Chapter 1.9.

5.2 Repair

5.2.1 Repair by Customer

It is only permissible for the customer/company operating the machine to replace defective parts with OEM (Original Equipment Manufacturer) parts approved by Forum B + V Oil Tools in conformance with the present operating instructions.

Use of parts not approved by Forum B + V Oil Tools voids the guarantee.

5.2.2 Repair by Manufacturer

Ensure that any repair work required on the HCS is performed only by Forum B + V Oil Tools or an authorized service company.

INFO

Please contact the Forum B + V Oil Tools Technical Support or one of the authorized service companies specified in Chapter 1.9 to perform repair or maintenance work.

5.2.3 Securing Screws with Nord Lock washers

Nord Lock bolt securing systems use geometry to safely lock bolted joints in the most critical applications. The key is the difference in angles. Since the cam angle „∂“ is larger than the thread pitch „ß“, the pair of washers expands more than the corresponding pitch of the thread. Any attempt from the bolt/nut to rotate loose is blocked by the wedge effect of the cams.

When the pushed movements of the device will get in contact with the under surface of the securing plate, this surface contact will secure the plate and prevents any motion in the axial direction.

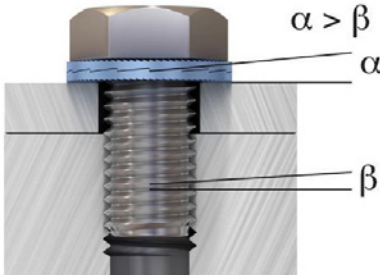


Fig. 21: Nord Lock Washer principle illustration

Fig. 22: Nord Lock Washer detailed illustration

SERVICE

Tightening torques for Nord Lock lock washers Several Nord Lock bolt securing systems are used on the HCS to generate safely lock bolted joints. Regarding the fact that different sizes and metric grades are applied detailed information from Nord Lock is given in the annex (refer to annex „I Nord Lock Washer (excerpt from Third Party Product information)“ on page <?>) to generate safe maintenance by the user.

The metric grade and make of the bolt can be seen on top of the bolt/nut.

Fig. 23: Nord Lock Marking

On Forum B + V Oil Tools Pipe handling Equipment the metric grades 8.8, 10.9 and 12.9 are used and the tightening torques can be found in the „a. Torque Guidelines“ on page <?>.

⚠ WARNING Please pay extra attention to the method of tightening as the tightening torques may vary on the methods.

INFO

As a result from tests the NORD LOCK washers were safely secured even after reuse 30 times. Only a limited part of the clamp load was lost due to normal settlements between contact surfaces. The cam edges of the washers got rounded off but were still intact after the reuse test.

The best thing to do is to make ocular inspection of the washers during every maintenance.

Make sure that the cams (cam tops) look good and that the teeth are not worn off. Lubricate the joint and the mating surfaces if possible so that the friction conditions do not change. When reassembling, care should be taken that the two washer halves are mated correctly.

If all these criteria are met, the washers can be safely reused.

.

5.3 Drawing, Parts List and Spare Parts

5.3.1 Contact to Parts Department

Info

Please contact the Forum B + V Oil Tools Technical Support or one of the authorized service companies specified in Chapter 1.9 to order replacement parts or in the event of any questions.

SERVICE

5.3.2 HCS 200-42"

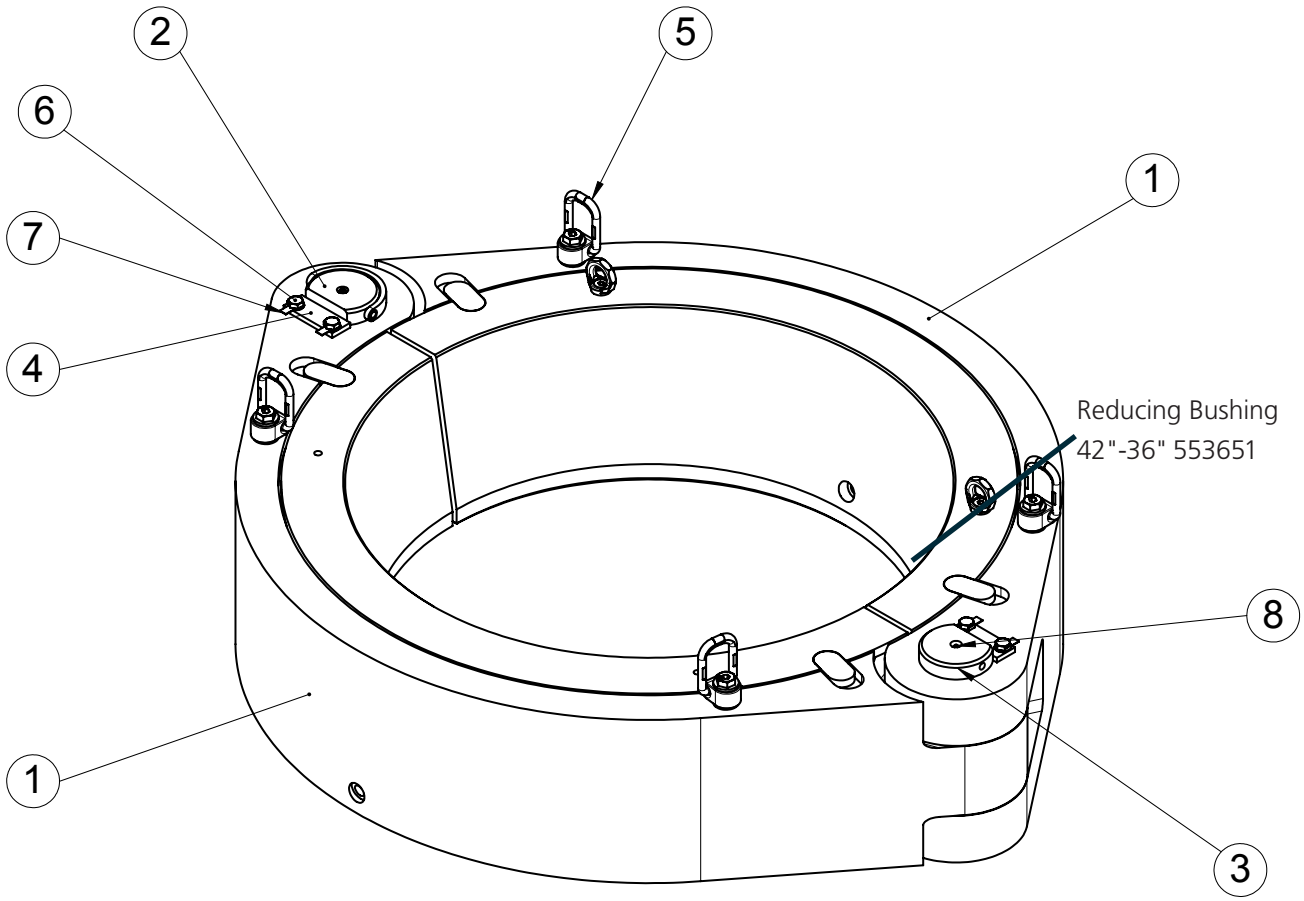


Fig. 24: Principle drawing of HCS 200 - 42"

P/N 553650 Parts List

Pos.	Qty.	P/N	Description
1	1	553650-BF	Body HCS 500-42" , machining part
2	1	553492-2	Hinge Pin Assembly
3	1	553492-3	Hinge Pin
4	2	617518	Plate
5	4	553676	Lifting eye
6	4	645673	Screw
7	4	617520	Safety sheet
8	1	612515	Grease Nipple

5.3.3 HCS 200-36"

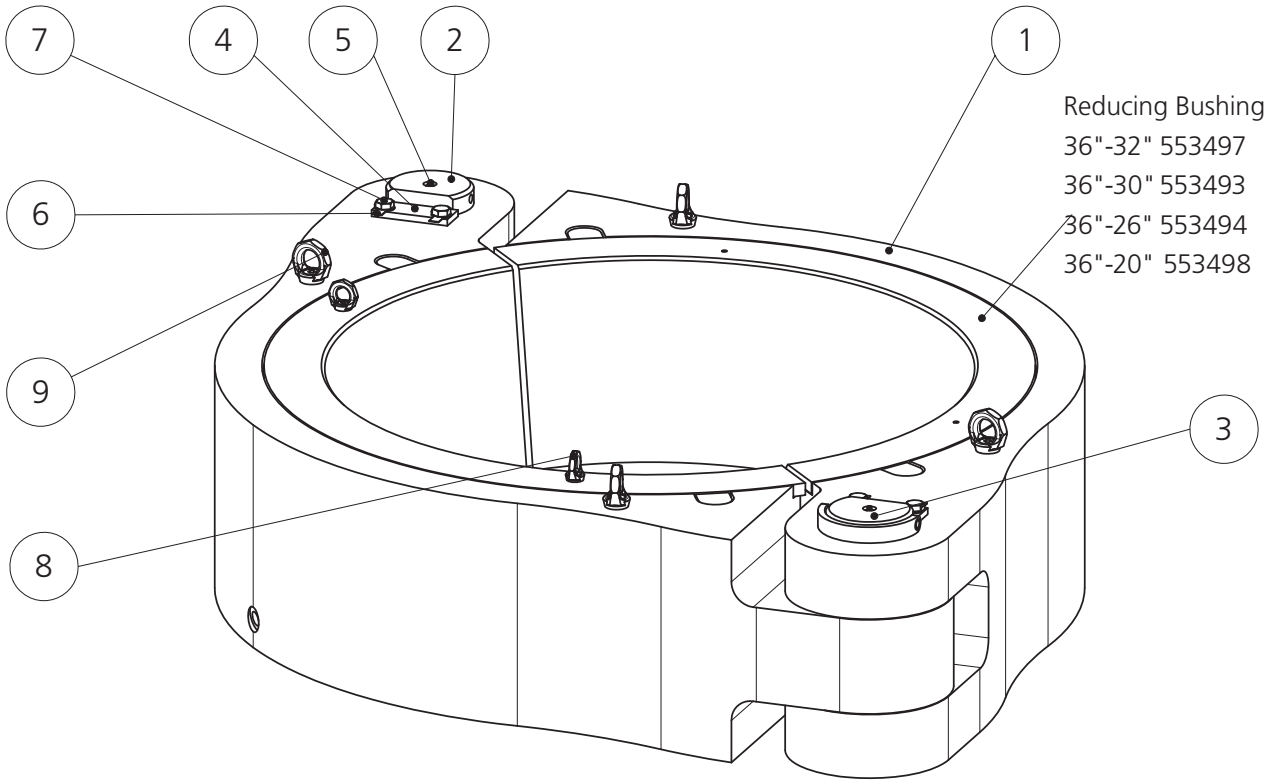


Fig. 25: Principle drawing of HCS 200 - 36"

P/N 553492 Parts List

Pos.	Qty.	P/N	Description
1	1	553492-BF	Forum B+V OT Type Hinged Casing Spider (HCS) 36"
2	1	553492-3	Hinge Pin
3	1	553492-2	Hinge Pin Assembly
4	2	617518	Plate
5	1	612515	Grease Nipple
6	4	617520	Safety sheet
7	4	645673	Screw
8	4	55492-6	Lifting Eye Bolt
9	4	726810	Ring Screw

5.3.4 HCS 200-30"

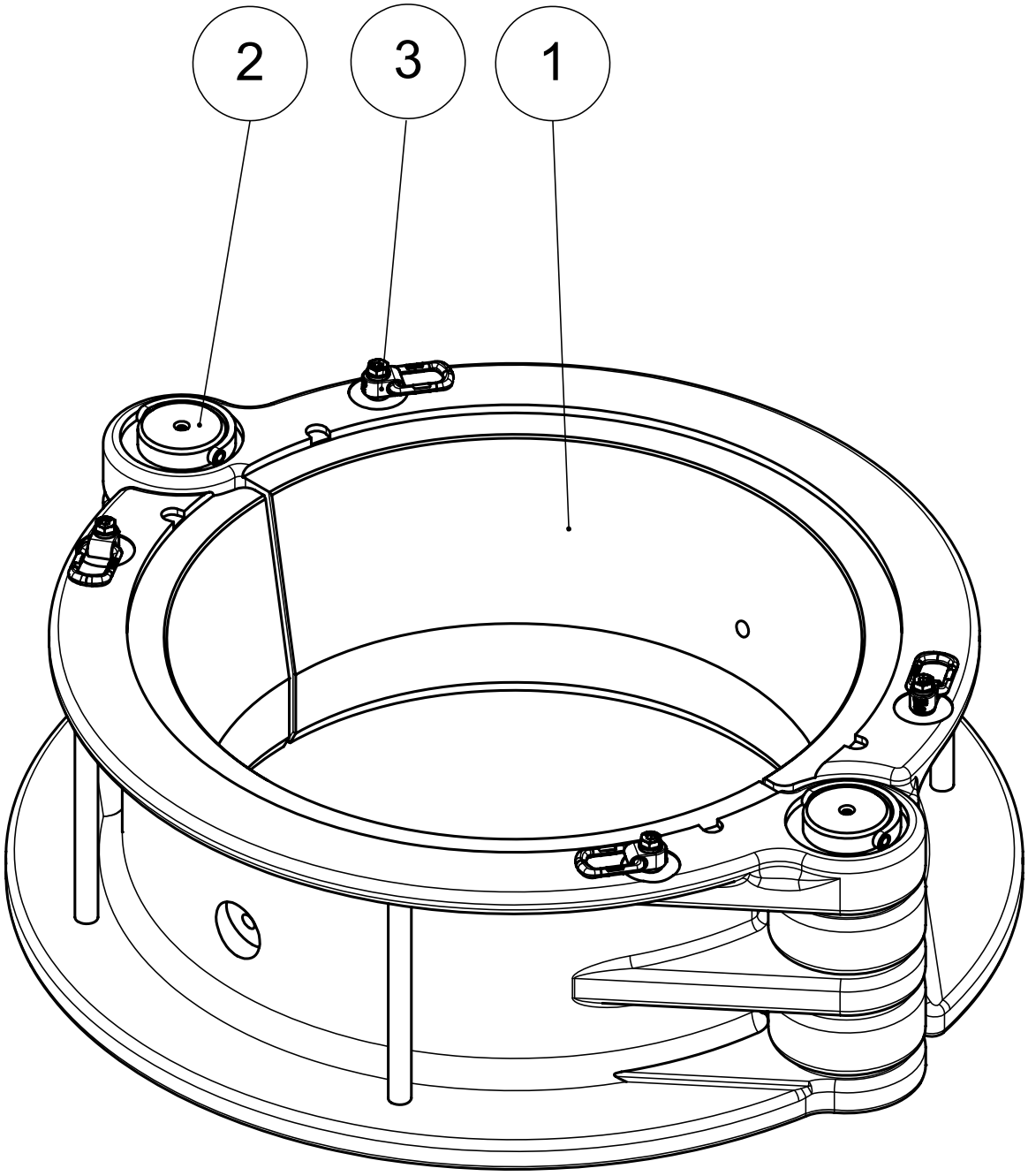


Fig. 26: Principle drawing of HCS 200 - 30"

