

FORUM™ B + V Oil Tools

Operation Manual • Pipe Handling Equipment • Hoisting Equipment

Air Operated Center Latch Elevator **ACL Type Series and VES ACL Type Series** **Pneumatic operated Elevator**

Operating Instructions

Original Operating Instructions



Manual PN 612970-Y-A-D Revision: 009, 07-2015

Forum B + V Oil Tools GmbH

Revision history

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01	2008-01	B+V OT, ROK	Product Update
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All data in this manual takes place using best knowledge. This manual is based on the latest product information that was available at the time of printing. Depending on ongoing technical improvements (ISO 9001), the Forum B + V Oil Tools GmbH reserves the right to make alterations to the design and specifications without notice. The values specified in this manual represent the nominal value of a unit produced in series. The values in individual units may have slight differences.

Only with written consent from Forum B + V Oil Tools GmbH the contents of this Instructions may be passed on to third persons. Especially procedure descriptions and explanations are not to be passed on to third persons.

Copying or multiplying for internal use is permitted.

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

Printed in Germany.

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A. GENERAL INFORMATION

I Warnings and Note

▲ WARNING A "WARNING" INDICATES A DEFINITE RISK OF EQUIPMENT DAMAGE OR DANGER TO PERSONNEL. FAILURE TO OBSERVE AND FOLLOW PROPER PROCEDURES COULD RESULT IN SERIOUS OR FATAL INJURY TO PERSONNEL, SIGNIFICANT PROPERTY LOSS, OR SIGNIFICANT EQUIPMENT DAMAGE.

NOTE: A "note" indicates that additional information is provided about the current topics.

▲ WARNING THIS TECHNICAL DOCUMENTATION CONTAINS INSTRUCTIONS ON SAFETY, INSTALLATION, OPERATION AND MAINTENANCE FOR THE FORUM B + V OIL TOOLS TOOL . IT MUST BE STUDIED BEFORE WORKING WITH THE TOOL.

II Intended use of this manual

This manual is intended for use by field service, engineering, installation, operation, and Forum B + V Oil Tools personnel. Every effort has been made to ensure the accuracy of the information contained herein. Forum B + V Oil Tools GmbH, will not be held liable for errors in this material, or for consequences arising from misuse of this material.

Anyone using service procedures or tools, whether or not recommended by Forum B + V Oil Tools GmbH, must be thoroughly satisfied that neither personal safety nor equipment safety will be jeopardized.

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All rights retained. No part of this document may be reproduced in any form (print, photocopy, microfilm or any other procedure) or be processed using an electronic system without written approval of Forum B + V Oil Tools GmbH.

All information contained in this manual is based upon the latest product information available at any time of printing.

Dependent on ongoing technical improvements (ISO 9001) "Forum B + V Oil Tools GmbH" reserves the right to change the design and specifications without announcement.

The values specified in this manual represent the nominal values of a unit produced in series. Slight deviations in the case of the individual devices are possible.

NOTE: In the event of problems that cannot be solved with the aid of this manual, please contact one of the addresses listed below.

IV Improper / Unsafe Use

The tool must only be used for the designated purpose. When using the tool, the rated load must never be exceeded.

V Limited Warranty

The warranty provided will be void if the tool is either: Forum or serviced by a service facility which was not authorised by Forum B + V Oil Tools GmbH. Replacement parts not manufactured by Forum B + V Oil Tools Forum GmbH are used. Modifications were made to the tool which were not approved by Forum B + V Oil Tools GmbH.

VI Conformity

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

NOTE: This operating manual is a part of the technical documentation for the Air Operated Center Latch Elevator.

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

VII Operational Environment

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



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

The machine is approved for operation in explosion hazard areas.



For machines containing any hydraulic powered parts, the directive 2014/34/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:

  II 2G IIB T5 for hydraulic and pneumatic tools

  II 2G IIB T6 for manual tools

	CE- marking (with reference to the ATEX guideline)
	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 vapours (G)
IIB	Category for Gases
T5/T6	Temperature class

IX General safety issues

▲ **WARNING** ONE SHOULD AVOID CREATING IGNITION SOURCES, LIKE HEAT, AS A RESULT OF THE USE OF THE TOOL WITH OTHER TOOLS OR EQUIPMENT.

▲ **WARNING** DO NOT USE THE TOOL FOR ANY OTHER PURPOSE THAN GIVEN IN THIS DOCUMENT WITHIN ITS SPECIFICATION.

▲ **WARNING** FAILURE TO CONDUCT ROUTINE MAINTENANCE COULD RESULT IN EQUIPMENT DAMAGE OR INJURY TO PERSONNEL.

▲ **WARNING** THE TOOL MUST ONLY BE SERVICED BY TRAINED AND BY AN FORUM B + V OIL TOOLS AUTHORIZED PERSONNEL.

▲ **WARNING** WEAR PERSONAL PROTECTION EQUIPMENT WHILE WORKING WITH THE EQUIPMENT.

▲ **WARNING** IF ANY SAFETY ELEMENTS (LIKE SAFETY ROPES, SAFETY SHEETS, PLATES OR WASHERS) WERE DISASSEMBLED DUE TO MAINTENANCE WORK, DO NOT RE-USE THEM. ALWAYS REPLACE THEM WITH NEW SAFETY ELEMENTS.

▲ **WARNING** ALL WARNING PLATES, SIGNS AND LABELS ATTACHED TO THE EQUIPMENT MUST BE OBSERVED. THE WARNING PLATES, SIGNS AND LABELS MUST BE PRESENT ON THE TOOL. DO NOT REMOVE THE LABELS. IF THEY ARE MISSING, REPLACING IS MANDATORY.

▲ **WARNING** ANY MODIFICATION TO THE TOOL CARRIED OUT WITHOUT THE APPROVAL OF FORUM B + V OIL TOOLS WILL VOID ANY WARRANTY.

▲ **WARNING** USING THE TOOL WITH DAMAGED OR WORN PARTS CAN CREATE SERIOUS INCIDENTS.

▲ **WARNING** IT IS NOT ALLOWED TO USE ANY COMPONENTS WHICH ARE OF "NON-FORUM B + V OIL TOOLS" ORIGIN, OR USE "NON-OEM" PARTS WHICH ARE NOT APPROVED BY FORUM B + V OIL TOOLS. IT WILL VOID ANY WARRANTY AND MAY EFFECT THE CORRECT FUNCTIONING OF THE TOOL AND IT'S SAFETY FEATURES.

▲ **WARNING** THE COMPANY OPERATING THE TOOL IS RESPONSIBLE FOR EVALUATING SAFE AND PROPER USE OF THE TOOL IN A HAZARD ANALYSES.

▲ **WARNING** THE OPERATING COMPANY IS OBLIGATED TO ISSUE WORKING INSTRUCTIONS

VIII Safe handling

▲ **WARNING** WARNING HANDLES/ GRIP POINTS ARE MARKED BY GREEN PAINT. DURING OPERATIONS THESE GRIPS ARE THE ONLY PLACES THE TOOL CAN BE HANDLED SAFELY. IN ALL NON-GREEN MARKED PLACES THERE IS THE RISK FOR INJURY. AUTOMATIC/ REMOTE OPERATED TOOLS MAY NOT HAVE ANY GREEN PAINTED GRIP-POINTS. IN THIS CASE IT IS NOT ALLOWED TO TOUCH THE TOOL WHILE OPERATING.

▲ **WARNING** FOR SAFE USE AND SUPERVISE OBSERVANCE OF THESE WORKING INSTRUCTIONS.



Fig. 1: Safe gripping points

▲ **WARNING** EVERY EMPLOYEE, OPERATING, SERVICING, INSPECTING OR OTHERWISE INVOLVED WITH THE USE OF THE TOOL IN OTHER AREA'S, SHOULD COMPLETE REGULAR COURSES OF TRAINING TO ENSURE PROPER USE AS WELL AS SAFE OPERATION, CORRECT MAINTENANCE AND INSPECTION.

▲ **WARNING** IF NECESSARY, A REASONABLE, ADDITIONAL SUPERVISOR SHOULD BE APPOINTED DURING OPERATION.

▲ **WARNING** STAY AWAY FROM THE TOOL DURING OPERATION. IN CASE IT IS REMOTE OPERATED IT MAY MAKE MOVEMENTS WITHOUT WARNING.

a. Safety issues elevator

▲ **WARNING** DO NEVER UNLATCH/OPEN THE TOOL WHILE A PIPE IS SUSPENDED IN THE TOOL; THE PIPE WILL BE LOST!

▲ **WARNING** WHILE USING THE ELEVATOR, ALWAYS MAKE SURE THE DOOR IS COMPLETELY CLOSED WITH THE LATCH LOCK FULLY ENGAGED AND IF APPLICABLE THE VERIFICATION PIN PROPERLY INSTALLED.

▲ **WARNING** PAY SPECIAL ATTENTION TO THE VERIFICATION PIN (IF APPLICABLE), LATCH AND LATCH LOCK FOR ANY SIGNS OF WEAR, BENDING OR DAMAGE AT ANY TIME. IN CASE PARTS ARE DAMAGED OR BENT, REPLACE IMMEDIATELY BY NEW, ORIGINAL PARTS.



Fig. 2: Warning sign PN 671638
General warning



Fig. 3: Warning sign PN 671642
Pay attention: Apply grease at least once a day.



Fig. 4: Warning sign PN 611524
Danger: Do not touch.



Fig. 5: Warning sign PN 671640-1
Pay attention: Do not place your hands between moving parts.



Fig. 6: Warning sign PN 671641
Pay attention: Risk of crushing.

b. VES elevators

▲ **WARNING** BUSHING SEGMENTS MUST ALWAYS BE USED WITH THE SAME SERIAL NUMBER AND PIPE SIZE. EVEN WHEN THE BUSHING SIZE IS THE SAME, BUSHINGS WITH DIFFERENT SERIAL NUMBERS MUST NEVER BE USED. THE ELEVATOR MUST NEVER BE USED WITHOUT BUSHINGS.

▲ **WARNING** [VES ONLY] THE ELEVATOR MUST NEVER BE USED WITHOUT BUSHINGS (EXCEPT 18° BORE ELEVATOR). SAFETY ISSUES AUTOMATIC ELEVATORS

▲ **WARNING** ENSURE THE CONNECTORS ARE FROM A MALE AND FEMALE TYPE TO PREVENT FAULTY CONNECTIONS.

c. Air operated elevators

▲ **WARNING** [VES ONLY] BEFORE PLACING OR REMOVING BUSHING SEGMENTS THE FOLLOWING CONDITIONS HAS TO BE SET:

1. THE TRIGGER LOCKING PIN MUST BE SET; THAT THE TRIGGER CAN NOT BE ACTIVATED.
2. AIR PRESSURE HAS TO STAY APPLIED TO THE ELEVATOR DURING THE HOLE PLACING OR REMOVING PROCESS.

▲ **WARNING** BEFORE ANY MAINTENANCE WORK IS CARRIED OUT, MAKE SURE THE ELEVATOR IS CLOSED AND NO PRESSURE IS APPLIED TO THE ELEVATOR AND THAT THE CONNECTING LINES ARE DISCONNECTED (IF APPLICABLE).

▲ **WARNING** WHEN THE ELEVATOR OPENS AND CLOSES, THERE IS AN INCREASED DANGER OF BEING CRUSHED NEAR THE LATCH (SEE PICTURE BELOW RED MARKED AREA). THE ELEVATOR HAS AN AUTOMATIC CLOSING TRIGGER. THE ELEVATOR IS AUTOMATICALLY CLOSED WHEN THE TRIGGER IS ACTUATED BY THE PIPE.

▲ **WARNING** THE ELEVATOR MAY NEVER BE CLOSED BY MANUALLY ACTUATING THE CLOSING TRIGGER IN THE ELEVATOR (DANGER OF ACCIDENT).

▲ **WARNING** UNDER NO CIRCUMSTANCES UNLATCH OR TOUCH / HIT THE AIR SWITCH OF THE AIR OPERATED ELEVATOR UNDER LOAD APPLICATIONS. TO PREVENT THIS, DISCONNECT AIR SUPPLY HOSE ON THE ELEVATOR. FOR EASIER HANDLING WE RECOMMEND TO INSTALL A TWO AIR SWITCH SYSTEM, WHICH HAVE TO BE OPERATED SEPARATELY AT THE SAME TIME.



Fig. 8: Serial number and Pipe Size

Fig. 7: Sticker „Patent Number“
PN 613921

Fig. 9: DANGER : Trigger & Elevator area

d. Position of Warning Signs



Fig. 10: Warning sign „Automatic“ PN 613639



Fig. 11: Warning sign PN 671636



Fig. 12: Warning sign „Danger“ PN 671637



Fig. 13: Warning sign „Warning“ PN 613684

Fig. 14: Warning sign on device I



Fig. 15: Warning sign on device II



Fig. 16: Warning sign on device III



Fig. 17: Warning sign on device IV




Fig. 18: Warning sign on device V



X Conformity

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

 **NOTE** This operating manual is a part of the technical documentation for the Air Operated Center Latch Elevator. The EC Declaration of Conformity is delivered together with the ACL.
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.

Forum B + V Oil Tools GmbH

Hermann-Blohm-Straße 2
20457 Hamburg
Federal Republic of Germany
fon: +49 40 37 02 26 855
fax: +49 40-37 02 26 896
oiltools@f-e-t.com
www.blohmvooss-oiltools.com

Forum Energy Technologies Regional Drilling locations

Drilling Inspection / Maintenance

6535Guhn Road
Houston
TX 77040
USA
fon: +1 71 36 09 98 08 – 24 hour hotline

Drilling Sales Headquarters

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

Drilling Regional Offices

Unit 7, Murcar Industrial Estate

Denmore Road
Bridge of Don Aberdeen
AB23 8JW UK
fon: +44 12 24 70 78 00

Oilfields Supply Center

Building B-20/21
Jebel Ali Free Zone Dubai
UAE
fon: +97 14 88 35 266

Drilling Regional Office

No 51 Benoi Road #06-00
Liang Huat Industrial Complex,
Singapore 629908
fon: +65 64 65 48 50
Out of hours +65 91 38 98 12
fax: +65 64 65 48 51

XII Information on the Forum B + V Oil Tools homepage

NOTE 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, Commissioning- and update notes for other Forum B + V Oil Tools products can be reached via the Forum B + V Oil Tools homepage.

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

www.blohmvooss-oiltools.com



Technical Documentations
Safety Notes and Product Updates

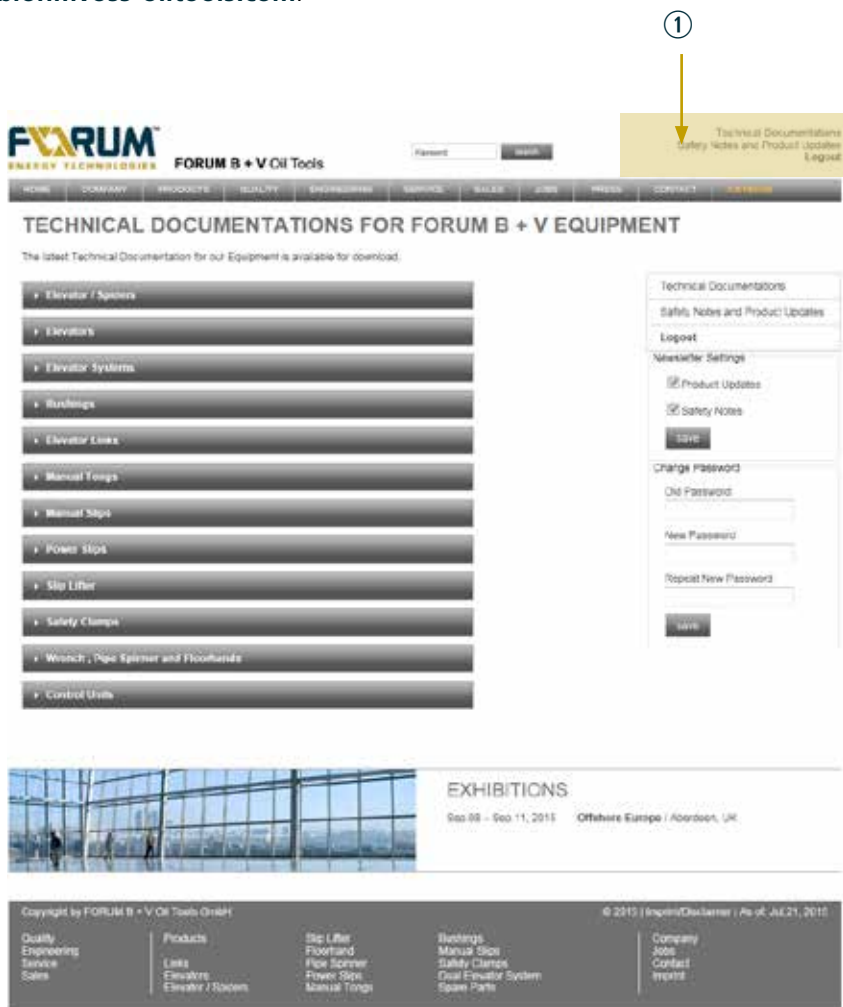


Fig. 19: Illustration Inspection / Maintenance–Homepage

DESCRIPTION

DESCRIPTION

1 DESCRIPTION

1.1 General

The Forum B + V Oil Tools ACL and VES ACL elevator is designed to be installed into the links. The ACL and VES ACL is a remote controlled elevator and has an integrated trigger device for an automatic elevator closing.

A visual feedback signal appears as soon the elevator is properly closed and latched.

The body and bushings are produced according to API 8C latest edition. The VES ACL elevator and VES ACL elevator is used for suspending drill pipe tubular. The VES-indication stands for "Variable Elevator System", meaning it can accommodate various sizes and types of bushings.

Features

- Pneumatic operated elevator (opening/closing)
- Rapid changing of pipe sizes by means of bushings. (for VES- only)
- Material and manufacturing standard in acc. to API 8C
- Pneumatic system is completely integrated and covered into the VES ACL and ACL elevator.
- Integrated trigger device for automatic elevator closing

Additional tool

- It is strongly recommended to keep a trigger closing tool in the vicinity of the equipment (PN 613700-TCT).

Options

- Longer air hoses upon request

1.2 Main assembly

The Elevator consist of the following main assemblies:

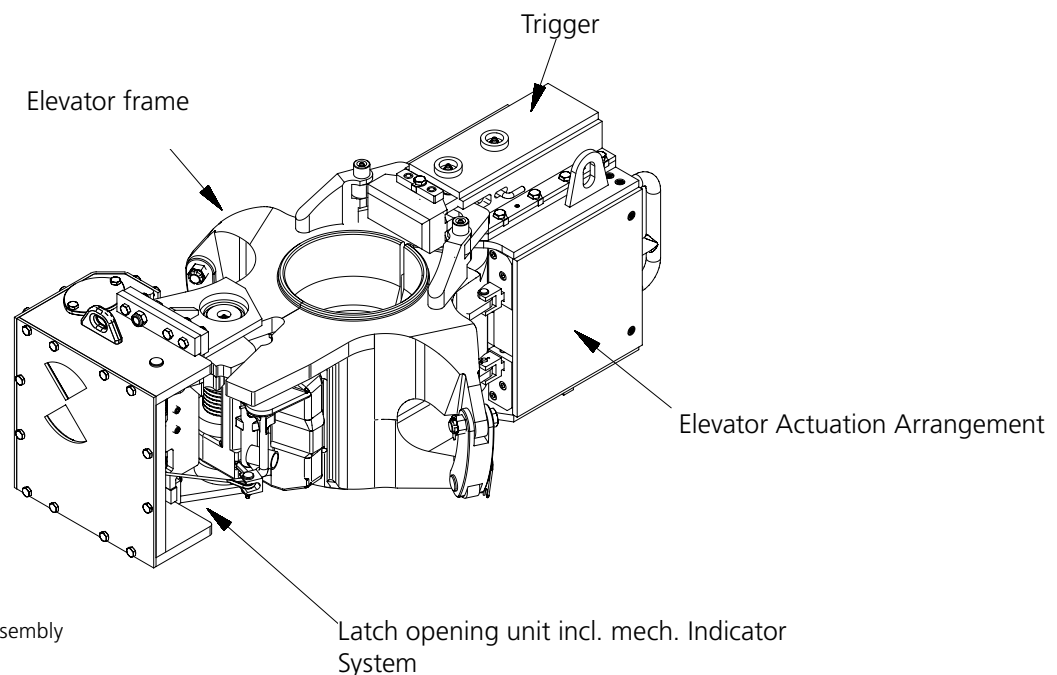


Fig. 20: Main Assembly

1.3 Technical Data

Type Series:	ACL 250	ACL 350	ACL 500	VES ACL 250	VES ACL 350	VES ACL 500
Working pressure	Min 7 bar (100 Psi), Max 10 bar (145 Psi)					
Maximum allowed pressure	10 bar (145 Psi)					
Required Flow rate	6,8 qm/min (240 cfm)					
Temperature working range ambient	- 20° C to + 60° C - 4° F to 140° F					
Load Capacity	250 sh tons	350 sh tons	500 sh tons	250 sh tons	350 sh tons	500 sh tons
Part number	612970-Y-BC	613970-Y-BC	615970-Y-BC	612970-Y	613970-Y	615970-Y
API test load	375 sh tons	525 sh tons	750 sh tons	375 sh tons	525 sh tons	750 sh tons
Pipe Diameter Range	min	2 3/8"	3 1/2"	4"	2 3/8"	2 3/8"
	max	5 1/2"	6 7/8"	6 7/8"	5 1/4"	7"
Weight	545 kg	500 kg	975 kg	545 kg	625 kg	1015 kg
Forum B + V Oil Tools Elevator Link	2 1/4" - 3 1/2"	2 3/4" - 3 1/2"	3 1/2"	2 1/4" - 3 1/2"	2 3/4" - 3 1/2"	3 1/2"

*If not otherwise stated in the data book

1.3.1 Contents of delivery

Part	Part Number
Hose assembly	613790
Hose coupling	613812
Hose coupling	613811
3/2 way valve	613731
Absorbent	612643

1.3.2 Optional

Part	Part Number
Trigger Closing Tool	613700-TCT
Insert Bushing	613902-BC

1.3.3 Improper / Unsafe Use

The (VES-) ACL Elevator must only be used for the designated purpose. When using the (VES-) ACL Elevator, the load rating must never be exceeded.

1.3.4 Machine Markings

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

- Manufacturer
- Machine model
- Production date
- Part number
- Serial number
- Material
- ATEX classification

Always keep this information at hand for maintenance and repair work. The email address of the manufacturer is given on the support sticker if service is required.



