



MAINTENANCE MANUAL

集装箱正面吊运机维护手册

CONTAINER REACH STACKER



CONTENTS

1. Preparing Work before Maintenance
2. Maintenance Cycle Table of the Whole Machine
3. Maintenance of the Equipment
4. Lubricating
5. Functional Oil
6. Checking of Key Bolts
7. Safety Regulations during Maintenance Work
8. Common Faults and Measures
9. Maintenance of Equipment Tracking Sheet

Preface

This manual mainly introduced specific maintenance method of container reach stacker (here after refer to reach stacker) and other malfunction elimination methods. Concerning certain type of reach stacker, there will be more detailed information.

We sincerely appreciate your purchase of our product SANY Container reach stacker. We will provide you with high-quality products and high-class after-sales service.

Our Company has derived the technology quintessence of the production of the container reach stacker mobile in and out of China. With the rich experience of designing and manufacturing of engineering machinery, we develop the reach stacker, which is completely new container handling equipment. It is widely used at the container terminal, railway transfer station, highway terminate station and container freight yard, and mainly used for the stacking and portage of containers.

The manual shows in details the specifications of performance parameter, technical characters, operational principle, structural composition, safe operation, transportation, lubrication and maintenance of SANY Container reach stacker.

In order to ensure a better operation of the reach stacker, we strongly recommend you to read this manual carefully before operation. It will:

- Help you understand the reach stacker;
- Protect you from danger owing to improper operation;

- Enhance the reliability of the reach stacker;
- Enhance the service life of the reach stacker;
- Reduce the repair cost and the shutdown time.

Please put this manual at an easily reachable position for your reference at any time. Only after fully understanding this manual, can you operate the reach stacker skilfully and safely.

Thanks for your trust to the SANY products. We sincerely wish you realizing your ambitious dreams in the future works and making great achievement.

SANY Group

Reading Guidance

1.Information

The maintenance manual is a manual for you to use and maintain the machine. It should be always put in the cab for your reference at any time. If it is damaged or lost, you should order another one from Huzhou SANY Group. The Manual covers the information and instructions for safety, technology, operation, transportation, lubrication and maintenance. Furthermore, some photos, drawing details or optional components shown in the Manual may differ from your machine. To make the instructions easy, the cover sheet and hood may have been dismantled.

The Manual may exclude the modification due to the improvement and updating of products. It is recommended for you to read and research the Manual carefully and put it together with your machine.

For any question on the machine of the Manual, please contact us for the latest information.

2.Preparing Work before Maintenance

Preparing work steps are introduced in the Preparing Work before Maintenance part.

3.Maintenance Cycle of the Whole Machine

Maintenance cycle of key parts of the machine are showed in this part which provide references to maintain the machine in a regular time.

4.Maintenance of the Equipment

Maintenance detailed specification of key parts such as engine, transmission, driving axle and spreader etc. is showed in this part which indicate the direction of maintenance work of the equipment.

5.Lubricating

Necessary lubricating materials to enable normal

work of the equipment are listed. The whole equipment lubricating cycle table which includes lubricating points and lubricating cycle is listed. Clients must lubricate the equipment according to this cycle table.

6.Function Oils

Technical specification of hydraulic oil etc medium and their standards, oil tank and volume are introduced in this part. Brand and type of recommended oil by the manufacturer are also listed in this part.

7.Inspection of Key Bolts

Inspection requirements of each key fastening bolts and torque are listed in this part.

8.Safety during Maintenance Work

Safety matters needing attention while maintenance, checking and lubrication, safety measure in the working place, safety measure of product, introduction of personnel safeguard measures.

9.Guidebook of Identifying Common Malfunction

Common mechanical/hydraulic/electric system malfunction are introduced in this part, which point out direction for diagnosing common malfunction of the equipment.

10.Track Record of Maintenance

Taking track record provide convenience to the maintaining staff to keep track of the status of maintenance and is easy to check the working condition of the equipment.

11.Explanation of Signs



The sign of "Danger" means the direct danger, which may cause death or serious injury if no preventive measure is taken.

Warning

It means the potential danger, which may cause death or serious injury if no preventive measure is taken.

Caution

It means the potential danger, which may cause slight or moderate injury if no preventive measure is taken.

Caution

There is no safety indication. If you ignore this indication, there will be some potential danger to induce loss of property.

Notice

It awrks people to take attention to the operation and maintenance.

TABLE OF CONTENTS

Container Reach Stacker Maintenance Manual



1. Preparing Work before Maintenance	1-1
2. Maintenance Cycle Table of the Whole Machine	2-1
3. Maintenance of the Equipment	3-1
3.1 Repairing and Maintenance of the Engine	3-1
3.2 Repairing and Maintenance of Transmission	3-5
3.3 Repairing and Maintenance of the Drive Axle	3-6
3.4 Repairing and Maintenance of the Steering Axle	3-7
3.5 Repairing and Maintenance of the Spreader	3-8
3.6 Repairing and Maintenance of the Jib System	3-10
3.7 Repairing and Maintenance of the Air Conditioner System	3-11
3.8 Repairing and Maintenance of Tyres	3-11
3.9 Repairing and Maintenance of Hydraulic System	3-13
3.10 Repairing and Maintenance of Electric System	3-14
4. Lubricating	4-1
4.1 Lubrication	4-1
4.2 Lubricating Table	4-1
5. Functional Oil	5-1
5.1 Oil Specification	5-1
5.2 Oil Capacity	5-2
5.3 Check and Change of Hydraulic Oil	5-2
5.4 Using Principle of Oil	5-3
6. Checking of Key Bolts	6-1
7. Safty Regulations during Maintenance Work	7-1
8. Common Faults and Measures	7-1
8.1 General	7-1
8.2 Common Faults of Mechanical Systems and Measures	8-1
8.3 Common Faults of Hydraulic System and Measures	8-4
8.4 Common Faults of Electrical Control System and Measures	8-6

TABLE OF CONTENTS

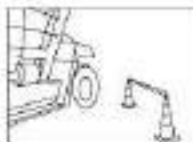
Container Reach Stacker Maintenance Manual



9. Maintenance of Equipment Tracking Sheet	9-1
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In order to avoid unnecessary break down of reach stacker, enhance the reliability and maneuverability, reduce repair cost, client should have a whole maintenance plan before operating. In the run-in period, reach stacker can only stand the medium or less load work. After working its first 50 to 100 h work, reach stacker must take a maneuverability maintenance. One should take the 1st maintenance according to C maintenance including adjustment of engine valve clearance.

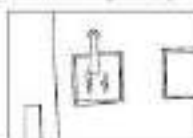


★Walk one circle around the engine, check if there exists damage and leakage.

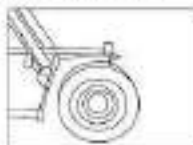
★The function test should be conducted to:



★Close the main switch, and take away the key.



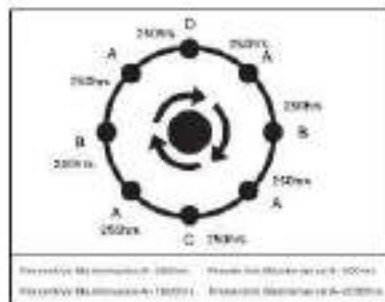
★Set the limit stop in the front and back of the tyre, so as to prevent accidental movement of angle.



★Hang the warning brand of "stop, in repairing" on the engine.
(One is hung on the steering wheel and one is hung at the end of engine.)



Specification: We have already done the maneuverability maintenance of the equipment for you.



1. Preparing Work before Maintenance

Before repairing and maintenance of the Container reach stacker, preparations should be well done strictly according to the following steps:

★Ensure engine will be stopped in the safe working site. If necessary, use the colored ribbon to separate the safety isolated belt.

2. Maintenance Cycle Table of the Whole Machine

Plan Of Maintenance

Serial No.	Maintenance parts	Maintenance items	Applicable plan
1	Engine	Check air cleaning status indicator	A B C D
2		Replace air filter core	A B C D
3		Replace engine oil and engine oil filter core	A B C D
4		Replace diesel filter core	A B C D
5		Check cooling water quality and amount	A B C D
6		Clean foreign matters on the surface of the radiator	A B C D
7		Check belt and ball wheel	A B C D
8		Check start, stop, and operation of engine	A B C D
9		Check if oil, diesel, and water leakage exists	A B C D
10		Check if turbocharger and exhaust gas tube have leakage	A B C D
11		Replace oil-water separator filter core	B C D
12		Clean oil stain in the oil cleaner	B C D
13		Replace cooling water filter core	C D
14		Check if clamping part and fixed nut are loose and broken	D
15		Check and adjust clearance of intake valve and exhaust valve	3D D
16	Gearbox and transmission shaft	Check and add transmission oil	A B C D
17		Check if fixed bolt of the transmission shaft is loose and broken	A B C D
18		Check rotary speed indicator	A B C D
19		Replace transmission oil filter core	C D
20		Replace transmission oil	C D
21	Drive axle and brake system	Check if fixed belt and fixed nut are loose and broken	D
22		Check fixed bolt of drum safe light wire degree	A B C D
23		Check if bolts of pressure plate of tyre are loose or broken	A B C D
24		Check if drive axle and brake components have oil leakage	A B C D
25		Check and add oil of drive axle differential and planet	A B C D
26		Replace oil of drive axle differential and planet gear case	C D
27		Clean versatile adaptor	C D
28		Check hand brake wheel and hand brake function	A B C D

