Confidentiality Level: Confidential

BYD BC12A06 Pure Electric Vehicle Chassis

Maintenance Manual

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Commercial Vehicle Research Institute

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Maintenance Manual

Foreword

This manual provides maintenance information for a BYD vehicle chassis and is applicable to the original parts and commonly optional parts. Note that if some contents in this manual differ from the information provided by the parts supplier, the latter shall prevail. If local regulations or operators have special technical requirements for maintenance, please consult BYD for confirmation.

This manual also provides practical information related to various parts and equipment of the vehicle. The maintenance procedures given in each chapter of this manual are developed based on our previous experience of BYD vehicle maintenance.

The information given in this manual can be used as teaching or training material or as a reference for experienced technicians. It is highly recommended to keep accurate records of regular maintenance.

Regular maintenance is essential to ensure safe and reliable operation of the BYD vehicle. This manual provides the most effective maintenance procedures for the vehicle and covers some special tools that should be used according to recommendations.

If the vehicle becomes faulty due to lack of maintenance, misuse, abuse or negligence, BYD has the right to reject any claims made for such reason. For driver related vehicle operation, please refer to the separately provided User's Manual.

All contents in this manual are based on the latest data available at release. The manufacturer reserves the right to change any content in this manual at any time.

Safety

This manual contains warning statements such as warning, caution and note. Please observe each warning statement to prevent corresponding potential consequence.

NOTICE

- Text with this heading refers to preset performance of the vehicle or parts and provides necessary additional information.

NOTE

- Text with this heading is a reminder of an operation which, if not avoided or carried out with due care, could involve the risk of unsafety.

CAUTION

- Text with this heading is a reminder of an operation which, if not avoided or carried out with due care, could involve the risk of general personal injury or vehicle damage.

WARNING

- Text with this heading is a reminder of an operation which, if not avoided or carried out with due care, will involve the risk of serious personal injury or even death.

Contents

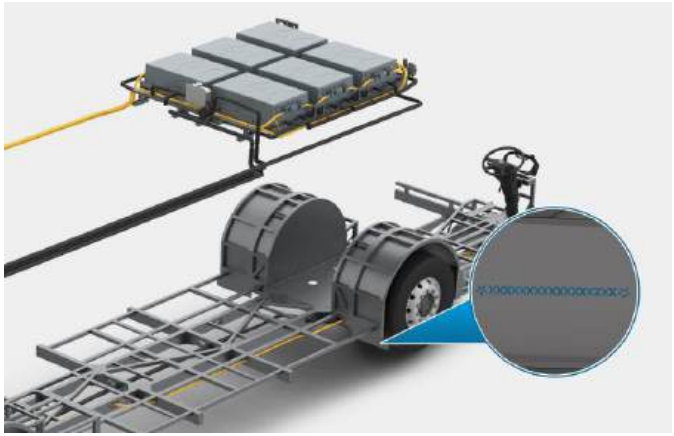
Chapter 1 Overview

1.1 Vehicle information

1.1.1 VIN

1.1.1.1 Position of VIN

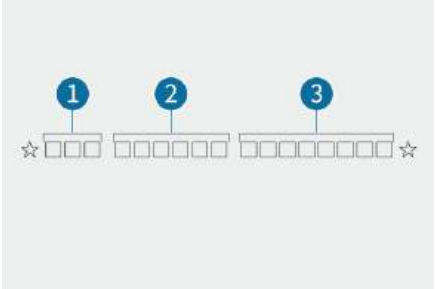
The vehicle identification number (VIN) is the legal identification mark of a vehicle. The VIN of this vehicle is stamped on the vertical face of the rear beam at the right front hubcap of the chassis frame and coated with epoxy coating. Do not scratch, modify, cover or remove the VIN.



Position of VIN

1.1.1.2 Composition of vehicle identification number (VIN)

The VIN consists of 17 characters including world manufacturer identifier (WMI), vehicle descriptor section (VDS), and vehicle identifier section (VIS).



VIN composition example

1.1.2 Chassis identification plate

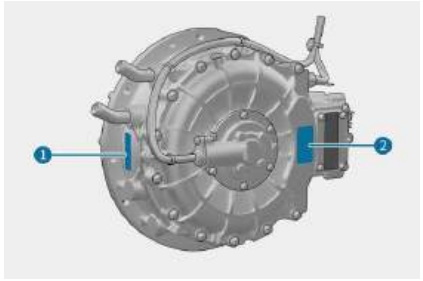
1.1.2.1 Pattern of chassis identification plate

The following figure shows the style of the chassis identification plate. The specific chassis identification plate and its information are subject to your actual chassis identification plate.

Pattern of chassis identification plate

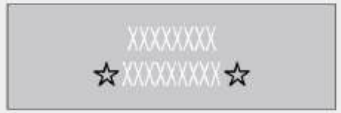
1.1.3 Motor production number

Motor production number of the vehicle can be read from the nameplate and production number mark on the drive motor as shown in the figure below.



■ 1 Motor nameplate (nameplates of left and right motors are symmetrical)

■ 2 Motor production number mark (production number marks of left and right motors are symmetrical)



Drive motor

1.2 Instructions for maintenance

1.2.1 Necessity of regular maintenance

BYD AUTO highly recommends that the pure electric vehicle be maintained as per the maintenance schedule provided in this manual.

Regular maintenance conduces to:

- Saving electricity
- Extending the service life of the vehicle
- Enjoying the driving pleasure
- Driving safety
- Driving stability
- Complying with warranty regulations
- Complying with government's regulations

The BYD pure electric vehicle is economical in driving and maintenance, with many maintenance items omitted that may be necessary for an ordinary fuel-powered vehicle. To maintain the vehicle in the optimum driving status, be sure to observe the following instructions for maintenance of the vehicle.

1.2.1.1 Running-in period

The correct running-in for a new vehicle greatly contributes to its normal service life and reliability.

Each new vehicle, or old vehicle with transmission components such as drive motor, wheel-hub reducers and wheel hub bearings replaced, should take an initial running-in period of 5,000 km or 3 months. Within the first 2,500 km, the vehicle speed should be kept under 50 km/h (31 MPH). After the vehicle travels for more than 2,500 km, the vehicle speed can be increased steadily.

1.2.1.2 Requirements for maintenance in the running-in period

Drive the vehicle properly. Dangerous behaviors such as dragging, rushing, sudden acceleration and sharp braking are strictly prohibited. Forced starting and driving the vehicle is also strictly prohibited when the vehicle power is insufficient or driving conditions are not met.

- During the running-in period, the vehicle shall run on flat and firm road surfaces.
- Do not quickly or slowly drive the vehicle with a single motor speed for a long time, because running-in with a single motor speed for a long time is prone to cause wear of parts.
- Pay attention to the drive motor, wheel-hub reducers, wheel hubs, brakes and other parts to check for over-temperature, alarm, brake drag, abnormal smell, smoke at high temperature, etc. Once the temperature anywhere exceeds normal level, identify the cause, and adjust or repair relevant parts. Within the first 2,500 km, do not tow any other vehicle.

1.2.2 Maintenance of vehicle

Pay attention to any change in the performance and sound of the vehicle as well as perceivable signs implying the need for maintenance of the vehicle. Some important signs are as follows:

- Coolant is constantly over temperature, stagnant or leaking;
- The motor jams or produces abnormal noise;
- The motor runs with excessive vibration;
- The motor fails to start
- The powertrain has oil leakage;
- The powertrain produces odor;
- The power significantly reduces;
- Fluid drips underneath the vehicle, which might indicate a leak (lubricant, coolant or other liquid), except for dripping due to the air conditioner's dehumidifying process;
- Flat tyre
- Excessive tyre noise is made when the vehicle is turning
- Tyres are worn unevenly
- The vehicle inclines to one side while running in a straight line on flat ground;
- Abnormal noise related to the suspension movement is produced;
- Braking effect is lost;
- Brake pedal feels like sponge when depressed;
- The vehicle inclines to one side during braking;
- The driving range decreases significantly;
- The battery temperature is constantly high, triggering overheating protection, with no power output.

If any of these conditions is identified, please contact a BYD authorised service provider as soon as possible, because the vehicle may need to be adjusted or serviced.

WARNING

- Do not drive a vehicle with fault to avoid possible serious damage to the vehicle and personal injuries.

1.2.3 Precautions for self-maintenance

If you desire to conduct maintenance of the vehicle by yourself, be sure to properly observe the procedure provided in this section. Improper or incomplete maintenance operations may damage the vehicle. This section provides information on simple maintenance only that can be operated by users. However, it may cover some items that must be left to qualified technicians with special tools.

During maintenance, be sure to guard against accidents. Observe the following preventive measures that need special attention:

1 After the vehicle is powered up, be sure to keep hands, clothes and tools far away from the running fans.

2 Please do not touch parts of the rear compartment immediately after the vehicle is driven, because they are very hot.

3 If you have to work near the electronic fan or the radiator, be sure to confirm whether the vehicle is powered up. After the vehicle is powered up, when the coolant temperature rises to a certain degree, the electronic fan would start working automatically.

4 Do not smoke near the start battery to avoid producing sparks or open flame, which is liable to cause a fire.

5 When handling the start battery, be sure to take special care, because the start battery contains toxic gas and corrosive sulfur acid.

6 Working on or beneath the vehicle requires use of goggles to avoid exposing the eyes to injury from falling objects or splashing liquid.

7 Used lubricating oil contains pollutants, which can cause skin diseases such as skin inflammation. In case of skin contact, clean the skin with soap and water and seek medical attention if necessary.

8 Be sure to put used lubricating oil to a specified recycling container. Do not put it into living garbage, sewage or onto the ground.

1.3 Safety and precautions

WARNING

- Before maintenance, make sure that the vehicle is powered off, and the service switch and the master switch are turned off.
- Before maintenance, use a multimeter to make sure that there is no voltage among the holes at the charging port.

CAUTION

- A maintenance operator must receive special training before conducting maintenance and must wear insulated gloves and insulated shoes during charging.
- After maintenance, make sure that the charging port cap and the charging port hatch are closed. Otherwise, water or dust may enter the charging port, affecting the normal function.

Tips

Observe the following precautions when checking the charging port:

- If the plastic at the end of the charging port is melted, check the charging plug to confirm whether it is caused by over-temperature of the charging plug.
- Replace any charging port beyond the quality warranty period at your own expense (if any charging port beyond the quality warranty period is damaged, be sure to replace it at your own expense. Failure to replace it may cause problems such as longer charging time and damage to the charging plug).

Insulated shoes

Insulating gloves

1.3.1 General precautions

CAUTION

- When lifting the vehicle, be sure to confirm that the vehicle is reliably supported at the lifting position.
- Before maintaining, removing or installing any components of the chassis air line system, relieve compressed air from corresponding air reservoir.

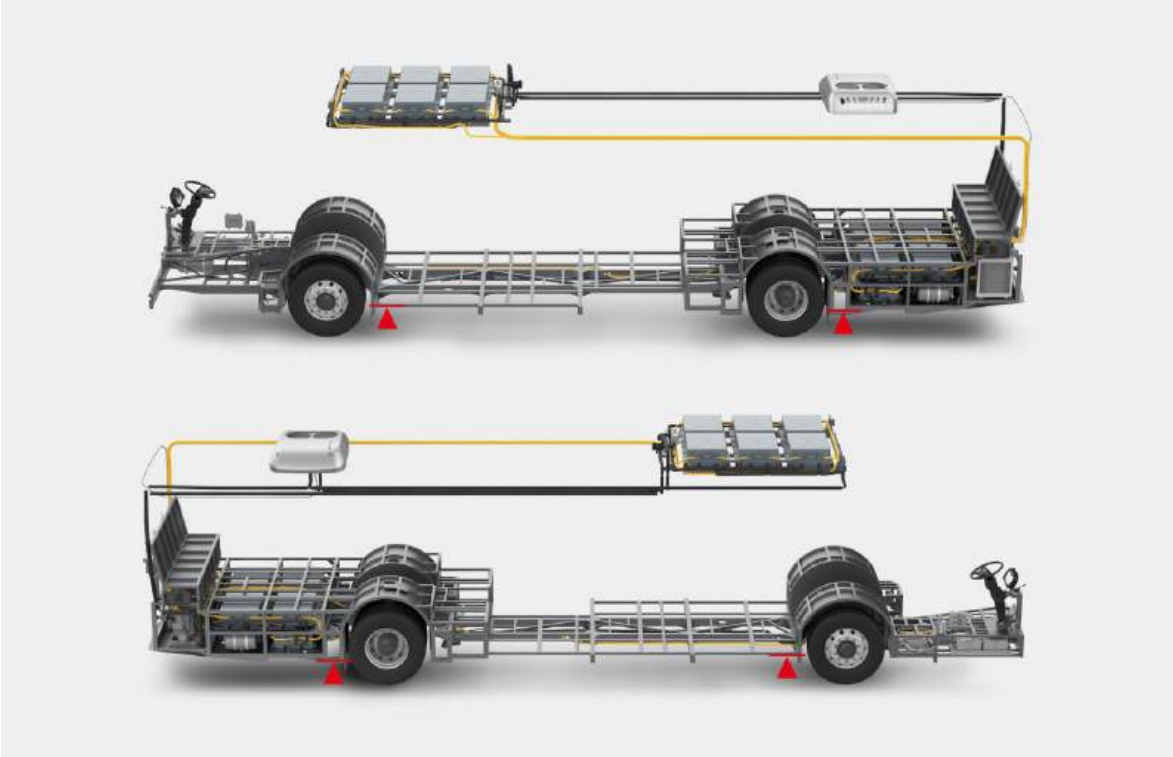
NOTE

- Be sure to disconnect the control unit connectors before performing welding on the vehicle; otherwise, the control units will be damaged.
- For replacement of HV / LV controller, make sure that the software version number after replacement is consistent with that before replacement.
- Be sure to use lubricating oil and filter elements that meet the requirements and perform replacement regularly.
- After any fuse is blown or any relay is damaged, be sure to replace it with a fuse or relay of the same capacity and specification.
- Collect discharged gear oil, motor oil, steering fluid, coolant, air compressor oil, etc. with a container and dispose of them in accordance with environmental protection regulations.

1.3.2 Vehicle lifting

1.3.2.1 Jacking point

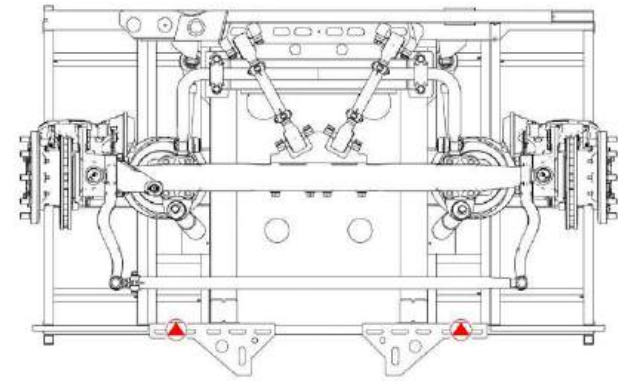
Identify the lifting position indicated by the exterior lifting label.



