

Side Door Elevator SDS

SDS / VES SDS / SDS-H Type Series Manual and hydraulic operated elevators

SDS Type Series Side Door Collar Type Elevator			VES SDS Type Series Side Door Collar Type Bushing Elevator		
Type	P/N	Rated Capacity	Type	P/N	Rated Capacity
SDS 65	640600-Y-BC	65 tons	VES SDS 250-3	642760-Y	250 tons
SDS 100-1	641020-Y-BC	100 tons	VES SDS 350	643600-Y	350 tons
SDS 100-3	641040-Y-BC	100 tons	VES SDS 500	645600-Y	500 tons
SDS 150-1	641500-Y-BC	150 tons	SDS-H Type Series		
SDS 150-2	641520-Y-BC	150 tons	Side Door Collar Type Hydraulic Elevator		
SDS 150-3	641540-Y-BC	150 tons	SDS 150-7-H	641620-Y-BC'-H	150 tons
SDS 150-4	641560-Y-BC	150 tons	SDS 250-3-H	642540-Y-BC'-H	250 tons
SDS 150-5	641580-Y-BC	150 tons	SDS 350-2-H	643520-Y-BC'-H	350 tons
SDS 150-7	641620-Y-BC	150 tons	SDS 350-4-H	643560-Y-BC'-H	350 tons
SDS 250-0	642600-Y-BC	250 tons	SDS 500-H	645500-Y-H	500 tons
SDS 250-1	642500-Y-BC	250 tons			
SDS 250-2	642520-Y-BC	250 tons			
SDS 250-3	642540-Y-BC	250 tons			
SDS 250-5	642580-Y-BC	250 tons			
SDS 250-6	642620-Y-BC	250 tons			
SDS 250-7	642630-Y-BC	250 tons			
SDS 350-1	643500-Y-BC	350 tons			
SDS 350-2	643520-Y-BC	350 tons			
SDS 350-4	643560-Y-BC	350 tons			
SDS 350-5	643580-Y-BC	350 tons			
SDS 350-6	643570-Y-BC	350 tons			
SDS 500	645500-Y-BC	500 tons			
SDS 750	647500-Y-BC	750 tons			

* Bore Code

Operating Instructions

Original Operating Instructions

Manual operated



Hydraulic operated



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We are grateful for suggestions and critic regarding this documentation or the product itself.

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A. General

I Basic Information

This operating manual refers to the Side Door Elevator SDS (hereinafter called SDS) 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 SDS 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 contains all information on safe and proper operation of the SDS elevator. 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 SDS is designed to be used vertical in hanging links. The SDS conduces as an association between the Top Drive, the Link and the drill tubes. The load capacity of the elevator is designated by the elevator make. The load capacity is limited in vertical direction only.

The VES SDS is equipped with replaceable bushing segments and a positive locking mechanism. The design of the bushing segments allows the equipment to grip casing with uniform radial pressure, ensuring a safe hold while minimizing the possibility of damage to the pipe.

The elevator is also available for hydraulic operation in the SDS-H type series .

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

Additionally the intended use covers the compliance and observance of all procedures and safety notes of this manual as well as performing all necessary maintenance work in the given intervals.

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 or the abbreviation ton.

1 ston = 2000 lb = 907,19 kg
1 ton = 2204,62 lb = 1000 kg

INFO



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

III Improper Use

The SDS is intended exclusively for lifting and holding the specified pipes. Always observe the specifications in chapter „1.4 Technical Data“ on page 22.

The following is specifically prohibited:

- Use of bushings with pipe sizes for which use is not specified [VES SDS only].
- Holding pipe with diameter for which use is not specified.
- Increasing the load limit of the SDS
- Every use of the SDS which is not intended.

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

- When the equipment is used for applications other than intended.
- When the hydraulic or pneumatic equipment is not installed properly [SDS-H only].
- When the equipment 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 SDS is not operating properly.
- When humans or foreign objects or personnel are located in the hazard area of the SDS.
- 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 equipment by companies not authorized by Forum B + V Oil Tools.
- Observe also the chapter “Warranty and Liability”

IV Potential Misuse

This manual contains information and warnings on procedures that address hazardous conditions and could cause personal injury but cannot reflect all fashions in which hazardous consequences may occur due to service and/or operation. All personnel using this equipment or service procedures contained within this manual must be completely satisfied that personal and/or equipment safety will not be compromised.

Common methods of MISUSE include but are not limited to:

1. Use without ALL warning and identification labels present. This can cause operating personnel to misunderstand the areas of the equipment that can cause serious injury.
2. Use with insufficient and/or worn assemblies and parts. This can cause failure causing a suspended hazard which can result in serious injury or death.
3. Use of the Side Door Elevator SDS in methods not intended. The SDS should be used ONLY in the methods described in this manual.

V 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 Side Door Elevator SDS treated in this operating manual. Claims or entitlements cannot be deduced or derived from information, illustrations and /or 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 performed at our order. Only the original text is binding. The original text language for Forum B + V Oil Tools documents and manual is English.

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 than intended;
- Improper installation, operation, maintenance or repair;
- Operation with defective, improperly attached or non-operational safety and/or protective equipment or devices;
- Failure to observe the instructions in the operating manual regarding safe conduct;
- Impermissible structural and/or functional 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;
- Lubricating the Side Door Elevator SDS with lubricants other than those recommended by Forum B + V Oil Tools.

Info



Any structural or functional modification to the equipment by the operating company requires previous written approval by Forum B + V Oil Tools. Failure to obtain such approval voids the warranty as well as the declaration of conformity 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.

VI 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 and with the SDS must be trained by the operating company for the work performed on and with the SDS.

All 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 SDS 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 SDS. Proper behavior 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 SDS 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 SDS is in operation where it is easily accessible for everyone and in an easily legible condition.
- Use the SDS exclusively for its intended purpose.
- Use the SDS 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 SDS includes knowledge of the general safety precautions.

Ensure that the SDS 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 SDS is familiar with the required procedures and safety precautions.

Minimum Qualifications

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

All personnel working on SDS 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 sections 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 SDS.
- Sufficient qualifications for working on the SDS under supervision and at the instructions of a trained specialist.

VII User Groups

This operating manual is subdivided into the following user groups:

Personnel	Qualifications
Operating personnel	Sufficiently trained in: <ul style="list-style-type: none"> • Functional procedures on the equipment • Operating procedures Knowledge: <ul style="list-style-type: none"> • Competency and responsibility in regard to the work to be performed • Behavior in emergencies
Service personnel	Basic knowledge of Mechanics Hydraulic Authorizations (according to standards of safety engineering): <ul style="list-style-type: none"> • Starting up equipment • Grounding equipment • Marking of equipment • Basic knowledge of installation and operation of the SDS.

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 in accordance with generally accepted codes of practice in industrial mechanics.

VIII 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 equipment 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. . t.b.c...

Instructions for Safe Procedure

Special work steps to ensure Safe Procedure are depicted.

For example:

Safe Procedure

5. Shut off equipment.
6. Disconnect supply lines.
7. Attach equipment to crane.
8. . t.b.c...

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 equipment feet.
2. Lift equipment.

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.

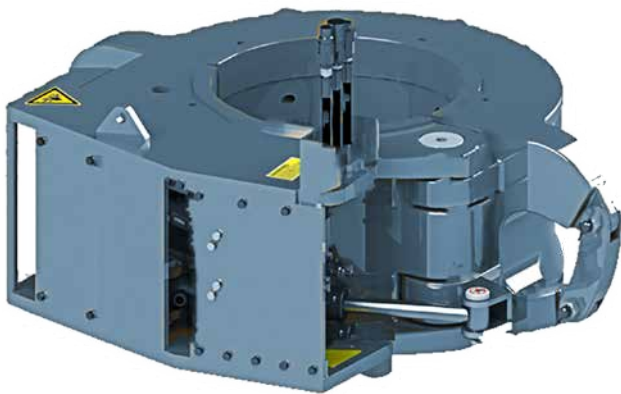


Fig. 1: Illustration Example Equipment

INFO



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

IX 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!

X Conformity

The SDS 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 SDS. The EC Declaration of Conformity is delivered together with the SDS. Keep these instructions and the associated documents for later use.

XI 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.

<p>Forum B + V Oil Tools GmbH Hermann-Blohm-Strasse 2 20457 Hamburg Germany tel: +49.40.37022.6855 fax: +49.40.37022.6899 Email: oiltools@f-e-t.com web: www.f-e-t.com www.blohmvoss-oiltools.com</p>	<p>Forum B + V Oil Tools 1023 Forum Drive Broussard, LA 70518 USA tel: +1.337.373.1800 fax: +1.337.369.6893</p>
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<p>United Arab Emirates Oilfields Supply Center Building B-45 Jebel Ali Free Zone Dubai UAE tel:+971.4.883.5266</p>	<p>Singapore No 51 Benoi Road #06-00 Liang Huat Industrial Complex, Singapore 629908 tel: +65.6465.4850 fax: +65.6465.4851 Out of hours +65.913.898.12</p>	

XII Online Technical Document access

a. Information via homepage

INFO

i 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 blohmvooss-oiltools 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.blohmvooss-oiltools.com.

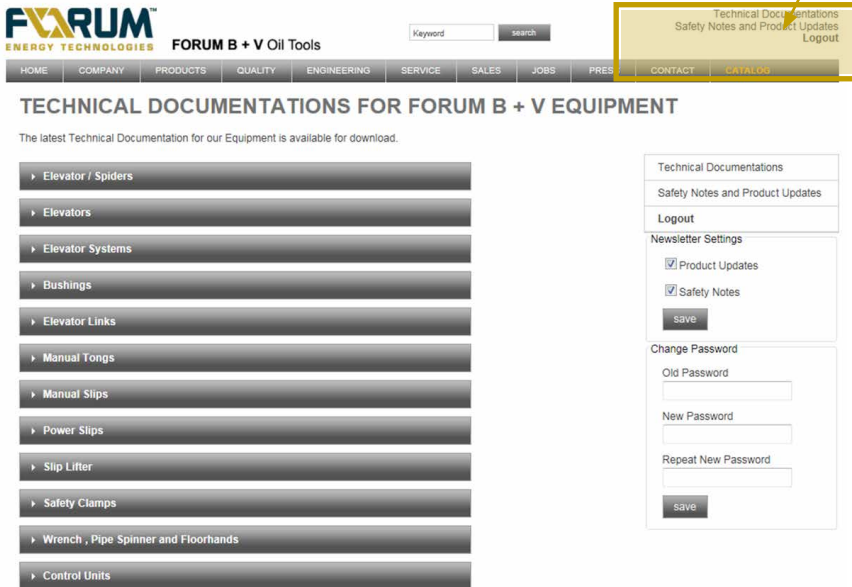


Fig. 2: Illustration Service–Homepage

b. Information via Extranet

INFO



For further and actual information you can also visit our Extranet homepage .

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 Extranet.

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Technical Documentations
Safety Notes and Product Updates

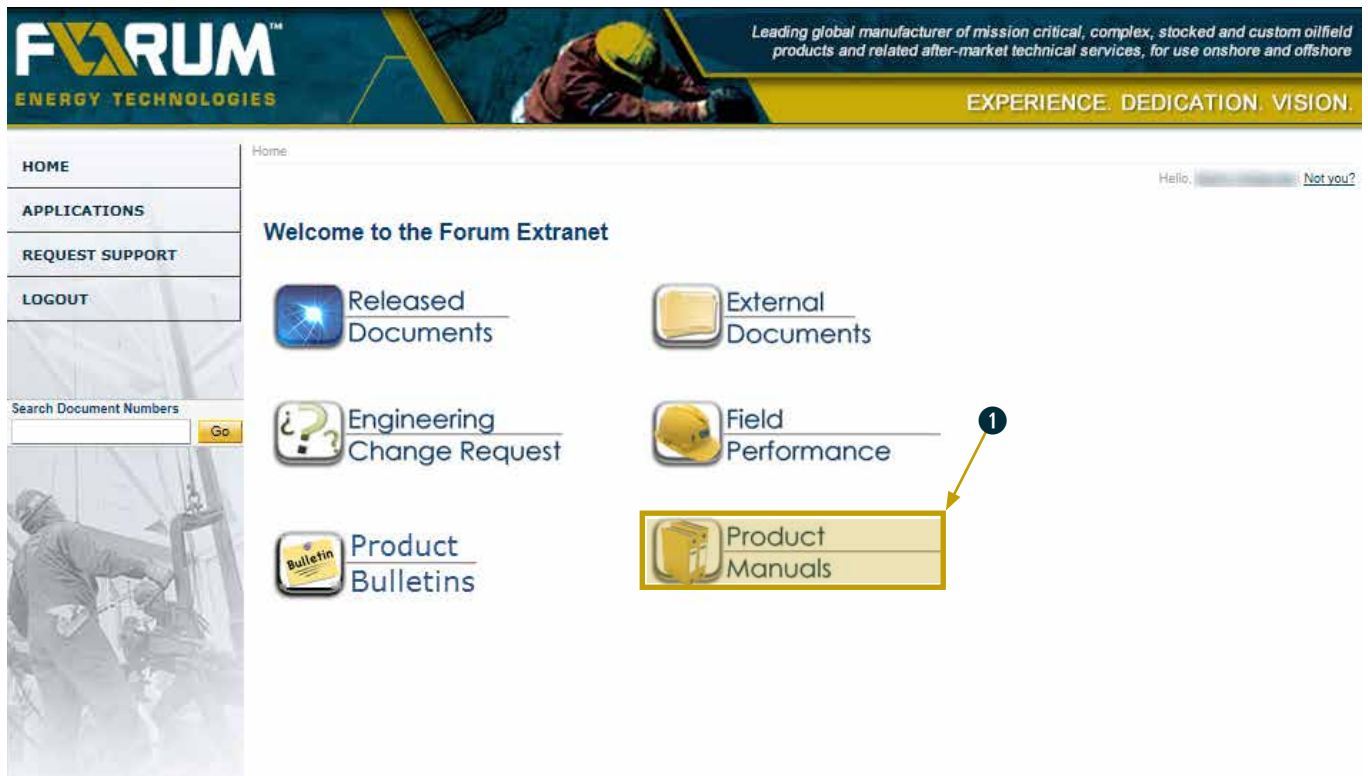


Fig. 3: Illustration Service–Extranet

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DESCRIPTION

DESCRIPTION

1 Description

The SDS Elevators are designed with strength and safety factors in accordance with API Regulations Section 8C - and are to be used for handling long, heavy drill strings. The Elevator can be operated easily by one man due to replaceable bushing segments and a positive locking mechanism.

The design of the bushing segments allows the equipment to grip casing with uniform radial pressure, ensuring a safe hold while minimizing the possibility of damage to the pipe.

The Side Door Elevator SDS is rated for its designated tonnage. It is used for suspending tubular like casing, tubing and-or drill collars.

The elevator type series covers devices for hydraulic and for bushing operation.

1.1 Type series overview

The SDS elevators type series consists of the, in following listed, members.

1.1.1 Manual SDS elevator type series

The manual Side Door Elevator SDS is designed for manual open and closed operation and has several key features that enhance safety and operational efficiency in deepwater environments.

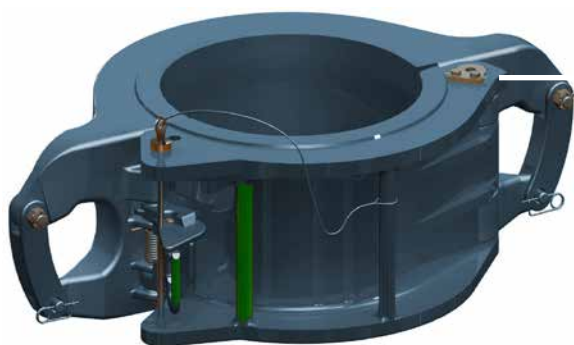


Fig. 4: Manual Side Door Elevator SDS

Type	P-N	Rated Capacity
SDS 65	640600-Y-BC	65 tons
SDS 100-1	641020-Y-BC	100 tons
SDS 100-2	641000-Y-BC	100 tons
SDS 100-3	641040-Y-BC	100 tons
SDS 150-1	641500-Y-BC	150 tons
SDS 150-2	641520-Y-BC	150 tons
SDS 150-3	641540-Y-BC	150 tons
SDS 150-4	641560-Y-BC	150 tons
SDS 150-5	641580-Y-BC	150 tons
SDS 150-7	641620-Y-BC	150 tons
SDS 250-0	642600-Y-BC	250 tons
SDS 250-1	642500-Y-BC	250 tons
SDS 250-2	642520-Y-BC	250 tons
SDS 250-3	642540-Y-BC	250 tons
SDS 250-5	642580-Y-BC	250 tons
SDS 250-6	642620-Y-BC	250 tons
SDS 250-7	642630-Y-BC	250 tons
SDS 350-1	643500-Y-BC	350 tons
SDS 350-2	643520-Y-BC	350 tons
SDS 350-4	643560-Y-BC	350 tons
SDS 350-6	643580-Y-BC	350 tons
SDS 350-6	643570-Y-BC	350 tons
SDS 500	645500-Y-BC	500 tons
SDS 750	647500-Y-BC	750 tons

1.1.2 Automated SDS-H elevator type series

The hydraulically operated automated SDS from the SDS -H type series are designed to quickly pickup drill tubes and casings.

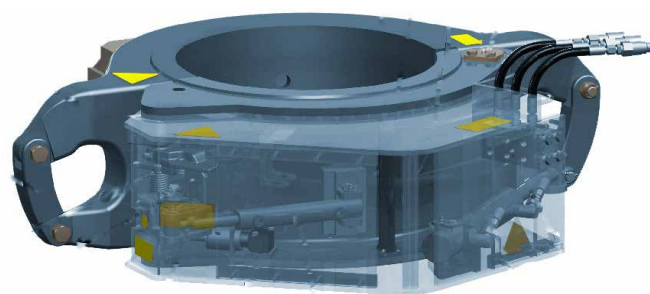


Fig. 5: Automated SDS -H elevator

Type	P-N	Rated Capacity
SDS 150-7-H	641620-Y-BC*-H	150 tons
SDS 250-3-H	642540-Y-BC*-H	250 tons
SDS 350-2-H	643520-Y-BC*-H	350 tons
SDS 350-4-H	643560-Y-BC*-H	350 tons
SDS 350-5-H	645580-Y-BC*-H	350 tons
SDS 350-6-H	645570-Y-BC*-H	350 tons
SDS 500-H	645500-Y-H	500 tons

* Bore Code

1.1.3 Bushing style VES SDS elevator type series

The series are designed with an interchangeable bushing bore to allow different contour fits of drill pipes to enhance efficiency on drill tubes and casings handling.

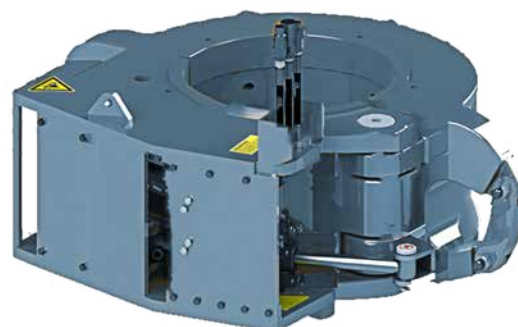


Fig. 6: VES SDS elevator

Type	P-N	Rated Capacity
VES SDS 150-3	641700-Y	150 tons
VES SDS 150-4	641710-Y	150 tons
VES SDS 150-7	641900-Y	150 tons
VES SDS 250-0	642700-Y	250 tons
VES SDS 250-1	642720-Y	250 tons
VES SDS 250-2	642740-Y	250 tons
VES SDS 250-3	642760-Y	250 tons
VES SDS 250-5	642780-Y	250 tons
VES SDS 250	642900-Y	250 tons
VES SDS 350	643600-Y	350 tons

1.2 Assemblies and Components

The members of the series consists of the assemblies and components as described below.

INFO



Please note that this illustration does not reflect the scope of delivery („V Warranty and Liability“ on page 6).

A catalog with complete general drawings and parts lists can be found in chapter 5 in this manual.

1.2.1 Manual SDS elevator type series

Item	Name	Item	Name
1	Body	2	Door
3	Latch	4	Safety Latch Lock
5	Verification pin		

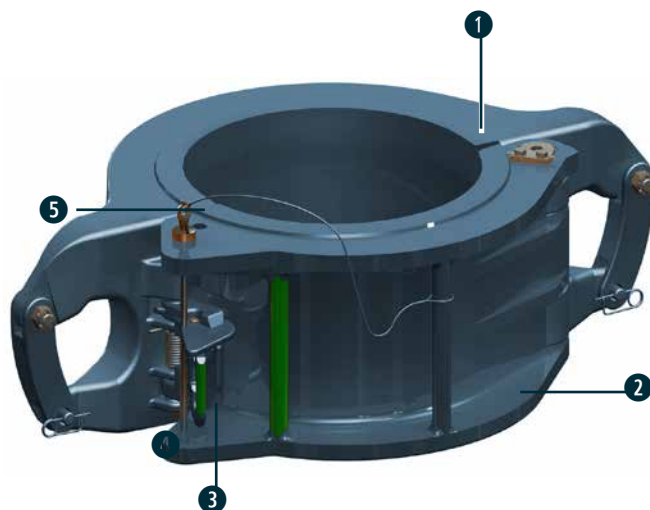


Fig. 7: Series -Main Assemblies

SDS 250-7 Type Series

Item	Name	Item	Name
1	Body	2	Door left
3	Latch	4	Safety Latch Lock
5	Verification pin	6	Door right

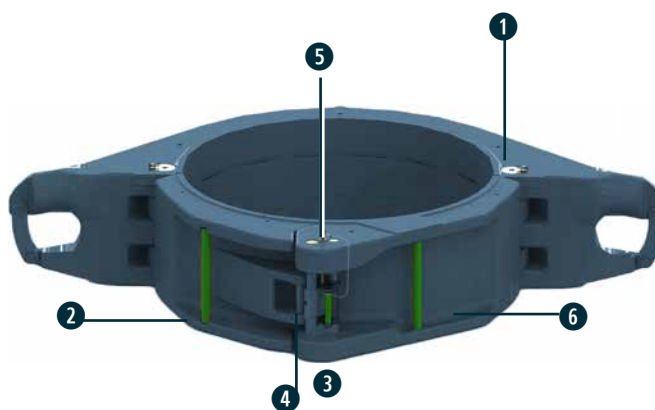


Fig. 8: SDS 250-7 - Main Assemblies

1.2.2 Automated SDS-H elevator type series

Item	Name	Item	Name
1	Body	2	Door
3	Serial Number	4	Hinge Pin
5	Grease Nipple	6	Elevator ears
7	Link Block	8	Latch
9	Latch Lock	10	Latch handle pin
11	Hydraulic Box	12	Door Cylinder
13	Latch Cylinder	14	Feedback Valve
15	Valve Block		

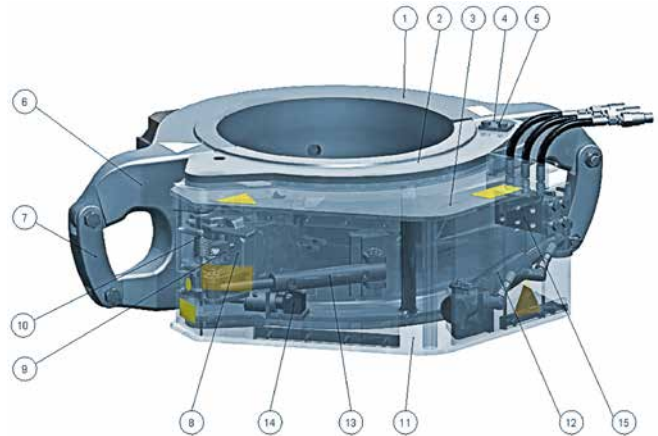


Fig. 9: SDS-H Type Series -Main Assemblies

1.2.3 Automated VES SDS elevator type series

Item	Name	Item	Name
1	Body	2	Door
3	Serial Number	4	Hinge Pin
5	Grease Nipple	6	Elevator ears
7	Link Block	8	Latch
9	Latch Lock	10	Latch handle pin
11	Hydraulic Box	12	Door Cylinder
13	Latch Cylinder	14	Feedback Valve
15	Valve Block		

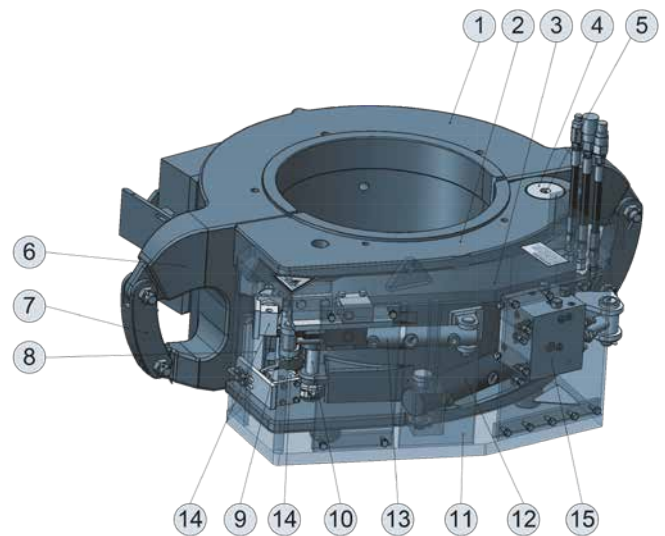


Fig. 10: VES SDS - Main Assemblies

1.2.4 Components and functional description

The SDS is constructed in 2 main parts, a body and a door. When the elevator is closed, the latch grips around the lug which is part of the body.

The latch lock assures the latch is properly locked. In order to validate the latch and latch lock are fully engaged, a verification pin must be fully installed.

Only then load should be transferred to the side door elevator.

Elevator Frame

The SDS Elevators are made of high-quality, heat treated and tested steel castings. For a proper balance during the opening and closing procedure the body and doors are constructed to meet the centre of gravity.

All elevators are made with a Latch Lock to secure the lock mechanism against accidental opening.

When the doors are open, the pipe is placed in the elevator.

On hydraulic devices [SDS-H and VES SDS] only after the elevator is properly closed and latched, the feedback signal „elevator closed and latched“ is given to the operator.

The frame takes the load transferred through the bushing system and transfers it to the elevator links.

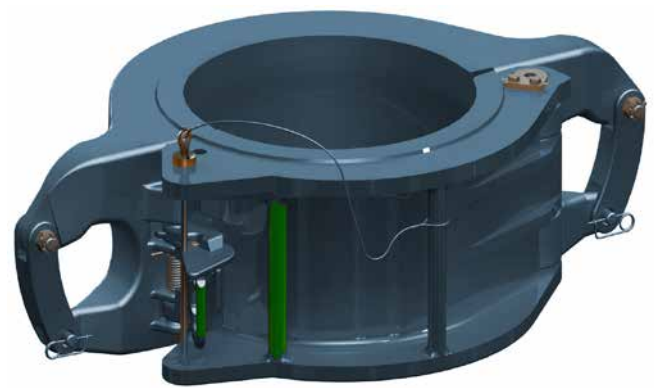


Fig. 11: SDS Elevator frame)

Bushing System [VES SDS only]

The design of the bushing segments allows the SDS to grip casing with uniform radial pressure, ensuring a safe hold while minimizing the possibility of damage to the pipes.

The SDS elevator can be converted for use as casing, drill pipe, drill collar or tubing elevator, and can be operated easily by one man due to replaceable bushing segments and a positive locking mechanism.



Fig. 12: SDS Bushing system

Verification pin

1. Verification pin
2. Distance plate
- 3+4. Steel wire + cable clamp
5. Clamp

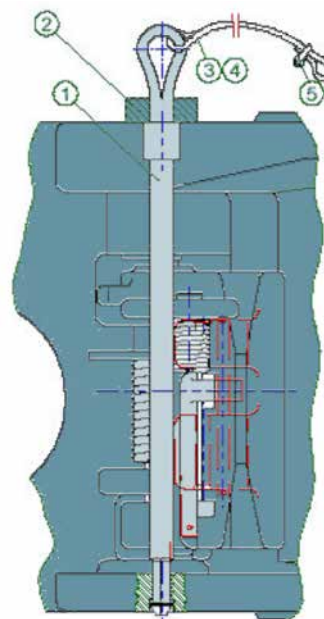


Fig. 13: SDS Verification Pin

Hydraulic Assembly [SDS-H and VES SDS-H]

Double acting hydraulic cylinders open and close the door. For this purpose it is necessary to supply pressure alternately to hydraulic connections.

The elevator has three connections on the rear (A, B and C for B + V type series
P, T and XP for VC type series).

A - used to close the elevator.

(P: Constant hydraulic pressure)

B - used to open the elevator.

(T: Tank Line)

C - used as a feedback line.

(XP: Pilot Signal (Feedback)).

- All hydraulic connections have a coupling bushing and a plug coupling with quick connection couplings, $\frac{3}{8}$ " and $\frac{1}{4}$ ".

The used coupling by Forum B + V Oil Tools meet the ISO 16028 standard and are ideal for interchangeability with other manufacturers.

This features include the ability to connect with virtually no air inclusion or disconnect with little or no spillage.

- 3046 psi maximum operating pressure for all sizes (connected and disconnected)
- Push-to-connect
- Standard sleeve-locking equipment prevents accidental disconnection
- Hydraulic feedback signal "Elevator closed":
When the elevator is fully closed and latched the driller receives a hydraulic closing signal (feedback signal).

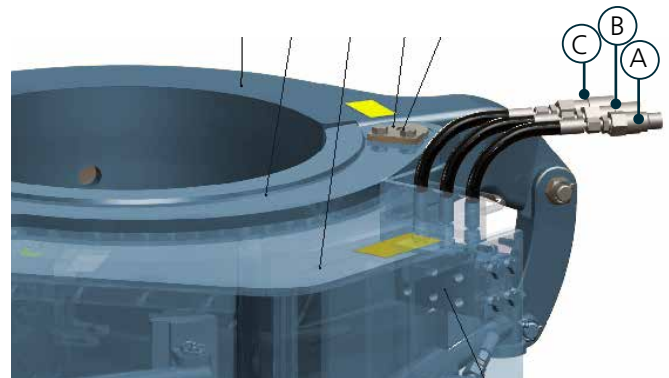


Fig. 14: SDS Hydraulic connections - B + V Connections

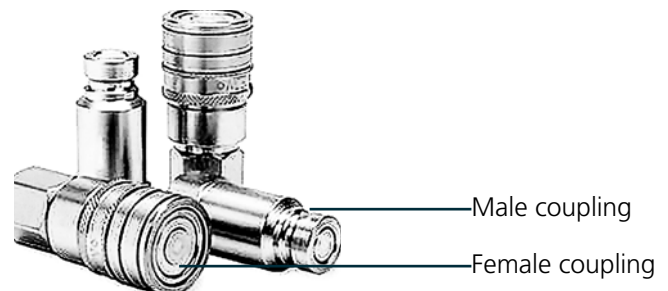


Fig. 15: SDS Hydraulic connections

1.3 Optional Accessories

To ease the handling and to support the equipment functions following accessories are available from Forum B + V Oil Tools for the SDS.

Please contact your local Forum B + V Oil Tools representant for detailed information.

- **Grease Pump, manual** PN 755667-3
Manual grease pump to apply grease on the equipment grease points.
- **Grease Pump, air operated** PN 775810
Air operated grease pump to apply grease on the equipment grease points.
- **Control Unit** [SDS-H] PN 737160
The Control Unit allows simple and convenient control of the SDS. The control unit contains all controls and regulating elements required for operation of the equipment.



Fig. 16: Manual Grease Pump

Fig. 17: 1 Air Operated Grease Pump



Fig. 18: Control Unit

- Locking Equipment two-handed operation

The locking equipment is an optional feature for the SDS-elevators which are operated with two hands. The locking equipment prevents the incorrect setting of the verification pin when the elevator door is opened or not completely closed. Only when the elevator door is properly closed, the equipment mechanism can unlock the bore and the verification pin can be inserted.

Elevator type	PN w-o locking equipment	PN of optional locking equipment
SDS 65	640600-Y-BC	640600-3
SDS 100-1	641020-Y-BC	641020-3
SDS 100-2	641000-Y-BC	641000-3
SDS 100-3	641040-Y-BC	641040-3
SDS 150-1	641500-Y-BC	641500-3
SDS 150-2	641520-Y-BC	641520-3
SDS 150-3	641540-Y-BC	641540-3
SDS 150-4	641560-Y-BC	641560-3
SDS 150-5	641580-Y-BC	641580-3
SDS 150-7	641620-Y-BC	641620-3
SDS 250-0	642600-Y-BC	642600-3
SDS 250-1	642500-Y-BC	642500-3
SDS 250-2	642520-Y-BC	642520-3
SDS 250-3	642540-Y-BC	642540-3
SDS 250-5	642580-Y-BC	642580-3
SDS 350-1	643500-Y-BC	643500-3
SDS 350-4	643560-Y-BC	643560-3

1.4 Technical Data

1.4.1 Side Door Elevator SDS type series

Elevator Type	SDS 65	SDS 100	SDS 150	SDS 250	SDS 350	SDS 500	SDS 750
Temperature working range	- 20° C to + 60° C ¹ - 4° F to 140° F						
Load Capacity	65 tons	100 tons	150 tons	250 tons	350 tons	500 tons	750 tons
Maximum permitted horizontal load rating ²	-	5 tons	7.5 tons	12.5 tons	17.5 tons	25 tons	37,5 tons
API test load	97,5 tons	150 tons	225 tons	375 tons	525 tons	750 tons	1125 tons

¹ Temperatures below - 20°C / -4°F on request ² 5% of load capacity

Pipe Diameter and Size

Type	P/N	Rated capacity Tons	Minimum size	Maximum size	Link size Min. - Max	Max. Weight (Lb/kg)
SDS 65	640600-Y-BC	65	1.66"	2.7/8"	1.3/4" - 2.1/4 "	100 / 45
SDS 100-1	641020-Y-BC	100	2.3/8"	4.1/8"	1.3/4" - 2.1/4"	130 / 59
SDS 100-2	641000-Y-BC	100	4"	6.3/4"	1.3/4" - 2.3/4"	250 / 113
SDS 100-3	641040-Y-BC	100	6.3/4"	9.5/8"	1.3/4" - 2.3/4"	275 / 124
SDS 150-1	641500-Y-BC	150	4"	6.3/4"	1.3/4" - 3.1/2"	230 / 104
SDS 150-2	641520-Y-BC	150	6.3/4"	9.5/8"	1.3/4" - 3.1/2"	285 / 130
SDS 150-3	641540-Y-BC	150	9.5/8"	12.3/4"	1.3/4" - 3.1/2"	350 / 160
SDS 150-4	641560-Y-BC	150	13"	16"	1.3/4" - 3.1/2"	610 / 276
SDS 150-5	641580-Y-BC	150	16.3/4"	20"	1.3/4" - 3.1/2"	815 / 370
SDS 150-7	641620-Y-BC	150	24"	30"	1.3/4" - 3.1/2"	880 / 400
SDS 250-0	642600-Y-BC	250	6.1/2"	9.5/8"	2.1/4" - 3.1/2"	530 / 240
SDS 250-1	642500-Y-BC	250	9.5/8"	13.3/8"	2.1/4" - 3.1/2"	583 / 265
SDS 250-2	642520-Y-BC	250	13.3/8"	18.5/8"	2.1/4" - 3.1/2"	836 / 380
SDS 250-3	642540-Y-BC	250	18.5/8"	20"	2.1/4" - 3.1/2"	880 / 400
SDS 250-5	642580-Y-BC	250	24"	30"	2.1/4" - 3.1/2"	1410 / 640
SDS 250-6	642620-Y-BC	250	30"	36"	2.1/4" - 3.1/2"	1715 / 777
SDS 250-7	642630-Y-BC	250	36.1/4"	42"	2.1/4" - 3.1/2"	1796 / 815
SDS 350-1	643500-Y-BC	350	6.3/4"	9.3/4"	2.3/4" - 3.1/2"	940 / 426
SDS 350-2	643520-Y-BC	350	10.3/4"	16.3/4"	2.3/4" - 3.1/2"	1510 / 685
SDS 350-4	643560-Y-BC	350	18.5/8"	21.1/2"	2.3/4" - 3.1/2"	1395 / 632
SDS 350-5	643580-Y-BC	350	24"	30"	2.3/4" - 3.1/2"	2375 / 1077
SDS 350-6	643570-Y-BC	350	30"	36"	2.3/4" - 3.1/2"	1715 / 777
SDS 500	645500-Y-BC	500	10.3/4"	16"	3.1/2" - 4.3/4"	2161/980
SDS 750	647500-Y-BC	750	10.3/4"	16"	3.1/2" - 4.3/4"	2161/980

INFO



The term Bore Code and „BC“ is a placeholder for various pipe-types with different diameters.