MAINTENANCE CYCLE TABLE OF THE WHOLE MACHINE

Container Reach Stacker Maintenance Manual



Serial No.	Maintenance parts	Maintenance items	Applicable plan	
29	Steering axle	Check if steering axial component has abnormal clearance and damage	A B C D	
30		Check anti-tilting inductor	A B C D	
31		Check if bolts of tyre pressure plate are loose and broken	A B C D	
32		Check if tyre is defective	A B C D	
33		Check if steering wheel bearing and fixed nut are loose or broken	C D	
34		Check if spherical pin and fixed nut are loose and broken	C D	
35	Crane spreader	Check twist-lock and relevant components	A B C D	
36		Check twist-lock inductor and indicator	A B C D	
37		Check and adjust 20/40 chain and limit	A B C D	
38		Check crane spreader rotary decelerator gear oil and lubricating oil amount	B C D	
39		Replace crane spreader rotary decelerator gear oil	C D	
40		Check if fixed bolt of crane spreader rotary gear case is loose and broken	C D	
41		Check if slide block on the crane spreader is abraded to the limit	C D	
42		Check if crane spreader has cracks by general vision	C D	
43		Contraction and pitch system	Check if fixed seat and lock pin on the basic boom are loose, broken, and worn	A B C D
44			Check if fixed seat and lock pin on the pitch oil cylinder are loose, broken, and worn	A B C D
45	Check if slide block on basic boom is abraded to the limit		B C D	
46		Check if basic boom has cracks by general vision	D	
47	Hydraulic system	Check oil amount in main hydraulic oil tank and brake oil tank	A B C D	
48		Check accumulator pressure	A B C D	
49		Check if hydraulic pressure on the hydraulic nameplate is consistent	C D	
50		Replace all high-pressure filter cores	C D	
51		Replace brake oil and brake cooling oil filter core	C D	
52		Replace hydraulic oil and hydraulic system filter core	C D	

MAINTENANCE CYCLE TABLE OF THE WHOLE MACHINE

Container Reach Stacker Maintenance Manual



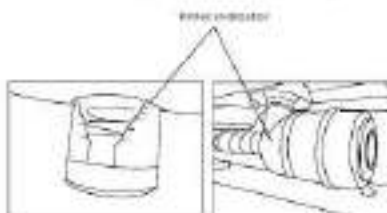
Serial No.	Maintenance parts	Maintenance items	Applicable plan
53		Replace main hydraulic oil tank and brake oil tank ventilation filter core	D
54	Circuit	Check if battery water is sufficient	A B C D
55		Check all working lights and indicator lights	A B C D
56	General items	Check tyre pressure plate and nut tightness degree	A B C D
57		Check tyre status and air pressure	A B C D
58		Check horn, reversing buzzer, and alarm light	A B C D
59		Lubricate all slide blocks and lubrication points	A B C D
60	Function test	Test anti-tilting protective system	A B C D
61		Test twist-lock safety interlocking device system	A B C D
62		Test integrated function of hydraulic system	A B C D
63		Check and treat places with oil or water leakage	A B C D

3. Maintenance of the Equipment

3.1 Repairing and Maintenance of the Engine

★Check the air filter indicator

In order to find out the cleanliness of the filter core check of the filter indicator is necessary. When the indicator turns red, filter core must be changed.



★Change the air filter core

Change the air filter core because:

— Squally air filter core may decrease the air that the combustion chamber needs as it is normally burning, which leads to incomplete burn.

— The engine needs enough air to support the combustion if it achieves the largest power.

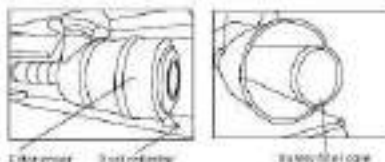
— If the filter performance of the core becomes worse, the dust particles may come into the combustion chamber to cause the abnormal abrasion in the cylinder.

If the working environment becomes quite worse, regular inspection of air filter cleaner must be taken regularly. As the indicator turns red, the filter core must be changed.

Notice

Before changing the filter core, the inside of filter core shell must be wiped. If in the emergency cases, the main filter core must be cleaned out, and reinstalled. The main filter core is unsuitable to be washed by compressed air.

Change the cavity filter core as the cases below:



Main filter core

★Change the engine oil and engine oil filter oil

Function of the engine oil:

— **Cleaning:** Wash away the wear scraps and carbon in the system.

— **Cool down:** Take away the heat generated by the engine and its components.

The performance and decontamination ability of the engine oil may goes bad as the reason of temperature and carbon, the reason is that the viscosity of the water, diesel and engine oil has been decreased. Besides, as the contamination of the carbon, the ability of the engine oil will be increased, which may generate chemical reaction with metals, so that the metal goes rusty. Because of the reasons above, the engine oil should be changed after the usage of a period to ensure the system normal.

We have to check the status of engine oil regularly. Once abnormal situation is found, prompt treatment should be taken.

No.	Phenomenon	Cause
1	Engine oil level abnormally	There is the surplus or withdrawal in fueling or venting
2	Engine oil color has been dark	Exhaust of the engine or the large amount of dirt
3	It is like sediment or the engine oil	Impurity or water mixed in the oil due to the compressed air, or impurity of the fuel. Fresh oil should be added

Take care of the filling-up amount of the engine oil as-charging. If the level is too high, the foam may come out, lube ability may be decreased. Otherwise, if too low of the oil level and there may be not enough engine oil into the lube system.

The filter core of the engine oil plays a part of filtering the engine oil. When the filter has been blocked, the engine oil may be blocked into the system, the cooling and lube ability of the engine oil may be decreased. So that engine oil filter core must be changed.

As changing the filter core, something should be taken out as follows:

Fresh engine oil and new filter should be used, the seal rings of the filter should be infiltrated by the fresh engine oil; tighten it by hand and then screw it three-fourths coil.

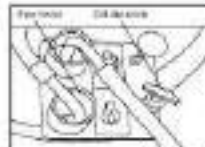
Disassemble



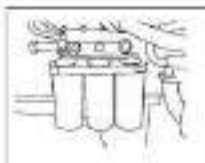
Before oil charging



Filling the oil



Engine oil filter



Engine with the core



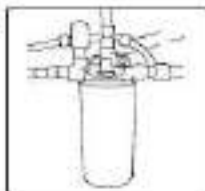
★Change the diesel filter core

The diesel may be blocked into the injection system by jammed and unclear filter, which make the diesel deficient atomization, lowering the working efficiency of engine.

Attention while changing the diesel filter core:

The seal rings of the filter should be infiltrated by the fresh fuel oil; tighten it by hand till touching and then screw it half coil.

Diesel filter



Check of the core



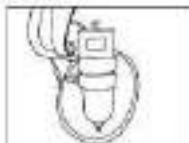
★Change the oil-and-water trap filter core

The main function of oil-and-water trap is to separate the impurity and water from the oil, and so that it can provide clean fuel to the engine.

Firstly detach the core from the top, then loose the bottom valve, clean the inner of the oil cup, replace another new one (take care to change all the seal O-rings), at last charging the fresh fuel oil.

Notice

As changing the filter core, it is necessary to clean the bottom of cap, so that it is obvious to know whether the oil cap is clean.



★Inspect the quality and quantity of the cooling water

Observe the cooling water on one's own eyes. It is necessary that the cooling water should be changed when it become worse. When the cooling water is not enough, you should recharge for fear of overheat of the engine.
Shut anti-freeze (ice point: -45°C) 50L.

★Clean the contamination attached on the surface of the radiator

In order to cool the air thoroughly, periodical clear away of the contamination is necessary. Ways of clear away the contaminations:

- Take away the radiator cover;
- Wipe out all the axetics on the radiator fins;
- Clean the radiator with abluent;
- Inspect the damaged radiator fins and rubber seal components.

Notice

Do not wash the radiator with high pressure water.

★Check belt and pulley

Belt checking mode
Press down each section of the belt, the downward distance should not exceed 10mm.
If the belt loose, to tighten it.
If still loose, replace that.
If belt abrasion, change another one.

Notice

There may be bad influence to the coolant of the engine, normal working of the air condition and generator if the belt loose.
Automatic tension pulley.
Check the tightness of the spring device.
Check the inner shaft of the device.

★Check the start-up, halt and operation of the engine

Follow steps should be abide by before start-up:
- Check all the oil level(engine, gearbox, hydraulic oil, drive axle, planet gear, brake coolant);
- Exhaust the air of fuel system;
- Turn the fire-key to start-up position, release it as the engine enable.
Do not let the engine work on the state of cold, neither too the critical low speed, working for 2-3 minutes on the state of 1200-1500rpm till the temperature gets normal is ok.

Notice

It is important for the warm-up of the engine, which may ensure the smooth run of the engine or before the high speed run of the turbine.



★Check oil, diesel or water leakage

Go around the machine, inspect the leakage of oil, diesel or water. If any part leaking, marking and cut off the power instantly.

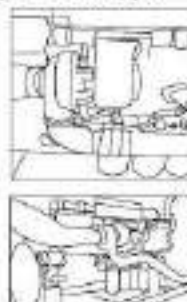
★Check the leakage of the turbocharger and exhaust pipe

You must check the leakage situation of the pipe of turbocharger as well as the connectors of each gas hose before the start-up of engine. If leaking,

please change all the damaged seal rings, connected pipe. Once the vent of crankcase is blocked, the pressure will higher, the oil may pressed into the gas handling system of booster and engine.