Fig. 22: Identification plate



Fig. 21: Contact with Technical Support

1.4 Main Dimensions ACL and VES ACL elevator

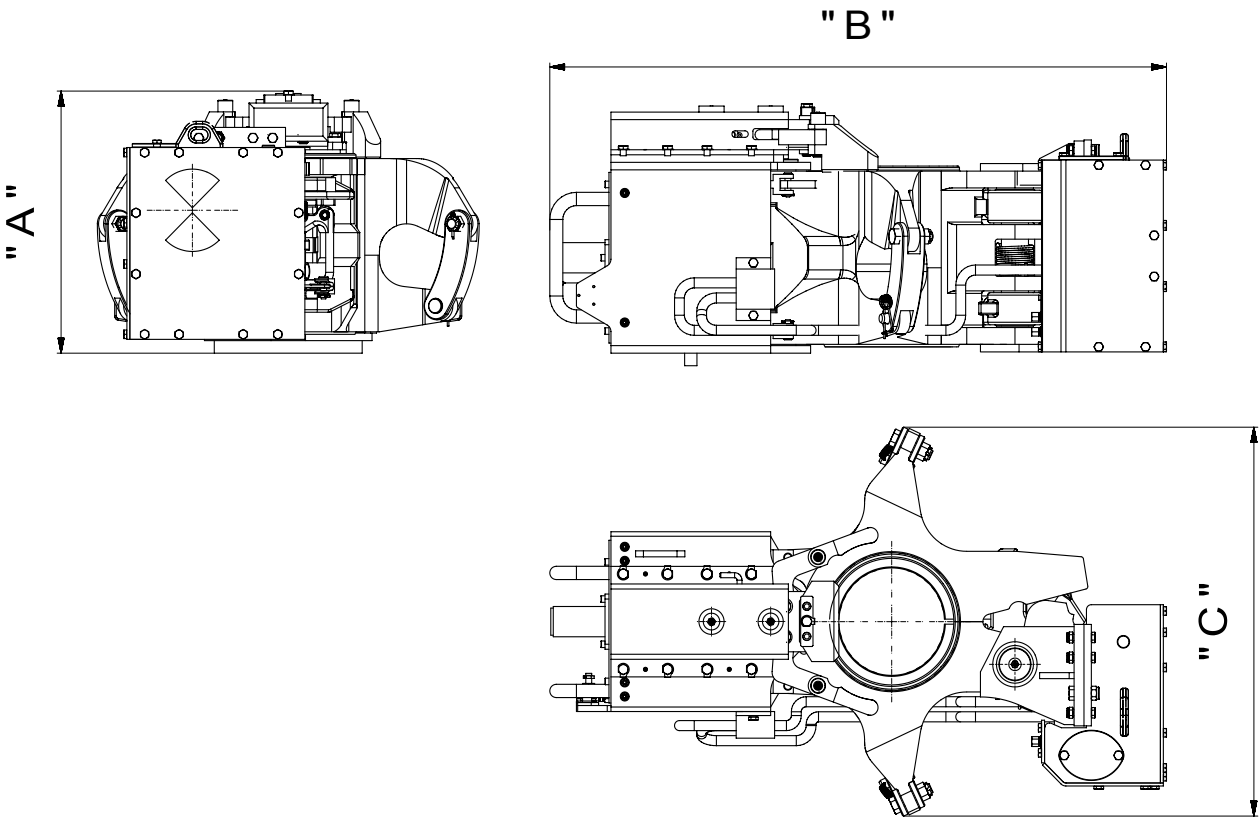


Fig. 23: Main Dimension

	ACL 250	ACL 350	ACL 500	VES ACL 250	VES-ACL 350	VES-ACL 500
A	495 mm	490 mm	550 mm	495 mm	475 mm	560 mm
B	1130 mm	1090 mm	1510 mm	1130 mm	1250 mm	1545 mm
C	690 mm	720 mm	1060 mm	690 mm	790 mm	1090 mm

1.5 Function

The elevator actuating arrangement opens the elevator body pneumatically.

When the elevator is open, the drill pipe will be placed in the elevator. When the Trigger system is activated, the elevator actuating arrangement closes.

The system shows a green sign in the front, the latch indicator. As long as the elevator is not completely closed the indicator sign indicates red.

VES ACL elevators have exchangeable bushings, which allows the elevator to run with different types of pipes and pipe diameters.

VES ACL elevators have 18° shoulders.

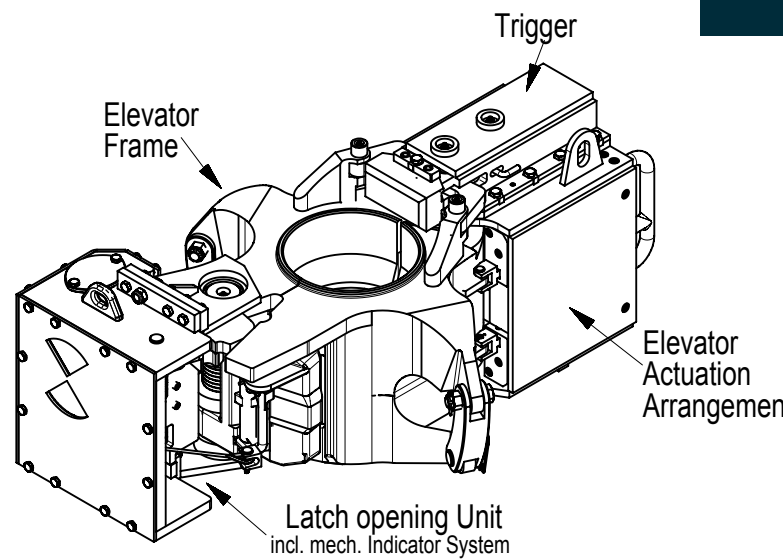


Fig. 24: Functional components



1.6 Optional Accessories

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

- **Grease Pump, manual** P/N 755667-3
Manual grease pump to apply grease on the device grease points.
- **Grease Pump, air operated** P/N 775810
Air operated grease pump to apply grease on the device grease points.
- **Control Unit** available on request
The Control Unit allows simple and convenient control of the ACL. The control unit contains all controls and regulating elements required for operation of the machine.



Fig. 25: Manual Grease Pump

Fig. 26: Air Operated Grease Pump



Fig. 27: Control Unit

COMMISSIONING

COMMISSIONING

2 Commissioning ACL and VES ACL Elevator

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

Read manual before first use !

OK	<input type="checkbox"/>	Check crew is aware of all danger regarding handling the Forum B + V Oil Tools tool.
OK	<input type="checkbox"/>	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	<input type="checkbox"/>	Cross check all delivered parts.
----	--------------------------	----------------------------------

Pneumatic characteristics

OK	<input type="checkbox"/>	Operating pressure	7...10 bar (100...140 PSI)
OK	<input type="checkbox"/>	Volumetric flow	6.8 l/min (240 cfm)
OK	<input type="checkbox"/>	Air filter and regulator	Lubricated and de-watered, air regulator and lubricator installed

Check and Lubrication

OK	<input type="checkbox"/>	Check elevator is in closed position.
OK	<input type="checkbox"/>	Check Air Supply line is disconnected.
OK	<input type="checkbox"/>	Check for correct seating of hinge pin and latch pin.
OK	<input type="checkbox"/>	Apply grease to all greasing points until grease is visibly coming out of the bores.
OK	<input type="checkbox"/>	Check if elevator is installed as outlined in manual.
OK	<input type="checkbox"/>	Connect the air supply line to the elevator.

Function Test

OK	<input type="checkbox"/>	Check elevator opens by air pressure.
OK	<input type="checkbox"/>	Check latch indicator shows a red sign when elevator open.
OK	<input type="checkbox"/>	Check feedback signal indicates elevator open.
OK	<input type="checkbox"/>	Switch air pressure off.
OK	<input type="checkbox"/>	Check if elevator closes after activating trigger with a pipe or Trigger Closing Tool.
OK	<input type="checkbox"/>	Check if indicator shows a green sign when elevator is closed.
OK	<input type="checkbox"/>	Observe indicator system and check if indicator is green, the elevator is properly closed.
OK	<input type="checkbox"/>	Check required bushings are installed before first use (VES-ACL only).
OK	<input type="checkbox"/>	Check if correct size trigger hammer is installed.
OK	<input type="checkbox"/>	Check both bushing segments are of same size and serial number (VES-ACL only).
OK	<input type="checkbox"/>	Check if bushings are fixed with the screws on top of the elevator (VES-ACL only).
OK	<input type="checkbox"/>	Check all safety / lock wire is present.
OK	<input type="checkbox"/>	Check if the trigger lock pin is present.
OK	<input type="checkbox"/>	Check elevator opens by air pressure. Now the indicator must indicate red.
OK	<input type="checkbox"/>	Pick up a pipe; Check if, after contact with trigger, the elevator closes.

Note: If the elevator refuses to close, check tension of trigger.

INSTALLATION

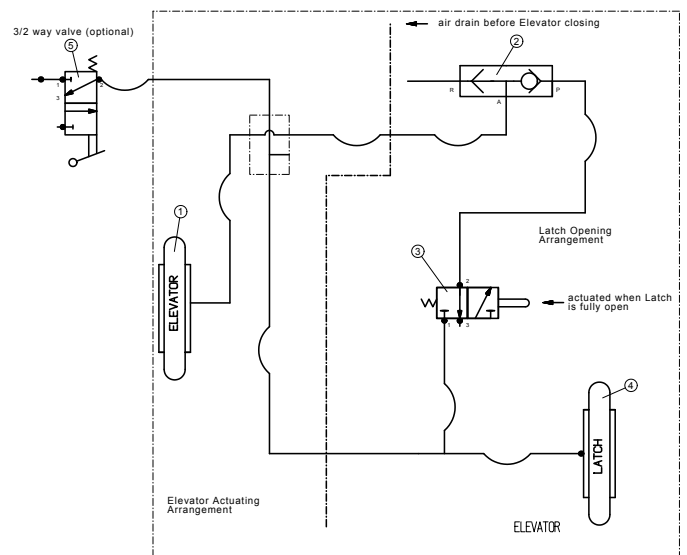
INSTALLATION

3.1 Lifting and transport

3.2 Installation of elevator

3.3 Pneumatic functioning

3.4 Installation of Pneumatic Parts



ensures constant working pressure and guards the pneumatic parts against break down.

The maintenance unit should be operated with anti freezing oil, to prevent freezing of air operated devices at temperatures up to minus 20° C.

This oil forms a film lubrication on the plain surface and guarantees the all connected air operated devices work to full capacity even at minus 20° C.

The way-valves, which are necessary to provide the air operated elevator with compressed air, should ensure quick ventilation of the system.

3.5 Installing and removing the bushings (VES-elevators only)

Before placing or removing bushing segments the following conditions has to be set:

1. The trigger locking pin must be set; that the Trigger can not be activated.
2. Air pressure has to stay applied to the elevator during the hole placing or removing process.
3. Make sure that both bushing segments are the same size and have the same serial number.

▲ WARNING A BUSHING CONSISTS OF TWO PARTS. TO EQUIP THE ELEVATOR WITH THE REQUIRED BUSHING, THE ELEVATOR MUST BE OPEN. BEFORE INSTALLING A NEW BUSHING, THE SEATING AREA IN THE ELEVATOR MUST BE CLEANED AND LUBRICATED.

4. Use handles (p/n 613903) to twist in the bushing segments (see picture). Fix the segments with the screws and holding plates on top of the elevator. Install the safety wire to secure the screws.

▲ WARNING THE VES ACL ELEVATOR SHALL NEVER BE USED WITHOUT BUSHING SEGMENTS.

3.5.1 Removal of the bushings

1. Open the elevator body.
2. Check that Locking pin is set and air pressure is applied to the elevator.
3. Remove the screws on the top of the elevator.
4. Screw the handles into the bushing segment.
5. Turn the segments for removal.

3.5.2 Installation of the bushing

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

1. Screw the handles into the bushing segment.
2. Turn the segment into the body.
3. Fixate the segments with the screws on top of the elevator.
4. Install new lock wire to secure the screws.
5. Remove the Loking pin.



Fig. 29: Locking pin



Fig. 30: Handles for bushings

3.6 Installation Checklist

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

Read manual before first use !

OK	<input type="checkbox"/>	Make sure the required bushings are installed before first use (VES-ACL only).
OK	<input type="checkbox"/>	Make sure the bushings are fixed with the screws (VES-ACL only).
OK	<input type="checkbox"/>	Make sure the correct trigger hammer is installed.
OK	<input type="checkbox"/>	Make sure Pneumatic Pressure is switched on.

3.6.1 Pneumatic Connections

OK	<input type="checkbox"/>	Make sure the controls are connected to the Pneumatic Power Supply.
OK	<input type="checkbox"/>	Make sure the 2-hand controls are connected.
OK	<input type="checkbox"/>	Make sure the Pneumatic Line is connected.

3.6.2 Function test

There are two possibilities to carry out the function test:

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

OK	<input type="checkbox"/>	Close elevator.
OK	<input type="checkbox"/>	Open elevator.
OK	<input type="checkbox"/>	Check signal "elevator closed and latched" is visible (green).
OK	<input type="checkbox"/>	Check signal "elevator open" is visible (red).
OK	<input type="checkbox"/>	Check closing tool and other loose service tools are removed from the elevator.

OPERATION

OPERATION

4 OPERATION

▲ **WARNING** WHILE USING THE ELEVATOR, ALWAYS MAKE SURE THE DOOR IS COMPLETELY CLOSED WITH THE LATCH/LATCH LOCK FULLY ENGAGED AND IF APPLICABLE THE VERIFICATION PIN PROPERLY INSTALLED.

▲ **WARNING** DO NOT TOUCH THE VES ACL AND ACL ELEVATOR.

▲ **WARNING** NEVER OPEN THE ELEVATOR WHEN THE PIPE LOAD IS STILL SUSPENDED BY THE ELEVATOR.

▲ **WARNING** OBSERVE THE ELEVATOR CONTINUOUSLY WHILE CLOSING TO CHECK IF THE ELEVATOR IS PROPERLY CLOSED.

▲ **WARNING** INDICATOR HAS TO SHOW A GREEN SIGNAL BEFORE LIFTING THE PIPE.

4.1 Safety

▲ **WARNING** MAKE SURE THAT ALL PNEUMATIC LINES ARE ISOLATED BEFORE ANY WORK IS CARRIED OUT ON A CLOSED ELEVATOR.

▲ **WARNING** WHILE WORKING AT AN OPEN ELEVATOR, MAKE SURE THE AIR PRESSURE IS APPLIED TO THE ELEVATOR

▲ **WARNING** IT IS RECOMMENDED TO HAVE THE ELEVATOR OPERATED BY THE DRILLER.

4.2 Operation Running in

1. Pick up a section of pipe. The elevator is closed when the indicator is green.
2. Now make up the stand or joint.
3. When the pipe is made up, pick up the load and open the slips.
4. Now lower the string.
5. Pick up the weight of the pipe string with the slips, before opening the elevator.
6. Open the elevator and pick up a new section of pipe.

4.3 Operation Tripping out

1. Pick up the string with the elevator. The elevator is closed when the indicator is green.
2. Raise the slips.
3. Pull out the string.
4. Set the slips.
5. Release the string weight from the elevator.
6. Now BO the stand or joint.
7. When the pipe is BO, pick up the stand and handle.

4.4 Connecting and disconnecting of the pneumatic hoses

▲ **WARNING** BE CAREFUL WHEN DISCONNECTING PNEUMATIC HOSES. MAKE SURE THAT NO PRESSURE IS ON PRESSURE LINE, BEFORE DISCONNECTING.

4.5 Manual Opening in Case of Emergency

If elevator cannot be opened by compressed air, please follow these points:

- » Disconnect elevator air supply
- » For Latch opening use a steel bar (Pos.1). Be aware of the latch spring!
- » The steel bar could cause injuries due to the Latch spring force.
- » To open the elevator body remove the two screws (Pos.2) and the Cap (Pos.3).
- » Remove the Cotter pin (Pos.4) and unscrew the nut (Pos.5) until the elevator body is fully opened.
- » After maintenance or repair make sure that the nut (Pos.4) is returned to it's originally position. Make sure all safety elements and warning signs are in place and undamaged.

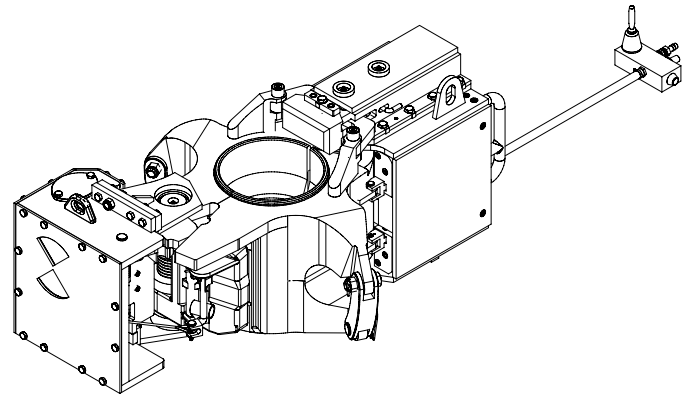


Fig. 32: Manual opening I

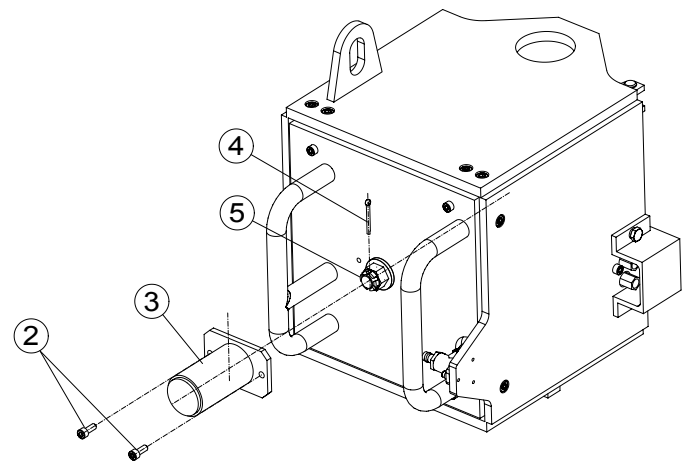


Fig. 31: Manual opening II

4.6 Manual Closing of the Elevator

▲ **WARNING** CLOSE AIR OPERATED CENTER LATCH ELEVATOR ELEVATORS ONLY WITH HELP OF THE TRIGGER CLOSING TOOL.

▲ **WARNING** REMOVE TRIGGER CLOSING TOOL FROM ELEVATOR AFTER EVERY TIME OF USE.

▲ **WARNING** WARNING: NEVER USE TOOLS LIKE HAMMERS OR BARS TO CLOSE FORUM B + V OIL TOOLS AIR OPERATED CENTER LATCH ELEVATOR ELEVATORS. USE ALWAYS THE FORUM B + V OIL TOOLS TRIGGER CLOSING TOOL TO CLOSE THE ELEVATOR.

▲ **WARNING** HANDLING THE TRIGGER CLOSING TOOL.

1. Elevator is hanging free, just above drill floor.

2. Make sure the Trigger Locking Pin is removed.



Fig. 33: Trigger Closing Tool



Fig. 34: First example of wrong closing method



Fig. 35: Second example of wrong closing method



Fig. 36: Position of locking pin

1. Depending on different hammer sizes:
 - » Turn back spindle to maximum opening measure of Trigger Closing Tool first.
 - » Put the Trigger Closing Tool on top of the Trigger System as shown below.



Fig. 37: Adjust to fit

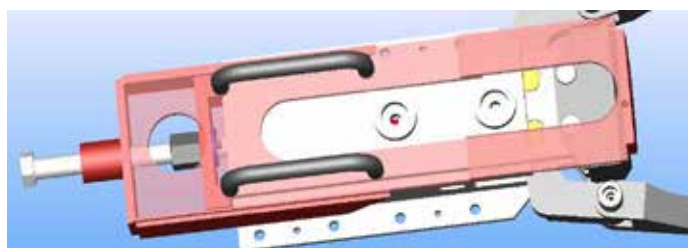


Fig. 38: Sketch of TCT

2. Turning the screw adjusts the Trigger Closing Tool, so there is no space in front to the hammer and no space to the rear of Trigger System.

▲ WARNING It is DANGEROUS AROUND THE LATCH AREA: NO PERSONNEL OR OBJECTS ALLOWED

3. Release air pressure from the Elevator.



Fig. 39: How to close the elevator

1. Hold down the Trigger Closing Tool with one hand. Use the wrench with the other hand.
2. By turning the screw, the hammer of the Trigger System is slowly drawn backwards.

▲ WARNING WHILE TURNING THE SCREW, DOUBLE CHECK THAT NOBODY IS IN FRONT OF THE ELEVATOR. THE ELEVATOR WILL CLOSE SUDDENLY AND QUICK AFTER A FEW TURNS OF THE SCREW. THERE IS AN EXTREME DANGER OF INJURIES.



Fig. 41: How to close the elevator (lifted)

3. Remove Trigger Closing Tool from Elevator after every time of use.

4. Trigger Closing Tool must be taken off the Elevator after every time of use.



Fig. 40: Remove trigger closing tool

INSPECTION / MAINTENANCE

INSPECTION /
MAINTENANCE

5 MAINTENANCE AND INSPECTION

5.1 General

If cracks, excessive wear etc. is recognised, contact Forum B + V Oil Tools GmbH or an authorised service company.

Weldings of the castings should be done only by Forum B + V Oil Tools GmbH or an authorised service company in according to Forum B + V Oil Tools welding procedure.

A regular preventative maintenance program should be established for all elevators. These written maintenance procedures should be given to the crew or maintenance personnel.

▲ WARNING FOR SERVICE AND MAINTENANCE DISCONNECT THE AIR SUPPLY. WHILE WORKING AT THE OPEN ELEVATOR, THE TRIGGER HAS TO BE IN THE LOCKED POSITION AND AIR PRESSURE MUST BE SUPPLIED.



Fig. 45: Locking hole for trigger

5.2 Daily Lubrication

Lubricate hinge pins and latch pins (grease nipples).

Lubricate springs and trigger system.

Lubricate emergency opening and actuator.

5.2.1 Daily Inspection

Inspect visually the latch opening arrangements and actuator with springs.

The ACL are supplied with lubrication nipples to apply grease manually by a grease gun.

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

5.2.2 Lubrication Intervals

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



Fig. 42: Instructions: Lubricate at Least Once Daily (PN 671642)

5.3 Lubricator and de-water unit

The lubricator unit should be filled with antifreezing oil to prevent freezing of air operated devices at temperatures up to minus 20 °C/-4°F.

The valves, which are necessary to provide the air operated elevator with compressed air, should ensure quick ventilation of the system.

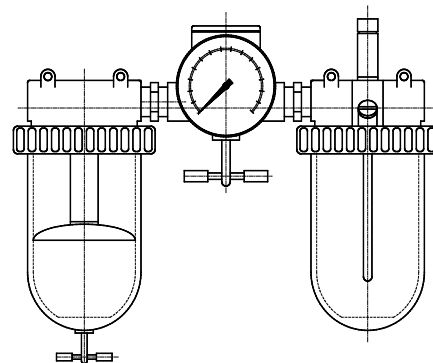


Fig. 46: Lubricator/de-water unit

5.3.1 Manual Lubrication

A check list for lubrication is given in the appendix.

Tools

- Grease gun (PN 755667-3)



Fig. 43: Recommended Grease Gun (PN 755667-3).

5.3.2 Lubrication points

All Lubrication points are marked with a red circle.
To ease lubrication all lubrication points a made with grease nipple. The grease nipple will protect the lubrication points against dirt and humidity and provide a standardized connection to the grease gun.

The internal grease lines will lead the grease to the lubrication points (output bores).

- Grease point 1: Hinge pin
- Grease point 2: Trigger lever
- Grease point 3: Trigger
- Grease point 4: Latch pin
- Grease point 5: Bearing pin
- Grease point 6: Elevator hinge

Daily Test

The function of the Feedbacksignal has to be checked daily. If any damage or malfunction were found, take the elevator out of service for .x

5.3.3 Locking of screws

All screws are normally secured by self-stopping threads. All other screws are secured by metal adhesive (locktite). After disconnecting the screws, secure them by using an appropriate metal-adhesive.

The ACL are supplied with lubrication nipples to apply grease manually by a grease gun.

W

5.3.4 Lubricants for manual Lubrication

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

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

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

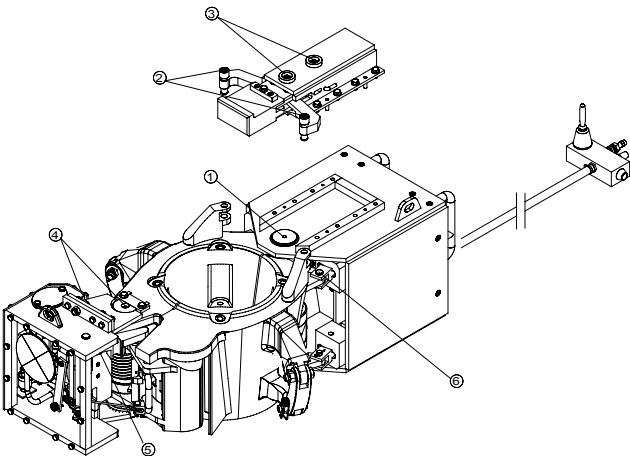


Fig. 44: Grease Points

5.4 Inspections

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

Shut off the machine and disconnect the hydraulic/ Pneumatic connections before performing an inspection.

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

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

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

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

INFO



The specified maintenance intervals are recommended for the ACL 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

5.4.1 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.

5.4.2 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 wedges,
- Pulling wedged drill strings,
- Holding heavy drill pipes / drill strings
- Jarring
- Operation at very low ambient temperatures (<-20 °C / -4 °F).

5.4.3 Inspection Following Removal

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

Moreover it should be inspected before putting back into service.

- It is necessary to disassemble the ACL 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 cast parts is accomplished only by Forum B + V Oil Tools or an authorized service company in compliance with the welding specifications issued by Forum B + V Oil Tools.
- If the field inspection indicates that further inspection work is required, remove the ACL and have it inspected in an appropriately equipped workshop.
- Check carefully for visible wear and material fatigue.