P/N 553480 Parts List

Pos.	Qty.	P/N	Description
1	2	553481	Forum B+V OT Type Hinged Casing Spider (HCS) 30"
2	2	553478	Hinge Pin Assembly
3	4	553468	Lifting Eye

5.3.5 HCS 200-20"

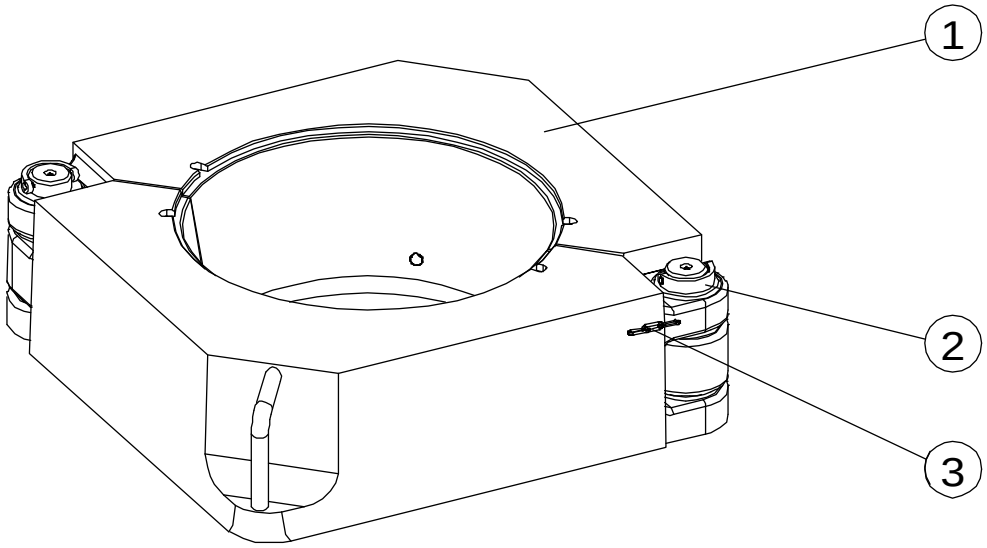


Fig. 27: Principle drawing of HCS 200 - 20''

P/N 553490 Parts List

Pos.	Qty.	P/N	Description
1	2	553491	Casting Part
2	2	553474	Hinge Pin
3	2	660414-4	Chain end 400 lg. chain of Rd.4

5.3.6 HCS 200-13.3/8”

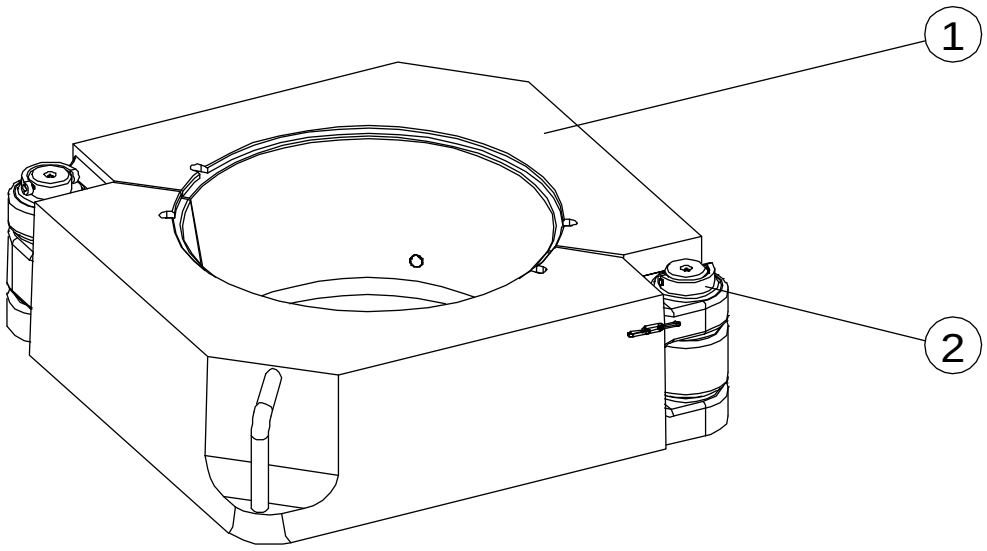


Fig. 28: Principle drawing of HCS 200 - 13.3/8''

P/N 553470-3TPF Parts List

Pos.	Qty.	P/N	Description
1	2	553470-3	casted Part
2	2	830-201	Hinge Pin Assy

5.3.6 HCS 200-13.3/8"-11.3/4"

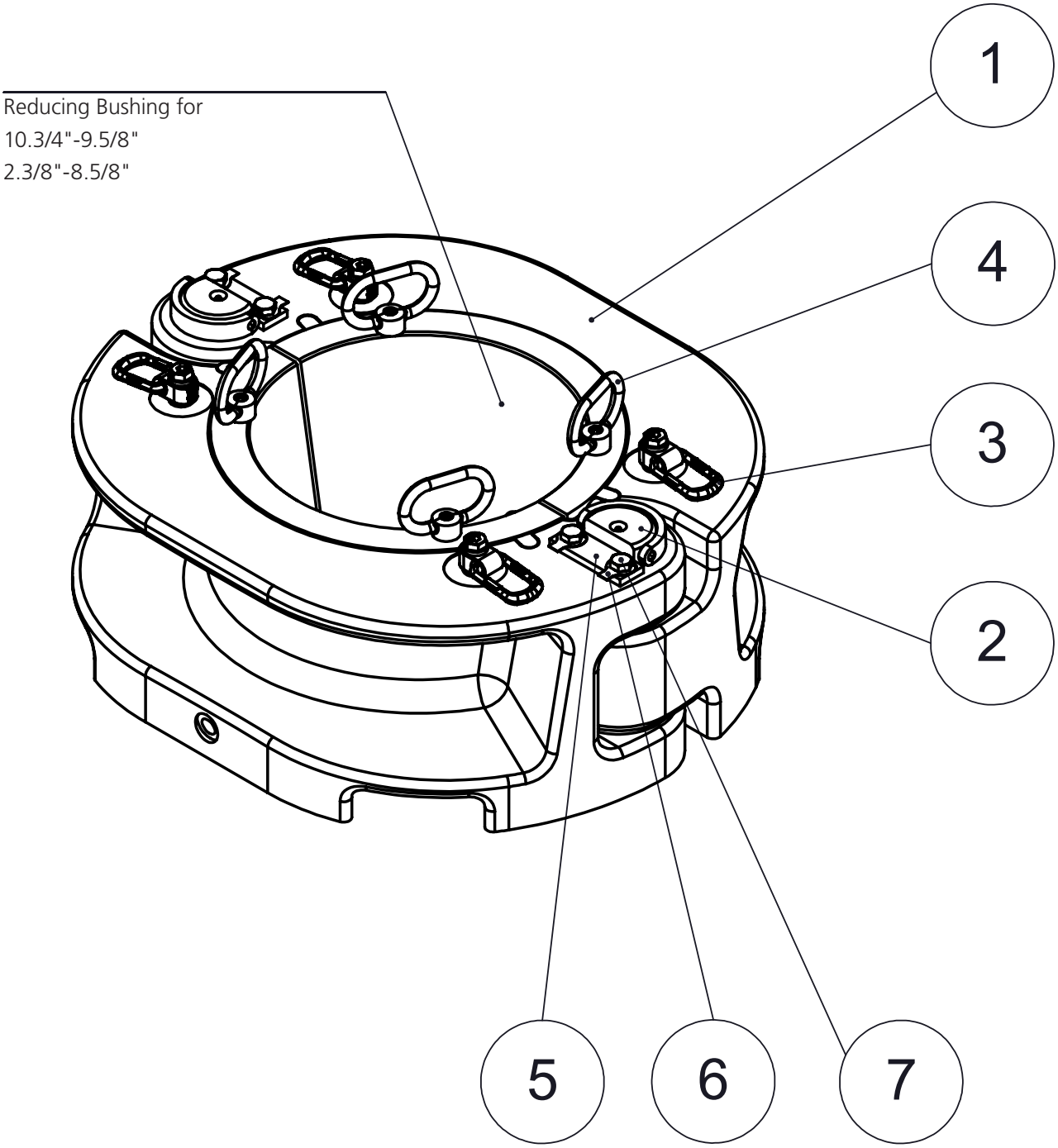


Fig. 28: Principle drawing of HCS 200 - 13.3/8" - 11.3/4"

P/N 553600 Parts List

Pos.	Qty.	P/N	Description
1	2	553601	Casting Part
2	2	553602	Hinge Pin
3	4	553468	Lifting eye
4	4	613903	Bowl-handle
5	2	615009	Securing sheet
6	4	775068	Washer
7	4	645657	Screw

P/N 553600-3TPF Parts List

Pos.	Qty.	P/N	Description
1	2	553600	Casting Part
2	2	553602	Hinge Pin
3	4	553468	Lifting eye
4	4	613903	Bowl-handle
5	2	615009	Securing sheet
6	4	775068	Washer
7	4	645657	Screw

5.3.7 HCS 350-36"

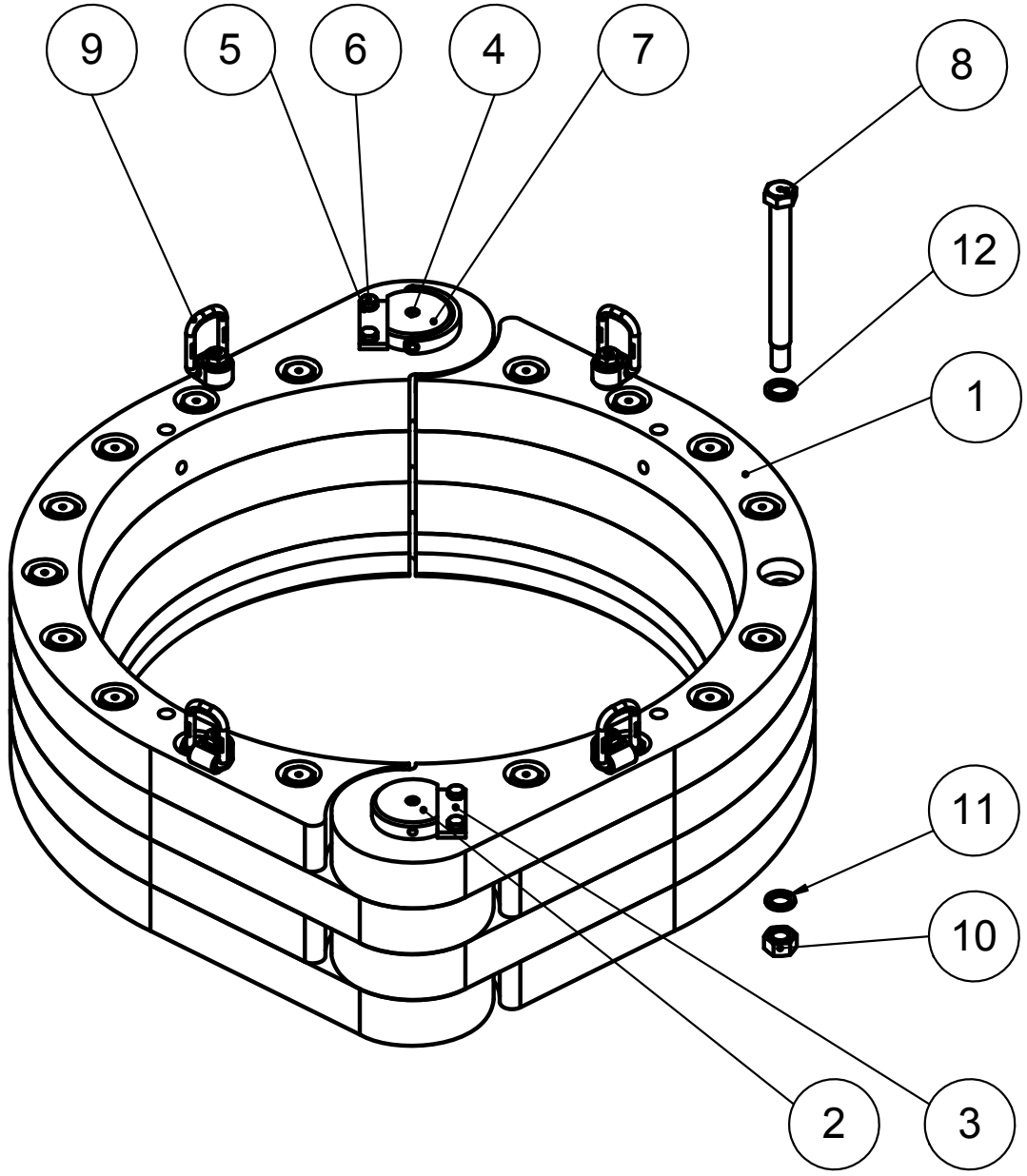


Fig. 29: Principle drawing of HCS 350 - 36"