A list of bore codes can be found in the Forum B + V Oil Tools General Catalog.

With the sale request the complete part number of desired Bore Code (BC) is specified for example as 645600-109

(Instead of 645600-BC).



Fig. 20: Side Door Elevator SDS illustration

Main Dimensions

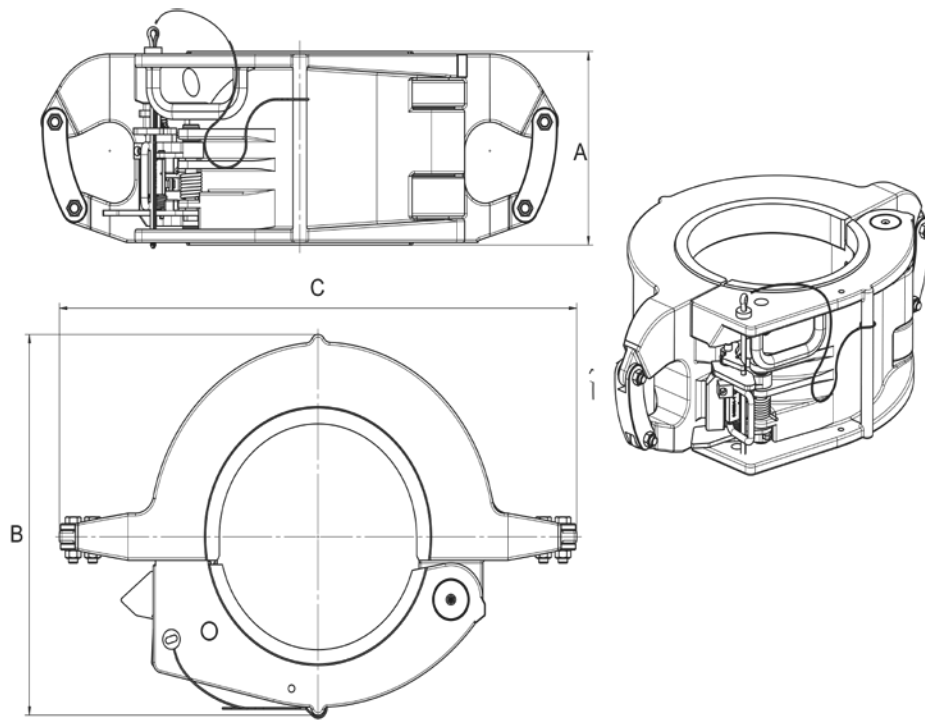


Fig. 19: SDS Dimensions

Type	P/N	A in [mm]	B in [mm]	C in [mm]
SDS 65	640600-Y-BC	9,84 [250]	9,53 [242]	20,87 [530]
SDS 100-1	641020-Y-BC	10,43 [265]	10,71 [272]	22,05 [560]
SDS 100-2	641000-Y-BC	10,43 [265]	15,08 [383]	25,59 [650]
SDS 100-3	641040-Y-BC	10,43 [265]	17,52 [445]	29,92 [760]
SDS 150-1	641500-Y-BC	11,02 [280]	15,35 [390]	27,64 [702]
SDS 150-2	641520-Y-BC	11,02 [280]	18,15 [461]	30,79 [782]
SDS 150-3	641540-Y-BC	11,02 [280]	21,3 [541]	34,72 [882]
SDS 150-4	641560-Y-BC	11,42 [290]	25,04 [636]	39,06 [992]
SDS 150-5	641580-Y-BC	10,63 [270]	31,5 [800]	43,54 [1106]
SDS 150-7	641620-Y-BC	14,17 [360]	41,34 [1050]	58,43 [1484]
SDS 250-0	642600-Y-BC	12,99 [330]	17,91 [455]	34,96 [888]
SDS 250-1	642500-Y-BC	12,99 [330]	21,46 [545]	39,21 [996]
SDS 250-2	642520-Y-BC	12,99 [330]	27,09 [688]	45,12 [1146]
SDS 250-3	642540-Y-BC	12,99 [330]	29,21 [742]	46,06 [1170]
SDS 250-5	642580-Y-BC	13,39 [340]	40,63 [1032]	56,3 [1430]
SDS 250-6	642620-Y-BC	14,57 [370]	48,43 [1230]	67,72 [1720]
SDS 250-7	642630-Y-BC	16,46 [418]	60,51 [1537]	89,53 [2274]
SDS 350-1	643500-Y-BC	14,57 [370]	21,65 [550]	37,4 [950]
SDS 350-2	643520-Y-BC	14,57 [370]	28,62 [727]	44,69 [1135]
SDS 350-4	643560-Y-BC	14,57 [370]	32,09 [815]	49,06 [1246]
SDS 350-5	643580-Y-BC	14,57 [370]	43,5 [1105]	57,99 [1473]
SDS 350-6	643570-Y-BC	14,57 [370]	48,43 [1230]	67,72 [1720]
SDS 500	645500-Y-BC	15,75 [400]	30,71 [780]	48,39 [1229]
SDS 750	647500-Y-BC	15,75 [400]	30,71 [780]	48,39 [1229]

1.4.2 Side Door Elevator VES SDS type series

Elevator Type	VES SDS 250	VES SDS 350	VES SDS 500
Temperature working range		- 20° C to + 60° C ¹ - 4° F to 140° F	
Load Capacity	250 tons	350 tons	500 tons
Maximum permitted horizontal load rating ²	12.5 tons	17.5 tons	25 tons
API test load	375 tons	525 tons	750 tons

1 Temperatures below - 20°C / -4°F on request 2 5% of load capacity

Main Dimensions

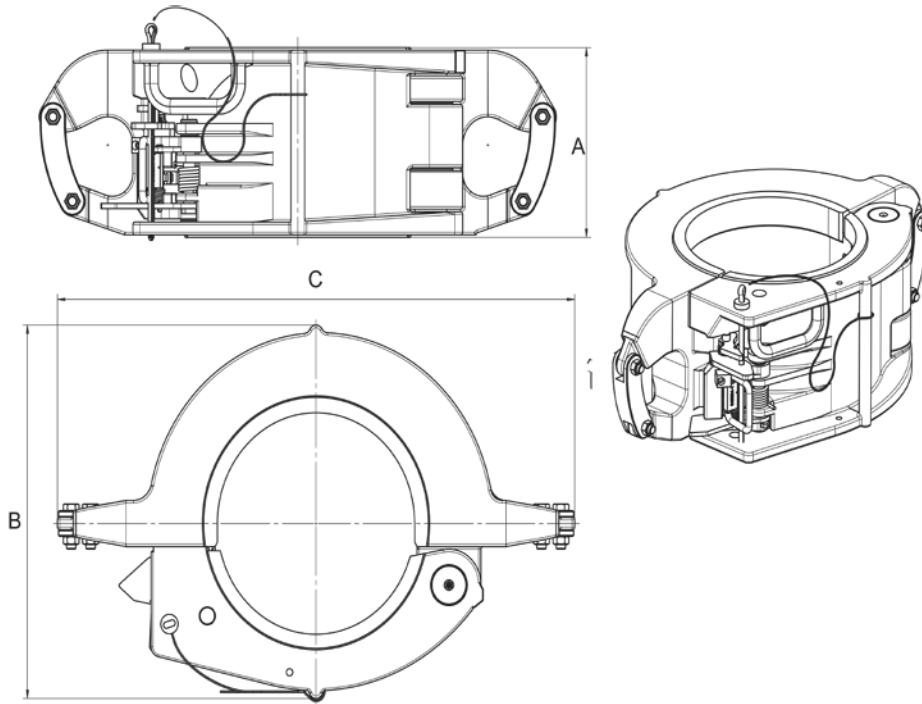


Fig. 21: VES SDS Dimensions

Type	P/N	A in [mm]	B in [mm]	C in [mm]
VES SDS 250-3	642760-Y	14,17 [360]	29,21 [742]	46,06 [1170]
VES SDS 350-2	643600-Y	17,09 [434]	28,62 [727]	44,69 [1135]
VES SDS 500	645600-Y	18,98 [482]	30,71 [780]	48,39 [1229]

1.4.3 Side Door Elevator SDS - H Type series

Elevator Type	SDS 150-7-H	SDS 250-3-H	SDS 350-2-H	SDS-350-4-H
Temperature working range ambient	- 40° C to + 60° C * - 40° F to 140° F			
Load Capacity	150 sh tons	250 sh tons	350 sh tons	350 sh tons
Pipe Size	24" - 30"	18.5/8" - 20"	18.5/8" 21.1/2"	18.5/8" 21.1/2"
Elevator links	1.3/4" - 3.1/2"	2.1/4" - 3.1/2"	2.1/4" - 3.1/2"	2.1/4" - 3.1/2"
Weight	2381 lb / 1080 kg	1356 lb / 615 kg	1744 lb / 791 kg	1744 lb / 791 kg
Operating pressure	80 - 160 bar (1160 - 2320 psi)			
Maximum pressure	210 bar (3096 psi)			
Volumetric flow	17 - 20,8 l/min. (4.5 - 5.5 GPM)			

Hydraulic pressure on C-line (feedback signal) when elevator is properly closed and latched: same as operating pressure.

Main Dimensions

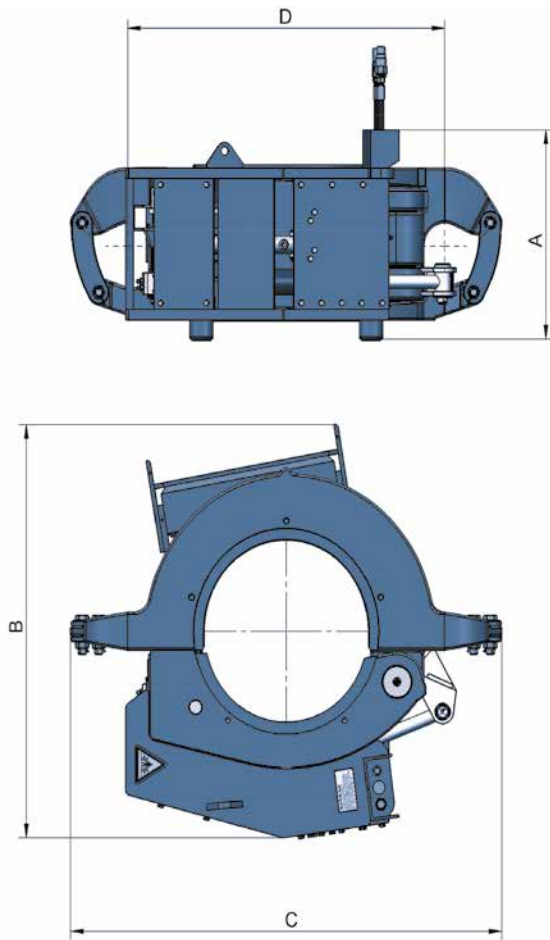


Fig. 22: SDS-H Dimensions

Type	P/N	A	B	C	D in [mm]
SDS 150-7-H	641620-Y-BC*-H	14,17 [360]	55,24 [1403]	58,43 [1484]	49,69 [1262]
SDS 250-3-H	642540-Y-BC*-H	13,74 [349]	44,65 [1134]	46,06 [1170]	35,04 [890]
SDS 350-2-H	643520-Y-BC*-H	19,49 [495]	38,5 [978]	44,57 [1132]	32,76 [832]
SDS 350-4-H	643560-Y-BC*-H	14,57 [370]	46,93 [1192]	49,06 [1246]	37,24 [946]
SDS 350-5-H	645580-Y-BC*-H	on request			
SDS 350-6-H	645570-Y-BC*-H	on request			
SDS 500-H	645500-Y-H	on request			

* Bore Code

1.5 Optional Accessories

To ease the handling and to support the equipment functions following accessories are available for the SDS. Please contact your local **Forum B + V Oil Tools** representant for detailed information.

- **Grease Pump , manual** PN 755667-3
Manual grease pump to apply grease on the equipment grease points.
- **Control Unit**
The Control Unit allows simple and convenient control of the SDS. The control unit contains all controls and regulating elements required for operation of the equipment.



Fig. 23: Manual Grease pump



Fig. 24: Control Unit

1.5.1 Recommended Hydraulic Fluid

Forum B + V Oil Tools recommends use of the following hydraulic fluids under various ambient conditions:

Brand	Flash point [°F/(°C)]	Above - 4 °F (-20 °C)	Flash point [°F/(°C)]
Aral	435.2 (224)	Aral Vitam GF 46	392 (200)
Castrol	392 (200)	Hyspin AWS-46	366.8 (186)
Gulf	410 (210)	Harmony 46AW	395.6 (202)
Shell	424.4 (218)	Tellus Tonna	408.2 (209)
Finke	572 (300)	Aviaticon HY-HE-46	509 (265)
Fuchs	428 (220)	Renolin MR 10	410 (210)

1.5.2 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
Castrol	MP grease	-20. . +29 °C (-4. . +84.2 °F)	
Chevron	Avi-Motive W	-20. . +29 °C (-4. . +84.2 °F)	
Exxon	Lidok EP2	-20. . +29 °C (-4. . +84.2 °F)	
Gulf	Gulfcrown EP@	-20. . +29 °C (-4. . +84.2 °F)	
Mobil	Mobilux EP2	-20. . +29 °C (-4. . +84.2 °F)	
Shell	Alvania EP2	-20. . +29 °C (-4. . +84.2 °F)	
Texaco	Multifak EP2	-20. . +29 °C (-4. . +84.2 °F)	
Union	Unoba EP2	-20. . +29 °C (-4. . +84.2 °F)	

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

Info



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

1.6 Operational Environment

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

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

The equipment is approved for operation in explosion hazard areas. For machines containing any hydraulic powered parts, the directive 2014 / 34 / EC "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 pneumatic equipment
or

CE **Ex** II 2G IIB T6 for manual equipment

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 Category for Gases

T5/T6 Temperature class

1.7 Hazardous Locations

This section shows hazardous locations.

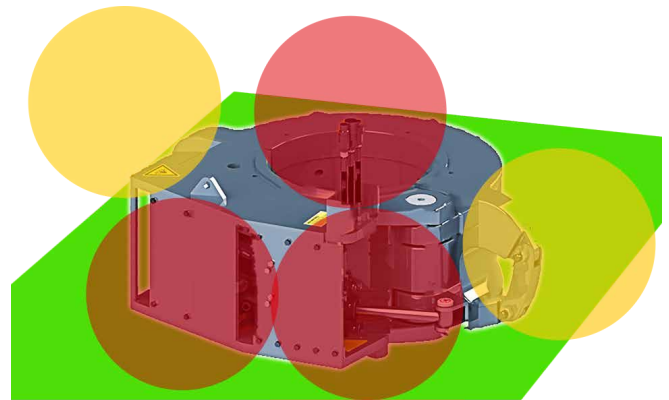


Fig. 25: SDS Working place Maintenance and Storage

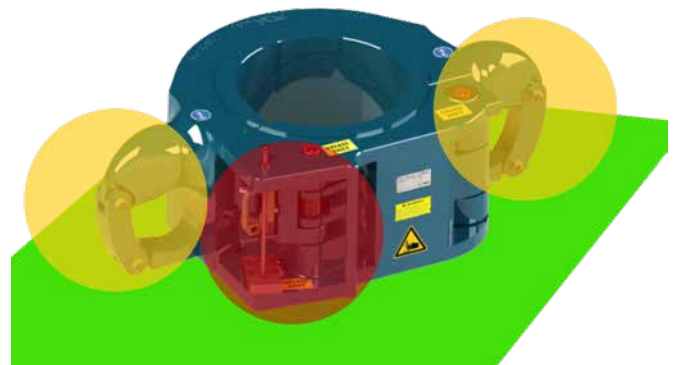


Fig. 26: SDS Working place operation

Maintenance work

- » A free space of approx. 4 m² around the SDS is required for work (e.g. maintenance work).

Lifting and Operation

- » A free space of approx. 1 m around the SDS is required for Lifting and operation.

⚠ WARNING Stay additionally away from the Load hooks.

Operation

- » A free space of approx. 1 m around the VES SD is required for operation.

⚠ WARNING Stay additionally away from the lifting assembly.

1.8 Equipment Markings

The markings are generally used for traceability and provide general information about the component/ equipment. All markings are in compliance to the latest API 8C and at least include the following information:

General Markings according to API 8C

- API Stamp (API monogram, spec, license)
- Manufacturer's specifications (FORUM logo)
- Production Date (Month / Year)
- Part number (marking P/N before the part number)
- Serial number (marking S/N before the serial number)
- Load Rating
- Equipment weight
- CE-ATEX marking (CE Ex II 2G IIB T5 / T6)
- Country of manufacture

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



Fig. 27: Contact with Technical Support

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

1.9 Controls

Operation of the SDS is controlled remotely from the doghouse or driller cabin. The connections for the hydraulic controls are located on the hydraulic assembly.

List of optional Control Units

Following Control Units are available for the VES SDS.
For Installation of the Control Unit refer to Control Units manual.

INFO



Please contact the Forum B + V Oil Tools Technical Support or one of the authorized service companies specified to order a Control Unit or in the event of any questions

PN	Description	Dimension	Function
757160	B+V Type Compact Stand Alone hydraulic operated Control Unit for Power Slips or Elevators, manual controlled. c/w Feedback signals (Slip up and down/Elevator closed) and hose couplingsC	1143x450x300	- OPEN/CLOSE (Manual operated)
645003-3	Control Unit (electrical) for VES-SD-Elevators (without Rotators) Ex-proofed for Group II Zone 1 Gas - Ex II 2 G, supply 24V DC	500x500x300	- OPEN/CLOSE (electric piloted)

1.10 Component Sizes and Drill Strings

The pipe diameters and matching components are listed with part numbers below for precise layout of the VES SDS 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 bushings are installed. Never operate the VES SDS without bushings.

INFO



Please contact the Forum B + V Oil Tools Technical Support or one of the authorized service companies specified to order VES SDS Bushings not listed in this table.

VES SDS Bushings

Part number	Description and Pipe size
VES SDS 150	
641700-194	Bushing assembly 8" Drill Collar
641700-199	Bushing assembly 9.½" Drill Collar
641700-229	Bushing assembly 7" Drill Collar
641700-231	Bushing assembly 7.⅝" Drill Collar
641700-236	Bushing assembly 9.⅝" Drill Collar
641700-238	Bushing assembly 10.¾" Drill Collar
641700-243	Bushing assembly 13.⅜" Drill Collar
641700-245	Bushing assembly 16" Drill Collar
641700-248	Bushing assembly 18.⅝" Drill Collar
641700-249	Bushing assembly 20" Drill Collar
VES SDS 250	
642800-224	Bushing assembly VES SDS 250-0 5.½" Drill Collar
642800-228	Bushing assembly VES SDS 250-0 6.⅝" Drill Collar
642820-229	Bushing assembly VES SDS 250-1 7" Casing
642820-231	Bushing assembly VES SDS 250-1 7.⅝" Drill Collar
642820-236	Bushing assembly VES SDS 250-1 9.⅝" Drill Collar
642820-238	Bushing assembly VES SDS 250-1 10.¾" Drill Collar
642820-242	Bushing assembly VES SDS 250-1 13" Drill Collar
642820-243	Bushing assembly VES SDS 250 13.⅜" Casing
642840-244	Bushing assembly VES SDS 250-2 14.¾" Drill Collar
642840-245	Bushing assembly VES SDS 250 16" Casing
642840-246	Bushing assembly VES SDS 250-2 16.¾" Drill Collar
642860-248	Bushing assembly VES SDS 250-3 18.⅝" Casing
642860-249	Bushing assembly VES SDS 250-3 20" Casing
642860-250	Bushing assembly VES SDS 250-3 21.½" Casing
642880-251	Bushing assembly VES SDS 250-5 24.¼" Casing
642880-252	Bushing assembly VES SDS 250-5 26" Casing
VES SDS 350	
643610-230	Bushing Assembly VES SDS 350-2 7.¾" Casing
643610-231	Bushing Assembly VES SDS 350-2 7⅝" Casing
643610-234	Bushing Assembly VES SDS 350-2 8.⅝" Casing
643610-236	Bushing Assembly VES SDS 350-2 9.⅝" Casing
643610-238	Bushing Assembly VES SDS 350-2 10.¾" Casing
643610-239	Bushing Assembly VES SDS 350-2 11.¾" Casing
643610-240	Bushing Assembly VES SDS 350-2 12" Casing
643610-241	Bushing Assembly VES SDS 350-2 12.¾" Casing
643610-242	Bushing Assembly VES SDS 350-2 13" Casing
643610-243	Bushing Assembly VES SDS 350-2 13.⅝" Casing
643610-244	Bushing Assembly VES SDS 350-2 14.¾" Casing
643610-245	Bushing Assembly VES SDS 350-2 16" Casing
643630-246	Bushing Assembly VES SDS 350-4 16.¾" Casing
643630-247	Bushing Assembly VES SDS 350-4 18" Casing

1.11 RFID-Chip Equipped Handling Equipment Equipment

INFO



For further information, you may access the Forum/IC Database from the FET Website or at www.infochip.com

FORUM Handling Tools outfits/supplies certain equipment with patent pending RFID Technology. This technology allows for easy real-time access to pertinent equipment information and technical documentation anytime, anywhere. The database is accessible via the internet or mobile application.

Tier I Access – General Access

As standard, the customer will be assigned and issued login information to the database provided for their assets/equipment. Once logged into the database, customers will be able to see all assets assigned to them. Attached to each asset is complete documentation including all contents of databook related to that specific asset. The customer will be able to view, download and print all documents associated with their particular assets.

Tier II Access – User Access

Customers opting for improved access as a system user will have the full functionality of Tier I Access but will be able to manipulate their assets. Additional functionality includes but is not limited to:

- Assigning Inspection and Certification due dates and reminders.
- Attaching Internal Inspection Checklists/Documentation.
- Managing Asset Locations.
- Assigning Internal Asset/Serial Numbers.

INFO



For detailed RFID instruction, please refer to Forum Document 1155081, FORUM RFID User Manual („XI Contact worldwide“ on page 11). The RFID Chip will be placed in the type series only. Not applicable for prototypes.

Frequently Asked Questions (FAQ)

- How do I know if my equipment has RFID?
 - » RFID tags are embedded and clearly marked (“RFID”) on equipment in inconspicuous locations generally at the upper visible part of the equipment.
- What type of RFID tag are we using?
 - » The RFID tags used in FORUM equipment operate on the UHF Frequency.
- How can I scan the tag?
 - » Standard NFC UHF Frequency Reader (available through Forum).
- What is on the tag/chip?
 - » The chip identification number is the only information physically on the chip. All other information is stored on the cloud-based database associated with the chip identification number.
- Whom do I contact to get Tier I access or to inquire about Tier II access?
 - » Forum Sales personnel can help with basic access and upgrade information.

SAFETY

SAFETY

2 Safety

The SDSs are designed and produced with consideration of all required safety precautions.

Failure to observe the safety precautions and operating instructions specified in this manual can lead to hazardous situations when operating the equipment. While it is not possible to eliminate all hazardous situations with awareness and instruction from this manual, good judgement should be used at all times surrounding the use of this equipment.

This equipment should only be used for its intended purpose.

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

2.1 General Safety Precautions

Ensure that work on the Equipment, particularly installation, maintenance and repair work, is performed only by personnel with the necessary qualifications and who are familiar with the associated risks (refer to section VI "Obligations of the Operating Company" on page 7).

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

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

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

Safety features may be released only when:

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

The Equipment contains components subject to wear. After longer periods of operation the safety can be reduced due to wear. Service the Equipment regularly in compliance with the maintenance chart (refer to section 6.2 "Lubrication" on page 109) 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, switch off the Equipment and secure it against being switched back on unintentionally. Advise the responsible service organization. Rectify every fault, which affects the safety, immediately.

2.2 Safety Equipment

The Side Door Elevator SDS 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.
- The hydraulic lines are connected with safety quick-release couplings.
- Hazard points on the Equipment are marked with signs („Safety Precautions" on page 32), 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 open the Elevator when load is still suspended by the Elevator.
- » Never remove the safety equipment or replace it with safety equipment not approved by Forum B + V Oil Tools. Failure to observe this instruction can lead to hazardous situations for which Forum B + V Oil Tools cannot be held responsible.
- » Always keep all safety equipment in working condition and check integrity regularly.

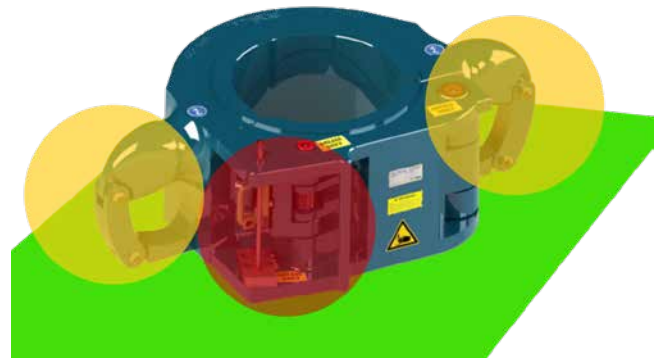


Fig. 28: Center Latch Elevator type series hazardous areas

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.



2.4 Operation Manual and Equipment

The safety precautions in this operating manual are indicated using standardized depictions and symbols. 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.



⚠ Caution

Risk of stumbling/tripping!

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



⚠ WARNING

Health hazards from service products!

This symbol warns of health hazards resulting from contact of service products (e.g. lubricants) with the skin, mucous membranes, eyes and respiratory paths.

2.5 Safety Precautions against Remaining Hazards

This Equipment was designed and produced in consideration of the safety precautions specified in EC Directive 2006 / 42 / EU on Machinery.

The Equipment may be used only for:

- Its intended purpose (refer to section II "Intended Use" on page 5).
- When it is in a technically safe state.

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

⚠ WARNING

Mechanically generated sparks

During some troubleshooting tasks, like such as clamping components, the use of metal tools like hammers can generate sparks.



- The use of metallic tools like hammers in hazardous areas must 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 equipment is familiar with the remaining risks and observe the appropriate safety precautions.



2.5.1 Warning and Safety Instructions on Equipment

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

SAFETY

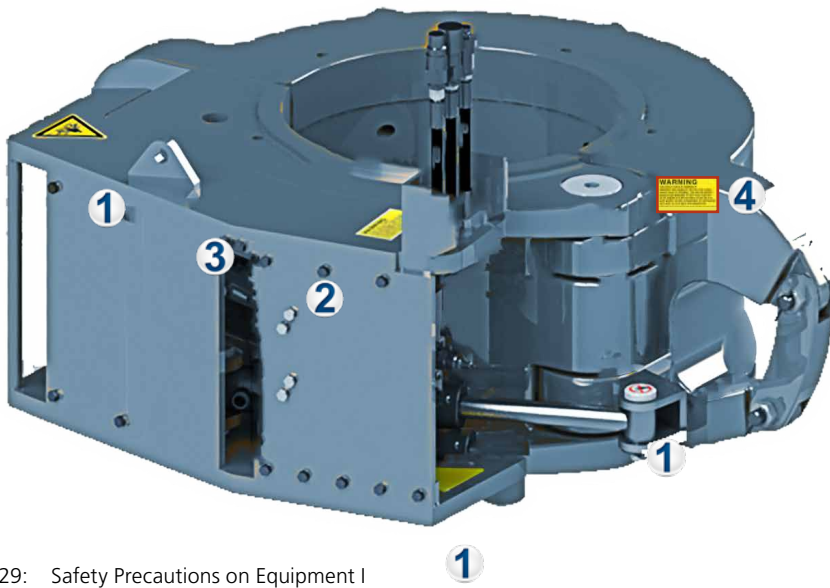


Fig. 29: Safety Precautions on Equipment I



Fig. 30: Safety Precautions on Equipment II

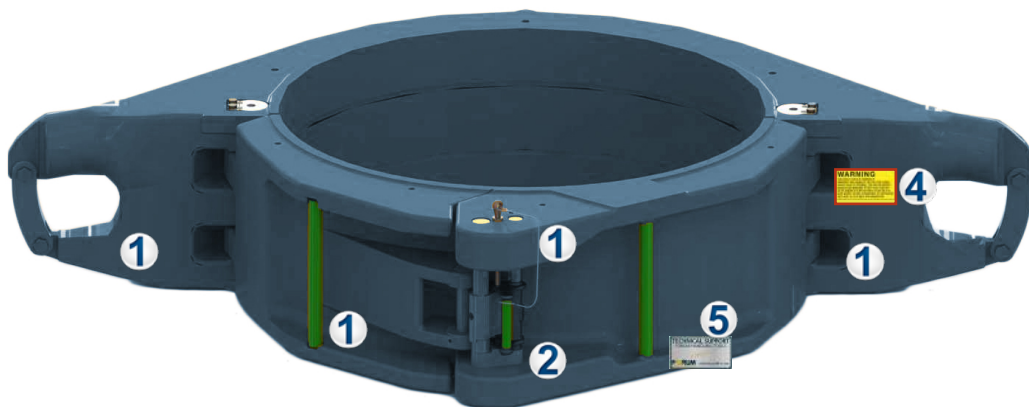


Fig. 31: Safety Precautions on Equipment III


1 **⚠ WARNING**



Danger of pinching/
crushing hands!
Keep clear of moving
parts during operation.


WARNING sign
"Hazard – Hand Injury"
ANSI Z535.4
PN 671640-1

2 **⚠ NOTE**



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

3 **⚠ WARNING**



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

WARNING sign
"Body crushing"
ANSI Z535.4
PN 671641

4 **WARNING**

THIS PRODUCT COULD BE HAZARDOUS IF
IMPROPERLY USED. MISUSE OF THIS TOOL COULD CAUSE
SERIOUS INJURY TO PERSONNEL. THIS MUST BE PROPERLY
INSTALLED AND MAINTAINED IN FIRST CLASS CONDITION.
DO NOT REMOVE OR ALTER ANY PARTS. DO NOT WELD OR
ALTER WITHOUT FACTORY AUTHORIZATION. ALL REPLACEMENT
PARTS MUST BE OF BLOHM & VOSS MANUFACTURE.

WARNING sign
General WARNING
PN 671638

5 **TECHNICAL SUPPORT**
FORUM B + V Oil Tools GmbH
...at your service!
roaftersales.bvr@f-e-t.com **FORUM**
ENERGY TECHNOLOGICS

Support sticker
PN 613129

2.5.2 Incorrect Handling of Hydraulic Equipment

⚠ WARNING



Defective hydraulic lines pose an injury hazard!

- » Route hydraulic lines safely and check regularly for damage.
- » Provide lines with chafe protection.
- » Replace defective lines immediately.

⚠ WARNING



Separated hydraulic lines pose an injury hazard!

- » Hydraulic fluid can escape under high pressure.
- » Always relieve pressure in hydraulic equipment before working on Equipment.
- » Check hydraulic connections regularly to ensure that they are properly fastened.

⚠ WARNING



Hydraulic fluid can pose a health hazard!

- » Hydraulic fluids can lead to skin and eye injury and poisoning symptoms upon contact.
- » Avoid direct contact with hydraulic fluids.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

Hydraulic lines which are weakened due to incorrect routing or damage can burst under load. The hydraulic fluid then escapes under pressure resulting in a powerful jet, which can lead to skin or eye injury.

For this reason always

- Lay hydraulic lines so that they are not kinked or pinched.
- Check regularly for damage and replace as required.

Always wear your personal protective equipment.

⚠ CAUTION



Danger of stumbling and Equipment defects!

Before turning the drilling table ensure that the supply lines for the Side Door Elevator SDS are disconnected, to prevent the hoses from tearing.

Hydraulic system safety instructions

1. Release the pressure in all lines carrying hydraulic oil prior to any maintenance and repair work.
 - Lower all hydraulically controlled components to the ground.
 - Move all control levers of the hydraulic control valves several times.
2. Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries. Always consult a doctor immediately even if the wound seems insignificant – otherwise serious infections could set in!
3. Replace the hose or line if one of the problems mentioned below is detected.
 - Damaged or leaky hydraulic seals.
 - Worn or torn shells or uncovered reinforcement branches.
 - Expanded shells in several positions.
 - Foreign bodies jammed or stuck in protective layers.
4. Re-tighten leaking screwed fittings and hose connections only when the system is not under pressure; i.e. release the pressure before working on pressurized lines!
5. Never weld or solder damaged or leaking pressure lines and screw connections. Replace damaged parts with new ones!
6. Never search for leaks with your bare hands or eyes, always wear protective gloves and eye protection!
 - Use paper or wood to check for minor leaks.
7. Leaks and damaged pressure lines must be immediately repaired or replaced.

2.5.3 Risk of Stumbling/Tripping

**⚠ CAUTION****Risk of stumbling/tripping!**

When VES SDS are installed in level with or above rig floor.

- » DO NOT RUN AND watch step.

2.5.4 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.

