



QD340/450 (API500)
CASING ELEVATOR/SPIDER

OPERATION MANUAL

QD340/450-SM

STANDARD:Q/320623AD16

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Read carefully the following instructions prior to mounting and operating the elevator/Spider. Especially pay attention to “Attentions”. It is essential for safety of the elevator/spider.

Prior to use, operator should know the elevator/spider’s maximum static load. Working load for QD340/450 elevator/spider is 4500kN.

Lowest design and operation temperature for the product is -20° C (-4° F) . If environmental working temp is below -20° C (-4° F) , it is necessary to inform lowest working temp when order the product.

1. Introduction

QD340/450 casing elevator/spider is applicable for gripping casing with any kinds of coupling and features high strength and safe clamping. It can be used alone as a spider, or as an elevator. It can be operated pneumatically or manually only by one person.

The whole body design of slip assembly provides even distributed circular pressure on the casing string during clamping, which ensures secured clamping and reducing damage and deformation of casing to lowest. Especially the elevator/spider is suitable for integral joint casing and thin-coupling casing, which can effectively prevent threads of casing from damaging.

QD340/450 casing elevator/spider handles casing ranging from 114mm to 340mm ($4\frac{1}{2}$ in-13 $\frac{3}{8}$ in). There are corresponding sizes of inserts and top guides and bottom guides to choose. All their replacement is easy and can handled at any occasion.

When used as an elevator, the tool is fitted with a bell guide and bottom guide to center the casing quickly and accurately and to prevent casing from striking the slip assembly and damage it. When used as a spider, it is fitted with an top protection cover and top guide to protect the slip assembly against being stricken by the casing coupling. And the spider adapter plate is for the spider to be seated steadily on the rotary table.

Therefore, QD340/450 Pneumatic casing elevator/spider is a kind of ideal mechanized tool for casing operation in oil fields.

2. Main Technical Parameters

2.1 Speculations

Model	QD340/450
Applicable casing OD	114~ 340mm (4.1/2" ~ 13.3/8")
Load capacity	4500 kN (500 ston)
Air pressure	0.5 ~ 0. 9 MPa
Overall dimensions Elevator(L×W×H)	1390×1290×890 mm
Overall dimensions Spider (L×W×H)	1390×1290×900 mm
Weight, Elevator	2870 kg (including one slip assy.)
Weight, Spider	2820 kg (including one slip assy.)
Model of Elevator ring	DH4500

2.2 Configuration of Slip Assemblies, Inserts, Top and Bottom Guides, and Bottom Front Guide

Casing OD in	Slip size mm	Inserts mark	Inserts Qty.	Elevator		Spider
				Bottom Guide	Bottom Front Guide	Top Guide
4.1/2	140	6	45*2	114	114	114
5		8		140	140	140-127
5.1/2		2				
5.3/4	194	7	75*2	178-168	178-168	178-168
5.7/8		19				
6		9				
6.5/8		6				
7		4				
7.1/2		12		194	194	194
7.5/8		2				
7.3/4		10				
7.7/8	245	19	90*2	219	219	219
8.1/8		9				
8.5/8		5		245	245	245
9.5/8		1				
9.7/8	298	17	105*2	273	273	273
10.1/8		20				
10.1/4		21				
10.7/16		13				
10.3/4		5				
10.7/8		16		298	298	298
11.1/8		3				
11.3/4		1				
11.7/8		15				
12.3/4	340	3	120*2		340-324	340-324
13.3/8		1				

Note: Only one slip assembly is equipped during delivery. It is necessary to specify the size of pipe to handle when ordering.

3. Installation

3.1 Before mounting, check, as per the attached table 1, to see if the slip assembly, inserts, top guide, bottom guide and bottom front guide match with the size of the casing pipe and to see if they are fixed properly to secure the gripping on the casing pipes and smooth operation.