P/N 553670 Parts List

Pos.	Qty.	P/N	Description
1	1	553671-BF	Body for HCS-350-36", machining
2	1	553672-1	Hinge Pin
3	2	617518	Plate
4	1	612515	Grease Nipple
5	4	792106	Washer
6	4	645673	Screw
7	1	553672	Hinge Pin assy.
8	18	553673	Fitting screw
9	4	553676	Lifting eye
10	18	753014	Nut
11	18	792113	Washer
12	18	792198	Washer

5.3.8 HCS 500-30"

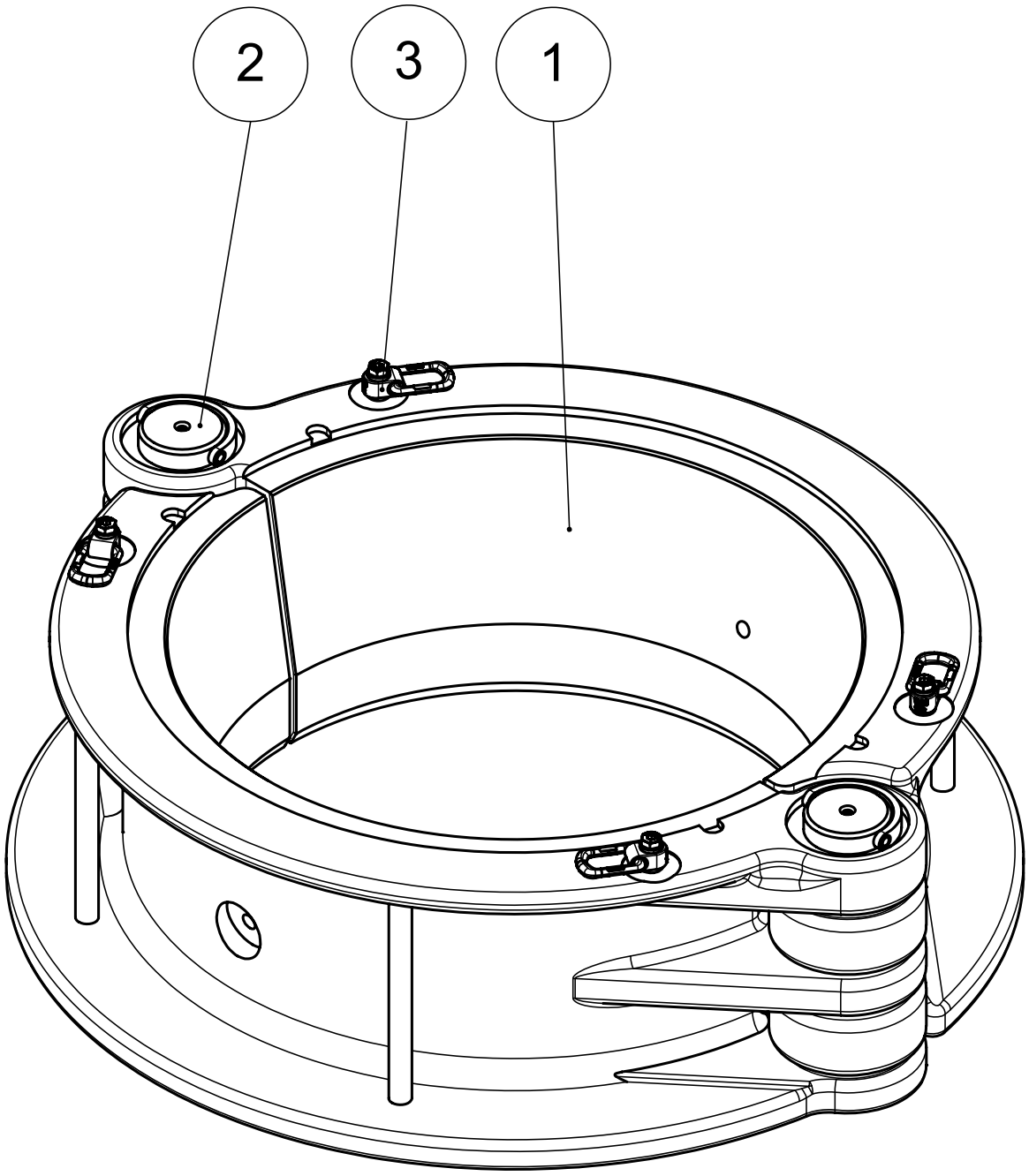


Fig. 30: Principle drawing of HCS 500 - 30"

P/N 553460 Parts List

Pos.	Qty.	P/N	Description
1	2	553461	Casting Part
2	2	553478	Hinge Pin
3	2	553468	Lifting eye

5.3.9 HCS 500-20"

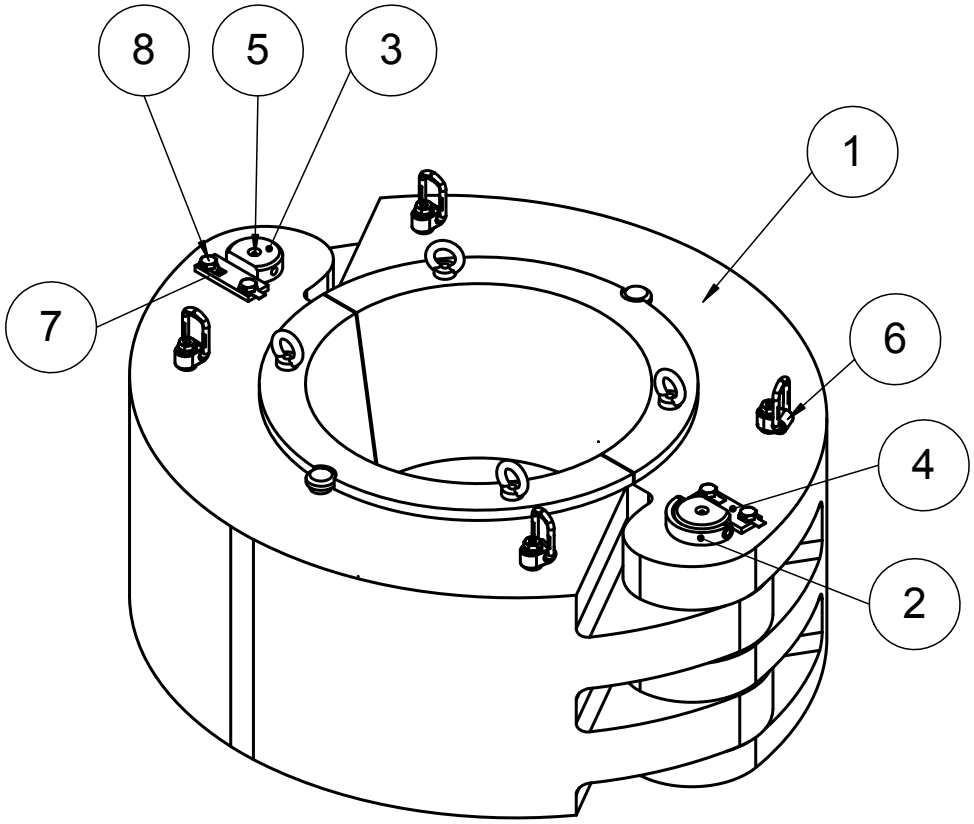


Fig. 31: Principle drawing of HCS 500 - 20"

P/N 553485 Parts List

Pos.	Qty.	P/N	Description
1	1	553485-BF	HCS 20" 500 sh tons - Body;machining part
2	1	553488	Hinge Pin Assembly
3	1	553488-1	Hinge pin
4	2	617518	Plate
5	1	612515	Grease Nipple
6	4	553468	Lifting Eye
7	4	617520	Safety sheet
8	4	645673	Screw

SERVICE

INSPECTION / MAINTENANCE

6 Inspection / Maintenance

	Ensure that setup and installation work are accomplished only by sufficiently qualified and trained personnel.
	Read these instructions carefully before setting up the machine and putting it into service.
	WEAR EYE PROTECTION!
	WEAR PROTECTIVE HELMET!
	WEAR PROTECTIVE GLOVES!
	WEAR SAFETY SHOES!

Instructions for inspection and maintenance

1. In the event of visible damage or excessive wear contact the Forum B + V Oil Tools Service Department or an authorized repair company.
2. Ensure that welding work on cast parts is performed exclusively by the Forum B + V Oil Tools Service Department or an authorized repair company observing the Forum B + V Oil Tools welding instructions.
3. Ensure that all other maintenance work is performed only by personnel trained for this work and familiar with the risks involved in operating the machine.
4. Ensure that all repair work not performed by Forum B + V Oil Tools is nevertheless accomplished in compliance with the manufacturer's specifications and instructions.
5. Small crates and irregularities, which do not affect the safety or proper operation of the HCS can be removed by grinding (see Critical Areas).
6. After repair always check the repaired part in a suitable manner to ensure that the defect has been remedied.

Prerequisites for maintenance work

1. Ensure that the HCS is set down on a good supporting surface so that it cannot tip.
2. Provide for sufficient lighting at the workplace.
3. The HCS must be removed from the rotary table.

Trouble shooting

In all events where the function are not as expected, following checks must be carried out to identify the cause.

1. Check proper lubrication.
2. Check Bushing size and installation
3. Check fixation of hinge pins

6.1 Lubrication

⚠ WARNING

Lubricants can pose a health hazard!

Lubricants irritate skin and eyes.

Avoid contact with lubricants.

WEAR EYE PROTECTION!

WEAR PROTECTIVE GLOVES!

The HCS are supplied with lubricating grease manually by a grease gun through lubrication nipples.

When the tool is in use, the following lubrication procedure should be performed daily, or as inspection indicates:

6.1.1 Lubrication Intervals

Areas of the machine marked with the plate GREASE DAILY must be lubricated at least once each day with one of the specified lubricants. The lubrication requirement can be higher depending on the conditions of use.

Fig. 32: Instructions: Lubricate at Least Once Daily (P/N 671642)

6.1.2 Lubrication Points on Machine

Tools

- Grease gun (P/N 778510)

Always grease the backside of the manual hand slips before use!

The HCS needs to be lubricated on regularly basis in operation following locations:

Grease Point 1: Hinge pin
(2 grease nipple)

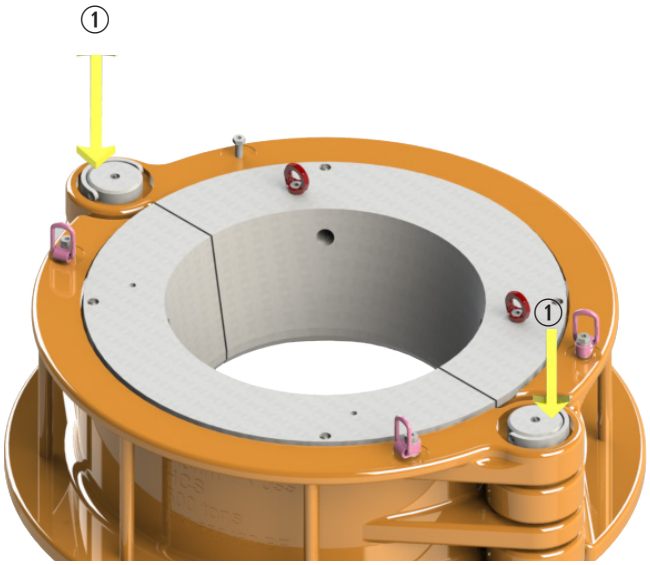


Fig. 33: Body lubrication

6.2 Inspections

Perform inspections in compliance with API RP 7 at specified intervals and in inspection categories. Otherwise the frequency of required inspections is dependent on the conditions of use of the machine.

Before inspection remove all foreign material such as dirt, paint, lubricants, oil, abrasion, etc. from the affected parts. Use suitable methods such as stripping off paint, steam cleaning, sand blasting, etc.

After an operating inspection the scope and results of the tests performed should be documented.

Periodic inspections and inspections following critical assignments should be accomplished at the operating location by the operators under the supervision of a supervisor.

In the event of crates, excessive wear, etc. contact Forum B + V Oil Tools or an authorized service company.

INFO

The specified maintenance intervals are recommended for the HCS during its service life. The necessity of inspections depends primarily on the following conditions:

- Ambient conditions
- Load cycles
- Regulatory requirements
- Period of use
- Tests
- Repairs
- Overhauls

6.2.1 Inspection Following Critical Loads

Perform an inspection IMMEDIATELY following any critical or unexpected loads. Critical loads could be:

- Loads resulting from shock when the drill pipe wedges,
- Pulling wedged drill strings,
- Holding heavy pipes / drill strings
- Jarring
- Operation at very low ambient temperatures (<-20 °C / – 4 °F).

6.2.2 Inspection Following Removal

Generally the HCS should be inspected immediately before it is taken out of service temporarily or stored.

Moreover it should be inspected before putting back into service.

- It is necessary to disassemble the HCS in an appropriately equipped workshop to check for excessive wear, deformation, crates and other damage.

Perform repair work only in compliance with the manufacturer's recommendations. These are available from Forum B + V Oil Tools.

Ensure that welding work on cast parts is accomplished only by Forum B + V Oil Tools or an authorized service company in compliance with the welding specifications issued by Forum B + V Oil Tools.

- If the field inspection indicates that further inspection work is required, remove the HCS and have it inspected in an appropriately equipped workshop.
- Check carefully for visible wear and material fatigue.

Inspection Intervals

Category	Interval	Preparatory measures
I	**Daily**	- HCS on rig
II	**Weekly**	- HCS on rig
III	**Semi-annually**	- HCS on rig - HCS partly dismantled
IV	**Every 1 years**	- HCS on rig - HCS partly dismantled

6.3 Inspection Categories

Always perform a complete inspection according to the instructions in Categories III or IV before AND after critical loads (see Chapter 6.2.1).