2.5.5 Human Error

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

Safe Work

1. All personnel working on the equipments are responsible for paying attention to their colleagues.
2. Consumption of alcohol and drugs is prohibited.
3. Work on the VES SDS is not permissible after taking medication which reduces reactions.
4. AT LEAST visual contact must exist between the operator in the doghouse and the personnel at the VES SDS, to allow communication via hand signals.
5. The personal protective equipment must always be kept and used in perfect condition.
6. All personnel working on the SDS, must be familiar with and observe the safety precautions in this instruction manual and on the equipment.
7. The instructions for handling and maintenance intervals specified in this operating manual must be observed.
8. Keep a copy of this operating manual in the vicinity of the equipment, where it is accessible at all times.

2.6 Organizational Measures

The operating company is responsible for ensuring that all legally and officially prescribed approvals for operation of the Equipment are present and in compliance with national laws and regulations. The required personal protective equipment (refer to section IX "Personal Protective Equipment (PPE)" on page 10) must be provided by the company operating the Equipment. All safety features present must be checked regularly in compliance with national and local requirements. Warning signs and safety notices on the Equipment must be legible at all times and replaced as required. The operating instructions must be kept so that they are available to those operating the Equipment at all times.

Personal Protective Equipment

The required Personal Protective Equipment (PPE) must be used when operating the Equipment. 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.

2.7 Accidents, Fire

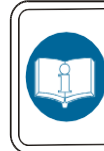
Basic rules in event of accidents or fire

1. Move accident victims out of hazard area and switch off Equipment 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.

SAFETY INSTRUCTIONS

for [VES] SDS Series Elevator



WARNING

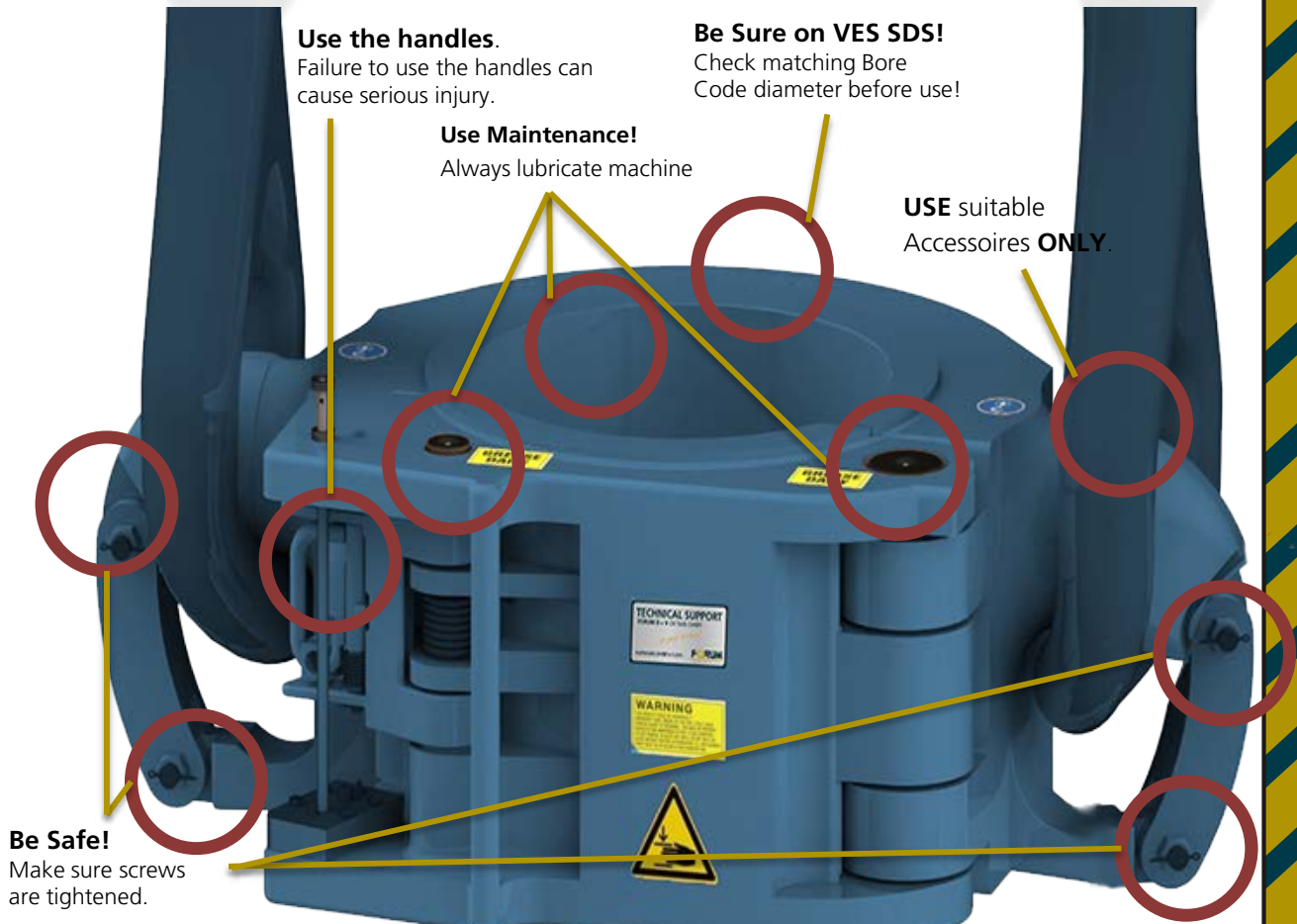
To reduce the risk of injury, everyone using, installing, performing maintenance, changing accessories on, or working with this tool must read and understand these instructions before operation.

*OUR goal is to produce tools that help you work safely and efficiently.
The most important safety device for this tool is YOU.
YOUR good judgement is the best protection against injury.*

The **FORUM Handling Tools** elevator were designed and produced in consideration of all required safety precautions. For safe and proper use it is essential that all personnel working on the machine take the prescribed safety measures and observe the safety precautions specified when operating the machine.

► Inspection Guide

- ⚠ **Use the equipment** only for the intended purpose in a safe state.
- ⚠ **Rectify all faults** immediately which could have a negative effect on the safety.
- ⚠ **All safety features** must be **installed** completely before operation.
- ⚠ The equipment contains components **subject to wear** (e.g. Hinge Pins).
- ⚠ **Check the specified wear limits regularly.**
- ⚠ **Replace worn or defective parts** immediately with new parts

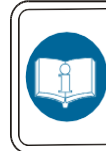


FORUM™ Pipe Handling Tools

DO NOT DISCARD = GIVE TO OPERATOR

SAFETY INSTRUCTIONS

for [VES] SDS Series Elevator



WARNING

To reduce the risk of injury, everyone using, installing, performing maintenance, changing accessories on, or working with this tool must read and understand these instructions before operation.

*OUR goal is to produce tools that help you work safely and efficiently.
The most important safety device for this tool is YOU.
YOUR good judgement is the best protection against injury.*

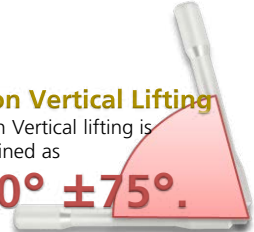
► Non vertical use premise

⚠ In general the intended use of our Elevators is vertical lifting.
Using elevators for non-vertical lifts is therefore a not intended use which can be performed under defined circumstances only. The defined hazard analyses for Elevators is nullified for non-vertical lifts and must be re-analyzed with the on-site specification by the operating company.

Non Vertical Lifting

Non Vertical lifting is defined as

00° ±75°.



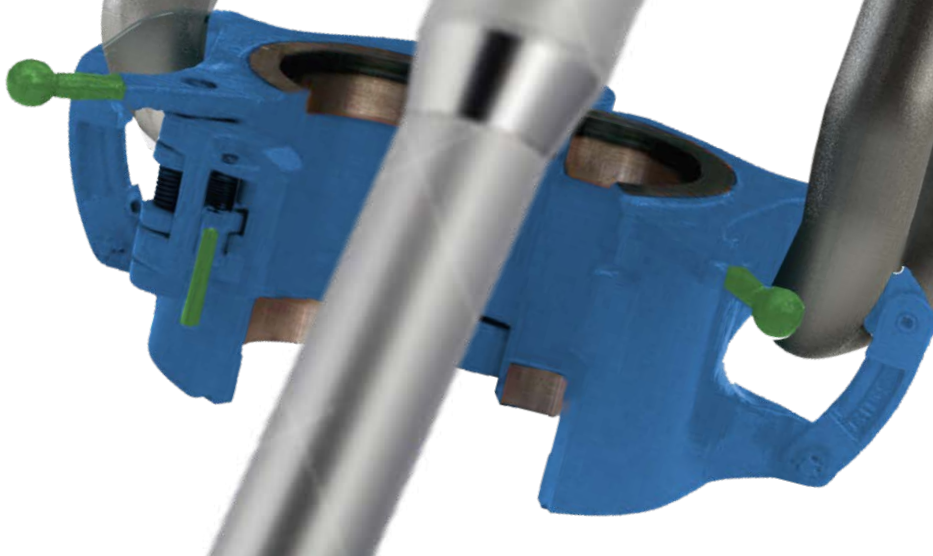
Non-vertical lifting is allowable with proper, actual and on-site defined hazard identification with all premisses fulfilled only!



A Risk Analyses according to DIN ISO12100 must be performed.

The Risk Analyses must include without being limited to:

- ⚠ Identification of all hazardous areas** in Non-Vertical lifting operation.
- ⚠ Definition of all hazardous work tasks** for local Rig workflow.
- ⚠ Ergonomic analyses of work tasks.**
- ⚠ Visibility of Elevator Safety** features(i.e. Safety Pin) throughout the complete workflow.
- ⚠ Possibility of supervision during lifting** operation
- ⚠ Special Training** for operational Rig personnel
- ⚠ Rig Layout analyses** for vertical transport i.e. lifting over driller cabin, work areas must under all circumstances be avoided.



FORUM™ Pipe Handling Tools

DO NOT DISCARD - GIVE TO OPERATOR

TRANSPORT / SET-UP

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 equipment and putting it into service.

3.1 Delivery

The SDS and all accessory parts are shipped in a transport crate. Instructions for safe transport are attached to the transport crate.

» Transport the packed equipment 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 „XI Contact worldwide“ on page 11 immediately.

The scope of delivery includes all components required for the intended operation of the Side Door Elevator SDS as described in Chapter „1.2 Assemblies and Components“.

3.1.2 Unpacking and Disposal of Packing Material

Remove the transport packaging and transport aids before hoisting the equipment to final site.

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 equipment has been damaged during transport or the shipment is incomplete, please notify the manufacturer immediately (see Chapter „XI Contact worldwide“).

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

3.1.3 Intermediate Storage

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

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



Fig. 32: Typical transport and conservation packing for SDS

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!



WEAR EYE PROTECTION!

⚠ NOTE

Safe Lifting Points!



- Lifting point locations, especially bores for load hooks are marked on the equipment.
- Make Sure all load hooks are fully installed in the lifting point
 - » Thus, the safe transport of Forum B + V Oil Tools equipment is ensured.

⚠ NOTE

Internal transport on site!



- Lifting point locations, especially bores for load hooks are designed for installation lifting.
- It is advised to use pallets for longer component transports.
 - » Use a pallet and place Slip assembly front side down for transport.
 - » Use a pallet and place body assembly uptight for transport.

Principles for transport

1. Ensure that transport routes are sufficiently dimensioned and marked.
 - » Ensure that persons are aware that a transport takes place.
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 equipment before transport and secure against starting back up unintentionally.
 - » Start de-installation 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 limits.
10. Secure equipment against Slipping/sliding.
 - » Observe equipment weight.
 - » Observe center of gravity.
11. Never loiter under suspended loads.
12. Transport the equipment carefully.
 - » Do not fasten, lift or pull equipment 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.

- Detailed weight specifications are given in the Chapters „1.4 Technical Data“ on page 22 and „1.10 Component Sizes and Drill Strings“ on page 29.

TRANSPORT/
SETUP

3.3 Lifting arrangements

This chapter is indicated to show save lifting arrangements for the main assemblies.

It may show the SDS in different assembled states, refer to the suitable set-up chapter for assemble tasks.

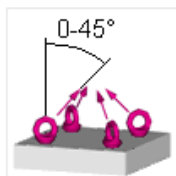
Hoist the equipment safely

1. Attach the SDS only at the attachment points provided for transport.
2. Only use appropriate lifting material with a load carrying capacity suitable to the weight of the elevator / spider.
3. Attach the hoisting ropes so that they are tensioned straight without kinks.
4. Use hoisting cables and load hooks with sufficient supporting capacity.

NOTE

Lifting angle limited to 45°!

The hoisting eyes installed are suitable for 1500 kg each. Therefore the lifting angle of the hoisting equipment might not succeed 45°.



NOTE

Lifting Points!

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



DANGER

Safe Lifting!

» Always Make sure that the load hooks are fully installed in the lifting points before lifting the SDS.



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.



3.3.1 SDS Lifting arrangement

1. Fasten the lifting material on SDS lifting points.
2. Lift the SDS slightly to tension the lifting material.

WARNING DANGER of collision with swinging loads! Ensure that no one is present in the swing range of the equipment.

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

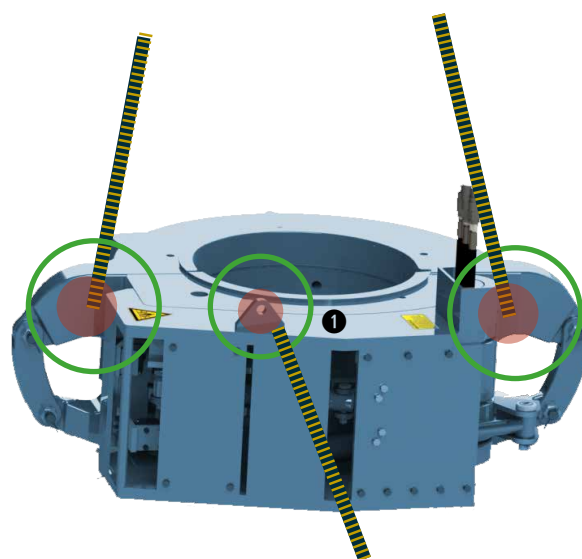


Fig. 33: Hoisting points for transport SDS

NOTE

Lifting guidance on transport!

Some members of the SDS type series are especially equipped with a guidance lifting point ①. If necessary a lifting eye for the guidance rope can be installed in a bore on the SDS body.



3.3.2 Space Requirement

During operation the SDS is connected to the Top drive in vertical drilling direction via elevator links.

A free space of approx. 10 m² around the SDS is required for work (e.g. maintenance work).



Fig. 34: SDS. Hazardous Locations

Maintenance work

- A free space of approx. 4 m² around the SDS is required for work (e.g. maintenance work).

Lifting and Operation

- A free space of approx. 1 m around the SDS is required for Lifting and operation.
Stay additionally away from the Load hooks.

Operation

- A free space of approx. 1 m around the SDS is required for operation.
Stay additionally away from the lifting assembly.

3.4 Set-up, Installation and Arrangement

For SDS operation several components have to be installed or changed to arrange a match with the pipe string to be handled. Installation and change routines for the SDS are described below.

INFO



Subroutines

The installation change of components is divided in subroutines. Please refer to described routines if it named in other processes.

INFO



Installation / Change

Only one process is described in the following instructions. For the missing process description perform the described tasks in reverse order.



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.



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!



DANGER

Injury hazard when body tips!

During installation of the bottom guide assembly the SDS is prone to tipping.

- » Leave the SDS connected to the crane during the entire installation procedure.



WARNING

Danger of pinching/crushing hands!

Severe pinching/crushing up to loss of limbs.

- » NEVER reach between body and bottom guide assembly when setting down.



WARNING

Pinching/crushing hazard from lowering body!

Severe pinching/crushing up to loss of limbs.

- » NEVER step beneath the SDS with feet.

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

Installation site requirement

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

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

For machines containing any hydraulic powered parts, the Directive 2014/34/EC "Equipment and protective systems in potentially explosive atmospheres" applies.

3.4.2.1 Hydraulic Supply Connection requirements

Hydraulic operating pressure	160 -210 bar (2320-3046 PSI)
Volumetric flow	6 Gpm (22 l/m) up to 10 Gpm (44 l/m)

Couplings:

- 2 hydraulic lines to open and close (3/8" – coupling)
- 1 hydraulic line as feed back signal (1/4" – coupling)

3.4.2.2 Tools

The following tools are required:

- Crane
- Suitable hoisting equipment
- Lifting eyes

3.5 Installing optional accessories and tools to the VES SDS

3.5.1 Installation and change of Elevator bushings

Make sure that the elevator bushings installed to the VES SDS match with the expected load. Additionally only use pairing bushings with the same size and serial number.

A set of bushings consists of five segments.



⚠ WARNING

NEVER operate the VES SDS without bushings!

Tools

- Appropriate lifting equipment to lift the VES SDS
- Screw wrench
- Bushing lifting handle (P/N 645234)

Preparations

1. Place the elevator on a plane surface.

Installation

1. Perform the remove tasks in reversed order.

Bushings removal [VES SDS]

A bushing consists three parts, one door segments, and two segments in the elevator frame.

The doors must be open in order to change the required bushing.

1. Remove the cotter pin from the ring,.
2. Install eyebolts or Bushing lifting handle to bushing.
3. Remove Bushings from SDS.
Remove the door segment first, and then the two body segments.
4. Repeat step 1. to 4. for the remaining segments.

NOTE Before installing a new bushing, the seating area in the elevator must be cleaned and lubricated.



Fig. 35: VES SDS



Fig. 36: Remove bushing VES SDS

3.5.2 Adjustment Work on Hydraulic System

NOTE

The following hydraulic adjustments are valid for the SDS350/2-H type series only!

- » Ensure that work on the hydraulic equipment of the equipment is performed only by personnel trained specifically for this purpose.

WARNING

Separated hydraulic lines pose an injury hazard!

Hydraulic fluid can escape under high pressure.

- » Always relieve pressure in hydraulic equipment before working on equipment.

WARNING

Hydraulic fluid can pose a health hazard!

Hydraulic fluids can lead to skin and eye injury and poisoning symptoms upon contact.

Avoid direct contact with hydraulic fluids.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

The following adjustments can be made on the hydraulic equipment:

- Change the operating sequences
- Re-adjustment is only necessary after major works or replacements to restore factory settings.

NOTE

- » On RE-Adjustment always start settings with Valve 1 and 3 completely closed.
- » Start with valve 1 on closed elevator and continue with valve 3.
- » Valve 2 stays completely open on BV versions.

Adjustment Valve 1

The valve can be adjusted by releasing the lock nut and secondly, by rotating the adjusting screw counter-clockwise.

- If valve adjustment is needed, start carefully with ¼ rotation and test the valve function first.
 - » Make sure adjustment screw and lock nut are pulled tight.

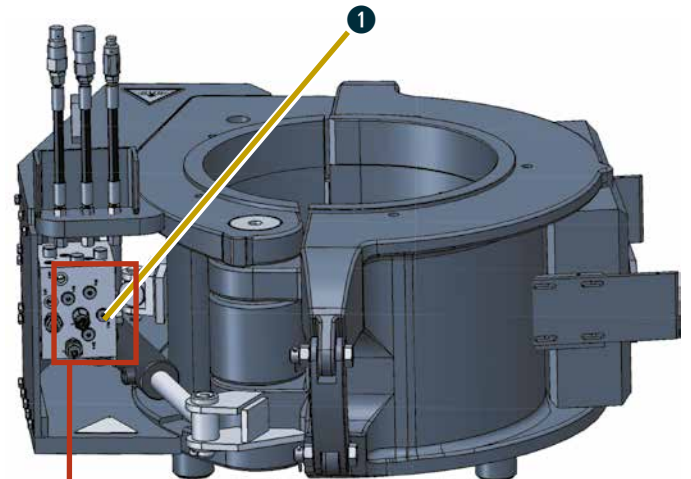


Fig. 37: SDS hydraulic adjustment



Fig. 38: SDS hydraulic adjustment

Following adjustment can be performed on Valves A, B and C with

- ↺ for counter clockwise rotation and
- ↻ for clockwise rotation

Valve 1 -Pressure Valve for feedback on VC-devices

- ↺ enhance Feedback pressure.
- ↻ reduce Feedback pressure.

Valve 2 -Sequence Valve for Latch

Adjusts the speed of the latch opening

- ↺ enhance Feedback pressure.
- ↻ reduce Feedback pressure.

Valve 3 -Sequence Valve for Latch closing sequence

adjusts the speed of the latch closing

- ↺ enhance Feedback pressure.
- ↻ reduce Feedback pressure.

3.6 Troubleshooting

Common Symptoms	Common Remedies						
	No hydraulic operating pressure on site	Feedback Pressure to high/low Check Feedback pressure	Adjustment of Latch sequence valve	Pestle Assembly damaged Re-adjust or replace pestle	Pestle not released on closing. Check Clearance between dorr Latch- Check PIN diameter.	Adjustment of Latch Closing valve	Adjustment of operating pressure
... has no function	•						•
... No Feedback signal		•					•
... will not open	•						•
... Latch opens door stays closed.			•				•
... door closes latch stays open						•	•
... Latch closes before elevator closes			•			•	•
... Latch does not close	•			•			•
... Latch does not open	•				•		•

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3.7 Installation Checklist

Basically the SDS has to be installed as shown in the manual.

NOTE All Checks must be in status OK

After installation or maintenance work following checks must be carried out :

- OK Make sure the required VES Bushings are Installed installed [VES SDS only]
- OK Make sure the Side Door Elevator SDS is fixed securely.
- OK Check lubrication status of SDS lubrication points and surfaces.
- OK Make sure that the Safety Pin is set.
- OK Make sure the bushings are fixed with the Bushing Retainer.

Hydraulic Connections

- OK Make sure the controls are connected to the Hydraulic Power Supply.
- OK Make sure all connections are made properly.
- OK Check all hoses and hydraulic components for leakage.
- OK Operating pressure 150 -210 bar (2176-3046 PSI)
- OK Volumetric flow 6 Gpm (27 l/m) up to 10 Gpm (45,5 l/m)

Function test

There are two possibilities to carry out the function test:

1. VES SDS Elevator standing on the floor
2. VES SDS Elevator installed into the links

- OK Close elevator.
- OK Open elevator.
- OK Close elevator.
- OK Check if elevator is properly closed and latched
- OK Check that feedback signal elevator is given.
- OK Check all tools are removed from the elevator.

TRANSPORT/
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COMMISSIONING / OPERATION

COMMISSIONING /
OPERATION

4 Commissioning and Operation



Ensure that the Side Door Elevator SDS are operated only by personnel trained for this work and familiar with the risks involved in operating the equipment.



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

INFO



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

4.1 Commissioning



⚠ WARNING

Danger of pinching/crushing feet!

Transporting and setting down heavy components.

- » NEVER step below moving equipment parts.



⚠ WARNING

Separated hydraulic lines pose an injury hazard!

This symbol is used to mark areas where injuries are possible from disconnecting hydraulic lines in which the pressure has NOT been relieved.



⚠ WARNING

Defective hydraulic lines pose an injury hazard!

This symbol is used to mark areas where injuries are possible from defective hydraulic lines.



⚠ WARNING

Health hazards from service products!

This symbol warns of health hazards resulting from contact of service products (e.g. lubricants, hydraulic fluids) with the skin, mucous membranes, eyes and respiratory paths.



⚠ 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 doors.
- » 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.

4.2 Safety checks before 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. Serial numbers of bushings are identical (matched pairs).
5. Bushings correspond to type/size of pipe used.
6. All hydraulic connections correctly connected and securely laid.
7. No hydraulic lines damaged.
8. All lubrication points lubricated properly (see Chapter „Lubrication“ on page 109).



WEAR EYE PROTECTION!



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!

Safety Check Procedure

- Ensure that required operating data is observed:
- Remedy all defects noted during checks.

⚠ CAUTION Never attempt to start up when defective.

- Activate hydraulic system.

Functional checks before initial operation

1. Check elevator opens by hydraulic pressure.
2. Check feedback signal indicates elevator closed and latched.
3. Check required bushings are installed before first use.
4. Check all bushing segments are of same size and serial number.
5. Check if bushings are fixed correctly.
6. Check all safety / lock wire is present.
7. Check if the feedback valve is present.
8. Check elevator opens by hydraulic pressure.
9. Pick up a pipe.
10. Check feedback signal is given when the elevator is closed and latched.
11. Check if elevator opens after giving command "open elevator".

4.3 Mounting the SDS to elevator links

⚠ 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



Pinching/crushing hazard from lowering!

- » Severe pinching/crushing up to loss of limbs.
- » NEVER step over edge of rotary table with feet.

⚠ WARNING



Danger of pinching/crushing hands!

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



WEAR PROTECTIVE HELMET!



WEAR PROTECTIVE GLOVES!



WEAR SAFETY SHOES!

Preparation

12. Remove the transport packaging and transport aids from the SDS.
13. Install the appropriate bushings to the SDS in order to ensure safe hoisting.
14. Position the SDS on the rig near the links.

Mounting the SDS to elevator links

1. Place the elevator on a plane surface.
2. After the elevator has been placed on the ground the link adapter ❶ can be opened.

For type series without quick release stake:

3. Loosen upper attachment screws in Link block stake ❷.

For type series with quick release stake:

3. Move release handle upwards ❷.
4. Open Link block stake with a downwards move.
5. Move the lower opening of the links ❸ over the lifting ears of the SDS.
6. Move Link block stake upwards.

For type series without quick release stake:

7. Tighten screws with 231 lbf-ft / 313 Nm.

For type series with quick release stake:

7. Press Link block stake in attachment plate. Listen to audio arrest noise to verify attachment.

⚠ WARNING Pinching and crushing!

The links must be handled and guided from the outside of the Lifting ear opening of the VES SDS. Use ropes to adjust the links.



Fig. 39: Mounting the SDS to elevator links

4.4 Connecting the Hydraulic System



Ensure that work on the hydraulic system is performed only by personnel trained for such work and conscious of the risks involved.



Read these instructions carefully before performing any work on the hydraulic system.

⚠ WARNING

Hydraulic fluid can pose a health hazard!

Hydraulic fluid can injure the skin, mucous membranes or eyes on contact.

- » Do NOT touch hydraulic fluids.
- » ALWAYS wear appropriate protective equipment.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

⚠ NOTE

During installation, when setting up and taking down as well as during operation of the SDS ensure that the hydraulic lines do not chafe. If necessary provide hydraulic lines with chafe guard.

INFO

i Bleeding

The hydraulic system in the SDS is bled at the factory. Ensure that the rig's own supply connections are bled before connecting the SDS.

4.4.1 Connecting the Hydraulics

4.4.1.1 BV Connections

Connection A: Hydraulic fluid pressure at connection **A** closes the elevator.

Connection B: Hydraulic fluid pressure at connection **B** opens the elevator.

Connection C: When the elevator is completely closed via connection **A**, connection **C** applies a hydraulic pressure of approximately working pressure.

4.4.1.2 VC Connections

The elevator has three connections (P, T, XP) on the rear side.

Connection P Pressure line

Connection T Return line

Connection XP Pilot line

4.4.1.3 Control Unit

Lines A, B and C (resp. T,P XP) are connected from the elevator to the Control Unit (optional equipment). The Control Unit has three outputs S1, S2 and S3 that lead to the driller cabin.

Two other outputs (T and P) connect the Control Unit to the hydraulic ring line or the hydraulic power unit.

8.

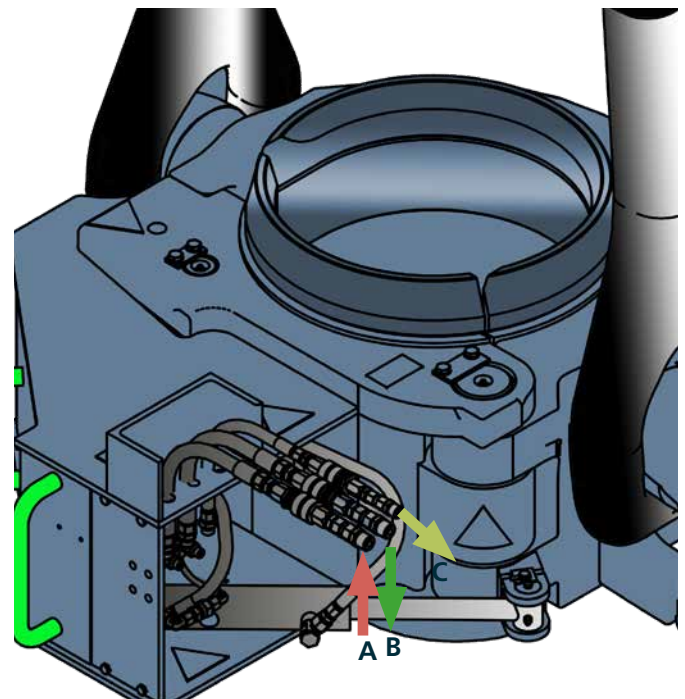
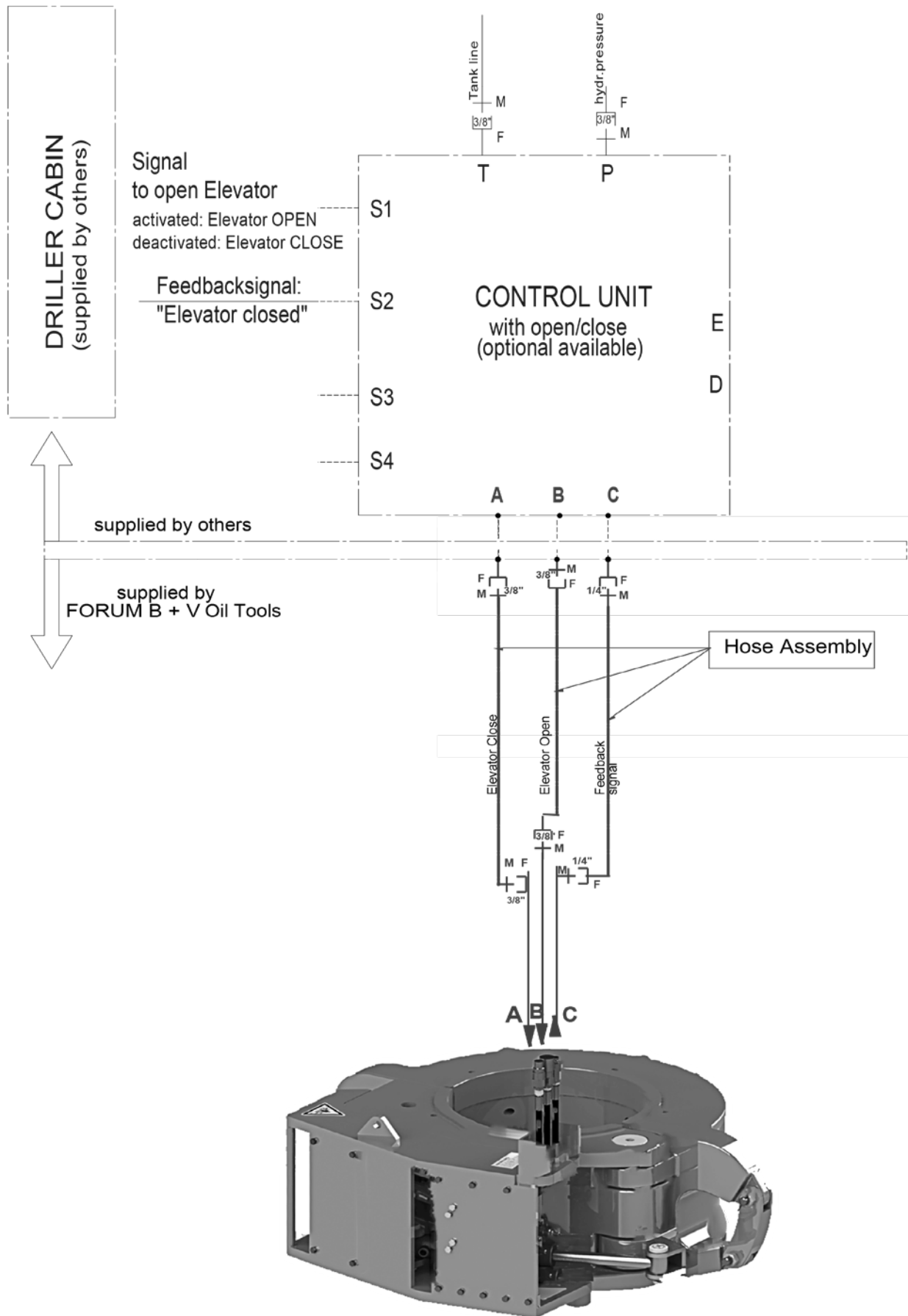


Fig. 40: SDS additional feedback

4.4.2 Installation Schematics



OPERATION

Fig. 41: Hydraulic Connections for SDS

NOTE

Notes to Installation Schematic!

- » Forum B + V Oil Tools does not supply electrical cable outside of Control Unit and does not supply installation of electrical cable.
- » If AMP, Rotation System or Control Unit is delivered without Hook Up Kit, then Forum B + V Oil Tools supplies complete couplings (both male and female) with outside thread for connection (see table for different thread sizes).

Electric connection

S1	24V DC, (cable gland: cable diameter 4-9 mm)
S2	max. 250V DC, (cable gland: cable diameter 4-9 mm)
S3	24V DC, (cable gland: cable diameter 4-9 mm)
S4	24V DC, (cable gland: cable diameter 4-9mm)

Hydraulic pressure

150 - 210 bar (2030 - 3046 psi)	Operating pressure (Line P,T,C1)
40 - 210 bar (2031 - 3046 psi)	Pilot/feedback pressure (Line XP):
85 bar (1233 psi)	Close Elevator (XP1)
110 bar (1595 psi)	Elevator closed and Load attached (XP2)
170 bar (2466 psi)	Open Elevator (XP3)

Caption

A	Elevator close
B	Elevator open
C	Feedback Signal
T	Return line
P	Pressure line
S1	Signal to open Elevator
S2	Feedback Signal (when Elevator closed)
M	Male coupling
F	Female coupling

OPERATION

4.5 Operating the SDS

⚠ WARNING



Danger of pinching/crushing body!

The body may fall shut.

- » DO NOT step between the unsecured shells of the open body.
- » DO NOT remove the spreading equipment BEFORE closing the body and securing it with the hinge pin.

⚠ WARNING



Danger of pinching/crushing feet!

Transporting and setting down heavy components.

- » NEVER step below moving equipment parts.

⚠ WARNING



Separated hydraulic lines pose an injury hazard!

This symbol is used to mark areas where injuries are possible from disconnecting hydraulic lines in which the pressure has NOT been relieved.

⚠ WARNING



Defective hydraulic lines pose an injury hazard!

This symbol is used to mark areas where injuries are possible from defective hydraulic lines.

⚠ WARNING



Health hazards from service products!

This symbol warns of health hazards resulting from contact of service products (e.g. lubricants, hydraulic fluids) with the skin, mucous membranes, eyes and respiratory paths.