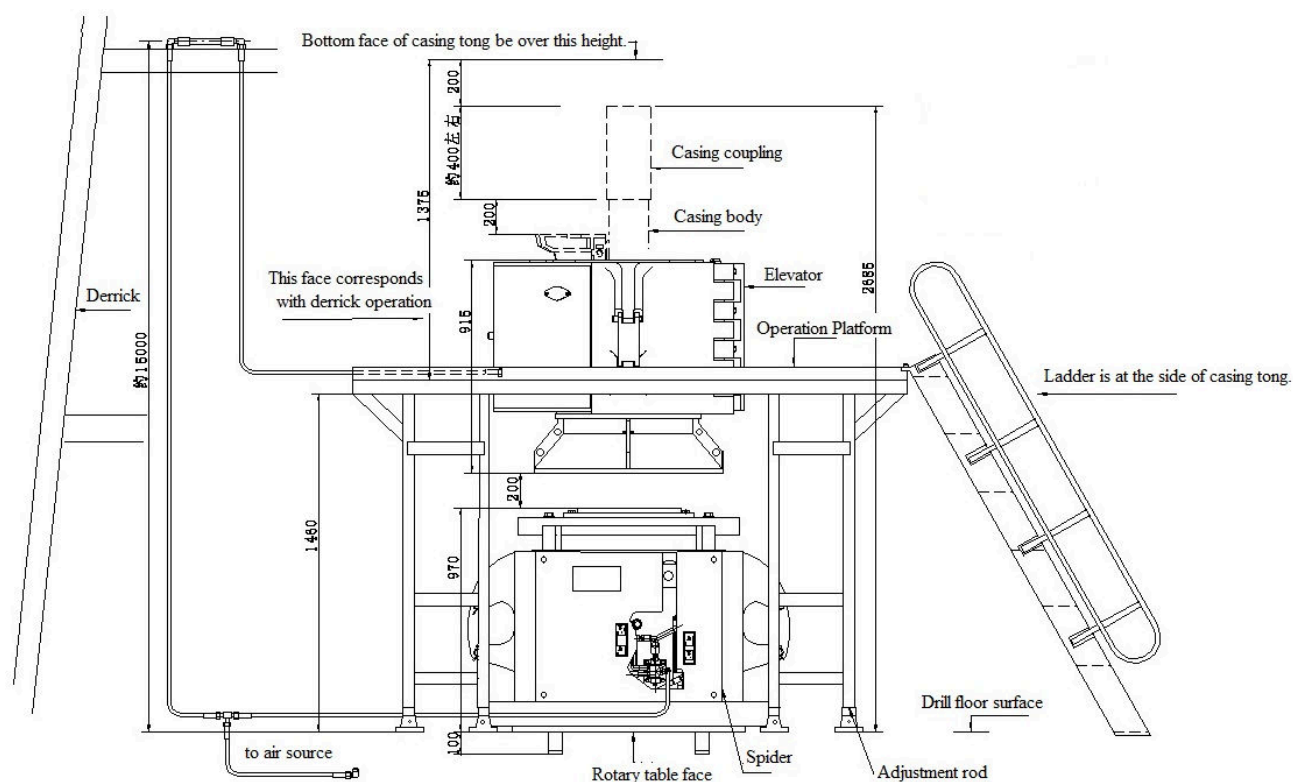


Fig.1 Installation of QD340/450 Casing Elevator/spider

- a. When installing the spider, check top protection cover, top guide and adapter plate for correct size and fixture.