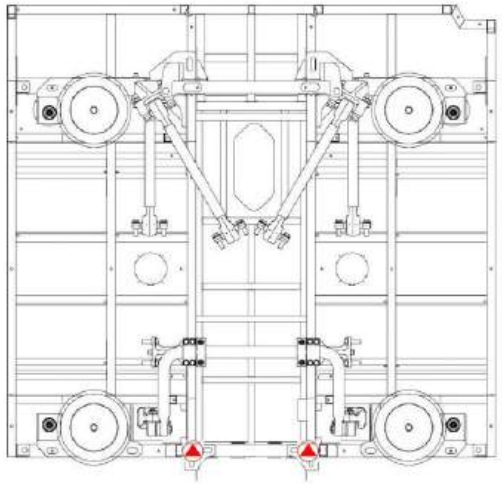
Vehicle jacking point diagram

1.3.2.2 Position of jack

Be sure to use a jack capable of lifting 11 t (22,046 lbs) and above, and observe its operating instructions. Select jacking points in red as shown in the figures to jack up the vehicle for maintenance operation.



Front axle jacking point



Front axle jacking point

NOTE

- Park the vehicle on flat and solid ground, pull up the manual brake valve assembly and place anchor blocks under the tyres.
- Make sure that a jack is placed at a proper lifting position. If a jack is improperly placed, the vehicle may be damaged or fall, causing personal injury.
- When the vehicle is jacked, do not allow any bodily part to be positioned below the vehicle, in order to avoid personal injury.
- Never lift the vehicle when persons are on board.
- While lifting the vehicle with a jack, do not start or operate its motor.
- While a jack is used, never place sundries above or below the jack. Lift the vehicle with a jack only when replacing wheels.
- Be sure to remove wheel nuts only after the vehicle has been jacked.

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Chapter 2 Maintenance Interval

2.1 Definition of maintenance interval

Maintenance items and technical requirements

Maintenance grade	Maintenance period	Description
Routine maintenance	Before start, in the process of driving and after off-running time	This maintenance focuses on cleaning, replenishment and safety performance inspection.
First maintenance	The first 5,000 km driving distance or 3 months	It is a necessary and prerequisite condition for user to obtain quality warranty.
Regular maintenance	Every 30,000km or 6 months	This maintenance focuses on lubricating, tightening, checking and adjusting safety components in relevant brake and operation systems as well as removing and checking tyres and performing tyre rotation in addition to routine maintenance.
	Every 60,000km or 12 months	
Special maintenance	No specific interval such as the routine and regular maintenance interval	Special attention shall be paid to maintenance items that last for a long time.
Special note: The above maintenance interval is the shortest one. It is determined based on the service conditions of the vehicle. Maintenance shall be performed at shorter interval for a region where a shorter interval is specified by laws and rules.		

NOTICE

- Maintenance intervals should be determined with reference to the maintenance schedule based on the mileage (i.e., reading of the odometer) or time interval (whichever occurs earlier).
- In case any maintenance item is not completed as per the schedule, follow the original maintenance intervals (mileage or time interval) to carry out subsequent maintenance.

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Chapter 3 Routine Maintenance Items

3.1 Requirements for routine maintenance items

Routine maintenance items and technical requirements

S/N	Operation content	Technical Requirements
1	Exterior walk-around inspection	(1) Walk around the vehicle and check for intact appearance and no deformation, abnormal wear, damage and fracture of the glasses, lights, vehicle body, skin, exterior side mirrors, doors, compartment hatches, tyres, rims, chassis, frame, axles and cameras; check whether there is any leakage at the front axle and rear axle wheel hubs; (2) Check whether the passenger door can be opened/closed normally, whether the emergency exit valve functions normally, whether there is jamming or interference, whether the seal is in good condition, whether there is direct light leak at the top, whether the door opening/closing speed is normal, whether there is buffer, whether the anti-pinch system functions, and whether the cylinder solenoid valve and others leak; (3) Open the front compartment hatch, the rear compartment hatch, the power battery pack hatch, the radiator hatch, etc. and visually check whether all parts inside the hatches are intact, whether wiring harnesses are subject to correct connection and good grounding without exposure, and whether there is no looseness of bolts and nuts, deposit of foreign matters, oil, liquid and gas leakage, or other detects that may affect the driving performance of the vehicle; (4) Check and make sure that the liquid levels inside the wiper washer fluid reservoir and expansion tank are in the normal ranges; (5) Check coolant pipes and oil pipes for leakage; (6) Check the air filter element surface for dust buildup. Remove dust promptly when there is much dust;

S/N	Operation content	Technical Requirements
1	Exterior walk-around inspection	(7) Re-tighten wheel nuts; (8) Drain the water in the air reservoir through the drain valve at the bottom of the air reservoir regularly (every 7 days); the drainage is required every day in frigid or high-humidity regions. (9) Use compressed air to clear the dust on the surface of all components inside the rear compartment, bottom power battery compartment and distribution box hatch body regularly (every 7 days); (10) Grease the complete vehicle regularly (every 30days).
2	Interior static inspection	(1) Check the switch buttons, steering wheel and pedals near the dashboard in the driver's cab for intact appearance, deformation, damage and fracture; (2) Check the floor, seats, handrails, safety devices and other interior trims for intact appearance, deformation, damage, fracture and loose bolts and nuts; (3) Check whether the destination signs and advertising screen fasteners loosen or have abnormal sound regularly (every 30 days).
3	Power-up inspection	(1) Check whether the vehicle is successfully powered up with OK indicator illuminating, whether any fault alarm indicator illuminates or message is displayed on the combination instrument, and whether abnormal alarm sound is generated inside the vehicle; (2) Check whether the instrument, horns, lights, wipers, switches, ramp, doors, parking brake valve and safety devices function properly and whether there is fault alarm or abnormal noise; (3) Check whether the image displayed on the rear view camera in the vehicle is clear and unobstructed; (4) Check that the service brake pedal and electronic accelerator pedal move freely and have no sense of heaviness, jamming or abnormal sound; (5) Check whether the power steering of the steering wheel is smooth without abnormal sound, check the steering wheel for free movement and check whether the steering system operates properly; (6) Check whether the air suspension control function is good;

S/N	Operation content	Technical Requirements
3	Power-up inspection	(7) After the air compressor stops with the reservoir filled up, depress and keep the brake pedal until the air compressor starts again. In this operation process, check whether the brake pedal is stuck, whether there is abnormality in the exhaust noise of the valve body and whether the air pressure rises abnormally; (8) Check if the electronic fan and the electric coolant pump work properly; (9) Check whether the locking and warning functions of the emergency exit are normal; (10) Power up the vehicle, wait until the air compressor pumps air to the set value of the dryer assembly, and observe whether the exhaust of the pressure relief valve below it is normal regularly (every 30 days);
4	Driving inspection	(1) Check whether the vehicle runs smoothly and whether the drive axle rotates smoothly or has jamming, vibration, special odor and mechanical noise; (2) Check whether the service and parking brake performances are normal; (3) Record the type of vehicle fault during vehicle operation as well as related data and information, such as time of fault, SOC, mileage, and alarm indicators on the combination instrument.
5	Charging inspection	(1) Check whether the charging port and outer cover are intact in appearance and whether its terminals are ablated, damaged or broken before charging each time; (2) Check whether the charging plug is normal without damage; (3) Check the electronic lock of the charging port. Push the electric lock switch at tail end of the charging port and check whether the lock cylinder is capable of acting normally and whether it has deformation and fracture; (4) When charging is started, listen and check whether the locking sound of the electric lock is normal; (5) After charging, if the charging plug cannot be pulled out, cut off the power of the charging port, and try to manually unlock the electric lock or contact BYD. Do not forcibly pull it; otherwise, the charging port and the charging plug may be damaged

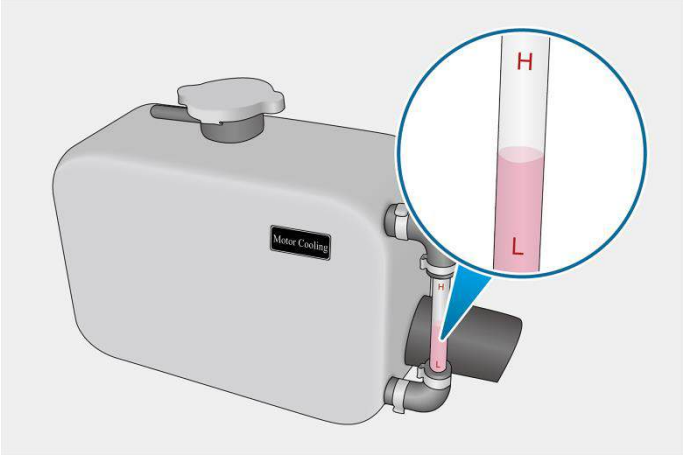
3.2 Operation methods for routine maintenance

3.2.1 Inspection of coolant

3.2.1.1 Inspection of coolant

1 Observe the coolant level in the expansion tank. Confirm that the level is between H (MAX) and L (MIN) marks.

2 If the coolant level is at or lower than "L" mark, add coolant to the expansion tank until coolant reaches "H" mark and check if the cooling system is subject to leakage.



Coolant level in the expansion tank

3.2.1.2 Operating procedure for adding coolant

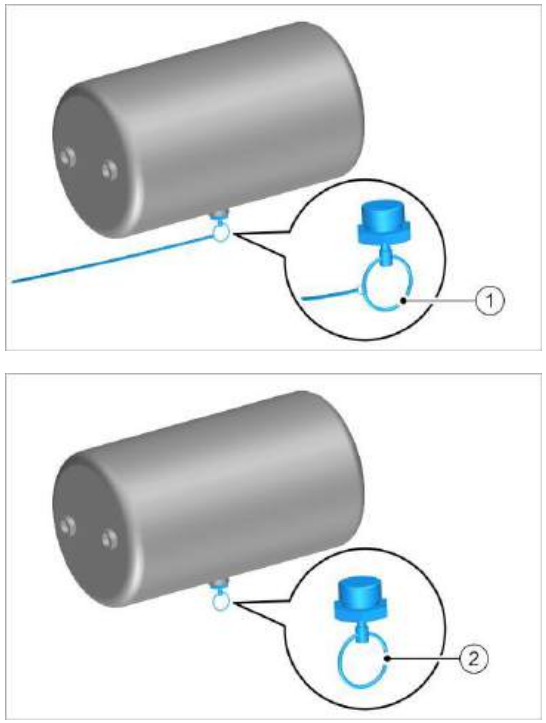
1 Open the expansion tank cover. Add specified coolant and tighten the end cover. Power up the vehicle and allow the coolant pump to run for about 5 min, and then power it off. Check the coolant level.

2 If the coolant is insufficient, repeat step 1, until the coolant level rises to the middle level of the indicator (between “H” and “L” marks).

3 Close the expansion tank cover and tighten it completely;

3.2.2 Draining of air reservoir

The manual drain valve (including pull cable type and pull ring type) is configured. To drain water or oil dirt, manually pull the pull rope cable, pull ring or valve of the manual drain valve.



- 1 Pull cable type manual drain valve
- 2 Pull ring type manual drain valve

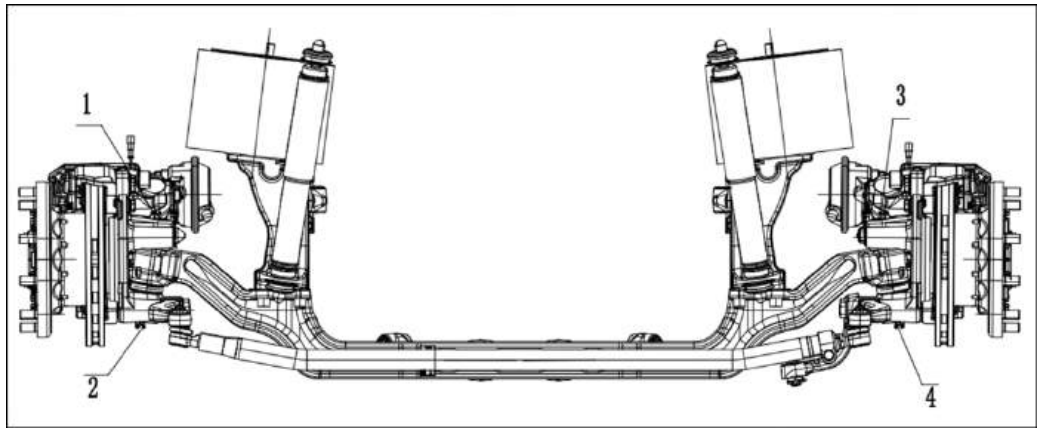
Manual drain valve

The drain valve is damaged and should be replaced if:

- Pulling the pull cable or pull ring fails to drain the water;
- Air leakage is identified.

3.2.3 Vehicle lubrication

3.2.3.1 Front axle lubrication



- 1 Upper left king pin
- 2 Upper right king pin
- 3 Lower left king pin
- 4 Lower right king pin

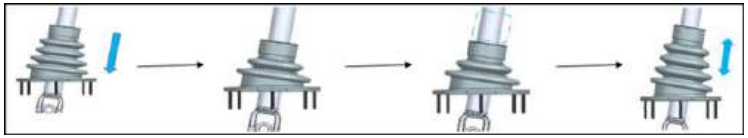
Front axle lubrication points

Vehicle lubrication

Structure	Type of structure	Lubrication point	Number of points	Remarks
Drag link	Single drag link	Front and rear ball pins	2	No maintenance-free points
Front axle	Disc axle	Upper king pin, lower king pin	4	2 on left and right sides each
Rear axle	Disc axle	None	None	
Suspension	Air spring	None	None	
Others	Angle transmission: 1; etc.			