Inspection Intervals

Category	Interval	Preparatory measures
I	Daily	- ACL on rig
II	Weekly	- ACL on rig
III	Semi-annually	- ACL on rig - ACL partly dismantled
IV	Every year	- ACL on rig - ACL partly dismantled

5.5 Inspection Categories

Always perform a complete inspection according to the instructions in Categories III or IV before AND after critical loads (see Chapter 6.2.2).

INFO



Inspection categories acc. to API 7L

5.5.1 Inspection Category I

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

Scope/Prerequisites

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

Procedure:

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

5.5.2 Inspection Category II

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

Scope/Prerequisites

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

Procedure:

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

5.5.3 Inspection Category III

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

Scope/Prerequisites

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

Procedure:

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

5.5.4 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
- in critical areas as well as removal of certain parts to determine the wear limits according to the specified tolerances

Procedure:

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

5.5.5 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.

5.5.6 Dismantling Inspection

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

The Tool 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 GmbH.

Weldings at the castings should be done only by Forum B + V Oil Tools GmbH or an authorized service company in accordance to Forum B + V Oil Tools welding procedure.

When need is shown in a field inspection, dismantle the Tool and arrange an inspection in a suitably equipped facility.

Springs should be carefully visually inspected for excessive wear and obvious weakness.

5.6 Check Lists for Inspections acc. to Category I - IV

INFO



The following check lists serve as copy templates for inspections to be performed in compliance with API 7L

Inspection Check List Category I - V

Cover Sheet, Inspection Check List Category I - IV

Machine model

Air Operated Center Latch Elevator

Serial number

Part number

Supervisor

Date of inspection

Place of inspection

INSPECTION /
MAINTENANCE

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

**⚠ WARNING**

Separated hydraulic lines pose an injury hazard!

Hydraulic oil can escape under high pressure.

ALWAYS relieve pressure in machine before performing maintenance work.

Check List Category I (Ongoing observation)

Observe during operation for inadequate performance

General

Description	Checked		Action when NOK	Sign.
	OK	NOK		
1 Complete front page of check list for the records.	<input type="checkbox"/>	<input type="checkbox"/>		
2 Check for correct size of elevator or bushing segments. (VES-ACL only)	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine; replace bushing.	
3 Check correct function elevator latch indicator (open - red or closed - green).	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine; lubricated device.	
4 Check correct function elevator latch.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine; check hydraulic connections and lines for damage and proper installation.	
5 Check state of lubrication.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department	

Remarks:

SUPERVISOR

DATE

Check List Category II (Daily)**Loose components**

Description	Checked		Action when NOK	Sign.
	OK	NOK		
1 Hinge pins, bolts and retainers.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department	
2 Fixation of bushing segments.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
3 Screws, bolts, nuts, washers, retainers, springs and lock wire.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
4 Trigger hammer.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
5 Link blocks.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
6 Check completeness and condition of warning plates and labels.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	

CHECK FOR CRACKS, ELONGATION, DAMAGE AND CORROSION

Description	Checked		Action when NOK	Sign.
	OK	NOK		
1 Elevator Body and Door.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department	
2 Hing pins, bolts, nuts.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
3 Bushing segments. (VES-ACL only)	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
4 Latch and lug.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
5 Closing arrangement.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
6 Trigger arrangement.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department	

Pneumatic

Description	Checked		Action when NOK	Sign.
	OK	NOK		
1 Check for loose fittings, pipes, valves.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department	
2 Check for pneumatic leaks (hoses, valves and cylinders).	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	
3 Check condition of pneumatic couplings and connection hoses.	<input type="checkbox"/>	<input type="checkbox"/>	Replace components	

SUPERVISOR

DATE

Check List Category III (every 6 months)

General				
Description		Checked		Action when NOK
		OK	NOK	Sign.
1	Carry out an Category II inspection.	<input type="checkbox"/>	<input type="checkbox"/>	
2	NDT (MPI) critical areas. Some disassembly may be needed to do so.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department
3	Check parts for wear according to allowable tolerances.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department

SUPERVISOR

DATE

Check List Category IV (every year)**General**

Description	Checked		Action when NOK	Sign.
	OK	NOK		
1 Carry out an Category III inspection.	<input type="checkbox"/>	<input type="checkbox"/>		
2 NDT(MPI) critical areas and load bearing components. Strip elevator to do so.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department	
3 Change all pneumatic hoses and fittings.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department	
4 Check condition of pneumatic valves and replace if necessary.	<input type="checkbox"/>	<input type="checkbox"/>	Shut down machine, check for damage, contact Forum B + V Oil Tools Service Department	

SUPERVISOR

DATE

5.7 Measuring of wear

It is obvious that a visual inspection is not enough to check a lifting device like the ACL.

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.

5.7.1 Wear at the Tool 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.

(\textcircled{A} = Tool joint diameter, \textcircled{B} = Actual Center Bore)

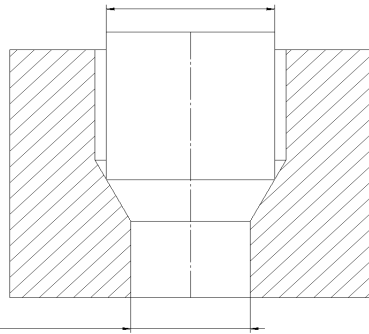


Fig. 47: Minimum A and B for ACL Elevators

The following table shows the minimum required Tool Joint diameter, depending on the Centre Bore. As soon as the Tool 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).

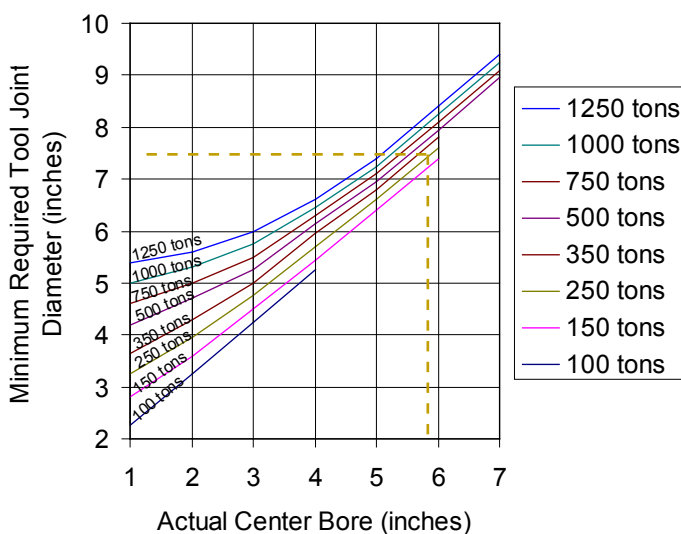


Fig. 48: Minimum A for Tool Joints

INFO

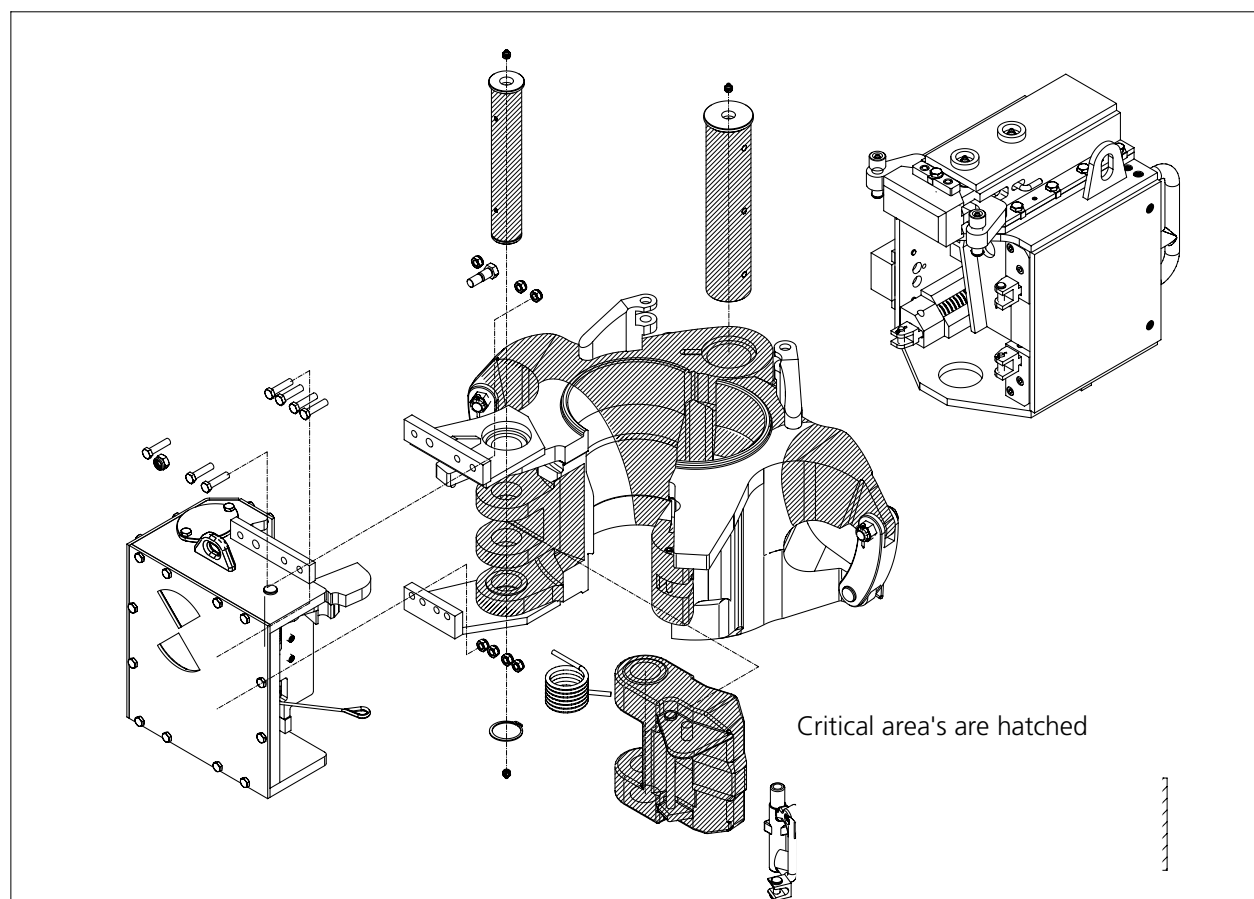


Example to Tool Joints table:

5" DP Bushing, rated 500 tons

1. Actual Centre Bore is 5.½"
Follow vertical to 500 tons
2. Follow horizontal to scale
» Required Tool Joint is A= 7.3"

5.7.2 Critical Areas



5.7.4 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. 49: Picture: Dimension A

Elevator Type dimension A	Partnumber	Minimum [mm]
CL 150/1	611500	84,1
CL 150/2	611520	84,1
CL 250	612540	101,1
CL 350	613540	120,8
CL 500	615000	148,8
CL 750	617500	218
CL 1000	611000	218
VES-CL 150	611900	84,1
VES-CL 250	612900	101,1
VES-CL 350	613900	120,8
VES-CL 500	615900	148,8
VES-CL 750	617500	218
VES-CL 1000	611000	218

5.7.3 Bore of Latch and Body Hinges

VES ACL / ACL elevator:

Body Hinge Pin

Dimension dia. new	64,85
Bore dia. new max:	65,074
Bore dia. worn max:	65,524

Latch Hinge Pin

Dimension dia. new	44,85
Bore dia. new max:	45,062
Bore dia. worn max:	45,542



Fig. 50: Measurement wear data

5.7.5 Wear Check for bushings

Normal wear of bushings and elevator ears caused by usage will eventually reduce the load capacity of elevators.

The existence of cracks or the appearance of defects can indicate severe deterioration and even failures. Prompt attention is required either to remove the elevator from service immediately or to undertake appropriate repair.

A wear condition in its early stages is common. Frequently, it results in a tool joint sticking to the elevator.

Elevators showing hammer marks around the top of the bore should be closely examined to determine whether it is the elevator, the tool joint or both are faulty.

To identify the conditions of the 18° Elevator taper gauges are available for all Forum B + V Oil Tools Elevators (P/N 600018).

A set of gauges consists of an 18° gauge (GOOD) and a 15° gauge (BAD)

How to check the bushing or Bore Code of the Elevator the correct way

1. Fit the gauge to the inner bore of the bushing.
2. Push the gauge against the bushing and start to move the gauge downwards until the chamfer touches the 18° shoulder or the bore.
3. Check the result as follows.

Check of results

1. Using the GOOD gauge: If the gauge sits directly on the bushing without showing any clearance between gauge and bushing, the bushing is OK.
2. If the gauge shows space between the gauge and the bushing, you have to check with the second gauge.
3. Using the BAD 15° gauge: If the gauge shows any clearance between gauge and bushing, the bushing is OK.
4. If the gauge sits directly on the bushing without showing any space between gauge and bushing or BC, take the elevator out of service.

⚠ CAUTION The results have to be evaluated in a conservative way.

- » If the taper is less than 15° take the elevator out of service or exchange the bushing.
- » If the taper is between 18° and 15°, reduce the elevators load capacity to 90%.

⚠ CAUTION Never use the elevator without a bushing.

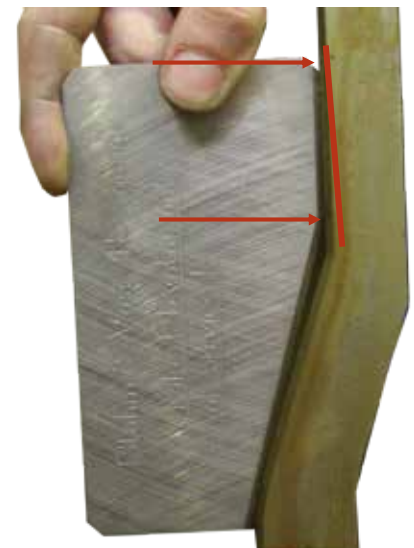


Fig. 51: Position the 18° and 15° gauge

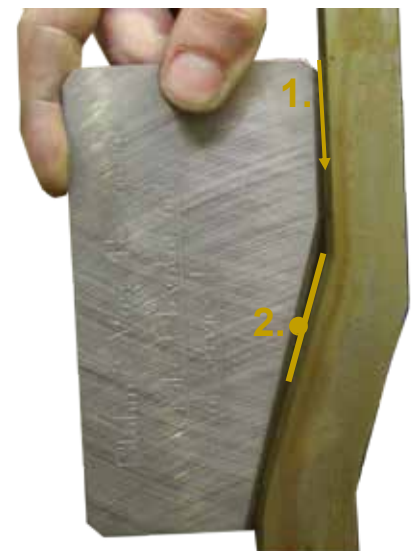


Fig. 52: Move for measurement



Fig. 53: Forum B + V Oil Tools 18° and 15° Gauge (P/N 600018)

5.8 Trouble shooting

5.8.1 Elevator does not open

- » Check connection for damages
- » Check pneumatic pressure and flow rate
- » Check function and adjustment of control valve
- » Check function of valve (3) (see pneumatic diagram)

5.8.2 Elevator does not close complete

- » Check Latch and latch lock springs for damage
- » Check pneumatic system for damages

5.8.3 Fatigue fracture of springs

- » Replace the springs

5.9 Cleaning

	<p>⚠ WARNING</p> <p>Health hazards from service products!</p> <p>Splashes of diluted drilling mud and small parts.</p> <p>ALWAYS wear your personal protective equipment.</p>
	<p>WEAR EYE PROTECTION!</p>
	<p>WEAR PROTECTIVE GLOVES!</p>

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

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

5.9.1 Time of Cleaning

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

5.9.2 Procedure and Cleaning Agents

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

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

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

Then lubricate the sliding surfaces as specified in Chapter 6.1.

SIZE COMPONENTS

SIZE
COMPONENTS

1 Component Sizes

The pipe diameters and matching components are listed with part numbers below for precise layout of the ACL with the desired drill string. To order components please contact the Service Department with the address given under „XIII Contact worldwide“ On page 9.

⚠ CAUTION Always ensure that the right component size is installed for each pipe diameter.

Pipe sizes, trigger hammers and bushings



Fig. 54: Bushing and Hammer location

Note Trigger hammers without partnumber will be manufactured on special request.

Trigger Hammers								Bushings 18° Shoulder		
Pipe dimension	Bore Code	ACL 250	ACL 350	ACL 500	VES ACL 250	VES ACL 350	VES ACL 500	VES ACL 250	VES ACL 350	VES ACL 500
2.3/8" EU	101	-	-	-	-	-	-	612900-101	613902-101	613902-101
2.7/8" IU	102	-	-	-	-	613951-5	-	612900-102	613902-102	613902-102
2.7/8" EU	103	-	613835-1	-	-	613951-5	615960-3	612900-103	613902-103	613902-103
3.1/2" IU	104	612722-1	613835-1	-	612722-1	613951-1	615960-3	612900-104	613902-104	613902-104
3.1/2" EU	105	612722-1	613835-1	-	612722-1	613951-1	615960-3	612900-105	613902-105	613902-104
4" IU	106	612722-2	613835-2	615732-1	612722-2	613951-2	615960-1	612900-106	613902-106	613902-106
4" EU	107	612722-2	613835-2	615732-1	612722-2	613951-2	615960-1	612900-107	613902-107	613902-107
4.1/2" IU+IEU	107	612722-2	613835-2	615732-1	612722-2	613951-2	615960-1	612900-107	613902-107	613902-107
4.1/2" EU	109	612722-3	613835-3	615732-1	612722-3	613951-3	615960-1	612900-109	613902-109	613902-109
5" IEU	109	612722-3	613835-3	615732-1	612722-3	613951-3	615960-1	612900-109	613902-109	613902-109
5.1/2" IEU	111	612722-3	613835-3	615732-2	612722-3	613951-3	615960-2	612900-111	613902-111	613902-111
5.7/8" IEU	111	612722-3	613835-3	615732-2	612722-3	613951-3	615960-2	612900-111	613902-115	613902-115
6.5/8" IEU	114		613835-5	615732-2		613951-4	615960-2		613902-114	613902-114
6.906	112		613835-5	615732-2		613951-4	615960-2		-	-

Trigger Hammers								Bushings 90° Tubing		
Pipe dimension	Bore Code	ACL 250	ACL 350	ACL 500	VES ACL 250	VES ACL 350	VES ACL 500	VES ACL 250	VES ACL 350	VES ACL 500
2.3/8" P	129	-	-	-	-	-	-	612900-129	613902-129	613902-129
2.3/8" U	130	-	-	-	-	-	-	612900-130	613902-130	613902-130
2.7/8" P	131	-	-	-	-	-	-	612900-131	613902-131	613902-131
2.7/8" U	132	-	-	-	-	-	-	612900-132	-	-
3.1/2" P	133	612722-1	612722-1	-	-	-	-	612900-133	613902-133	613902-133
3.1/2" U	134	612722-1	612722-1	-	-	-	-	612900-134	-	-
4" P	135	612722-2	612722-2	-	-	-	-	612900-135	613902-135	613902-135
4" U	136	612722-2	612722-2	-	-	-	-	612900-136	-	-
4.1/2" P	137	612722-2	612722-2	-	-	-	-	612900-137	-	-
4.1/2" U	138	612722-2	612722-2	-	-	-	-	612900-138	-	-
5" P	139	612722-3	612722-3	-	-	-	-	612900-139	613902-139	613902-139
5" U	140	612722-3	612722-3	-	-	-	-	612900-140	-	-
Trigger Hammers								Bushings 90° Shoulder		
Pipe dimension	Bore Code	ACL 250	ACL 350	ACL 500	VES ACL 250	VES ACL 350	VES ACL 500	VES ACL 250	VES ACL 350	VES ACL 500
2.3/8" EU	151	-	-	-	-	-	-	612900-151	-	-
	152	-	-	-	-	-	-	612900-152	-	-
2.7/8" IU	153	-	-	-	-	-	-	612900-153	613902-153	613902-153
2.7/8" EU	154	-	-	-	-	-	-	612900-154	-	-
3.1/2" IU	155	612722-1	-	-	-	-	-	612900-155	-	-
3.1/2" EU	156	612722-1	-	-	-	-	-	612900-156	613902-156	613902-156
4" IU	157	612722-2	-	-	-	-	-	612900-157	-	-
4" EU	158	612722-2	-	-	-	-	-	612900-158	613902-158	613902-158
4.1/2" IU	158	612722-2	-	-	-	-	-	612900-158	613602-158	613902-158
4.1/2" IEU	158	612722-2	-	-	-	-	-	612900-158	613902-158	613902-158
4.1/2" EU	159	612722-3	-	-	-	-	-	612900-159	613902-159	613902-159
5" IEU		612722-3	-	-	-	-	-	-	613902-159	613902-159
5.1/2" IEU	160	-	-	-	-	-	-	-	613902-160	613902-160
6.7/8" IEU	161	-	-	-	-	-	-	-	613902-161	613902-161

Trigger Hammers								Bushings 90° Casing		
Pipe dimension	Bore Code	ACL 250	ACL 350	ACL 500	VES ACL 250	VES ACL 350	VES ACL 500	VES ACL 250	VES ACL 350	VES ACL 500
3½"	219	612722-1	-	-	612722-1	-	-	612900-219	-	-
4"	220	612722-2	-	-	612722-2	-	-	612900-220	-	-
4½"	221	612722-2	-	-	612722-2	-	-	612900-221	-	-
4¾"	222	612722-2	-	-	612722-2	-	-	612900-222	-	-
5"	223	612722-3	-	-	612722-3	-	-	612900-223	613902-223	613902-223
5½"	234		-	-		-	-	-	613902-234	613902-234
6¼"	227	-	-	-	-	-	-	-	613902-227	613902-227
7"	229	-	-	-	-	613951-4	615960-2	-	613902-229	613902-229
7¼"	230	-	-	-	-	-	-	-	613902-230	613902-230

Trigger Hammers								Bushings 90° Drill Collar with Zip		
Pipe dimension	Bore Code	ACL 250	ACL 350	ACL 500	VES ACL 250	VES ACL 350	VES ACL 500	VES ACL 250	VES ACL 350	VES ACL 500
4¾"	181	612722-1	-	-	612722-1	-	-	612900-181	-	-
4¾"	182	612722-2	-	-	612722-2	-	-	612900-182	-	-
5¼"	183	612722-2	-	-	612722-2	-	-	612900-183	-	-

Trigger Hammers								Bushings 90° Casing		
Pipe dimension	Bore Code	ACL 250	ACL 350	ACL 500	VES ACL 250	VES ACL 350	VES ACL 500	VES ACL 250	VES ACL 350	VES ACL 500
3¼"	271	612722-1	-	-	612722-1	-	-	612900-271	-	-
3½"	272	612722-1	-	-	612722-1	-	-	612900-272	-	-
4"	273	612722-2	-	-	612722-2	-	-	612900-273	-	-
4¾"	274	612722-2	-	-	612722-2	-	-	612900-274	-	-
4½"	275	612722-2	-	-	612722-2	-	-	612900-275	-	-
4¾"	276	612722-2	-	-	612722-2	-	-	612900-276	-	-
5"	277	612722-3	-	-	612722-3	-	-	612900-277	-	-
5⅝"	278	612722-3	-	-	612722-3	-	-	612900-278	-	-
5½"	279	612722-3	-	-	612722-3	-	-	612900-279	-	-

DRAWINGS

DRAWINGS

7 Drawings

⚠ NOTE Operational safety and readiness of the machine do not only depend on your skill, but also on maintenance and servicing of the machine. Insist on using original spare parts when carrying out maintenance and repair work. This ensures operational safety and readiness of your machine, and maintains its value.

7.1 Malfunction

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

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

1. Check hydraulic connections and hydraulic lines.
2. Check whether the hydraulic unit is switched on.
3. Check whether the Slip Assembly has been installed for the size/type of pipe used.
4. Check for proper lubrication of the ACL.
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.

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

7.2 Repair

7.2.1 Repair by Customer

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

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

7.2.2 Repair by Manufacturer

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

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

7.2.3 Securing Screws with Nord Lock washers

Nord Lock bolt securing systems use geometry to safely lock bolted joints in the most critical applications. The key is the difference in angles. Since the cam angle „ 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 device will get in contact with the under surface of the securing plate, this surface contact will secure the plate and prevents any motion in the axial direction.