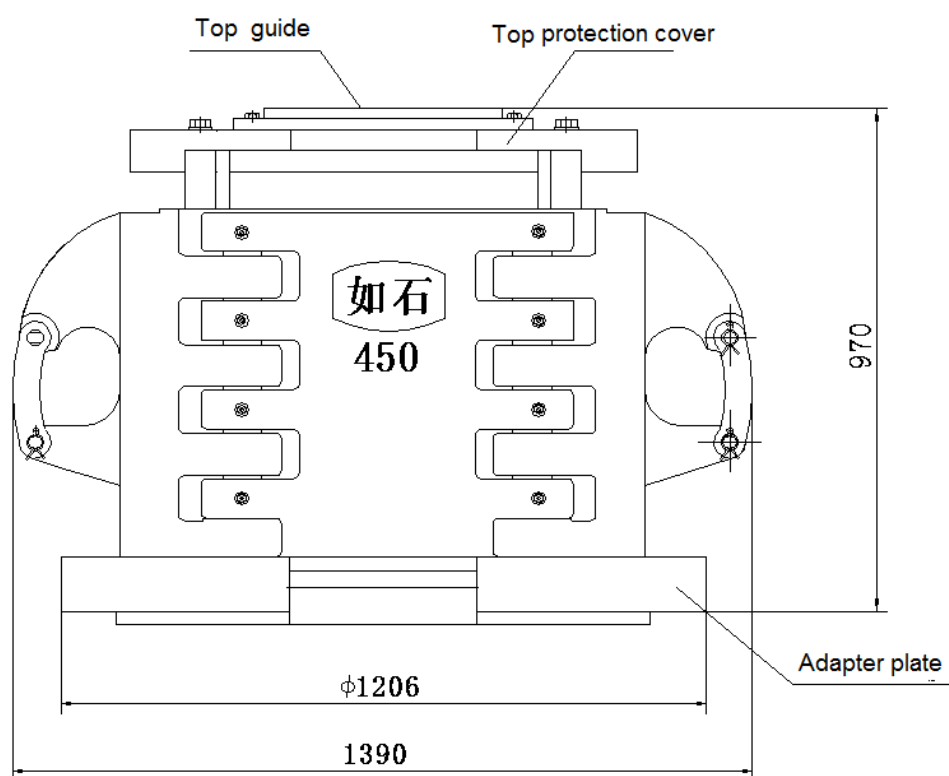


Fig.2 Outline of QD340/450 Pneumatic Spider

- b. When installing the elevator, check bell guide, bottom guide and bottom front guide for correct size and if securely fixed on the housing.

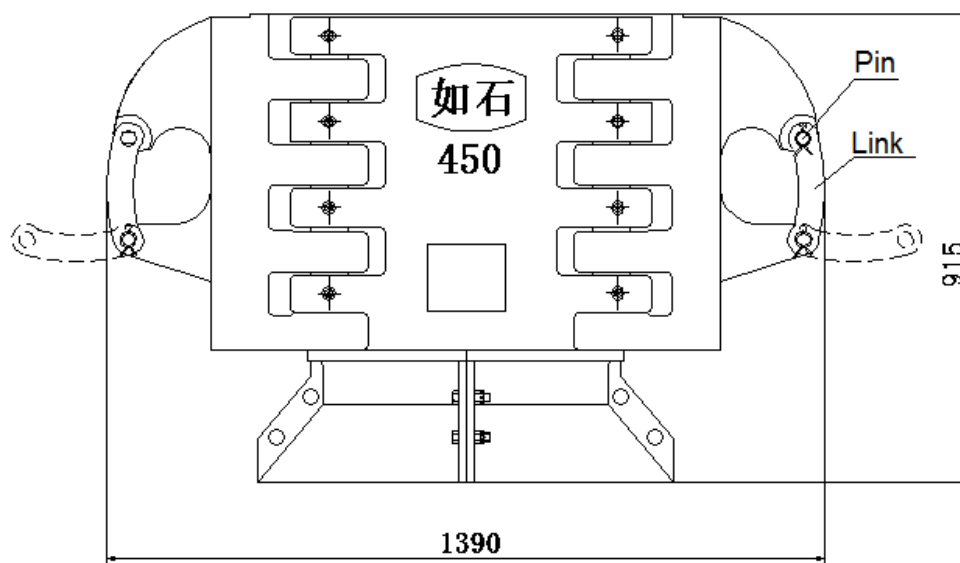


Fig.3 Outline of QD340/450 Pneumatic Elevator

3.2 Mounting of elevator

Remove the insert pins from the two ear-rings and make ear-rings open. Push the elevator bail into the lifting eyes, and close the ear-rings and latch with the insert pins (Fig.3). Connect the joint beside the reversal valve at the bottom of the back of the tool with the source of compressed air (Fig. 6). Lift the elevator to an enough height to promise smooth installation of the spider. Reversal valve operation face should be in accordance with operation platform.