Operational Safety

1. Do not touch the SDS while in operation.
2. All screw retainers present.
3. Make sure that ALL hydraulic lines are isolated before any work is carried out in the SDS.
4. It is recommended to have the SDS operated by the driller.
5. Ensure that visual contact is always present between the deck personnel, and the operator in the doghouse.
6. Never open the elevator when the pipe load is still suspended by the elevator.
7. The driller and floor man must coordinate operation of the elevator and slips/spider so one equipment is engaged around the casing before the other is disengaged. Thus, one or both tools continuously suspend the casing during all stages of casing handling operations.

4.5.1 Proper Shutdown

Proceed as follows to shut down the equipment for maintenance work or breaks in operation.

1. Relieve the SDS.

NOTE Ensure that the drill string is held securely (e.g. by Power Slip).

2. Open the SDS.
3. Move the drill string out of the SDS.
4. Switch off pressure to the SDS.

4.5.2 Starting Back Up

4.5.2.1 Starting Back Up Normally

Proceed as follows to put equipment back into service following maintenance work or breaks in operation:

1. Perform the safety checks and function tests.
2. Activate hydraulic system.

4.5.2.2 Starting Back Up Following an Emergency Stop

Proceed as follows to put the equipment back into service following an emergency stop:

1. Ensure that the cause for the emergency stop has been remedied.
2. Check whether the drill string is held by the elevator securely.
3. Ensure that the hydraulic system is operating properly.
4. Ensure that no one is in a hazardous position.
5. Release the emergency stop switch.
6. Perform the safety checks and function tests described in Chapter 4.2.
7. Activate hydraulic system.

4.6 General operation Procedure

4.6.1 Operation MU (make up)

1. Pick up a section of pipe.
2. Now make up the stand or joint.
3. When the pipe is made up, pick up the load and open the (spider) slips.
4. Now lower the string.
5. Pick up the weight of the pipe string with the (spider) slips, before opening the SDS Elevator.
6. Open the SDS Elevator and pick up a new section of pipe.

4.6.2 Operation BO (break out)

1. Pick up the string with the elevator. The SDS Elevator is closed when the latch, the latch lock is closed and the verification pin is properly installed.
2. Raise the (spider) slips.
3. Pull out the string.
4. Set the (spider) slips.
5. Release the string weight from the SDS Elevator.
6. Now BO the stand or joint.
7. When the pipe is BO, pick up the stand and handle.

4.7 Handling and Operation

4.7.1 General handling procedure

1. The elevator is closed and the verification pin is in Position 1 "Verification position"

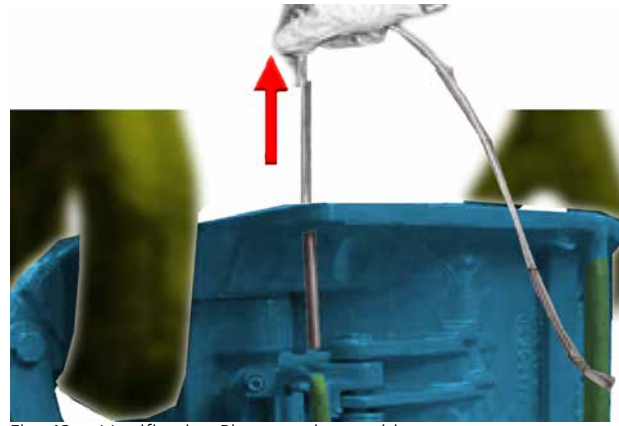


Fig. 42: Versification Pin operation position

2. Remove the verification pin from "Position 1" and put it into Position 2 "Storage position"

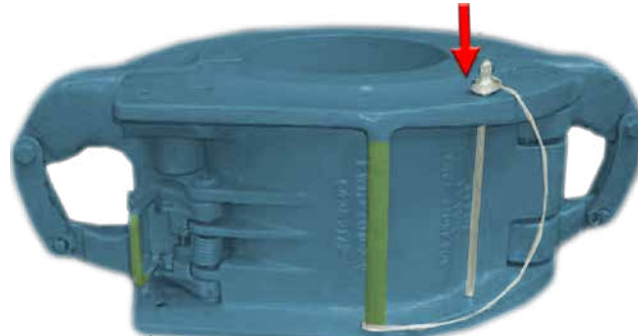


Fig. 43: Versification Pin Storage position

3. Open the elevator and remove the pipe.

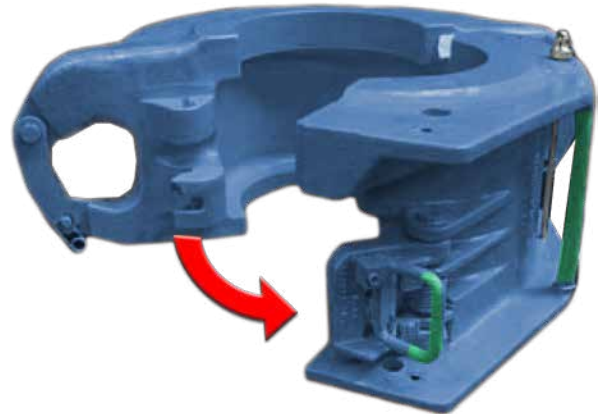


Fig. 44: SDS open

4. Put the pipe in and close the elevator.

5. Remove the verification pin from "Position 2" and put it back in "Position 1".

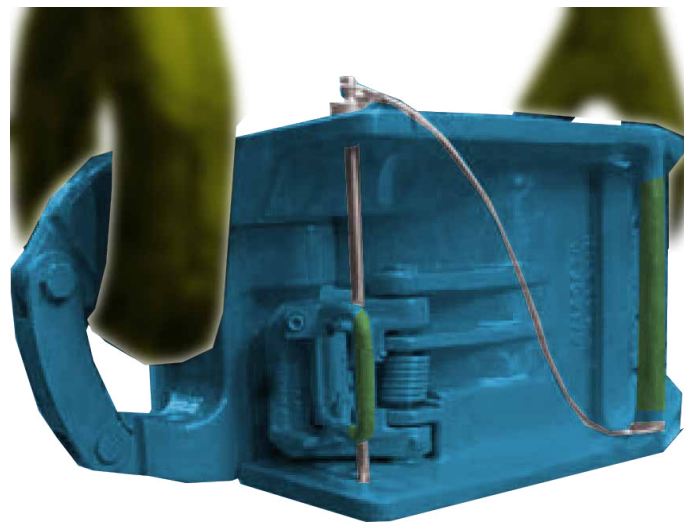


Fig. 45: SDS Closed and locked

NOTE If the latch is not properly locked, the verification pin can not be placed properly.

WARNING: Check that verification pin is not bend.

6. Check if verification pin is resting in both holes and the head of the pin is resting on the top of the door.

WARNING: If the verification pin is bend, all work must be stopped and the pin must be replaced.

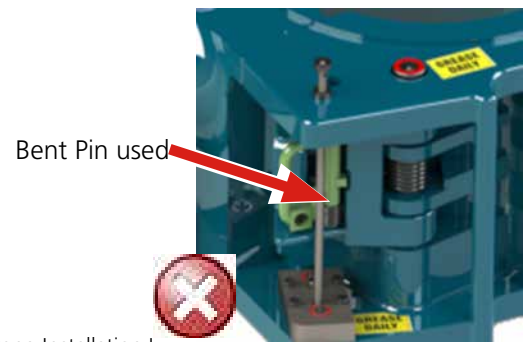


Fig. 46: PIN wrong Installation I



Fig. 47: PIN wrong Installation II

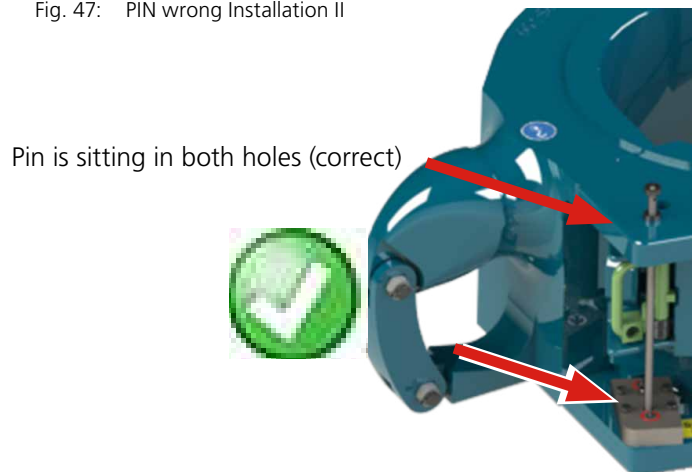


Fig. 48: PIN correct installation I

7. Check if the verification pin is loose in the holes by moving it up and down and by turning it.

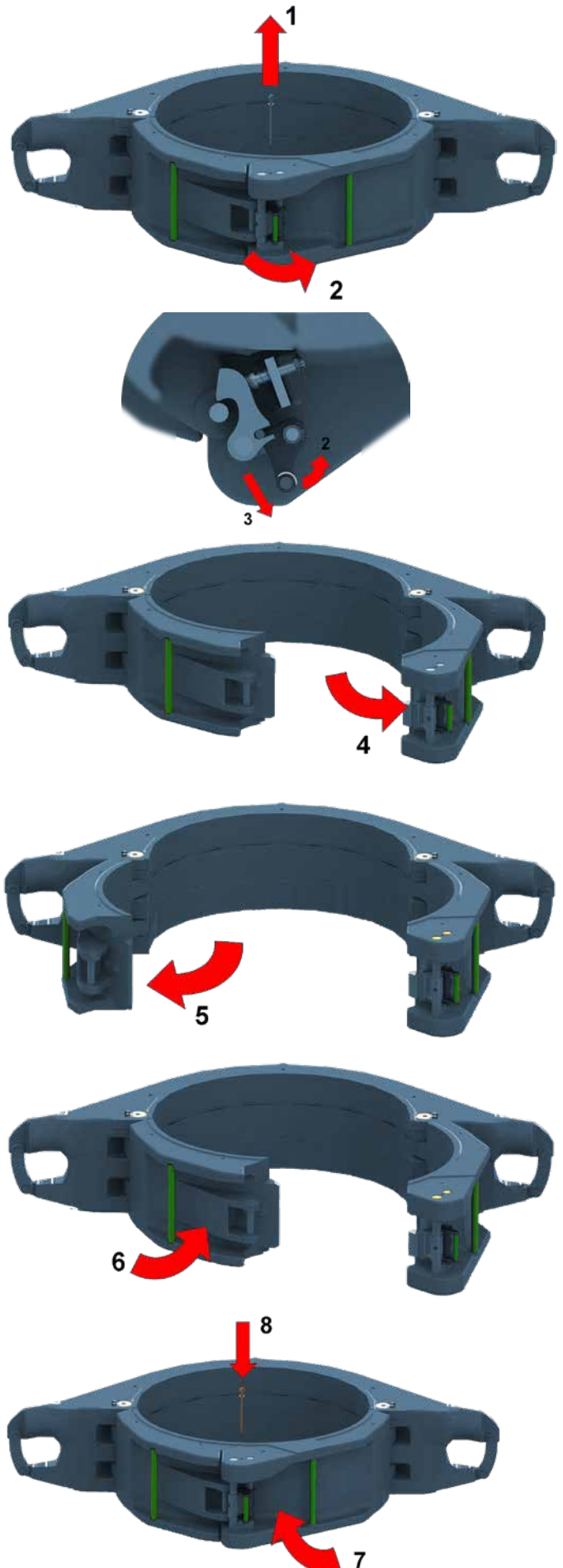


Fig. 49: Check PIN seat

OPERATION

4.7.2 Operation procedure SDS 250-7

1. The elevator is closed an the verification pin is in „Verification position“
2. Remove the verification pin (1)from the Verification position“
3. Pull the handle outside against the spring force (2). This open the latch mechanic.
4. Pull open the right door (4).
5. Pull open the left door (5).
6. Close the door (Step 6 to 8)
7. Close the left door first (6).
8. Slam the right door (7).
9. Check that the lock has snapped into place.
10. Secure the handle with the verification pin (8) assembly.

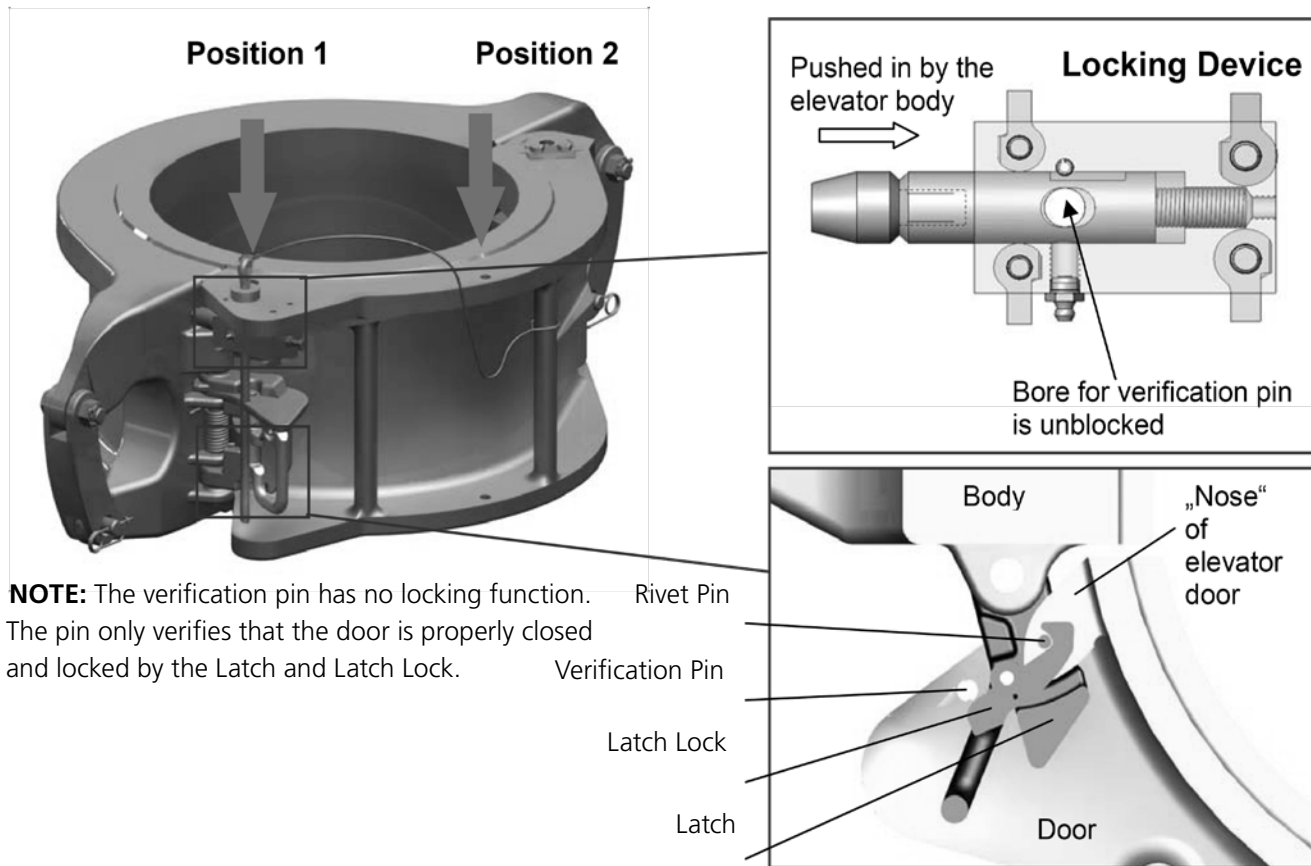


OPERATION

4.7.3 Operating Procedure and Latch mechanism of SDS-Elevators

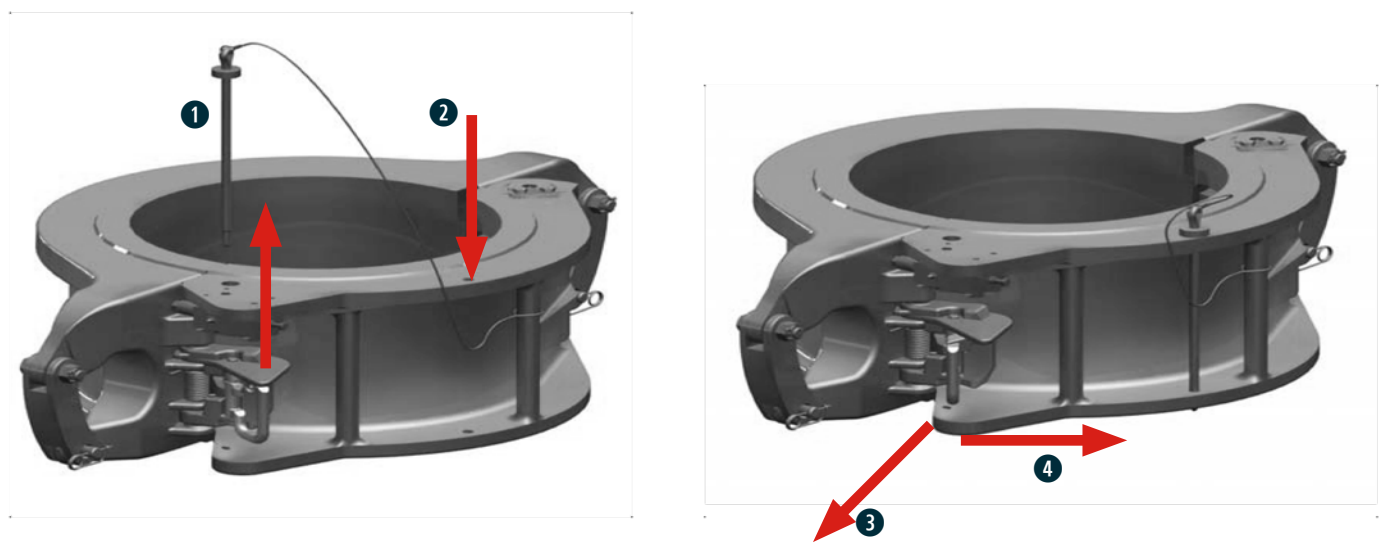
4.7.3.1 SDS-Elevators for two-hand operation with Locking Equipment

1. The SDS-Elevator door is closed. The Latch is attached on the elevator body and catches the "nose" of the elevator door. The Latch Lock grips around a rivet pin to hold the Latch in Position. The bore for the verification pin is unblocked by the Locking Equipment. The verification pin is inserted in "Position 1" and verifies that the door is properly closed and locked by the Latch and Latch Lock.

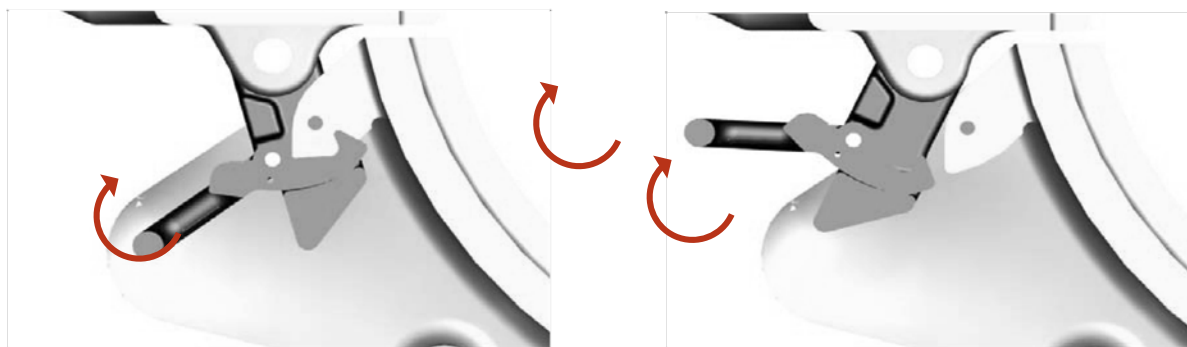


NOTE: The verification pin has no locking function. The pin only verifies that the door is properly closed and locked by the Latch and Latch Lock.

2. Remove the verification pin from "Position 1" and put it into "Position 2". Pull the latch lock outside against the spring force with the left hand [1]. This opens the latch mechanism. Pull with the other hand the door handle to open the door [2].



OPERATION



Pulling the latch lock against the spring force

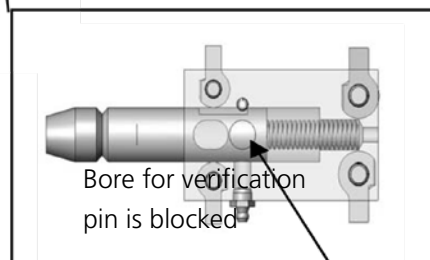
Opening of the latch mechanism

1. The SDS-Elevator door is opened and the mechanism of the Locking Equipment blocks the bore for the verification pin. This avoids the setting of the verification pin into "Position 1" when the door is opened or not completely closed.



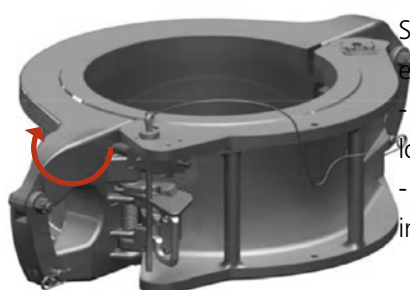
Locking Equipment

Pushed out by spring force



4. Close the elevator door by slam the door against the elevator body.
5. Check that latch and latch lock snapped into place and put the verification pin back into "Position. 1".

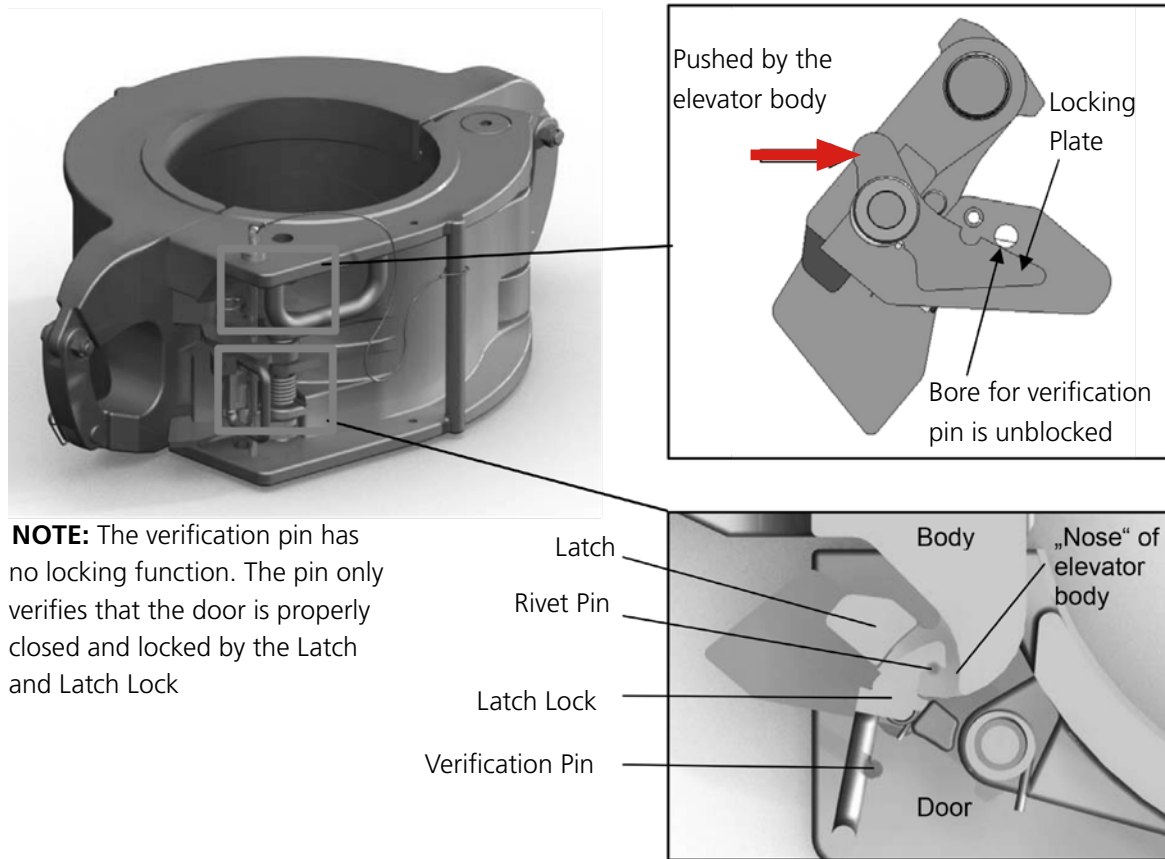
NOTE: The verification pin can not be set into "Position 1" when the door is opened or not completely closed



- Slam door to close the elevator
- Check that latch and latch lock has snapped into place
- Put verification pin back into "Position 1"

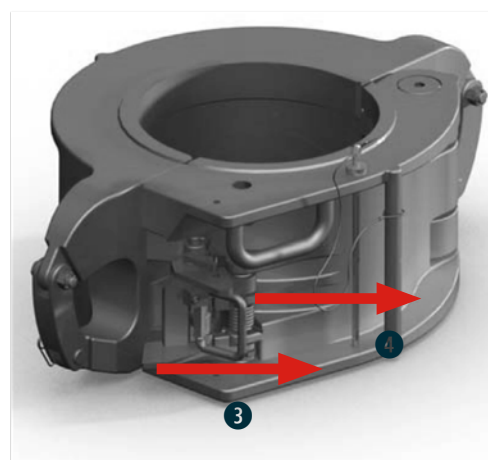
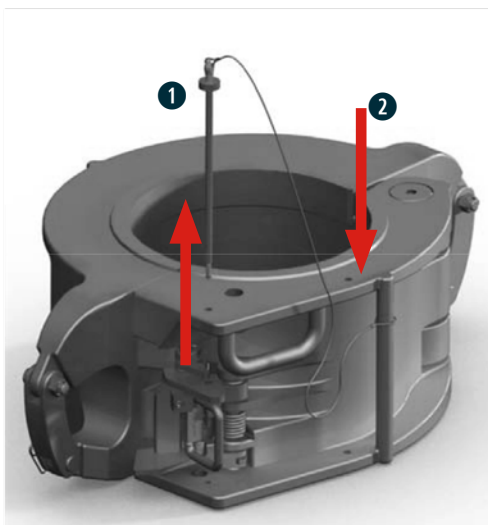
4.7.3.2 SDS-Elevators for one-hand operation

1. The SDS-Elevator door is closed. The Latch is attached on the elevator door and catches the "nose" of the elevator body. The Latch Lock grips around a rivet pin to hold the Latch in Position. The bore for the verification pin is unblocked by the Locking Plate. The verification pin is inserted in "Position 1" and verifies that the door is properly closed and locked by the Latch and Latch Lock.

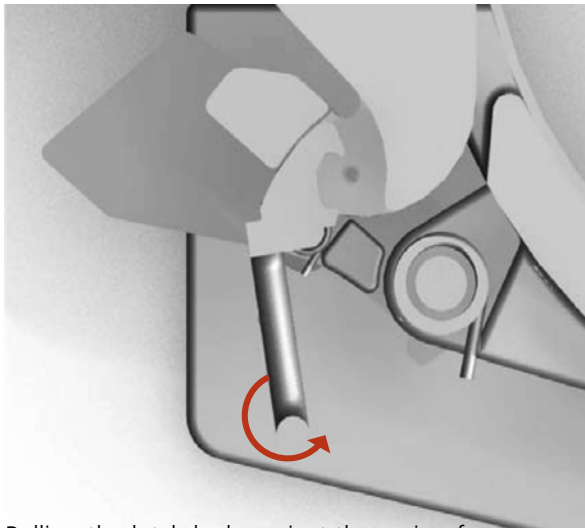


NOTE: The verification pin has no locking function. The pin only verifies that the door is properly closed and locked by the Latch and Latch Lock

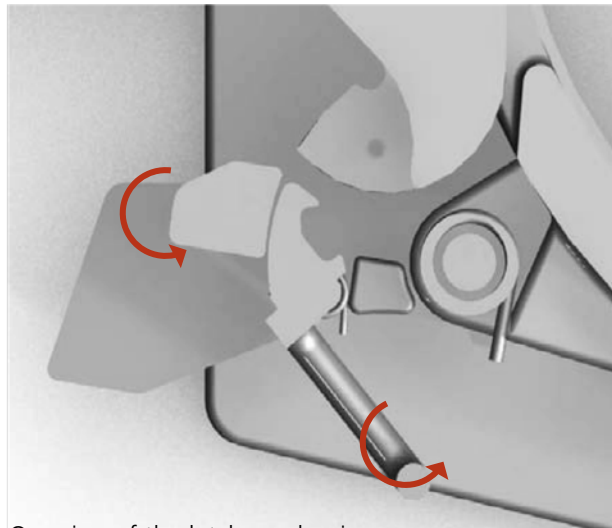
2. Remove the verification pin from "Position 1" and put it into "Position 2". Pull the latch lock inside against the spring force with the left hand [1]. This opens the latch mechanism. Pull with the other hand the door handle to open the door [2].



OPERATION



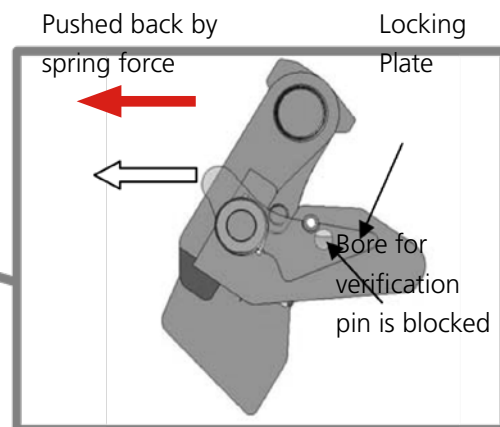
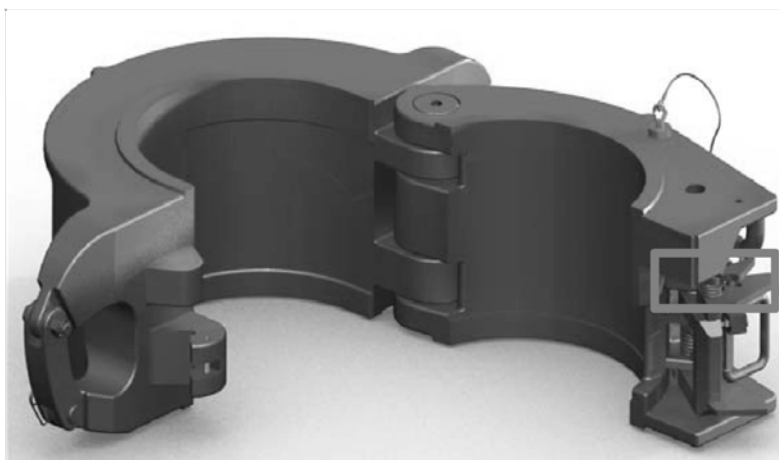
Pulling the latch lock against the spring force



Opening of the latch mechanism

3. The SDS-Elevator door is opened and the Locking Plate blocks the bore for the verification pin. This avoids the setting of the verification pin into "Position 1" when the door is opened or not completely closed.

OPERATION



4. Close the elevator door by slam the door against the elevator body. Check that latch and latch lock snapped into place and put the verification pin back into "Position 1".

Note:

The verification pin can not be set into "Position 1" when the door is opened or not completely closed.



- Slam door to close the elevator
- Check that latch and latch lock has snapped into place
- Put verification pin back into "Position 1"

4.8 Commissioning checklist

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

⚠ NOTE: Read manual before first use !

OK Check crew is aware of all danger regarding handling the SDS.

OK Go through manual with crew.

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

Scope of supply

OK Cross check all delivered parts.

Hydraulic Characteristics

OK Operating pressure 150 - 210 bar (2176 - 3046 PSI)

OK Volumetric flow 6 Gpm (27 l/m) to 10 Gpm (45,5 l/m)

Check and Lubrication

OK Check elevator is in closed position.

OK Check Hydraulic Supply lines are disconnected.

OK Apply grease to all greasing points until grease is visibly coming out of the bores.

OK Check if elevator is installed as outlined in manual.

OK Connect feedback line.

Function Test

OK Check elevator opens by hydraulic pressure.

OK Check feedback signal indicates elevator closed and latched.

OK Check required bushings are installed before first use.

OK Check all bushing segments are of same size and serial number.

OK Check if bushings are fixed correctly.

OK Check all safety / lock wire is present.

OK Check feedback valve is present.

OK Check elevator opens by hydraulic pressure.

OK Pick up a pipe.

OK Check feedback signal is given when the elevator is closed and latched.

OK Check if elevator opens after giving command "open elevator".

OK Check presence of second feedback valve (if applicable).

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SERVICE

SERVICE

5 Service

INFO



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

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

5.1 Malfunction

If a malfunction occurs or the SDS does not operate as expected, troubleshoot 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 the present necessary hydraulic pressure.
3. Check that the required components correspond to the used pipe size.
4. Check for proper lubrication of the SDS.
5. Check feedback 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 („XI Contact worldwide“ on page 11).

5.2 Repair

5.2.1 Repair by Customer

It is only permissible for the customer/company operating the Equipment 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 warranty.

5.2.2 Repair by Manufacturer

Ensure that any repair work required on the SDS 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 („XI Contact worldwide“ on page 11), to perform repair or maintenance work.

5.2.3 Securing Screws with Wedge-Locking Washers

Wedge-Lock style 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 „ α “ is larger than the thread pitch „ β “, 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 equipment 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.

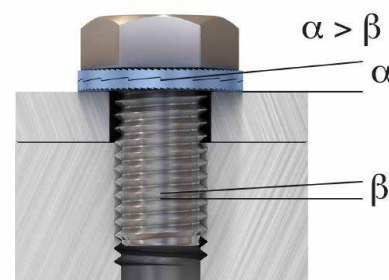


Fig. 50: Wedge-Locking Washer principle illustration



Fig. 51: Wedge-Locking Washer detailed illustration

Wedge-Locking Washer specified torques

Several Wedge-Locking style bolt securing systems are used on the SDS to generate safely locked bolted joints. Regarding the fact that different sizes and grades are used detailed information is given in the annex („B. Third Party Documents“ on page 128) to generate safe maintenance by the user.

If the tightening torque needed to fasten a screw/nut is not explicitly written in this manual, please check the screw/nut head and refer to the annex in order to find the required fastening torque:

The grade and make of the bolt can be seen on top or on the side of the bolt / nut. The tightening torques can be found via third party document in the annex.

⚠ 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 Wedge-Locking style washers were safely secured even after reuse 30 times.

Make visual inspection of the washers during every maintenance.



Make sure that the cams (cam tops) are not damaged or rounded 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 („XI Contact worldwide“ on page 11). to order replacement parts or in the event of any questions.