Notice

Never start the engine in the case of disengaged of turbocharger and exhaust pipe.

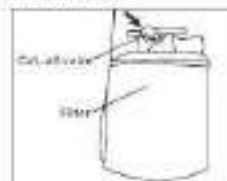


★change the filter core of cooling water

Firstly close the stop valve, get out the old core, tube the o-rings with lubrication, then tighten the new one by hand, screw it by half coil. In the end, open the stop valve.

Notice

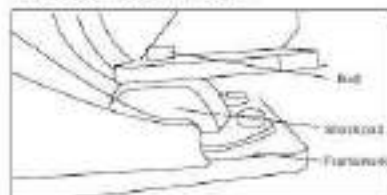
The liquid level of the expansion tank should be checked, refill that in time.



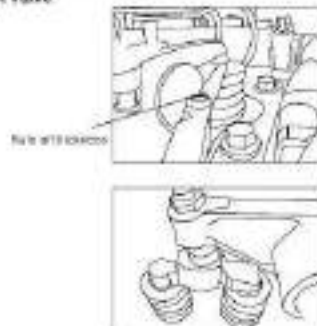
★ Check the damping pad and fixed bolt if they are loose

It is essential to check if the damping pad damaged or the loose of the bolts before the start-up of engine.
Function of damping pad:
Fasten the engine onto the frame work, which can

buff when start-up of the engine.



★Check and adjust the gap of inlet and exhaust valve



The open and close time of gas gate may be relevant to the gas gate cap. It will be late if the cap big, and be earlier if narrow. Way of adjusting the gap:
Turn the crankshaft to the position that the inlet valve just open but the outlet valve incomplete open. Check the valve gap, adjust it if necessary.

Notice

The check sequence of the air valve is 1-2-3-4-5-6, and the observe sequence of rotational crankshaft is 8-5-4-3-2-1.

See User's Guide of "VOLVO Engine" and "Cummins Engine" for more details of use and maintenance.



3.2 Repairing and Maintenance of Transmission

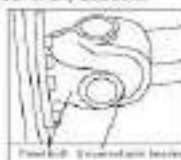
★Check and add the drive shaft oil

Let the engine run slowly, then draw the dipstick to oil place of the gear-box. Add the oil as told when the place is lower than the lowest station.

Action: Select the right lubricating oil, according to the type of the gear-box.

★Check the fixed bolts of the drive shaft

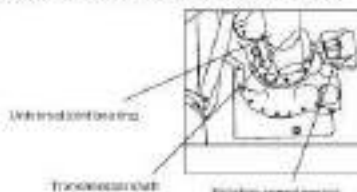
The loose bolts may be easily sheared in the action of load and vibration. The fixed bolts should be inspected carefully for fear of any accident.



Check measure:
To see if the fixed bolts loose.
If the universal joint shaft damaged.
Retightened the loose shaft bolts with 200NM moment.

★Check the speed sensor

Check the speed sensor and its support to see if the speed signal can be transferred correctly into the control system by the inductor. For the protection of driving device, make sure that only when low speed can the gear position be shifted.



★Change the gearbox filter

Block of filter will reduce of volume of gear shift and lubrication.

Change the filter core of gearbox:
Firstly detach the old core. Then the seal rings of the filter should be infiltrated by the fresh engine oil; tighten it by hand and then screw it two-thirds oil.



★Change the gearbox oil

Check if there is any dirt in the old oil to see the working condition of gearbox components. If it has been polluted, open the fuel outlet, and give it off. As it is finished, first plug the outlet, then fill the oil to the min position level. Start the engine, let the oil reach the normal temperature, then check the oil dipstick, refill the oil to the max level position of oil dipstick.



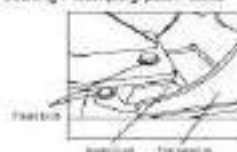
Action: Shift DosaarT226W-30 shafting oil is adopted for DANA Clark 360.00.

★Check if the fixed bolts and fixed seating are loose

Action of fixed seating and damp pad:
It plays a part of damping the vibration as the start-up, operation or halt of gearbox.



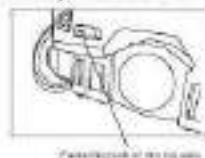
Check items: fixed seating, damping pad, bolts



3.3 Repairing and Maintenance of the Drive Axle

★Check the tightness of the fixed bolts of driving axle

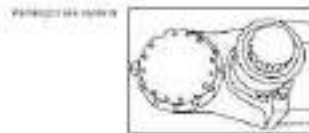
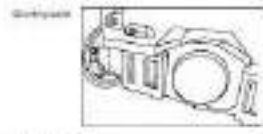
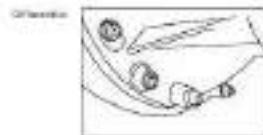
Loose bolts may easily be cracked with load and vibration.
Fracture of bolts may do a serious impact to our device, and may even cause injuries and deaths.



Action: Tightness of bolts of drive axle: moment 1200NM

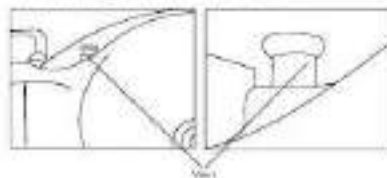
★Check the leakage of driving axle and brake components

Check items:
Oil dipped disk brake and its connecting tube, parking brake system and its connecting tube, differential mechanism, drive wheel and drive axle.



★Clean the connector of vent hole

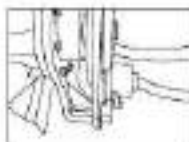
The purpose of cleaning the connector of vent hole is to let the steam in the drive axle escape for fear of high pressure in the drive axle. If not, may bring about leakage of seal components.





★Check the hand brake block and hand brake function

Start up the engine; do not stop it until the accumulator charging. Stop the engine, turn the fire key to position 1, release the parking brake. inspect that if the parking brake nipper can shift on the bracket, as well as the cap of brake gasket and Brake disk if it satisfied to the requirement, adjust it if necessary.

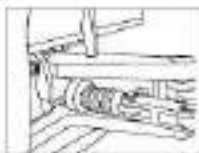


Caution There may be danger of crush if machine shifts freely, so in order to avoid accidents, make sure that the truck may not move even if the brake is released.

3.4 Repairing and Maintenance of the Steering Axle

★Check if there exists the gap or damage of components of steering axle

Check steering cylinder, joint shaft and joint bearing, steering link rod, damping rod, and counterweight, if any component loose or any abnormal gap and damage as well as the leakage of the steering axle. If one of the cases occurred, deal with it immediately.



★Check the anti-lipper inductor

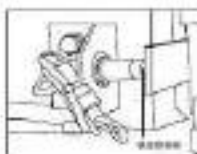
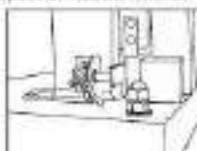
Function of anti-lipper inductor:
In normal condition, anti-lipper inductor is in normally closed state. When hoisting overload

causes carriage fail to lift, the clearance between inductor and induce track will be enlarged, the induction will send no signal. With this mode, a kind of overload signal will be formed, which make the container retain to current state for fear of accidents.

Before the machine lifting, please carefully inspect the reliability of inductor.

To find out if the sensor damaged as well as the reliability of angle-bar of inductor

block or bolts and if the space of inductor normal.



★Check the tyre if deviate

In normal cases, all the wheels should swing to the same direction, and be parallel of the back wheel.

If there is something serious, please check the linking structure.



★Check if the steering wheel shaft and fixed bolts loose

Check measures:

- Detach the wheel hub cover;
- Clean out the grease of wheel hub cover and steering wheel shaft;



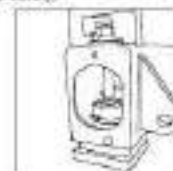
3.5 Repairing and Maintenance of the Spreader

★Check the rotary-lock and its components

Check the rotary-lock components if damaged, change it if necessary.

Check the position of rotary-lock link rod if correct and firm, adjust that if necessary.

Notice It is important to check the rotary-lock and its components because it plays a key role of lifting the containers correctly and safely.



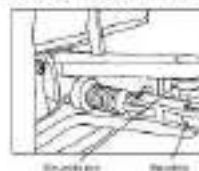
- Detach the lock cushion ring and lock nuts;
- Tighten the nuts with the moment of 350NM, rotate the wheel hub for 10 loops;
- Tighten the nuts with the moment of 350NM again; check the spacer ring of wheel hub if it lies on the wheel axle. If not, retighten it;
- Mount on the lock nuts, tighten it with the moment of 350NM;
- Film the grease on the safety cover of shaft, then fixed on.



Notice Take care of the abrasion state of shaft; change that immediately if damaged.

★ Check if the knuckle-pin and fixed nut are loose

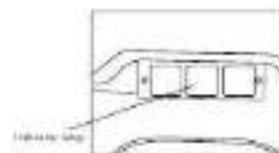
Clear out and check the shaft bearing. Check the knuckle-pin if it can roll smoothly, and the max rotate distance is not allowed to exceed 0.25mm. Rise stroke can be adjusted by the nuts.



Notice Find out the abrasion and loose components as early as possible and take some measures to give a precaution for fear of accelerate failure of some components.