INFO

Inspection categories acc. to API 7K

6.3.1 Inspection Category I

This category consists of observing the machine during operation for signs of inadequate operation.

Scope/Prerequisites

- During operation check the machine daily for visible damage such as crates, breaks, loose connecting elements and obvious signs of wear.

Procedure:

- Visual check.
- Put all parts indicating such signs out of service and check for proper function.
- Ensure that this check is accomplished by a person with appropriate technical knowledge.

6.3.2 Inspection Category II

Category II includes additional tests not included in Category I inspections.

Scope/Prerequisites

- Check for signs of corrosion, deformation, loose or missing parts, aging processes, proper lubrication, externally visible crates and adjustment work.

Procedure:

- Category II inspections may require removal of certain parts to assess the wear limits according to the specified tolerances.

6.3.3 Inspection Category III

Category III includes additional tests not included in Category II inspections.

Scope/Prerequisites

- Before inspection remove all foreign material such as dirt, paint, lubricants, oil, abrasion, etc. from the affected parts. Use suitable methods such as stripping off paint, steam cleaning, sand blasting, etc.

Procedure:

- Non-destructive testing (NDT) is required in critical areas as well as removal of certain parts to determine the wear limits according to the specified tolerances.

6.3.4 Inspection Category IV

In addition to the inspections in Category III, Category IV includes removal of all primary, load-bearing parts for non-destructive testing (NDT).

Scope/Prerequisites

- Appropriately equipped workshop
- Remove all primary load-bearing parts or parts critical for operation to such an extent that complete inspection is possible.
- Inspect all parts for excessive wear, crates, deformation and other damage
- in critical areas as well as removal of certain parts to determine the wear limits according to the specified tolerances

Procedure:

- Ensure that all tests are performed according to the manufacturer's specifications.
- Before inspection remove all foreign material such as dirt, paint, lubricants, oil, abrasion, etc. from the affected parts. Use suitable methods such as stripping off paint, steam cleaning, sand blasting, etc.

6.3.5 Inspection Intervals and inspection tasks

Pos.	Task / Interval	Daily	Weekly	Monthly	6 Monthly	1 Year
1	Ongoing observation	✓	✓	✓	✓	✓
2	Grease all grease points and check state of lubrication	✓	✓	✓	✓	✓
3	Check functioning of HCS as a whole.	!	✓	✓	✓	✓
4	Check completeness and condition of warning labels and plates	✗	✓	✓	✓	✓
5	Check for loose items, especially on: shafts, bolts, retainers, screws, nuts, washers, springs, lock wire	✗	!	✓	✓	✓
6	Visual check for cracks, elongation, change, corrosion on all parts, especially on: dies, rollers, shafts	✗	✗	!	✓	✓
7	Check presence and condition of centering buttons and dies	✗	✗	✗	!	✓
8	Check parts for wear according to allowable tolerances.	✗	✗	✗	!	✓
9	Perform NDT on all primary-load-carrying components	✗	✗	✗	✗	!

✓ Necessary ! Safety Task! Take out service for repair if NOK! ✗ Not necessary

6.3.6 Overview: Critical Areas

Check critical areas shown according to inspection check lists.

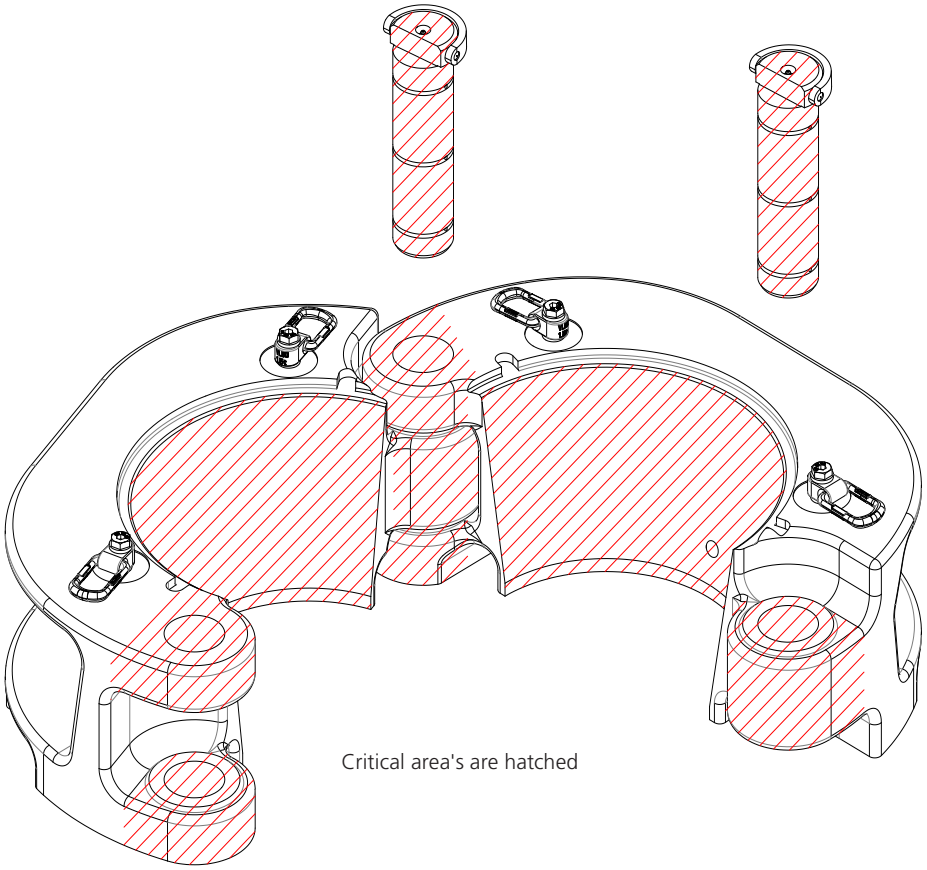


Fig. 34: Critical Areas

6.3.7 Wear data criteria

All kind of repairs not performed by Forum B + V Oil Tools, should nevertheless be done in accordance with their methods and procedures or with their agents. Minor crates or defects, which may be removed without reducing safety or operation of the HCS, can be removed by grinding (see critical areas).

Following the repair, the parts should again be inspected by an appropriate method to insure that the defect has been completely removed.

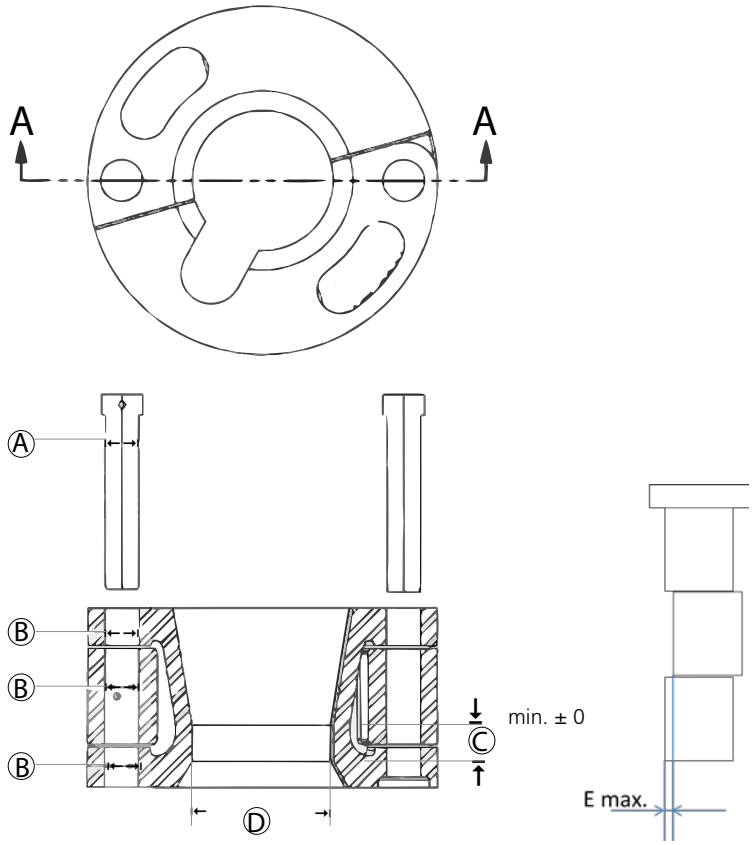


Fig. 35: Measurement of wear

Hinged Casing Spider (HCS)

HCS P/N	Hinge Pin P/N	Hinge pin dia, A New min."	Max. worn ≤ B-A	Bore dia, B New max."	Bore dia, D-nominal	Bore dia, D- never exeed	Pin Exentricity, E-worn max.
553480	553478	3,934 in	0.050in	3,965 in	32,047 in	32,672 in	0.032 in
		99,913 mm	1,270 mm	100,700 mm	814,000 mm	829,875 mm	0.80 mm
553650	553492-2 553492-3	4,721 in	0.050in	4,735 in	44,000 in	44,625 in	0.032 in
		119,913 mm	1,270 mm	120,260 mm	1117,600 mm	1133,475 mm	0.80 mm
553470-3TPF	830-201	3,147 in	0.050in	3,158 in	15,500 in	16,125 in	0.032 in
		69,647 mm	1,270 mm	69,970 mm	393,700 mm	409,575 mm	0.80 mm
553600	553602	3,147 in	0.050in	3,158 in	15,000 in	15,625 in	0.032 in
		79,926 mm	1,270 mm	80,220 mm	381,000 mm	396,875 mm	0.80 mm
553600-3-TPF	553602	3,147 in	0.050in	3,158 in	15,504 in	16,129 in	0.032 in
		79,926 mm	1,270 mm	80,220 mm	393,800 mm	409,675 mm	0.80 mm
553490	553474	2,556 in	0.050in	2,568 in	22,480 in	23,105 in	0.032 in
		64,926 mm	1,270 mm	65,220 mm	571,000 mm	586,875 mm	0.80 mm
553492	553492-2 553492-3	4,721 in	0.050in	4,735 in	38,000 in	38,625 in	0.032 in
		119,913 mm	1,270 mm	120,260 mm	965,200 mm	981,075 mm	0.80 mm
553670	553672 553672-1	4,524 in	0.050in	4,538 in	38,000 in	38,625 in	0.032 in
		114,913 mm	1,270 mm	115,260 mm	965,200 mm	981,075 mm	0.80 mm
553485	553488 553488-1	3,147 in	0.050in	3,158 in	22,500 in	23,125 in	0.032 in
		79,926 mm	1,270 mm	80,220 mm	571,500 mm	587,375 mm	0.80 mm
553460	553478	3,934 in	3,965 in	0.050in	32,047 in	32,672 in	0.032 in
		99,913 mm	100,700 mm	1,270 mm	814,000 mm	829,875 mm	0.80 mm

Reducing Bushings

P/N	Bore dia, D nominal	Bore dia, D never exeed	Dimension C	Plain height C max. wear
553660 RB	42,000 in	42,625 in	0,992 in	1,117 in
[Size:42" x 40"]	1066,800 mm	1082,675 mm	25,200 mm	28,375 mm
553651 RB	38,000 in	38,625 in	1,575 in	1,700 in
[Size:42" x 36"]	965,200 mm	981,075 mm	40,000 mm	43,175 mm
553497 RB	34,000 in	34,625 in	1,575 in	1,700 in
[Size:36" x 32"]	863,600 mm	879,475 mm	40,000 mm	43,175 mm
553493 RB	32,000 in	32,625 in	0,906 in	1,031 in
[Size:36" x 30"]	812,800 mm	828,675 mm	23,000 mm	26,175 mm
553494 RB	28,500 in	29,125 in	1,575 in	1,700 in
[Size:36" x 26"]	723,900 mm	739,775 mm	40,000 mm	43,175 mm
553498 RB	22,500 in	23,125 in	2,492 in	2,617 in
[Size:36" x 20" - 18.5/8"]	571,500 mm	587,375 mm	63,300 mm	66,475 mm
553 463-1 RB	22,500 in	23,125 in	0,799 in	0,924 in
[Size:30" x 20"]	571,500 mm	587,375 mm	20,300 mm	23,475 mm
553630 RB	18,114 in	18,739 in	0,906 in	1,031 in
[Size:20" x 16"]	460,100 mm	475,975 mm	23,000 mm	26,175 mm
553475 RB	15,000 in	15,625 in	0,472 in	0,597 in
[Size:20" x 13.3/8" to 11.3/4"]	381,000 mm	396,875 mm	12,000 mm	15,175 mm
553610 RB	12,252 in	12,877 in	0,157 in	0,282 in
[Size:13.3/8" x 10.3/4" - 9.5/8"]	311,200 mm	327,075 mm	4,000 mm	7,175 mm
553611 RB	10,126 in	10,751 in	0,157 in	0,282 in
[Size:13.3/8" x 8.5/8" - 2.3/8"]	257,200 mm	273,075 mm	4,000 mm	7,175 mm
553675 RB	34,000 in	34,625 in	0,984 in	1,109 in
[Size:36" x 32"]	863,600 mm	879,475 mm	25,000 mm	28,175 mm
553677 RB	32,000 in	32,625 in	0,984 in	1,109 in
[Size:36" x 30"]	812,800 mm	828,675 mm	25,000 mm	28,175 mm
553618 RB	17,752 in	18,377 in	1,575 in	1,700 in
[Size:13.3/8" x 8.5/8" - 2.3/8"]	450,900 mm	466,775 mm	40,000 mm	43,175 mm
553462 RB	28,504 in	29,129 in	0,799 in	0,924 in
[Size:30" x 26"]	724,000 mm	739,875 mm	20,300 mm	23,475 mm
553463 RB	26,500 in	27,125 in	0,799 in	0,924 in
[Size:30" x 24"]	673,100 mm	688,975 mm	20,300 mm	23,475 mm
553464 RB	22,500 in	23,125 in	0,799 in	0,924 in
[Size:30" x 20" - 18.5/8"]	571,500 mm	587,375 mm	20,300 mm	23,475 mm
552465 RB	17,752 in	18,377 in	1,575 in	1,700 in
[Size:20" x 16"]	450,900 mm	466,775 mm	40,000 mm	43,175 mm

6.4 Cleaning

⚠ WARNING

Health hazards from service products!