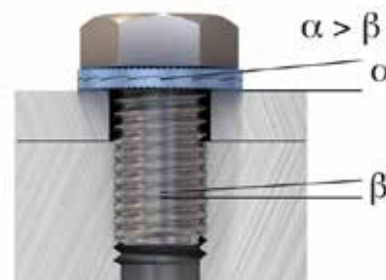


Fig. 55: Nord Lock Washer principle illustration



Fig. 56: Nord Lock Washer detailed illustration

Tightening torques for Nord Lock lock washers Several Nord Lock bolt securing systems are used on the ACL to generate safely lock bolted joints. Regarding the fact that different sizes and metric grades are applied detailed information from Nord Lock is given in the annex (refer to annex „I Nord Lock Washer (excerpt from Third Party Product information)“ on page 94) 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 metric grade and make of the bolt can be seen on top of the bolt/nut.



Fig. 57: Bolt head marking

On Forum B + V Oil Tools Pipe handling Equipment the metric grades 8.8, 10.9 and 12.9 are used and the tightening torques can be found in the „a. Torque Guidelines“ on page 96

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

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

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

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

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

7.3 Drawing, Parts List and Spare Parts

7.3.1 Contact to Parts Department

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

7.4 DRAWINGS AND PART LISTS

7.4.1 612970-Y-BC ACL 250 Elevator exploded View

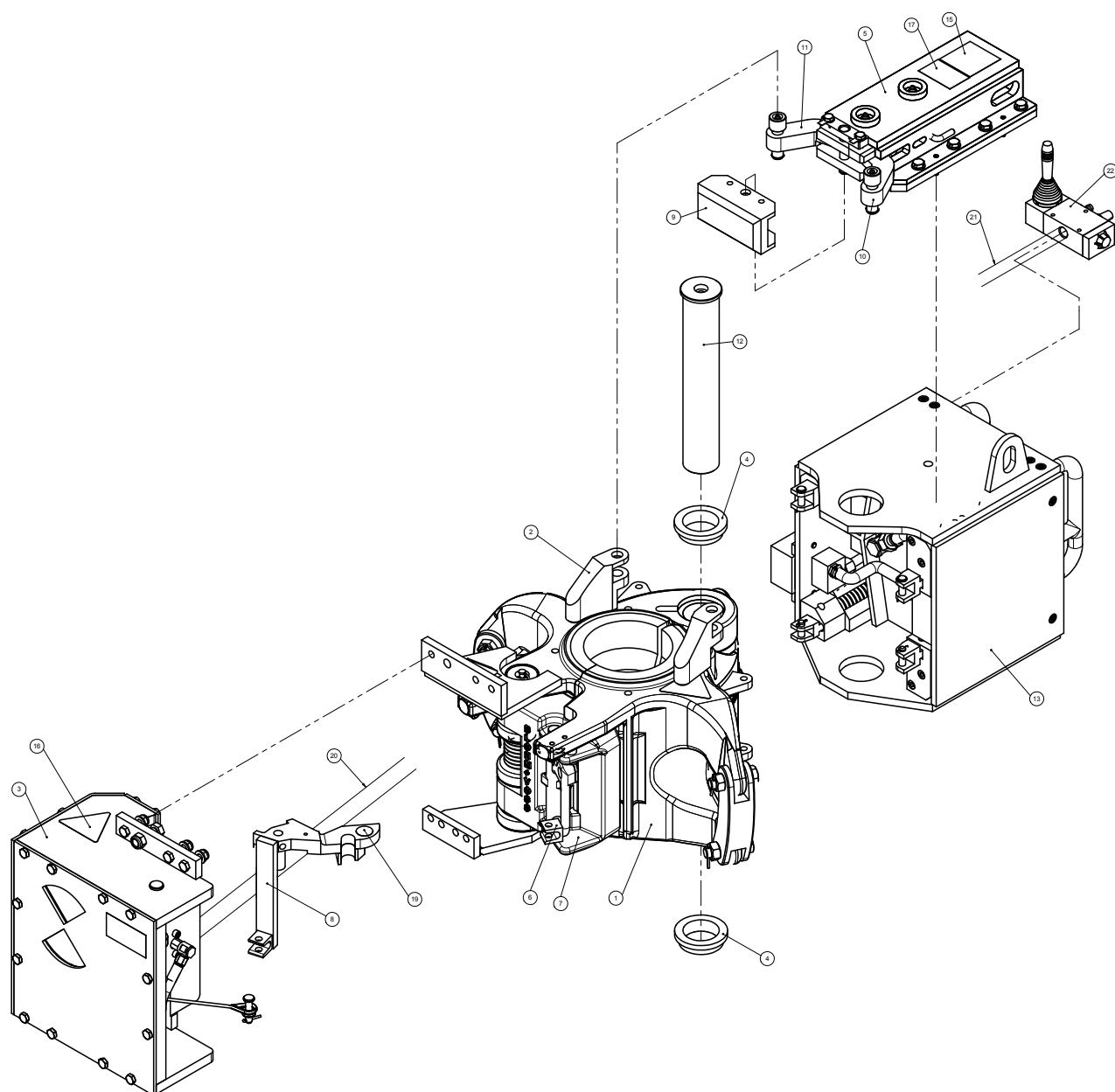


Fig. 58: 612970-Y-BC ACL 250 Elevator exploded View

612970-Y-BC Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	612540-Y-BC	Forum B + V Oil Tools Type VES-CL-250 Center Latch Elevator
2	1	612702-1	Welding Attachments to Elevator and Latch
3	1	613860	Latch Opening Unit (New Design)
4	2	612736	Distance Bushing
5	1	612735	Trigger Assembly
6*	1	612543-2	Latch Lock Assembly for VES ACL / VES ACL
7	1	612732	Latch with Attachments for ACL
8	1	612731	Hook
9	1	612722-1	Hammer BC 104 - 105
9	1	612722-2	Hammer BC 106 - 108
9	1	612722-3	Hammer BC 109 - 111
9	1	612722-4	Hammer BC 112 - 113
10*	1	612723	Lever, left
11*	1	612724	Lever, right
12	1	612605-1	Hinge Pin for ACL (new Type)
13	1	613610	Elevator Actuation Arrangement
14*	1	671638	Warning sign Forum B + V Oil Tools
15*	1	671639	Warning sign "Automatic"
16*	1	671640	Warning sign "Hands" - sticker
17*	1	671642	Warning sign "GREASE DAILY"
18*	1	671637	Warning sign "Spring"
19*	1	611524	Warning sign „Don't touch“
20*	2	612726	Pneumatic Hose 710mm
21	1	613790	Pneumatic Hose 5000mm
22	1	613733	Stop and Go Valve Assembly
23*	2	671052	Safety Wire
24	2	755372	Standpipe Reducer

* Spare Parts

7.4.2 612970-Y VES ACL Elevator exploded View

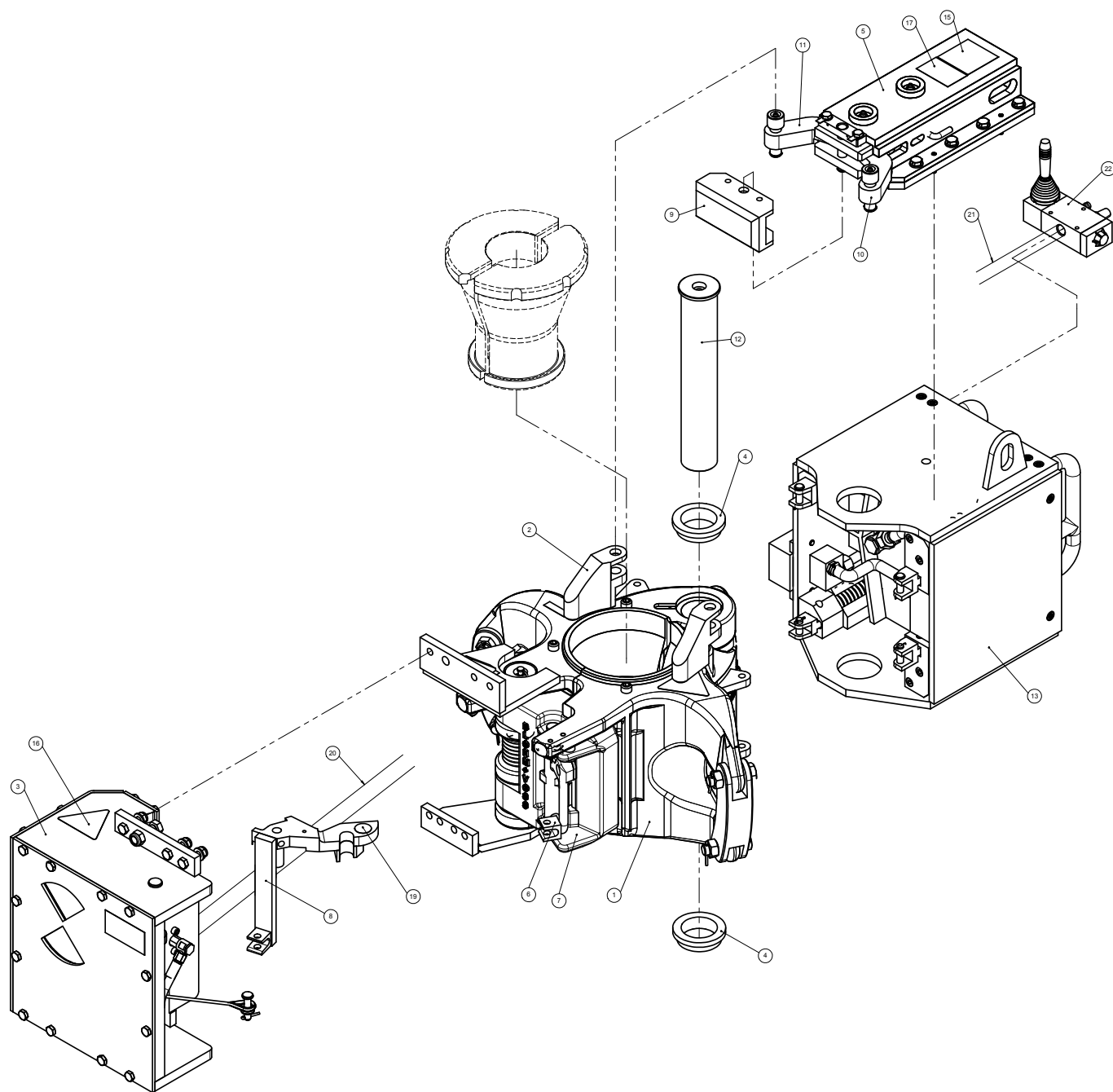


Fig. 59: 612970-Y VES-ACL 250 Elevator exploded View

612970-Y Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	612900-Y	Forum B + V Oil Tools Type VES-ACL-250 Center Latch Elevator
2	1	612702-1	Welding Attachments to Elevator and Latch
3	1	613860	Latch Opening Unit (New Design)
4	2	612736	Distance Bushing
5	1	612735	Trigger Assembly
6*	1	612543-2	Latch Lock Assembly for VES ACL / VES ACL
7	1	612732	Latch with Attachments for ACL
8	1	612731	Hook
9	1	612722-1	Hammer BC 104 - 105
9	1	612722-2	Hammer BC 106 - 108
9	1	612722-3	Hammer BC 109 - 111
9	1	612722-4	Hammer BC 112 - 113
10*	1	612723	Lever, left
11*	1	612724	Lever, right
12	1	612605-1	Hinge Pin for ACL (new Type)
13	1	613610	Elevator Actuation Arrangement
14*	1	671638	Warning sign Forum B + V Oil Tools
15*	1	671639	Warning sign "Automatic"
16*	1	671640	Warning sign "Hands" - sticker
17*	1	671642	Warning sign "GREASE DAILY"
18*	1	671637	Warning sign "Spring"
19*	1	611524	Warning sign „Don't touch“
20*	2	612726	Pneumatic Hose 710mm
21	1	613790	Pneumatic Hose 5000mm
22	1	613733	Stop and Go Valve Assembly
23*	2	671052	Safety Wire
24	2	755372	Standpipe Reducer
		613902-BC	Insert Bushing (to be ordered seperatly)

* Spare Parts

7.4.3 612540-Y CL-250 Center Latch Elevator

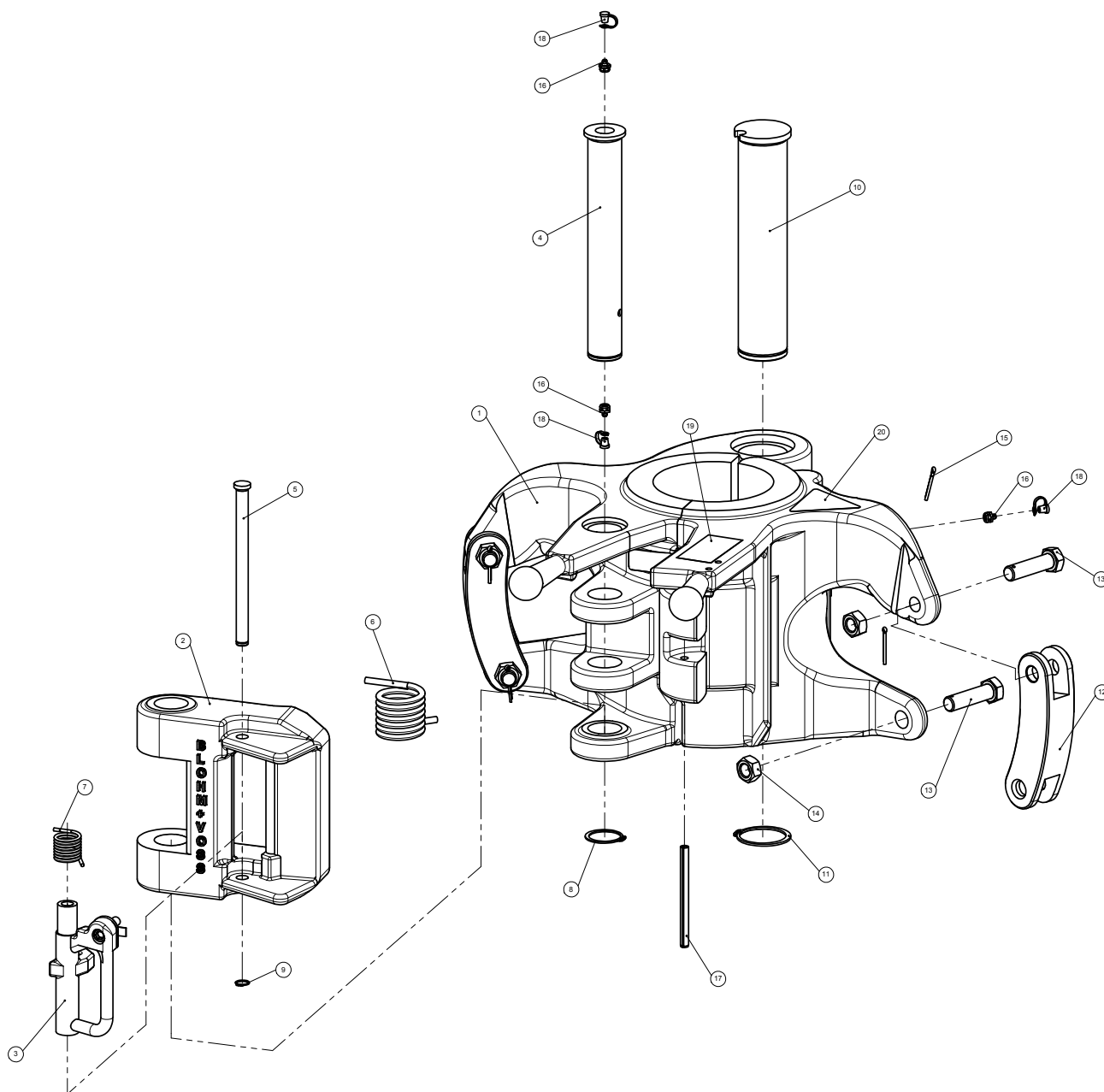


Fig. 60: 612540-Y CL-250 Center Latch Elevator

612540-Y CL-250 Center Latch Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	612541-BF	Body CL 250 Center Latch Elevator
2	-	-	Latch
3	-	-	Latch Lock Assy.
4	1	612504	Latch Pin
5*	1	612505	Latch Lock Pin
6*	1	612506	Latch Spring
7*	1	612507	Latch Lock Spring
8*	1	612508	Retaining Ring
9*	1	612509	Retaining Ring
10	-	-	Hinge Pin
11*	1	612511	Retaining Ring
12	2	612512	Link Block
13	4	613623-1	Screw
14	4	613556-41	Nut
15*	4	752339	Cotter Pin
16*	3	612515	Grease Nipple
17	1	615021	Dowel Pin
18*	3	612518	Protection Cap
19*	1	671638	Warning sign Forum B + V Oil Tools
20*	1	671641	Warning sign "squeeze danger"
21*	2	671642	Warning sign "GREASE DAILY"

Pos. 2,3+10 are not used in the VES ACL

Pos. 21 not shown

* Spare Parts

7.4.4 612900-Y VES-CL-250 Center Latch Elevator

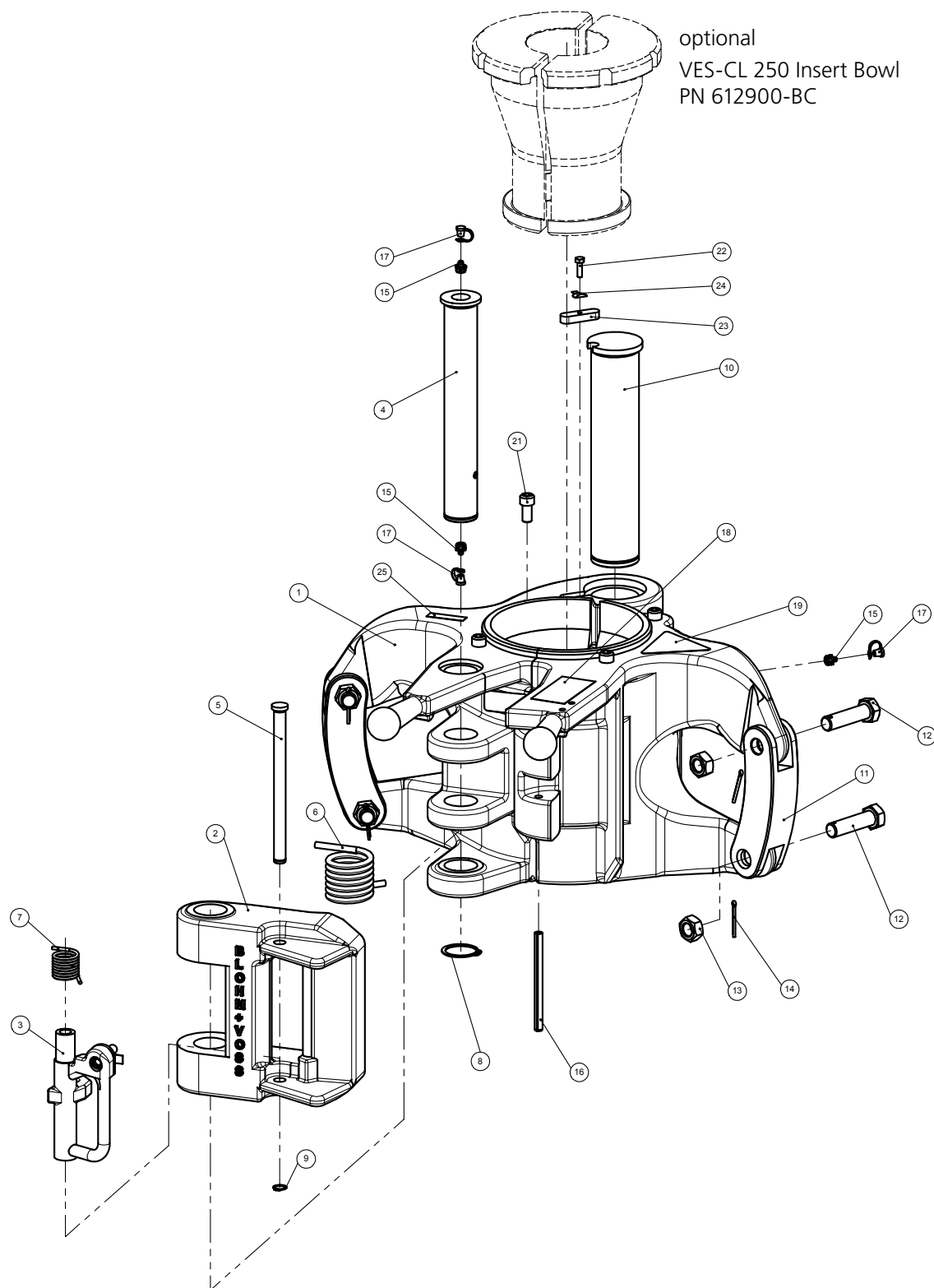


Fig. 61: 612900-Y VES-CL-250 Center Latch Elevator

612900-Y VES-CL-250 Center Latch Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	612900-BF	Body VES- CL-250
2	-	-	Latch
3	-	-	Latch Lock Assy.
4	1	612504	Latch Pin
5*	1	612505	Latch Lock Pin
6*	1	612506	Latch Spring
7*	1	612507	Latch Lock Spring
8*	1	612508	Retaining Ring
9*	1	612509	Retaining Ring
10	-	-	Hinge Pin
11	2	612512	Link Block
12	4	613623-1	Screw
13	4	613556-41	Nut
14*	4	752339	Cotter Pin
15*	3	612515	Grease Nipple
16	1	615021	Dowel Pin
17*	3	612518	Protection Cap
18*	1	671638	Warning sign Forum B + V Oil Tools
19*	1	671641	Warning sign "squeeze danger"
20*	2	671642	Warning sign "GREASE DAILY"
21*	4	612554	Screw
22*	1	612557	Screw
23*	1	612556	Fitting Key
24*	1	612558	Washer with TAP
25*	1	613921	Label: Patent Number
26*	2	613903	Bowl Fitting Handle
27*	1	755127	Safety Rope for Screws

Pos. 2,3+10 are not used in the VES ACL

Pos.26+27 are not shown

* Spare Parts

7.4.5 613860 Latch opening unit ACL / VES ACL

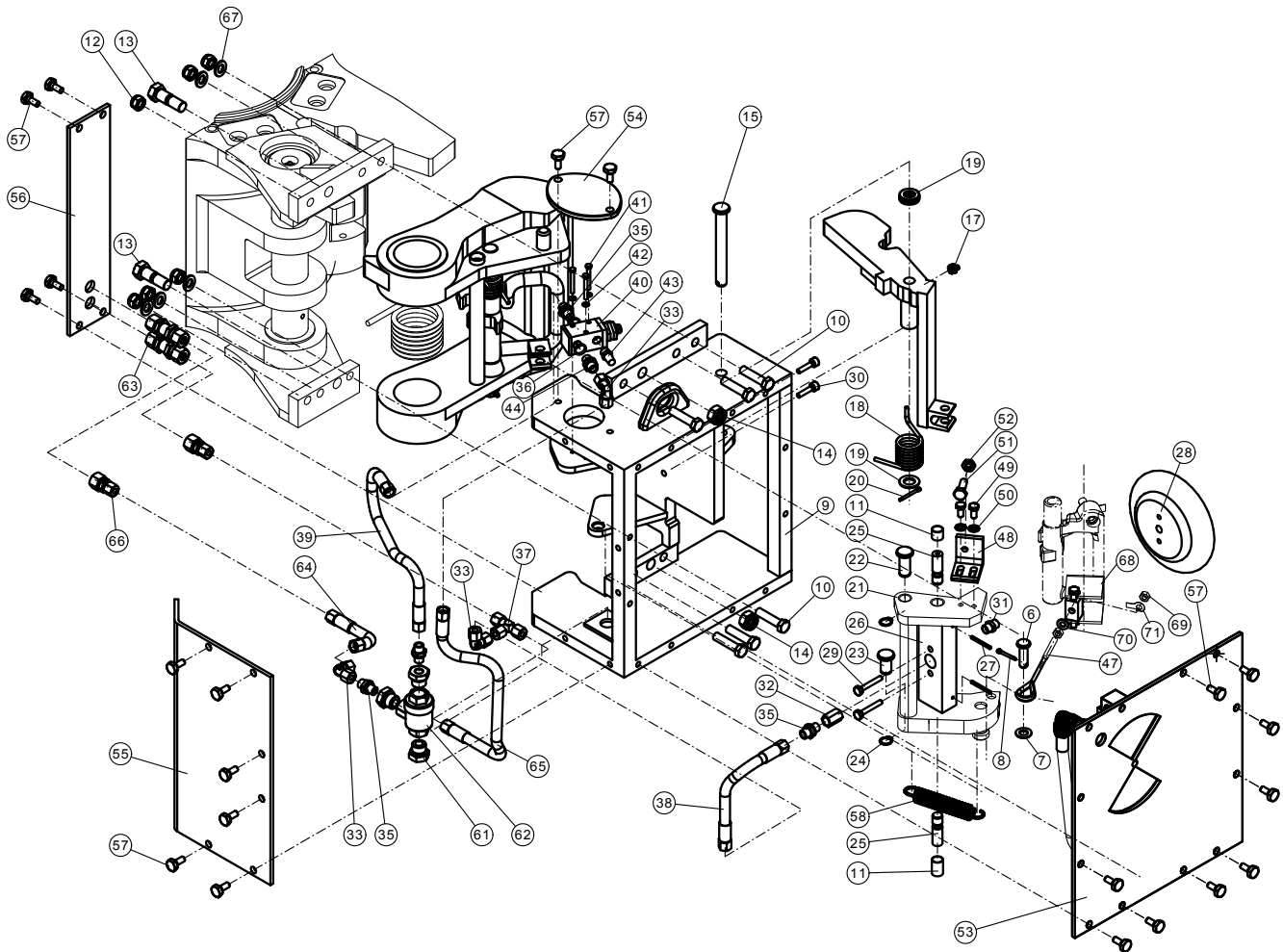


Fig. 62: 613860 Latch opening unit ACL / VES ACL

613860 Latch opening unit ACL / VES ACL Parts list

Pos.	Qty	Part no.	Description
6	1	613889	Clevis Pin with Head
7	1	621431	Washer
8	1	70814	Cotter Pin
9	1	613862	Casing Latch opening system
10	7	621412	Screw
11	2	612685	Permaglide Bush
12	7	752312	Lock Nut
13	1	621427	Screw
14	1	621430-1	Nut
15	1	613891	Clevis Pin with Head
17	1	612515	Grease Nipple
18	1	613880	Spring
19	4	615879	Washer
20	1	611009	Cotter Pin
21	1	613870-1	Lever
22	1	613881	Bolt
23	1	613882	Bolt
24	2	612509	Latch Pin Securing Ring
25	2	613879	Pin