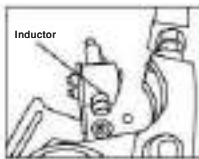
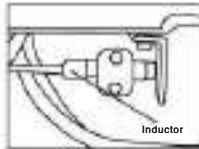
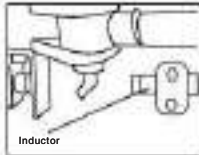
★ Check the status of rotary-lock inductor and indicator

Check items:
Each inductor and its connection status;
Each inductor if not firm or damaged;
If the gap of inductor block normal;
If the induction lights are in the normal operation state.



MAINTENANCE OF THE EQUIPMENT

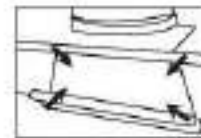
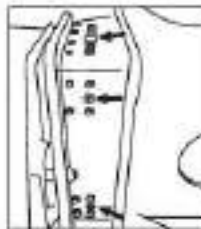
Container Reach Stacker Maintenance Manual



★Check abrasion status of the slide blocks in the spreader

There are two kinds of slide blocks on the spreader: side-slide blocks and 20'-40' extension blocks, which do an action of sustentation and guiding.

Firstly detach the bottom strap, shim and slide block, then measure the thickness of slide blocks as well as the gap of slide block and slide components, adjust and change the shim if necessary, at last reinstall the strap.

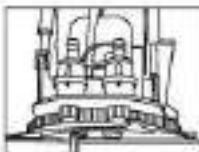


★Check if there exists the gap or damage of components of steering axle

Regularly inspection on the fixed bolts is necessary for fear of accidents caused by loose of bolts.

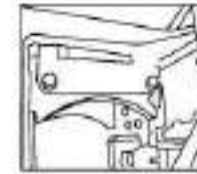
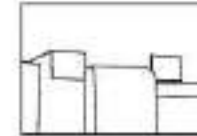
Rotary motor is composed of hydraulic motor, disk brake, planetary gear set, who are connected by fixed bolts.

The hydraulic motor lies on the upper of disk brake, which provides rotary power. Disk brake is something that avoids accidental rotation and followed by the rotation of hydraulic motor, which makes the brake released and spreader planetary gear rotated, so that the output of motor and disk brake will be enlarged.



MAINTENANCE OF THE EQUIPMENT

Container Reach Stacker Maintenance Manual



3.6 Repairing and Maintenance of the Jib System

★Check the fixed seating and pin roll of the basic boom if loose or abrasion

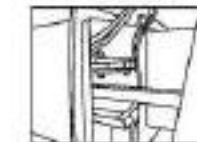
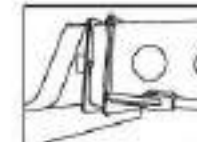
The fixed seating and pin roll of the basic boom is the key components connected with frame and spreader. And the stability of structure and welding of fixed seating, pin roll, bearing of pin hole and fixed bolts should be checked periodically. Please

color them if necessary.



★General observations of cracks

The spreader is the direct container-lifting device of the machine, usually inspection of the important components, to find out the cracks as early as possible is necessary.



★Check the fixed seating and pin roll of the pitch cylinder if loose or abrasion

Check if there is any crack around the fixed seating; please color it for next inspection if necessary.



★Check if the slide block of basic boom wears to extreme

Firstly detach the strap, shim and slide block, then

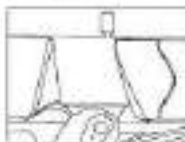
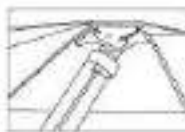
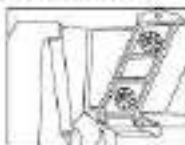


measure the thickness of slide blocks as well as the gap of slide block and slide components, adjust and change the shim if necessary, at last reinstall the strap.



★General observations of cracks of basic boom

Usual inspection of the usage of basic boom, to find out the cracks as early as possible, then deal with that immediately for fear of deeper damage.



3.7 Repairing and Maintenance of the Air Conditioner System

Main checking items within 50 hours:

- Check transmission strap tightness of compressor and adjust it promptly;
- Check the leakage of each pipe connector. There might be leakage when the refrigerant connector has grease dirt;

- Check if the fixation of pipes is in good condition, pipes is over close to the heating component, rotary component and control rocker arm;
- Check if the connector of circuit harness is in good condition, harness fixation is solid. Pay special attention to the compressor clutch plug;
- Check if the fixed bolt of compressor is fastening;
- Check the fixed bolt of air conditioner is fastening;
- Take off fresh air filter core, blow the dust off from backside, and reinstall it.

Main checking items within 100 hours:

- Recheck the above checking items;
- Blow the condenser with compressed air. Don't use the high-pressure squirt gun;
- Clean out of the dirt on the condenser.

Main checking items within 200 hours:

- Recheck the above checking items;
- Change the fresh air filter core;
- Adjust the transmission strap tightness of compressor.

Notice Add proper amount of coolant. Too much or too less would affect the cooling effect. Air conditioner should be started for several minutes every week in order to lubricate each component even in winter.

3.8 Repairing and Maintenance of Tyres

Tyres

★Check the tyre condition and pressure

Before starting the equipment, check if there is any cracks on the tyre surface, any corrosion and over-wear. Change the over-wear tyre. Check and clean dirt on the tyres, such as glasses, etc. Check tyre pressure, add it when it's too low. Low tyre pressure may have bad influence on stability and load capacity of the equipment.

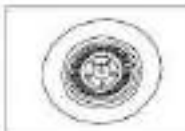


Notice

Don't over charge the tyre, keep the tyre pressure in a normal condition.

★Check the tyre plate and nut tightness

Check the tyre nut tightness. Screw the rear axle nut with 350NM moment, front axle with 400NM moment.



★Attention when changing the tyres

- If the tyre tread at the 1/4 breadth of the tyre is worn in 2-3mm, replace the tyre;
- Old tyres can be replaced with retread tyres;
- Must use tyres appointed by Sany Group. Using different type of tyres may cause early damage of tyres or tyre explosion and endanger people and equipment;
- Changing dangers is accompanied with danger. Trained workers must follow the operation steps with proper tools. Any operation doesn't follow the standard schedule may cause explosion which has enough power to hurt even kill someone;
- Anyone without formally training is strictly forbade to install or dismantle tyres.

★The Dismantlement of Tyre

- Before dismantling tyre, deflate the tyre to reduce the air pressure;
- While dismantling tyre, do not use sharp tools; do not pry the tyre bead forcibly; do not hit the tyre with a big hammer;
- While dismantling tyre, replace the O-shape loop. Before installing felly, check the O-shape loop to see whether there are any defects and apply lubricant on it;
- While dismantling tyre, use the bead detacher or the dotcher. Forcible prying and smashing should be prohibited to avoid damage to the sealing layer in the tyre and bead. To facilitate the installation, neutral soap tyre or special lubricant can be applied to the bead bottom and ring support of the felly. Some lubricants, such as grease lubricant, which affect the quality of the tyre, should not be adopted.

★Installation of Tyres

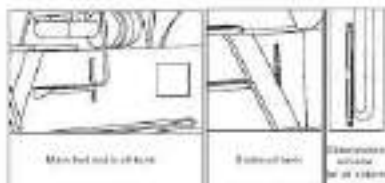
- Install the tyre in the felly, which is installed in the wheel hub. The direction-mark on the side of the tyre should be in consistency with the forward direction of the front-handling crane. The locating cone hole in the felly should match the outer cone of the hub to ensure the superposition of the felly center and the hub center;
- When the tyre is pumped, the pumping pressure should be ensured at around 1kpa;
- Install the pressure plate on the threaded stud of the hub and screw the hub nut. The hub nut should be screwed down gradually with symmetrical force. The moment of screwing down the hub nut is 300-370Nm. When the nut is screwed down, make sure 2-3 circles of screw thread of the stud expose;
- Test the installed tyre by spinning it. Make sure the right-left amplitude of swing at the maximum outside diameter of the tyre is less than 3mm.



3.9 Repairing and Maintenance of Hydraulic System

★ Check the oil volume of main hydraulic tank and brake tank

Check the oil volume of hydraulic tank and brake tank if it is sufficient by the window (the oil level height should exceed the red line, at the position of 3/4 of the window), if deficient please fill in.



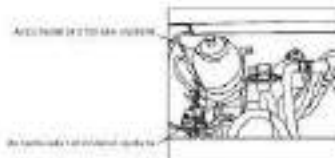
Notice
As checking the oil volume, all of the cylinder should retract to the original position.

★ Check the pressure of accumulator

There are two accumulators of hydraulic system: Brake system accumulator and control system accumulator.

Start the engine, let it rotate at idle speed for 3 minutes (the accumulator may not be charged completely until the charging valve of brake system accumulator shift to coolant loop). As the engine halted, turn over the start-up key to position 1, and then step on the brake pedal forcefully with under square mode and to keep a small period of time at stepping position each time. There can be at least 20 times brake before the warning light on, if not there may be some problems in the system; you'd better give a further inspection. There are also pressures testing joints, which can be measured directly.

Generally, the accumulator pressure of control system is ascribed to the requirement of control system.



★ Check the if hydraulic pressure is consistent with the hydraulic rating plate

— Test of the main system pressure

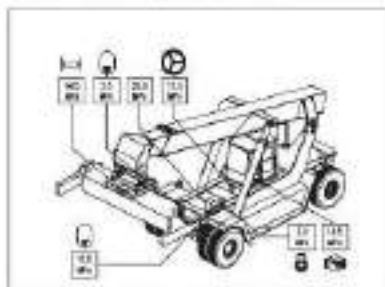


Diagram of hydraulic rating plate

Start the engine, to keep it in idle speed; there are two main pressure testing points, whose testing pressure should be the same. The result will be displayed on the screen.