3.2.3.2 Lubricate the steering column shield

Evenly lubricate the inner ring of the steering column shield. Grease: lithium grease NIGL2



1 Compress the lower shield of steering column to the shortest extent in the compression direction;

2 Apply a thin layer of grease to the upper outer ring of the column axial, as shown in the double-drawn line square;

3 Move the seal ring at small end of the shield up and down to lubricate the inner ring sufficiently;

4 Wipe the grease off the outer surface of the shield with a rag to avoid staining the driver's clothes.

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Chapter 4 First Maintenance Items

4.1 Requirements for first maintenance items

First Maintenance Items

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Whole vehicle	1	Vehicle lubricating points	Injection of grease: use a grease injection gun to inject lithium grease #2 until it overflows from the parts binding area. Grease injection for king pin and ball joint of driving system. (See 3.2.3 for operation guide on greasing the complete vehicle)	
Chassis	Air compressor	2	Check and adjust the connectors, fasteners, pipes, joints and cushion pad	1 Check whether the connector is connected firmly and whether it is loose; 2 Check whether the fasteners are loose; 3 Check whether the pipeline and joints leak; 4 Check the cushion pad for crack or appearance damage. (See 4.2.1 for operation guide on the inspection of air compressor)	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Air compressor	3	Clean/replace the air filter element	1 Check the air filter element surface for dust buildup. Remove dust promptly when there is much dust and replace the air filter element if it is damaged; 2 Blow with dry and clean compressed air of about 0.4 MPa from the inside out until no dust exists; 3 Check whether the air inlet valve has lubricating oil on it (if there is a large amount of lubricating oil, check whether air inlet valve sealing element is damaged and replace it if it is damaged). (See 4.2.1 for operation guide on the inspection of air compressor)	
Chassis	Air compressor	4	Replace the air compressor oil (Naili)	1 Check whether the oil level is above the middle line of the oil sight glass; add lubricating oil if it is insufficient; 2 Check whether the lubricating oil is emulsified (oil becomes milky white) and replace it if it is emulsified. (See 4.2.1 for operation guide on the inspection of air compressor)	
Chassis	Air compressor	5	Replace the oil filter (Naili)	Check whether the lubricating oil is emulsified and replace it if it is emulsified. (See 4.2.1 for operation guide on the inspection of air compressor)	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Air compressor	6	For other maintenance items, refer to instructions for air compressor of corresponding brands and models. For oil-containing air compressor, remember to replace oil filter.		
Chassis	Driving system	7	Check the shock absorber	Check whether the shock absorber is firmly mounted and free of oil leakage and functions effectively, whether the mounting bracket is cracked, and whether the rubber pad of the shock absorber is damaged.	
Chassis	Driving system	8	Check the suspension bushing	Rubber bushing (push rod and stabiliser bar): Check whether the rubber bushing is intact and free of aging and peeling off; replace the rubber bushing if it is abnormal;	
Chassis	Driving system	9	Check the brake clearance	The brake clearance for disc brake: Disc brake: 0.6 mm~1.2 mm.	
Chassis	Driving system	10	Check the steering tie rod/drag link and ball joint	Check whether the steering drag link is deformed, and whether the ball joint fits well without looseness.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Driving system	11	Check whether the chassis bolts are fastened reliably	1 Check the wheel nut paint marks regularly (every 7 days); 2 Conduct vehicle lubrication regularly (every 30 days) (for models without maintenance-free and centralised lubrication); 3 Check the paint marks and torques of key fasteners in the suspension regularly (every 6 months).	
Chassis	Electric drive axle	12	Check the high-voltage/low-voltage wiring harness	Check whether the three-phase wire of the motor and low voltage wiring harnesses on the axle are worn or damaged.	
Chassis	Electric drive axle	13	Replace the gear oil for reducer	1 SAE 75W.90 GL-5 (suitable for use in an environment with temperature not below -40°C) (recommended brand: Total) gear oil is designated, and oil of a same type from a proper manufacturer shall be used when the above oil is not available due to special restrictions. 2 In removal of oil drain and filler plugs, the surrounding area must be wiped clean to prevent dust and sand from entering the box.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Electric drive axle	13	Replace the gear oil for reducer	3 The oil drain plug should be magnetic and the oil filler plug should not be magnetic (do not misuse them). In removal and installation of oil drain and filler plugs each time, be sure to replace the Teflon tape with a new one and remove iron sludge on end faces of the oil drain and filler plugs. Tightening torque of the oil drain and filler plugs is 35 N.m (26 lb.ft). 4 Carry out maintenance according to the specified maintenance interval, volume of oil filling for maintenance and oil type. (See 4.2.4 for operation guide on the inspection of drive axle)	
Electrical appliances	Distribution box, transit box	14	Check the fastener for the high/low distribution transit box	Check whether each bolt is firmly installed, and check the mark.	
Electrical appliances	Distribution box, transit box	15	Check the terminal of each connector of the cable.	Check whether the cable sheath at the end of the connector is blackened, cracked or embrittled.	
Electrical appliances	Low-voltage wiring harness	16	Check the wheel-hub driving motor ground wire	1 Check whether the ground wire joint fastening bolt is loose and whether the ground wire surface is damaged; 2 Check whether the ground wire is routed smoothly and whether the ground wire is too taut or has any interference with other parts in dynamic application;	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Electrical appliances	Low-voltage wiring harness	17	Check low-voltage wiring harness in the hubcap.	Check whether the low voltage wiring harness is intact or has damage or interference, whether the wiring harness bundled on the air pipeline is free of force applied, and whether the connectors are loose or broken.	
Electrical appliances	Start battery	18	Check the appearance and voltage and fasten, and clean and replace it	1 Check whether the single start battery voltage is higher than 12.5 V using a multimeter. If this requirement is not met, recharge it in time. If it cannot be recharged, replace it in time; 2 Check whether any start battery fastener is loose and tighten it in time if it is loose;	
Electrical appliances	Power battery thermal management system (independent)	19	Check whether the compressor and its mounting components are normal; check the pipeline connection reliability, insulation sponge and mortar, condenser fan, electronic expansion valve, thermal management system outer cover and base fastening, and wiring harness and controllers fastening; check whether the coolant pump is normal.	1 Check whether any compressor bolt is loose, and whether the compressor generates abnormal sound; 2 Check whether any pipeline clamp is loose or worn due to interference; 3 Check whether the insulation sponge and insulation mortar are damaged or fall off; 4 Check whether the condenser fan has damage or abnormal sound; 5 Check whether the outer cover and base are damaged and whether any fastener is loose; 6 Check whether the wiring harnesses and controllers are fixed without wear; 7 Check if the coolant pump works normally.	

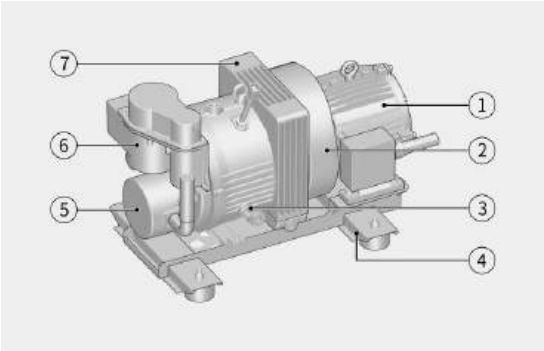
Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Electrical appliances	Power battery thermal management system (independent)	20	Clean the condenser	Clean the condenser core directly using a high pressure water spray gun for vehicle washing at a pressure <200 kPa;	
Electrical appliances	Climate control system device	21	Check whether the compressor and its mounting components are normal; check the pipe connection reliability, insulation sponge and mortar, condenser fan and evaporator fan, electronic expansion valve, A/C outer cover and base fastening, and wiring harness and controllers fastening;	1 Check whether any compressor bolt is loose, and whether the compressor generates abnormal sound; 2 Check whether any pipeline clamp is loose or worn due to interference; 3 Check whether the insulation sponge and insulation mortar are damaged or fall off; 4 Check whether the condenser fan and evaporator fan have damage or abnormal sound; 5 Check whether the outer cover and base are damaged and whether any fastener is loose; 6 Check whether the wiring harnesses and controllers are fixed without wear;	
Electrical appliances	Climate control system device	22	Clean the fresh air strainer and evaporator and condenser cores	Clean the fresh air strainer and condenser core directly using a high pressure water spray gun for vehicle washing at a pressure <200 kPa; clean the evaporator core using an atomizing water spray gun at a pressure <200 kPa.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Electrical appliances	Climate control system device	23	For other maintenance items, refer to the A/C manual.		
Electrical appliances	Defroster (applicable if equipped)	24	Replace or clean the interior inlet and return air strainers		Refer to the Service Manual for details.

4.2 Operation methods for first maintenance

4.2.1 Air compressor

Naili



- 1 Motor
- 2 Fan and air director
- 3 Sight glass
- 4 Cushion pad
- 5 Built-in air filter
- 6 Air/oil separator element
- 7 Radiator

Air compressor

4.2.1.1 Replacement of filter element

Maintenance of built-in air filter

Removal of built-in air filter

Naili

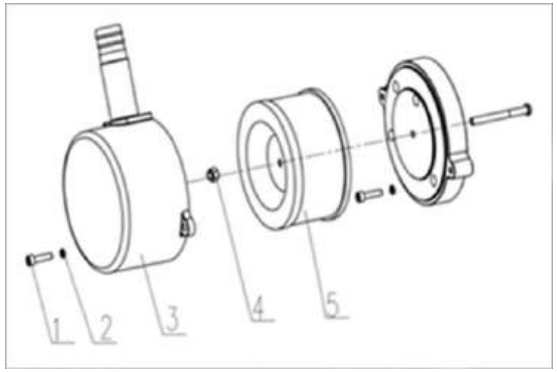
1 Remove the screw (1);

2 Remove the spring washer (2);

3 Remove the air filter cover (3);

4 Unscrew the lock nut (4);

5 Remove the air filter element (5).



Removal of built-in air filter (Naili)

Cleaning of built-in air filter

Purge the built-in air filter from inside out using dry and clean compressed air of about 0.4 Mpa. Do not use any fluid such as water, gasoline or detergent to wash the air filter.

Purge dust from the surface and internal of the built-in air filter housing using dry and clean compressed air of about 0.4 Mpa.

Replacement of built-in air filter

Naili

Remove the internal air filter (5) and install a new one in the opposite order shown in the figure. Pay attention to the sound O-ring on air filter seat during installation.

Maintenance of external air filter

1 Loosen the three clips on the end cover of the air filter, which are labeled with "Remove this cover for maintenance", and then remove the end cover;

2. Loosen the nut locking the filter element by hand, remove the gasket and rubber pad in turn, and then remove the old air filter;

3 Install them in reverse order according to the above removal steps.

NOTE

- After the filter element is locked up, the nut should be flush with the bolt.

4.2.1.2 Inspection of connectors, fasteners and joints

- Check if the motor connectors and temperature control connectors are locked securely.
- Check if the fastening bolts at each part are tightened.
- Check if the joints such as air inlet and outlet joints are locked securely.

4.2.1.3 Inspection of fan

The fan is a cooling device of the system. It is helpful to identify faults of the air compressor by regularly checking whether the fan is damaged or rotates properly. When the fan does not rotate, the compressor head may be stuck, resulting in failure to inflate air normally or even damaging the motor. Therefore, be sure to check the fan regularly.

Check if the fan is damaged by moving the fan blade with a screwdriver or any other tool to check if it rotates. If it rotates, the fan is sound. If it does not rotate, repair the fan.

4.2.1.4 Cleaning of oil cooler

The air compressor lubricating oil circulation system is cooled by the fan blowing air to carry away heat from the radiator of the oil cooler. Therefore, it is necessary to check and clean the oil cooler regularly.

If the oil cooler is clogged, air cannot be ventilated, causing failure to dissipate heat. As a result, the air compressor high temperature alarm will sound, and the air compressor may be burnt out in a worse condition.

4.2.1.5 Inspection of air intake pipeline

The air intake pipeline is an important component that has an effect on whether the air compressor can have normal air intake and whether air inside is clean. Therefore, it is necessary to regularly check the air intake pipeline for poor flow of air intake, leakage or damage. Such defect would lead to reduced air output of the air compressor. If the air is not clean, the air filter life will be reduced; in a worse condition, when dust flows in to the air compressor, the service life of its components will be affected, resulting in damage to the air compressor.

4.2.1.6 Inspection of cushion pad

The shock absorber is a damping device of system. The condition of the shock absorber (aged/damaged or not) is very important for the shock absorption of the system. If the shock absorber is aged or damaged, the air compressor vibration frequency may increase; this would cause loosened connection between its components, resulting in reduced service life or even damage of the air compressor. Therefore, it is necessary to regularly check whether the shock absorber is aged or damaged. Replace it if it is cracked. The torque of the mounting bolt/nut is (44±4) N.m.

4.2.1.7 Cleaning of system surface

Regularly clear the system of dust to allow its important parts such as the motor and air compressor to maintain good heat dissipation effect and lengthen the service life of the air compressor.

4.2.2 Inspection of steering system

4.2.2.1 Inspection of steering ball joint

(Inspection method and replacement steps for steering ball joint movement; in case of replacement, provide ball joint material information, or search method)

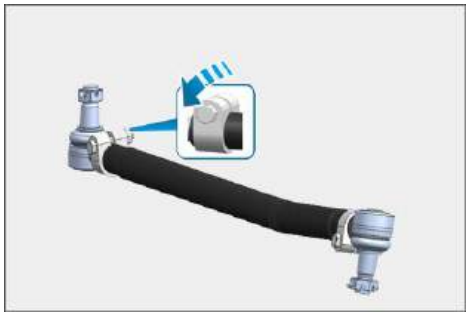
Check the ball joint of steering drag link joint regularly according to the maintenance schedule. Check whether the ball joint adequately fits with the bowl, whether there is crack damage, and whether there is damage or abnormal sound. Replace the ball joint in time that are found faulty in spot inspection (refer to the after-sales parts catalogue for specific ball joint material information).

Removal and installation of steering ball joint

Removal

Required special tool: two-jaw puller (used during separation of the ball joint from the steering arm)

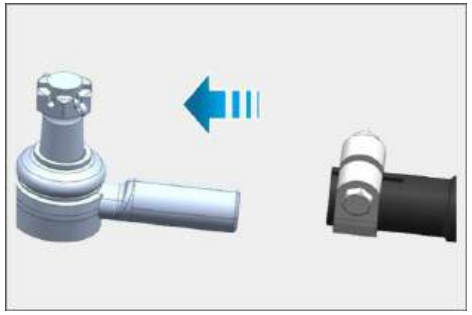
1 Loosen the bolts and nuts of fastening clips at both ends of the drag link.



2 Remove the cotter pins and slotted nuts of ball joint assembly at both ends of the drag link.

3 Separate the left and right ball joints from the steering arm, and use two-jaw puller if necessary. Do not hit the ball pin with hard objects.

4 Separate the left and right ball joints from the drag link body. The removal is finished.

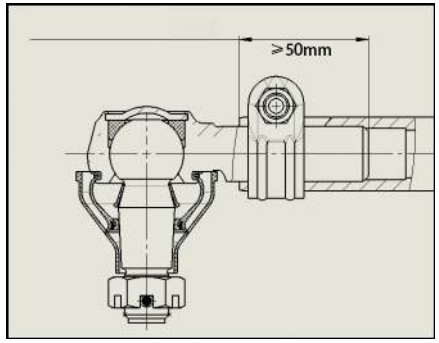


Installation

1 Before assembling the drag link, be sure to ensure that the alignment mark on the steering drop arm is aligned with the mark on the steering gear output shaft, the steering gear input shaft is aligned with the center mark, and the wheels are kept in straight-ahead state.

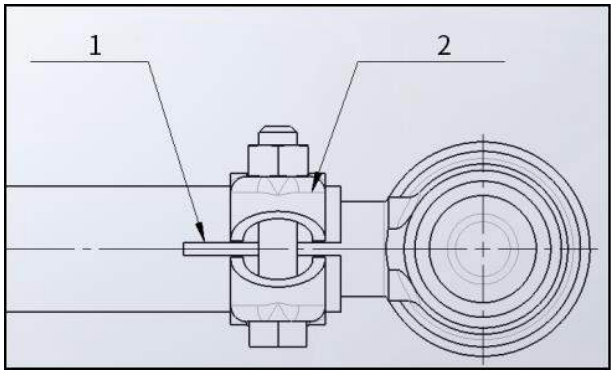
2 Screw the left and right ball joints into the link body (ensure that the screwing length for both joints is the same wherever possible).

3 Fix the left and right ball joints, adjust the drag link to the appropriate length by rotating the link body (ensure that the length of thread engagement for screws at both ends of the link body and ball joints shall be ≥ 50 mm), and then correctly install the ball joints at both ends and the steering arm, as shown in the figure below.



4 Install slotted nuts and cotter pins at both ends of the drag link, and tighten the slotted nuts to the specified torque.