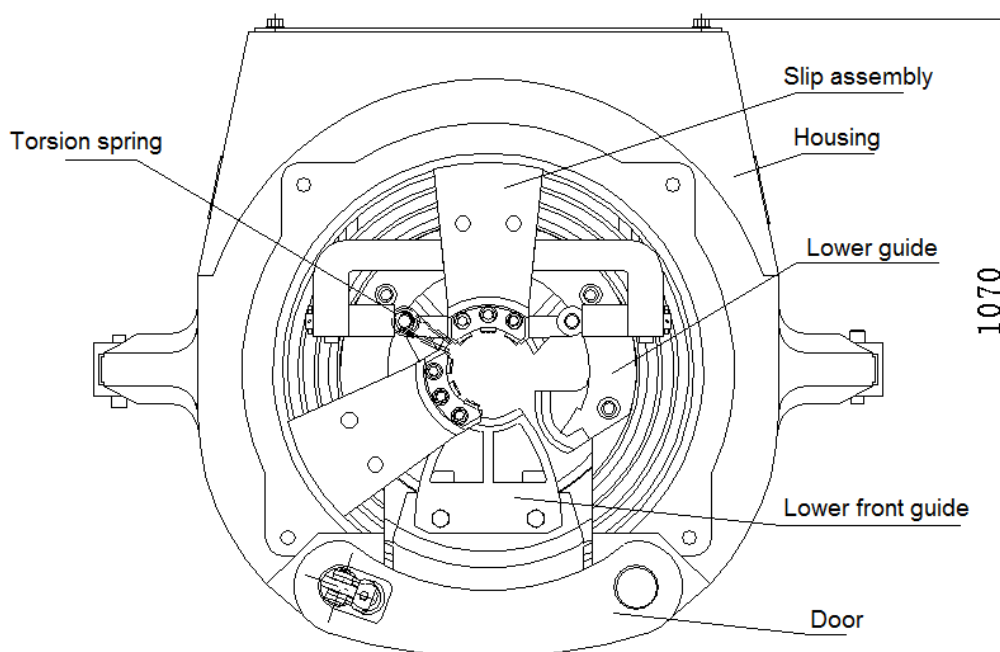


Fig.4 Top View of QD340/450 Pneumatic Elevator

3.3 Mounting of spider

For ZP205, ZP275 rotary tables, need to take out master bushing. Check and remove the drive pins in the adapter plate and make them in corresponding holes. Then align and insert the two pins into the diagonal space in rotary table platform. (see Fig. 5)

For ZP375 rotary table, need to take out insert bowls. Check and remove the drive pins in the adapter plate and make them in corresponding holes. Then insert the two pins into the two turning pin holes in master bushing of the rotary table. (see Fig. 5)

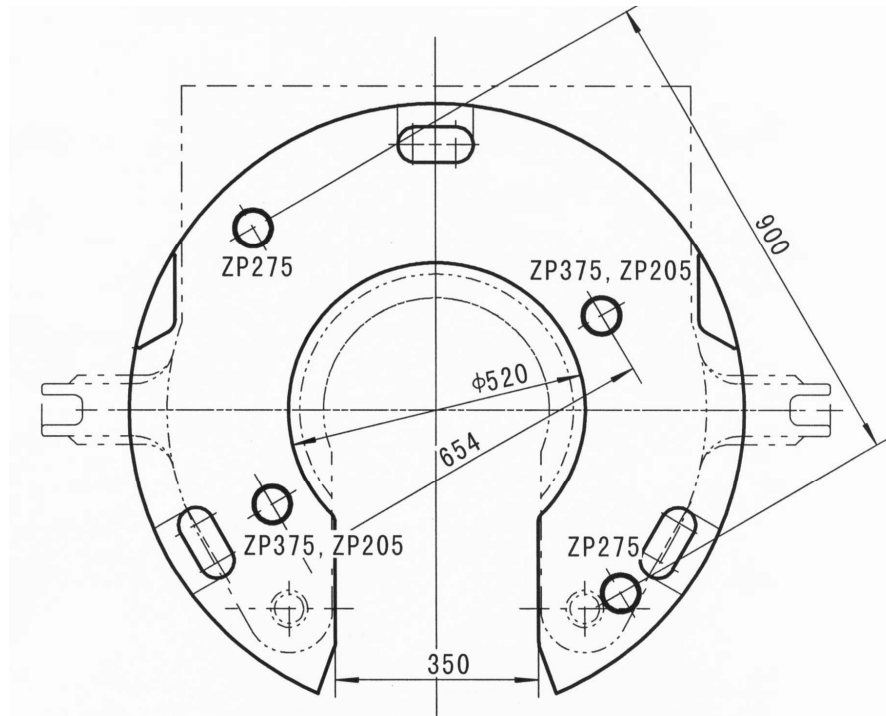


Fig.5 Adapter Plate

Put the spider adapter plate on the rotary table (see Fig.1), make the door of the spider and the opening of adapter plate at the same line. At the same time, keep the hook on the same axle line with the spider. Connect the joint beside the reversal valve at the bottom of the back of the tool with the source of compressed air(refer to Fig.6). Pay attention that the reversal operation face be at safe position.

3.4 Mounting of operation platform

Operation platform, consisting of support, frame, ladder and armrest, is assembled at site (refer to Fig.1). Notch of platform frame should correspond with two ear rings of Elevator. Platform support can be thread adjusted at the site with drill floor, to ensure the platform steady. Ladder should be set at the side where casing tong is on, convenient for operators.