— Brake pressure testing
Brake pressure should be 14.5±0.5MPa.

Notice
Please step on the brake pedal as testing the pressure of brake system.

— Steering pressure testing
To keep the engine with medium speed, turn the steering wheel to only one direction, the max pressure you have got in this process is steering pressure. The valve is 1.75±0.5MPa.

— Accumulator pressure testing
Start the engine, release the pressure, and get



the measured value (the max charging pressure) as the accumulator has been charged completely, then get another value as the accumulator being recharged (initial charging pressure). The accumulator measured pressure is composed of brake system and control system testing pressure, whose rated pressure are 10-0.5MPa and 2.5-0.5MPa individually.

— Spreader system pressure testing
The spreader system pressure is 14-0.5MPa.

★ Change the entire high pressure filter
Blocked filter may lower the flow of hydraulic oil, the movement speed of cylinder may be affected, besides, it will bring about to greater oil pump pressure to make the tube easy to burst. The hydraulic system is sensitive to the impurity, the light damage of chromium piston rod may bring about the leakage of seal components.

Notice
Replace all the seal O-rings; change a new filter core with the moment of 140NM.

★ Change the hydraulic oil and brake oil
The oil may be worsened gradually by the effect of pollution and heat; metamorphous oil may accelerate the abrasion and erosion of components such as pump and valve, take periodical examination, change the hydraulic oil and brake oil.
Please adopt for the VG68GS hydraulic oil at the tropical zone or long-time use place.

Notice
Do not forget to fill in the oil for main pump case first before you have finished the whole renewing of the oil.

★ Change the breather filter of main hydraulic tank and brake tank
The hydraulic system is sensitive to the impurity

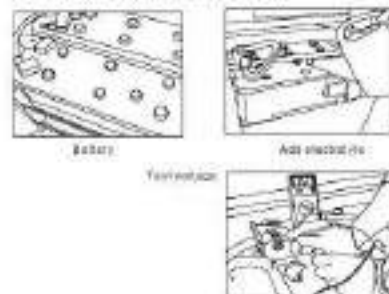
such as dust, sand, liquid and gas, the pressure of oil tank may be higher if the breather filter blocked, so periodically change the breather filter.

★ Change the return oil filter
The flow may be hampered if the filter blocked, which bring about high pressure of outlet and burst of oil tube.

3.10 Repairing and Maintenance of Electric System

★ Check if there is enough battery water
Check the voltage of battery, which should be 23-25V as the engine halted 27-29V as the max speed.

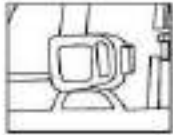
As the engine powered off, turn off the main switch, tidy the battery, its line and joints. Check all the connectors if they are tightened. Smear the grease on the blading post and connectors, put a rubber gasket under the battery for fear of drain, and check the height of electrolyte, which should be 10-15mm higher than the battery, fill with the plasma water when it is not enough.



★ Check all the work light and indication light
Turn on all the work lights and indication lights, to see if they are normal.

LUBRICATING

Container Reach Stacker Maintenance Manual



Front headlamp



Rear headlamp

Boom lamp



★**Test the overall function of hydraulic system**
Operate the electro-hydraulic control handler; test all the hydraulic functions such as pitch and contraction of jib, expansion, contraction and sideshift of spreader. Find out parts that need adjustment.

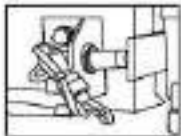


★**Check horn, reverse buzzer and rotary warning light**

Turn on the horn, reverse buzzer and rotary warning light to check they are working.

★**ROPS system test**

Test if the ROPS system is working. Once the controller get the front tilting signal, it would lock the motion immediately (except contraction), give a warning and flash the red light. The signal would get through relay to control the front red acousto-optical alarm prompt. Once the controller gets the signal, that red light would turned on, display screen will also have the malfunction warning signal.



★**Test the Rotary-lock safe interlocking device system**

Before turning on the rotary lock, check if all the standby lights (green) is on; while the rotary isworking , check if all the sensor light (yellow) is on; check if clearance between sensor and sensing block is normal, if there is any sign of abnormal, treatment should be taken promptly.

4.Lubricating

4.1 Lubrication

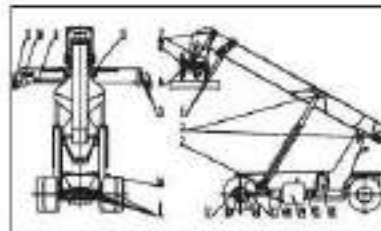
Add lubricant coating in order to ensure the smooth rotation and sliding parts, not sufficient lubrication can cause issuing and excessive wear parts. Lubricant is to guarantee the normal operation of machine of lubricating necessary materials.

Reach stacker use Mobil EP2 hanging type automobile universal lithium grease, banning the use nonspecified lubricant by Sany Group.

Lubricating (butter) method:

Firstly clean the grease fitting, do not stop to inject the butter with the grease gun until the old grease is forced out.

4.2 Lubricating Table



Container Reach Stacker Maintenance Manual

LUBRICATING

Lubricating Table of the Machine

Lubricating points	Brand	Amounts	Cycle
Steer axle	Mobil lubricating grease EP2	15	60 h or every week
Pitching cylinder fulcrum		2	
Lubricating pump		4	
Jib extension and contraction lubricating block		14	
Extension and contraction surface of spreader		6	
Pivot of jib and spreader		2	
Damping cylinder lug of spreader		4	
Sideshift cylinder lug of spreader		4	
Sideshift surface of spreader		4	
Extension-contraction cylinder lug of spreader		4	
Rotary lock of spreader		8	
Turntable slewing bearing of spreader		4	
Transmission axle		3	
Parking brake	1		
Diesel engine	Shell Diesel engine CG-415W40	1	250 h
Brake oil tank	Shell transmission oil DonaxTD5W-30	1	1000 h or one year
Reducer of driving axle	Shell gear oil VG150 (>0?)	2	1000 h or one year
Differential of driving axle	Shell gear oil VG150 (>0?)	1	1000 h or one year
Hydraulic oil tank	Shell anti-wear hydraulic oil VG46T	1	2000 h or one year
Torque converter	Shell multi-function transmission oil Donax TD 5W-30	1	2000 h or one year
Engine radiator	Shell antifreeze (freezing point-45°C)	1	one year

5. Functional oil

5.1 Oil specification

Use correctly the fuel, the hydraulic liquid, the lubricating oil and the cooling liquid which SANY Group recommends in written form. Check the quantity and quality of all functional liquids regularly. The equipment cannot start operation unless all functional liquids satisfy the needs of the equipment.

Type	Brand	Specification	-30 -20 -10 0 10 20 30						
Fuel	Diesel oil		-30#						
Engine oil	Shell Diesel engine CG-415W40	API Diesel engine CC (crank)	SAE10W	SAE30					
			SAE10W130	SAE30W					
Driving axle oil	Shell gear oil VG100(X-RC) VG100(L-RC)	GLT	SAE80W	SAE90					
Transmission torque converter oil	Shell transmission oil DexacT D5W-50		SAE10W130						
Hydraulic oil	Shell anti-wear hydraulic oil VGANT 152C Shell		SAE10-15W	SAE30-4E					
Transmission cooling oil	transmission oil DexacT D5W-50		SAE10W	SAE30W40					
Lubricating oil	General Purpose Oil		Maypole oil EP2						
Antiwear	Shell antiwear (freezing point)-45		-45C						

Oil features are different from different manufacturer, so client should use recommended oil.

5.2 Oil Capacity

You must use the right Fuel, Hydraulic Liquid, Cooling Liquid as SANY test says, and check the quality and quantity of all the liquid often. Only all the liquid has good quality and enough quantity, the engine is able to work.

Capacity Table

Item	Capacity (L)
The Fuel Tank	470
The Hydraulic Liquid	900
The Engine Cooling Liquid	50
The Drive Axle and Torque Converter	50
The Driving Axle	40
The Wheel Reducer	2.11
The Engine Oil	25
The Brake Oil	100

Notice

The capacities in the above table are for reference.

The oil level indicator is placed on the side of the oil tank in order to check the oil level in the tank.

5.3 Check and Change of Hydraulic Oil

The Shell brand antiwear hydraulic liquid is adopted for this machine. The hydraulic liquid in the tank should be checked every 6 months in the form of the appearance appraisal and quality analysis. The appearance appraisal refers to estimating whether the performance of the hydraulic liquid deteriorates. Please see the following table:

Appearance Appraisal of Hydraulic Liquid

Phenomenon	Disturbance
Darkening Color	Oxygen
Milky White	Water or Emulsion
Bubbles	Air
Floating Impurities or Sediments	Solid Particles
Separation of Oil and Water/Separation of Oil and Water	Water

The quality analysis refers to regular laboratory tests made on various items, including the viscosity, oxidation, water content, additive and cleanliness. They will be compared with the normal value to determine whether the hydraulic liquid needs to be replaced. Among the items, the cleanliness is the major one which indicates the quantity and size of the solid particles in the hydraulic liquid.