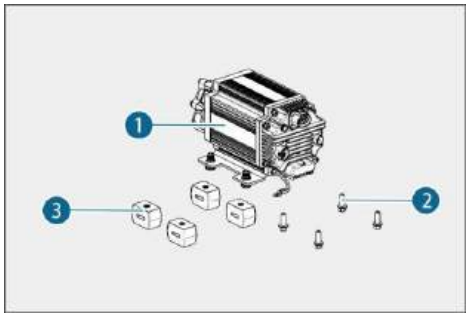
5 Adjust the fastening clip to ensure that its orientation is consistent with the slot direction of link body, and then tighten it to the specified torque of 170 N•m±10 N•m (125.5lb.ft±12.5 lb.ft). The installation is finished, as shown in the figure below.



■ 1 Rod body breaking the slot ■ 2 Direction of fastening clip

4.2.2.2 Steering fluid pump

According to the maintenance schedule, check the steering fluid pump regularly, and check the rubber cushion pad for crack or damage. If any, replace it (refer to the after-sales parts catalogue for material information).



■ 1 Steering fluid pump ■ 2 Fixing bolt and mounting bolt

■ 3 Rubber cushion pad

Steering fluid pump

Operating procedure for replacing cushion pad

1 Remove the mounting bolt of the electric steering fluid pump.

2 Raise the electric steering fluid pump, remove the old rubber cushion pad, and install a new one.

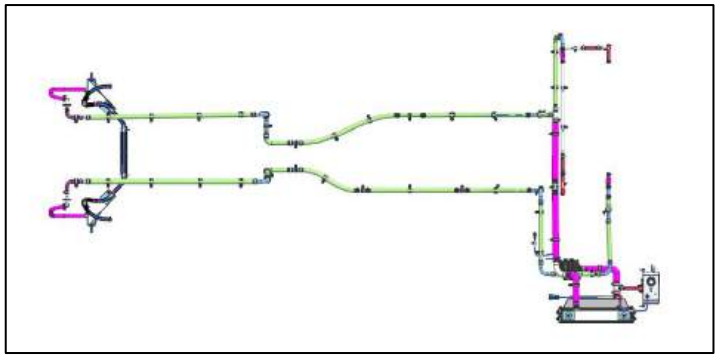
3 Install the mounting bolt of the electric steering fluid pump, tighten it to the specified torque, and draw a mark.

4.2.3 Cooling system

Cooling system hose

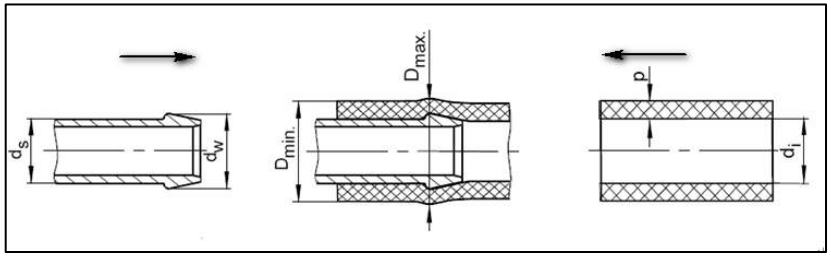
1 Use a socket to loosen the worm drive hose hoop at the connection between the pipe and hose, place the drain pan below this connection, and slowly separate the pipe and hose to both sides, and contain coolant that flows out in the drain pan.

Worm drive hose hoop



Cooling system hose

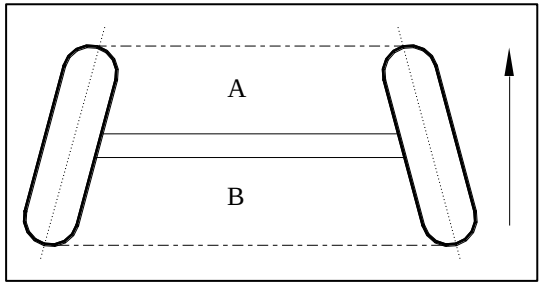
2 When there is no coolant flowing out of the pipeline, replace the damaged hose, insert the pipe into the hose with a length of at least 30mm, and clamp the hoop again. Refer to the parts catalogue for detailed material information of coolant pipeline.



Coolant pipeline

3 Add the coolant again until the level rises to the middle level (between the "H" and "L" marks) of the indicator.

4.2.4 Adjust the toe-in



Toe-in of non-independent front axle

Park the vehicle on a flat ground. Jack up the front axle, with the wheel in a straight-ahead position. Loosen the clamp bolt in corresponding tie rod. Turn the tie rod with a pipe tong to the extent that the required front wheel toe-in value is obtained. When adjusting the toe-in, make a mark in the middle of each tread pattern of the left and right tyres. Measure value A in the front of the front axle, and then turn the mark to the rear and measure value B. The toe-in is the difference between the values A and B (B - A). Tighten the clamp bolt after the toe-in is adjusted properly. Adjust the front wheel toe-in symmetrically for each wheel equipped with the corresponding steering tie rod (the right wheel is equipped with the right steering tie rod, and the left wheel with the left steering tie rod). Dimension C of rims on both sides must be the same. If the front wheel toe-in is adjusted for only one wheel, the steering system will suffer from imbalance. If conditions permit, check the sideslip of each tyre.

Adjustment of toe-in

Model of axle	Front wheel camber	Total toe-in of front wheels	King pin inclination angle	King pin caster angle
ZF 82A	0°	(0～2) mm	8°	3.5°

4.2.5 Brake system

4.2.5.1 Brake clearance

Check the thickness of the fixed brake pad (2) and the active brake pad (1). 22.5″ brake pads (front / rear), including backing plates: (11 ~ 30 / 11 ~ 30); service limit: 2mm.

■ Inspection of adjustment mechanism

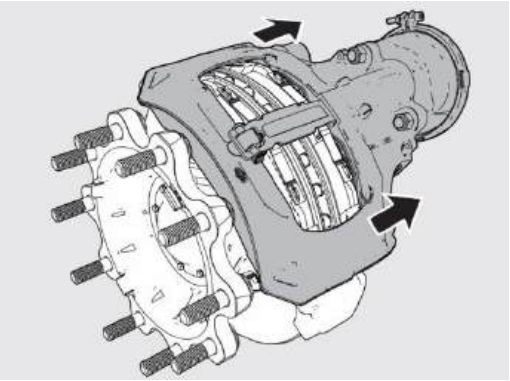
NOTE

- Before work, make sure that all wheels are chocked to prevent the rolling of the vehicle, and ensure that the service, parking and stopping (if any) brakes are released.

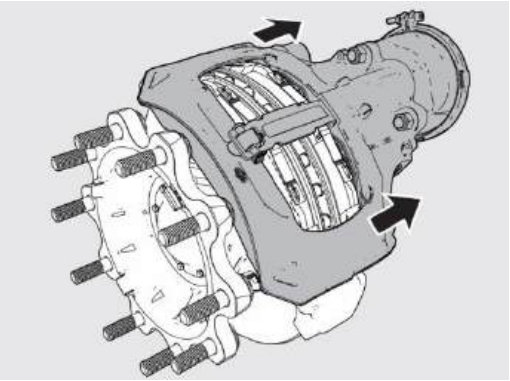
1 Remove the wheel (refer to the vehicle manufacturer's recommendation)

1) Under the condition that the brake does not slip, remove the brake pad pressure plate according to the mounting angle of the brake caliper on the axle.

2) Push and pull the brake caliper three times along the axis to confirm the existing clearance, as shown in the figure below.



3) Push the brake caliper inward along the guide pin, as shown in the figure below.

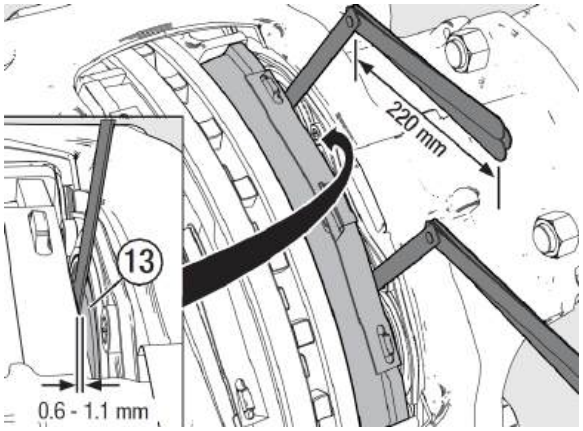


4) Use appropriate tools to pry up the inside brake pad to remove it from the push plate.

NOTICE

- Ensure that there is no dust between the backing plate of brake pad and the contact surface of the brake caliper. Dust may cause measurement errors. Clean the dust if necessary.

5) Check the clearance between each push plate and the inside brake pad backing plate. Simultaneously check two push plates with two feeler gauges, and make sure to check the entire surfaces of the push plates (the length of the feeler gauges must be at least 220 mm), as shown in the figure below.



6) If the clearance difference between each push plate and the bottom plate of brake pad is greater than 0.25 mm, be sure to check the clearance of the brake caliper bearing.

In addition, each measured clearance value must be in the range of 0.6~1.2 mm. If not, the adjusting mechanism function may be abnormal.

NOTE

- If the clearance is too large, the risk of brake failure may occur. If the clearance is too small, the risk of overheating may occur, resulting in corresponding damage.
- Please refer to the standards provided by the vehicle manufacturer.

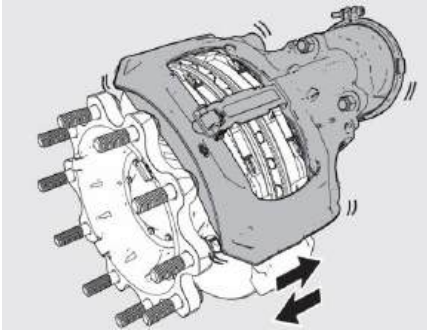
Inspection of brake caliper

NOTE

- Before work, make sure that all wheels are chocked to prevent the rolling of the vehicle. Ensure that the service and parking brakes are released.

Inspection of brake caliper clearance

Push and pull the brake caliper back and forth along the axis by hands. The brake caliper must be able to move within the working clearance, as shown in the figure below.

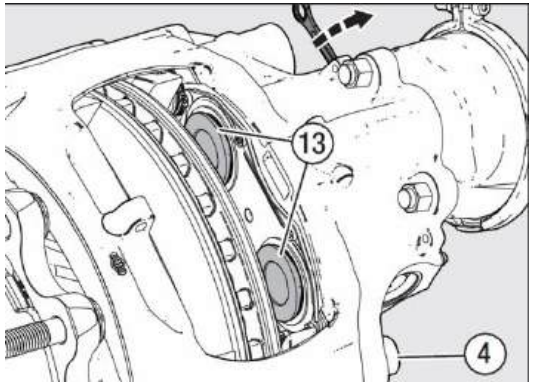


If the brake caliper does not move even though considerable force is applied by hands (no tools are used), be sure to check the guide pin and seal.

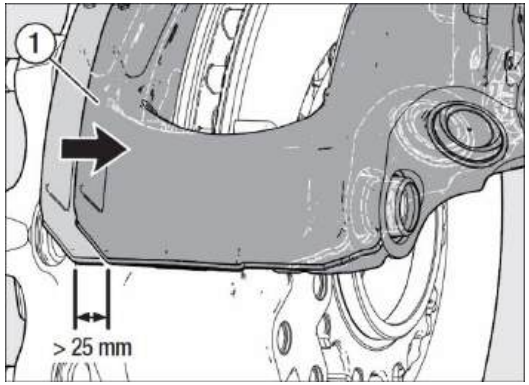
Movement of brake caliper along guide pin

1 Removal of brake pad.

2 Use a box wrench and torque protector to fully turn the push plate back. Remove the dust inside and outside the guide pin bushing, as shown in the figure below.



3 The brake caliper must be able to move freely within the full travel of the guide pin and the travel shall not exceed 25 mm, as shown in the figure below.



If the travel is less than 25 mm, be sure to check the seal of guide pin.

4.2.5.2 Drive axle

Replace the oil of drive axle after the vehicle has run for certain distance or time, so as to ensure the normal operation of the drive axle and extend its service life. The maintenance interval of the drive axle is shown in the Maintenance Schedule.

The replacement of drive axle gear oil is divided into two parts: replacement of main reducer gear oil and replacement of planetary reducer gear oil.

Preparation

1 Apply parking brake as per the standard power-off process, wait for 10 min, and confirm that the drive system has cooled.

2 Replace gear oil under the body by utilizing a pit or lifting the vehicle at vehicle jacking points described in 1.3.4.

3 Removal of tyres: See 5.1 for the removal of tyres. After removing tyres, clean the rear axle plugs and areas around them to prevent dust from entering the box.

CAUTION

- After running of the vehicle, the temperature of some parts (reducer, motor, brake, etc.) of the drive system is relatively high, which can reach more than 100 °C in summer (the temperature of brake can reach more than 200 °C). Therefore, make sure that the drive system is completely cooled before maintaining the drive axle to prevent burn.

NOTICE

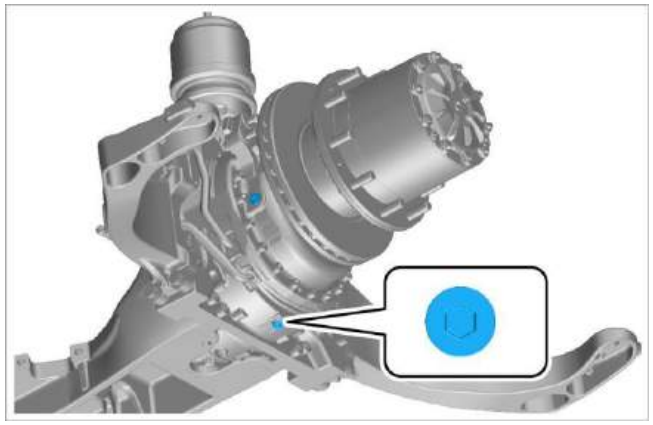
- Be sure to use a horizontal hydraulic jack capable of lifting 10 tons and above.
- Before jacking the vehicle, be sure to place anchor blocks at the front and rear sides of the front wheels, to prevent the vehicle from sliding.
- When replacing the gear oil, take care to collect the oil. Do not let the oil drop to the rim, and if any, wipe it immediately to avoid corrosion of the tyres.
- All oil filler plugs and oil drain plugs are of hex plugs with the same size.
- The screw plug at oil drain hole is magnetic.
- The screw plug at oil drain hole is non-magnetic.
- Fluid discharged shall be collected in a container for disposal as per provisions for environmental protection.

Replacement of main reducer gear oil

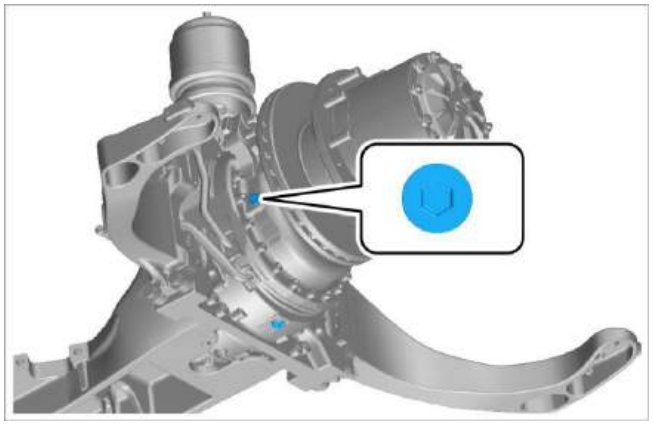
Oil discharge

1 Oil drainage of main reducer: place the liquid reservoir below the oil drain hole of the main reducer, and unscrew the oil drain plug with a #10 Allen wrench, as shown in the figure

below.