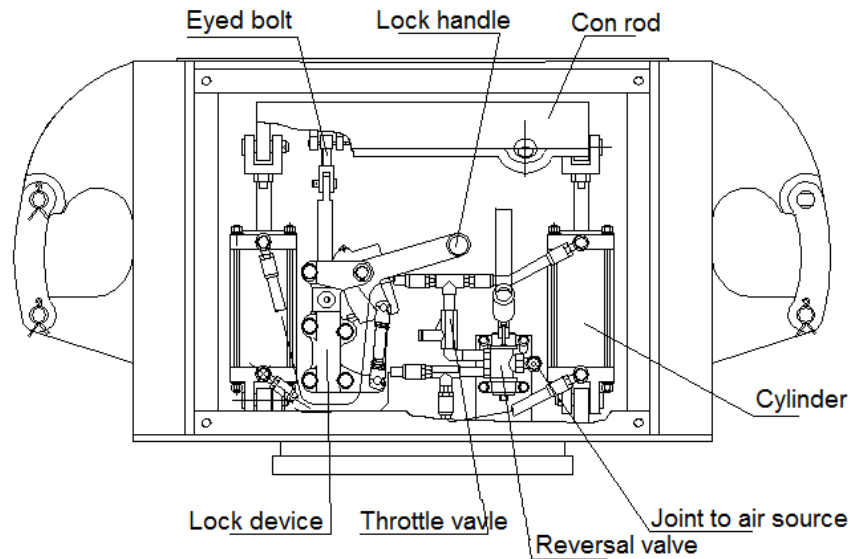


Fig.6 Operation Location of QD340/450 Casing Elevator/Spider

4. Operation

QD340/450 casing elevator/spider is pneumatically controlled. Also it is fitted with a manual operation apparatus, which can be used when compressed air is not available or the pressure of the air source is insufficient. The movement of the slip assembly involves the working of two air cylinders, lock mechanism, link, reversal valve, etc. as shown in Fig. 8

Warning: Never allow to operate QD340/450 Elevator/Spider over maximum load.

4.4.1 Pneumatic operation

4.4.1.1 Lifting the slip assembly: firstly, insert the pry bar into the hole in the handle of the lock mechanism and press the handle down to low position; then insert the pry bar into the hole in the reversal valve and lift it until the slip assembly moves up to the high position, where the spider will open automatically, and release the casing pipe.

4.4.1.2 Lowering the slip assembly: firstly, insert the pry bar into the hole in the handle of the lock mechanism and lift it, then insert the pry bar into the hole in the reversal valve and press down it until the slip assembly moves down to its low position, where the slip assembly will close automatically to grip the casing pipe.

4.4.1.3 In short, when lift the lock mechanism, reversal valve should be pressed down to lower the slip assembly. That is gripping operation. When press down the lock mechanism, reversal valve should be raised to lift slip assembly. That is release operation. Or else it will be self-locked.

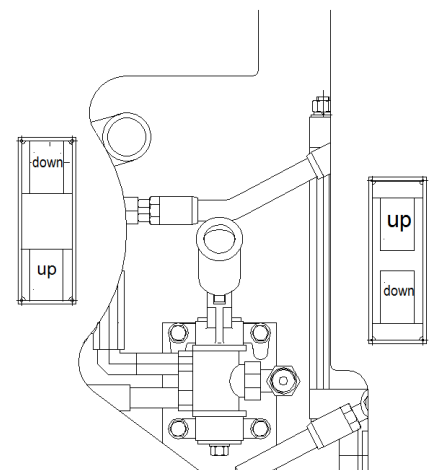


Fig. 7

4.4.2 Manual operation

4.4.2.1 Lifting the slip assembly: firstly, set the handle of the lock mechanism at the low position; then, insert the pry bar into the hole in the link beam and apply force to press the bar downward until a click sound is heard, showing that the slip assembly has been lifted to its high position and been locked up, where the slip assembly will open automatically to release the casing pipe.

4.4.2.2 Lowering the slip assembly: firstly, remove the pry bar out of the hole in the link beam. Then lift the handle of the lock mechanism, and the slip assembly will lose locking in its high position and fall to its low position automatically and that is to grip the casing pipe.