This system's requirement on the cleanliness of the hydraulic liquid equals to level 8 or level 9 in NAS1638 which is comparable to 17/14 level of ISO standard. Please see the two tables:

NAS1638 Standard

The Level of Cleanliness	The Size of Solid Particles (µm)					
	3-5	5-10	15-25	50-100	>150	
Level 7	32,000	6,700	1,652	500	50	
Level 8	64,000	11,400	3,025	900	80	
Level 9	128,000	22,800	4,050	1,200	120	

Notice

The level 8 in the NAS1638 indicates that, in the 100ml of sample, the number of the particles with the size of 5-10µm will not exceed 64,000; the number of those with the size of 15-25µm will not exceed 11,400, so on and so forth.

The ISO Standard (DIS4406, SAEJ1155)

Level of Cleanliness	The Size of the Solid Particles (µm)	
	>5	>15
16/13	16,000	8,000
17/14	125,000	
18/15	250,000	32,000
19/16	500,000	64,000

Notice

The cleanliness level 17/14 in ISO standard indicates that, in the 100ml of sample, the number of the particles with the size above 5µm should not exceed 125,000; the number of those above 15µm should not exceed 16,000.

FUNCTIONAL OIL

Container Reach Stacker Maintenance Manual



During utilization, the particle contamination level in the hydraulic liquid in the tank should not exceed 10/15 (which is comparable to NAS10 level)

The hydraulic system of this machine has the following items for oil change:

Variations of viscosity: 10

The increase of acid number: 0.1-0.25mgKOH/g

Moisture: <0.1%

Mechanical Impurities: 5%

Variations of density (150°C): 0.05

Copper sheet erosion: disqualification

Rust preventing ability: disqualification

Ash content: 0.00%

Variations of surface tension: 15 dyne/cm

Residue carbon: 0.05-0.10

Variation of color (Union grade): above +2

The hydraulic liquid, the checking results of which are not up to the requirement, should be changed in time. The change of oil should follow the following steps:

— Remove the plug on the bottom of the hydraulic oil tank to drain the hydraulic oil in the tank and pipe.

— Open the hydraulic oil tank to clean the hole cap.
— Use the cleaning liquid (diesel, etc.) and pads to clean the oil tank.

— If it is qualified after being checked and cleaned, the cleaned hole lip should be installed back.

— Add oil to the tank. Open the air filter lip on the top of the oil tank. Add the hydraulic oil filtered by 5μm filter (filtering car) to the oil tank through the filter element until reaching the full scale of the oil indicator.

5.4 Using Principle of Oil

Working temperature of brake oil and hydraulic oil don't exceed 80°C, selecting principles are:

Brake oil:

Hydraulic oil No.46 + Additive LZ9990A.

Proportion: + 5.8% ~ 6.5% (Suitable environment temperature > -5°C)

Hydraulic oil No.32T + Additive LZ9990A.

Proportion: + 5.8% ~ 6.5% (Suitable environment temperature > -5°C)

Hydraulic oil type:

Shell hydraulic oil No.68 (Suitable environment temperature 30°C)

Shell hydraulic oil No.46 (Suitable environment temperature 35°C ~ -5°C)

Shell hydraulic oil No.32T (Suitable environment temperature < -5°C)

Southern area of China (All year long)

Brake oil—Hydraulic oil No.46+Additive LZ9990A.

Proportion: 5.8% ~ 6.5%

Hydraulic oil—Shell hydraulic oil No.46

Guangdong province (China), Southeast Asia, Brazil, New Zealand etc. areas.

Brake oil—Hydraulic oil No.46+Additive LZ9990A.

Proportion: 5.8% ~ 6.5%

Hydraulic oil—Shell hydraulic oil No.68

Northern area of China, Germany, Sweden, America, Australia etc. areas

Brake oil—Hydraulic oil No.32T + Additive LZ9990A.

Proportion: 5.8% ~ 6.5%

Hydraulic oil—Shell hydraulic oil NO.32T

Severe cold region (temperature lower than -25°C), Russia, Canada etc. area

Brake oil—Hydraulic oil No.32T + Additive LZ9990A.

Proportion: 5.8% ~ 6.5%

Hydraulic oil—Shell hydraulic oil No.32T

Changing period:

Hydraulic oil—Running-in of new equipment: change it after 50 h; second time: 500h; following changing period: 1000h

Hydraulic oil—Running-in of new equipment: Change it after 50h; following changing period: 2000h

Notice when the environment temperature is under 0°C, equipment has to be warming-up for one hour.



CHECKING OF KEY BOLTS

Container Reach Stacker Maintenance Manual

6. Checking of Key Bolts

Before start, carefully check fastening status of key bolts. Loose bolts will possibly cause acute shaking, damaged parts, weak function, broken bolts, and other dangerous phenomena, and, periodic check will avoid accidents. The following items of the bolt should be carefully checked:

- Checking of fixed bolt of engine
- Checking of fixed bolt of torque-converter
- Checking of fixed bolt of transmission shaft
- Checking of fixed bolt of drive axle
- Checking of fixed bolt of crane spreader rotary gear case
- Checking of fixed bolt of tyre pressure plate

Notice

If the bolts are loose, please check it with torque spanner and screw the bolts and nuts to torques according to figures in the following table. If bolts or nuts are broke, they should be replaced with equal or higher standard bolts or nuts.

Fastening Torque Standard

Standard (Natural Size)			
Screw Thread dimension	Standard Fastening Torque (Nm)	BMW Thread dimension	Standard Fastening Torque (Nm)
M8	11.8	M14	10.0
M6	26.7	M16	26.7
M10	51.16	M20	51.16
M12	126.26	M24	126.26

Bolts' Fastening Torque of Main Components (Undetermined)

Bolt dimension	Force needed (excluding coefficient)
M12 1. 20 fixed bolt of engine	70.3
M16 20	100
Fixed bolt of torque converter M12 130	65
Fixed bolt of transmission shaft M24 300 fixed bolt of drive axle	1150
M24 2 Fixed bolt of tyre pressure plate	989
M30 2	472.1 0
Fixed bolt of steering cylinder	1400 1 0
Fixed bolt of crane spreader rotary gear case	1400 1 0

Notice

- Make sure thread on the bolts and nuts are clean before install them.
- Lubricate the bolts and nuts to stabilize their friction coefficient.
- If the bolts of counter-weight are loose, screw up immediately; please contact your nearest and Sany service engineer.
- Standard measurement of torque is Nm. For example: Screw bolt or nut with a spanner (m) with 120N force twisting the spanner and, which would generate following torque: 1m*120N = 120Nm. Same torque by using a 0.25m spanner: 0.25m*γ=120Nm. Needed force: γ=120Nm/0.25m=480N.



7. Safety Regulations during Maintenance Work

Safety regulation while maintenance, checking and lubricating.

★ Safety regulations in working place:

- Make sure equipment parked in a safe place;
- Segregate a safe area with a ribbon if necessary;
- Arrange a signaler to assist the work if necessary;

★ Safety regulations of product:

- Use warning sign;
- Cut off or lock the electric power switch to prevent unauthorized reenergize;
- Release the electric power or discharge the storage energy liquid power, gas power or electric power;
- Regarding to information of certain situations and working conditions which haven't included in this manual, please ask manufacturer for help.

★ Safe protection of personnel:

- Must wear working cloath, helmet and safe shoes while working;
- Safety belt must be weared while working in high position;
- Hang the warning brand of "stop, is repairing" on the equipment.

8. Common Faults and Measures

8.1 General

The machine can finish the operations such as pile, fetch containers and operating with containers. It must bring some certain impacts to users on the progress of work, economic and social benefits, etc. when the faults occur. With a timely diagnosis and elimination, the customers can restore the economic losses and keep our corporate image. This section will state the common faults of machine and give elaboration corresponding to the measures in three major aspects of mechanical system, hydraulic system, and electrical control system.



8.2 Common Faults of Mechanical Systems and Measures

Table 8-1 Common Faults of Mechanical Systems and Measures

Category	Faults	Causes of faults	Measures
Engine is abnormal	Difficult to start up	Temperature is too low (preheating time is short), Air filter or air intake jammed, Thermostat is failure, Starting voltage is insufficient	Fully preheating of engine; Check whether the engine gas-handling system jammed; Check fuel oil system; Check the thermostat; Check battery voltage.
	Engine high-speed	EDC fuel control unit has problem	Engine high-speed
	Bellows cracks with air-leakage	Seal-faults	Repair
	Engine speed up with difficulty	EDC fuel control unit with a problem	Check the EDC fuel control unit
	Engine jacking by itself	Knock on (oil) or (gas) pipe can enter into (oil) (gas)	Check whether the valve is set; Check whether the line pipe or armors with air
	Engine temperature is too high	Lack of water coolant, Thermostat failure, The fan belt is loose, The water pump is damaged	Check whether coolant water is enough; Check it is correct; Check whether the fan belt is loose; Check water pump
	The water with oil but oil without water	Engine Oil Cooler is damaged	Check whether the oil cooler is damaged
	Cylinder head Cracks	Seal-faults coolant is not enough	Repair; Check whether the coolant is enough
	Fuel level of oil pump tank with water	Cylinder head or cylinder body cracked, outside into water	Check whether cylinder head or cylinder body cracks; Check whether cylinder body is damaged
	Lubricating oil pressure is too low	Low-oil level, oil filter jammed, Lubricating oil is too thin	Add or replace lubricating oil; Replace filter
	Water leakage	Water tank is damaged	Repair
	Diesel water leakage (green oil)	Diesel filter is damaged	Replace
	Engine power is not enough	Insignificant fuel, Diesel does not meet the quality requirements, The air intake jammed	Check whether the fuel is correct; Use smoothly; Check whether the air intake is smooth; Use the approved fuel