5.3.2 Drawing and Parts List SDS

5.3.2.1 SDS type 250/6, 350/2, 350/5, 350/6 "One hand operation"

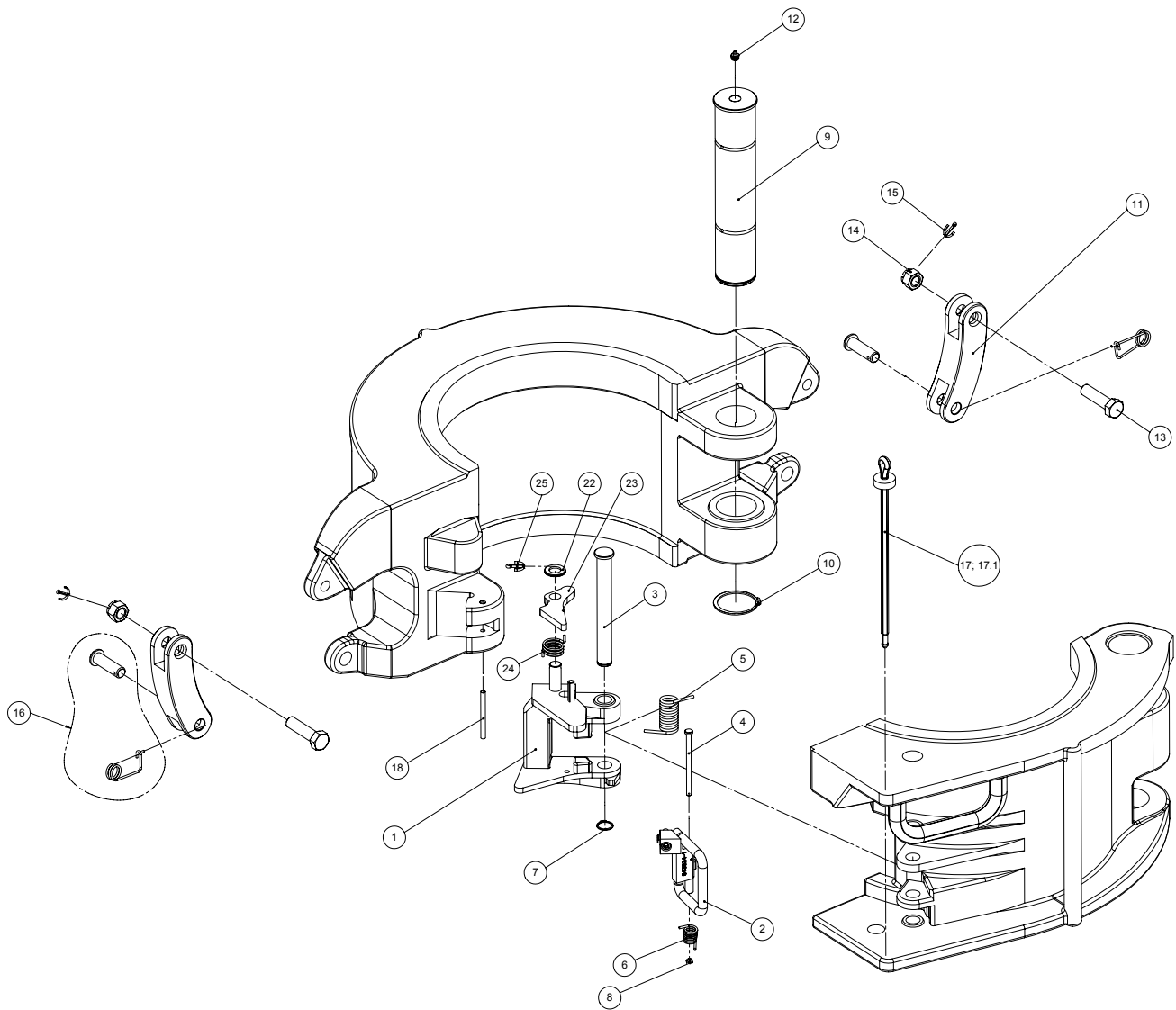


Fig. 52: SDS type 250/6, 350/2, 350/5, 350/6 "One hand operation"

SDS type 250/6, 350/2, 350/5, 350/6“One hand operation”

No.	Qty.	Description	Recommended Spare Parts (one year operation)	SDS-250/6 P/N 642620-Y-BC	SDS-350/2 P/N 643520-Y-BC	SDS-350/5 P/N 643580-Y-BC	SDS-350/6 P/N 643570-Y-BC
		Frame part no.		642621	643521	643581	642621
1	1	Latch		611503-1	643502-1	643502-4	611503-1
2	1	Latch Lock Assembly		611043-1	643524-1	643524-1	642624
3	1	Latch Pin		611504	643522	643522	611504
4	1	Latch Lock Pin		611005	641505	641505	611005
5	1	Latch Spring	*	611506	643506	643506	611506
6	1	Latch Lock Spring	*	611007	643507	643507	611007
7	1	Latch Pin Sec.Ring	*	611508	641058	641058	611508
8	1	Cotter Pin	*	80340-1	620609	620609	80340-1
9	1	Hinge Pin	*	643511	643526	643526	643511
10	1	Hinge Pin Sec. Ring	*		643528	643528	
11	2	Link Block		612512	612512	612512	612512
12	1	Grease Nipple	*	(2x) 612515	612515	612515	(2x) 612515
13	2	Screw	*	613623-1	613623-1	613623-1	613623-1
14	2	Nut	*	752338	752338	752338	752338
15	2	Cotter Pin	*	752339	752339	752339	752339
16	2	Link Block Bolt Ass..	*	612514	612514	612514	612514
17	1	Verification pin Ass..	*	643900-3	643900-4	643900-4	643900-3
17--	1	Rope clamp	*	643801-1	643801-1	643801-1	643801-1
18	1	Rivet Pin	*	642695	641575	641575	642695
19	2	Washer	*	792103			792103
20	1	Safety plate	*	641590-2			641590-2
21	2	Screw	*	89126			89126
22	1	Washer	*	612679	612679	612679	612679
23	1	Locking plate		642620-4	643520-4	643580-4	642620-4
24	1	Spring	*	643520-5	643520-5	643520-5	643520-5
25	1	Cotter Pin	*	752322	752322	752322	752322
26	1	Screw	*				
27	4	Screw	*				
28	1	Plunger					
29	1	Additional Block					
		Rec. spare parts Assembly		642620-RSP	643520--RSP	643580-RSP	643570-RSP

All parts marked with * are recommended Spare Parts (one year operation)

5.3.2.2 SDS type 65, 100, 150, 250/0 up to 250/5, 350/1, 350/4 "Two hand operation"

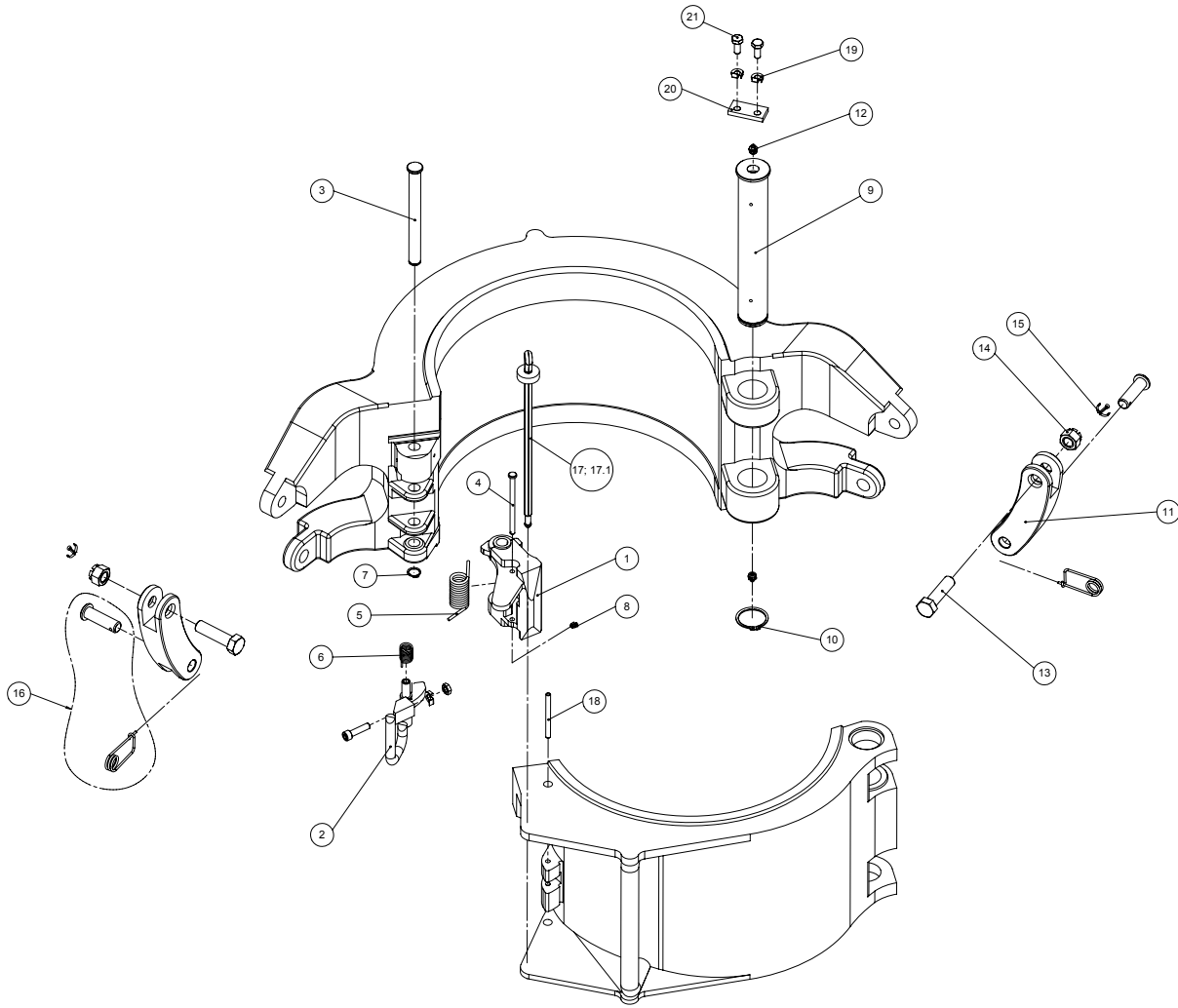


Fig. 53: SDS type 65, 100, 150, 250/0 up to 250/5, 350/1, 350/4 "Two hand operation"

SDS type 65, 100, 150, 250/0 up to 250/5, 350/1, 350/4“Two hand operation”

Index No.	Qty	Description	Recommended Spare Parts	SDS-65	SDS-100-1	SDS-100/2	SDS-100/3	SDS-150/1	SDS-150/2	SDS-150/3	SDS-150/4	SDS-150/5	SDS-150/7
				P/N 640600-Y-BC	P/N 641020-Y-BC	P/N 641000-Y-BC	P/N 641040-Y-BC	P/N 641500-Y-BC	P/N 641520-Y-BC	P/N 641540-Y-BC	P/N 641560-Y-BC	P/N 641580-Y-BC	P/N 641620-Y-BC
		Frame part no.		640601	641021	641001	641041	641501	641521	641541	641561	641581	641621
1	1	Latch		640602	640602	641572	641572	641572	641572	641572	641572	641572	641602
2	1	Latch Lock Assembly		641015	641015	641573	641573	641573	641573	641573	641573	641573	641603
3	1	Latch Pin		640604	640604	641504	641504	641504	641504	641504	641504	641504	641504
4	1	Latch Lock Pin		641505	641505	641505	641505	641505	641505	641505	641505	641505	641505
5	1	Latch Spring	*	640606	640606	641506	641506	641506	641506	641506	641506	641506	641506
6	1	Latch Lock Spring	*	641507	641507	641507	641507	641507	641507	641507	641507	641507	641507
7	1	Latch Pin Sec. Ring	*	612509	612509	620608	620608	620608	620608	620608	620608	620608	620608
8	1	Cotter Pin	*	620609	620609	620609	620609	620609	620609	620609	620609	620609	620609
9	1	Hinge Pin	*	640610	641030	641010	641010	641510	641510	641550	641570	641590	641630
10	1	Hinge Pin Sec. Ring	*	612509	612509	641011	641011	641511	641511		620611		612508
11	2	Link Block		611512	611512	611512	611512	611512	611512	611512	611512	611512	611512
12	1	Grease Nipple	*	612515	612515			612515	612515	612515 / (2x) 70064	612515 / 70064	2x612515	612515
13	2	Screw	*	621430-11	621430-11	621430-11	621430-11	621430-11	621430-11	621430-11	621430-11	621430-11	621430-11
14	2	Nut	*	621430	621430	621430	621430	621430	621430	621430	621430	621430	621430
15	2	Cotter Pin	*	752339	752339	752339	752339	752339	752339	752339	752339	752339	752339
16	2	Link Block Bolt Assembly	*	611514	611514	611514	611514	611514	611514	611514	611514	611514	611514
17	1	Verification pin Assembly	*	643900-7	643900-1	643900-1	643900-1	643900-8	643900-8	643900-8	643900-8	643900-1	643900-3
17--	1	Rope clamp	*	643801-1	643801-1	643801-1	643801-1	643801-1	643801-1	643801-1	643801-1	643801-1	643801-1
18	1	Rivet Pin	*	641575	641575	641575	641575	641575	641575	641575	641575	641575	641615
19	2	Washer	*						792103			792103	
20	1	Safety plate	*							641550-1		641590-2	
21	2	Screw	*						645198			89126	
22	1	Washer	*										
23	1	Locking plate											
24	1	Spring	*										
25	1	Cotter Pin	*										
26	1	Screw	*										
27	4	Screw	*										
28	1	Plunger											
29	1	Additional Block											
		Rec. spare parts Assembly		640600-RSP	641020-RSP	641000-RSP	641040-RSP	641500-RSP	641520-RSP	641540-RSP	641560-RSP	641580-RSP	641620-RSP

All parts marked with * are recommended Spare Parts (one year operation)

SDS type 65, 100, 150, 250/0 up to 250/5, 350/1, 350/4 "Two hand operation" (ctd.)

Index No.	Qty	Description	Recommended Spare Parts	SDS-250/0 P/N 642600-Y-BC	SDS-250/1 P/N 642500-Y-BC	SDS-250/2 P/N 642520-Y-BC	SDS-250/3 P/N 642540-Y-BC	SDS-250/5 P/N 642580-Y-BC	SDS-350/1 P/N 643500-Y-BC	SDS-350/4 P/N 643560-Y-BC
		Frame part no.		642601	642501	642521	642541	642581	643501	643561
1	1	Latch		641572	641572	641572	641572	641572-2	643502	643502
2	1	Latch Lock Assembly		642603	642603	642603	642603	641573-A	643503-1	643503-1
3	1	Latch Pin		641504	641504	641504	641504	641504	643504	643504
4	1	Latch Lock Pin		641505	641505	641505	641505	641505	641505	641505
5	1	Latch Spring	*	641506	641506	641506	641506	641506	643506	643506
6	1	Latch Lock Spring	*	641507	641507	641507	641507	641507	643507	643507
7	1	Latch Pin Sec.Ring	*	620608	620608	620608	620608	620608	725314	725314
8	1	Cotter Pin	*	620609	620609	620609	620609	620609	620609	620609
9	1	Hinge Pin	*	642610	642510	642510	642510	642590	643511	643511
10	1	Hinge Pin Sec. Ring								
11	2	Link Block		612512	612512	612512	612512	612512	612512	612512
12	1	Grease Nipple	*	2x 612515	2x 612515	2x 612515	2x 612515	2x 612515	612515	612515
13	2	Screw	*	613623-1	613623-1	613623-1	613623-1	613623-1	613623-1	613623-1
14	2	Nut	*	752338	752338	752338	752338	752338	752338	752338
15	2	Cotter Pin	*	752339	752339	752339	752339	752339	752339	752339
16	2	Link Block Bolt Ass..	*	612514	612514	612514	612514	612514	643900-4	643900-4
17	1	Verification pin Ass..	*	643900-3	643900-3	643900-3	643900-3	643900-3	643500-1	643560-1
17--	1	Rope clamp	*	643801-1	643801-1	643801-1	643801-1	643801-1	643801-1	643801-1
18	1	Rivet Pin	*	641575	641575	641575	641575	641577	641575	641575
19	2	Washer	*	792103	792103	792103	792103	792103	792103	792103
20	1	Safety plate	*	641590-2	642506	641512	641512	641590-2	641590-2	641590-2
21	2	Screw	*	89126	89126	89126	89126	89126	89126	89126
22	1	Washer	*							
23	1	Locking plate								
24	1	Spring	*							
25	1	Cotter Pin	*							
26	1	Screw	*							
27	4	Screw	*							
28	1	Plunger								
29	1	Additional Block								
		Rec. spare parts Assembly		642600-RSP	642500-RSP	642520-RSP	642540-RSP	642580-RSP	643500-RSP	643560-RSP

SERVICE

5.3.2.3 642630-Y-BC SDS-Type 250/7

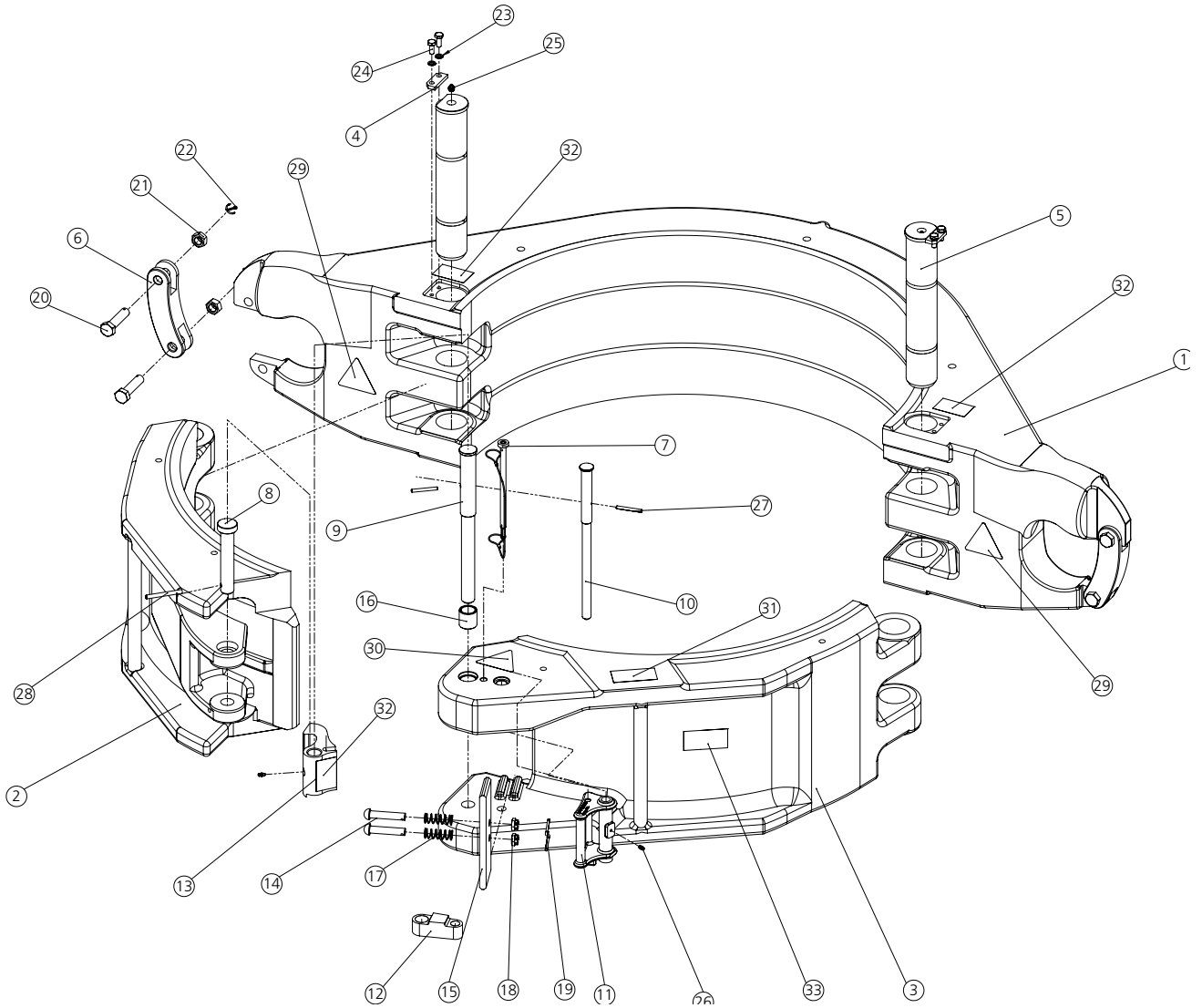


Fig. 54: 642630-Y-BC SDS-type 250/7

SERVICE

Part List 642630-Y-BC SDS-type 250/7

No.	Qty.	Part no.	Description
1	1	642631-BF	SDS-250/7 Body
2	1	642632-BF	Door Left
3	1	642633-BF	Door Right
4	2	641590-2	Safety Plate
5	2	642629	Hinge Pin
6	2	612512	Link Block
7	1	643900-7	Safety Pin Assembly
8	1	642635	Catch Pin
9	1	642637	Latch Pin
10	1	642638	Latch Handle Pin
11	1	651525	Latch Handle
12	1	642636	Stopper Plate
13	1	642634	Latch
14	2	642630-19	Spring Bolt
15	1	642630-18	Retaining Plate
16	1	642639	Latch Bushing
17	2	6426311	Pressure Spring
18	2	613912	Castle Nut
19	2	99615	Split Pin
20	4	613623-1	Screw
21	4	613556-41	Nut
22	4	752339	Split Pin
23	4	792103	Washer
24	4	89126	Screw
25	2	612515	Grease Nipple
26	2	756790	Lubricating Nipples
27	2	622516	Spring Type Straight Pin
28	1	641575	Spring Type Straight Pin
29	2	671640	Warning Sign "Hands"
30	1	671641	Warning Sign "Squeeze Danger"
31	1	671638	Warning Sign Forum
32	3	671642	Warning Sign "GREASE DAILY"
33	1	613129	Sticker Hotline

* Spare Parts

SERVICE

5.3.2.4 645500 SDS-Type 500

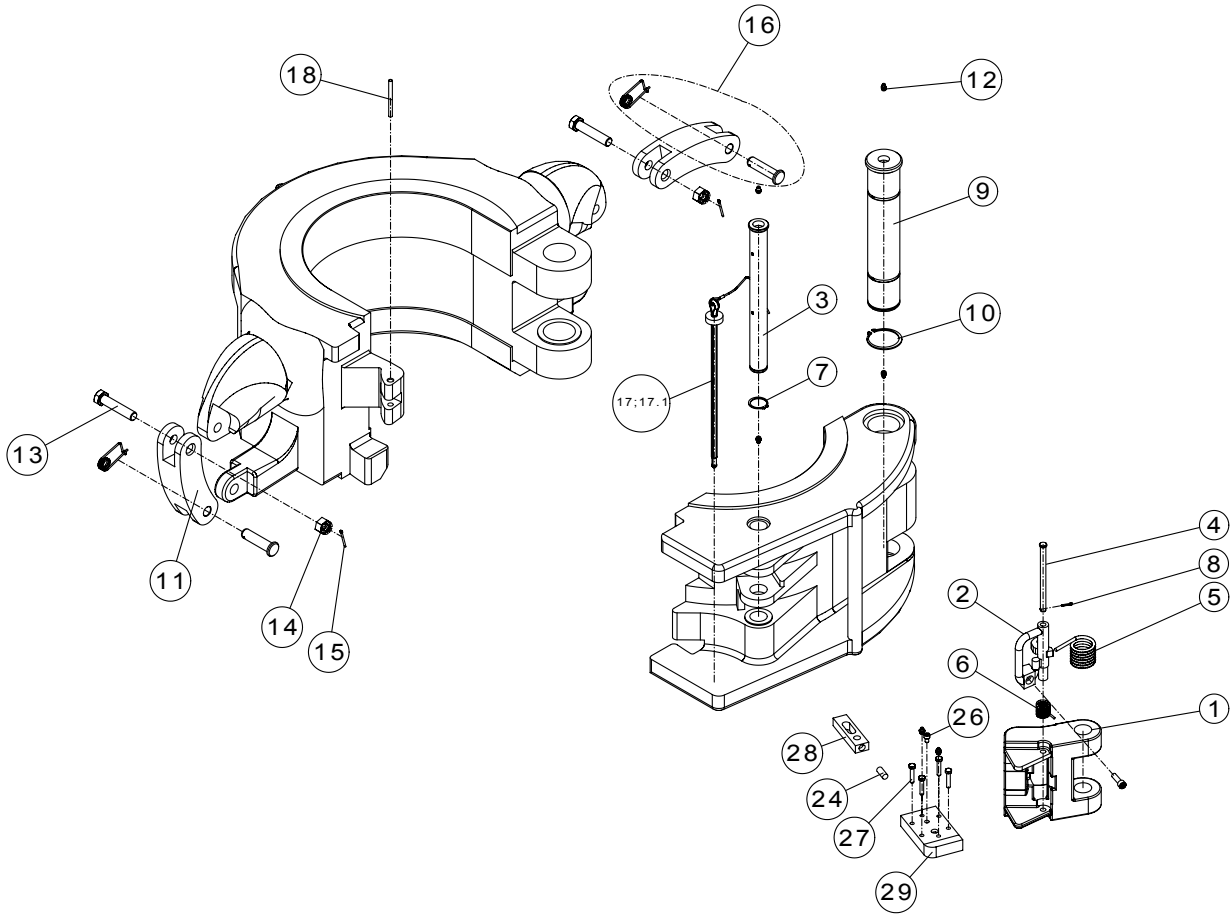


Fig. 55: SDS-type 500 "One hand operation"

SERVICE

SDS-type 500 "One hand operation"

No.	Qty.	Part no.	RSP	Description
		645501		Frame part no.
1	1	611503		Latch
2	1	642624		Latch Lock Assembly
3	1	645505		Latch Pin
4	1	611005		Latch Lock Pin
5	1	611506	*	Latch Spring
6	1	611007	*	Latch Lock Spring
7	1	611508	*	Latch Pin Sec.Ring
8	1	80340-1	*	Cotter Pin
9	1	645504	*	Hinge Pin
10	1			Hinge Pin Sec. Ring
11	2	615012		Link Block
12	1	642623 / 70064	*	Grease Nipple
13	2	613623-11	*	Screw
14	2	752338	*	Nut
15	2	752339	*	Cotter Pin
16	2	615014 / 622515	*	Link Block Bolt Ass..
17	1	643900-4	*	Verification pin Ass..
17--	1	643801-1	*	Rope clamp
18	1	641575	*	Rivet Pin
19	2		*	Washer
20	1		*	Safety plate
21	2		*	Screw
22	1		*	Washer
23	1			Locking plate
24	1	650216	*	Spring
25	1		*	Cotter Pin
26	1	775081-1	*	Screw
27	4	645138	*	Screw
28	1	645500-4		Plunger
29	1	645500-3		Additional Block
		645500-RSP		Rec. spare parts Assembly

SERVICE

5.3.2.5 647500 SDS-type 750

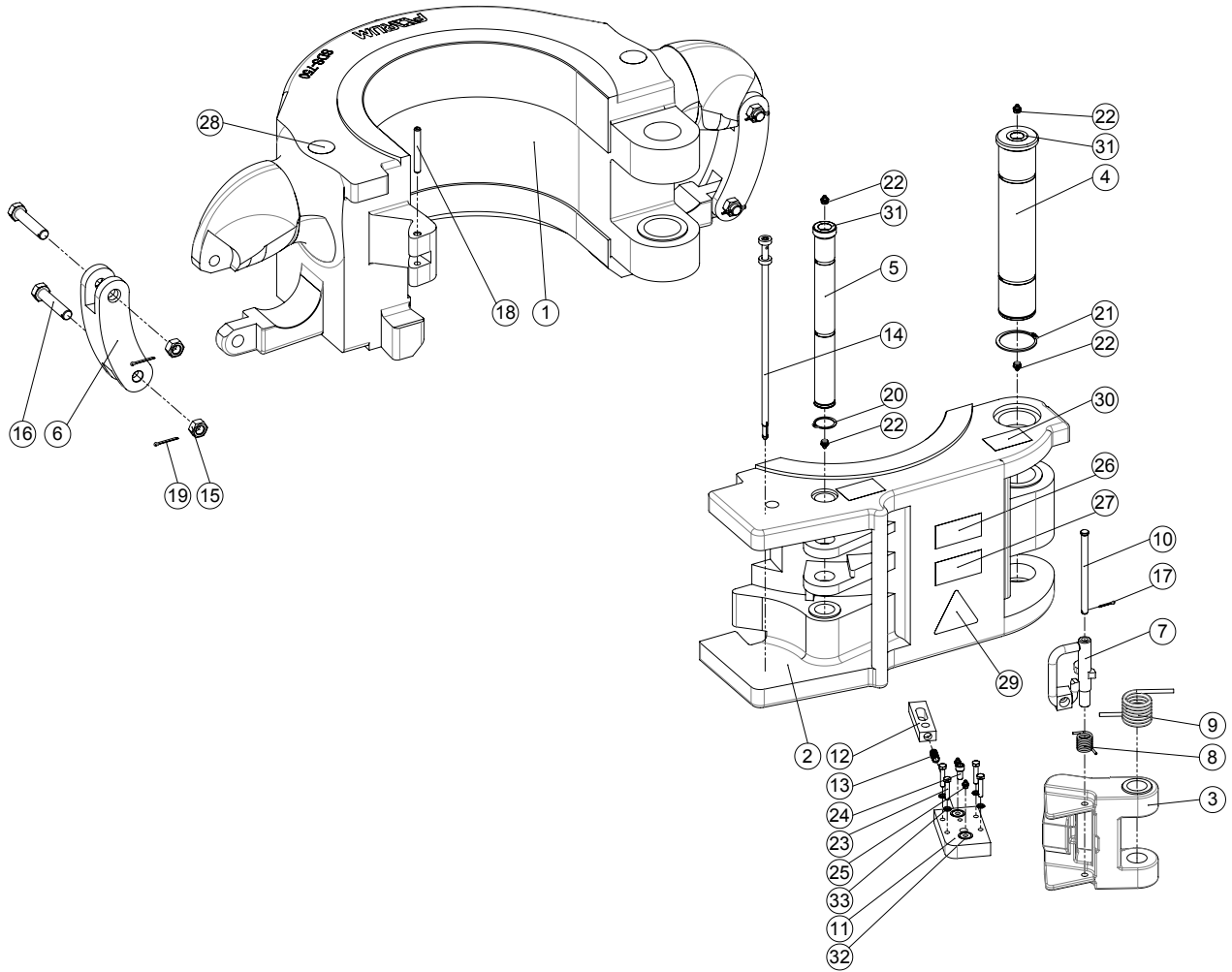


Fig. 56: SDS-type 750 "One hand operation"

SERVICE

SDS-type 750 "One hand operation"

No.	Qty.	Part no.	Description
1	1	647501-BC-BF	SDS 750 Body
2	1	611503	Latch
3	1	645504	Hinge Pin
4	1	645505	Latch Pin
5	2	615012	Link Block
6	1	611043-1	Latch Lock
7	1	611007	Latch Lock Spring
8	1	611506	Latch Spring
9	1	611005	Latch Lock Pin
10	1	645500-3	Additional Block
11	1	645500-4	Plunger
12	1	650216	Slip Spring
13	1	643900-4	Safety Pin Assembly
13.1	1	643801	Wire line
13.2	2	643801-1	Rope Clamp
14	4	613556-41	Nut
15	4	613623-11	Screw
16	1	80340-1	Split Pin
17	1	642695	Spring Type Straight Pin
18	4	752339	Split Pin
19	1	611508	Retaining ring
20	1	643528	Retaining Ring
21	4	612515	Grease Nipple
22	4	645138	Screw
23	1	612666	Screw
24	2	70064	Grease Nipple
25	1	613129	Sticker Hotline
26	1	671638	Warning sign Forum
27	2	671646	Sign "lifting point"
28	1	671640	Warning Sign "Hands"
29	3	671642	Warning Sign "GREASE DAILY"
30	4	612530-3	Marking Point
31	2	612530-7	Marking Point
32	4	792112	Washer
33	4	792112	Washer

* Spare Parts

5.3.2.6 DS Type series Assemblies - Locking equipment for SDS 65 up to SDS 250

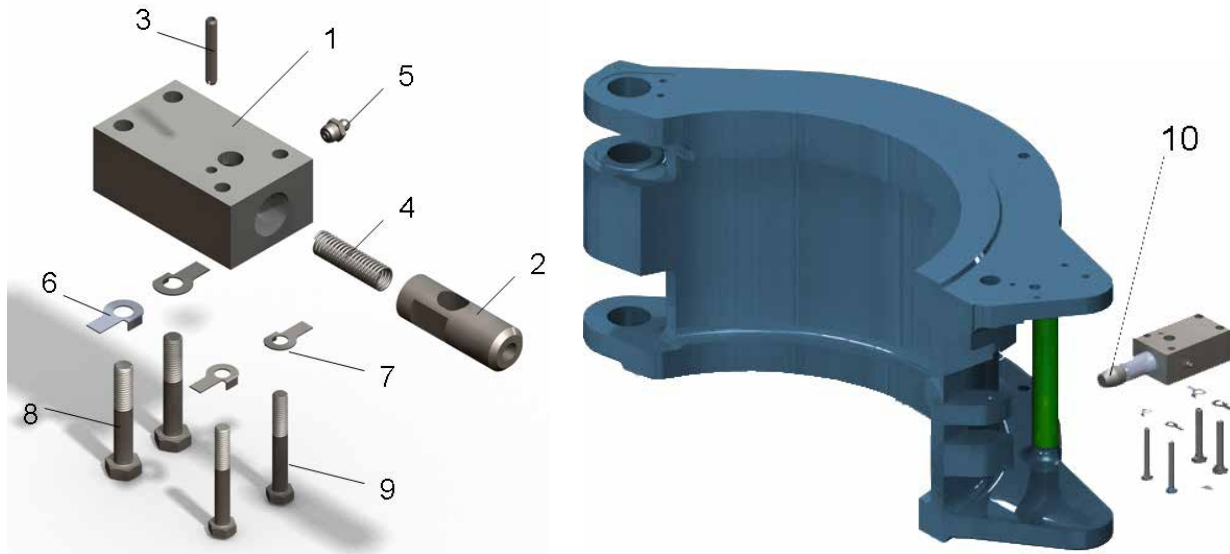


Fig. 57: 775115 Carrier securing Assembly

775115 Carrier securing Assembly

No.	Qty.	Part no.	Description
1	1	775124	Securing Latch
2	1	775125	Pin for Securing Latch
3 *	1	775026	Washer No.1 for Securing Latch
4 *	1	775027	Washer No. 2 for Securing Latch
5 *	1	775028	Spring
6	1	775129	Stopper
7 *	1	775015-1	Hexagonal Nut
8 *	1	70064	Grease Nipple
9	1	775019	Flat Headed Screw
10 *	1	775015-3	Threaded Pin
11 *	1	88240-4	Split Pin
12	1	643663	Screw
13	1	643801-1	Crimp Sleeve
14	0,27m	643801	Wire Line
15	1	643801-11	Wire Line Clamp