4.4.3 Explanations

4.4.3.1 The lock mechanism can prevent incorrect operations and is designed for the need of manual operation as well. Even you are the skillful operator and all the pneumatic components and lines are in the reliable states, the limit pin of the lock mechanism still can not be released but only use the reversal valve directly, which is to avoid the occurrence of severe accidents when lowering casing being obstructed or under a sudden burst of air lines and cause slip assembly open by itself.

4.4.3.2 The one-way valve (check valve) functions as a controller on the falling speed of the slip assembly and can be regulated to control the slip assembly to fall at an appropriate speed. If the slip assembly falls too fast, the inserts and the casing pipe may be damaged; if too slow, it may not grip the casing pipe. It is recommended that the lowering speed for the elevator be set quicker than the spider, which is favorable for effective clamping of elevator.

4.4.4 Operating the spider and the elevator

Driller, derrick floor man and derrick monkey should coordinate their operations. In the whole process of connecting the casing pipes, ready casing is continually hung by one or two tools. When the connection for guide shoe and stop valve are finished, set the casing pipe into the spider housing and clamp it, afterwards the operation is as follows:

4.4.4.1 The derrick floor man uses a length of lifting rope to tie a casing elevator to the hook or the lower part of the ear-ring of the pneumatic elevator, the lifting rope shall be long enough for the casing elevator to be able to clamp the next casing coupling when the elevator descends to the spider.

4.4.4.2 The driller lifts the casing pipe to its working area.

4.4.4.3 The derrick floor man connects a single casing pipe to the coupling of the casing pipe in the working area.

4.4.4.4 Use Hydraulic Casing Power Tong to make up.

4.4.4.5 The derrick monkey removes the small casing elevator from the single casing pipe, the driller lowers the elevator.

4.4.4.6 The derrick monkey guides the elevator toward the top of the casing pipe and gives a gesture to the driller that he may continue to lower the elevator when he finds that the slip assembly is open. When the coupling shoulder of the casing pipe is about 200 mm over the slip assembly of the elevator, he gives the driller a gesture to stop descending and to grip the casing pipe with the elevator.

4.4.4.7 The driller firstly lifts the elevator a little and then slowly raise it after ensuring the elevator is clamping the casing tightly. When lifting up for about 50mm, the derrick floor man operate the spider to release casing and the slip assembly will auto open along with the up-running pipe.

4.4.4.8 The driller lowers the elevator and stops lowering when the bell guide of the elevator is about 200 mm away from the top protection components of the spider. The derrick floor man uses the small elevator to grip next single casing pipe.

4.4.4.9 The derrick floor man operates the spider to grip the casing pipe.

4.4.4.10 The driller raises the elevator to get the next casing pipe up to working position, preparing for the step 3.

4.4.4.11 After finishing the last casing string, use corresponding drill pipe slips or lifting sub to lift the casing pipe. Then open the spider door quickly and draw back the spider and the spider adapter plate. Let the casing string sit in the wellhead to wait for the next process. Refer to Fig. 7.

4.4.5 Replacing the slip assembly

Firstly, remove the top protection cover, then set the handle of the lock mechanism in the lower position to make the reversal valve at the lifting state, lift up the slip assembly with hoisting cord steadily to its upper position, pull out the two pins for the link and lift out the slip assembly slowly, finally, install in the needed slip assembly. The procedure for installation is in the opposite order.

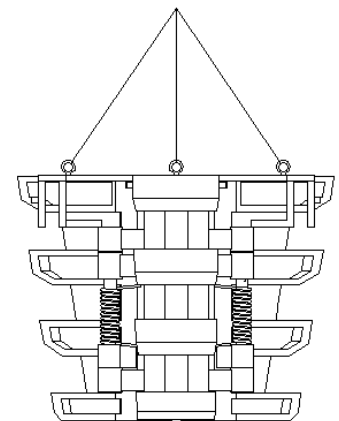


Fig.8

4.4.6 Replacing inserts

If the size of the casing pipe to be gripped is smaller than the slip assembly, the insets must be changed to use the thick inserts (see Table 1). When the casing pipe cannot be gripped securely due to the worn-out of inserts (tooth-tip 0.8mm wide), it is necessary to replace the inserts with new ones. When replacing inserts, remove the set screws and plate for inserts, then, pull out the inserts. Grease the insert seat and install in new inserts. Keel tooth profile of inserts upwards.