COMMON FAULTS AND MEASURES

Container Reach Stacker Maintenance Manual



Category	Faults	Causes/Leak	Measures
Engine is abnormal	Automatic deceleration of the engine	Oil supply is not enough	Check whether the fuel is sufficient (amount)
	The diesel rough filter and second filter of engine is jammed	Oil is too dry, the cleanliness of diesel filter is not enough	Use the clean diesel. Replace oil type
	Engine exhaust pipe leakage	Exhaust pipe is damaged; exhaust pipe joint is not sealed enough	Check the leakage position and repair
	Engine fan belt broken	Self-loose, the belt is too tight	Replace the belt. Adjust the belt tension
	Engine with blue-smoke	When intensity between air and exhaust guide tube is comes larger or scraper is damaged	Replace air intake guide tube. Replace oil scraper
	Engine speed up with difficulty	EDC fuel control unit with problem	Check the EDC fuel control unit
	Engine to overheat with oil leakage	Seal damage, cooling components damaged	Replace the sealing components
	Fuel meter shows wrongly	Fuel meter or float level sensor is damaged	Check fuel meter and float level sensor
	Oil seal of engine front crankshaft with leakage	Self-loose	Replace
Gearbox is abnormal	Clutch slipping	Low oil pressure, clutch steel, charging pump is damaged, Clutch abrasion and heat distortion	Check the oil level; Check the charging pump; Change the clutch
	High oil temperature	Low oil level, charging pump is damaged, high oil level, too much working hours or too bad condition of torque converter, the clutch cannot break away in the condition of long period brake	Check the oil level of lubricant; To avoid to make the torque converter work in the condition of full-throttle mode; Stop on the clutch switch or brake, check the clutch switch if it is available
		Big noise	Gear mesh with problems, shaft bearing abrasion or damaged
	Self-increase pressure of oil pressure gauge	Low oil level, charging pump is damaged, pressure control valve of clutch is damaged, release components of clutch is damaged	Check the charging pump; Check the pressure control valve; Change the damaged seal components

COMMON FAULTS AND MEASURES

Container Reach Stacker Maintenance Manual



Category	Faults	Causes/Leak	Measures
Gearbox is abnormal	Gearbox control shift	Gearbox control unit with problem	Check the signal of gearbox control unit if it is correct, check the magnetism of gear box magnet valve if it is burn-out, the advance valve if it is blocked
			Low brake air pressure, adjust brake air pressure, brake block abrasion and oil seal damage
Differential is abnormal	Front brake lever not enough	High temperature of brake oil	Check the temperature of cooler system, change the filter element if they were damaged
			Big noise
gear change noise	Mesh of shift is not good	Contact Failure	Improve the contact
Apply Hydraulic	Control failure	Contact Failure	Improve the contact
Traveling machine	Angle adjustment failure	Retaining mechanism Failure	Check the retaining mechanism
Control mechanism	Control cable failure	Brake cylinder failure or wear	Check the oil circuit of brake cylinder
Control damage	Control cable failure	Tighten the loose bolt	Tighten loose bolt

5.3 Common Faults of Hydraulic System and Measures

Table 5-2 Common Faults of Hydraulic System and Measures

Category	Faults	Cause of faults	Measures
Boom System	Lifting phenomenon at the boom retracting	Magnetic valve block	① Clean the magnetic valve
	Automatic retraction of the boom	① Internal drain of the spring ② Self-lock function of logic valve ③ Malfunction	① Do an inspection and change the seal components ② Check the logic valve
	No push, telescoping of the boom	① Loss of pressure ② Logic valve with problem ③ Only one pressure of differential magnetic valve	① Check and adjust the pressure value of between pump and main valve ② Check the logic valve ③ Check the electric state of differential magnetic valve
	The boom can not reach its position	① Low oil tank level ② Cushion protection distance of telescoping cylinder is too large ③ Deficiency pressure of the system	① Add the hydraulic oil to the tank ② Adjust the cushion protective distance ③ Increase the working pressure of the system
Spreader System	No pressure in the system	① Control valve, relief pressure valve damaged or valve core blocked ② No output of oil pump	① Change and clean the control valve, relief pressure valve ② Check the oil pump feedback valve
	Without movement	① Electrical Fault ② Magnetic valve is damaged or the spool is blocked	① Change the circuit ② Clean or change the magnetic valve
Brake System	Without foot brake valve the press function failure	① Stroke valve failure ② Brake Failure ③ Pressure Relay Fault ④ Accumulator Failure ⑤ Gear pump Failure ⑥ Return valve block (air)	① Adjust the distance of stroke valve ② Check the clearance of brake block ③ Clean or Replace ④ Replace ⑤ Replace the gear pump ⑥ Clean or Replace the valve

Category	Faults	Cause of faults	Measures
Lift System	Without the handbrake or handbrake failure	① Parking brake failure ② Magnetic valve failure ③ Feed pump Failure ④ Shuttle Valve Failure	① Clean the parking brake ② Clean the magnetic valve or change ③ Check the return line ④ Clean or replace
		Steering System	Fail or too soft
Cooling System	High oil temperature		
		Hydraulic Oil	Hydraulic oil polluted and gas
Leakage of hydraulic oil	① Seal components damaged or obsolete ② joints, pipe thread are loose		

5.4 Common Faults of Electrical Control System and Measures

Due to the complexity of malfunction of electric control system, careful observation and research and rich experience are needed to determine the real cause of malfunctions. After determine the cause of malfunctions, eliminate them from the easy ones to hard ones.

Table 5-3 Common faults of electrical control system and measures

Category	Faults	Cause of faults	Measures
Electricity component	Non-operation of Magnetic valve	1 Broken a spring of return coil 2 Rust - water of magnet 3 Spool abrasion or in a state of seal - ring aging 4 Severe oxidation or pollution in the valve 5 Loss of data of detection spring 6 Loss of data of detection valve	1 Change coil 2 Scrubbing magnet 3 Change spool or seal ring 4 Scrubbing magnet 5 Change the spring
	Water level alarm as full water tank	1 Short circuit 2 Fault of structure of water level switch 3 Reversal of water level switch	1 Check and recovery 2 Change 3 Put in water, make sure that the alarm is not there is water in the water tank
	No indication of fuel level	1 Broken circuit 2 Reversal of power line and signal line	1 Check address wire 2 Check and correct
	Instability of fuel oil level	1 Line abrasion, there is contact resistance between signal line and power line 2 Invalid data of sensor	1 Check and recovery 2 Change
	Non-operation of Temperature switch	1 Fault of circuit 2 Switch damaged	1 Check and recovery 2 Change
Electricity component	Signal error of temperature switch	1 Inaccuracy of temperature switch adjusting value 2 Invalid data of temperature switch	1 Readjust 2 Change
	Non-operation of pressure switch	1 Fault of circuit 2 Switch damaged	1 Change 2 Check and recovery

Category	Faults	Cause of faults	Measures
Electricity component	Signal error of pressure switch	1 Adjusting value of pressure switch recovery 2 Invalid data of pressure switch	1 Readjust 2 Change
	No signal of pressure sensor	1 Broken circuit 2 Reversal of power line and signal line	1 Check and recovery 2 Check and correct
	Instability of pressure sensor	1 Line abrasion, there is contact resistance between signal line and power line 2 Invalid data of sensor	1 Check and recovery 2 Change
	Wrong signal of accelerator pedal, start-up the engine, which operates the max speed, when it operates the 1st speed indicator	Reversal of pedal power wire and ground wire	Check and recovery
Electricity component	Non-operation of wire switch	1 Wire switch failed 2 Lead wire is off	1 Change 2 Check and recovery
	Indicator light failed	1 Burnt out 2 Something wrong with electricity wire	1 Change the bulb 2 Find out the cause that deal with it
	Contact or armature connection when electricity failure	1 Too soft of contact spring 2 Tagged and protrude bottom board 3 Tight or separated armature and mechanical parts 4 Contacts are tightly welded together	1 Adjust the elastic force 2 Remove of the protrude part 3 Adjust with make it more flexible 4 Change the contacts
	Contact or armature fully close when supply power	Too soft of contact spring	Adjust the elastic force of the spring
	Contact or wire generates heat	1 Load exceeds the rated capacity 2 Large edge of contact 3 Severe burning line of contact 4 Excessive pressure of contacts	1 Find out the reasons that deal with it 2 Change the contacts 3 Change the contacts 4 Change the contacts

COMMON FAULTS AND MEASURES

Container Reach Stackler Maintenance Manual



Category	Faults	Cause of faults	Measures
Electricity component	Pool contact of relay	① There is dirt, dirt or burned ② Failure of contact spring	① Find out the reason then deal with it ② Inspect on an arcing trace Change that if necessary
	There is sparkle on the contact stroke when it is closed	① Contact is not qualified ② Failure of contact spring ③ Being loose of contact, poor contact	① Change the contacts ② Change the spring ③ Change
	Exception noise of direct current contactor	① Poor connection of contact and iron core ② Large pressure of contact pressure	① Clean up the joint surface ② Change the contact spring and contact box if necessary
	Cannot break away the accumulator switch	① Contacts are welded together ② Tightly contact of mechanical structure	① Change the contacts to weld ② Repair it to make it flexible
	Non-operation of push button	① Circuit breaker ② Heater damaged	① Inspection and maintenance ② Change
	Press down the set-up button, the response is slow	① Loose of contactor connector ② Burn-out of control circuit fuse ③ No connection in the control circuit ④ Relay damaged ⑤ Pushing button failure	① Realign the connector ② Find out the reason then deal with that ③ Re-connect the wire line ④ Inspect on relay, change that as being confirmed to be damaged ⑤ Inspect on button, change that as being confirmed to be damaged
	The form of program is wrongly when being worked	① Short circuit of main power wire and control power line ② Failure of welding of contact of form controller	① Check and recovery ② Change the relay
	Accurate operation failure	① Lead wire break off or circuit broken ② Motor damaged	① Inspection and recovery ② Change