Splashes of diluted drilling mud and small parts.

ALWAYS wear your personal protective equipment.

WEAR EYE PROTECTION!

WEAR PROTECTIVE GLOVES!

The operating conditions and operating environment result in contamination on the HCS. Remove this contamination regularly to prevent incrustation and ensure safe operation of the machine.

Lift the HCS lout of rotary table for cleaning and remove insert bowls.

6.4.1 Time of Cleaning

Clean contamination from drilling from the HCS regularly. The machine should be cleaned thoroughly at the end of each shift at the latest. Also observe the instructions in Chapter 6.3.5.

6.4.2 Procedure and Cleaning Agents

Forum B + V Oil Tools recommends cleaning the HCS with a high pressure steam cleaner.

Use it to clean the body and slip assembly thoroughly from inside and outside.

Clean particularly the shoulder inclines on the body, upper ring and slips.

Then lubricate the sliding surfaces as specified in Chapter 6.1.

STORAGE / DISPOSAL

7 Storage / Disposal

7.1 Storage

Safe Storage

1. Ensure that the machine is stored so that no one can be injured by moving parts or sharp edges.
2. Secure the machine with tensioning cables or in another manner to prevent it from slipping or tipping when moved. .
3. Store the machine on a pallet located on an even, supporting surface. Observe the weight specifications in the technical data.
4. Protect the machine against water penetration with a plastic tarp.
5. Remove the Slip Assembly and store it separately.
6. If stored for more than three months, bleed the hydraulic lines.

7.1.1 Short-term Storage after Use and for Less Than Three Months

Lubrication	
Protection of tools	• Apply lubricant to all bare surfaces (cylinders). • Protect all other bare surfaces with Tectyl Type 864 or an equivalent agent.
Ambient Conditions	• Store in dry surroundings (maximum humidity 80%).

7.1.2 Long-term Storage for More Than Three Months

Lubrication	
Protection of tools	• Apply lubricant to all bare surfaces (cylinders). • Protect all other bare surfaces with Tectyl Type 864 or an equivalent agent.
Ambient Conditions	• Store in dry surroundings (maximum humidity 80%).

7.2 Disposal

When used properly the machine does not pose any hazard for users or the environment.

However, operation of the machine requires use of hydraulic fluids, lubricants and cleaning agents, which can pollute the environment. For this reason always ensure that such substances are disposed of properly according to international, national and local regulations.

Never dispose of hydraulic fluids, oils, greases, oily cleaning rags or oily water together with industrial or domestic wastes.

Observe the safety data sheets published by the manufacturers on environmental hazards and disposal of the service and operating products used.

Ensure that all service and operating products as well as replacement parts are disposed of safely and ecologically.

Please note specifically that Forum B + V Oil Tools is not obligated to take back used equipment.

7.2.1 List of Service Products Used

The Safety Data Sheets on the service products used are included in the appendix to this operating manual.

APPENDIX

8 Appendix

A Sample of EC Certificate of Conformity

B Operating Instructions from Other Manufacturers

A. Sample of EC Declaration of Conformity

FORUM B + V Oil Tools GmbH

EC -DECLARATION OF CONFORMITY

We, **FORUM B + V Oil Tools GmbH**
Hermann-Blohm-Strasse 2
20457 Hamburg / Germany

declare that the product s: **Hinged Casing Spider HSC**

which is the subject of this declaration, fulfils all of the relevant requirements of:

2006/42/EC Machinery Directive,
2014/34/EC ATEX Directive of Equipment for use in hazardous areas .

Amongst others following harmonized and technical standards and specifications were used:

API 7K 5.Edition Specification for Drilling and Well Servicing Equip ment
ISO 14693 Petroleum and natural gas industries - Drilling and well-servicing equipment
DIN EN ISO 12100 Safety of machinery, Risk assessment and Risk Reduction
DIN ISO 14121 -1 Safety of machinery, Risk assessment
DIN EN 13463 -1 Non-electrical eq uipment for use in potentially explosive atmospheres

Description of Product:

The following named lifting accessory will be described in more detail in the accompanying Data Book and/or certificate and the associated Technical Documentation

Product / Devic e Type: [Refer to chapter “Technical Data”]
[Serialnumber of the device]
Rated Capacity [Refer to order]
Part Number: [Refer to order]
Serial Number: [Refer to data book]
Delivery Date: [Refer to data book]
B+V Order No.: [Refer to data book]
Marking: CE Ex II 2G T6

The Engineering Manager of FORUM B + V Oil Tools GmbH, Hermann -Blohm-Strasse 2, 20457 Hamburg, Germany, is authorized to compile the technical files.
Documents in accordance to Directive 94/9/EC Article 8 (1) b) ii) are lodged at IBExU - Institut für Sicherheitstechnik Gm bH, Fuchsmühlenweg 7, D -09599 Freiberg, Notified Body No. 0637, reference IB-14-6-001/200, Archive-No. 219/14
FORUM B + V Oil Tools has established a quality assurance system in accordance to ISO 9001 approved by GL System Certification, Hamburg / Germany , Certificate No. QS -8339 HH.

Hamburg, issued on [Refer to data book]

[Refer to data book]

Authorized Representative: Name Jens Lutzhöft
Position Managing Director

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P.O.Box 11 22 53, 20422 Hamburg, Germany
Phone: +49 40 37022-6855, Fax: +49 40 37022-6899
E-Mail: oiltools@f -e-t.com
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Registered Office: Hamburg

Managing Directors: Jens Lutzhöft, James W. Harris
Commercial Register: District Court of Hamburg, HRB 125 890
Tax-No.: 46/722/02375, VAT-ID. No.: DE 294 745 990
Banking: HSBC Trinkaus & Burkhardt AG
BIC / SWIFT: TUBD DE DD XXX
EUR -Acc.: IBAN: D E73 3003 0880 0012 8350 19
USD -Acc.: 401 / 2835 / 006 / IBAN: DE50 3003 0880 4012 8350 06
Stand: 24.07.201 5

Fig. 36: EC Certificate of Conformity Sample

B. Third Party Documents

I Nord Lock Washer (excerpt from Third Party Product information)

ENGLISH • METRIC

Excerpt for B+V Operation Manual - Annex

Nord-Lock washers

Product information

TÜV SÜD

NORD-LOCK®

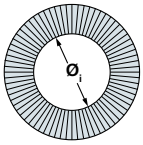
Nord-Lock steel washers

EN 1.7182 or equivalent, zinc flake coating (Delta Protekt®), through hardened

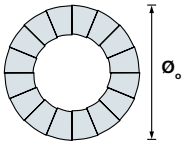
Dimension chart

Washer size	Bolt size Metric	Bolt size UNC	$ø_i$ [mm]	$ø_o$ [mm]	Thickness T [mm]	Min. package [pairs]	Approx. weight kg / 100 pairs
NL3	M3	#5	3,4	7,0	1,8	200	0,03
NL3,5	M3,5	#6	3,9	7,6	1,8	200	0,04
NL3,5sp	M3,5	#6	3,9	9,0	1,8	200	0,06
NL4	M4	#8	4,4	7,6	1,8	200	0,04
NL4sp	M4	#8	4,4	9,0	1,8	200	0,06
NL5	M5	#10	5,4	9,0	1,8	200	0,05
NL5sp	M5	#10	5,4	10,8	1,8	200	0,11
NL6	M6		6,5	10,8	1,8	200	0,07
NL6sp	M6		6,5	13,5	2,5	200	0,20
NL1/4"		1/4"	7,2	11,5	1,8	200	0,08
NL1/4"sp		1/4"	7,2	13,5	2,5	200	0,18
NL8	M8	5/16"	8,7	13,5	2,5	200	0,15
NL8sp	M8	5/16"	8,7	16,6	2,5	200	0,28
NL3/8"		3/8"	10,3	16,6	2,5	200	0,23
NL3/8"sp		3/8"	10,3	21,0	2,5	200	0,48
NL10	M10		10,7	16,6	2,5	200	0,22
NL10sp	M10		10,7	21,0	2,5	200	0,47
NL11	M11	7/16"	11,4	18,5	2,5	200	0,29
NL12	M12		13,0	19,5	2,5	200	0,29
NL12sp	M12		13,0	25,4	3,4	100	0,93
NL1/2"		1/2"	13,5	19,5	2,5	200	0,27
NL1/2"sp		1/2"	13,5	25,4	3,4	100	0,90
NL14	M14	9/16"	15,2	23,0	3,4	100	0,56
NL14sp	M14	9/16"	15,2	30,7	3,4	100	1,41
NL16	M16	5/8"	17,0	25,4	3,4	100	0,67
NL16sp	M16	5/8"	17,0	30,7	3,4	100	1,28
NL18	M18		19,5	29,0	3,4	100	0,85
NL18sp	M18		19,5	34,5	3,4	100	1,58
NL3/4"		3/4"	20,0	30,7	3,4	100	1,05
NL3/4"sp		3/4"	20,0	39,0	3,4	100	2,20
NL20	M20		21,4	30,7	3,4	100	0,93
NL20sp	M20		21,4	39,0	3,4	100	2,03
NL22	M22	7/8"	23,4	34,5	3,4	100	1,29
NL22sp	M22	7/8"	23,4	42,0	4,6	50	3,31
NL24	M24		25,3	39,0	3,4	100	1,68
NL24sp	M24		25,3	48,5	4,6	50	4,51
NL1"		1"	27,9	39,0	3,4	100	1,53
NL1"sp		1"	27,9	48,5	4,6	50	4,20
NL27	M27		28,4	42,0	5,8	50	3,29
NL27sp	M27		28,4	48,5	5,8	25	5,39
NL30	M30	1 1/8"	31,4	47,0	5,8	50	4,20
NL30sp	M30	1 1/8"	31,4	58,5	6,6	25	8,96
NL33	M33	1 1/4"	34,4	48,5	5,8	25	3,97
NL33sp	M33	1 1/4"	34,4	58,5	6,6	25	8,31
NL36	M36	1 3/8"	37,4	55,0	5,8	25	5,59
NL36sp	M36	1 3/8"	37,4	63,0	6,6	25	9,15
NL39	M39	1 1/2"	40,4	58,5	5,8	25	6,28
NL42	M42		43,2	63,0	5,8	25	7,47
NL45	M45	1 3/4"	46,2	70,0	7,0	25	10,20
NL48	M48		49,6	75,0	7,0	25	12,00
NL52	M52	2"	53,6	80,0	7,0	25	13,00
NL56	M56	2 1/4"	59,1	85,0	7,0	10	13,50
NL60	M60		63,1	90,0	7,0	10	15,20
NL64	M64	2 1/2"	67,1	95,0	7,0	10	16,70
NL68	M68		71,1	100,0	9,5	1	28,19
NL72	M72		75,1	105,0	9,5	1	30,70
NL76	M76	3"	79,1	110,0	9,5	1	33,31
NL80	M80	3 1/8"	83,1	115,0	9,5	1	36,02
NL85	M85		88,1	120,0	9,5	1	37,84
NL90	M90		92,4	130,0	9,5	1	47,67
NL95	M95		97,4	135,0	9,5	1	49,81
NL100	M100	4"	103,4	145,0	9,5	1	58,91
NL105	M105		108,4	150,0	9,5	1	61,28
NL110	M110		113,4	155,0	9,5	1	63,65
NL115	M115		118,4	165,0	9,5	1	75,28
NL120	M120		123,4	170,0	9,5	1	77,94
NL125	M125		128,4	173,0	9,5	1	76,63
NL130	M130	5"	133,4	178,0	9,5	1	79,17

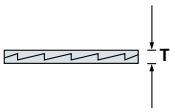
NL3–NL8
$Ø_i$ ±0,1 mm
NL10–NL42
$Ø_i$ ±0,2 mm
NL45–NL130
$Ø_i$ +0,5 / -0,0 mm



NL3–NL24
$Ø_o$ ±0,2 mm
NL27–NL42
$Ø_o$ ±0,3 mm
NL45–NL130
$Ø_o$ +0,0 / -2,0 mm



NL3–NL42
T±0,25 mm
NL45–NL130
T±0,75 mm



Note that washers with thickness 6,6 mm has a thickness tolerance +0,0 / -0,5 mm

- Please consult our website for current dimensions and 2D / 3D CAD models: **www.nord-lock.com/cad**

Nord-Lock washers made of steel with zinc flake coating are standard stock items, yet subject to prior sale.