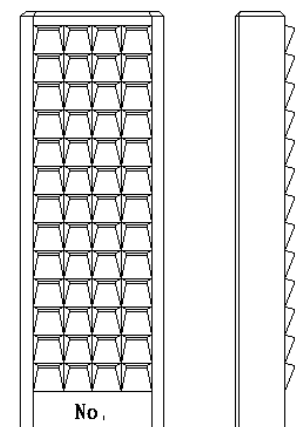


Fig.9

4.4.7 Replacing bottom guide and bottom front guide

Remove the bell guide and pull out the door latch to let door open. Unscrew the fixed screws and replace the bottom guide and bottom front guide with needed ones. At last, fix on the bell guide shade.

5. Attentions

5.1 When changing the slip assembly from one size to another different size, do remember to replace the top guide, the bottom guide, and the bottom front guide (Note: slip assembly 340 has no bottom front guide), refer to Table 1.

5.2 The slip assembly should be able to auto open to its widest position when being lift up. Open distance of the slip assembly should be larger than the diameter of casing pipe to ensure the spider retreating from wellhead via door. If slip assembly fails to open to its widest position, adjust the adjusting screw at the top end of locking rod for locking mechanism (Fig. Fig. 8) to ensure the slip assembly open to its widest position.

5.3 When changing inserts, apply enough grease in the insert seat against rusting and affecting next change. Remember to keep tooth profile upwards.

5.4 Do not allow the bell guide strike the top protection components, or it will cause injury or property damage.

5.5 When addressing casings with thin or without coupling, it is recommended to use lifting sub to lift the casing for the first three casings, and set safety clamp on the lower part of the casings.

5.6 For the first ten casings, it is recommended to inject once mud for every 2 casings. After ten casings, inject once mud for every 3 casings. After 20 casings, no need to use safety clamp. After finishing for 50 casings, inject mud once for 10 casings. Afterwards, it is normal for operation.

5.7 It is recommended to check inserts once every 5 casings. If the inserts are stained with thick dirties, use wire brush to clean out the dirties.

5.8 During injecting mud, pay attention to avoid overspill of mud. If overspill occurs, clear right away. Always keep the external and internal taper surfaces of elevator/spider clean.

5.9 When lifting elevator, driller must firstly lift it a little to assure the elevator is clamping tightly on the casing, then lift up slowly. By doing this can prevent incidents.

5.10 Once the spider holds the casing, the elevator may still goes downwards for about 50mm, to avoid accidents caused by the spider not clamping the casing.

5.11 For very large load, to ensure lubrication between external taper surface of slip assembly and internal surface of housing, discarded machine oil to be deposited can be used for lubricating.

5.12 Never allow to use Elevator/spider with abnormal locking device.

5.13 Re-welding and heat-treating should be conducted under the instruction of Jiangsu Rushi Company or conforming to API RP 8B. Inappropriate treating may cause stress increase (decrease load capacity). The stress is generated due to improper adjustment and component parts. Wear gloves and goggles for grinding, knocking or other operations.

5.14 Conduct NDT on elevator ears after a period of use. Its test results should meet API Spec 8C or JB/T4730.4 Standard. It is recommended to do the test and record every three months or after completion of one well. Never allow to use the elevator if crack appears.

6. Maintenance

Maintain and inspect the Elevator/spider according to API RP 8B Recommended Practice for Procedures for Inspections, Maintenance, Repair, and Remanufacture of Hoisting Equipment

6.1 Lubrication

The following parts and points should be checked regularly and lubricated carefully.

6.1.1 Prior to operation, coat bell guide and taper surface of slip assembly with enough lubricating grease.

6.1.2 Inject lubricating grease with a gun into the lubrication holes in the door and in the lock mechanism and in the rolling pin for the link. At least once every shift.

6.1.3 Lubricate link pins and its holes. At least once each shift.

6.1.4 Lubrication points distribution is as follows.

No.	1	2	3	4
Lubrication points	Door	Link pin assy.	Locking device	Link pin
Numbers	8	2	1	2