* Recommended Spare Parts (see 775115-RSP)

Locking equipment for SDS 65 up to SDS 250 I

Pos.	Qty.	PN	Description
1	1	640011	Casing
2	1	640012-1	Locking bolt
		640012-2	Locking bolt
3	1	775114-2	Dowel pin
4	1	650216	Spring
5	1	70064	Grease fitting
6	2	735854	Washer
7	2	645059	Washer
8	2	645158	Screw
9	2	612588	Screw
10	1	640013	Welding attachment

SERVICE

5.3.2.7 SDS Type series Assemblies - Locking equipment for SDS 350

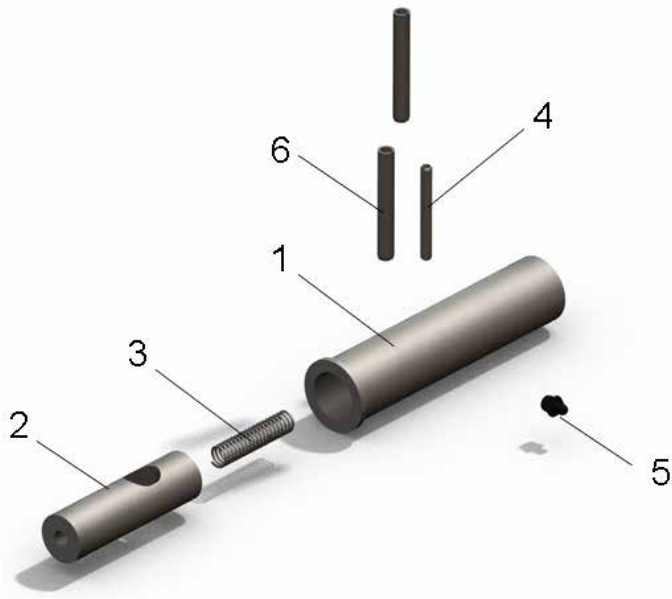


Fig. 58: Locking equipment for SDS 65 up to SDS 350

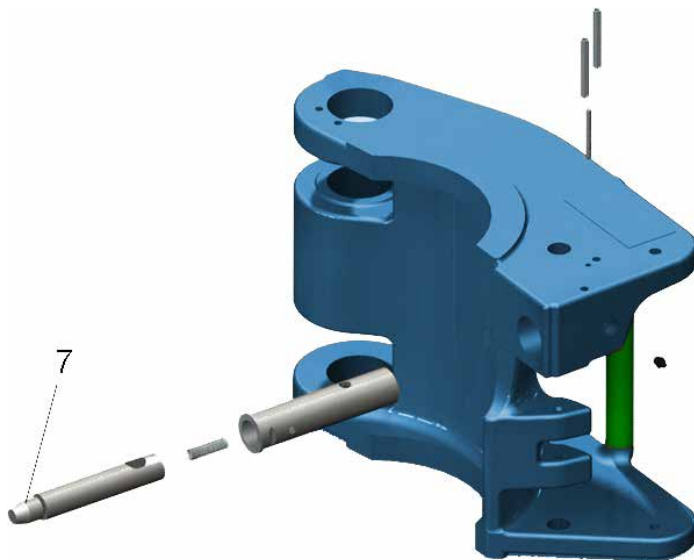


Fig. 59: Locking equipment for SDS 65 up to SDS 350

Pos.	Qty.	PN	Description
1	1	640021	Casing
2	1	640012-3	Locking bolt
	1	640012-4	Locking bolt
3	1	650216	Spring
4	1	622516	Dowel pin
5	1	70064	Grease fitting
6	2	70752	Dowel pin
7	1	640013	Welding attachment

5.3.3 Drawing and Parts List SDS -H

5.3.3.1 642540-Y-BC-H SDS 250-3 Hydraulic operated side door elevator

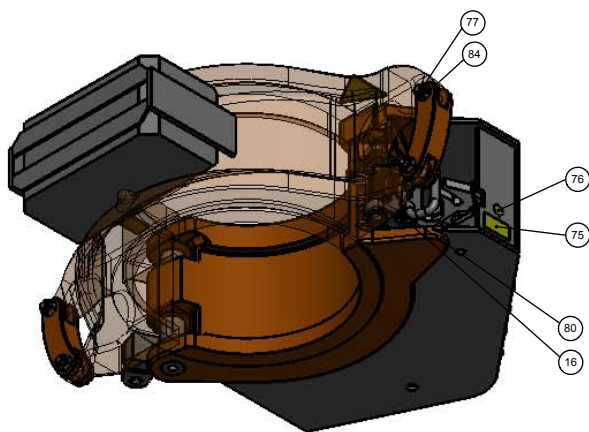
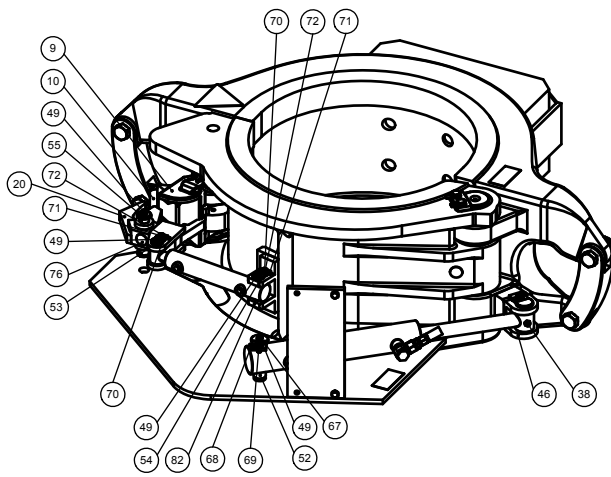
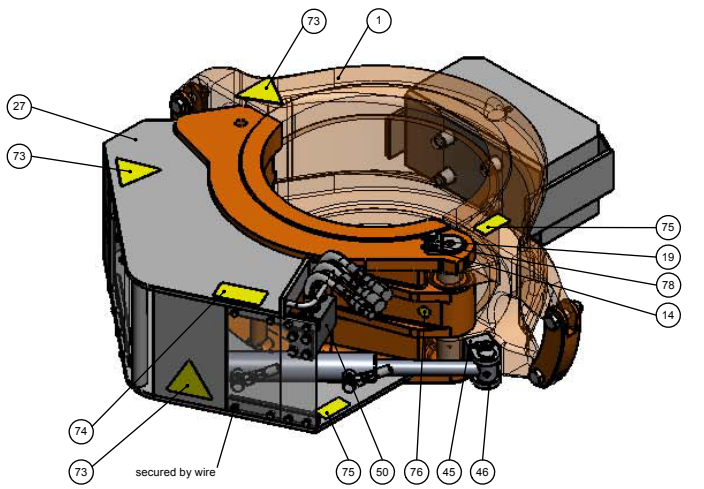


Fig. 60: 642540-Y-BC-H SDS 250-3 Hydraulic operated side door elevator I

SERVICE

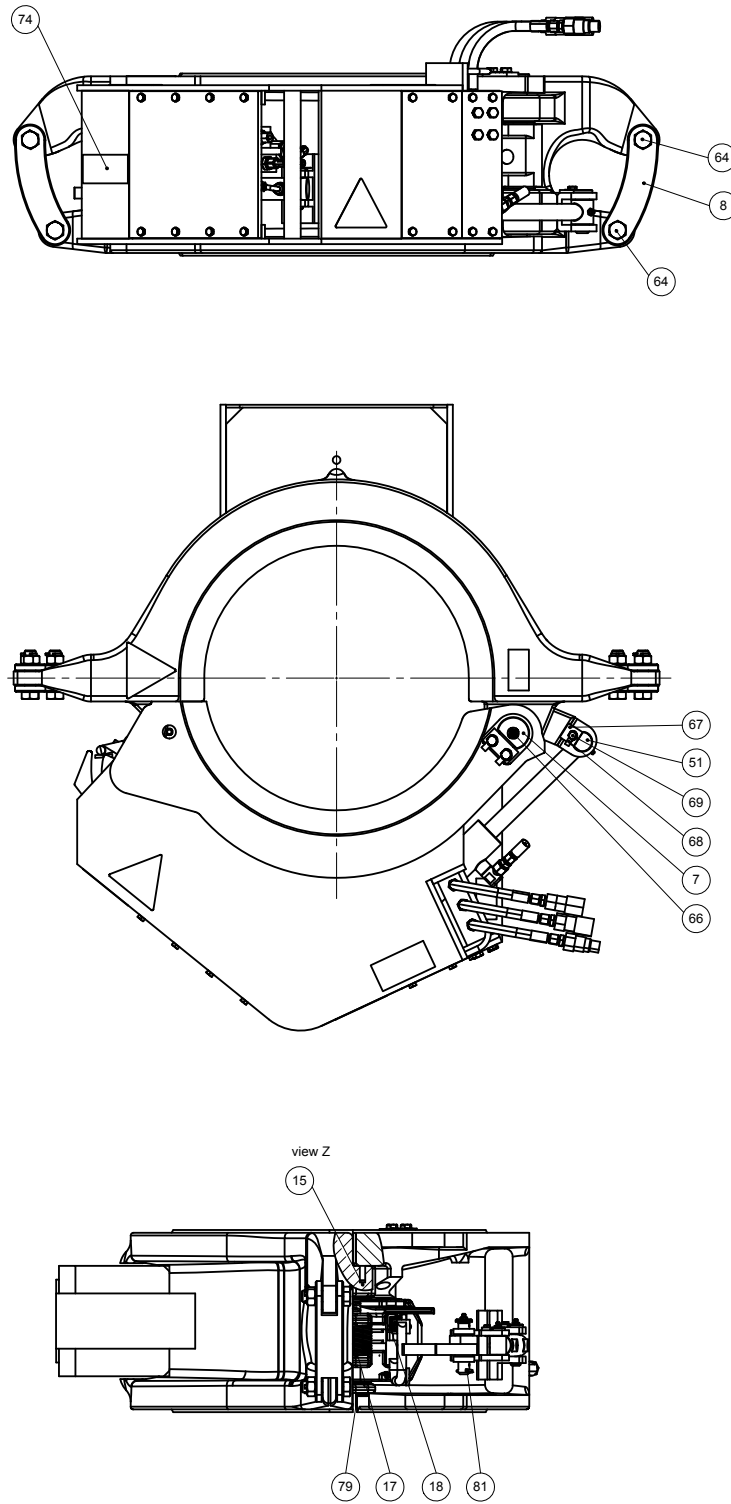


Fig. 61: 642540-Y-BC-H SDS 250-3 Hydraulic operated side door elevator II

Part List 642540-Y-BC-H Parts list

No.	Qty.	Part no.	Description
1	1	642541-H	Body/Door reworking
2	1	642510	Hinge Pin
3	2	612512	Linck Block
4	1	642519-1	Latch Hydraulic Alternative
5	1	642519-2	Latch Lock Assembly
6	1	641504	Latch Pin
7	1	641505	Latch Lock Pin
8	1	641506	Latch Spring
9	1	641507	Latch Lock Spring
10	1	641512	Safety Plate
11	1	642546	Lever
12	1	642505	Hydraulic Box Assembly
13	1	642543	Welding Flange
14	1	645594-2	Welding Flange Part 2
15	1	643602-48	Manifold
16	1	642509-1	Cylinder Bolt 1
17	1	642509-2	Cylinder Bolt 2
18	1	642509-3	Cylinder Bolt 3
19	1	642509-4	Cylinder Bolt 4
20	2	642509-5	Securing Sheet 1
21	2	642509-6	Securing Sheet 2
22	1	642509-1	Lever Bolt
23	1	642551	Hydraulic Assembly
24	2	612671	Screw
25	2	645028	Screw
26	6	89126	Screw
27	4	613623-1	Screw
28	2	613783	Washer
29	2	645059	Washer
30	2	735854	Washer
31	4	70064	Grease Fitting
32	1	612515	Grease fitting
33	1	620609	Cotter Pin
34	1	611009	Cotter Pin
35	4	752339	Cotter Pin
36	1	620608	Securing Ring
37	3	611524	Warning Sign Don't Touch
38	2	671642	Warning Sign Blohm + Voss
39	3	671642	Warning Sign GREASE DAILY
40	3	671641	Warning Sign Squeeze Danger
45	3	642544-1	Latch Cylinder Console Assembly
46	4	613556-41	Nut

5.3.3.2 643600-Y-H and 643590-Y-H VES SDS 350/2 Hydraulic operated side door elevator

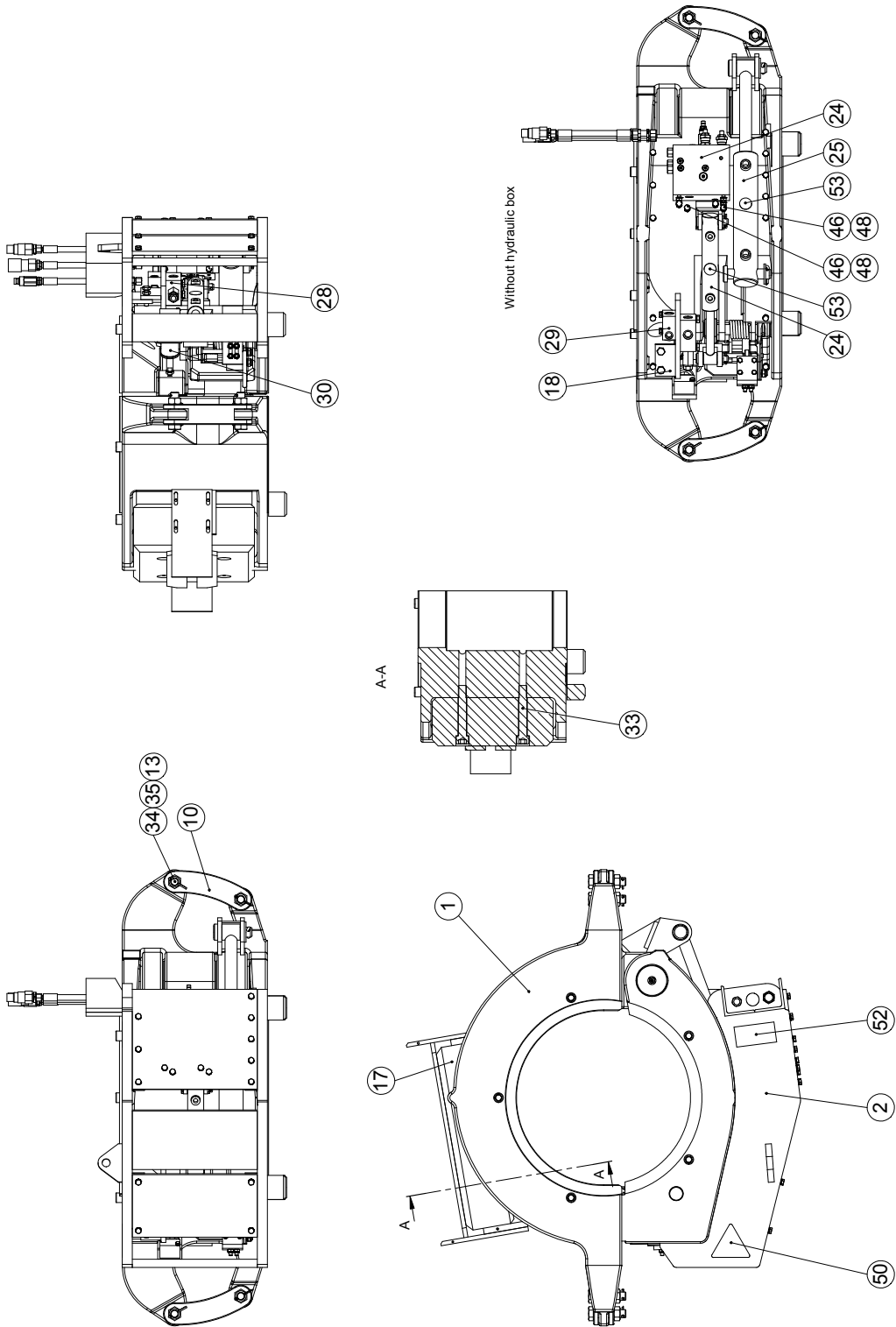


Fig. 62: 643600-Y-H VES SDS 350/2 Hydraulic operated side door elevator I

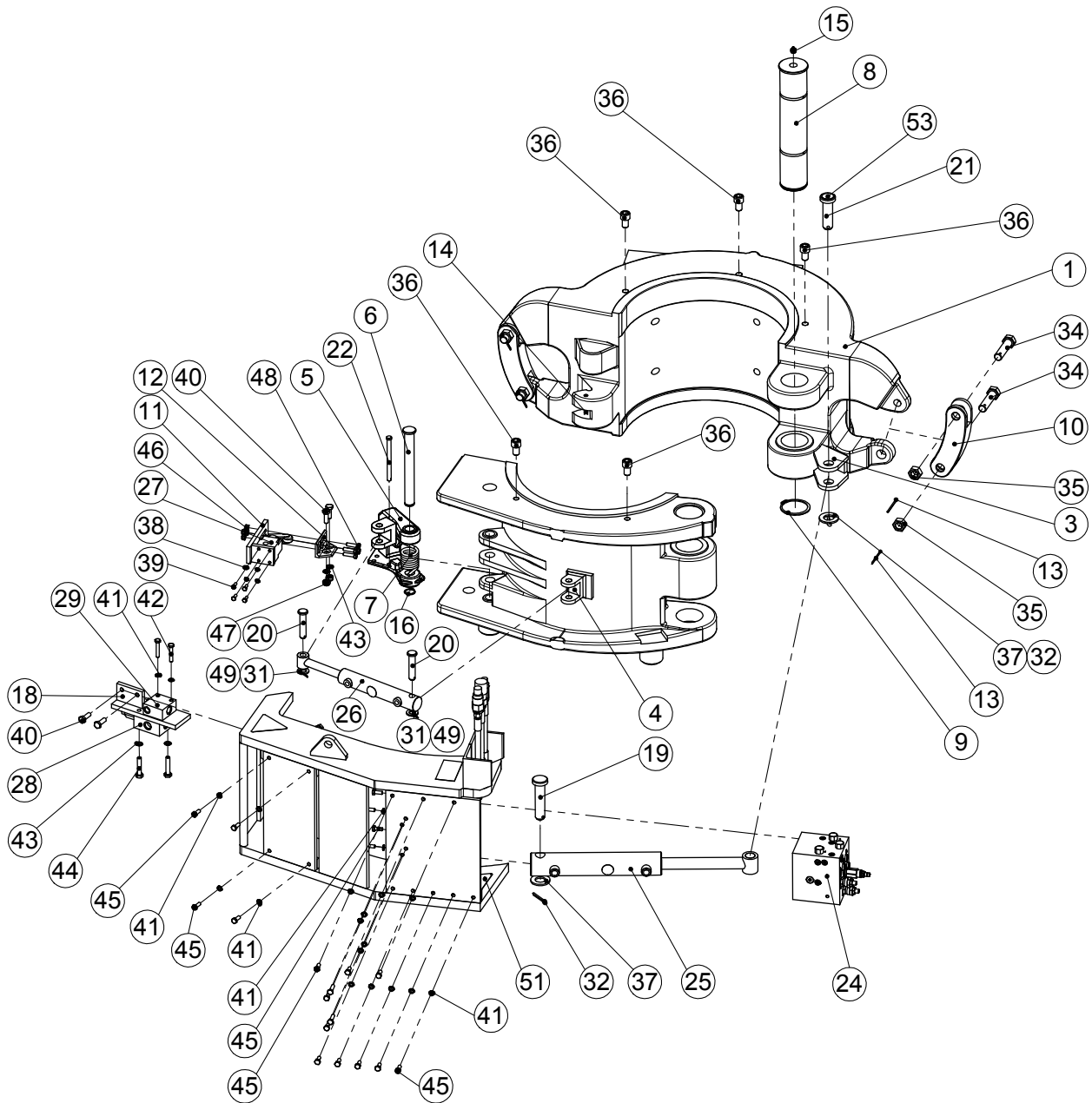


Fig. 63: 643600-Y-H VES SDS 350/2 Hydraulic operated side door elevator II

SERVICE

Part List 643600-Y-H VES SDS 350/2 Hydraulic operated side door elevator

No.	Qty.	Part no.	Description
1	1	643651-H	Body VES-SDS 350, hydraulic
2	1	643653	Hydraulic Box
3	1	643652	Cylinder holder
4	1	643529	Fork
5	1	643537	Hydraulic latch
6	1	643522	Latch pin
7	1	643506	Latch spring
8	1	643526	Hinge pin
9	1	643528	Retaining ring
10	2	612512	Link block
11	1	643593	Valve holder
12	1	643594	Angle
13	4	752339	Cotter pin
14	1	641575	Rivet pin
15	1	612515	Lubricating nipple
16	1	641511	Retaining ring
17	1	643600-M	Modification kit "Counterweight"
18	1	643602-77	Valve plate
19	1	643656	Elevator cylinder pin (long)
20	2	643547	Latch cylinder pin
21	1	643656-1	Elevator cylinder pin (short)
22	1	641505	Latch lock pin
23*	1	643616-1	Hydraulic assembly
24	1	615164	Hydraulic manifold
25	1	643544-1	Elevator cylinder
26	1	643531	Latch cylinder
27	1	775088	Directional poppet valve
28	1	643776	3/2 way valve
29	1	643775	Pilot operated check valve
30	1	642518	Pestle assembly
31	2	70814	Cotter pin
32	2	752404	Cotter pin
33	4	756731	Screw
34	4	613623-1	Screw
35	4	613556-41	Nut
36	5	643663	Capscrew
37	2	752321	Washer
38	4	792111	Washer
39	4	612671	Screw
40	4	645195	Screw
41	22	792112	Washer
42	2	643775-1	Screw
43	4	792103	Washer
44	2	710723	Screw
45	16	643779-1	Screw
46	8	675057	Nut
47	2	89125	Nut
48	8	645671	Screw
49	2	621432	Washer
50	1	671641	Warning sign "squeeze danger"
51	1	671640-1	Warning sign "Hands"
52	1	671638	Warning sign Forum B + V Oil Tools
53	3	611524	Warning sign "don't touch"

SERVICE

5.3.3.3 643560-Y-BC-H SDS 350-4 Hydraulic operated side door elevator

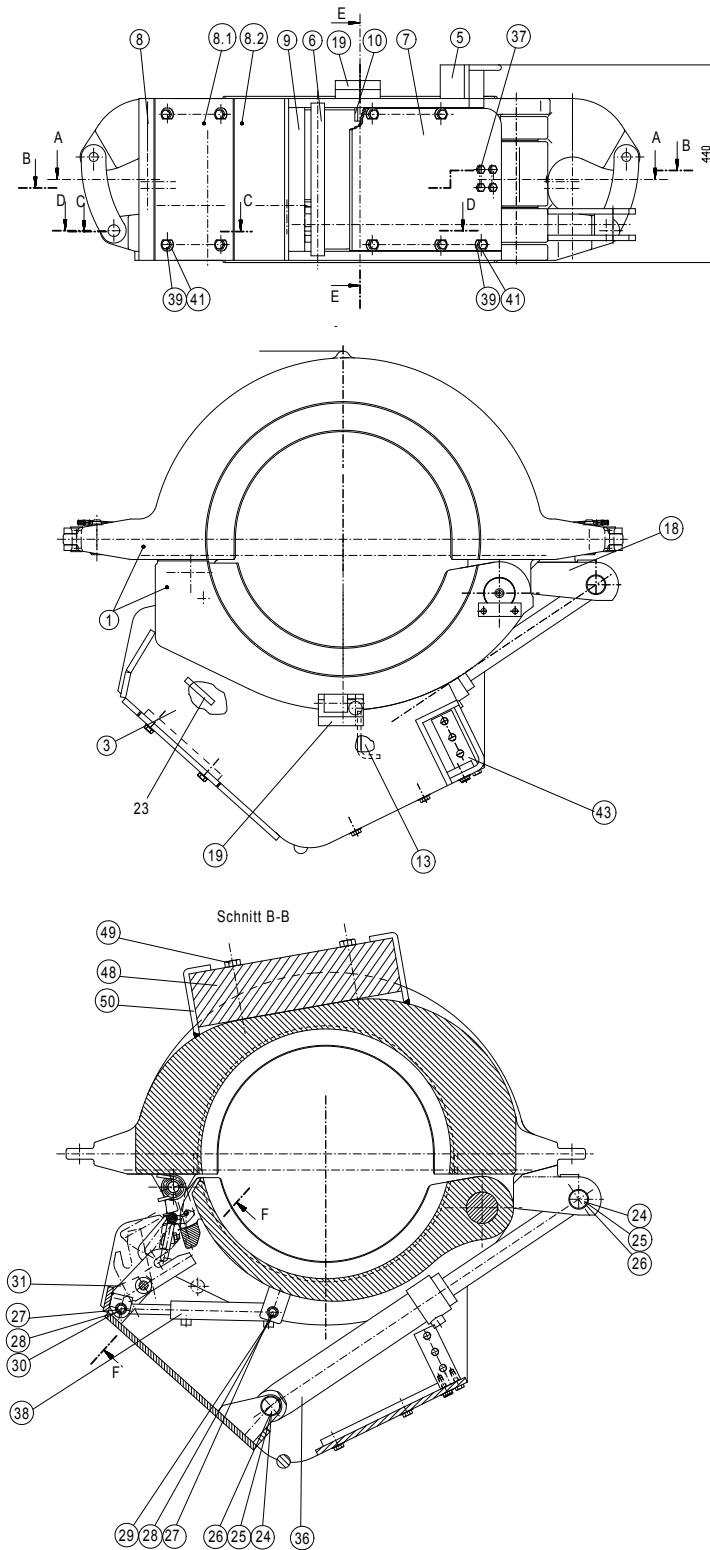


Fig. 64: 643560-Y-BC-H SDS 350-4 Hydraulic operated side door elevator I

SERVICE

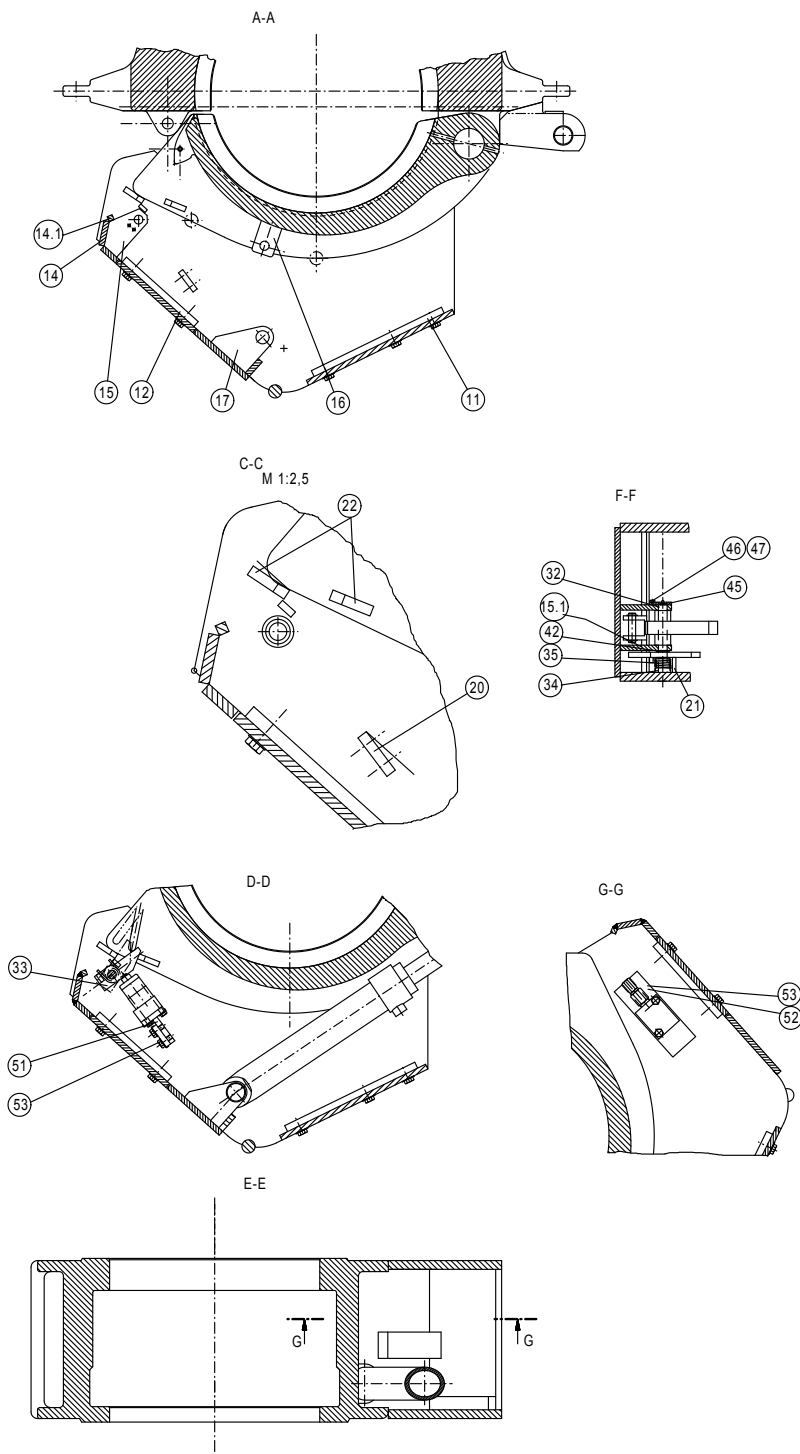


Fig. 65: 643560-Y-BC-H SDS 350-4 Hydraulic operated side door elevator II

Part List 643560-Y-BC-H

No.	Qty.	Part no.	Description
1	1	643560	Side Door Elevator SDS-350/4
3	1	643602-3	Top plate
4	1	643602-4	Bottom plate
5	1	643602-5	Coupling plate
6	1	643602-6	Handle
7	1	643602-7	Front plate right
8	1	643602-8	Plate 1
8.1	1	643602-8-1	Front plate left
8.2	1	643602-8-2	Plate 2
9	1	643602-9	Plate 3
10	1	643602-10	Holding plate 1
11	1	643602-11	Holding plate 2
12	2	643602-12	Holding plate 3
14	1	643602-14	Plate 4
14.1	1	643602-14-1	Plate 5
15	1	643602-15	Cylinder plate 1
15.1	1	643602-15-1	Cylinder plate 2
16	1	643602-16	Cylinder plate 3
17	2	643602-17	Cylinder plate 4
18	1	643602-18	Cylinder plate 5
20	1	643602-20	Holding plate 4
21	1	643602-21	Stopper 1
22	2	643602-22	Stopper 2
23	1	643602-23	Holding plate 5
24	2	756096-1	Washer
25	2	775017	Cotter Pin
56	2	643602-26	Cylinder Bolt 1
27	3	621432	Washer
28	2	70814	Cotter Pin
29	1	643602-30	Cylinder Bolt 2
30	1	643602-31	Cylinder Bolt 3
31	1	643602-33	Lever 1
32	1	643602-34	Bolt
33	1	643602-39	Lever 3
34	1	643602-40	Bushing
35	1	643682	Spring
36	1	617545	Hydraulic Cylinder
37	4	89126	Screw
38	1	643531	Latch Hydraulic Cylinder
39	9	735326	Screw
40	5	643602-2	Washer
41	4	645100	Washer
42	1	612679	Washer
43	1	643602-48	Hydraulic Connection Plate
44	1	643509	Spring Type Pin
45	1	643602-68	Distance Plate
46	2	612671	Screw
47	2	612558	Washer with TAP
48	1	643602-73	Counter weight
49	4	643602-90	Screw
50	2	643602-75	Holding Plate
51	1	643602-76	Valve plate 2
52	1	643602-77	Valve plate 1
53	8	643602-1	Washer