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APPENDIX

Torque guidelines

Nord-Lock steel washers with zinc flake coating (Delta Protekt®)

Nord-Lock steel washers with electro zinc plated **bolt grade 8.8**

Washer size	Bolt size	Pitch [mm]	Oil, G_F=75% μ_{th}=0,10, μ_b=0,16		Cu/C paste, G_F=75% μ_{th}=0,11, μ_b=0,16		Dry, G_F=62% μ_{th}=0,15, μ_b=0,18	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
NL3	M3	0,5	1,3	2,4	2,1	2,4	1,3	2,0
NL4	M4	0,7	3,1	4,2	4,4	4,2	3,1	3,5
NL5	M5	0,8	6,0	6,8	8,0	6,8	6,0	5,6
NL6	M6	1,0	10,5	9,7	13,2	9,7	10,5	8,0
NL8	M8	1,25	25	18	30	18	25	15
NL10	M10	1,5	49	28	49	28	50	23
NL12	M12	1,75	85	40	83	40	85	33
NL14	M14	2,0	135	55	131	55	136	46
NL16	M16	2,0	205	75	197	75	208	62
NL18	M18	2,5	288	92	275	92	291	76
NL20	M20	2,5	402	118	382	118	408	97
NL22	M22	2,5	548	146	517	146	557	120
NL24	M24	3,0	693	169	652	169	703	140
NL27	M27	3,0	1010	221	945	221	1028	182
NL30	M30	3,5	1379	269	1286	269	1401	222
NL33	M33	3,5	1855	333	1722	333	1889	275
NL36	M36	4,0	2394	392	2219	392	2436	324
NL39	M39	4,0	3087	468	2852	468	3145	387
NL42	M42	4,5	3820	538	3525	538	3890	445

Cu/C paste = Copper/graphite paste (Molykote® 1000)
G_F = ratio of yield point
μ_{th} = thread friction
μ_b = washer friction

1 N = 0,225 lb
1 Nm = 0,738 ft-lb

Nord-Lock steel washers with non-plated **bolt grade 10.9**

Washer size	Bolt size	Pitch [mm]	Oil, G_F=71% μ_{th}=0,13, μ_b=0,14		Cu/C paste, G_F=75% μ_{th}=0,11, μ_b=0,15	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
NL3	M3	0,5	1,8	3,2	3,5	3,4
NL4	M4	0,7	4,1	5,6	7,0	5,9
NL5	M5	0,8	8,1	9,1	12,5	9,6
NL6	M6	1,0	14,1	12,9	20,1	13,6
NL8	M8	1,25	34	23	44	25
NL10	M10	1,5	67	37	73	39
NL12	M12	1,75	115	54	121	57
NL14	M14	2,0	183	74	188	78
NL16	M16	2,0	279	100	281	106
NL18	M18	2,5	391	123	388	130
NL20	M20	2,5	547	156	534	165
NL22	M22	2,5	745	194	719	205
NL24	M24	3,0	942	225	902	238
NL27	M27	3,0	1375	294	1297	310
NL30	M30	3,5	1875	358	1755	378
NL33	M33	3,5	2526	443	2340	468
NL36	M36	4,0	3259	522	3003	551
NL39	M39	4,0	4203	624	3845	659
NL42	M42	4,5	5202	716	4740	757

Nord-Lock steel washers with non-plated **bolt grade 12.9**

Washer size	Bolt size	Pitch [mm]	Oil, G_F=71% μ_{th}=0,13, μ_b=0,12		Cu/C paste, G_F=75% μ_{th}=0,11, μ_b=0,15	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
NL3	M3	0,5	2,0	3,9	3,8	4,1
NL4	M4	0,7	4,6	6,7	7,6	7,1
NL5	M5	0,8	9,1	10,9	13,6	11,5
NL6	M6	1,0	15,8	15,4	21,8	16,3
NL8	M8	1,25	38	28	47	30
NL10	M10	1,5	75	44	93	47
NL12	M12	1,75	128	65	151	68
NL14	M14	2,0	204	89	232	94
NL16	M16	2,0	311	120	342	127
NL18	M18	2,5	437	148	467	156
NL20	M20	2,5	610	188	638	198
NL22	M22	2,5	831	233	852	246
NL24	M24	3,0	1052	270	1064	286
NL27	M27	3,0	1533	352	1519	372
NL30	M30	3,5	2091	430	2042	454
NL33	M33	3,5	2815	532	2710	562
NL36	M36	4,0	3633	626	3463	662
NL39	M39	4,0	4683	748	4415	790
NL42	M42	4,5	5799	860	5429	908

Torque guidelines for other bolt grades are available through your local Nord-Lock representative.

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APPENDIX

Nord-Lock washers joint guide

Tapped holes
Nord-Lock washers safely lock the bolt against the underlying surface.

Counter bores
The outer diameter of regular Nord-Lock washers is designed for counter-bore holes according to DIN 974, i.e. the washers fit under the head of standard bolts.

Through holes
As for all locking washers, through holes require two pairs of Nord-Lock washers – one pair for securing the bolt and a second pair for securing the nut.
Turn both fasteners in order to close the cams on both washer pairs before tightening to minimize settlements. Keep the nut secure whilst tightening the bolt.

Stud bolts
Nord-Lock washers safely lock the nut on stud bolts and eliminate the need for adhesives.

Large / slotted holes

Soft underlying surfaces

Applications with large / slotted holes or soft underlying surfaces
To optimize the load distribution for applications with large / slotted holes or with soft underlying surface, use a flanged nut / bolt together with Nord-Lock "sp" washers with enlarged outer diameter.

Designs where Nord-Lock washers are not recommended
- Mating surfaces that are not locked in place (see left figure)
- Mating surfaces harder than the washers
- Very soft mating surface, e.g. wood, plastic
- Applications with extremely large settlements
- Non-preloaded joints

If your application corresponds to one or more of the mentioned design criteria, contact your Nord-Lock representative and we will help you find an alternative solution.

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APPENDIX

Using Nord-Lock washers

Nord-Lock washers are easy and effective to use while ensuring structural security for applications exposed to vibration and dynamic loads.

Installing the washers
The pre-assembled washers are installed in pairs, cam face to cam face. Nord-Lock recommends lubrication when possible.

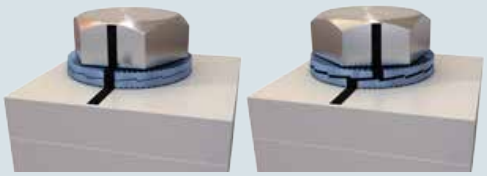
Tightening
Tighten Nord-Lock washers with standard tools according to the guidelines (on page 9-11). Tightening guidelines for other bolt grades are available through your Nord-Lock representative.

Untightening
Untightening Nord-Lock washers is as simple as tightening. Note that since the locking function is not based on increased friction, the untightening torque is generally lower than the tightening torque. Therefore it is not possible to measure off-torque as verification of locking function.

Reusing Nord-Lock
Nord-Lock washers can normally be reused. As with all fasteners, they should be inspected for wear before reassembly. Make sure that the washers are reinstalled correctly cam face to cam face. Nord-Lock recommends lubrication of fasteners before reuse in order to minimize changes in friction conditions.

6

Possible to verify the locking function



When untightening a bolt secured by Nord-Lock washers, check that sliding occurs between the cam faces.

After disassembly, impression marks must be visible on both the fastener and the contact surface.

When the two criteria above are met, you have verified the locking function of the Nord-Lock washers.

Utilize the advantages of lubrication
Nord-Lock recommends the use of a high quality, anti-seize lubricant as it improves the tightening results. It is especially beneficial for large sized bolts and stainless steel applications. The Nord-Lock wedge-locking function provides safe locking in both dry and lubricated conditions. Benefits of lubricated fasteners include:

- Improve reusability
- Reduce friction and deviation
- Facilitate assembly and disassembly
- Reduce torsion stress due to minimized thread friction
- Avoid galling and thread seizure
- Additional protection against corrosion

II Data-sheet Grease

SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006.

Product name: AVIATICON FETT XRF Date: 28/05/2009
Revised: 28/05/2009 Page 1/4

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of substance or preparation

1.1.1 Trade name: **AVIATICON FETT XRF**
1.1.2 Use of the substance/the preparation: Grease.

1.2 Company/undertaking identification

Supplier (manufacturer/importer/downstream user/distributor):
FINKE MINERALÖLWERK GMBH, Rudolf-Diesel-Straße 1, D-27374 Visselhövede
Telephone: (Germany ++49) - 04262 798
Fax: (Germany ++49) - 04262 799519
Department responsible for information: Technical service.
E-mail (competent person): sicherheitsdatenblatt@finke-mineraloelwerk.de
Emergency telephone: (Germany ++49) - 04262 79-9601 (This number is serviced during office hours only.)

2. HAZARDS IDENTIFICATION

2.1 Classification: Not classified as dangerous under EC criteria.
R-Phrases: none
2.2 Information pertaining to special dangers for human and environment: The product does not have to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.
This product is not considered to be especially hazardous to health, but should be handled in accordance with good industrial hygiene and safety practices.
Environmental hazards: Not classified as dangerous under EC criteria.

Classification system: The classification was made according to the latest editions of the EC-lists, and expanded upon from company and literature date.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization Substance: [ ] Preparation: [X]

3.1.1 Chemical characterization (preparation): Lubricating grease. Composition of sodium soap and mineral oil.
3.1.2 Hazard ingredients:

Chemical name	EC-No.	CAS-No.	Content, unit	Hazard symbol(s)	R-Phrases
Zinc dialkydithiophosphate		68649-42-3	< 2,5 wt.-%	Xi, N	36-51/53

3.1.3 Additional information: No component is present at sufficient concentration to require a hazardous classification for health in accordance with EC legislation. Full text of R-Phrases: see section 16.

4. FIRST AID MEASURES

4.1 General information: No special measures required. Remove and clean stained or soaked clothing immediately. Consult a physician if problems persist.
4.2 In case of inhalation: No special precautions necessary. Move to fresh air in case of accidental inhalation of dust or fumes from overheating or combustion.
4.3 In case of skin contact: Wash skin thoroughly with plenty of soap and water.
4.4 In case of eye contact: In case of contact with eyes, rinse immediately thoroughly with plenty of running water. Consult an ophthalmologist if any pain or redness develops or persists.
4.5 In case of ingestion: Seek medical advice. If contamination of the mouth occurs, wash out thoroughly with water. Do not induce vomiting. Never give anything by mouth to an unconscious person.
4.6 Self-protection of the first aider: First aider: Pay attention to self-protection.
4.7 Information to physician: Treatment should in general be symptomatic. If aspiration should occur, transport casualty immediately to hospital.

5. FIRE FIGHTING MEASURES

5.1 Suitable extinguishing media: Use foam, dry chemical powder, sand or carbon dioxide (CO_2).
5.2 Extinguishing media which must not be used for safety reasons: Do not use water.
5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: Carbon monoxide, carbon dioxide, sulphur dioxide and other toxic fumes may be evolved on burning or exposure to strong heat.
5.4 Special protective equipment for fire-fighters: Full protective clothing and self-contained breathing apparatus.
5.5 Additional information: Water may be used to cool nearby heat exposed areas/objects/packages.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions: Use personal protective equipment. Avoid contact with skin and eyes. Particular danger of slipping on leaked/spilled product.
6.2 Environmental precautions: Prevent contamination of soil and water.
6.3 Methods for cleaning up: Prevent from spreading by making a barrier with sand, earth or other containment material. Remove with shovel. Absorb remains with sand or other suitable inert absorbent material.
6.4 Additional information: In case of large spills contact the appropriate authorities.

SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006.

Product name: AVIATICON FETT XRF Date: 28/05/2009
Revised: 28/05/2009 Page 2/4

7. HANDLING AND STORAGE

7.1 Handling

7.1.1 Advices on safe handling: If properly used no special handling precautions required. When handling heavy containers, wear safety shoes and use suitable tools. Avoid contact with eyes. Avoid contact with fresh or used product. Good working practices, high standard of personal hygiene and plant cleanliness must be maintained at all times. Wash hands thoroughly after contact.

7.1.2 Precautions against fire and explosion: No special measures required.

7.1.3 Further information: none

7.2 Storage

7.2.1 Requirements for storage rooms and vessels: Observe all storage regulations.
Keep in original containers only. Keep containers dry.

7.2.2 Hints on storage assembly: Do not store together with oxidizing agents. Do not store in the same place with foodstuffs.

7.2.3 Further information on storage conditions: Protect against pollution. Protect from frost and direct sunlight. Storage temperatures: ambient (5-30 °C).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Exposure limit values: Ensure good ventilation. Avoid, as far as reasonably practicable, inhalation of vapour, mists or fumes generated during use. If vapour, mists or fumes are generated, their concentration in the workplace air should be controlled to the lowest reasonably practicable level. Comply with current local occupational exposure limit. Where not established, it is recommended that mineral oil mists are kept below 5 mg/m³ (8 hr TWA).

8.1.1

CAS No	Component name	Code	Value	Unit	Remark
	oil mist	8 hours	5	mg/m³	TWA, 5 h

8.1.2 Additional Information: The lists valid during the making were used as basis.

8.2 Personal protection equipment

8.2.1 Respiratory protection: Not required in normal case.

8.2.2 Hand protection: Protective gloves. *Material of gloves:* Nitrile rubber, NBR.
Penetration time of glove material:
Nitrile: thickness 0,4 mm, breakthrough time > 240 min.
The exact breakthrough time has to be found out by the manufacturer of the protective gloves and has to be observed.

8.2.3 Eye protection: Not normally required. If contact may reasonably be anticipated, a full face visor or chemical goggles as appropriate should be worn.

8.2.4 Body protection: Protective work clothes.

8.2.5 General protective and hygiene measures: The usual precautionary measures are to be adhered to when handling chemicals. Do not eat and drink while working. Keep away from food and drink. Change heavily contaminated clothing as soon as reasonable practicable. Wash any contaminated underlying skin with soap and water. Avoid contact with eyes. Avoid close or long term contact with the skin. Wash hands thoroughly after contact. After washing the application of a suitable conditioning cream may help to prevent cracking, fissuring or dryness of the skin. Don't keep oily rags in your pockets.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance

9.1.1 Physical state: pasty 9.1.2 Colour: yellowish-brown 9.1.3 Odour: characteristic

9.2 Important health, safety and environmental information

Safety relevant basic data

9.2.1	pH value:	g/l water at °C		Not applicable.	
9.2.2	Boiling point/range:			Not determined.	
9.2.3	Melting point/range:	dropping point		150 °C	DIN/ISO 2176
9.2.4	Flash point:	(base oil)		> 200 °C	DIN/ISO 2592
9.2.5	Inflammability (solid/gaseous):			No data available.	
9.2.6	Inflammation point:			No data available.	
9.2.7	Autoignition (solid/gaseous):			Product is not selfigniting.	
9.2.8	Fire hazard properties:			No data available.	
9.2.9	Danger of explosion:			Product does not present an explosion hazard.	
9.2.10	Explosion limits:	lower %	upper %	No data available.	
9.2.11	Vapour pressure:	at 20 °C		< 0,1 hPa	
9.2.12	Density:	at 20 °C		< 1,000 g/cm³	
9.2.13	Solubility in water:	at 20 °C		dispersible	
9.2.14	n-Octanol/water partition coefficient:			No data available.	
9.2.15	Viscosity, kinematic:	at 40 °C (base oil)		Approximately 190 mm²/s	DIN 51562/T1
9.2.16	Solvent content:	%			

9.3 Other information: The data are subject to usual tolerances.

SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006.