Operating Instructions

Pos.	Qty	Part no.	Description
26	1	613871	Yoke
27	2	613885	Spiral Split Pin
28	1	612641	Latch Cylinder
29	2	643775-1	Screw
30	2	775089	Screw
31	1	612662-1	Double Socket
32	1	612663-1	Socket
33	3	645096	L-Adapter
35	5	612944	Straight Connection
36	2	613945-1	Seal Rings
37	1	755737	Equal Tee
38	1	613797	Pneumatic Hose Assembly, L=290mm
39	1	613793	Pneumatic Hose Assembly, L=360mm
40	1	613886	3/2-Way-Valve
41	3	613887	Screw
42	3	613883	Washer
43	1	612661	Absorber II
44	1	645111	Straight Connection
47	1	613816	Rope
48	1	613878	Angle position indicator switch
49	2	645028	Screw
50	2	645683	Washer
51	1	645195	Screw
52	2	645675	Nut
53	1	613861	Cover Assembly, Middle
54	1	752117	Abdeckblech
55	1	613868	Cover, Left
56	1	613869	Cover, Left Behind
57	24	613899	Screw
58	1	612688	Spring
60	0	615701-3	Pneumatik-Set III for Mechanical Operated
61	3	613944	Reducing Nipple
62	1	612642-1	Quick-Relief-Valve
63	2	755370	Straight Bulkhead Coupling
64	1	613798	Pneumatic Hose Assembly, L=590
65	1	613794	Pneumatic Hose Assembly, L=410mm
66	2	755372	Standpipe Reducer
67	6	621431	Washer
68	1	612543-5	Latch Lock Assembly 2
69	2	613633	Nut
70	1	645683	Washer
71	1	645059	Safety Sheet

* Spare Parts

7.5 DRAWINGS AND PART LISTS [VES] ACL 350 / [VES] ACL 500

7.5.1 613970-Y-BC ACL-350 / 615970-Y-BC ACL-500 Exploded view

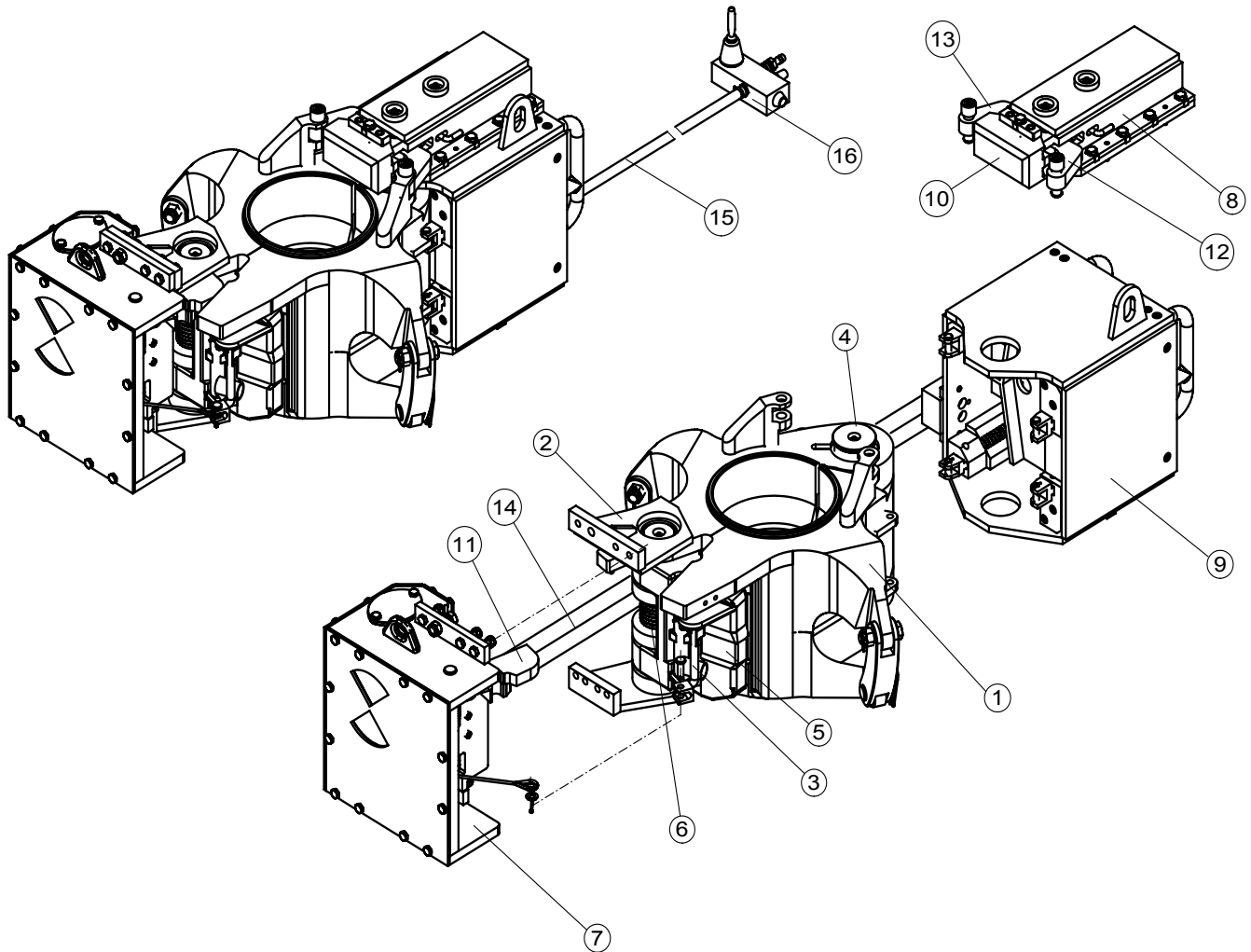


Fig. 63: 613970-Y-BC ACL-350 / 615970-Y-BC ACL-500 Exploded view

BC=Abbreviation for Bore Code (see Table page 13). For standard elevators, elevator bushings and Trigger Hammer (Pos. 10) the proper Bore Code must be named for purchasing or identification.

613970-Y-BC ACL-350 Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	613540-Y-BC	Forum B + V Oil Tools Type Center Latch Elevator
2	1	613702	Welding Attachment
3	1	613543-2	Latch Lock Ass For ACL / VES-ACL
4	1	613605-1	Hinge Pin for ACL
5	1	613542-1	Latch for ACL
6	1	613506-1	Latch Spring for ACL
7	1	613860	Latch Opening Unit
8	1	613844	Trigger Assembly
9	1	613610	Elevator Actuation Arrangement
10	1	613835-...*	Hammer for ACL
11	1	613877	Hook
12	1	613821	Lever
13	1	613838	Lever

Operating Instructions

Pos.	Qty	Part no.	Description
14	2	613791	Hose Assembly
15	1	613790	Hose Assembly
16	1	613733	Stop and Go Valve Assembly
17	1	671637	Warning sign "Spring"
18	1	671638	Warning sign "Forum B + V Oil Tools "
19	1	671639	Warning sign "Automatic"
20	1	671640	Warning sign "Hands"
21	1	671642	Warning sign "Grease Daily"

* Spare Parts

615970-Y-BC ACL-500 Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	615000-Y-BC	Forum B + V Oil Tools Type Center Latch Elevator
2	1	615710-1	Welding Attachment
3	1	615003-2	Latch Lock Ass For ACL / VES-ACL
4	1	615129	Hinge Pin for ACL
5	1	615744	Latch for ACL
6	1	615006	Latch Spring for ACL
7	1	613860	Latch Opening Unit
8	1	613844	Trigger Assembly
9	1	615130	Elevator Actuation Arrangement
10	1	615732-...**	Hammer for ACL
10	1	615960-...**	Hammer for VES-ACL
11	1	615745	Hook
12	2	615961	Lever for VES-ACL
12	2	615731	Lever for ACL
14	2	615709	Hose Assembly
15	1	613790	Hose Assembly
16	1	613733	Stop and Go Valve Assembly
17	1	671637	Warning sign "Spring"
18	1	671638	Warning sign "Forum B + V Oil Tools "
19	1	671639	Warning sign "Automatic"
20	1	671640	Warning sign "Hands"
21	1	671642	Warning sign "Grease Daily"

* Spare Parts

* . = Abbreviation for Bore Code. For standard elevators, the elevator bushings and trigger hammer the proper Bore Code must be named when ordering or identification.

** For identification and purchase, choose the correct hammer size.

7.5.2 613970-Y VES ACL-350 / 615970-Y VES ACL-500 Exploded view

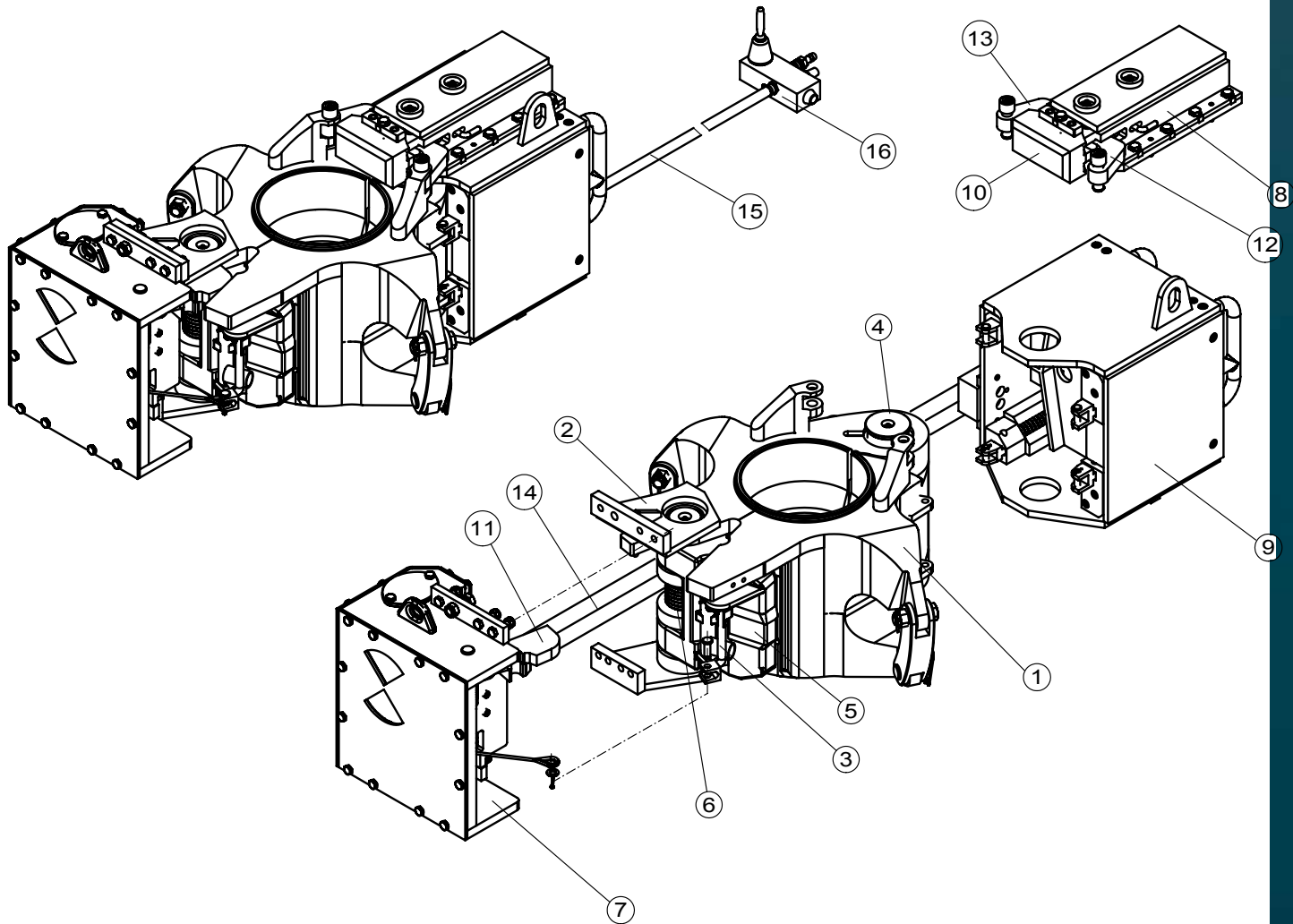


Fig. 64: 613970-Y VES ACL-350 / 615970-Y VES ACL-500 Exploded view

613970-Y VES ACL-350 Exploded view Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	613900-Y	Forum B + V Oil Tools Type Center Latch Elevator
2	1	613702	Welding Attachment
3	1	613543-2	Latch Lock Ass For ACL / VES-ACL
4	1	613605-1	Hinge Pin for ACL
5	1	613542-1	Latch for ACL
6	1	613506-1	Latch Spring for ACL
7	1	613860	Latch Opening Unit
8	1	613844	Trigger Assembly
9	1	613610	Elevator Actuation Arrangement
10	1	613951-BC	Hammer for ACL
11	1	613877	Hook
12	1	613821	Lever
13	1	613838	Lever
14	2	613791	Hose Assembly
15	-	613902-BC	Insert Bushing (to be ordered separately)
16	1	613790	Hose assembly
17	1	613733	Stop and Go Valve Assembly
18	1	671637	Warning sign "Spring"

Pos.	Qty	Part no.	Description
19	1	671638	Warning sign "Forum B + V Oil Tools "
20	1	671639	Warning sign "Automatic"
21	1	671640	Warning sign "Hands"

* Spare Parts

613970-Y VES ACL-350 / 615970-Y VES ACL-500 Exploded view Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	615900-Y	Forum B + V Oil Tools Type Center Latch Elevator
2	1	615710-1	Welding Attachment
3	1	615003-2	Latch Lock Ass For ACL / VES-ACL
4	1	615129	Hinge Pin for ACL
5	1	615744	Latch for ACL
6	1	615006	Latch Spring for ACL
7	1	613860	Latch Opening Unit
8	1	613844	Trigger Assembly
9	1	615130	Elevator Actuation Arrangement
10	1	615960-BC	Hammer for ACL
11	1	615745	Hook
12	2	615961	Lever
13	-	-	-
14	2	615709	Hose Assembly
15	-	613902-BC	Insert Bushing (to be ordered separately)
16	1	613790	Hose assembly
17	1	613733	Stop and Go Valve Assembly
18	1	671637	Warning sign "Spring"
19	1	671638	Warning sign "Forum B + V Oil Tools "
20	1	671639	Warning sign "Automatic"
21	1	671640	Warning sign "Hands"

* Spare Parts

7.5.3 Modified Center Latch Elevator modified for [VES] ACL 350 / [VES] ACL 500

7.5.3.1 613540-Y-BC CL-350 / 615000-Y-BC CL-500 modified

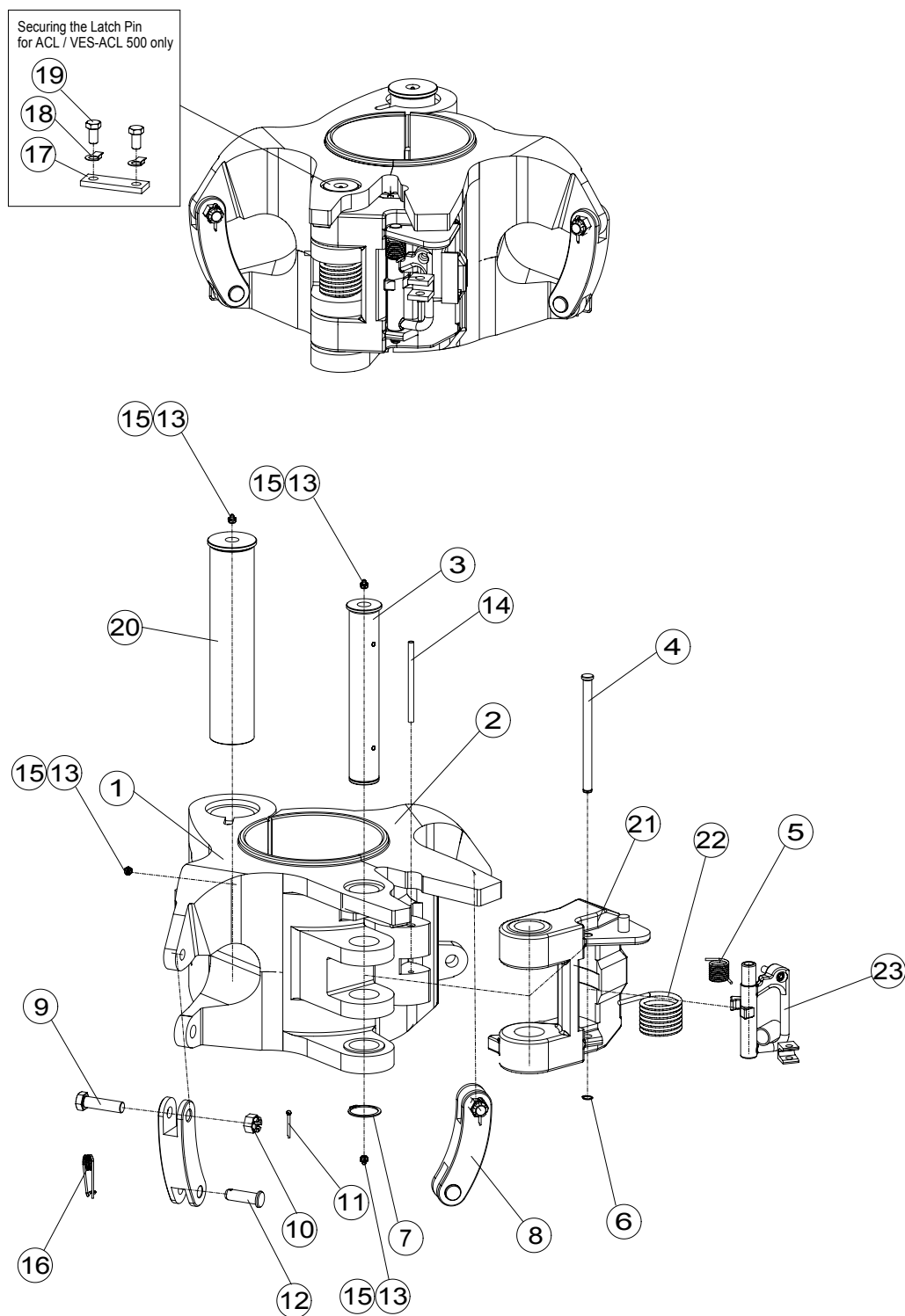


Fig. 65: 613540-Y-BC CL-350 / 615000-Y-BC CL-500 modified
Pos. 20-23 modified

613540-Y-BC CL-350 modified Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	613541-1	Elevator Frame 1
2	1	613541-2	Elevator Frame 2
3	1	613504	Latch Pin
4	1	612505	Latch Lock Pin
5	1	612507	Latch Lock Spring
6	1	612509	Latch Pin Securing Ring
7	1	613508	Securing Ring
8	2	612512	Link Block
9	2	613623-1	Hexagon Head Screw with Shaft
10	2	752338	Castle Nut
11	2	752339	Cotter Pin
12	2	622514	Clevis Pin with Head
13	4	612515	Grease Nipple
14	1	613545	Rivet Pin
15	4	612518	Protection Cap
16	2	622515	Safety Spring
17	1	-	Securing Plate for Latch Pin
18	2	-	Washer
19	2	-	Hexagon Head Screw
20	1	613605-1	Hinge Pin for ACL
21	1	613542-1	Latch for ACL
22	1	613506-1	Latch Spring for ACL
23	1	612543-2	Latch Lock Assembly
24	2m	671052	Safety Wire

* Spare Parts

615000-Y-BC CL-500 modified Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	615001-1	Elevator Frame 1
2	1	615001-2	Elevator Frame 2
3	1	615004	Latch Pin
4	1	615005	Latch Lock Pin
5	1	615007	Latch Lock Spring
6	1	612509	Latch Pin Securing Ring
7	-	-	-
8	2	615012	Link Block
9	2	613623-11	Hexagon Head Screw with Shaft
10	2	752338	Castle Nut
11	2	752339	Cotter Pin
12	2	615014	Clevis Pin with Head
13	4	612515	Grease Nipple
14	1	615016	Rivet Pin
15	4	612518	Protection Cap
16	2	622515	Safety Spring
17	1	615009	Securing Plate for Latch Pin
18	2	775068	Safety Sheet
19	2	710541	Hexagon Head Screw
20	1	615129	Hinge Pin for ACL
21	1	615744	Latch for ACL
22	1	615006	Latch Spring for ACL
23	1	615003-2	Latch Lock Assembly
24	2m	671052	Safety Wire