2 Unscrew the oil filler plug to increase the drainage speed. When the oil flows out in droplet form (the velocity is less than 2s per drop), the oil drainage is complete. Remove debris attached to the oil filler and drain plugs, as shown in the figure below.



Oil filling

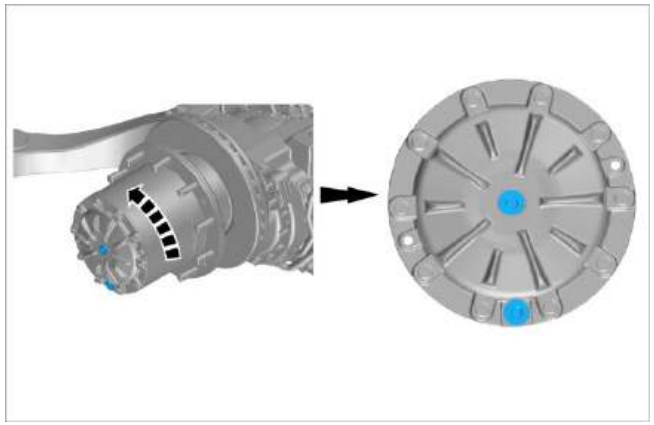
1 After completion, wind Teflon tape around the oil drain plug thread by 1 turn for 1 layer (no more layers are needed). Fit the oil drain plug into the main reducer oil drain hole, with a tightening torque of 35 N.m.

2 Add gear oil through the oil filler hole of the main reducer. Refer to the following oil amount table for the amount of oil to be filled.

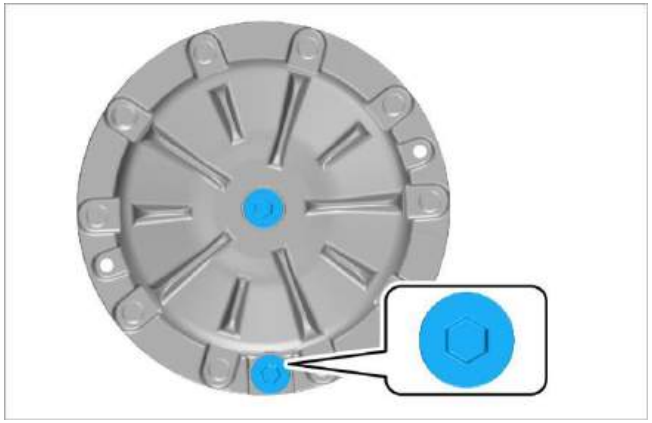
Replace the gear oil for planetary reducer

Oil discharge

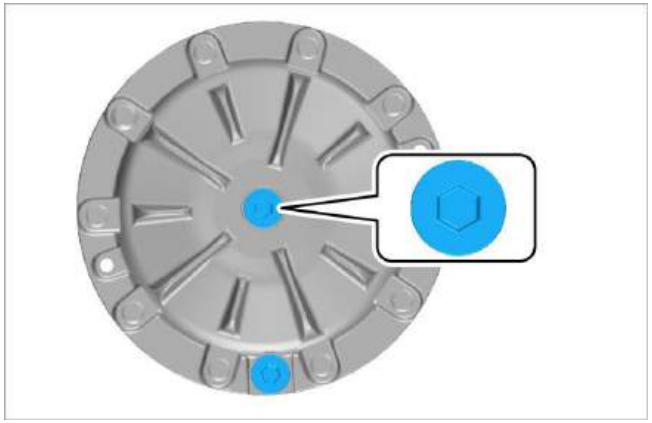
1 Adjust the position of the planetary reducer: Release the parking brake lever, adjust the planetary reducer drain hole to the lowest position, and pull up the parking brake lever again, as shown in the figure below.



2 Oil drainage: open the planetary reducer oil drain hole to drain the gear oil, as shown in the figure below.



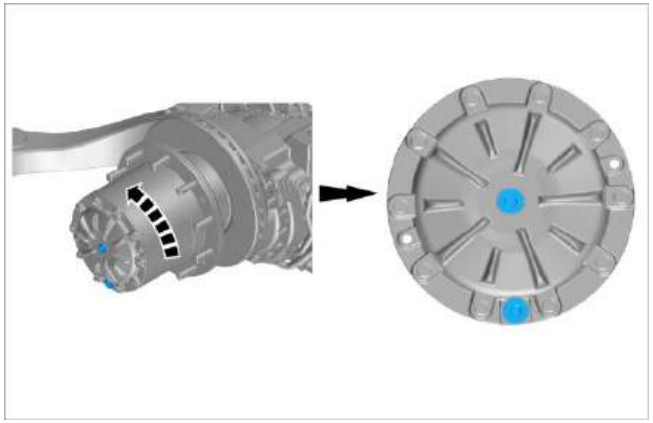
3 Unscrew the oil filler plug to increase the drainage speed, as shown in the figure below.



4 Cleaning: When the oil flows out in droplet form (the velocity is less than 2s per drop), the oil drainage is complete. Remove debris attached to the oil filler and drain plugs.

Oil filling

1 Release the parking brake lever, adjust the planetary reducer oil drain hole to the highest position of the wheel hub, and pull up the parking brake lever again; after completion, wind Teflon tape around the oil drain plug thread by 1 turn for 1 layer (no more layers are needed), as shown in the figure below.



2 Add oil through the oil filler hole of the planetary reducer. Refer to the following oil amount table for the amount of oil to be filled.

3 Note that, after the oil is added, wind Teflon tape around the oil filler plug thread by 1 turn for 1 layer (no more layers are needed). Install and tighten it according to the corresponding position with a torque of 35 N.m.

4 After all the plugs are tightened, rotate the oil drain hole of the planetary reducer to the bottom side (as described in step 1), and check the oil drain bolt for leakage.

NOTICE

- During filling, check the oil drain hole for leakage. If any, check the oil drain hole, wind Teflon tape around the plug again and tighten the plug. Replace the plug if it is deformed or damaged.
- Wind Teflon tape around all the plug threads for seal.
- The plug at the oil drain hole is magnetic, which can be used to absorb foreign matters such as scrap iron at the bottom of the reducer. The screw plug at oil drain hole is non-magnetic.

The gear oil specified by BYD must be strictly adopted for replacement in specified amount quantitatively shown in the following table.

Amount of oil filled for drive axle (single side)

Status	Planetary gear Oil filler hole	Reduction gear Oil filler hole	Total oil capacity
Amount of oil filled for new product or after disassembling	1.3L (0.35gal)	2.1L (0.56gal)	6.8L (1.80 gal)
Amount of oil filled for maintenance	1.0L (0.27gal)	2L (0.53gal)	6.0L (1.59 gal)
Recommended oil	SAE 75W-90 GL-5 (suitable for use in an environment with a temperature not below -40°C; recommended brand: Total)		

4.2.6 Charging port

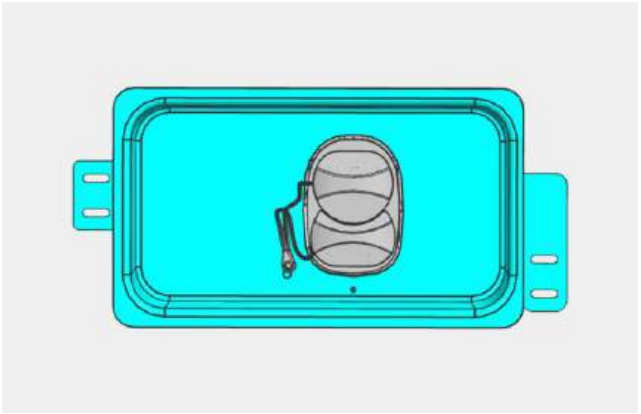
4.2.6.1 Content of Spot Check

1 Check the charging port hatch (including charging port mounting bracket).

- It is tight and free of fracture.
- The keyhole can be used normally.

2 Open the charging port hatch, and check interior of the charging port hatch and the cap of the charging port

- The cap of the charging port and the locking clip shall be free of damage and fracture;
- There shall be no foreign objects, water stain and others inside.
- The label for cap of the charging port shall be firmly affixed.



Normal state in the charging port hatch

3 Open the inner cap of the charging port, check interior of the charging port, the charging port terminal (including power terminal and signal terminal) and charging port sleeve.

- The terminal shall be free of blackening and fracture;
- The terminal cap is free of fall-off.
- The terminal shall be free of retraction, inclination and free movement.

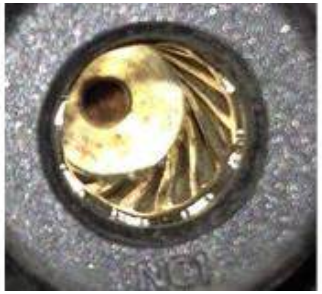
- The sleeve shall be free of crack and terminal exposure due to fusion.
- There shall be no foreign objects, water stain, or dust inside.
- The seal ring (if any) in the charging port shall be intact and firm.

Normal terminal 1

Contact prevention cap fall-off

Normal terminal 2

Terminal blackened



Yellowed terminal

Terminal broken and falling off

Foreign matters in terminal

Foreign matters in terminal

4 Open the service hatch to observe tail end of the charging port.

- The outer layer of the cable at the tail end of the charging port shall be free of blackening and breakage (careful observation is required with auxiliary lighting);
- The ground wiring harness shall be firmly fixed and the fixing bolts are tight.

- The tail end of the charging port shall be dry and free of water stain, etc.
- The high-voltage connectors of the charging port shall be firmly connected without damages

Normal cable at tail end of the charging port

Blackened outer layer of cable at tail end of the charging port

The ground wiring harness are fixed and intact

High voltage connector of charging port is in normal state

Electric lock (red mark)

5 Locking function

- Open the service hatch and push the manual lock/unlock switch of the electric lock at tail end of the charging port. The lock cylinder shall be capable of normal action.
- Place the lock cylinder at stretched state manually. Observe and make sure that the lock cylinder is free of deformation or fracture affecting the function.

Note: 1. Make the lock cylinder retracted after electric lock inspection is completed.

2. DC charging port is unavailable.

6 Charging port fixing

- Measure the torque of the four fixing bolts with a torque wrench. The torque shall be 10±1 N.m.

7 Ground wiring harness

- Measure the ground wiring harness installation torque with a torque wrench. The torque shall be 10±1 N.m.

4.2.6.2 Solution

1 If any charging port clip, seal cover, seal ring, electronic lock or any other component that can be removed and installed separately is damaged, replace the damaged component separately.

2 If any damaged component cannot be removed and installed separately, replace the charging port assembly.

3 If the charging port terminal reed and bottom become yellow and the cable at the tail end of the charging port blackens or cracks (careful observation is required with auxiliary lighting), make replacement.

4 Visually check the interior of the charging port and the terminal. In case any foreign object, water stain or dust exits, handle it in the following sequence:

1) If foreign object exists, remove it with a tool such as tweezers with an insulated handle;

2) If water stain exits, remove it with a lint-free wiper (do not use paper towel for wiping charging port terminal);

3) If dust exists, remove it with a nylon soft fur round brush (brush diameter: 10 mm suggested for DC port jack, and 5-6 mm suggested for AC port jack) and lint-free wiper.

5 If the charging port tightening torque does not meet the requirement, re-tighten the charging port;

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Chapter 5 Regular Maintenance Items

5.1 Every 30,000 km or 6 months

5.1.1 Requirements for maintenance every 30,000 km or 6 months

Requirements for maintenance every 30,000 km or 6 months

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Brake system	1	Check the air dryer and replace the drying cylinder	1 Check whether the dryer starts blowback normally when the air pressure of the vehicle reaches the rated value; 2. Check whether the air dryer muffler is blocked or leaking when the air compressor is charged; 3 Check whether there is significant increase in water or oil accumulation, replace the drying cylinder if so. 4 After replacing the drying cylinder, discharge residual compressed air and water from the air reservoir. Restart the air compressor, check if the air dryer can blow back normally, and check if the joints leak. After the air reservoir is inflated, check if water is drained from the drain valve of the air reservoir.	
Chassis	Brake system	2	Clean the condenser	Clean the spiral fins, filter sieve and valve element of the condenser.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Brake system	3	Check whether the system functions are normal, whether the operating pressure can be reached, and whether the low air pressure alarm functions properly	1 When the dryer discharges air and blows reverse air, it is considered that the system working pressure is reached; 2 Continuously depress the brake pedal and observe whether the instrument has a textual alarm of low air pressure and generates audible alarm. If it has the alarms, it is considered that the low air pressure alarm system works properly.	
Chassis	Brake system	4	Check the air line joints and parts for leakage and safety and check the rubber parts for cracks or hardening	1 Perform pressure hold test for the brake systems (When the air pressure rises to 750 kPa and no brake is applied, the pressure drop shall be less than or equal to 10 kPa 3min after shutdown of the air compressor. When the air pressure reaches 750 kPa, stop the air compressor, depress the brake pedal to the floor, and observe the air pressure 3min after it is stable; the air pressure drop shall be less than or equal to 20 kPa). If the standard is met, the entire vehicle has no leakage; otherwise, check the joint for leaking sound and use soapy water to check the airtightness of the joint. Treat or replace corresponding item when a leaking source is identified (see the Service Manual); 2 Visually check the pipe clamps, brake hoses, and PA air pipes for cracking and aging, and replace any item that is cracked or aged. (See the Service Manual)	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Brake system	5	Check the brake pipes and hoses for damage and oil or air leakage	1 Check whether they are installed and connected firmly, whether each brake pipe leaks, and whether the brake hoses have suppression or interference with tyres and surrounding parts during movement.	
Chassis	Air compressor	6	Check and adjust the connectors, fasteners, pipes, joints and cushion pad	1 Check whether the connector is connected firmly and whether it is loose; 2 Check whether the fasteners are loose; 3 Check whether the pipeline and joints leak; 4 Check the cushion pad for crack or appearance damage.	
Chassis	Air compressor	7	Replace the air compressor oil (Naili)	1 Check whether the oil level is above the middle line of the oil sight glass; add lubricating oil if it is insufficient; 2 Check whether the lubricating oil is emulsified (oil becomes milky white) and replace it if it is emulsified. (See 4.2.1 for operation guide on the inspection of air compressor)	
Chassis	Air compressor	8	Replace the oil filter (Naili)	Check whether the lubricating oil is emulsified and replace it if it is emulsified. (See 4.2.1 for operation guide on the inspection of air compressor)	