5.3.3.4 641620-Y-BC-H SDS 150-7 Hydraulic operated side door elevator

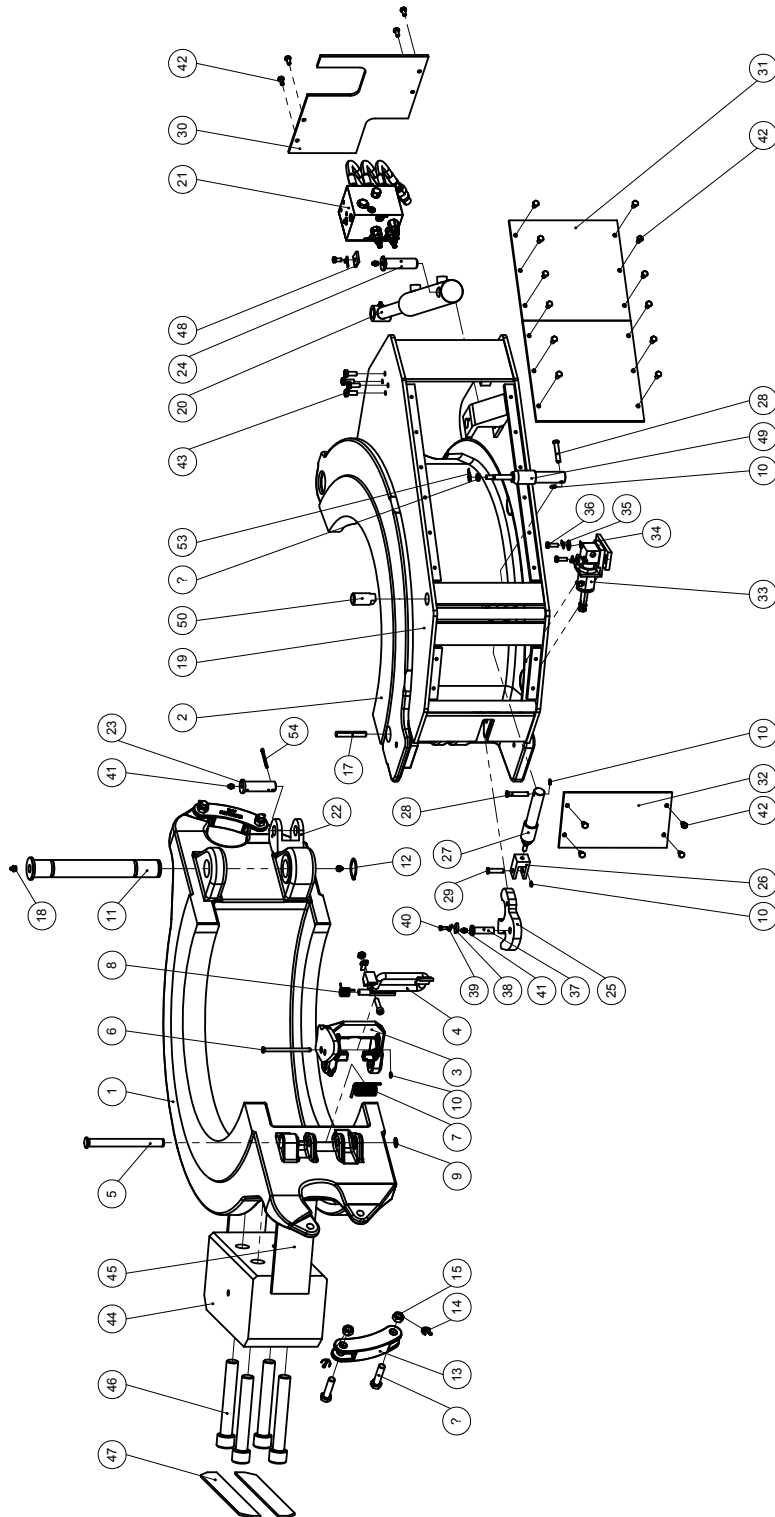


Fig. 66: 641620-Y-BC-H SDS 150-7 Hydraulic operated side door elevator I

Part List 641620-Y-BC-H SDS 150-7 Hydraulic operated side door elevator

No.	Qty.	Part no.	Description
1	1	641621-1-H	Body
2	1	641621-2-H	Door
3	1	641602	Latch
4	1	641603-H	Latch Lock Assembly
5	1	641504	Latch Pin
6	1	641505	Latch Lock Pin
7	1	641506	Latch Spring
8	1	641507	Latch Lock Spring
9	1	620608	Retaining ring
10	4	620609	Cotter Pin
11	1	641630	Hinge Pin
12	1	612508	Retaining ring
13	2	611512	Link Block
14	4	752339	Cotter Pin
15	4	755137	Nut
16	4	621430-11	Screw
17	1	641615	Clamping pins
18	2	612515	Grease Nipple
19	1	641751	Hydraulic Box
20	1	615915	Elevator Cylinder
21	1	651537	Hydraulic Block
22	1	641752	Cylinder Flange
23	1	641752-1	Cylinder Pin
24	1	642509-2	Cylinder Bolt 2
25	1	641753	Lever
26	1	641754	Cylinder Fork
27	1	660561	Micro Cylinder
28	2	651539-7	Bolt 3
29	1	660570	Flange Pin 1
30	1	641755-1	Cover sheet 1
31	2	641755-2	Cover sheet 2
32	1	641755-3	Cover sheet 3
33	1	651538	Pestle Assembly
34	2	753051	Washer
35	3	645059	Washer
36	2	735852	Screw
37	1	642509-3	Cylinder Bolt 3
38	1	642509-5	Securing sheet
39	1	613783	Washer
40	1	612671	Screw
41	3	70064	Grease Nipple
42	21	645028	Screw
43	4	89126	Screw
44	1	642547	Counterweight for SDS
45	2	642548	Sheet1
46	4	641758	Screw
47	1	642549	Sheet 2
48	1	642509-6	Securing Sheet 2
49	1	641756	Micro Cylinder
50	1	641757	Verification Pin
51	1	641759	Hydraulic Assembly
52	1	645675	Nut
53	1	735854	Washer
54	1	70263	Cotter Pin

5.3.3.5 641759 SDS 150-7 Hydraulic plan

Operating pressure
80 - 160 bar / 1160 - 2320 PSI
Maximum pressure
210 bar / 3045 PSI
Volumetric flow
17 - 20,8 L/min / 4,5 - 5,5 GPM

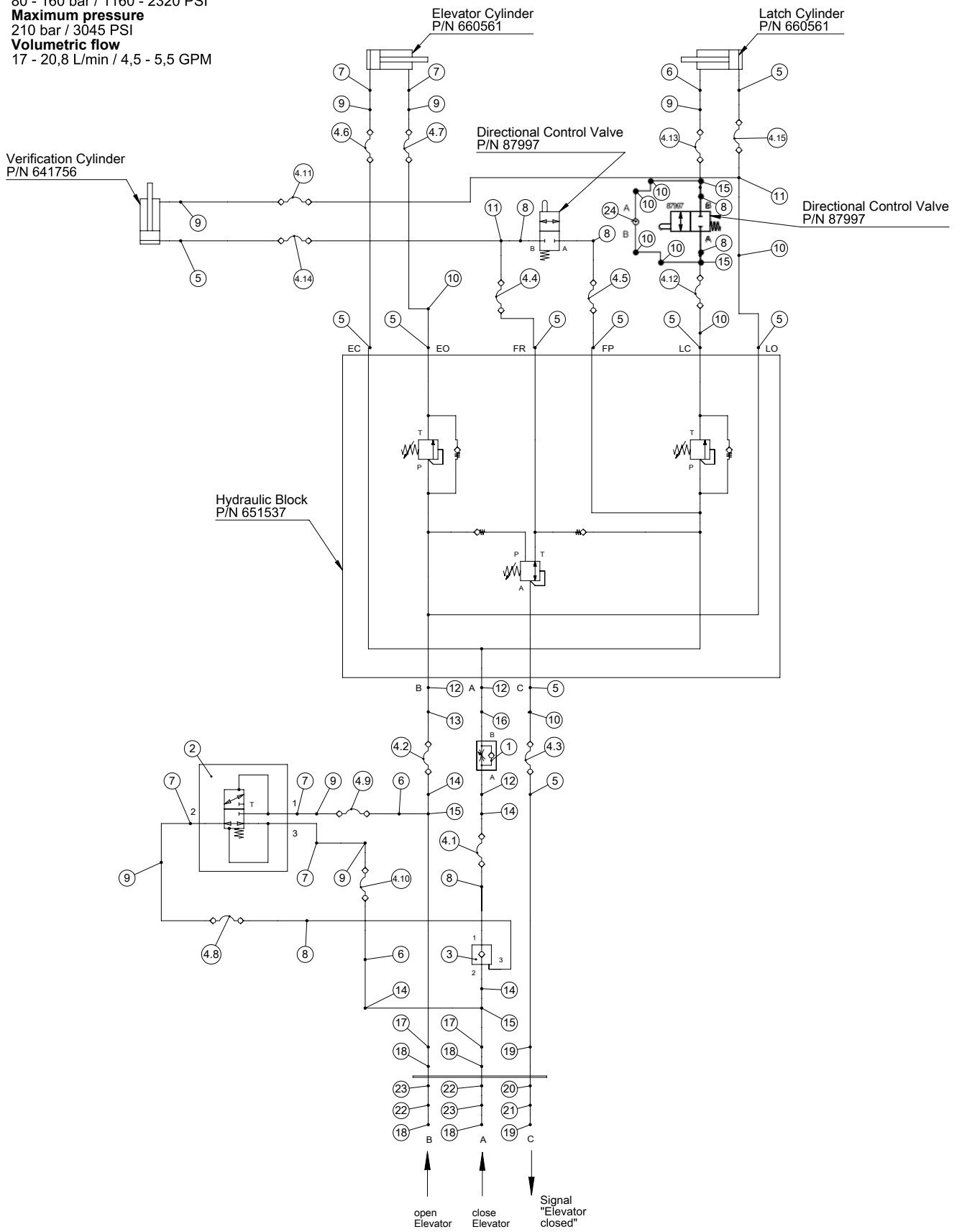


Fig. 67: 641759 SDS 150-7 Hydraulic plan

SERVICE

Part List 641759 SDS 150-7 Hydraulic plan

Qty.	Part no.	Description
1	612934	Throttle
1	643775	Pilot operated Check Valve
1	643776	3/2 Way Valve
1	641759-40	Hose Assembly SDS 150-7
1	641759-A	Hose Assembly "A"
1	641759-B	Hose Assembly "B"
1	641759-C	Hose Assembly "C"
1	641759-FR	Hose Assembly "FR"
1	641759-FP	Hose Assembly "FP"
1	641759-EC	Hose Assembly "EC"
1	641759-EO	Hose Assembly "EO"
1	641759-VS1	Hose Assembly "VS1"
1	641759-VS2	Hose Assembly "VS2"
1	641759-VS3	Hose Assembly "VS3"
1	641759-VS4	Hose Assembly "VS4"
1	641759-VS5	Hose Assembly "VS5"
1	641759-VS6	Hose Assembly "VS6"
1	641759-VS7	Hose Assembly "VS7"
1	641759-VS8	Hose Assembly "VS8"
10	671551-1	fitting straight
3	671551-2	Straight fitting
5	671551-4	Reducing adapter
6	671551-6	Banjo coupling 90°
7	775094-2	Fitting 90°
8	775094-3	Adjustable Stud Elbow
2	670737	Adjustable direction fitting, L shaped
3	613945	Swivelling Screw Fitting 90°
1	613096	Crimp fitting 45°
4	645096	L-Adapter
4	645095	Adjustable Stud Barrel Tee
1	645117	Direct Pipe Fitting
2	755372	Standpipe Reducer
4	755373	Straight Male Stud Coupling
2	612944	Straight Connection 8L-1/4"
1	612965	Coupling, Flat Face, male
1	612966	Coupling, Flat Face, female
2	612936	Coupling, Flat Face, male
2	612937	Coupling, Flat Face, female
1	645110	Check Valve

5.4 Recommended Spare parts

Forum B + V Oil Tools recommended spare parts provide a list of potential wear items that may be beneficial to keep on hand for repair and maintenance.

5.4.1 640600-RSP One year spare part SDS 65/1

No.	Qty.	Part No.	Description
	1	640606	Latch Spring
	1	641507	Latch Lock Spring
	1	612509	Retaining ring
	1	620609	Split Pin
	1	640610	Hinge Pin
	1	612509	Retaining ring
	5	612515	Grease nipple
	2	621430-11	Screw
	2	621430	Castle Nut
	4	752339	Split Pin
	2	613623-1	Screw
	2	613556-41	Nut
	1	643900-7	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin

5.4.2 641020-RSP One year spare part SDS 100-1

No.	Qty.	Part No.	Description
	1	640606	Latch Spring
	1	641507	Latch Lock Spring
	1	612509	Retaining ring
	1	620609	Split Pin
	1	641030	Latch Lock Pin for Side Door Elevator, or
	1	612509	Retaining ring
	5	70064	Grease Nipple
	2	621430-11	Screw
	2	621430	Castle Nut
	4	752339	Split Pin
	2	613623-1	Screw
	2	613556-41	Nut
	1	643900-1	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin

5.4.3 641000-RSP One year spare part SDS 100/2

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	641010	Hinge Pin
	1	641011	Retaining ring
	5	612515	Grease nipple
	4	621430-11	Screw
	4	755137	Nut
	4	752339	Split Pin
	1	643900-1	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin

5.4.4 641040-RSP One year spare part SDS 100-3

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	641010	Hinge Pin
	1	641011	Retaining ring
	5	612515	Grease nipple
	4	621430-11	Screw
	4	755137	Nut
	4	752339	Split Pin
	1	643900-1	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin

5.4.5 641500-RSP One year spare part SDS 150-1

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	641510	Hinge Pin
	1	641511	Retaining ring
	5	612515	Grease nipple
	2	621430-11	Screw
	2	621430	Castle Nut
	2	752339	Split Pin
	2	613623-1	Screw
	2	613556-41	Nut
	2	752339	Split Pin
	1	643900-8	Safety Pin Assembly
	1	643801-1	Rope Clamp
	1	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin

5.4.6 641520-RSP One year spare part SDS 150-2

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	641510	Hinge Pin
	1	641511	Retaining ring
	5	612515	Grease nipple
	2	621430-11	Screw
	2	621430	Castle Nut
	2	752339	Split Pin
	2	613623-1	Screw
	2	613556-41	Nut
	2	752339	Split Pin
	1	643900-8	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin

5.4.7 641540-RSP One year spare part SDS 150-3

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	641550	Hinge Pin
	5	70064	Grease Nipple
	2	621430-11	Screw
	2	621430	Castle Nut
	4	752339	Split Pin
	2	613623-1	Screw
	2	613556-41	Nut
	1	643900-8	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	2	792103	Washer
	1	641550-1	Safety Plate
	2	645198	Screw

5.4.8 641560-RSP One year spare part SDS 150-4

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	641570	Hinge Pin
	1	620611	Retaining ring
	5	612515	Grease nipple
	5	70064	Grease Nipple
	2	621430-11	Screw
	2	621430	Castle Nut
	4	752339	Split Pin
	2	613623-1	Screw
	2	613556-41	Nut
	1	643900-8	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin

5.4.9 641580-RSP One year spare part SDS 150-5

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	641590	Hinge Pin
	5	612515	Grease nipple
	2	621430-11	Screw
	2	621430	Castle Nut
	4	752339	Split Pin
	2	613623-1	Screw
	2	613556-41	Nut
	1	643900-1	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	2	792103	Washer
	1	641590-2	Safety plate
	2	89126	Screw

5.4.10 641620-RSP One year spare part SDS 150-7

No.	Qty.	Part No.	Description
6	1	641506	Latch Spring
7	1	641507	Latch Lock Spring
8	1	620608	Retaining ring
9	5	620609	Split Pin
11	1	612508	Retaining ring
13	6	612515	Grease nipple
14	4	621430-11	Screw
15	4	755137	Nut
16	12	752339	Split Pin
17	1	643900-3	Safety Pin Assembly
18	1	641615	Rivet Pin
22	6	643801-1	Rope Clamp
23	1	643801	Wire line
24	6	612518	Protection Cap
25	6	671642	Warning sign "GREASE DAILY"
26	6	612530-5	Marking Pointfor Grease Nipple

5.4.11 642500-RSP One year spare part SDS 250-1

No.	Qty.	Part No.	Description
	1	642603	Latch Lock Assembly
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	5	612515	Grease nipple
	2	613623-1	Screw
	2	752338	Castle Nut
	2	612514	Link Block Bolt Assy.
	1	643900-2	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	2	792103	Washer
	2	89126	Screw

5.4.12 642520-RSP One year spare part SDS 250-2

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	642510	Hinge Pin
	5	612515	Grease nipple
	2	613623-1	Screw
	2	752338	Castle Nut
	2	752339	Split Pin
	2	612514	Link Block Bolt Assy.
	1	643900-2	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	2	792103	Washer
	1	641512	Safety Plate
	2	89126	Screw

5.4.13 642540-RSP One year spare part SDS 250-3

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	642510	Hinge Pin
	5	612515	Grease nipple
	2	613623-1	Screw
	2	752338	Castle Nut
	2	752339	Split Pin
	2	612514	Link Block Bolt Assy.
	1	643900-2	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	2	792103	Washer
	1	641512	Safety Plate
	2	89126	Screw

5.4.14 642580-RSP One year spare part SDS 250-5

No.	Qty.	Part No.	Description
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	1	620609	Split Pin
	1	642590	Hinge Pin
	5	612515	Grease nipple
	2	613623-1	Screw
	2	752338	Castle Nut
	2	752339	Split Pin
	2	612514	Link Block Bolt Assy.
	1	643900-2	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641615	Rivet Pin
	2	792103	Washer
	1	641590-2	Safety plate
	2	89126	Screw

5.4.15 642600-RSP One year spare part SDS 250-0

No.	Qty.	Part No.	Description
	1	642603	Latch Lock Assembly
	1	641506	Latch Spring
	1	641507	Latch Lock Spring
	1	620608	Retaining ring
	5	612515	Grease nipple
	2	613623-1	Screw
	2	752338	Castle Nut
	2	612514	Link Block Bolt Assy.
	1	643900-2	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	2	792103	Washer
	2	89126	Screw

5.4.16 642620-RSP One year spare part SDS 250-6

No.	Qty.	Part No.	Description
	1	611506	Latch Spring
	1	611007	Latch Lock Spring
	1	611508	Retaining ring
	1	80340-1	Split Pin
	1	643511	Hinge Pin
	5	612515	Grease nipple
	4	613623-1	Screw
	4	613556-41	Nut
	8	752339	Split Pin
	1	643900-3	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	642695	Spring-type straight pin
	2	792103	Washer
	1	641590-2	Safety plate
	2	89126	Screw

5.4.17 643500-RSP One year spare part SDS 350-1

No.	Qty.	Part No.	Description
	1	643506	Latch Spring
	1	643507	Latch Lock Spring
	1	725314	Retaining ring
	1	620609	Split Pin
	1	643511	Hinge Pin
	5	612515	Grease nipple
	2	613623-1	Screw
	2	752338	Castle Nut
	2	752339	Split Pin
	2	612514	Link Block Bolt Ass.
	1	643900-4	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	2	792103	Washer
	1	641590-2	Safety plate
	2	89126	Screw

5.4.18 643560-RSP One year spare part SDS 350-4

No.	Qty.	Part No.	Description
	1	643506	Latch Spring
	1	643507	Latch Lock Spring
	1	725314	Retaining ring
	1	620609	Split Pin
	1	643511	Hinge Pin
	5	612515	Grease nipple
	2	613623-1	Screw
	2	752338	Castle Nut
	2	752339	Split Pin
	2	612514	Link Block Bolt Assy.
	1	643900-4	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	2	792103	Washer
	1	641590-2	Safety plate
	2	89126	Screw

5.4.19 643580-RSP One year spare part SDS 350-5

No.	Qty.	Part No.	Description
	1	643506	Latch Spring
	1	643507	Latch Lock Spring
	1	641511	Retaining ring
	1	80340-1	Split Pin
	1	643526	Hinge Pin
	1	643528	Retaining ring
	10	612515	Grease nipple
	2	613623-1	Screw
	2	752338	Castle Nut
	2	752339	Split Pin
	2	612514	Link Block Bolt Assy.
	1	643900-4	Safety Pin Assembly
	5	643801-1	Rope Clamp
	5	643801-11	wire line clamp 3mm
	1	641575	Spring-type straight pin
	1	612679	Washer
	1	643520-5	Spring
	1	752331	Split Pin

5.4.20 645500-RSP One year spare part SDS 500 and SDS750

No.	Qty.	Part No.	Description
	1	611506	Latch Spring
	1	611007	Latch Lock Spring
	1	611508	Retaining ring
	1	620609	Split Pin
	1	645504	Hinge Pin
	1	643528	Retaining ring
	5	612515	Grease nipple
	5	70064	Grease Nipple
	2	613623-11	Screw
	2	752338	Castle Nut
	2	752339	Split Pin
	2	615014	Clevis pin with head
	2	622515	Safety Spring
	1	643900-4	Safety Pin Assembly
	1	643801-1	Rope Clamp
	1	641575	Spring-type straight pin
	1	650216	Slip Spring

5.4.21 643590-Y-H-RSP One year spare part VES SDS 350-2

No.	Qty.	Part No.	Description
7	1	643506	Latch Spring
9	2	643528	Retaining ring
10	2	612512	Link Block
12	1	643594	Angle
13	4	752339	Cotter Pin
15	1	612515	Lubrication nipple
16	1	641511	Retaining ring
19	1	643546	Elevatorzylinder Bolzen
20	2	643547	Latch cylinder Pin
31	2	70814	Cotter Pin
21	1	643546-1	Elevatorcylinder Bolt
25	1	643544	Elevator Cylinder
26	1	643531	Latch Cylinder
27	1	775088	Directional Poppet Valve
28	1	643776	3/2 Way Valve
29	1	643775	Pilot operated Check Valve
33	4	756731	Screw
34	4	613623-1	Screw
35	4	613556-41	Nut
36	5	643663	Screw
38	4	792111	Washer
39	4	612671	Screw
40	6	645195	Screw
41	2	792112	Washer
42	2	643775-1	Screw
43	2	792103	Washer
44	2	710723	Screw
45	12	643779-1	Screw
46	4	675057	Nut
47	2	89125	Nut
49	2	621432	Washer
50	2	671641	Warning sign "squeeze danger"
51	2	671640-1	Warning sign "Hands" - metal plate
52	2	671638	Warning sign Forum
53	2	611524	Warning sign "don't touch"
-	2	752331	Split Pin
-	2	612679	Washer
-	2	612948	Sequence Valve G1/2"
-	1	645110	Check Valve
-	5	643548	Hydraulic Hose Assembly 600 lg
-	1	643549	Hydraulic Hose Assembly 400 lg
-	1	642526	Hydraulic Hose Assembly A
-	1	642527	Hydraulic Hose Assembly B
-	1	642528	Hydraulic Hose Assembly C
-	1	642529	Connection Hydraulic Hose Assembly A-NPT
-	1	642530	Connection Hydraulic Hose Assembly B-NPT
-	1	642531	Connection Hydraulic Hose Assembly C-NPT
-	2	671642	Warning sign "GREASE DAILY"

- not shown

5.4.22 643600-Y-H-RSP One year hydraulic spare part VES SDS 350-2

Pos.	Qty.	Part No.	Description
5	1	643537	Hydraulic Latch
6	1	643522	Latch Pin
7	1	643506	Latch Spring
9	1	641511	Retaining ring
13	4	752339	Split Pin
14	1	641575	Spring-type straight pin
19	1	643656	Elevator Cylinder Pin (long)
20	2	643547	Latch cylinder Pin
21	1	643656-1	Elevator Cylinder Pin (short)
22	1	641505	Latch Lock Pin
24	1	615164	Hydraulic Manifold
25	1	643544-1	Elevator Cylinder
26	1	643531	Latch Cylinder
28	1	643776	3/2 Way Valve
27	1	775088	Directional Poppet Valve
29	1	643775	Pilot operated Check Valve
30	1	642518	Pestle Assembly
32	2	752404	Split Pin
31	2	70814	Split Pin
34	4	613623-1	Screw
35	4	613556-41	Nut
37	2	752321	Washer
38	4	792111	Washer
39	4	612671	Screw
41	2	792112	Washer
42	2	643775-1	Screw
43	2	792103	Washer
44	2	710723	Screw
49	2	621432	Washer
50	1	671641	Warning sign "squeeze danger"
51	1	671640-1	Warning sign "Hands" - metal plate
52	1	671638	Warning sign Forum
53	3	611524	Warning sign "don't touch"
-	3	643517-1	Hydraulic Hose Assembly
-	1	643517-2	Hydraulic Hose Assembly
-	1	643517-3	Hydraulic Hose Assembly
-	1	643517-4	Hydraulic Hose Assembly
-	1	643517-5	Hydraulic Hose Assembly
-	1	643517-6	Hydraulic Hose Assembly
-	2	643517-7	Hydraulic Hose Assembly
-	1	643517-8	Hydraulic Hose Assembly
-	1	643517-9	Hydraulic Hose Assembly
-	1	643517-10	Hydraulic Hose Assembly
-	1	643517-11	Hydraulic Hose Assembly
-	1	643517-12	Hydraulic Hose Assembly
-	1	612937	Coupling, Flat Face, female
-	1	612936	Coupling, Flat Face, male
-	1	612965	Coupling, Flat Face, male

- not shown

INSPECTION / MAINTENANCE

INSPECTION /
MAINTENANCE

6 Inspection / Maintenance

This chapter contains important information on how to service your equipment safely, correctly and economically. It helps to avoid dangerous situations and reduce repair costs and downtimes. Furthermore, the reliability and the service life of the equipment will be increased by following the instructions in this manual.



Ensure that setup and installation work are accomplished only by sufficiently qualified and trained personnel.



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

⚠ WARNING



Separated hydraulic lines pose an injury hazard!

Hydraulic fluid can escape under high pressure.

- » ALWAYS relieve pressure in equipment before performing maintenance work.



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 equipment.
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 cracks and irregularities, which do not affect the safety or proper operation of the SDS 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 SDS is set down on a good supporting surface so that it cannot tip.
2. Provide for sufficient lighting at the workplace.
3. The SDS must be removed from the rotary table.
4. Ensure that equipment is disconnected from hydraulic system.

Trouble shooting

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

1. Check all hydraulic and electrical connections for proper condition.
2. Check proper lubrication.
3. Check software programme regarding equipment specification
4. Check bushing size and installation

6.1 Daily Maintenance

Daily Inspection

Visual inspection of

- Latch pin.
- Presence of all bolts, nuts, safety elements, lock wire.
- Hinge pin.
- Springs of the locking system.
- Latch handle pin and locking system.
- Pins of door cylinder.
- Pins of latch cylinder.
- Feedback valve.

Daily Test

Function the elevator daily. If any damage or malfunction is found, take the elevator out of service for repair.

Locking of screws

All Screws are normally secured by a mechanical bolt lock or with a safety wire. All other screws are secured by metal adhesive (Loctite). Ensure the correct retention method is applied.

Latch mechanism

Ensure that the latch mechanism are functioning properly. Hinge pins, latch lug surface and link contact surface should be lubricated.

6.2 Lubrication



WARNING

Lubricants can pose a health hazard!

Lubricants irritate skin and eyes.
» Avoid contact with lubricants.



WEAR EYE PROTECTION!



WEAR PROTECTIVE GLOVES!

The SDS must be supplied with lubricating grease manually by a grease pump through lubrication nipples.

6.2.1 Lubrication steps

Lubricate the hinge pin, the pins for door cylinder and feedback valve at the grease nipple with a hand grease gun until the grease comes out uniformly from the openings.

Lubricate the springs of the latch system by applying grease with a brush.

Lubricate the catch pin and pins for latch cylinder by applying a uniform film of lubricant on the surface with a brush.

Lubricate the latch handle pin and the latch system. To do this, take care not to pull the bolts out fully and with a brush apply a uniform film of lubricant on the surface.

6.2.2 Lubrication Intervals

Areas of the equipment 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.

INFO



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

Tools

- Grease Gun



Fig. 68: Recommended Grease Gun



Fig. 69: Instructions: Lubricate at Least Once Daily (P/N 671642)

6.2.3 Daily lubrication

Lubrications Points Overview

1. Grease nipple for hinge pin.
2. Grease nipple for latch mechanism.
3. Spring of locking system.
4. Latch pin.
5. Grease nipple for door cylinder pins.
6. Grease nipple for feedback valve.
7. Grease nipple for latch cylinder.

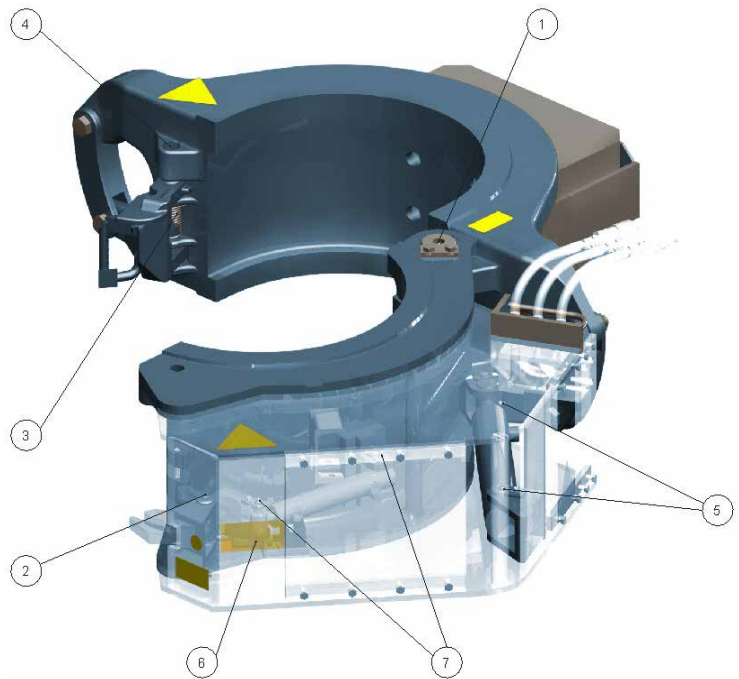


Fig. 70: Lubrication Point overview

6.3 Operational Inspections

6.3.1 Critical Load Inspection

Critical loads may occur. For example: impact loads such as jarring, pulling on stuck pipe, etc. If critical loads occurred unexpectedly, conduct the inspection immediately.

6.3.2 Dismantling Inspection

Generally, when the equipment returns to base, warehouse, etc. Carry out the Equipment inspection, immediately. Furthermore, control it prior to its being sent on the next job.

- » The Equipment should be dismantled and inspected in a suitably equipped facility for excessive wear, cracks, flaws or deformations.
- » Corrections should be made in accordance with recommendations which can be obtained from Forum B + V Oil Tools.
- » Weldings at the castings should be done only by Forum B + V Oil Tools or an authorized service company in according to Forum B + V Oil Tools welding procedure.
- » When need is shown in a field inspection, dismantle the Equipment and arrange an inspection in a suitably equipped facility.
- » Springs should be carefully visually inspected for excessive wear and obvious weakness.

6.4 Inspections

Perform inspections in compliance with API RP 8B at specified intervals and in inspection categories. Otherwise the frequency of required inspections is dependent on the conditions of use of the equipment.

Prior to inspection, remove all foreign material such as dirt, paint, lubricants, oil, 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 and retained.

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

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

INFO

Specified maintenance intervals are recommended for the VES SDS 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

Inspection Intervals

Category	Interval	Preparatory measures
I	Daily	- SDS in working environment
II	Weekly	- SDS on work location
III	Semi-annually	- SDS on work location - SDS disassembled
IV	Every 1 years	- SDS on work location - SDS disassembled

6.4.1 Inspection of Hydraulic Equipment

Check the hydraulic equipment daily for leakage. If unacceptably high leakage occurs internally or externally contact Forum B + V Oil Tools or an authorized service company.

6.4.2 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 sets,
- Pulling wedged drill strings,
- Holding heavy drill pipes / drill strings
- Jarring

6.4.3 Inspection Following Removal

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

Moreover, it should be inspected prior to being put back into service.

- It is necessary to disassemble the VES SDS in an appropriately equipped workshop to check for excessive wear, deformation, cracks 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 critical parts is performed 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 VES SDS and have it inspected in an appropriately equipped workshop.
- Check carefully for visible wear and material fatigue.

6.5 Inspection Categories

Always perform a complete inspection according to the instructions in Categories III or IV before AND after critical loads (6.4.2).

INFO



Inspection categories in accordance with API RP 8B

6.5.1 Inspection Category I

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

Scope/Prerequisites

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

Procedure:

- Visual check.
- Check for proper function.
- Ensure that this check is performed by a person with appropriate technical knowledge.

6.5.2 Inspection Category II

Category II includes additional tests not included in, but in addition to Category I inspections.

Scope/Prerequisites

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

Procedure:

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

6.5.3 Inspection Category III

Category III includes additional tests not included in, but in addition to 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 (refer to section „Critical Areas“ on page 141) for designated areas).

6.5.4 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, cracks, deformation and other damage.
- Inspect 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 etc. from the affected parts. Use suitable methods such as stripping off paint, steam cleaning, sand blasting, etc.

6.5.5 Inspection tasks list able

INFO

i The following check lists serve as copy templates for inspections to be performed in compliance with API 8K

Task / Interval	Daily	Weekly	6 Monthly	1 Year
Ongoing observation.				
Ongoing cleaning.				
Visual inspection and repair (if needed)				
Check status of Equipment lubrication				
Check for loose , missing parts and completeness of warning labels				
Check hoses for signs of cracks, wear or abrasion				
Check proper engagement of all parts				
Check the turnbuckle jaw nut to ensure tightness. Hand tighten as necessary				
Check the turnbuckle threads to ensure no rust. Clean and lubricate as necessary				
Condition and completeness of warning labels.				
Check for visible cracks, breaks, elongation, corrosion, damages, wear.				
NDT testing of all critical parts.				

Caption:

Not necessary

Necessary

Safety task!
Take out of Service for repair, if NOK!

6.5.6 Inspections cover sheet

INFO



The following check lists serve as copy templates for inspections to be performed in compliance with API 8L and are required to file performed inspections as defined in the user manual [„6.5.5 Inspection tasks list able“ on page 113]



Ensure that maintenance work is accomplished only by sufficiently qualified and trained personnel.

SDS model: _____

Serial number: _____

Part number: _____

Inspection Category I

Date / Place of Inspection	Checked		Name of Inspection Operator / Supervisor	Sign.
	OK	NOK		
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Remarks:

Inspection Category II

Date / Place of Inspection	Checked		Name of Inspection Operator / Supervisor	Sign.
	OK	NOK		
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Remarks:

Inspection Category III

Date / Place of Inspection	Checked		Name of Inspection Operator / Supervisor	Sign.
	OK	NOK		
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Remarks:

Inspection Category IV

Date / Place of Inspection	Checked		Name of Inspection Operator / Supervisor	Sign.
	OK	NOK		
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Remarks:

6.6 Measuring of wear

It is obvious that a visual inspection is not enough to check lifting equipment like the SDS. To measure link ears it is necessary to use calipers and a ruler.

Significant wear is restricted to the top link ear, it is here that the measurement is taken. Hinge Pins, Latch Pins and socket holes are not normally measured for wear in the field. When it becomes apparent that the Hinge or Latch Pins have more tolerances, the Elevator should be dismantled for general engineering check up.

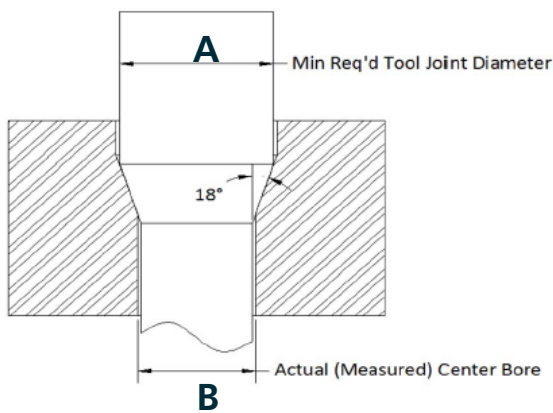
For Side Door Elevator SDSs a rule marked in sixteenth of an inch as adequate. The straight edge of a rule is used to check the squareness of the top bore and the end of a rule is inserted into the worn pockets and ridges. Wear of 1/16 inch (1,6 mm) or more should require refacing of collar surface.

6.6.1 Wear at the Equipment Joint of a Drill Pipe

The Elevator wear is measured directly at the pipe inlet of the Elevator. The maximal wear at the bore is:

Nominal pipe size + 0,25 inch.

(**A** = Equipment joint diameter, **B** = Actual Center Bore)



INFO

Example to Equipment Joints table:

5 DP Bushing, rated 500 t

1. Actual Centre Bore is 5.1/2
Follow vertical to 500 t
2. Follow horizontal to scale
» Required Equipment Joint is A= 7.3

Fig. 71: Minimum A and B for SDS Elevators

The following table shows the minimum required Equipment Joint diameter, depending on the Centre Bore. As soon as the Equipment Joint diameter falls below the rating line, the bushing/Elevator or the pipe has to be changed

(Contact Forum B + V Oil Tools or a Forum B + V Oil Tools authorized Repair Centre).