* Spare Parts

7.5.3.2 613540-Y CL-350 / 615000-Y CL-500 modified

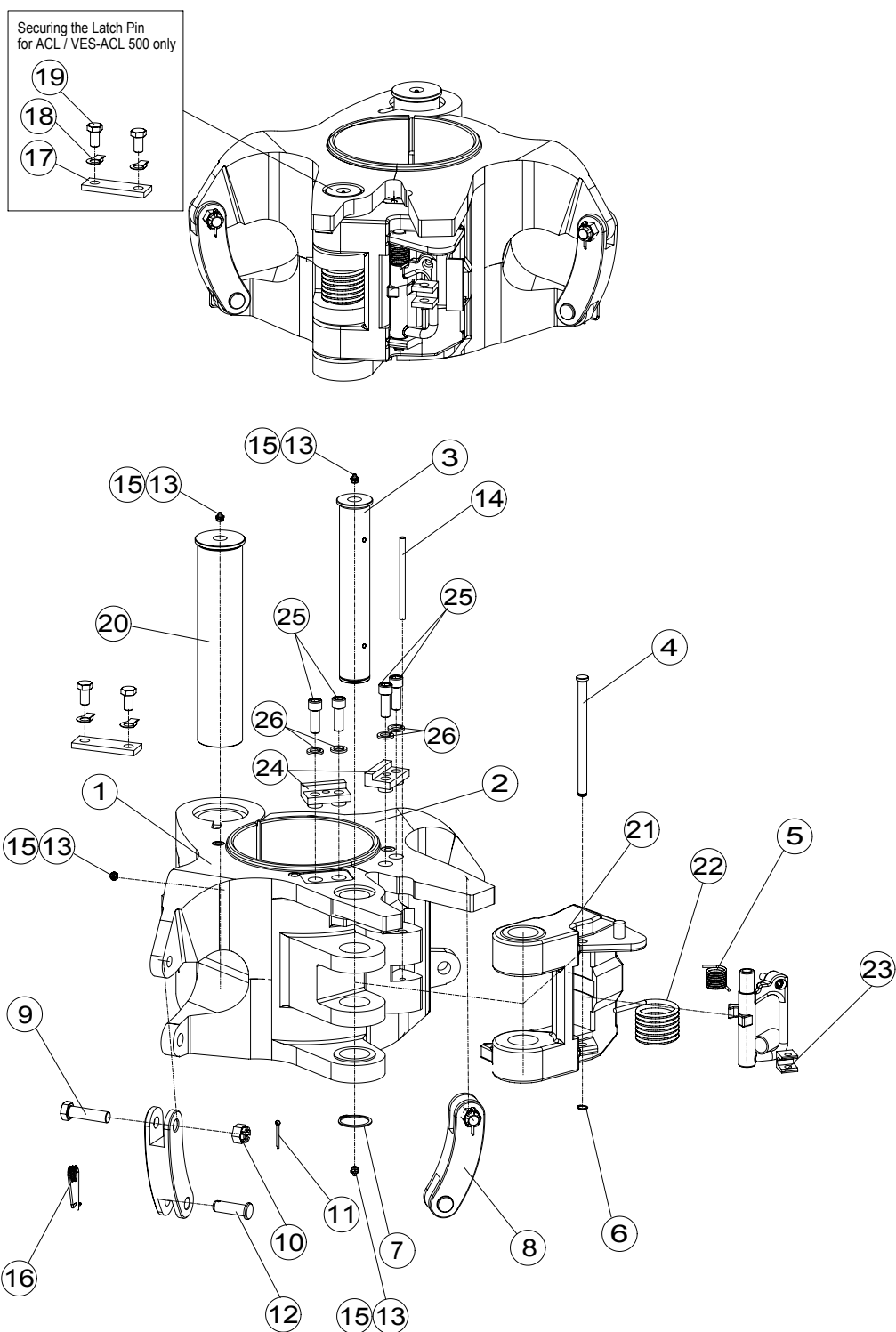


Fig. 66: 613540-Y CL-350 / 615000-Y CL-500 modified
Pos. 20-23 modified

613540-Y CL-350 modified Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	613901-1	Elevator Frame 1
2	1	613901-2	Elevator Frame 2
3	1	613504	Latch Pin
4	1	612505	Latch Lock Pin
5	1	612507	Latch Lock Spring
6	1	612509	Latch Pin Securing Ring
7	1	613508	Securing Ring
8	2	612512	Link Block
9	2	613623-1	Hexagon Head Screw with Shaft
10	2	752338	Castle Nut
11	2	752339	Cotter Pin
12	2	622514	Clevis Pin with Head
13	4	612515	Grease Nipple
14	1	613545	Rivet Pin
15	4	612518	Protection Cap
16	2	622515	Safety Spring
17	-	-	-
18	-	-	-
19	-	-	-
20	1	613605-1	Hinge Pin for ACL
21	1	613542-1	Latch for ACL
22	1	613506-1	Latch Spring for ACL
23	1	612543-2	Latch Lock Assembly
24	2	613902-1	Holding Plate
25	4	613902-2	Cylinder Head Screw
26	4	70114	Washer
27	2m	671052	Safety Wire
28	1	612556	Parallel Key
29	1	612557	Screw
30	1	671638	Label "Warning"
31	1	613921	Label "Patent Number"
32	1	671642	Label "Grease Daily"
33	2	613903	Bowl Fitting Handle
34	1	-	Insert Bushing

* Spare Parts

615000-Y CL-500 modified Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	615901-1	Elevator Frame 1
2	1	615901-2	Elevator Frame 2
3	1	615004	Latch Pin
4	1	641030	Latch Lock Pin
5	1	615007	Latch Lock Spring
6	1	612509	Latch Pin Securing Ring
7	-	-	-
8	2	615012	Link Block
9	2	613623-11	Hexagon Head Screw with Shaft
10	2	752338	Castle Nut
11	2	752339	Cotter Pin
12	2	615014	Clevis Pin with Head
13	4	612515	Grease Nipple
14	1	615016	Rivet Pin
15	4	612518	Protection Cap
16	2	622515	Safety Spring
17	1	615009	Securing Plate for Latch Pin
18	2	617520	Safety Sheet
19	2	617519	Hexagon Head Screw
20	1	615129	Hinge Pin for ACL
21	1	615744	Latch for ACL
22	1	615006	Latch Spring for ACL
23	1	615003-2	Latch Lock Assembly
24	2	613902-1	Holding Plate
25	4	613902-2	Cylinder Head Screw
26	4	70114	Washer
27	2m	671052	Safety Wire
28	-	-	-
29	-	-	-
30	1	671638	Label "Warning"
31	1	613921	Label "Patent Number"
32	1	671642	Label "Grease Daily"
33	2	613903	Bowl Fitting handle
34	1	-	Insert Bushing

* Spare Parts

7.5.4 Elevator Actuation Arrangement

7.5.4.1 613610 ACL 350 / VES-ACL 350

7.5.4.2 615130 ACL 500 / VES-ACL 500

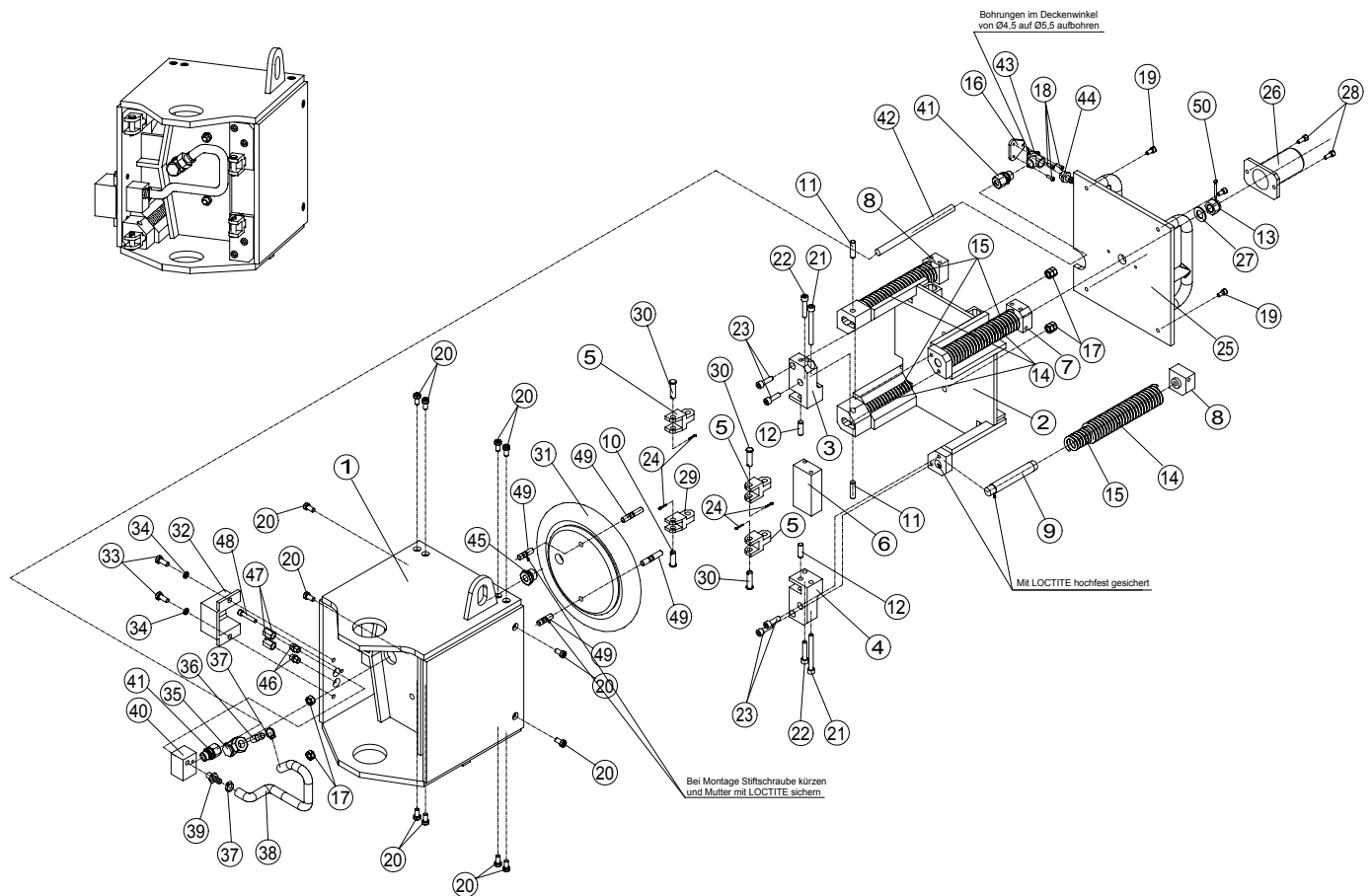


Fig. 67: Elevator Actuation Arrangement

613610 ACL 350 / VES-ACL 350 Elevator Actuation Arrangement Parts list

Pos.	Qty	Part no.	Description
1	1	613611	Casing
2	1	613612	Actuator
3	1	613613	Connector 1
4	1	613614	Connector 2
5	3	613615-1	Connection Bar
6	1	613616	Connection Bar
7	2	613617	Spring Support 1
8	2	613618	Spring Support 2
9	4	613619	Bush
10	1	613620	Bolt
11	2	613621	Actuating Pin I
12	2	613622	Actuating Pin II
13	1	613623	Nut
14	4	613641	Spring
15	4	613626-1	Spring
16	1	613690	Doubling Plate
17	6	612690	Nut
18	3	612692	Screw
19	4	612673	Screw
20	12	612694	Screw
21	2	612695	Screw
22	2	612696	Screw
23	4	612697	Screw
24	4	612698	Split Pin
25	1	613625	Cover
26	1	613624	Cap
27	1	612679	Washer
28	2	613640	Screw
29	1	613615	Connection Bar
30	3	613620-1	Bolt
31	1	612640	Elevator Cylinder
32	1	613831	Pneumatic-Cap
33	2	725461	Screw
34	2	752396	Lock Washer
35	1	612647-1	Swivel Connection
36	1	612648	Compression Fitting
37	1	613945	Swivelling Screw Fitting
38	0,45m	612668	Air-Hose II
39	1	612658	Pipe-Socket
40	1	613830	Distribution Block
41	3	612654	Straight-Socket
42	1	612653	EO-Pipe
43	1	612655	Cover-Piece
44	1	613812	Clutch Hose Coupling
45	1	615128	Reducing Fitting
46	2	612662-1	Double Socket
47	2	612663-1	Socket
48	1	613785	Screw
49	4	612650	Screw
50	1	752322	Cotter pin

615130 ACL 500 / VES-ACL 500 Elevator Actuation Arrangement Parts list

Pos.	Qty	Part no.	Description
1	1	615131	Casing
2	1	615132	Actuator
5	3	615134	Connection Bar
7	2	615137	Spring Support I
8	2	615138	Spring Support II
9	4	615133	Rod
10	1	615136	Bolt
11	2	615135	Actuating Pin I
12	2	615135	Actuating Pin II
13	1	613623	Castle Nut
14	4	615141	Pressure Spring
15	4	615143	Pressure Spring
16	1	613690	Doubling Plate
17	6	612690	Hexagon Nut
18	3	612692	Cylinder Head Screw
19	4	615145	Cylinder Head Screw
20	12	615146	Cylinder Head Screw
24	4	615147	Split Pin
25	1	615140	Cover
26	1	615139	Cap
27	1	612679	Washer
28	2	613640	Cylinder Head Screw
29	1	615134	Connection Bar
30	3	615136	Bolt
31	1	615160	Elevator Cylinder
32	1	615831	Pneumatic Cap
33	2	613782	Hexagon Head Screw
34	2	752124	Lock Washer
35	1	612647-1	Swivel Connection
36	1	612648	EO-Pipe-Bend
37	2	613945	Swivelling Screw Fitting
38	0,45m	612668	Air Hose II
39	1	612658	Pipe Socket
40	1	615704	Distribution Block
41	2	612654	Straight Socket
42	1	612653	EO-Pipe
43	1	612655	Cover Piece
44	1	613812	Clutch Hose Coupling
45	1	615128	Reducing Fitting
46	2	615702	Double Socket
47	2	615703	Socket
48	1	613785	Cylinder Head Screw
49	4	612650	Threaded Bolt
50	1	752322	Cotter pin

* Spare Parts

7.5.5 613860 Latch opening unit [VES] ACL 350 / [VES] ACL 500

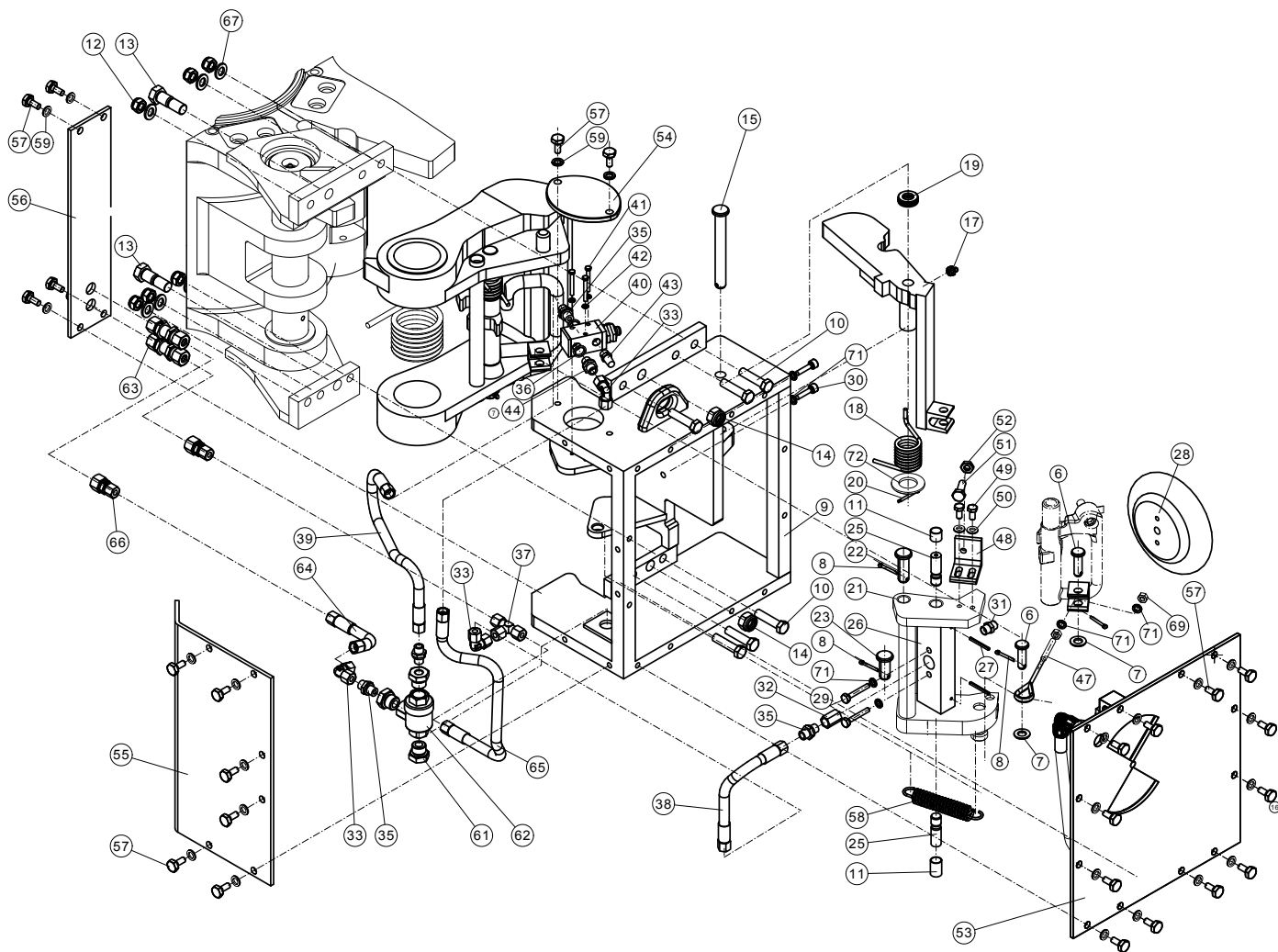


Fig. 68: 613860 Latch opening unit [VES] ACL 350 / [VES] ACL 500

613860 Latch opening unit [VES] ACL 350 / [VES] ACL 500 Parts list

Pos.	Qty	Part no.	Description
6	2	613889	Clevis Pin with Head
7	2	621431	Washer
8	4	70814	Cotter Pin
9	1	613862	Housing Latch Opening System
10	6	621412	Screw
11	2	612685	Permaglide Bush
12	6	752312	Nut
13	2	621427	Fitting Screw
14	2	621430-1	Nut
15	1	613891	Clevis Pin with Head
17	1	612515	Grease Nipple
18	1	613880	Spring
19	3	615879	Washer
20	1	611009	Cotter Pin
21	1	613870-1	Lever
22	1	613881	Clevis pins
23	1	613882	Clevis pins
25	2	613879	Pin
26	1	613871	Yoke
27	2	613885	Spiral Split Pin
28	1	612641	Latch Cylinder
29	2	643775-1	Screw
30	2	775089	Screw
31	1	612662-1	Double Socket
32	1	612663-1	Socket
33	3	645096	L-Adapter
35	3	612944	Straight Connection
36	2	613945-1	Seal Rings
37	1	755737	Equal Tee
38	1	613797	Pneumatic Hose Assembly, L=170mm
39	1	613793	Pneumatic Hose Assembly, L=330mm
40	1	613886	3/2-Way-Valve
41	3	613887	Screw
42	3	792114	Washer
43	1	612877	Flat Muffler
44	1	613946	Straight connection
47	1	613816	Rope
48	1	613878	Angle position indicator switch
49	2	645028	Screw
50	2	792112-1	Washer
51	1	645195	Screw
52	1	645675	Nut
53	1	613861	Cover Assembly, Middle
54	1	752117	Cover plate
55	1	613868	Cover, Left
56	1	613869	Cover, Left Behind
57	24	613899	Screw
58	1	612688	Spring

Pos.	Qty	Part no.	Description
59	26	792103	Washer
60	0	615701-3	Pneumatic-Set III for Mechanical Operated
61	3	613944	Reducing Nipple
62	1	612642-1	Quick-Relief-Valve
63	2	755370	Straight Bulkhead Coupling
64	1	613798	Pneumatic Hose Assembly, L=440mm
65	1	613794	Pneumatic Hose Assembly, L=320mm
66	2	755372	Standpipe Reducer
67	6	621431	Washer
69	2	675057	Nut
71	6	792112	Washer
72	1	775018	Washer

* Spare Parts

7.6 Pneumatic Assembly with FEEDBACK

7.6.1 612737 Pneumatic Assembly with Feedback ACL 250 / VES-ACL250

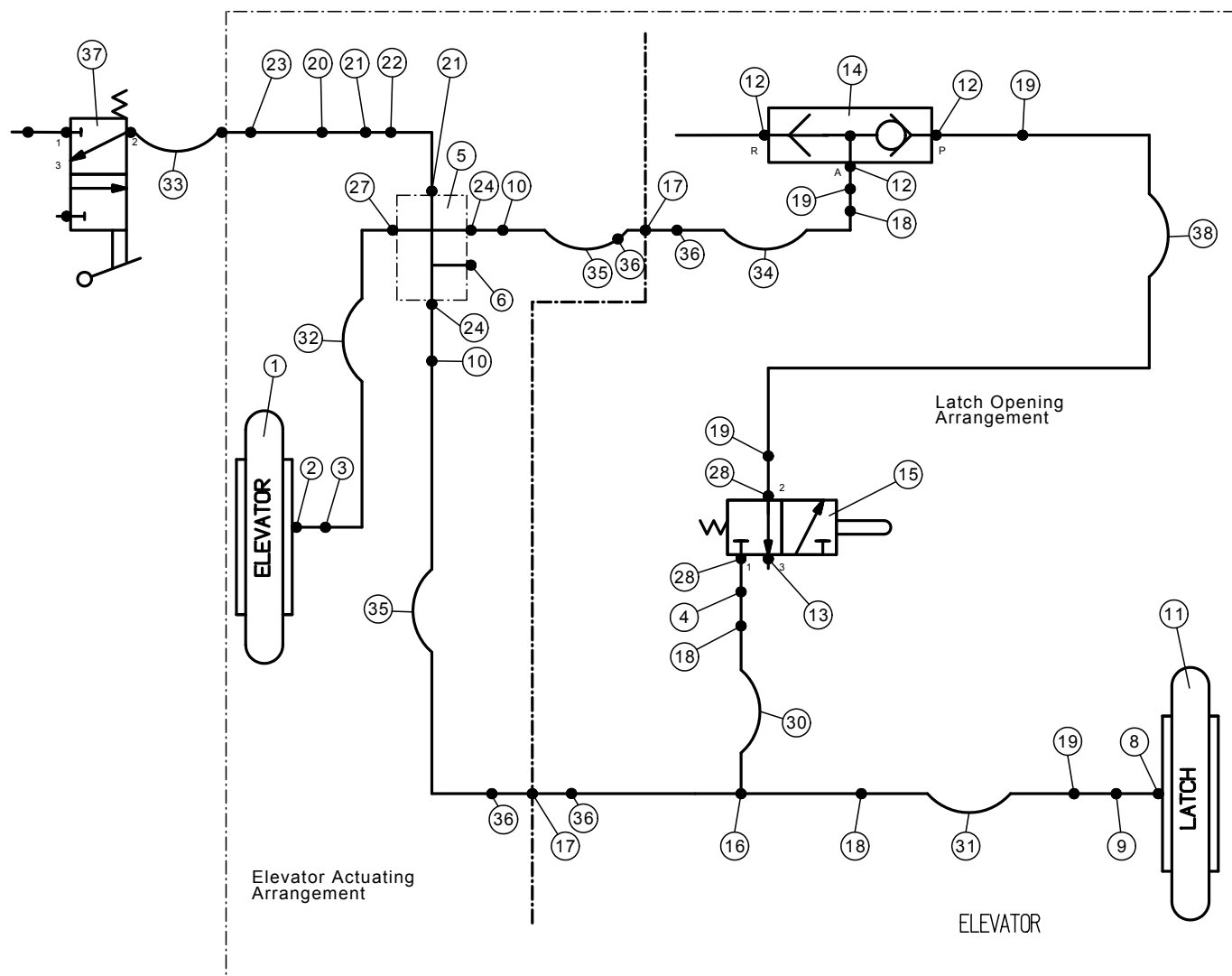


Fig. 69: 612737 Pneumatic Assembly with Feedback

612737 Pneumatic Assembly with Feedback Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	612640	Elevator Cylinder
2	1	615128	Reducing Fitting
3	1	615161	Banjo Coupling
4	1	645111	Straight Connection
5	1	613830	Distribution Block
6	1	645094	Blind Screw
7	2	613946	straight connection
8	1	612662-1	Double Socket
9	1	612663-1	Socket
10	2	755738	90 degree Fitting
11	1	612641	Latch Cylinder
12	3	613944	Reducing Nipple
13	1	612661	Absorber II
14	1	612642-1	Quick-Relief-Valve G ½"
15	1	613886	3/2-Way-Valve
16	1	755737	Equal Tee
17	2	755370	Straight Bulkhead Coupling
18	3	645096	L-Adapter
19	4	612944	Straight Connection
20	1	612655	Cover-Piece
21	2	612654	Straight-Socket
22	1	612653	EO-Pipe
23	1	613812	Clutch Hose Coupling
24	2	613946	straight connection
24	0	613811	Clutch Hose Coupling
25	0	613731	3/2 Pneumatic Valve R ½"
26	0	612643	Absorber I
27	1	755374	Straight Male Stud Coupling
28	2	613945-1	Seal Rings
30	1	613794	Pneumatic Hose Assembly 460 mm;
31	1	613797	Pneumatic Hose Assembly 290 mm
32	1	613789	Pneumatic Hose 420 mm
33	1	613790	Pneumatic Hose 5000 mm
34	1	613798	Pneumatic Hose Assembly 590 mm
35	2	612726	Pneumatic Hose 710 mm
36	4	755372	Standpipe Reducer
37	1	613733	Stop and Go Valve Assembly
38	1	613793	Pneumatic Hose Assembly 360 mm