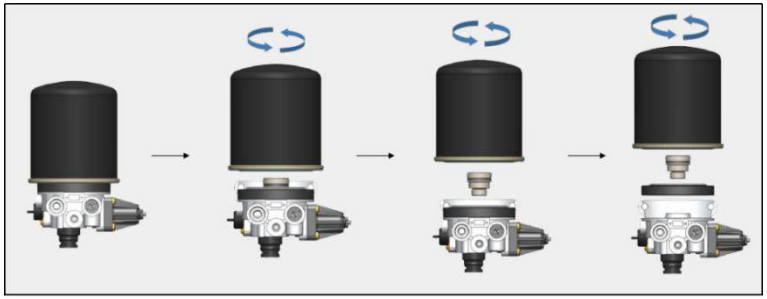
Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Air compressor	9	For other maintenance items, refer to instructions for air compressor of corresponding brands and models. For oil-containing air compressor, remember to replace oil filter.		
Chassis	Cooling system	10	Check the electronic fan for dirt and clean it if necessary	1 The electronic fan shall be firmly mounted, and the fan and fan cowl shall be free of cracks and looseness. 2 Clean the fan. Make sure that its surface is clean and free of dust and mud. The fan shall operate properly without abnormal noise. Do not flush the fan blades directly with high pressure water.	
Chassis	Driving system	11	Check the suspension bushing	Rubber bushing (push rod and stabiliser bar): Check whether the rubber bushing is intact and free of aging and peeling off; replace the rubber bushing if it is abnormal;	
Chassis	Driving system	12	Replace the main reducer gear oil, wheel-end gear oil (only for oil lubricated wheel end) or grease	1 Use gear oil of specification recommended in the User's Manual; 2 Refer to the User's Manual for the gear oil capacity (refer to the drive axle as an item in 5.5 Maintenance of chassis of User's Manual for details).	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Driving system	13	Check the steering tie rod/drag link and ball joint	Check whether the steering drag link is deformed, and whether the ball joint fits well without looseness.	
Chassis	Driving system	14	Check the fasteners of suspension and axle	Front suspension: steering knuckle arm bolt, axle and airbag mounting base bolt, thrust rod bolt, brake bolt and other fastening bolts Rear suspension: upper and lower thrust rod bolts, stabilizer bar mounting base and axle C-arm connecting bolt The above fasteners shall not be loose, and there shall be no loose dirt, rust scale or metal wear around the bolt head and nut.	
Chassis	Driving system	15	Tyre rotation	Perform tyre rotation (refer to the section about wheel assembly of the driving system in 5.5 Maintenance of chassis of User's Manual for details). The customer can adjust it according to actual condition	
Chassis	Electric drive axle	16	Clean the vent valve	Clear dirt from the vent cap in time. The vent cap shall return normally after being pressed to ensure smooth ventilation.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Electric drive axle	17	Replace the gear oil for reducer	1 SAE 75W-90 GL-5 (suitable for use in an environment with temperature not below -40 ℃) (recommended brand: Total) gear oil is designated, and oil of a same type from a proper manufacturer shall be used when the above oil is not available due to special restrictions. 2 In removal of oil drain and filler plugs, the surrounding area must be wiped clean to prevent dust and sand from entering the box. 3 The oil drain plug should be magnetic and the oil filler plug should not be magnetic (do not misuse them). In removal and installation of oil drain and filler plugs each time, be sure to replace the Teflon tape with a new one and remove iron sludge on end faces of the oil drain and filler plugs. Tightening torque of the oil drain and filler plugs is 35 N.m (26 lb.ft). 4 Carry out maintenance according to the specified maintenance interval, volume of oil filling for maintenance and oil type.	
Three-electricity (motor, electronic control and power battery)	Safety	18	Regularly check the automatic fire extinguishing system	Refer to the maintenance manual of the automatic fire extinguishing system from the supplier for details.	

5.1.2 Method for maintenance every 30,000 km or 6 months

5.1.2.1 Drying cylinder



Replacement of drying cylinder

1 To remove the drying cylinder, turn it leftward using a strap wrench with force;

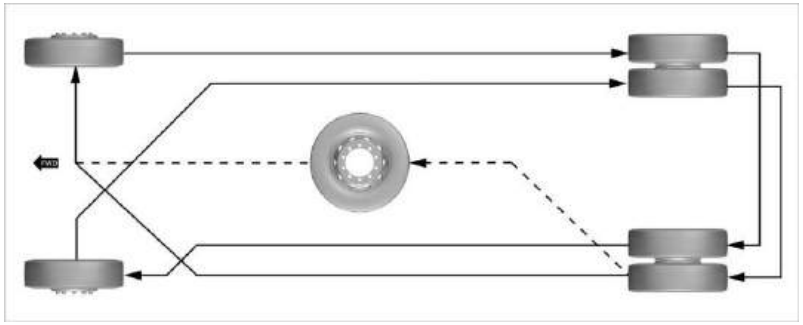
2 To remove the drying cylinder, remove the transition joint first;

3. Before reinstalling the drying cylinder, thoroughly clean the surface;

4 When reinstalling the drying cylinder, tighten it clockwise (M = 15 N•m).

5.1.2.2 Perform tyre rotation

To enable tyres to be worn to the same degree and lengthen their service lives, be sure to perform tyre rotation by following the requirements.



Tyre rotation

Principle of tyre rotation:

- To use double tyres for the rear wheels, make sure that the outside diameter difference between the two tyres does not exceed 12 mm (0.47 inch). Install the tyre with a smaller outside diameter in the inner part if the outside diameter difference is less than 12 mm (0.47 inch).
- When installing double tyres, separate the valve core of the inner tyre from that of the outer tyre to facilitate replenishment of compressed air.
- The front wheels should be equipped with even, wear-resisting, and less worn tyres.
- Use tyres of the same size on one axle only. Using tyres of different sizes on one axle can cause braking deviation, body sway or steering malfunction.

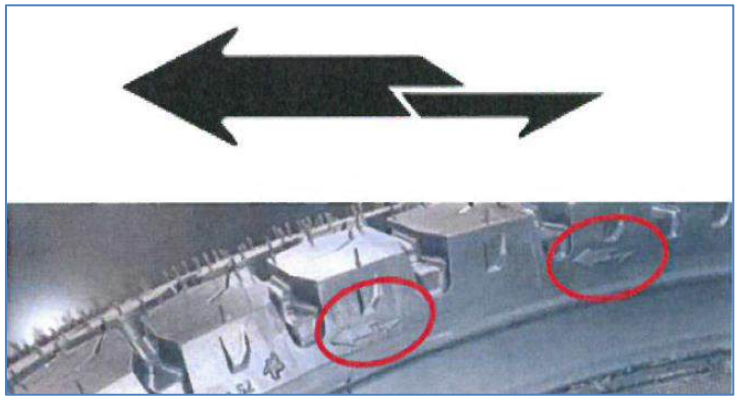
- Be sure to use new tyres in pair and install them on the front wheels initially.
- Check whether the wheel hub bolts and wheel nuts have scratches on their threads. For the sake of safety, when thread damage is found on the bolts and nuts of one side, replace the bolts and nuts on both sides because bolts and nuts on the other side may also be damaged.
- Check whether the contact area of each tyre is deformed or damaged. If any contact area or mounting hole is deformed or damaged, replace corresponding tyres.

5.1.2.3 Inspection and replacement of tyres and wheels

Inspection of tyres

- If tyre damages such as cut, fracture, deep crack exposing ply and expansion are identified, the tyres have internal damages and should be replaced.
- If a tyre often leaks or is not suitable for reuse after repair due to the size and location of cut and other damages, replace the tyre. If you are unsure about this, please contact a BYD authorised service provider.
- If air leakage happens when the vehicle is travelling, please do not continue driving. Even tyres that have not been used or not often used may be subject to deterioration.

To use a tyre with directional signs as shown in Figure 5-3, it is recommended that the tyre should be installed in a direction indicated by the larger arrow; when the tread pattern is half worn, it is recommended that the tyre should be installed in a direction indicated by the smaller arrow. Make sure that the coaxial tyres roll in a direction indicated by the arrow.



Tyres with directional signs

Replacement of tyres

- When a tyre has been worn to the wear limit, be sure to replace it; in case of a tyre with directional signs, when the tread pattern is half worn, it is recommended that the tyre should be reinstalled in a direction indicated by the smaller arrow that is shown in the figure above.

- Replace the tyre with one of the same model and specification;
- Inflate the tyre to the specified air pressure;
- During use of tyres, check the tyre pressure regularly;
- Before driving, conduct dynamic balance testing, weighting and calibration for the tyre and rim assembly;
- When the road condition is poor, drive the vehicle at a low speed and reduce rapid braking and sharp turn as much as possible, and avoid the tyre hitting other objects, especially sharp hard objects.
- Be sure to use new tyres in pair and install them on the front wheels initially.
- Check whether the wheel hub bolts and wheel nuts have scratches on their threads. For the sake of safety, when thread damage is found on the bolts and nuts of one side, replace the bolts and nuts on both sides because bolts and nuts on the other side may also be damaged.

5.1.2.4 Inspection and replacement of wheels

- If any wheel has damages such as bends, cracks or serious corrosions, replace it immediately.
- If any damaged wheel is not replaced, the tyre may separate from the wheel or cause the vehicle to be out of control.
- Replace wheels with those of the same size and specified type only.
- Using wheels of other sizes or types will cause adverse effect to brake cooling, speedometer/odometer calibration, braking performance, headlight aiming, bumper height, ground clearance and clearance between tyres or antiskid chains and the body and chassis.

NOTE

- It is recommended that rims of correct specifications should be used.
- Check whether the wheel nuts are tightened when the vehicle has traveled for 1,000 ~ 5,000 km if it is equipped with rims.
- Check whether the wheel nuts are tightened when the vehicle has traveled for 1,000 ~ 5,000 km after tyre rotation, repair or replacement.
- When using antiskid chains for wheels, take care not to damage the rims. Use wheel nuts and wrench specially designed for the wheels only. Regularly check whether the rims are damaged. In case of damage, replace it immediately.

NOTICE

- If drained oil has deteriorated (e.g., blackened, emulsified or smelly), clean corresponding gears with new oil and then add new oil by the replacement method. Do not directly add new oil to the original deteriorated oil.
- The lubricating oil specified by BYD for replacement is a must.

5.2 Every 60,000 km or 12 months

5.2.1 Requirements for maintenance every 60,000 km or 12 months

Requirements for maintenance every 60,000 km or 12 months

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Whole vehicle	1	Check the chassis fasteners	Check whether the push rod, stabiliser bar, shock absorber, air compressor, steering motor, drag link, drive shaft, angle steering gear, ball joint and steering gear are firmly installed, and fasten bolts regularly according to the torque required in the Maintenance Manual.	
Chassis	Whole vehicle	2	Vehicle lubricating points (non maintenance-free and no centralised lubrication)	Use a grease injection gun to inject lithium grease #2 until it overflows from the parts binding area. Grease injection for king pin and ball joint of driving system. (See 3.2.6 for operation guide on greasing the complete vehicle)	
Chassis	Driving system	3	Check the shock absorber	Check whether the shock absorber is firmly mounted and free of oil leakage and functions effectively, whether the mounting bracket is cracked, and whether the rubber pad of the shock absorber is damaged.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Driving system	4	Check the wheel-end brake units	1 The brake disc thickness shall be >37 mm, and the thickness difference between brake discs on the same side shall be <1 mm, without flake-type crack or radial through crack; 2 Check whether the brake chamber housing is deformed or leaking; 3 Check whether the brake discs and brake calipers are contaminated with foreign matters or oil dirt; 4 Inspection of automatic adjustment function: Rotate the adjuster counterclockwise until 2-3 "beeps" are heard. Place the box spanner or socket on the adjustment shaft and apply brake (about 2 bar) for 5-10 times. If the adjuster works normally, the spanner or sleeve shall turn clockwise for a small distance; 5 Inspection of brake caliper body: Push the brake caliper with hand. The caliper body shall slide freely along the guide pin, with travel greater than 25 mm, indicating it is normal. If it is abnormal, check and replace the guide component, check each protective cover of the brake caliper for damage, and check connection of brake caliper mounting bolts; 6 Inspection of brake pads: Check whether the total thickness of the remaining backboard and friction material is less than 11 mm and whether there is eccentric wear, damage or chip-off problem;	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Driving system	4	Check the wheel-end brake units	7 Check the seal: (1) check whether the push plate with bushing is damaged; (2) whether the steel cap, inner protective cover and bushing of the guide pin and other seal parts are damaged, lost or aged; 8 Brake clearance inspection: 0.6 mm~1.2 mm (disc type).	
Chassis	Driving system	5	Grease the ZF front axle	Fill grease through the upper and the lower injection ports of the king pin until grease overflows around.	
Chassis	Electric drive axle	6	Check the high-voltage/low-voltage wiring harness	Check whether the three-phase wire of the motor and low voltage wiring harnesses on the axle are worn or damaged.	
Chassis	Brake system	7	Check the air dryer and replace the desiccant	1 Check whether the dryer starts blowback normally when the air pressure of the vehicle reaches the rated value; 2. Check whether the air dryer muffler is blocked or leaking when the air compressor is charged; 3 Replace the drying cylinder (see 5.1 for operation guide on dryer and drying cylinder) 4 After replacing the drying cylinder, discharge residual compressed air and water from the air reservoir. Restart the air compressor, check if the air dryer can blow back normally, and check if the joints leak. After the air reservoir is inflated, check if water is drained from the drain valve of the air reservoir.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Brake system	8	Clean manual drain valve	Remove the manual drain valve, and clean the oil stain and other impurities at the water inlet.	
Chassis	Air compressor	9	Check/replace the fine oil separator (Naili)	Remove the fine oil separator with a strap wrench and observe whether the oil tap and the oil core tube are rusted. If any item is seriously rusted, replace it. If it is normal, replace it at the specified intervals. (See 4.2.1 for operation guide on the inspection of air compressor)	
Chassis	Air compressor	10	For other maintenance items, refer to instructions for air compressor of corresponding brands and models. For oil-containing air compressor, remember to replace oil filter.		
Chassis	Steering system	11	Check the power steering fluid level.	Check whether the steering fluid reservoir, fluid line joints and steering gear leak. In case of leakage of steering fluid, repair corresponding parts in time and contact a BYD authorised service provider when necessary. If the fluid level in steering fluid reservoir is between the "MAX" and "MIN" marks, the level meets the requirement. If the fluid level is at or below the "MIN" mark, add steering fluid until the fluid level is between the "MAX" and "MIN" marks.	
Chassis	Steering	12	Check whether the oil	Fasten or replace any pipeline joint if it leaks.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
	system		pipe is broken, and check the pipeline joint for leakage or damage.		
Chassis	Cooling system	13	Check the cooling system hose, vulnerable parts and hose connection	1 Check the cooling system hose for aging. In case of aging, replace the hose with a hose of the same number. 2 The connecting pipeline shall be free of breakage and aging, the connections shall be tight. 3 Check for damage and aging of vulnerable parts such as radiator damping pads and coolant pump damping pads. If they are damaged or aged, replace them.	
Three-electricity (motor, electronic control and power battery)	Service switch	14	Check the fastening of service switch	After unplugging the handle of the service switch, check whether the fixing bolts for the installation of the service switch are fastened properly.	
Three-electricity (motor, electronic control and power battery)	Service switch	15	Check the surroundings.	Check whether some areas on the surface of the service switch seem yellowish black.	
Three-electricity (motor, electronic control and power battery)	Service switch	16	Check the service switch handle	Check whether the copper cores of upper and lower assemblies of service switch handle are ablated	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Electrical appliances	Low-voltage wiring harness	17	Check the wheel-hub driving motor ground wire	1 Check whether the ground wire joint fastening bolt is loose and whether the ground wire surface is damaged; 2 Check whether the ground wire is routed smoothly and whether the ground wire is too taut or has any interference with other parts in dynamic application;	
Electrical appliances	Low-voltage wiring harness	18	Check low-voltage wiring harness in the hubcap.	Check whether the low voltage wiring harness is intact or has damage or interference, whether the wiring harness bundled on the air pipe is free of force applied, and whether the connectors are loose or broken.	
Electrical appliances	Power battery thermal management system (independent)	19	Check whether the compressor and its mounting components are normal; check the pipeline connection reliability, insulation sponge and mortar, condenser fan, electronic expansion valve, thermal management system outer cover and base fastening, and wiring harness and controllers fastening; check whether the coolant pump is normal.	1 Check whether any compressor bolt is loose, and whether the compressor generates abnormal sound; 2 Check whether any pipeline clamp is loose or worn due to interference; 3 Check whether the insulation sponge and insulation mortar are damaged or fall off; 4 Check whether the condenser fan has damage or abnormal sound; 5 Check whether the outer cover and base are damaged and whether any fastener is loose; 6 Check whether the wiring harnesses and controllers are fixed without wear; 7 Check if the coolant pump works normally.	