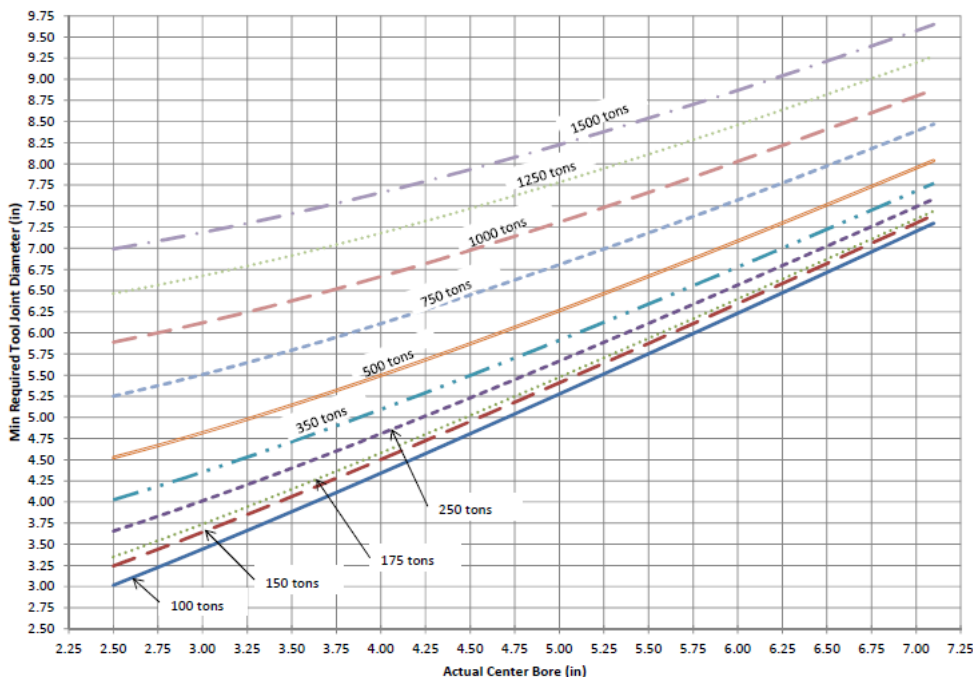


Fig. 72: Minimum A for Equipment Joints

6.7 Critical Areas Side Door Elevator SDS

Check critical areas shown according to inspection check lists.

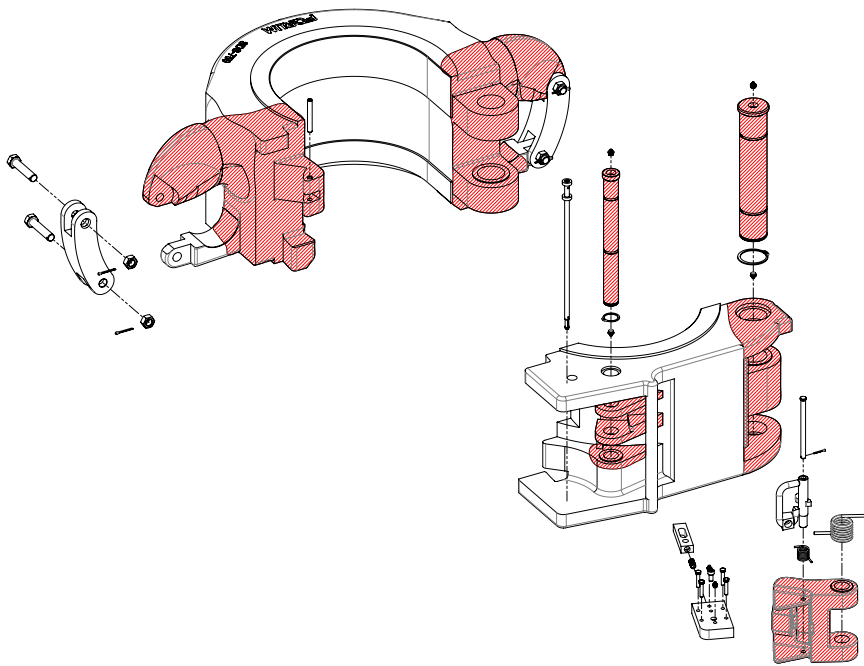


Fig. 73: SDS Elevators Critical Areas

Critical areas are hatched.

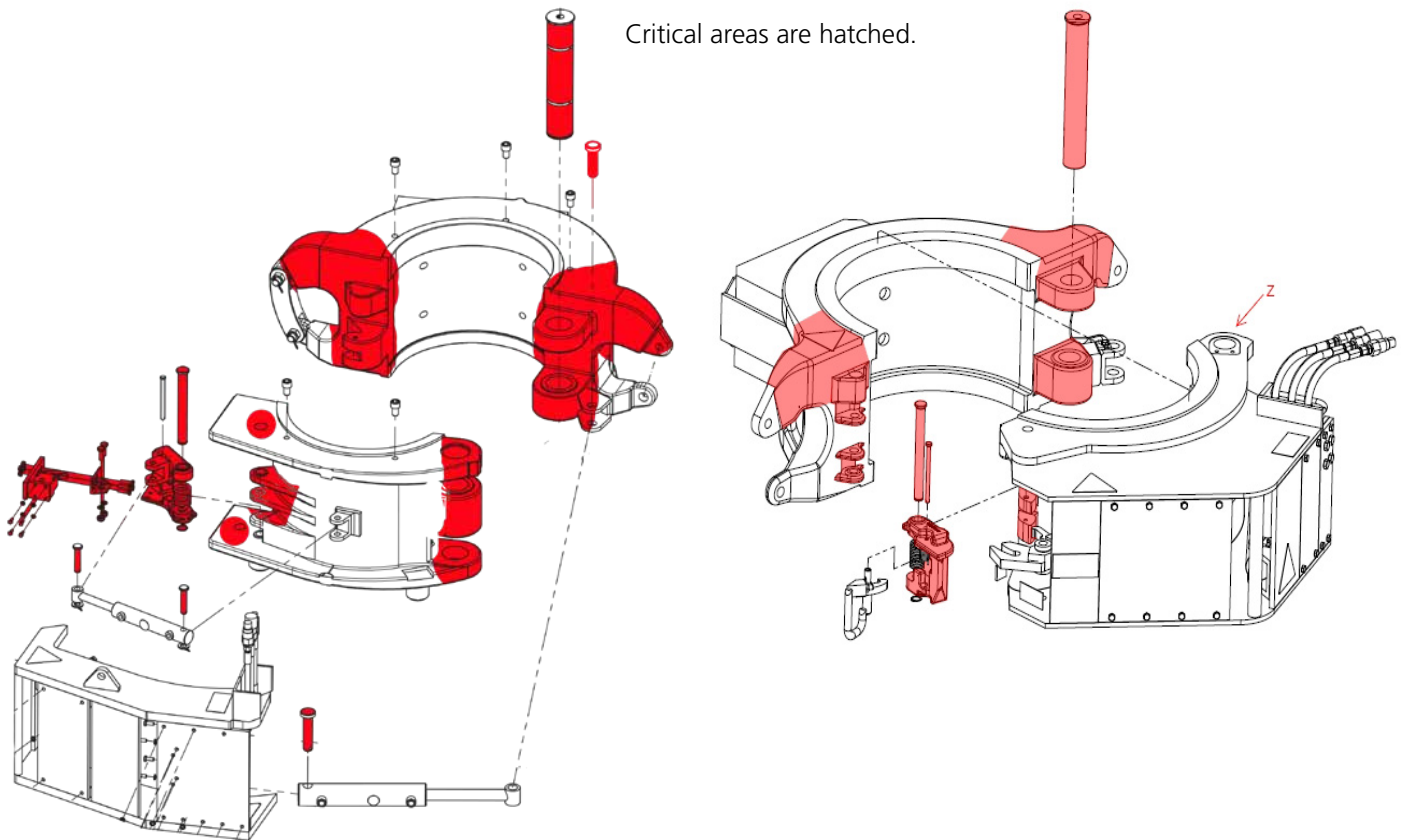


Fig. 74: VES SDS - H Elevators Critical Areas

Fig. 75: Critical Areas SDS-H Elevators Critical Areas

INSPECTION / MAINTENANCE

6.8 Measuring of wear

It is obvious that a visual inspection is not enough to check a lifting equipment like the SDS.

To measure link ears it is necessary to use callipers and a ruler.

Significant wear is restricted to the top link ear, it is here that the measurement is taken.

Hinge Pins, Latch Pins and socket holes are not normally measured for wear in the field. When it becomes apparent that the Hinge or Latch Pins have more tolerances, the elevator should be dismantled for general engineering check up.

6.8.1 Wear data for components

Check the wear limits as specified in the inspection check lists.

6.8.1.1 Minimum ear dimensions

Minimum ear dimensions are only valid when the elevator is in otherwise good condition, does not have excessive wear, cracks or other defects, or previous weld repair and has not been misused. This inspection criteria can not on their own determine the overall condition of the elevator and its suitability for continued use.

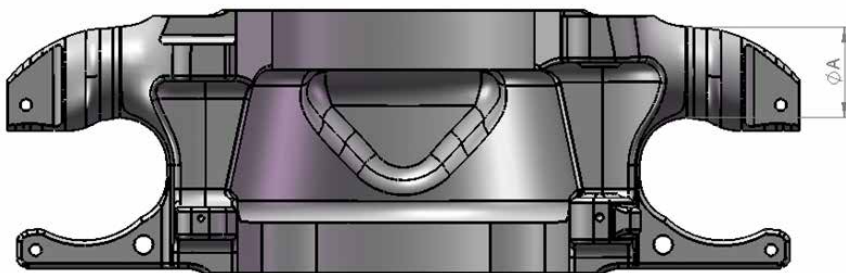


Fig. 76: Minimum ear dimensions

Elevator Type	Minimum A In [mm]	Elevator Type	Minimum A In [mm]
SDS 65	2,52 [64]	SDS 250/5	4,25 [108]
SDS 100/1	3,11 [79]	SDS 250/7	5,39 [137]
SDS 100/2	3,11 [79]	SDS 250/7	5,39 [137]
SDS 100/3	3,11 [79]	[VES] SDS 350/1	4,76 [121]
SDS 150/1	3,5 [89]	SDS 350/2	4,76 [121]
SDS 150/2	3,5 [89]	SDS 350/4	4,76 [121]
SDS 150/3	3,5 [89]	SDS 350/5	4,76 [121]
SDS 150/4	3,5 [89]	[VES] SDS 500	6,1 [155]
SDS 150/5	3,5 [89]	SDS 750	6,1 [155]
SDS 150/7	3,5 [89]	SDS 250/3-H	4,25 [108]
SDS 250/0	4,41 [112]	SDS 350/4-H	4,76 [121]
SDS 250/1	4,41 [112]	SDS 150/7-H	3,5 [89]
SDS 250/2	4,41 [112]	SDS 350/2-H	4,76 [121]
SDS 250/6	4,41 [112]	SDS 500-H	6,1 [155]
[VES] SDS 250/3	4,25 [108]		

6.8.1.2 Tolerance dimensions of critical wear parts

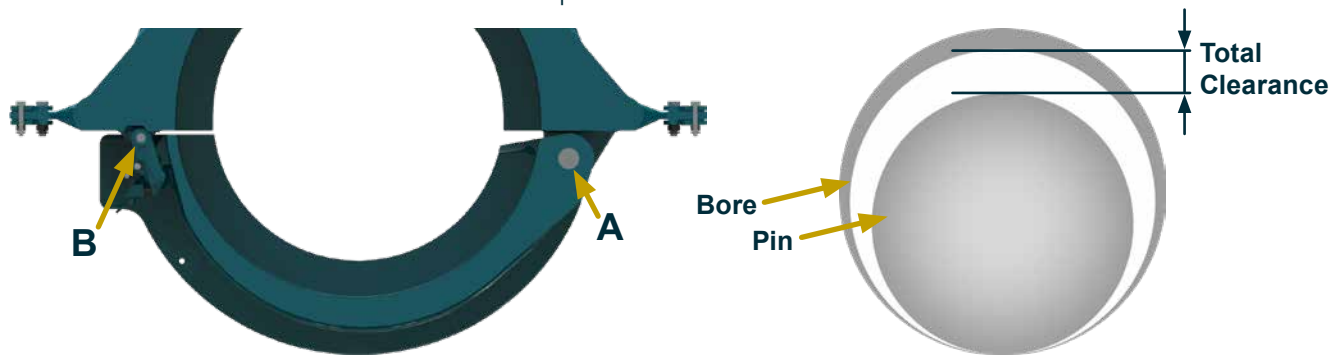


Fig. 77: Hinge and Latch wear dimension

NOTE

The total clearance is the main dimension to evaluate the state of wear. It is not allowed to exceed this dimension. Please feel free to contact the Technical Support for further information.

Type Series	SDS 65	SDS 100-1	SDS 100-2	SDS 100-3	SDS 150-1	SDS 150-2	SDS 150-3
"A" Hinge Pin – inch [mm]							
Pin Ø (Standard - min.)	0,621 [15,77]	0,621 [15,77]	0,856 [21,75]	0,856 [21,75]	0,974 [24,75]	0,974 [24,75]	1,092 [27,75]
Bore Ø New (max.)	0,632 [16,05]	0,632 [16,05]	0,868 [22,06]	0,868 [22,06]	0,986 [25,06]	0,986 [25,06]	1,105 [28,06]
Bore Ø Worn (max.)	0,642 [16,30]	0,642 [16,30]	0,883 [22,43]	0,883 [22,43]	1,004 [25,51]	1,004 [25,51]	1,123 [28,51]
Total Clearance	0,021 [00,53]	0,021 [00,53]	0,027 [00,67]	0,027 [00,67]	0,030 [00,75]	0,030 [00,75]	0,030 [00,75]
"B" Latch Pin – inch [mm]							
Pin Ø (Standard - min.)	0,621 [15,77]	0,621 [15,77]	0,777 [19,75]	0,777 [19,75]	0,777 [19,75]	0,777 [19,75]	0,777 [19,75]
Bore Ø New (max.)	0,632 [16,05]	0,632 [16,05]	0,79 [20,06]	0,790 [20,06]	0,790 [20,06]	0,790 [20,06]	0,790 [20,06]
Bore Ø Worn (max.)	0,643 [16,32]	0,643 [16,32]	0,804 [20,41]	0,804 [20,41]	0,808 [20,51]	0,808 [20,51]	0,808 [20,51]
Total Clearance	0,022 [00,55]	0,022 [00,55]	0,026 [00,65]	0,026 [00,65]	0,030 [00,75]	0,030 [00,75]	0,030 [00,75]

Type Series	SDS 150-4	SDS 150-5	SDS 150-7 *	SDS 250-0	SDS 250-1	SDS 250-2	SDS 250-3**
"A" Hinge Pin – Standard							
Pin Ø (Standard - min.)	1,367 [34,73]	1,958 [49,73]	1,761 [44,73]	1,958 [49,73]	1,958 [49,73]	1,958 [49,73]	1,958 [49,73]
Bore Ø New (max.)	1,381 [35,07]	1,971 [50,07]	1,774 [45,07]	1,971 [50,07]	1,971 [50,07]	1,971 [50,07]	1,971 [50,07]
Bore Ø Worn (max.)	1,399 [35,52]	1,989 [50,52]	1,797 [45,64]	1,994 [50,64]	1,994 [50,64]	1,994 [50,64]	1,994 [50,64]
Total Clearance	0,031 [00,78]	0,031 [00,78]	0,036 [00,90]	0,036 [00,90]	0,036 [00,90]	0,036 [00,90]	0,036 [00,90]
"B" Latch Pin – Standard							
Pin Ø (Standard - min.)	0,777 [19,75]	0,777 [19,75]	0,777 [19,75]	0,779 [19,79]	0,779 [19,79]	0,779 [19,79]	0,777 [19,75]
Bore Ø New (max.)	0,790 [20,06]	0,790 [20,06]	0,790 [20,06]	0,790 [20,06]	0,790 [20,06]	0,790 [20,06]	0,790 [20,06]
Bore Ø Worn (max.)	0,808 [20,51]	0,808 [20,51]	0,808 [20,51]	0,807 [20,51]	0,807 [20,51]	0,807 [20,51]	0,807 [20,51]
Total Clearance	0,030 [00,75]	0,030 [00,75]	0,030 [00,75]	0,028 [00,71]	0,028 [00,71]	0,028 [00,71]	0,041 [01,03]

* The specified wear dimensions also apply to the hydraulic version of the SDS 150-7 (SDS 150-7-H).

** The specified wear dimensions also apply to the hydraulic and the bushing version of the SDS 250-3 (VES SDS 250-3 , SDS 250-3-H).

Type Series	SDS 250-5	SDS 250-6	SDS 250-7	SDS 350-1	SDS 350-2*	SDS 350-4**	SDS 350-5
"A" Hinge Pin – Standard							
Pin Ø (Standard - min.)	2,744 [69,70]	2,744 [69,70]	2,744 [69,70]	2,744 [69,70]	2,744 [69,70]	2,744 [69,70]	2,744 [69,70]
Bore Ø New (max.)	2,759 [70,08]	2,759 [70,08]	2,759 [70,08]	2,759 [70,08]	2,759 [70,08]	2,759 [70,08]	2,759 [70,08]
Bore Ø Worn (max.)	2,782 [70,65]	2,782 [70,65]	2,782 [70,65]	2,775 [70,49]	2,777 [70,53]	2,777 [70,53]	2,777 [70,53]
Total Clearance	0,037 [00,94]	0,037 [00,94]	0,037 [00,94]	0,030 [00,77]	0,032 [00,82]	0,032 [00,82]	0,032 [00,82]
"B" Latch Pin – Standard							
Pin Ø (Standard - min.)	0,777 [19,75]	1,485 [37,73]	2,744 [69,70]	0,974 [24,73]	0,978 [24,84]	0,974 [24,73]	0,974 [24,73]
Bore Ø New (max.)	0,790 [20,06]	1,499 [38,07]	2,759 [70,08]	0,986 [25,06]	0,986 [25,06]	0,986 [25,06]	0,986 [25,06]
Bore Ø Worn (max.)	0,807 [20,51]	1,517 [38,52]	2,782 [70,65]	1,004 [25,51]	1,004 [25,51]	1,004 [25,51]	1,004 [25,51]
Total Clearance	0,041 [01,03]	0,031 [00,78]	0,037 [00,94]	0,026 [00,66]	0,030 [00,77]	0,026 [00,66]	0,026 [00,66]

* The specified wear dimensions also apply to the hydraulic and the bushing version of the SDS 350-2 (VES SDS 350-2 , SDS 350-2-H).

** The specified wear dimensions also apply to the hydraulic version of the SDS 350-4 (SDS 350-4-H).

INSPECTION / MAINTENANCE

Type Series	SDS 350-6	SDS 500*	SDS 750
"A" Hinge Pin – Standard			
Pin Ø (Standard - min.)	2,744 [69,70]	2,743 [69,67]	2,743 [69,67]
Bore Ø New (max.)	2,759 [70,08]	2,759 [70,08]	2,759 [70,08]
Bore Ø Worn (max.)	2,777 [70,53]	2,779 [70,58]	2,779 [70,58]
Total Clearance	0,032 [00,82]	0,034 [00,88]	0,034 [00,88]
"B" Latch Pin – Standard			
Pin Ø (Standard - min.)	0,978 [24,84]	1,485 [37,73]	1,485 [37,73]
Bore Ø New (max.)	0,986 [25,06]	1,499 [38,07]	1,499 [38,07]
Bore Ø Worn (max.)	1,004 [25,51]	1,518 [38,56]	1,518 [38,56]
Total Clearance	0,026 [00,66]	0,032 [00,82]	0,032 [00,82]

* The specified wear dimensions also apply to the hydraulic and the bushing version of the SDS 500 (VES SDS 500 , SDS 500-H).

6.9 Dismantling and installing the elevator

Some inspections require the operator to dismantle the elevator.

⚠ WARNING: Before dismantling /installing the elevator make sure NO hydraulic pressure exists and all connecting lines are uncoupled.

Dismantling Tasks:

1. Disconnect the elevator and position the elevator on a firm and sturdy ground.
2. Clean all surfaces of dust and foreign matter.
3. Dismantle both sheets of the hydraulic box by removing the latch wire and unscrewing the screws.
4. To dismantle the door- and latch cylinder, disconnect the hydraulic lines, remove the secure elements and pull out the pins of the cylinders.
5. To dismantle the feedback valves remove screws, secure elements and washer.
6. Dismantle the door by unscrewing the set screw (headless screw) used for fixing the hinge pin and then push out the hinge pin. If it is difficult to move the hinge pin merely by pushing, you must use a hammer to tap it gently.
7. To remove the latch pin and the catch pin, you must remove the set screws and push them out as described under Point 6.
8. When dismantling the lock, pay attention to the latch system springs.

⚠ NOTE: When pushing out the bolts, use a plastic hammer, this spares the surfaces.

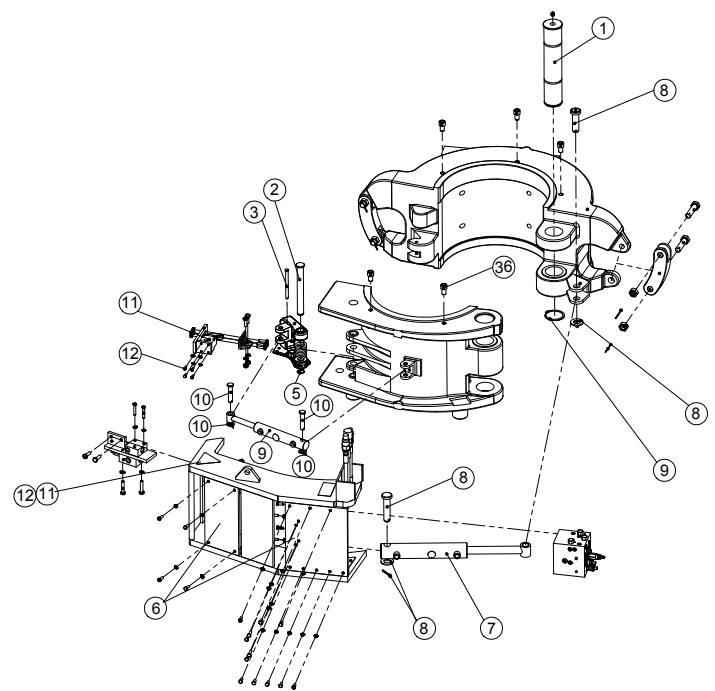


Fig. 78: SDS - H Dismantling

- | | |
|---------------------------|-----------------------------|
| 1 Hinge Pin | 2 Latch Pin |
| 3 Latch Lock Pin | 4 Hinge Retainer Pin ring |
| 5 Latch Retainer Pin ring | 6 Hydraulic Box cover sheet |
| 7 Door cylinders | 8 Door cylinder safety |
| 9 Latch cylinder | 10 Latch cylinder safety |
| 11 Feedback Valve | 12 Feedback Valve safety |

Re-installation tasks:

1. First mount the door. To do this, fix the latch by knocking in the latch pin and thereby, note the exact position of the springs of the latch system. Fix the latch pin with the set screw.
2. Knock the catch pin into the body and fix the catch pin with the set screw.
3. Lift the door and place it in the door hinge of the body so that the holes are aligned. Knock in the hinge pin and fix it with the set screw.
4. Attach the latch cylinder to the latch system and the hydraulic box, set both pins for the latch cylinder and fix it with cotter pins.
5. Attach the feedback valves to the hydraulic box and fix it with secure elements, screws and washers.
6. Adjust the feedback valve in a way that the valve is activated by the latch system when the elevator is properly closed and latched.
6. Adjust the feedback valves [VES SDS 350-2] so that the latch valve is activated by the latch system AND the body valve is activated by the elevator Bode after the elevator is properly closed and latched.
7. Attach the door cylinder to the hydraulic box and elevator body, put in both pins and fix it with secure elements and screws.
8. Fix both sheets with the screws and locking wire to the hydraulic box.
9. After installing perform a function test (see chapter Installation).

NOTE: When knocking in the bolts, use a plastic hammer, this spares the surfaces.

NOTE: Apply a coat of lubricant on the bolt surfaces so that they slide in better.

NOTE: The set screws are headless screws of size M 8 and M 10. Apply Locktite 243 on the thread of the headless screws. Insert the headless screws and tighten them hand-tight

6.10 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 SDS. Remove this contamination regularly to prevent incrustation and ensure safe operation of the equipment.

To clean shut off the SDS, disconnect from hydraulic system and lift out of rotary table. Remove upper ring and slip assembly.

6.10.1 Time of Cleaning

Clean contamination from drilling from the SDS regularly. The equipment should be cleaned thoroughly at the end of each shift at the latest. Also observe the instructions in Chapter „6.4 Inspections“.

6.10.2 Procedure and Cleaning Agents

Forum B + V Oil Tools recommends cleaning the SDS 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 „Lubrication“.

STORAGE / DISPOSAL

STORAGE /
DISPOSAL

7 Storage / Disposal

This section deals with procedures to be taken to the storage after the decommissioning of the SDS. The aim is to protect the Equipment, the environment and people from damages. Therefore Forum B + V Oil Tools recommends to read and implement the following procedure accurately.

7.1 Storage of the entire equipment

Storage procedure

1. Store the equipment on a pallet located on an even, supporting surface.
 - » Observe the weight specifications in the technical data.
2. Ensure that the equipment is stored so that no person can be injured by moving parts or sharp edges.
3. Secure the equipment with tensioning cables or in another manner to prevent it from slipping or tipping when moved.
4. Lubricate the equipment as described in section "Lubrication".
5. Conserve all bare metal surfaces. Forum B + V Oil Tools recommends the use of a lubricant or Tectyl.
 - » These surfaces should be checked periodically to be sure that no corrosion has occurred.
6. Protect the equipment against water penetration with a plastic tarp

Short-term storage for less than three months

Intermediate Storage

- | | |
|--------------------------------|--|
| Protection of equipment | <ul style="list-style-type: none"> • Clean the equipment roughly. • Apply lubricant to all bare surfaces (e.g. cylinder). • Protect all other bare surfaces with Tectyl Type 864 or an equivalent agent. • Place SDSs only on surrounded pallets and secure them with tensioning cables and anti-slip mat. |
| Ambient Conditions | <ul style="list-style-type: none"> • Store in dry surroundings (maximum humidity 80%). |

Longer Storage

- | | |
|--------------------------------|--|
| Protection of equipment | <ul style="list-style-type: none"> • Clean the equipment carefully and thoroughly. • Apply lubricant to all bare surfaces (e.g. cylinder). • Protect all other bare surfaces with Tectyl Type 864 or an equivalent agent. • Place SDSs only on surrounded pallets and secure them with tensioning cables and anti-slip mat. • Protect the SDS against water penetration with a plastic tarp. • Drain the hydraulic oil, if applicable. |
| Ambient Conditions | <ul style="list-style-type: none"> • Store in dry surroundings (maximum humidity 80%). |

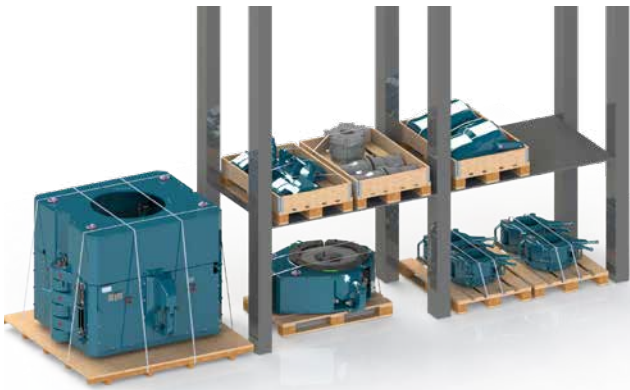


Fig. 79: Correct Storage Example I

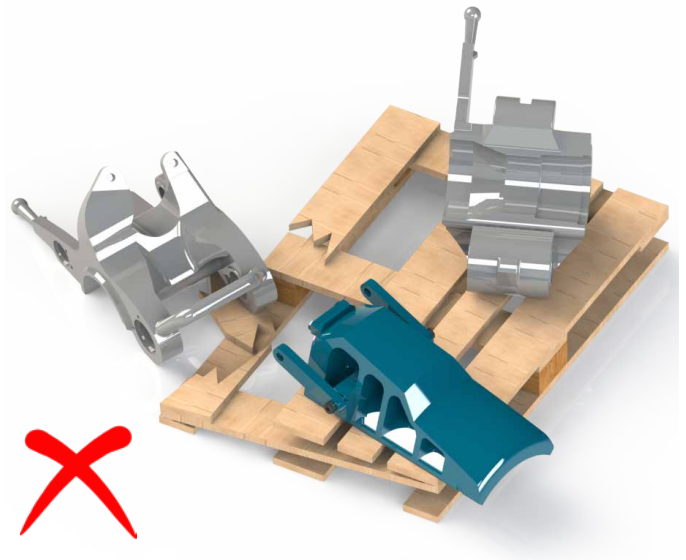


Fig. 82: Incorrect Storage Example I

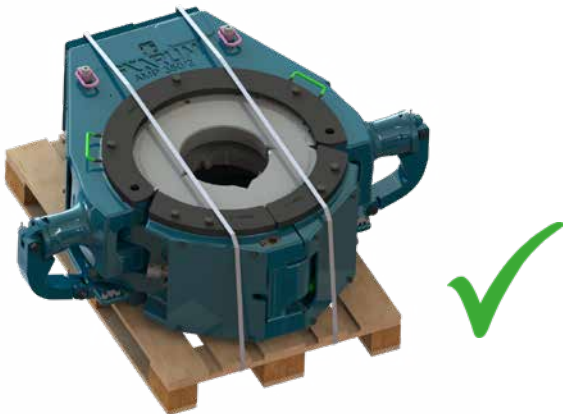


Fig. 80: Correct Storage Example II

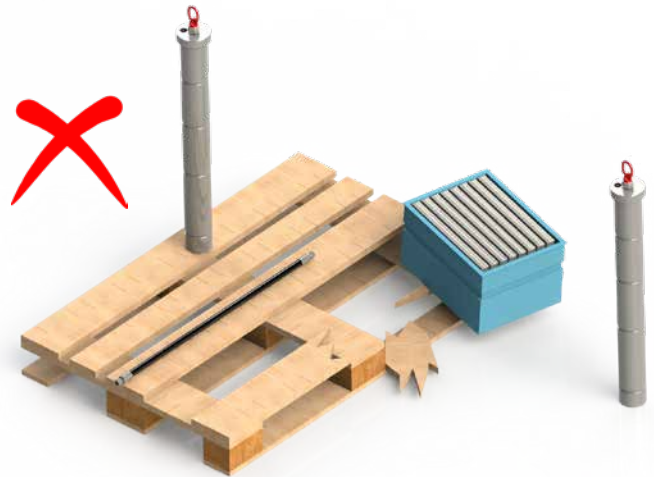


Fig. 83: Incorrect Storage Example II



Fig. 81: Correct Storage Example III

7.2 Disposal

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

However, operation of Forum B + V Oil Tools equipment requires use of hydraulic fluids, lubricants and/or cleaning agents, which can pollute the environment. For this reason always ensure that such substances are disposed of properly in accordance with 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.

List of Service Products Used

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APPENDIX

APPENDIX

8 Appendix

A.	Sample of EC Declaration	127
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A. Sample of EC Declaration



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 products: **„1.3 Technical data“ on page 19**

which is the subject of this declaration, fulfils all of the relevant requirements of:
 2006/42/EC Machinery Directive,
 2014/34/EU ATEX Directive of Equipment for use in hazardous areas.

Amongst others following harmonized and technical standards and specifications were used:
 API 8C, 5. Edition Drilling and Production Hoisting Equipment (PSL1 and PSL2)
 DIN EN ISO 13535 Petroleum and natural gas industries - Drilling and production equipment - Hoisting equipment
 DIN EN ISO 12100 Safety of machinery, Risk assessment and Risk Reduction
 DIN EN 80079-36 Non-electrical equipment 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 / Device Type: **„1.3 Technical data“ on page 19**

Rated Capacity: **„1.3 Technical data“ on page 19**

Part Number: **[refer to data book]**

Serial Number: **[refer to data book]**

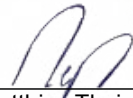
Delivery Date: **[refer to data book]**

Order No.: **[refer to data book]**

Marking: **CE Ex [refer to data book]**

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 2014/34/EU Article 13 (1) b) ii) have been deposit at the notified body IBExU - Institut für Sicherheitstechnik GmbH, 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 and API Q1 approved by API Quality Registrar, Washington D.C./ USA, Registration No. 2850 + Q1-2769.

Hamburg, issued on

Authorized Representative:	Name Position	 Matthias Theiss Managing Director
----------------------------	------------------	--

























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Managing Directors: Matthias Theiss, 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: DE73 3003 0880 0012 8350 19
 USD-Acc.: 401 / 2835 / 006 / IBAN: DE50 3003 0880 4012 8350 06
 Stand: 24.07.2015

Fig. 81: EC Certificate of Conformity Sample




B. Third Party Documents

I Safety Data-Sheet

Material Name	Link to file
[Aerosol] Krylon Paint Aerosols	
[Aerosol] Rust O Leum Paint Aerosols	
[Hydraulic Fluid] Aral Vitam GF 32	
[Hydraulic Fluid] Citgo AW 68	
[Hydraulic Fluid] Conoco Megaflow AW 32 68	
[Hydraulic Fluid] Shell Tellus S2 M 32	
[Hydraulic Fluid] Shell Tellus S2 M 68	
[Hydraulic Fluid] Shell Tellus S2 V 15	
[Hydraulic Fluid] Shell Tonna S2 M 68	
[Lubricant] Buster 2007	
[Lubricant] AVIATICON FETT XRF	
[Lubricant] KO5	
[Lubricant] Lubrimatic Multipurpose Lithium	
[Lubricant] MasterPro Hi Temp WB	
[Lubricant] Mobil CM L	
[Lubricant] Mystik JT 6 Multi purpose #2	
[Lubricant] Permatex 767 Anti Seize Lubricant	
[Lubricant] Shell Gadus S2 V220 2	
[Lubricant] Shell Stamina RLS 2	
[Lubricant] Sprayon LU 100 White Lithium	
[Lubricant] Super S Hi Temp Red	
[Lubricant] Thermaplex Hi Temp Bearings	
[Paint] Paint Gallon	
[Paint] Paint Marker	

Material Name	Link to file
[Paint] Paint Marking Ink	
[Paint] Ruthless Paint and Varnish Remover	
[Paint] Startex Paint Thinner	
[Paint] Uni Paint Markers	
[Safety adhesive] Loctite 242 Threadlocker	
[Safety adhesive] Loctite 262 (High Strength)	
[Safety adhesive] Loctite 515 Gasket Eliminator	
[Safety adhesive] Loctite Clover Compound	
[Safety adhesive] Loctite Silver Grade Anti Seize	

II Components

Component Name	Link to file
[Safety Washer] NordLock	
[Lifting] RUD VRS Starpoint	
[Lifting] RUD VLBG Load Ring	

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.



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