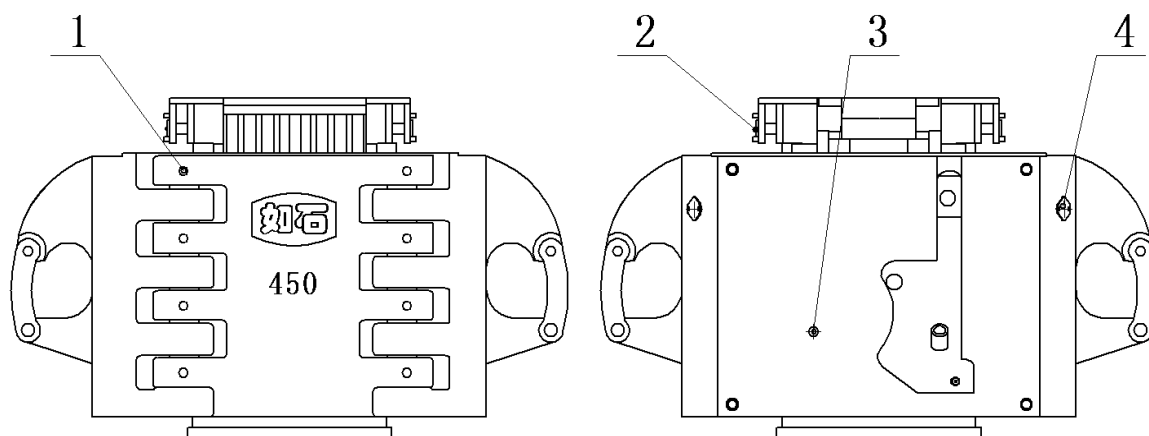


Fig.10 Lubrication Chart

6.2 Maintenance

6.2.1 Each time a drilling operation finishes, the tool must be, in time, washed clean with water and be blown dry. All the motion parts and contacted parts should be coated with lubricating oil or grease to prevent rusting and affecting service life.

6.2.2 Wear of the inserts should be checked regularly and replaced in time if necessary. Also lubricate the insert seat with grease to prevent the inserts being stuck on the seat, which will disturb normal function.

6.2.3 To prevent air cylinder from rusting, certain amount of lubricating oil should be injected into it regularly to guarantee its normal operation.

6.3 Repairs

6.3.1 Check the support pin for the link and press the link down tight regularly. Once air leaking occurs, replace the worn parts.

6.3.2 Always check pneumatic elements such as cylinder and reversal valve. Once leaking occurs, corresponding remedies should be done to promise its normal operation.

6.3.3 All the screws and pins removed should be greased before reassembling.

7. Trouble shooting

Troubles	Reasons	Solutions
Failure to raise a slip assembly at lower position	1. The cam mechanism jammed.	1. Dismantle and polish the cam and lock rod.
	2. Rusting due to long time storage or lumping of mud.	2. Immerse it with diesel and then dismantle and wash it clean.
	3. Violent placement of the slip assembly on the hard ground for storage causes pre-compressive stress.	3. Lift the slip assembly gently via a rope.
	4. Broken or bending of support pin for the link.	4. Replace the support pin.
It is difficult to draw slip assemblies out of housing.	External conical surface of slips and internal surface of housing have bite condition.	1. Add lubrication oil; 2. Drop out of use if oil adding has no effect.
Failure to lock the slip assembly at upper or lower position	Some parts of the lock mechanism worn-out.	Remove the connection pin and dismantle the lock mechanism to check the wear-out of over-load pin, spring, cam, etc. Replace or repair them according to the actual state. Then regulate the length of the adjustable screws of the lock mechanism. .
Failure to open automatically when the slip assembly is at the upper position	The hinge pins or the tensional springs damaged.	1. Check the hinge pins to see if damaged and jammed due to rusting. Replace if damaged. If rusted, remove rust first and then lubricate with oil. 2. Check the tensional springs to see if fatigue failure or broken, and replace if necessary
Fail to bite pipe in the use.	1. Inserts are bad worn. 2. External surface of slips is short of lubricating.	1. Replace with new inserts 2. Add lubrication oil.

8. Transportation and Storage

8.1 Do not bump the Elevator/spider in the shipping process and keep the product away from rain.

8.2 Store the Elevator/spider in a ventilated dry place, away from sun and rain, and avoid contacting with corrosive substances such as acid, alkali and salt.

9. Recommended Spare Parts

Recommended spare parts for QD340/450 Elevator/spider

No.	Part No.	Description	Qty.
1	QD07.02-07	Torsion spring	4
2	JB/ZQ4264-97	Yx seal ring D100	4
3	JB/ZQ4265-97	Yx seal ring d25	2
4	JB/ZQ4224-97	O-ring 100*3.1	4
5	QD07.12.00	Link pin parts	4
6	JB982-77	Washer 14	8