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Electrical appliances	Power battery thermal management system (independent)	20	Clean the condenser	Clean the condenser core directly using a high pressure water spray gun for vehicle washing at a pressure <200 kPa;	
Electrical appliances	Defroster (applicable if equipped)	21	Replace or clean the interior inlet and return air strainers		

5.2.2 Method for maintenance every 60,000 km or 12 months

5.2.2.1 Brake pad

Check the brake discs

NOTE

- As the brake pad is made of toxic material, frequent contact with its debris is harmful to health.
- Avoid inhaling debris from brake pads.
- Be sure to use vacuum cleaner to clean the brake pad. Do not use suction hose or brush.

Replacement of brake pad

Before work, make sure that all wheels are chocked to prevent the rolling of the vehicle. Ensure that the service and parking brakes are released.

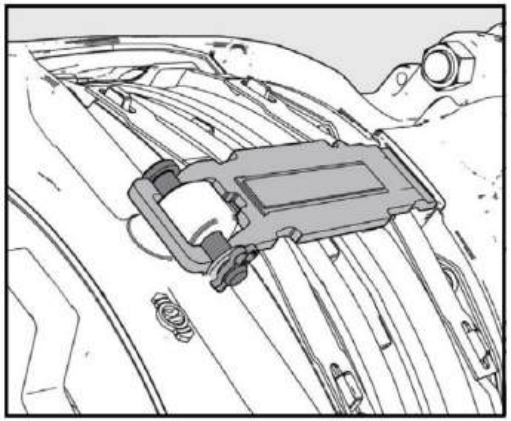
Removal of brake pad

1 Remove the wheel.

NOTICE

- Before removing the brake pad, it is highly recommended to check whether the regulator mechanism operates normally.
- Depending on the direction of brake caliper on the axle, the brake pad may fall off after the brake pad fastener is removed.

2 Remove the spring clamp and gasket, press the brake pad fastener, and remove the pin, as shown in the following figure.



Removal of brake pad 1

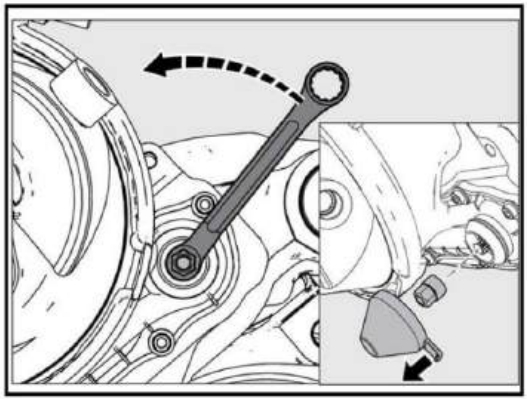
3 If necessary, remove the damaged sensor components in the brake pad.

4 Use a snap tongue to pull out the regulator cap. Take care not to lose the shear adapter.

NOTICE

- Do not use any tools to remove the regulator cap; otherwise, the seal elements of the regulator will be damaged.

5 Rotate the shear adapter anticlockwise (viewed from the brake side) until the tappets and sheath components are fully retracted and "click" is heard, as shown in the following figure.

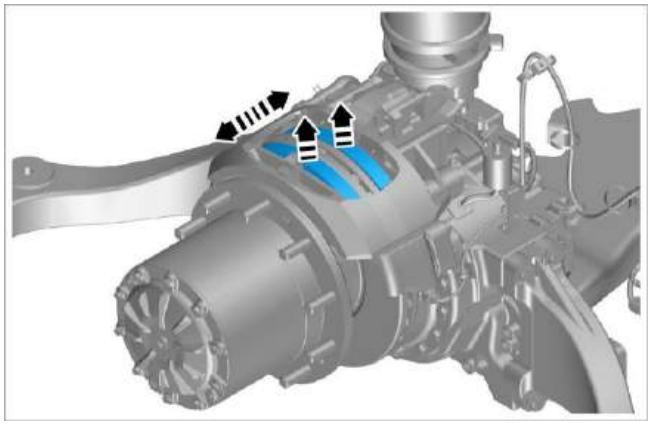


Removal of brake pad 2

NOTICE

- If no shear adapter is installed, do not turn the regulator. If the shear torque of the shear adapter is exceeded, the design will fail. Try again with a new (unused) shear adapter. If the shear adapter fails again, be sure to replace the brake caliper due to internal damages. Do not use an open-end wrench on the shear adapter.

6 Remove the brake pad, as shown in the following figure.



Removal of brake pad 3

Note: For disc brake, considering the geometry of the brake pad housing, remove the brake pad according to the following procedure:

1 Pull the brake caliper outwards.

2 Remove the outer brake pad.

3 Push the brake caliper inwards.

4 Remove the inner brake pad.

Installation of brake pad

NOTICE

- The brake pads must be replaced as a complete set but not separately. Brake pads allowed by vehicle manufacturer, axle manufacturer and disc brake manufacturer shall be used only. Failure to follow this requirement will void the warranty.

1 Clean the bracket area of the brake pad.

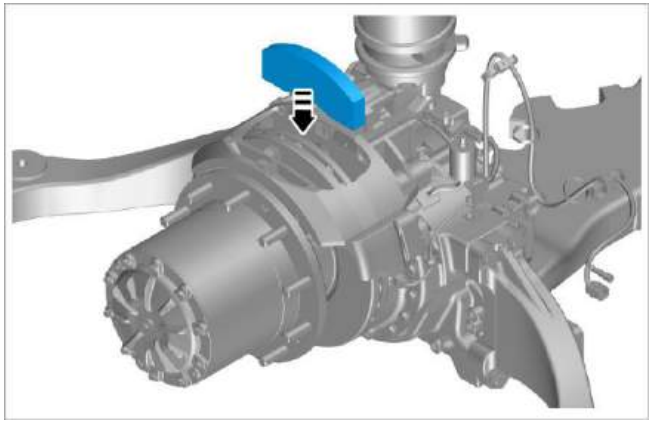
Before inserting a brake pad, rotate the shear adapter anticlockwise until the tappets and dust shield components are fully retracted.

NOTICE

- If an inner wear indicator is needed, please follow the regulations in this section.

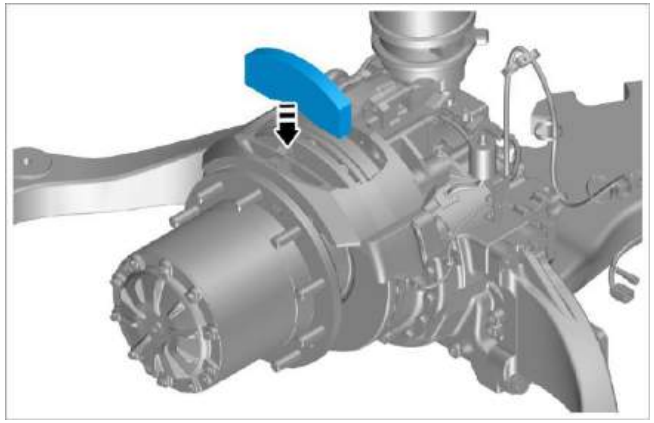
2 For disc brake, the following installation tools are needed considering the geometry of the brake pad:

1) Slide the brake caliper inwards and insert the inner brake pad, as shown in the following figure.



Installation of brake pad 1

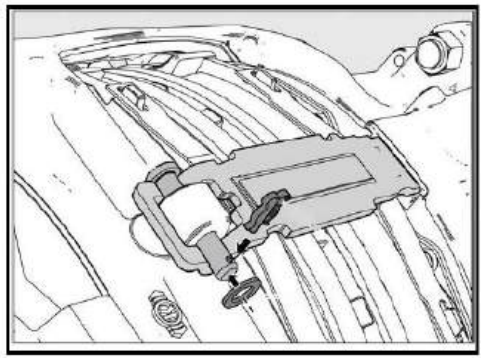
2) Slide the brake caliper outwards and insert the outer brake pad, as shown in the following figure.



Installation of brake pad 2

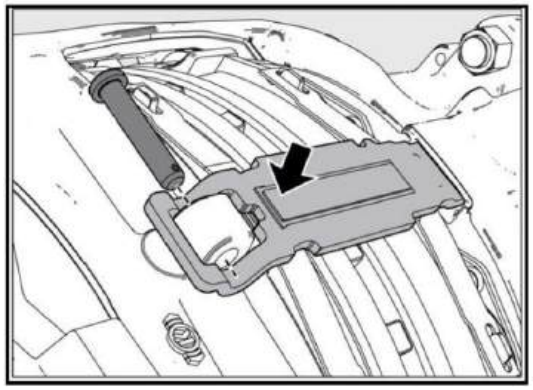
3 Rotate the shear adapter clockwise until the brake pad contacts with the disc. Do not excessively retract the regulator. Rotate the regulator anticlockwise for three times, and check the running clearance.

4 After the brake pad fastener is mounted to the groove of the brake caliper, press it down to ensure that its pin can be inserted (use new part only), as shown in the following figure.

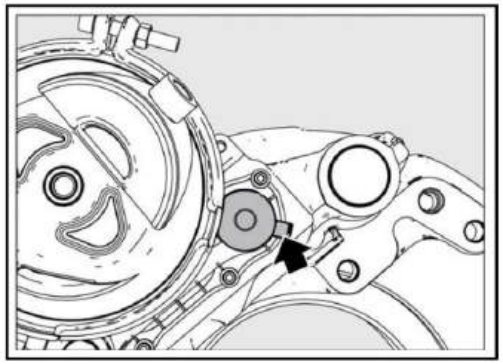


Installation of brake pad 3

5 Install a new gasket and new spring clamp to the brake pad fastener pin (use new part only), as shown in the following figure.



Installation of brake pad 4



Installation of brake pad 5

NOTICE

It is recommended that the brake pad fastener pin, when mounted, should face downwards whenever possible.

6 Replace the regulator cap (use new regulator cap only). The contact surface of the new one shall be coated with grease (Part No.: II14525 or II32868), as shown in the following figure.

NOTE

- The accessory of the regulator cap shall be positioned as shown in the figure (see the arrow). This ensures the access for subsequent removal.

7 If necessary, please install cable guider and brake pad wear indicator.

8 Reinstall the wheels as per the recommendation of the vehicle manufacturer.

9 Depress and release the brake pedal, and then rotate the wheel hub by hands. The wheel hub shall be able to move freely.

NOTICE

- After any maintenance work, check the brake performance and system behaviour through a roller dynamometer. Check the function and availability.
- Keep in mind that the performance may be relatively low during running-in period of the brake pad and / or brake disc.

5.2.2.2 Inspection of steering fluid and reservoir

Inspection of fluid level of steering fluid reservoir

Check whether the steering fluid reservoir, fluid line joints and steering gear leak during maintenance. In case of leakage of steering fluid, repair corresponding parts in time and contact a BYD authorised service provider when necessary.

If the fluid level in steering fluid reservoir is between the "MAX" and "MIN" marks, the level meets the requirement. If the fluid level is at or below the "MIN" mark, add steering fluid until the fluid level is between the "MAX" and "MIN" marks.

Steering fluid reservoir level

After adding steering fluid, if the steering fluid level drops in a short period of time, be sure to check whether any hydraulic fluid leaks onto the parking ground.

If steering fluid leakage is identified, repair it in time and contact a BYD authorised service provider when necessary.

Adding steering fluid

Check the steering fluid reservoir; add fluid specified by BYD when necessary.

Using other types of power steering fluid or automatic transmission fluid can damage the steering system.

Operating procedure for adding steering fluid:

1 Power up the vehicle, turn the steering wheel twice or thrice, and power it off 5 min later.

2 Open the driver's side compartment hatch, open the end cover of steering fluid reservoir, add the specified steering fluid until the fluid level reaches the "MAX" mark, and tighten the end cover.

3 Repeat step 1.

4 If the fluid level still does not reach the "MIN" mark, repeat the above steps until it reaches the position between the "MAX" mark and the "MIN" mark.

5 Tighten the end cover of steering fluid reservoir.

5.2.2.3 Start battery

Inspection of start battery

If the vehicle is left in a place for more than one day, be sure to turn off the master switch (If the model is not equipped with a service switch, disconnect master switch at the negative terminal of the start battery).

Set a charging rule to stop charging the lead-acid battery when the charging current is lower than 1A to prevent battery leakage;

The battery should be recharged every three months.

If the vehicle has been stored for more than 1 year and its start battery has never been charged as is in normal operating conditions, be sure to replace and dispose of the start battery.

NOTE

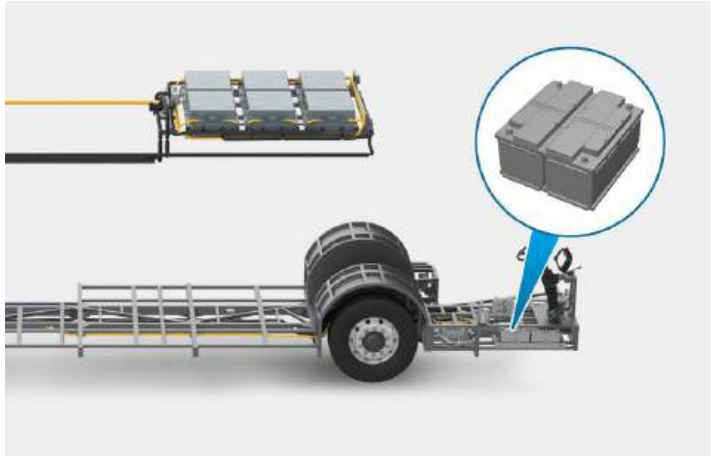
- Before maintenance, confirm the vehicle has been powered off.
- Before checking the start battery, remove the grounding cable from the negative terminal (with "-" mark) and install it at the end.
- Use tools in such a manner that would not cause start battery short circuit.
- Do not allow fluid to flow into the start battery when cleaning it.
- The start battery may produce combustible and explosive hydrogen.
- Use tools in such a manner that would not allow the start battery to produce spark.
- Never smoke or ignite in the vicinity of the start battery.
- As electrolyte contains toxic and corrosive sulfuric acid.
- Prevent electrolyte from splashing to the eyes, skin or clothes.
- Never drink the electrolyte.
- Be sure to wear safety goggles when working near the start battery.
- Be sure to keep children away from the start battery.

Exterior inspections of start battery

NOTE

Before check, make sure that the vehicle is powered off and the master switch is turned off.

1 Open the start battery hatch and unplug the negative terminal



Exterior inspections of start battery

2 Check whether the start battery terminals have signs of corrosion, loose clamps or connectors, or cracks.

3 If any electrode has been corroded, wash it with mixed solution of warm water and soda water. Grease the connector surface to prevent further corrosion.

If the connector is loosely connected, tighten the clamp nut, and care must be taken to prevent over-tightening.