COMMON FAULTS AND MEASURES

Container Reach Stackler Maintenance Manual



Category	Faults	Cause of faults	Measures
Electricity component	No response of screen when the system is started	① Circuit broken ② Burn-out of power fuse ③ The fuse of motor power is burnt-out ④ Input-output is not correct ⑤ Endless loop of program ⑥ The controller is damaged	① Check and recovery ② Change the fuse ③ Change the fuse ④ Check and recovery ⑤ Check and recovery, refresh the program ⑥ Change the controller
	The engine cannot start after start for the switch	① Loose of the lead wire contact ② Burn-out of fuse or control circuit ③ Position handle not at neutral position ④ Solenoid relay damaged ⑤ Failure of solenoid switch	① Find out the connection ② Find out the reason then deal with it ③ Put the position handle to neutral position ④ Inspect on relay, change that when confirmed ⑤ Check on the solenoid switch and change that as confirmed
Electricity component	How is the start-up relay switch, no movement of start-up relay or start-up condition	① Poor contact of start-up relay switch ② Burn-out of the body of control circuit fuse ③ Poor contact of body wire or contact wire ④ Loose of the lug of relay in contact wire or competing spring with the wire ring	① Find out the reason then deal with that ② Change the fuse body after inspection ③ Find out the reason then deal with that ④ Find out the reason then deal with it
	Engine speed cannot reach to the rated speed	① Freewheel locked, enable to stop in the end ② Output signal of gear with mistake ③ Connector loose or stop	① Release the freewheel ② Check the output signal at gear 6V-24V ③ Check connector and work
	After starting the engine, and engaging a gear, the crane cannot move with the light lighting	① Braking system has some malfunction, with a braking signal ② Stop with signal as parking	① Inspection and exclusion ② Operate the parking button
No indication of the wheel speed, and can only run at gear one	① Each connection of power wire with problem ② Velocity sensor is damaged ③ Resistor is damaged	① Check and repair ② Change ③ Change the cable, and change the frequency converter if necessary	

COMMON FAULTS AND MEASURES

Container Reach Stackers Maintenance Manual



Category	Faults	Causes of faults	Measures
Electric component	Some of the one-to-four gas is cannot be cut off	① Gas handle is not flexible ② Connector loose or drop	① Check and repair gas handle ② Check connector and wire
	Power supply being on, the main cut-off switch of display stop	Short circuit or short, for example, contacting with insulation or when to ground, electric coil is burned, magnetic coil is short, wire is strongly jointed, etc	Fix the conditions and repair the fault
	Something wrong with Air speed knob	① The on-off switch of its power supply is off ② The on-off of trapping pressure has some malfunction ③ Looseness of connection of the lines or air speed driving control panel, condenser make has some malfunction	① Inspect the fault, and then cut off the cut-off switch after you confirm it ② Check and Change ③ Inspect and recovery
	Hydraulic cooling system cannot regulate automatically	① The level of power supply is limited out ② Temperature switch is damaged ③ Movement controlling valve contact is severed ④ Cooler electronic magnetic wire burnt for some malfunction ⑤ Radiator water takes	① Change the fused body ② Change ③ Change contacts ④ Confirmed and recovery ⑤ Confirmed and change
Only part movement of spreader	① Malfunction of lines, conducting wire is abraded ② Corresponding electromagnetic valve is leak ③ The ring of magnetic coil is damaged ④ Spreader controller damaged ⑤ The button of spreading handle has some malfunction for some malfunction	① Inspect and recovery ② Try the magnetic valve ③ Change the ring ④ Change ⑤ Check and maintain it, change the button or handle if necessary	

COMMON FAULTS AND MEASURES

Container Reach Stackers Maintenance Manual



Category	Faults	Causes of faults	Measures
Electric component	Nonmovement of the spreader	① The power supply line of longer control line is submerged out ② The line of general or supplying wire five holes is a function ③ Overload of supplying valve ④ Spreader controller damaged	① Change the fuse ② Inspection and recovery ③ Check and resume it, change the general or supplying wire if necessary ④ Change
	The yellow indication light blinking or bright all the time as the spreader has not to work	① Induction distance of location sensor with problem ② Location sensor is damaged ③ The yellow indication light is damaged	① Adjust the induction distance of location sensor ② Change the sensor ③ Change the yellow indication light
	The spreader has released but no red indication light or blinking	① Induction distance of unlock sensor ② Location sensor is damaged	① Adjust the induction distance of unlock sensor ② Change the sensor
	The sensor has no effect, but no red indication light or blinking	① Red indication light is damaged	① Change the red indication light
	The spreader has not to lift, but no red indication light or blinking	① The induction distance of lock in sensor with problem ② Lighter sensor is damaged	① Adjust the induction distance of light sensor ② Change the sensor
	The spreader has not to lift, but no white indication light or blinking	White indication light damaged	① Change the white indication light
	Nonoperation of the boom	① Run-out of power line of boom control ② Noval failure, no correct signal input of the coil or with proportional valve output signal circuit failure ③ With or without safety switch	① Change the wiring body ② Change as necessary ③ Check according to the safety protection table
The operation of the boom. Lose of control	① No interie signal ② Handle signal wire scored ③ Valve is damaged ④ Deceler proportional valve damaged	① Move the handle with-coaching valve ② Repair the handle ③ Change the handle ④ Change the proportional valve	

COMMON FAULTS AND MEASURES
Container Reach Stacker Maintenance Manual



Category	Faults	Cause of faults	Measures
Electricity component	Nutation emergency is failed	①Without key switch ②Magnetic valve of Nutation emergency failure ③Connectors loose or drop	①Turn on the key switch ②Overhaul the magnetic valve ③Check connector and wire
	Inaccuracy of weight-measuring	①Reverse plug of rod and rodless pressure sensor ②Pressure sensor damaged ③Connector lug loose of drop	①Joint the wire correctly ②Change the pressure sensor ③Check connector and wire
	ROPS give an alarm	①Rough road surface ②Distance of Proximity switch improper ③Proximity switch damaged ④Connector lug loose of drop	①Smooth the road surface ②Adjust the distance of Proximity switch ③Change the Proximity switch ④Check connector and wire
	Abnormal show of the screen, figures distorted	①Too much redundancy data ②The screen is disturbed by magnetism ③The screen damaged	①Refresh the page ②Eliminate the interference source ③Change the screen
	the page data of the screen is abnormal	①Bus failure ②Bus terminal resistance damaged or lead fell off	①Check the wire and recovery ②Change the resistance and check the wire and recovery
	No operation of controller	①Power fuse burn out ②Power fuse burn-out on the enter point ③Power fuse burn-out on the enter point ④To judge the state of the program according to the instruction book ⑤Controller damaged	①Change the fuse ②Change the fuse ③Check and recovery ④Check, recovery and refresh the program ⑤Change the controller
	No operation of extended block	①Power fuse burn-out ②No blinking of communication indication light ③There is light on the input, output points but no operation	①Change the fuse ②Check and recovery communication wire ③Change the extended block
	Cab can not move	①No key switch ②Magnetic valve damaged ③Connector lug loose or drop	①Check the switch ②Check and repair magnetic valve ③Check connector and wire

COMMON FAULTS AND MEASURES
Container Reach Stacker Maintenance Manual



Category	Faults	Cause of faults	Measures
Communication wire	Communication fault of the engine and the controller	The engine works but no speed information on the screen	Check whether the wire broken or with water
	Controller and I/O extended block	There is length and angle indication on the screen but without gear information, and the red light of the I/O extended block always on	Check whether the wire broken or with water
	Controller and screen	The screen is ok but no content on it	①Check whether the wire is broken or water intake; ②Check whether terminal resistance burn out or bad connects, The terminal resistance locates on its plugs.
	Controller and length and angle sensor	The indication of the length and angle of the boom is abnormal the others are ok	①Check whether the wire is broken or water intake; ②Check whether terminal resistance burn out or bad connect .As the terminal resistance locates in the length angle sensor ,the

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



9.Maintenance of Equipment Tracking Sheet

Maintenance of equipment tracking sheet 1

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 2

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 3

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 4

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 5

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
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10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 6

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 7

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 8

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 9

Equipment Name		Manufacture No.		Using Start Date		Working Place		
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 10

Equipment Name		Manufacture No.		Using Start Date		Working Place		
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

MAINTENANCE OF EQUIPMENT TRACKING SHEET

Container Reach Stacker Maintenance Manual



Maintenance of equipment tracking sheet 11

Equipment Name	Manufacture No.	Using Start Date	Working Place					
Maintenance Contents								
No.	Maintenance Part	Materials	Materials type	Materials quantity	Materials Source	Maintenance date	Operator	Using time
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								