Product name: AVIATICON FETT XRF Date: 28/05/2009
Revised: 28/05/2009 Page 3/4

10. STABILITY AND REACTIVITY

10.1 Conditions to avoid: Products of this type are stable and unlikely to react in a hazardous manner under normal conditions of use. This material is combustible.
10.2 Materials to avoid: Avoid contact with strong oxidizing agents.
10.3 Hazardous decomposition products: Thermal decomposition can produce a variety of compounds, the precise nature of which will depend on the decomposition conditions. Incomplete combustion/thermal decomposition will generate smoke, carbon dioxide, carbon monoxide and sulphur dioxide.
10.4 Further remarks: none

11. TOXICOLOGICAL INFORMATION

11.1 Acute effects (toxicity tests)

11.1.1 Acute toxicity:

Acute toxicity:	*Effective dose:*	*Species:*	*Method:*	*Remark:*
Oral	LD50	Rat		No data available for the product.
Dermal	LD50	Rabbit		No data available for the product.
Inhalative	LC50	Rat		No data available for the product.

11.1.2 Specific symptoms in animal studies: No data available for this formulation.
11.1.3 Irritant and corrosive effects:
Irritant effect on the skin: Unlikely to cause harm to the skin on brief or occasional contact.
Irritant effect on the eyes: No irritant effects.
Irritant effect on the respiratory tract: Normally low inhalation risk due to low volatility. High temperatures or mechanical processing may form oil mist, vapours or smoke which may irritate the respiratory system.
11.1.4 Sensitization:
In case of skin contact: No sensitizing effects known.
In case of inhalation: No sensitizing effects known.
Remark: none
11.1.5 Repeated dose toxicity (sub-acute to chronic toxicity): Repeated or prolonged exposure may cause irritation to eyes and skin.
11.1.6 CMR effects (carcinogenity, mutagenicity and toxicity for reproduction): No particulars available.

11.2 Experiences made in practice

11.2.1 Observations relevant to classification: -
11.2.2 Other observations: -

11.3 General remarks: When used and handled according to specifications, this product doesn't have any particular harmful effects according to our experience and the information provided to us.

12. ECOLOGICAL INFORMATION

12.1 Ecotoxicity

12.1.1 Aquatic toxicity: No data available.

12.2 Mobility

12.2.1 Known or predicted distribution to environmental compartments: No data available.
12.2.2 Adsorption/Desorption: No data available.

12.3 Persistence and degradability: Not expected to be readily biodegradable.

12.3.1 Bioaccumulative potential: No data available.

12.4 Other adverse effects: This product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities.

12.5 Further ecological information: Do not allow product to reach ground water, water course or sewage system. Danger to drinking water if even small quantities leak into the ground.

13. DISPOSAL CONSIDERATIONS

13.1 Product

13.1.1 Recommendation: Disposal in accordance with local and national regulations. Dispose to licensed disposal contractor. Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
13.1.2 Waste codes / waste designations according to EWC / AVV: EWC-Code 1201 12 (used Wax and Greases).
The waste disposal code is just a recommendation. Contact your local experts to obtain information about use or disposal of the material involved.
The indication about disposal refers to the product and its residues. If the product is mixed with other materials or preparations an individual evaluation should be necessary.
Classification of waste is always the responsibility of the end user.

SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006.

Product name: AVIATICON FETT XRF Date: 28/05/2009
Revised: 28/05/2009 Page 4/4

13.2 Appropriate packaging

13.2.1 Recommendation: Contaminated packages should be optimally emptied and can be reused when adequately cleaned. Disposal must be made according to official regulations.
13.2.2 Recommendet detergent: No data available.

13.3 Additional information: none

14. TRANSPORT INFORMATION

14.1 Land transport (ADR/RID): Not classified as hazardous for transport.
14.2 Sea transport (IMDG-Code/GGVSee): Not classified as hazardous for transport.
14.3 Air transport (ICAO/IATA-DGR): Not classified as hazardous for transport.

15. REGULATORY INFORMATION

15.1 EU regulations

15.1.1 Chemical Safety Assessment:
For this preparation a chemical safety assessment has not been carried out.

15.1.2 Labelling

Hazard symbols and hazard statements: No special labelling required.
This product is not subject to identification regulations under EC Directives and the Ordinance on Hazardous Materials (GefStoffV). Observe the general safety regulations when handling chemicals.
Hazard components for labelling: none
R-Phrases: none
S-Phrases: none
Special provisions concerning the labelling of certain preparations: Safety data sheet available for professional user on request.

15.1.3 Other EU regulations:

15.2 National regulations (Germany)

15.2.1 Restrictions of occupation:
15.2.2 Chemikalienverbotsverordnung: Not applicable.
15.2.3 Störfallverordnung (12. BImSchV):
15.2.4 Betriebssicherheitsverordnung (BetrSichV): Not classified.
15.2.5 Technische Anleitung Luft (TA-Luft):
15.2.6 Wassergefährdungsklasse (water hazard class): WGK 1 [classification, according to VwVwS (27.07.05)/Administrative regulations on the classification of water contaminants], slightly hazardous for water.
15.2.7 Other regulations, restrictions and prohibition regulations: Pay attention to VAwS (regulations for plants handling water hazardous substances) of the different federal states in Germany.

16. OTHER INFORMATION

16.1 Full text of risk phrases referred to in section 2 and 3:
R 36 Irritating to eyes.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
16.2 Further information: This information is based on our current knowledge and is intended to describe the product for the purpose of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.
16.3 Issued by: Technical service. Telephone: (Germany ++49) - 04262 79-9601.

III Data-sheet RUD VRSF

STARPOINT - VRS

RUD

Complies with the machinery directives 2006/42/EC

4better lifting

CE

BG-Prüfzert

MO
045199

User Instructions - Part 1

Safety instructions

This safety instruction / declaration of the manufacturer has to be kept on file for the whole lifetime of the product.

EC-Declaration of the manufacturer

According to the Machinery Directive 2006/42/EC, annex II B and amendments.

We hereby declare that the design and construction of the equipment detailed within this document, adheres to the appropriate level of health and safety of the corresponding EC regulation.

Any un-authorised modification of the equipment and/or any incorrect usage of the equipment not adhered to within these user instructions waivers this declaration invalid.

The equipment must be regularly tested and inspected as per BGR 500. Failure to carry out the recommended maintenance and testing of the equipment waivers this declaration invalid.

Designation of the equipment:

LIFTING POINT

Type: **Load ring - STARTPOINT VRS**

Manufacturer's sign:

Drawings are available on request as hard copies or DXF files. Drawings can also be downloaded from our website: www.rud.com.au.

Check the RUD website: www.rud.com.au for product information.

Workshop wall charts available upon request for working load limits (WLL).

Please visit our website at www.rud.com.au to register for your FREE CD with CAD Files

STARPOINT - VRS

RUD

User Instructions - Part 2

1. Reference should be made to relevant standards and other statutory regulations. Inspections should be carried out by competent persons only.

2. Before installing and every use, visually inspect RUD lifting points, with particular attention to any evidence of corrosion, wear and weld cracks and deformations. Please ensure compatibility of bolt thread and tapped hole.

3. The material construction to which the lifting point will be attached, should be of adequate strength to withstand forces during lifting without deformation. RUD, with reference to the German testing authority BG, recommends the following minimum for bolt lengths:

- 1.5 x M in steel (minimum quality S235JR [1.0037]) ≈ AS3678 GR250.
- 1.5 x M in cast iron (for example GG 25)
- 2 x M in aluminium alloys
- 2.5 x M in aluminium-magnesium alloys
- (M = diameter of RUD lifting point bolt, e.g. M 20)

When lifting light metals, nonferrous heavy metals and gray cast iron, the thread has to be chosen in such a way that the working load limit of the thread corresponds to the requirements of the respective base material.

4. The lifting points must be positioned on the load in such a way that movement is avoided during lifting.

a) For single leg lifts, the lifting point should be vertically above the centre of gravity of the load.

b) For two leg lifts, the lifting points must be equidistant to/or above the centre of gravity of the load.

c) For three and four leg lifts, the lifting points should be arranged symmetrically around the centre of gravity in the same plane if possible.

5. Load Symmetry: The working load limit of individual RUD lifting points are calculated using the following formula and are based on symmetrical loading:

$$W_{LL} = \frac{G}{n \times \cos ß}$$

W_{LL} = required of lifting point/individual leg (kg)
G = load weight (kg)
n = number of load bearing legs
ß = angle of inclination of the individual leg

NOTE: For WLL Calculations

- ß angle is taken from the vertical plane.
- Included angle is the angle between the sling legs.

6. Safety: When lifting points are used in a multileg assembly, care should be taken to calculate the WLL (Working Load Limit) due to the deration caused by forces acting in multiple directions. The reduction in WLL (Working Load Limit) for multileg assemblies should be checked with relevant Standards e.g. AS 3775-2004 - Chain Slings-Gr t (8)

The lifting points should be mounted in such a way that they may easily be accessed for inspection and assembly/ disassembly of the sling.

7. A plane bolting surface must be guaranteed to ensure correct mating of the lift component.

8. For fitting without tools and for inspection of the compatibility of bolt thread and tapped hole the STARPOINT can be delivered with a tempered key (type: VRS-F). Simply engage the Hexagon socket bolt with the star profile key and tighten by hand. Disengage the key before attaching the lifting mean.

For a long term application the VRS should be tightened to torque according to relevant table (+/- 10%).

9. To prevent unintended dismounting through shock loading, rotation or vibration, thread locking fluid such as Loctite (depending on the application, please refer to the manufacturer's instruction) should be used to secure the eyebolt.

10. The STARPOINT has to be adjustable through 360° when fitted and with key disengaged. Adjust to direction of pull before attaching of the lifting means.

Attention: STARPOINT's are not suitable for rotation under load!

11. All fittings connected to the eyebolt should be free moving. When connecting and disconnecting the lifting means (wire ropes, chain slings, round slings) pinches and impacts should be avoided. Damage to lifting components caused by sharp corners should also be avoided.

12. Effects of temperature:

Due to the DIN/EN bolts that are used with the STARPOINT the working load limit should be reduced accordingly:

-10° to 100°C	no reduction	14°F to 212°F
100° to 200°C	minus 15%	212°F to 392°F
200° to 250°C	minus 20%	392°F to 482°F
250° to 350°C	minus 25%	482°F to 662°F

Temperatures above 350°C (662°F) are not permitted.

13. RUD lifting points must not be used under chemical influences such as acids, alkaline solutions and vapours e.g. in pickling baths or hot dip galvanising plants. If this cannot avoided, please contact the manufacturer indicating the concentration, period of penetration and temperature of use.

14. The position where the lifting points should be attached should be clearly marked with colour.

15. After fitting, an annual inspection or sooner if conditions dictate should be under taken by a competent person examining the continued suitability. Also inspect after damage and special occurrences.

Inspection criteria concerning paragraphs 2 and 15:

- Ensure compatibility of bolt thread and tapped hole.
- The lifting point should be complete.
- The working load limit and manufacturers stamp should be clearly visible.
- Deformation of the component parts such as body and bolt.
- Mechanical damage, such as notches, particularly in high stress areas.
- Wear should be no more than 10% of cross sectional diameter.
- Evidence of corrosion.
- Evidence of cracks.
- Damage to the bolt and/or thread.
- The body of the STARPOINT must be free to rotate.

Any non-adherence to this advice may result damages of persons and / or materials!