* Spare Parts

7.6.2 613701-3 Pneumatic Assembly with Feedback ACL 350 / VES-ACL350

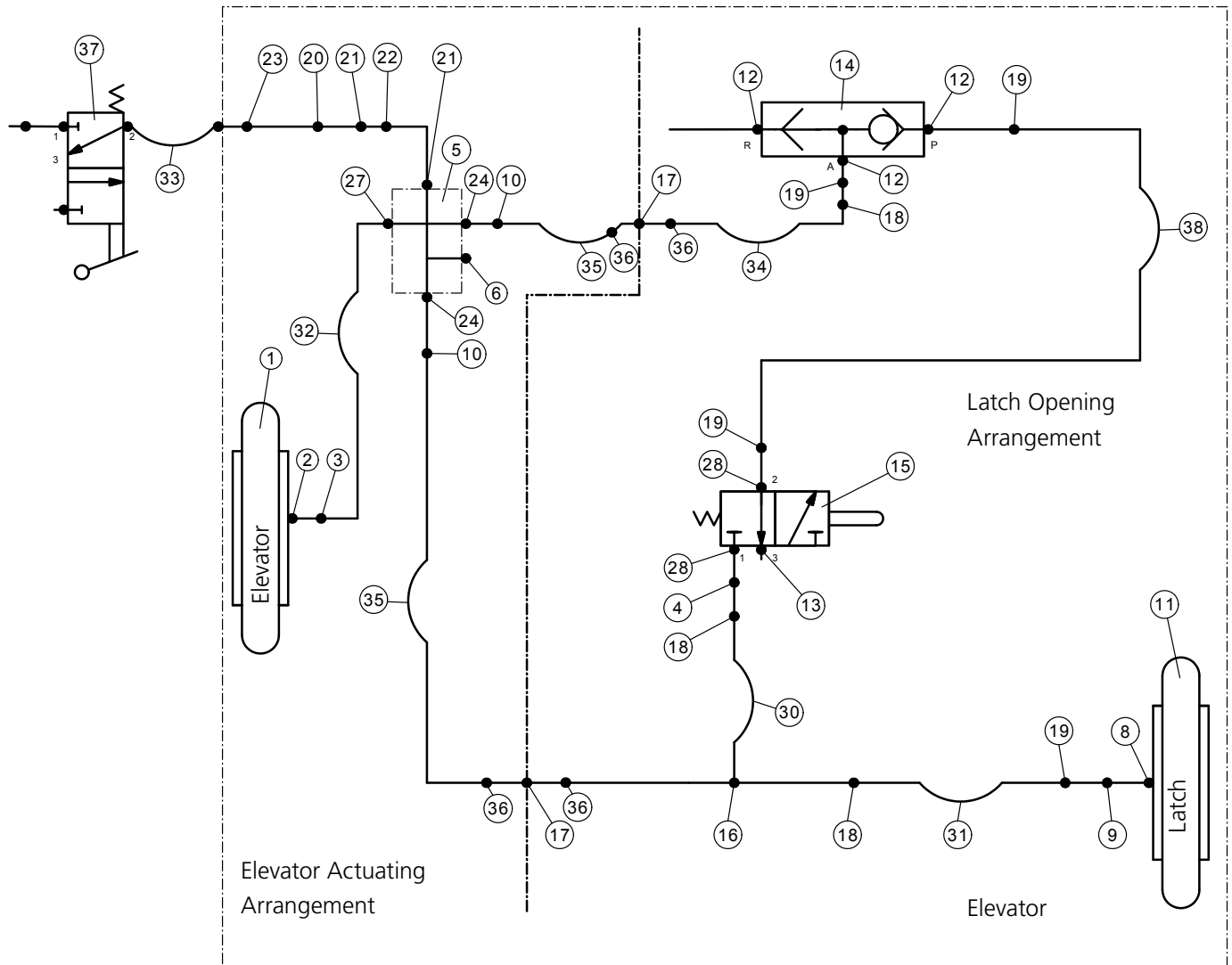


Fig. 70: 613701-3 Pneumatic Assembly with Feedback

613701-3 Pneumatic Assembly with Feedback Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	612640	Elevator Cylinder
2	1	615128	Reducing Fitting
3	1	615161	Banjo Coupling
4	1	613946	straight connection
5	1	613830	Distribution Block
6	1	645094	Blind Screw
7	2	613946	straight connection
8	1	612662-1	Double Socket
9	1	612663-1	Socket
10	2	755738	90 degree Fitting
11	1	612641	Latch Cylinder
12	3	613944	Reducing Nipple
13	1	612877	Flat Muffler
14	1	612642-1	Quick-Relief-Valve
15	1	613886	3/2-Way-Valve
16	1	755737	Equal Tee
17	2	755370	Straight Bulkhead Coupling
18	3	645096	L-Adapter
19	4	612944	Straight Connection
20	1	612655	Cover-Piece
21	2	612654	Straight-Socket
22	0,01	612653	EO-Pipe
23	1	613812	Clutch Hose Coupling
24	2	613946	straight connection
24	0	613811	Clutch Hose Coupling
25	0	613731	3/2 Pneumatic-Valve
26	0	612879	Flat Muffler
27	1	755374	Straight Male Stud Coupling
28	2	613945-1	Seal Rings
30	1	613794	Pneumatic Hose Assembly, L=320mm
31	1	613797	Pneumatic Hose Assembly, L=170mm
32	1	613789	Pneumatic Hose Assembly, L=510mm
33	1	613790	Pneumatic Hose Assembly, L=5000mm
34	1	613798	Pneumatic Hose Assembly, L=440mm
35	2	613791	Pneumatic Hose Assembly, L=750mm
36	4	755372	Standpipe Reducer
37	1	613733	Stop and Go Valve Assembly
38	1	613793	Pneumatic Hose Assembly, L=330mm

* Spare Parts

7.6.3 615701-3 Pneumatic Assembly with Feedback ACL 500 / VES-AC500

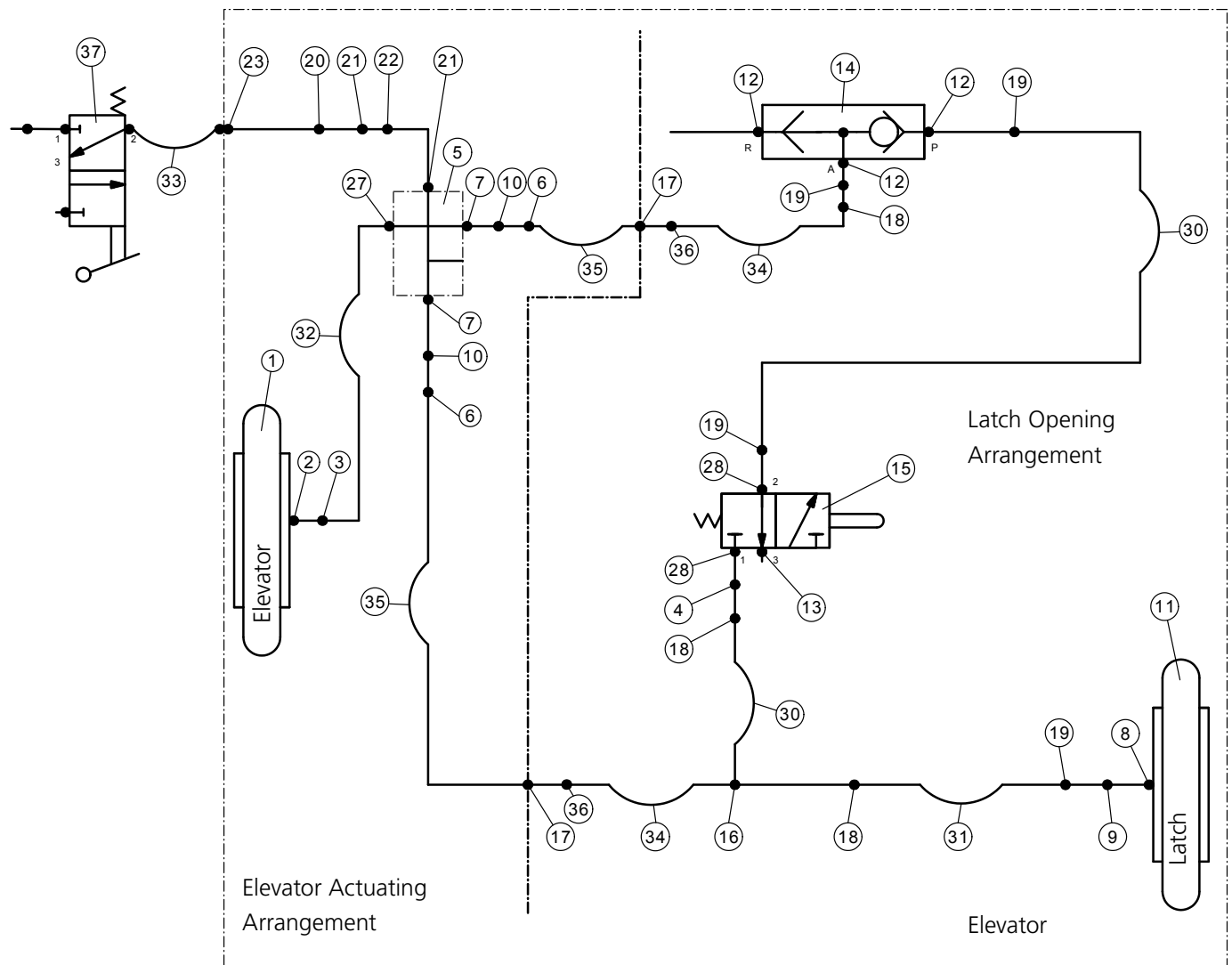


Fig. 71: 615701-3 Pneumatic Assembly with Feedback

615701-3 Pneumatic Assembly with Feedback Elevator Parts list

Pos.	Qty	Part no.	Description
1	1	615160	Elevator Cylinder
2	1	615128	Reducing Fitting
3	1	612647-1	Swivel Connection
4	1	613946	straight connection
5	1	615704	Distribution Block
6	2	755367	Adjustable Stud Elbow
7	2	88274	Straight Bulkhead Coupling
8	1	612662-1	Double Socket
9	1	612663-1	Socket
10	2	612059	Female Stud Coupling
11	1	612641	Latch Cylinder
12	3	613944	Reducing Nipple
13	1	612877	Flat Muffler
14	1	612642-1	Quick-Relief-Valve
15	1	613886	3/2-Way-Valve
16	1	755737	Equal Tee
17	2	755370	Straight Bulkhead Coupling
18	3	645096	L-Adapter
19	4	612944	Straight Connection
20	1	612655	Cover-Piece
21	2	612654	Straight-Socket
22	0,01	612653	EO-Pipe
23	1	613812	Clutch Hose Coupling
27	1	612658	Pipe-Socket
28	2	613945-1	Seal Rings
30	2	613787	Pneumatic Hose Assembly, L=400mm
31	1	613788	Pneumatic Hose Assembly, L=250mm
32	1	613789	Pneumatic Hose Assembly, L=510mm
33	1	613790	Pneumatic Hose Assembly, L=5000mm
34	2	613792	Pneumatic Hose Assembly, L=150mm
35	2	615709	Pneumatic Hose Assembly, L=1025 mm
36	2	755372	Standpipe Reducer
37	1	613733	Stop and Go Valve Assembly

* Spare Parts

7.7 Type Series Assemblies

7.7.1 613861 Cover Assembly, Middle ACL / VES ACL

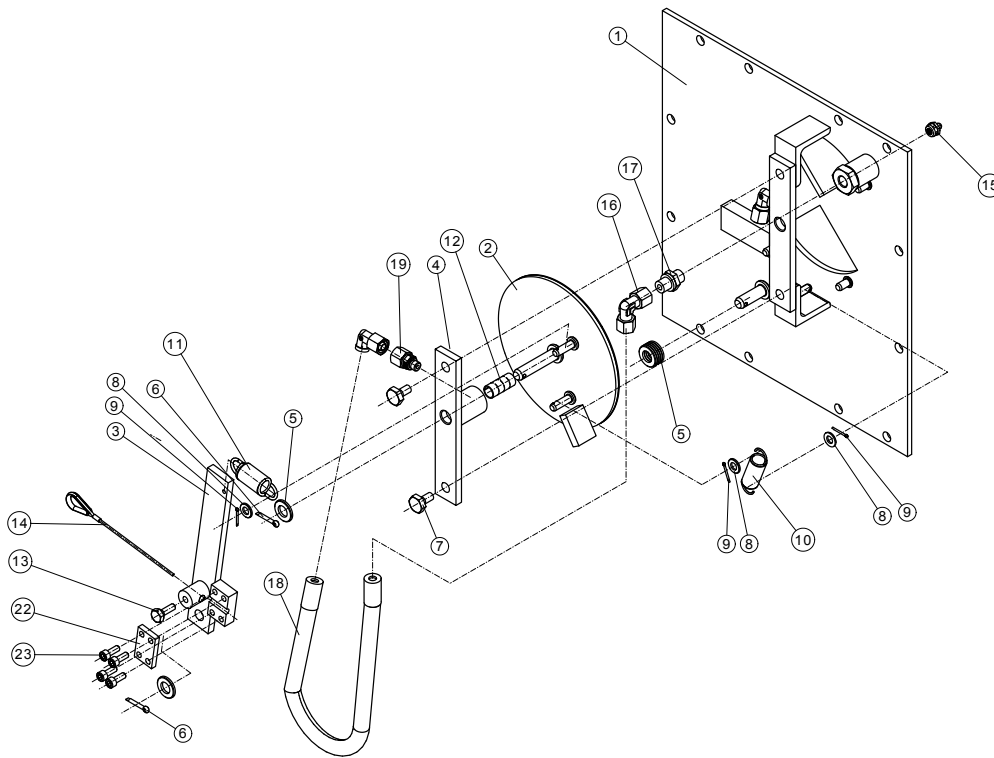


Fig. 72: 613861 Cover Assembly, MiddleACL / VES ACL

613861 Cover Assembly, Middle ACL / VES ACL Parts list

Pos.	Qty	Part no.	Description
1	1	613863	Cover, Middle
2	1	613864	Indicator Disk
3	1	613865	Lever
4	1	613866	Holder for Indicator Disk
5	7	753047	Washer
6	2	613893	Cotter Pin
7	2	613894	Hexagon Head Screw
8	2	645683	Washer
9	2	613895	Cotter Pin
10	1	613896	Tension Spring 1
11	1	613897	Tension Spring 2
12	4	612609	Bushing
13	1	643779-1	Screw
14	1	613898	Rope for Latch Opening Unit VES ACL
15	1	612515	Grease Nipple
16	2	645096	L-Adapter
17	1	612944	Straight Connection
18	1	613788	Pneumatic Hose 250mm
19	1	710653	straight Connection
20	1	613859	Holder plate
21	4	613884	Screw

* Spare Parts

7.7.2 613844 Trigger Assembly ACL / VES ACL

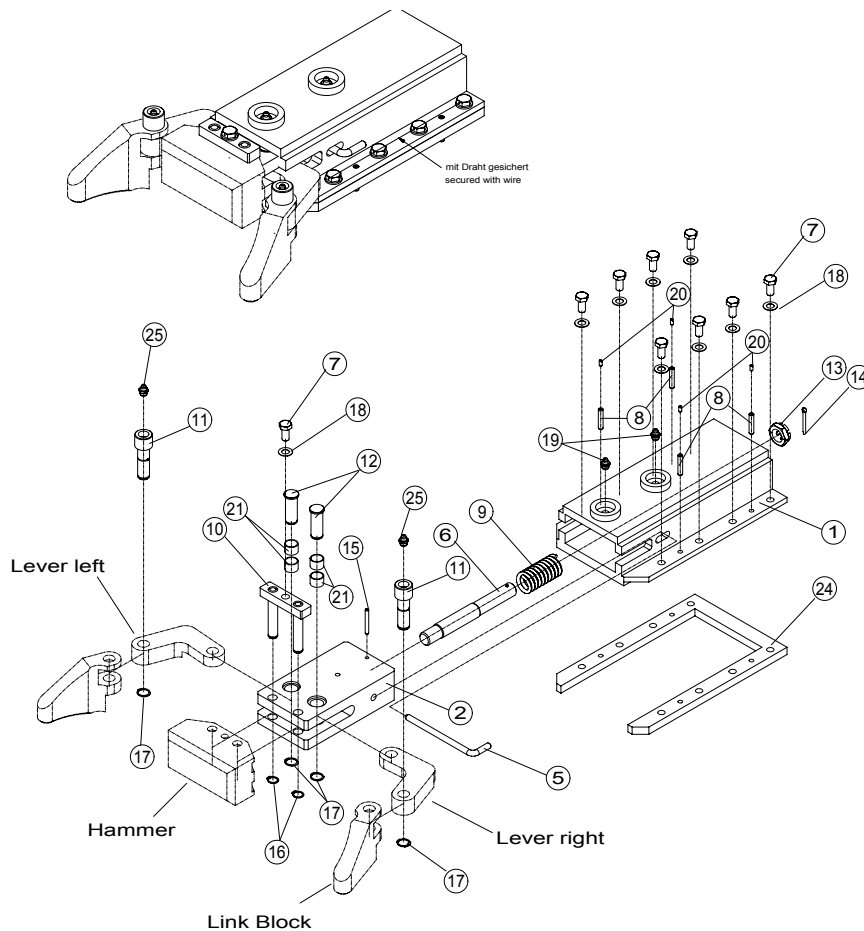


Fig. 73: 613844 Trigger Assembly ACL / VES ACL

613844 Trigger Assembly ACL / VES ACL Parts list

Pos.	Qty	Part no.	Description
1	1	613839	Trigger casing Ass.
2	1	613836	Slide
3	--	--	--
4	--	--	--
5	1	613842	Safety Pin
6	1	613834	Spindle
7	9	613823	Screw
8	4	613824	Taper pin
9	1	613626	Pressure spring
10	1	613841-1	Bolt Assembly for Hammer
11	2	613840	Bolt
12	2	613837	Bolt
13	1	613848	Nut
14	1	753600-12	Split Pin
15	1	620411	Spring-type straight pin
16	2	612509	Retaining ring
17	4	613720	Retaining ring
18	1	613825	Washer
19	4	612515	Grease nipple
20	4	613826	Hexagon socket set screw
21	4	612594	Sliding Bushing
22	8	792104	Washer
23	--	--	--
24	1	613847	Mounting Frame
25	2	70064	Grease Nipple

7.7.3 613700 Trigger Closing Tool ACL / VES ACL

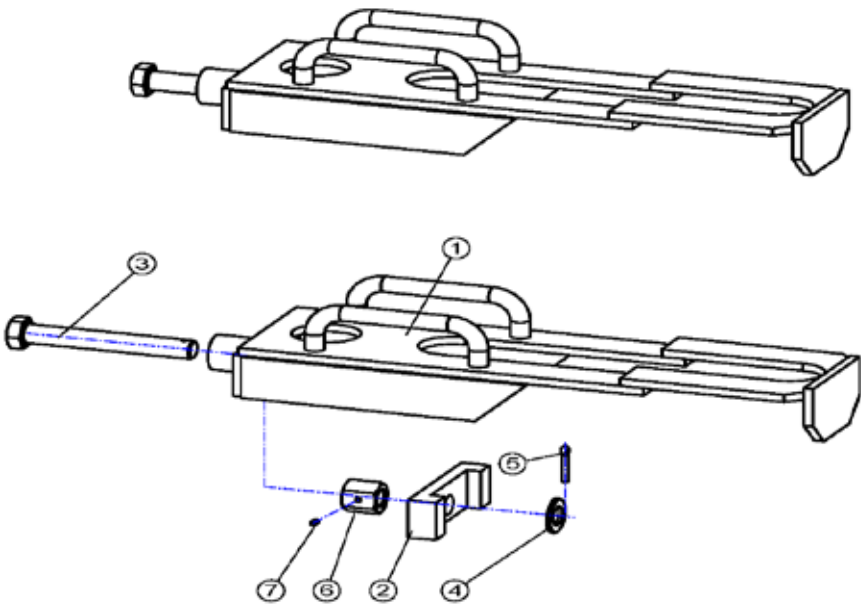


Fig. 74: 613700 Trigger Closing Tool ACL / VES ACL

613700 Trigger Closing Tool ACL / VES ACL Parts list

Pos.	Qty	Part no.	Description
1	1	613735	Body
2	1	613735-1	Center Support
3	1	613735-2	Hexagon head screw
4	1	621435	Washer
5	1	752837	Cotter Pin
6	1	613735-3	Hexagonal Nut
7	1	775015-2	Threaded Pin
1	1	613735	Body
2	1	613735-1	Center Support
3	1	613735-2	Hexagon head screw
4	1	621435	Washer
5	1	752837	Cotter Pin
6	1	613735-3	Hexagonal Nut
7	1	775015-2	Threaded Pin
	1	613888	Steel bar for Latch opening

* Spare Part

7.8 Spare Parts for one year operation

7.8.1 Spare Parts List 613970-Y-BC¹ ACL-350

Pos.	Quantity	Part no.	Description
12	1	613821	Lever
13	1	613838	Lever
14	2	613791	Hose Assembly
17	1	671637	Warning sign "Spring"
18	1	671638	Warning sign "Forum B + V Oil Tools "
19	1	671639	Warning sign "Automatic"
20	1	671640	Warning sign "Hands"
21	1	671642	Warning sign "Grease Daily"

7.8.2 Spare Parts List 615970-Y-BC¹ ACL-500

Pos.	Quantity	Part no.	Description
12	2	615961	Lever
14	2	615709	Hose Assembly
17	1	671637	Warning sign "Spring"
18	1	671638	Warning sign "Forum B + V Oil Tools "
19	1	671639	Warning sign "Automatic"
20	1	671640	Warning sign "Hands"
21	1	671642	Warning sign "Grease Daily"

7.8.3 Spare Parts List 613970-Y VES/ACL-350

Pos.	Quantity	Part no.	Description
12	1	613821	Lever
13	1	613838	Lever
14	2	613791	Hose Assembly
18	1	671637	Warning sign "Spring"
19	1	671638	Warning sign "Forum B + V Oil Tools "
20	1	671639	Warning sign "Automatic"
21	1	671640	Warning sign "Hands"

7.8.4 Spare Parts List 615970-Y VES/ACL-500

Pos.	Quantity	Part no.	Description
12	2	615961	Lever
14	2	615709	Hose Assembly
18	1	671637	Warning sign "Spring"
19	1	671638	Warning sign "Forum B + V Oil Tools "
20	1	671639	Warning sign "Automatic"
21	1	671640	Warning sign "Hands"

Attention: Inside the Elevator Actuation Unit is assembled with heavy springs under high pressure !
There is an extreme danger of injuries while disassembling, if disassembling is not done correctly. Therefore disassembling and repair is strictly permitted only for **Forum B + V Oil Tools** and their authorized Service Facilities.

7.8.5 Spare Parts 613610-RSP

Pos.	Qty	Part no.	Description
26	1	613624	Cap
28	2	613640	Screw
32	1	613831	Pneumatic-Cap
33	2	725461	Screw
34	2	752396	Lock Washer
46	2	613946	Straight Connection
47	2	755738	90 degree Fitting
48	1	613785	Screw

7.8.6 Spare Parts 613860-RSP

Pos.	Qty	Part no.	Description
6	2	613889	Clevis Pin with Head
7	2	621431	Washer
8	2	70814	Cotter Pin
11	2	612685	Permaglide Bush
12	7	752312	Lock Nut
13	1	621427	Screw
17	1	612515	Grease Nipple
18	1	613880	Spring
19	4	615879	Washer
20	1	611009	Cotter Pin
22	1	613881	Bolt
23	1	613882	Bolt
24	2	612509	Latch Pin Securing Ring
28	1	612641	Latch Cylinder
29	2	643775-1	Screw
35	5	612944	Straight Connection
36	2	613945-1	Seal Rings
38	1	613797	Pneumatic Hose Assembly, L=290mm
39	1	613793	Pneumatic Hose Assembly, L=360mm
40	1	613886	3/2-Way-Valve
41	3	613887	Screw
42	3	613883	Washer
47	1	613816	Rope
49	2	645028	Screw
50	2	645683	Washer
57	2	4645198	Screw
58	1	612688	Spring
64	1	613798	Pneumatic Hose Assembly, L=590
65	1	613794	Pneumatic Hose Assembly, L=410mm
70	3	645683	Washer
71	3	645059	Safety Sheet

7.8.7 Spare Parts 613861-RSP

Pos.	Qty	Part no.	Description
1	1	613863	Cover, middle
10	1	613896	Tension Spring 1
11	1	613897	Tension Spring 2
14	1	613898	Rope
15	3	612515	Grease Nipple
18	1	613788	Pneumatic Hose

As an alternative to the single spare parts the hole Latch opening unit (PN 613860) can be ordered completely.