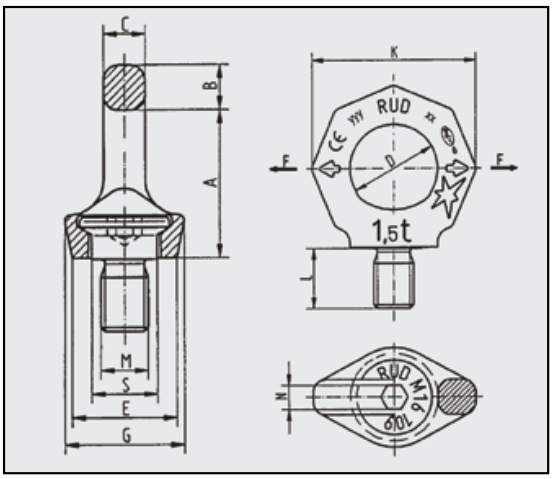
STARPOINT - VRS

RUD

User Instructions - Part 3

WORKING LOAD LIMITS (G - in tonnes)					
PRODUCT DESCRIPTION	Single Leg G	Single Leg G	2 , 3 or 4 Legs G		
			60°	90°	120°
			Maximum Included Angle (Degrees)		
VRS-F M8	1.0	0.40	0.69	0.56	0.40
VRS-F M10	1.0	0.40	0.69	0.56	0.40
VRS-F M12	2.0	0.80	1.4	1.0	0.80
VRS-F M16	4.0	1.5	2.6	2.1	1.5
VRS-F M20	6.0	2.3	4.0	3.2	2.3
VRS-F M24	8.0	3.2	5.5	4.5	3.2
VRS-F M30	12.0	4.5	7.8	6.3	4.5
VRS-F M36	16.0	7.0	12.1	9.8	7.0
VRS-F M42	24.0	9.0	15.6	12.6	9.0
VRS-F M48	32.0	12.0	20.8	16.8	12.0

Table 1



Type	WLL (t)	Weight (kg)	A	B	C	D	E	G	K	L	M	N	S	Ref.-No. VRS	Ref.-No. VRS-F
VRS-M8	0.4	0.1	34	11	8.5	25	25	28	47	12	8	6	16	7100554	8500911
VRS-M10	0.4	0.1	34	11	8.5	25	25	28	47	15	10	6	15	7982219*	7104029
VRS-M12	0.75	0.2	42	13	10	30	30	34	56	18	12	8	18	7982220*	7101313
VRS-M16	1.5	0.3	49	15	14	35	35	40	65	24	16	10	22	7982221**	7101314
VRS-M20	2.3	0.5	57	17	16	40	40	50	75	30	20	12	27.5	7982222**	7101315
VRS-M24	3.2	0.9	69	21	19	48	48	60	90	36	24	14	33	7982223**	7101316
VRS-M30	4.5	1.7	86	26	24	60	60	75	112	45	30	17	41.5	7982224***	7101317
VRS-M36	7	2.9	103	32	29	72	75	90	135	54	36	22	49.5	7984198	7984201
VRS-M42	9	4.6	120	38	34	82	85	105	158	63	42	24	58	7984199	7984202
VRS-M48	12	7.0	137	43	38	94	100	120	180	72	48	27	66	7984200	7984203
VRS-3/8"-16UNC	0.4	0.1	34	11	8.5	25	25	28	47	15	3/8"	1/4"	15	7103959	7104480
VRS-1/2"-13UNC	0.75	0.2	42	13	10	30	30	34	56	18	1/2"	5/16"	18	7103960	7104481
VRS-5/8"-11UNC	1.5	0.3	49	15	14	35	35	40	65	24	5/8"	3/8"	22	7103961	7104482
VRS-3/4"-10UNC	2.3	0.5	57	17	16	40	40	50	75	30	3/4"	1/2"	27.5	7103962	7104483
VRS-7/8"-9UNC	2.3	0.6	57	17	16	40	40	50	75	32	7/8"	1/2"	27.5	7103963	7104484
VRS-1"-8UNC	3.2	0.9	69	21	19	48	48	60	90	36	1"	9/16"	33	7103964	7104485
VRS-1 1/4"-7UNC	4.5	1.7	86	26	24	60	60	75	112	45	1 1/4"	5/8"	41.5	7103965	7104486
VRS-1 1/2"-6UNC	7	2.9	103	32	29	72	75	90	135	54	1 1/2"	7/8"	49.5	7103966	7984221
VRS-1 3/4"-5UNC	9	4.6	120	38	34	82	85	105	158	63	1 3/4"	1"	58	7103967	7104488
VRS-2"-4.5UNC	12	7.0	137	43	38	94	100	120	180	72	2"	1 1/8"	66	7103968	7984223

Table 2

* = packing unit consisting of 20 pieces · ** = packing unit consisting of 10 pieces · *** = packing unit consisting of 4 pieces

RUD

RUD Chains Pty Ltd
8 West Link Place, Richlands, Queensland 4077 PO Box 689, Sumner Park, Queensland 4074
Telephone: +61 7 3712 8000 Facsimile: +61 7 3712 8001
Email: chains@rud.com.au www.rud.com.au

LIT00017/L&L/Jan10

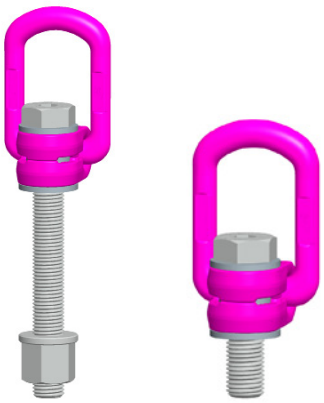
IV Data-sheet RUD VLBG

Load Ring for bolting
>VLBG<

EN

Safety instructions

This safety instruction/declaration of the manufacturer has to be kept on file for the whole lifetime of the product.
Translation of the original instructions



Load Ring in pink - for bolting
VLBG

DGUV Test
OA 1451016
Sicherheit geprüft
tested safety

RUD Ketten
Rieger & Dietz GmbH u. Co. KG
73428 Aalen
Tel. +49 7361 504-1370
Fax +49 7361 504-1460
sling@rud.com
www.rud.com

RUD-Art.-Nr.: 8500972-EN / 05.015

RUD

EG-Konformitätserklärung

entsprechend der EG-Maschinenrichtlinie 2006/42/EG, Anhang II A und ihren Änderungen

Hersteller: **RUD Ketten**
Rieger & Dietz GmbH u. Co. KG
Friedensinsel
73432 Aalen

Hiermit erklären wir, dass die nachfolgend bezeichnete Maschine aufgrund ihrer Konzipierung und Bauart, sowie in der von uns in Verkehr gebrachten Ausführung, den grundlegenden Sicherheits- und Gesundheitsanforderungen der EG-Maschinenrichtlinie 2006/42/EG sowie den unten aufgeführten harmonisierten und nationalen Normen sowie technischen Spezifikationen entspricht.
Bei einer nicht mit uns abgestimmten Änderung der Maschine verliert diese Erklärung ihre Gültigkeit.

Produktbezeichnung: Lastbock VLBG

Folgende harmonisierten Normen wurden angewandt:

EN 12100 : 2011-03 | EN 1677-1 : 2008-03

Folgende nationalen Normen und technische Spezifikationen wurden außerdem angewandt:

BGR 500, KAP2.8 : 2008-04

Für die Zusammenstellung der Konformitätsdokumentation bevollmächtigte Person:
Reinhard Smetz, RUD Ketten, 73432 Aalen

Aalen, den 27.06.2014 — Dr.-Ing. Arne Kriegsmann (Prokurist/QMB)
Name, Funktion und Unterschrift Verantwortlicher

RUD

EC-Declaration of conformity

According to the EC-Machinery Directive 2006/42/EC, annex II A and amendments

Manufacturer: **RUD Ketten**
Rieger & Dietz GmbH u. Co. KG
Friedensinsel
73432 Aalen

We hereby declare that the equipment sold by us because of its design and construction, as mentioned below, corresponds to the appropriate, basic requirements of safety and health of the corresponding EC-Machinery Directive 2006/42/EC as well as to the below mentioned harmonized and national norms as well as technical specifications.
In case of any modification of the equipment, not being agreed upon with us, this declaration becomes invalid.

Product name: Load ring VLBG

The following harmonized norms were applied:

EN 12100 : 2011-03 | EN 1677-1 : 2008-03

The following national norms and technical specifications were applied:

BGR 500, KAP2.8 : 2008-04

Authorized person for the configuration of the declaration documents:
Reinhard Smetz, RUD Ketten, 73432 Aalen

Aalen, den 27.06.2014 — Dr.-Ing. Arne Kriegsmann (Prokurist/QMB)
Name, function and signature of the responsible person

Please read user instruction before initial operation of the bolt-on lifting point VLBG. Make sure that you have comprehend all subjected matters.
Non observance can lead to serious personal injuries and material damage and eliminates warranty.

1 Safety instructions

ATTENTION
Wrong assembled or damaged VLBG as well as improper use can lead to injuries of persons and damage of objects when load drops.
Please inspect all VLBG before each use.

- Reference should be made to German Standards accord. BGR 500 or other country specific statutory regulations and inspections are to be carried out by competent persons only.
- The VLBG must be rotatable 360° when installed.

2 Intended use

VLBGs must only be used for the assembly of the load or at load accepting means

Their usage is intended to be used as lifting means.

The VLBGs can also be used as lashing points for the fixture of lashing means.

The VLBGs must only be used in the here described usage purpose.

3 Assembly- and instruction manual

3.1 General information

- Effects of temperature:
  Due to the DIN/EN bolts that are used in the VLBG, the working load limit must be reduced accordingly:

  -40°C to 100°C --> no reduction (-40°F to 212°F)
  100°C to 200°C minus 15 % (212°F to 392°F)
  200°C to 250°C minus 20 % (392°F to 482°F)
  250°C to 350°C minus 25 % (482°F to 662°F)
  Temperatures above 350°C (662°F) are not permitted.

  Please observe the maximum usage temperature of the supplied nuts (optionally):
  - Clamping nuts according to DIN EN ISO 7042 (DIN 980) must only be used up to +150°C at the max (302°F).
  - Collar nuts according to DIN 6331 can be used up to +300°C. Please note also the reduction factors (572°F).
- RUD-Lifting points must not be used under chemical influences such as acids, alkaline solutions and vapours e.g. in pickling baths or hot dip galvanising plants. If this cannot avoided, please contact the manufacturer indicating the concentration, period of penetration and temperature of use.
- The places where the lifting points are fixed should be marked with colour.
- RUD lifting points are delivered with a 100 % crack tested bolt (length up to lmax please see chart 3).
- When using your own bolts, the bolts have to be 100 % crack tested.
  The average notch bar impact test value at the deepest allowed usage temperature must be at least 36 J. This is required in the test fundamentals for lifting points GS MO 15-04 (Point 6.4.1).

HINT
The min. quality of the hexagon bolt has to be 10.9 accord. EN 24014 (DIN 931) with the nominal diameter. For replacement the bolt can be easily hammered out.
The disassembly and the exchange of parts mus only be carried out by a competent person.

Versions

- VLBG lifting points are either supplied with bolts of strength class 10.9 or with „ICE“ material bolts. (Original ICE-bolts are available as a spare part from RUD)
- The type VLBG 7 t M36 is only delivered with a **special bolt**, therefore it is **not possible to use a DIN/EN-bolt**.
- RUD supplies the Vario length complete with a washer and crack-detected nut corresponding to DIN EN ISO 7042 (DIN 980) or will be supplied with a crack inspected collar nut acc. to DIN 6331.
- If the VLBG is used exclusively for lashing, the value of the working load limit can be doubled. LC = permissible lashing capacity = 2 x WLL

3.2 Hints for the assembly

Basically essential:

- The material construction to which the lifting point will be attached should be of adequate strength to withstand forces during lifting without deformation. The German testing authority BG, recommends the following minimum for bolt lengths:
  1 x M in steel (minimum quality S235JR [1.0037])
  1,25x M in cast iron (for example GG 25)
  2x M in aluminium alloys
  2,5x M in aluminium-magnesium alloys
  (M = diameter of RUD lifting point bolt, for ex. M 20)
- When lifting light metals, nonferrous heavy metals and gray cast iron the thread has to be chosen in such a way that the working load limit of the thread corresponds to the requirements of the respective

base material.

- The lifting points must be positioned on the load in such a way that movement is avoided during lifting:
  - **For single leg lifts,** the load ring should be positioned vertically above the centre of gravity of the load.
  - **For two leg lifts,** the lifting points must be equidistant to/or above the centre of gravity of the load.
  - **For three and four leg lifts,** the lifting points should be arranged symmetrically around the centre of gravity in the same plane, if possible.
- Load symmetry:
  The working load limit of individual RUD lifting points are calculated using the following formula and are based on symmetrical loading:

$$W_{LL} = \frac{G}{n \times \cos ß}$$

W_{LL} = working load limit
G = load weight (kg)
n = number of load bearing legs
ß = angle of inclination of the chain to the vertical

The calculation of load bearing legs is as follows:

	symmetrical	asymmetrical
two leg	2	1
three / four leg	3	1

table 1: Load bearing strands (see table 2)

HINT
With unsymmetrical loads, the WLL of each Lifting Point must be at least as high as the weight of the load.

- A plane bolt-on surface (ØD, table 3) with a perpendicular thread hole must be guaranteed. The thread must be carried out acc. to DIN 76 (countersink max. 1.05xd)
- The holes must be drilled with a sufficient depth in order to guarantee compatibility with the supporting surface.
- The VLBG must be rotatable 360° when installed. Please observe the following:
  - For a **single use** hand tightening with a spanner is sufficiant. Bolt supporting area must sit proper on bolt-on surface.
  - For **long term application** the VLBG must be tightened with torque according to table 3 (+/- 10 %).
  - When turning loads using the VLBG (see chapter 3.3.2 permissible lifting- and turning process) it is necessary to tighten the bolt with a torque (+/- 10 %) acc. to chart 3.
- With shock loading or vibrations, especially at through hole fixtures with a nut at the end of the bolt, accidential release can occure.
  Securing possibilities: Observe torque moment, use liquid securing glue f.e. Loctite (can be adapted to the usage, observe manufacturer hints) or assemble a form closure bolt locking device f.e. a castle nut with cotter pin, locknut etc.
- Finally check the proper assembly (see chapter 4 *Inspection criteria*).

3.3 User instructions

3.3.1 General information for the usage

- Before every usage, control in regularly periods the whole lifting point in regard of the continuous aptitude as a lifting mean, whether it is tightened (torqued), or has strong corrosion, wear, deformations etc. (see chapter 4 *Inspection criteria*).

ATTENTION
Wrong assembled or damaged VLBG as well as improper use can lead to injuries of persons and damage of objects when load drops.
Please inspect all VLBG before each use.

- Adjust to the direction of pull, before attaching to the lifting means. The load ring should be free movable and must not touch edges.
- All fittings connected to the VLBG should be free moving. When connecting and disconnecting the lifting means (sling chain) pinches and impacts should be avoided.

Our goal is to become the leading provider of mission critical oilfield products and related services in terms of customer satisfaction, safety and financial performance.

Our experienced management team and employees are dedicated to solving our customers' problems. We invest in long term relationships and cooperate on product development with our clients, we consider them our partners.

OUR CORE VALUES

Integrity: In everything we do, in every interaction, both internally and externally, we strive to operate with the upmost integrity and mutual respect.

Customer focused: Our products enhance our customer's performance and we listen to their needs and work with them to solve their challenges.

Good place to work: We are committed to creating a workplace that fosters innovation, teamwork and pride. Every team member is integral to our success and is treated equally and fairly.

No one gets hurt: The safety of our employees and customers is our first priority coupled with a healthy respect for the environment.

FORUM™ B+V

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