7.8.8 Spare Parts 612735-RSP

Pos.	Qty	Part no.	Description
7	9	613823	Screw
8	4	613824	Taper Pin
10	1	612729	Bolt Assembly for Hammer
11	2	613840	Bolt
12	2	613837	Bolt
16	2	612509	Latch Pin Securing Ring
17	4	613720	Retaining Ring
18	1	613825	Washer
19	6	612515	Grease Nipple
20	4	613826	Thread Pin
21	4	612594	Sliding Bushing
22	16	621431	Washer
25	2	70064	Grease Fitting

APPENDIX

8 Appendix

A Sample of EC Certificate of Conformity

B Operating Instructions from Other Manufacturers

A. Sample of EC Declaration of Conformity



FORUM B + V Oil Tools GmbH

EC-DECLARATION OF CONFORMITY

We,

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

declare that the products:

ACL 250, 350 + 500 / VES-ACL 250, 350 + 500

Air Operated Center Latch Elevator

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

2006/42/EC Machinery Directive,

2014/34/EC ATEX Directive of Equipment for use in hazardous areas.

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

API 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 ISO 14121-1 Safety of machinery, Risk assessment

DIN EN 13463-1 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 / [see „1.3 Technical Data“ on page 13]

Device Type: [see „1.3 Technical Data“ on page 13]

Rated Capacity [see „1.3 Technical Data“ on page 13]

Part Number: [see data book]

Serial Number: [see data book]

Delivery Date: [see data book]

B+V Order No.:

Marking:  II 2G T5

The Engineering Manager of FORUM B + V Oil Tools GmbH, Hermann-Blohm-Strasse 2, 20457 Hamburg, Germany, is authorized to compile the technical files.

Documents in accordance to Directive 94/9/EC Article 8 (1) b ii) are lodged at IBExU - Institut für Sicherheitstechnik 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 approved by GL System Certification, Hamburg / Germany, Certificate No. QS-8339 HH.

Hamburg, issued on [see data book]

[see data book]

Authorized Representative:

Name
Position

Jens Lutzhöft
Managing Director

FORUM B + V Oil Tools GmbH
Hermann-Blohm-Strasse 2, 20457 Hamburg
P.O.Box 11 22 53, 20422 Hamburg, Germany
Phone: +49 40 37022-6855, Fax: +49 40 37022-6899
E-Mail: oiltools@f-e-t.com
Internet: www.blohm-voss-oiltools.com
Registered Office: Hamburg
Blohm + Voss is a trademark of Blohm + Voss Shipyards GmbH®

Managing Directors: Jens Lutzhöft, James W. Harris
Commercial Register: District Court of Hamburg, HRB 125 890
Tax-No.: 46/722/02375, VAT-ID. No.: DE 294 745 990
Banking: HSBC Trinkaus & Burkhardt AG
BIC / SWIFT: TUBD DE 3303 0000
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. 75: EC Certificate of Conformity Sample Page 1

B. Third Party Documents

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

ENGLISH • METRIC

Excerpt for B+V Operation Manual - Annex

Nord-Lock washers

Product information



NORD-LOCK®

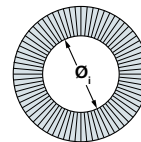
Nord-Lock steel washers

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

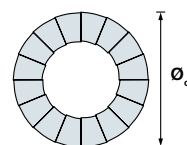
Dimension chart

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

NL3–NL8
 $\phi_o \pm 0,1$ mm
NL10–NL42
 $\phi_o \pm 0,2$ mm
NL45–NL130
 $\phi_o \pm 0,5 / -0,0$ mm

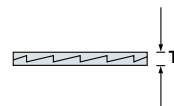


NL3–NL24
 $\phi_o \pm 0,2$ mm
NL27–NL42
 $\phi_o \pm 0,3$ mm
NL45–NL130
 $\phi_o \pm 0,0 / -2,0$ mm



NL3–NL42
T $\pm 0,25$ mm

NL45–NL130
T $\pm 0,75$ mm



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

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

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

Torque guidelines

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

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

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

Cu/C paste = Copper/graphite paste (Molykote® 1000)

G_r = ratio of yield point

μ_{th} = thread friction

μ_b = washer friction

1 N = 0,225 lb

1 Nm = 0,738 ft-lb

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

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

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

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

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

Nord-Lock washers joint guide



Tapped holes

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



Counter bores

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



Through holes

As for all locking washers, through holes require two pairs of Nord-Lock washers – one pair for securing the bolt and a second pair for securing the nut.

Turn both fasteners in order to close the cams on both washer pairs before tightening to minimize settlements. Keep the nut secure whilst tightening the bolt.



Stud bolts

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



Large / slotted holes



Soft underlying surfaces

Applications with large / slotted holes or soft underlying surfaces

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



Designs where Nord-Lock washers are not recommended

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

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

Using Nord-Lock washers



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

Installing the washers

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

Tightening

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

Untightening

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

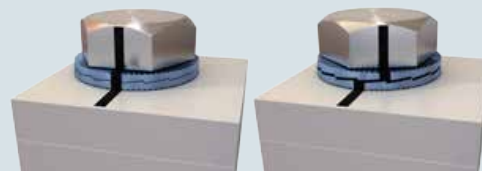
Reusing Nord-Lock

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



6

Possible to verify the locking function



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



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

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

Utilize the advantages of lubrication

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

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

II Data-sheet Grease

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

Product name: AVIATICON FETT XRF
Revised: 28/05/2009

Date: 28/05/2009
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1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of substance or preparation

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

1.2 Company/undertaking identification

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

2. HAZARDS IDENTIFICATION

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

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

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

3.1.2 Hazard ingredients:

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

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

4. FIRST AID MEASURES

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

5. FIRE FIGHTING MEASURES

- 5.1 Suitable extinguishing media: Use foam, dry chemical powder, sand or carbon dioxide (CO₂).
5.2 Extinguishing media which must not be used for safety reasons: Do not use water.
5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: Carbon monoxide, carbon dioxide, sulphur dioxide and other toxic fumes may be evolved on burning or exposure to strong heat.
5.4 Special protective equipment for fire-fighters: Full protective clothing and self-contained breathing apparatus.
5.5 Additional information: Water may be used to cool nearby heat exposed areas/objects/packages.

6. ACCIDENTAL RELEASE MEASURES

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

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

Product name: AVIATICON FETT XRF
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7. HANDLING AND STORAGE**7.1 Handling**

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

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

7.1.3 Further information: none

7.2 Storage

7.2.1 Requirements for storage rooms and vessels: Observe all storage regulations.

Keep in original containers only. Keep containers dry.

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

8.1.1	CAS No	Component name	Code	Value	Unit	Remark
		oil mist	8 hours	5	mg/m ³	TWA, 5 h

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

8.2 Personal protection equipment

8.2.1 Respiratory protection: Not required in normal case.

8.2.2 Hand protection: Protective gloves. *Material of gloves:* Nitrile rubber, NBR.

Penetration time of glove material:

Nitrile: thickness 0,4 mm, breakthrough time > 240 min.

The exact breakthrough time has to be found out by the manufacturer of the protective gloves and has to be observed.

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

8.2.4 Body protection: Protective work clothes.

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

9. PHYSICAL AND CHEMICAL PROPERTIES**9.1 Appearance**

9.1.1 Physical state: pasty

9.1.2 Colour: yellowish-brown

9.1.3 Odour: characteristic

9.2 Important health, safety and environmental information**Safety relevant basic data**

9.2.1 pH value: g/l water at °C

Not applicable.

9.2.2 Boiling point/range: Not determined.

9.2.3 Melting point/range: dropping point

150 °C

DIN/ISO 2176

9.2.4 Flash point: (base oil)

> 200 °C

DIN/ISO 2592

9.2.5 Inflammability (solid/gaseous):

No data available.

9.2.6 Inflammation point:

No data available.

9.2.7 Autoignition (solid/gaseous):

Product is not selfigniting.

9.2.8 Fire hazard properties:

No data available.

9.2.9 Danger of explosion:

Product does not present an explosion hazard.

9.2.10 Explosion limits: lower % upper %

No data available.

9.2.11 Vapour pressure: at 20 °C

< 0,1 hPa

9.2.12 Density: at 20 °C

< 1,000 g/cm³

9.2.13 Solubility in water: at 20 °C

dispersible

9.2.14 n-Octanol/water partition coefficient:

No data available.

9.2.15 Viscosity, kinematic: at 40 °C (base oil)

Approximately 190 mm²/s

DIN 51562/T1

9.2.16 Solvent content: %

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

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

Product name: AVIATICON FETT XRF
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10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION**11.1 Acute effects (toxicity tests)****11.1.1 Acute toxicity:**

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

11.1.2 Specific symptoms in animal studies: No data available for this formulation.**11.1.3 Irritant and corrosive effects:**

Irritant effect on the skin: Unlikely to cause harm to the skin on brief or occasional contact.

Irritant effect on the eyes: No irritant effects.

Irritant effect on the respiratory tract: Normally low inhalation risk due to low volatility. High temperatures or mechanical processing may form oil mist, vapours or smoke which may irritate the respiratory system.

11.1.4 Sensitization:

In case of skin contact: No sensitizing effects known.

In case of inhalation: No sensitizing effects known.

Remark: none

11.1.5 Repeated dose toxicity (sub-acute to chronic toxicity): Repeated or prolonged exposure may cause irritation to eyes and skin.**11.1.6 CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction):** No particulars available.**11.2 Experiences made in practice****11.2.1 Observations relevant to classification:** -**11.2.2 Other observations:** -**11.3 General remarks:** When used and handled according to specifications, this product doesn't have any particular harmful effects according to our experience and the information provided to us.**12. ECOLOGICAL INFORMATION****12.1 Ecotoxicity****12.1.1 Aquatic toxicity:** No data available.**12.2 Mobility****12.2.1 Known or predicted distribution to environmental compartments:** No data available.**12.2.2 Adsorption/Desorption:** No data available.**12.3 Persistence and degradability:** Not expected to be readily biodegradable.**12.3.1 Bioaccumulative potential:** No data available.**12.4 Other adverse effects:** This product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities.**12.5 Further ecological information:** Do not allow product to reach ground water, water course or sewage system. Danger to drinking water if even small quantities leak into the ground.**13. DISPOSAL CONSIDERATIONS****13.1 Product****13.1.1 Recommendation:** Disposal in accordance with local and national regulations. Dispose to licensed disposal contractor. Must not be disposed of together with household garbage. Do not allow product to reach sewage system.**13.1.2 Waste codes / waste designations according to EWC / AVV:** EWC-Code 1201 12 (used Wax and Greases). The waste disposal code is just a recommendation. Contact your local experts to obtain information about use or disposal of the material involved. The indication about disposal refers to the product and its residues. If the product is mixed with other materials or preparations an individual evaluation should be necessary. Classification of waste is always the responsibility of the end user.

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13.2 Appropriate packaging

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

13.3 Additional information: none**14. TRANSPORT INFORMATION**

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

15. REGULATORY INFORMATION**15.1 EU regulations****15.1.1 Chemical Safety Assessment:**

For this preparation a chemical safety assessment has not been carried out.

15.1.2 Labelling

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

15.1.3 Other EU regulations:**15.2 National regulations (Germany)**

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

16. OTHER INFORMATION

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

III Data-sheet Hydraulic Oil

SAFETY DATA SHEET



1. Identification of the substance/preparation and company/undertaking

Product name	Vitam GF 32
SDS no.	56345
Use of the substance/preparation	Hydraulic fluid For specific application advice see appropriate Technical Data Sheet or consult our company representative.
Supplier	Deutsche BP Aktiengesellschaft Industrial Lubricants & Services Erkelenzer Straße 20, D-41179 Mönchengladbach Germany Telefon: +49 (0)2161 909-319 Telefax: +49 (0)2161 909-392 Aral AG Geschäftsbereich Schmierstoffe Max-Born-Str. 2 D-22761 Hamburg Customer Service Center / Environmental Protection / Product Safety: +49 (0)40 3594-05
EMERGENCY TELEPHONE NUMBER	Carechem: +44 (0) 208 762 8322 (24 hours)
E-mail address	MSDSadvice@bp.com

2. Hazards identification

This preparation is not classified as dangerous according to Directive 1999/45/EC as amended and adapted.

Additional hazards	Note: High Pressure Applications Injections through the skin resulting from contact with the product at high pressure constitute a major medical emergency. See 'Notes to physician' under First-Aid Measures, Section 4 of this Safety Data Sheet.
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See sections 11 and 12 for more detailed information on health effects and symptoms and environmental hazards.

3. Composition/information on ingredients

Highly refined base oil (IP 346 DMSO extract < 3%). Proprietary performance additives.

This product does not contain any hazardous ingredients at or above regulated thresholds.

4. First-aid measures

Eye contact	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.
Skin contact	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if irritation develops.
Inhalation	If inhaled, remove to fresh air. Get medical attention if symptoms appear.
Ingestion	Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If potentially dangerous quantities of this material have been swallowed, call a physician immediately.
Notes to physician	Treatment should in general be symptomatic and directed to relieving any effects. Note: High Pressure Applications Injections through the skin resulting from contact with the product at high pressure constitute a major medical emergency. Injuries may not appear serious at first but within a few hours tissue becomes swollen, discoloured and extremely painful with extensive subcutaneous necrosis. Surgical exploration should be undertaken without delay. Thorough and extensive debridement of the wound and underlying tissue is necessary to minimise tissue loss and prevent or limit permanent damage. Note that high pressure may force the product considerable distances along tissue planes.

Product name Vitam GF 32

Product code 56345-DE04

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Date of issue 16 March 2010

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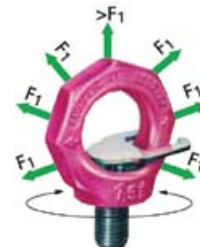
IV Data-sheet RUD VRSF

STARPOINT - VRS



Complies with the machinery directives 2006/42/EC

4 better
lifting



User Instructions - Part 1

Safety instructions

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

EC-Declaration of the manufacturer

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

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

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

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

Designation of the equipment:

LIFTING POINT

Type: **Load ring - STARTPOINT VRS**

Manufacturer's sign: 

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

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

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

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

STARPOINT - VRS



User Instructions - Part 2

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

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

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

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

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

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

- a) For single leg lifts, the lifting point should be vertically above the centre of gravity of the load.
- b) For two leg lifts, the lifting points must be equidistant to/or above the centre of gravity of the load.
- c) For three and four leg lifts, the lifting points should be arranged symmetrically around the centre of gravity in the same plane if possible.

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

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

WLL = required of lifting point/individual leg (kg)
 G = load weight (kg)
 n = number of load bearing legs
 β = angle of inclination of the individual leg

NOTE: For WLL Calculations

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



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

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

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

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

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

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

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



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

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

12. Effects of temperature:

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

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

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

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

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

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

Inspection criteria concerning paragraphs 2 and 15:

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

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

STARPOINT - VRS



User Instructions - Part 3

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

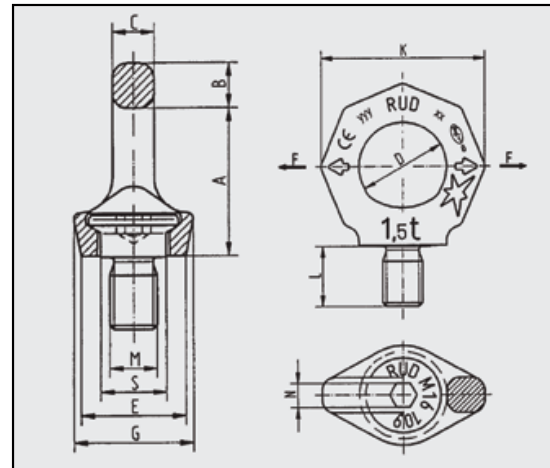


Table 1

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

Table 2

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



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LIT00017/L&L/Jan10

V Data-sheet RUD VLBG

LOAD RING - VLBG



Complies with the machinery directives 2006/42/EC



4 better
lifting



User Instructions - Part 1

Safety instructions

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

EC-Declaration of the manufacturer

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

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

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

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

Designation of the equipment:

LIFTING POINT

Type: **Load ring - VLBG - for bolting**

Manufacturer's sign: 

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

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

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

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

LOAD RING - VLBG



User Instructions - Part 2

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

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

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

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

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

The min quality of the hexagon bolt has to be 10.9 accord. EN 24014 (DIN 931) with the nominal diameter. For replacement, the bolt can be easily hammered out (M8 - M30). The type VLBG 7t M36 is only delivered with a special bolt, therefore it is not possible to use a EN/DIN-bolt.

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

- For single leg lifts, the lifting point should be vertically above the centre of gravity of the load.
- For two leg lifts, the lifting points must be equidistant to/above the centre of gravity of the load.
- For three and four leg lifts, the lifting points should be arranged symmetrically around the centre of gravity in the same plane if possible.

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

$$WLL = \frac{G}{n \times \cos \beta}$$

WLL = required of lifting point/individual leg (kg)
 G = load weight (kg)
 n = number of load bearing legs
 β = angle of inclination of the individual leg

NOTE: For WLL Calculations

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



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

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

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

8. The VLBG has to be adjustable through 360° when fitted. For single use just tighten with spanner. For long term application the VLBG should be tightened to torque according to relevant table (+/- 10%). In case of turning movements (continuous operation) the recommended torques have to be checked regularly. For rotation under load RUD recommend to use the PowerPoint or WBG or WBG-V.

Adjust to the direction of pull, before attaching to the lifting means.

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

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

11. If the lifting points are used exclusively for lashing, the value of the working load can be doubled. LC (lashing capacity) = 2 x WLL.

12. Effects of temperature: Due to the DIN/EN bolts that are used with the VLBG the working load limit should be reduced accordingly:

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

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

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

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

Inspection criteria regarding paragraphs 2 and 14:

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

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

LOAD RING - VLBG



User Instructions - Part 3



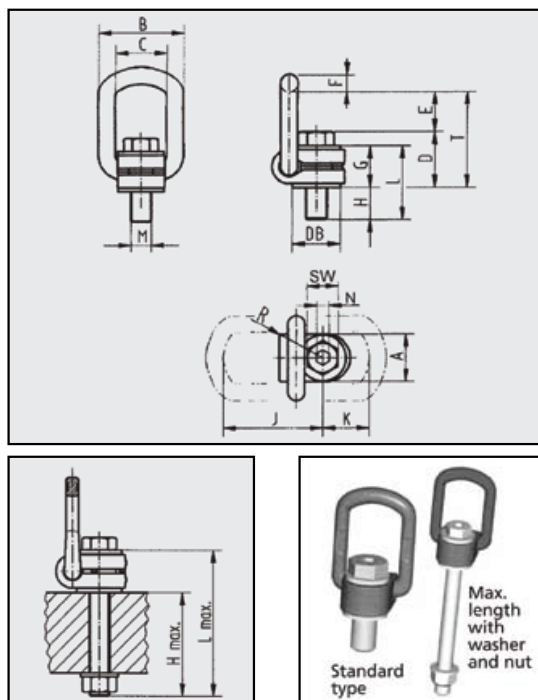
WORKING LOAD LIMITS (G - in tonnes)				
PRODUCT DESCRIPTION	Single Leg	2, 3 or 4 Legs		
			60°	90°
			Maximum Included Angle (Degrees)	
VLBG - 0.30t M8	0.30	0.52	0.42	0.30
VLBG - 0.63t M10	0.63	1.1	0.89	0.63
VLBG - 1.0t M12	1.0	1.7	1.4	1.0
VLBG - 1.5t M16	1.5	2.6	2.1	1.5
VLBG - 2.5t M20	2.5	4.3	3.5	2.5
VLBG - 4.0t M24	4.0	6.9	5.6	4.0
VLBG - 5.0t M30	5.0	8.6	7.0	5.0
VLBG - 7.0t M36	7.0	12.1	9.9	7.0
VLBG - 8.0t M36	8.0	13.8	11.3	8.0
VLBG - 10.0t M42	10.0	17.3	14.1	10.0
VLBG - 15.0t M42	15.0	26.0	21.2	15.0
VLBG - 20.0t M48	20.0	34.6	28.2	20.0

Table 1



Type	WLL (t)	A	B	C	D	E	F	G	H stand.	H max.	J	K	L stand.	L max.	M	N	SW	R	T	DB	Weight (kg)	Torque (Nm)	Ref.-No. stand	Ref.-No. Vario with Washer + nut
VLBG 0.3t M8	0.3	30	54	34	35	40	10	29	11	76	75	45	40	105	8	5	13	32	75	24	0.3	30	8500821	8600280
VLBG 0.63t M10	0.63	30	54	34	36	39	10	29	16	96	75	45	45	125	10	6	17	32	75	24	0.32	60	8500822	8600281
VLBG 1t M12	1	32	54	34	37	38	10	29	21	116	75	45	50	145	12	8	19	32	75	26	0.33	100	8500823	8600382
VLBG 1.2t M14	1.2	33	56	36	46	39	13.5	36	—	34	86	47	—	70	16	10	24	38	85	30	0.55	120	—	8600399
VLBG 1.5t M16	1.5	33	56	36	46	39	13.5	36	24	149	87	47	60	185	16	10	24	38	85	30	0.55	150	8500824	8600383
VLBG 2.0t M18	2.0	50	82	54	55	55	16.5	43	—	47	113	64	—	90	20	12	30	48	110	45	1.3	200	—	8600384
VLBG 2.5t M20	2.5	50	82	54	55	55	16.5	43	32	187	113	64	75	230	20	12	30	48	110	45	1.3	250	8500826	8600385
VLBG 4t M24	4	50	82	54	58	67	18	43	37	222	130	78	80	265	24	14	6	48	125	45	1.5	400	8500827	8600386
VLBG 4t M27	4	60	103	65	78	69	22.5	61	39	—	151	80	100	—	27	—	41	67	147	60	3.1	400	7983658	—
VLBG 5t M30	5	60	103	65	80	67	22.5	61	49	279	151	80	110	340	30	17	46	67	147	60	3.1	500	8500828	8600388
VLBG 7t M36	7	60	103	65	72	74	22.5	55	52	—	151	80	107	—	36	—	55	67	146	60	3.3	700	8500829	—
VLBG 8t M36	8	77	122	82	100	97	26.5	77	63	223	205	110	140	300	36	22	55	85	197	70	5.8	800	7983553	8600289
VLBG 10t M42	10	77	122	82	103	94	26.5	77	73	273	205	110	150	350	42	24	65	85	197	70	6.4	1000	7983554	8600290
VLBG 15t M42	15	95	156	100	113	109	36	87	63	263	230	130	150	350	42	24	65	100	222	85	11.2	1500	7982966	8600291
VLBG 20t M48	20	95	156	100	117	105	36	87	73	303	230	130	160	390	48	27	75	100	222	95	11.6	2000	7982967	8600292
VLBG-Z 1t 1/2"-13UNC	1	32	54	34	38	37	10	29	22	—	75	45	51	—	1/2"	—	3/4"	32	75	26	0.33	100	8502349	—
VLBG-Z 1.5t 5/8"-11UNC	1.5	33	56	36	47	38	13.5	36	24	—	87	47	60	—	5/8"	—	15/16"	38	85	30	0.55	150	8502350	—
VLBG-Z 2.5t 3/4"-10UNC	2.5	50	82	54	56	54	16.5	43	28	—	113	64	71	—	3/4"	—	1 1/8"	48	110	45	1.3	250	8502351	—
VLBG-Z 2.5t 7/8"-9UNC	2.5	50	82	54	58	52	16.5	43	27	—	113	64	70	—	7/8"	—	1 5/16"	48	110	45	1.3	300	8502352	—
VLBG-Z 4t 1"-8UNC	4	50	82	54	61	64	16.5	43	41	—	130	78	84	—	1"	—	1 1/2"	48	125	45	1.5	400	8502353	—
VLBG-Z 5t 1 1/4"-7UNC	5	60	103	65	80	64	22.5	61	41	—	151	80	102	—	1 1/4"	—	1 7/8"	67	147	60	3.3	500	8503187	—

Table 2



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LIT00017/L&L/Jan10

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.

Long-term view: We are building our company for the long-term, a company that we can be proud of.

Open communication: We believe partnerships with our customers and co-workers must be based on trust, professionalism and transparency.

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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