4 Tighten the clamp to the extent that the start battery can be retained in position. Over-tightening would damage the start battery body.

Inspection of start battery state

Check the voltage of the start battery according to the instructions on the start battery shell and the start battery magic eye or the multimeter, so the state of charge of the start battery can be found

Use a multimeter for check:

Checklist of start battery

Voltage	Color of magic eye	SOC	Handling Method
Above 12.5V	Green	OK, sufficient charge	Start battery is normal
11V~ 12.4V	Black	Insufficient charge, requiring immediate charging	Charge the vehicle in time.

Voltage	Color of magic eye	SOC	Handling Method
The voltage is lower than 10.5V	White	Damaged, requiring immediate replacement	There is a short circuit or open circuit. Please replace with a new one.

NOTE

- Recharge the start battery with a 12 V charger. Do not recharge two start batteries in series.
- The ambient temperature for charging should not be above 40°C (104℉).
- During charging, once the start battery temperature exceeds 45°C (113℉), stop charging; and when the start battery temperature falls down to the room temperature, resume charging with charging current halved.
- When a single start battery is damaged, replace the two start batteries in the vehicle together.

NOTICE

- Therefore, be sure to remove the start battery cable before connecting the start battery to the charger. Charging start battery without disconnecting the cable can seriously damage the electronic control unit (ECU) and electrical equipment.
- Using electrical equipment of the vehicle for a long period of time with the DC controller off can cause the start battery to be over-discharged, resulting in failure to start the vehicle or even permanent damage to the start battery.

5.2.2.4 A/C system

Cleaning of condenser

When condenser cooling fins are fouled with dirt or foreign objects, heat transfer efficiency will be affected and the pressure of the cooling system will increase; therefore, be sure to clean or wash condenser fins regularly.

Cleaning of evaporator

When the evaporator becomes fouled, the blower speed will decrease, resulting in poor cooling effect, and even condensed water on the evaporator surface will be blown by the blower into the air duct; therefore, be sure to clean or wash the evaporator regularly depending on how much it is fouled with dirt.

Cleaning of water outlet

1 The evaporator chamber drainage line mainly serves to drain condensed water from the evaporator. If the drainage is blocked, high level of water trapped in the evaporator will cause water leaking into air ducts from the air outlet and inlet. Allow condensed water from the evaporator drain pan to be discharged from the unit via the drain pipe at the bottom of the unit to the roof drain pipe, through which condensed water is discharged from the vehicle. To keep drainage unblocked, clear the whole drain channel.

2 The condenser chamber chain channel mainly serves to drain rainwater and sand collected at the cooling fan and gaps of the condenser outside of the unit. If the water outlet is blocked by foreign objects, water and sand will build up in the chamber. During cleaning, remove foreign objects and deposits on the bottom surface. During cleaning, remove foreign objects and deposits on the bottom surface.

Replacement and cleaning of air filter

The recirculated air and fresh air inlets of the A/C unit are equipped with air filter. When the air filter becomes excessively fouled, the blower speed will decrease, resulting in poor cooling effect, and even condensed water on the evaporator surface will be blown by the blower into the air duct; therefore, be sure to replace and clean the air filter regularly. The recirculated air filter is located at the recirculated air inlet in the vehicle top plate. You may open the recirculated air inlet cover and then remove and replace the filter with a clean one. Flush the replaced air filter with water in the opposite direction of air output, wash it with soapy water and clear water, and dry it in the air for use later.

Replacement and cleaning of air filter

Item	Cycle	Inspection method and treatment
Recirculated air filter	Twice per week	Flush the device with water in the opposite direction of air output and dry it up in the air, and wash it with a neutral detergent if necessary.
Fresh air filter	Once per week	Flush the device with water in the opposite direction of air output and dry it up in the air, and wash it with a neutral detergent if necessary.
Heat exchanger	Once per quarter	Blow compressed air into its fin gaps in the direction opposite to the direction in which the device runs or vacuum the device from the side with more dirt attached. If it is extremely dirty, clean it with warm water solution of neutral detergent.
Tubing	Once per year	If the pipeline is stained with oil, it indicates a refrigerant leakage and the pipeline should be checked and repaired.
Condenser fan	Once per year	1 Clear the cooling fan of rust and paint it with antirust varnish and then finishing coat. 2 If abnormal vibration or sound is produced when the cooling fan is running, replace the bearing or the motor.
Evaporator fan	Once per year	1 Clean the fan with a soft brush, particularly for removing dust on inner parts of its blades (take care not to deform the blades). 2 If abnormal vibration or sound is produced when it is running, replace the ball bearing.
Reservoir dryer	Once per year	Replace the reservoir dryer once a year.

Item	Cycle	Inspection method and treatment
Compressor	Once per year	1 Check whether the compressor mounting nuts are fastened. 2 Check whether the terminals of the compressor electric box are secure. 3 Check whether the waterproof device of the junction box meets the requirement.
Inverter	Once per quarter	1 Check whether the interior of the inverter and the inverter box cooling fan are normal. 2. Check whether the internal wiring of the inverter is secure, the spacing between terminals is sufficient and terminals are short-circuited.

5.3 Special maintenance

5.3.1 Requirements for special maintenance items

Requirements for special maintenance items

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Process	Corrosion prevention	21	Check the fasteners, pipe clip, clamp, bracket, joint, pipeline and other parts of the chassis, rear compartment and battery pack compartment for rust.	Heavily rusted parts and components must be replaced; secondary anti-corrosion treatment shall be carried out locally for new parts and components. In case of slight rust, rust can be removed and sprayed with anticorrosive paint or antirust wax.	Perform inspection every 12 months (See 5.3.2.1 for operation guide on corrosion prevention)
Process	Corrosion prevention	22	Check the chassis frame, front and rear axles, suspension and other components for rust or damaged surface anti-corrosion coating.	Check the components for wear and collision points. Check the anti-corrosion coating (rust-proof wax and anti-corrosion paint) for peeling or damage. Rusted components shall be subject to rust removal, grinding and painting and local secondary anti-corrosion treatment; any anti-corrosion coating that suffers from peeling or damage shall be re-sprayed.	Perform inspection every 12 months (See 5.3.2.1 for operation guide on corrosion prevention)
Process	Corrosion prevention	23	Check whether the chassis armor and anti-corrosion paint on the hubcap cover panel and bracket are intact	The chassis armor and anti-corrosion paint shall be fully covered on the cover panel and bracket; in case of damage or peeling, re-spraying is required in time.	Perform inspection every 12 months (See 5.3.2.1 for operation guide on corrosion prevention)

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Steering system	1	Check whether the ball joint in the steering system is worn or abnormal.	1 Check whether the connections are firm, whether the lock pins are complete and effective, whether the ball joint adequately fits with the bowl and whether there is damage or abnormal sound, and make sure that the radial movement of each ball joint is not more than 0.6 mm, and axial movement is not more than 2 mm. Otherwise, timely replacement is required; 2 Make sure that the parts and components are firmly installed and effectively locked, and the power steering system is effectively unloaded when leftward/rightward steering is approaching the limit.	Perform inspection every 150,000 km or 30 months
Chassis	Steering system	2	Check the steering gear for leakage or external damage	Replace the steering gear when there is fluid leakage and damage affecting its performance;	Perform inspection every 300,000 km
Chassis	Steering system	3	Check the steering drive shaft	Check whether the universal joint is loose or has jamming or abnormal noise, and the dust cover is damaged;	Perform inspection every 90,000 km or 18 months

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Steering system	4	Replace the steering fluid, clean the fluid reservoir and replace the filter element	The steering fluid shall be completely drained. Air shall be bled from the pipelines thoroughly after steering fluid refilling. The system shall operate normally after the replacement and fluid level shall be within the specified scale range.	Carry out replacement and cleaning at intervals of 120,000 km or 24 months.
Chassis	Cooling system	5	Replace the coolant	The coolant shall be completely drained. Air shall be bled from the pipelines thoroughly after coolant refilling. The system shall operate normally after the replacement and coolant level shall be within the specified scale range.	Replace it at intervals of 240,000 km or 48 months.
Chassis	Brake pedal	6	Check the free travel of the brake pedal	Check whether the pedal moves with jamming or abnormal sound and whether it returns smoothly: 1 Suspended brake pedal: The free travel of the brake pedal is 14-20 mm (i.e., the travel of the brake pedal from its initial position to the point where it returns with slight exhaust sound). The service brake valve push rod assembly, the pin shaft and the lock pin must be connected firmly. 2 Floor-mounted brake pedal: The free travel of the floor-mounted brake pedal is calibrated at delivery of parts and components and should not be adjusted by user in use without authorisation.	Perform inspection every 12 months

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Chassis	Accelerator pedal	7	Check the free travel of the accelerator pedal	Check whether the pedal moves with jamming or abnormal sound and whether it returns smoothly: The free travel of accelerator pedal is set at its delivery and should not be adjusted in the process of use without authorisation.	Perform inspection every 12 months
Chassis	Driving system	8	Grease the ZF front axle wheel hub bearing and wheel hub chamber	Uniformly apply lubricating oil to the roller of outer ring, and add about 96g of oil to the single-side hub. Replace the oil seal and O-ring after the lubricating oil is replaced. . (See 5.4 for operation guide on greasing the front axle)	For 12G series, perform inspection and maintenance every 500,000 km or 24 months For 12H series, perform inspection and maintenance every 500,000 km or 48 months in public transport or intercity conditions For 12H series, perform inspection and maintenance every 800,000 km or 72 months in long-distance passenger transportation conditions

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Electrical appliances	Start battery	9	Check the appearance and voltage and fasten, and clean and replace it	1 Check whether the single start battery voltage is higher than 12.5 V using a multimeter. If this requirement is not met, recharge it in time. If it cannot be recharged, replace it in time; 2 Check whether any start battery fastener is loose and tighten it in time if it is loose;	Replace it at intervals of 120,000 km or 24 months.
Three-electricity (motor, electronic control and power battery)	Power battery thermal management system (independent)	10	Replace the coolant	The old coolant shall be completely drained. Air shall be bled from the pipelines thoroughly after new coolant is added. The system shall operate normally after the replacement and coolant level shall be within the specified scale range.	Replace it at intervals of 240,000 km or 48 months.
Three-electricity (motor, electronic control and power battery)	Equipotential connection	11	High-voltage on-board power supply: test equipotential connection	Inspect high-voltage components according to the configuration table: 1 Connect the test wiring harnesses of the GND resistance tester to the shells of two high-voltage components to be tested, and turn on the grounding resistance tester. The test current of the GND resistance tester is at least 0.1A (commonly used test current is 10A or 25A), and the test time is at least 5s;	Perform inspection every 12 months.

Related system	Item	S/N	Operation content	Technical Requirements	Remarks
Three-electricity (motor, electronic control and power battery)	Equipotential connection	11	High-voltage on-board power supply: test equipotential connection	It is necessary to detect the GND resistance between the farthest high-voltage parts on the vehicle, as well as the grounding resistance between the charging port and the farthest high-voltage parts.	Perform inspection every 12 months.
Three-electricity (motor, electronic control and power battery)	Switch	12	High-voltage on-board power supply: Check that warning signs on all high-voltage components are present and clear	1 Whether there are high-voltage hazard signs at the shell and barrier of high-voltage parts; 2 Whether the signs is undamaged, clean, tidy, and easy to see.	Perform inspection every 12 months.

5.3.2 Method for special maintenance items

5.3.2.1 Corrosion prevention

1 Thoroughly clean the outer surface (including the vehicle body and chassis) of the vehicle, and then remove the sewage, dirt and other debris that may be hidden in the chassis and hubcap using a water sprayer, so as to avoid harsh corrosive environment caused by such debris.

2 Check the parts of the vehicle (especially the chassis, rear compartment, power battery pack compartment and hubcap) for rust and coating damages. Carry out supplementary anti-corrosion treatment in a timely manner for any rusted positions and damaged positions of coating.

3 Timely carry out anti-corrosion repair for the rusted positions that may be rusted prematurely due to harsh environment or scratch during operation.

Anti-corrosion operations

1 Spray rust-proof wax on the parts (fasteners) that need to be replaced due to rusting; for fasteners in rear compartment and power battery pack compartment, spray transparent rust-proof wax.

2 For rusted chassis frame or parts that do not require replacement, observe the following steps:

- Grinding. Grind the rusted parts of chassis by sanding machine with sandpaper or wire brush until the rust is completely removed and the metallic luster is shown;
- Degreasing and cleaning. Clear the rust dust with compressed air, and then wipe the ground surface using a piece of degreaser cloth dipped with degreaser until the surface is completely clean, free of oil stain and floating dust;
- Spraying of anti-corrosive paint. Evenly re-spray or brush anti-corrosion paint on the rusted surface that is ground, without omitted or thin spraying. The film thickness of parts shall be about 100 μm, and that of the chassis frame body and bracket shall be 200 μm m;
- **Masking.** Use masking films, masking paper and adhesive tape to cover the adjacent parts that may affect the normal function of the vehicle due to the application of anti-corrosion paint, including various valve ports, exhaust ports, service brake valve module, front and rear emergency air sources, connecting positions of movable rods, dryers, horns, buzzers, VIN, tyres and the lower half of the vehicle body.

- Spraying of rust-proof wax. Before spraying wax, use a clean mixer or stirring rod to stir the wax in the barrel evenly. If the temperature is too low to spray wax normally, place the wax bucket in the baking room for heating, and then spray the wax after stirring it evenly. After the anti-corrosion paint surface is dry, spray rust-proof wax on the parts of chassis (key spraying positions: front and rear push rods, stabiliser bars, tie rods and surrounding mounting supports, all visible pipe joints, valve body joints and pipeline mounting brackets) using an airless spray gun. Evenly spray these parts with 1~2 passes of rust-proof wax from front to rear and from left to right. After each pass, conduct self-check. Re-spray the surface that suffers from omitted or thin spraying to make it consistent with the surroundings. During wax spraying, the air pressure is 0.3 MPa~0.5 MPa. The spraying shall be even, without omission. The wet film thickness is about 150 μm ~ 200 μm;
- **Inspection.** Check the sprayed position. In case of omission or defect of film, handle the problem in time;
- **Cleaning.** After spraying, completely remove the masking paper, masking film and adhesive tape at the covered position in time, and immediately wipe clean the surface that is polluted by paint mist due to inadequate masking to prevent the impact on the normal operation of subsequent vehicles.

3 Re-spray the chassis armor of hubcap as follows:

- Before spraying, for the chassis armor in large package, stir it for 5 min ~ 10 min with a mixer evenly; for chassis armor in small package, shake it up and down for at least 10 times until it is uniform;
- Use special spray gun or airless spraying machine to spray chassis armor on the cover panel installed on the chassis. The coating surface shall be uniform, free from omitted or insufficient spraying. Slight sagging is allowed. The thickness of chassis armor film is 400 μ m ~ 700 μ m;
- After spraying, place the cover panel in a ventilated and dry place to allow it dry naturally. No stacking is allowed before drying to avoid damages of the chassis armor coating.

The corresponding suggested repair materials are in the following table:

S/N	Material No.	Part name	Unit	Name of supplier	Remarks
1	13379894-00	Rust-proof wax _LM1000_black	KG	SEMEKA	
2	11580094-00	Primer_ANY999_black_Penguard HB	L	Shenzhen Green Breeze Environmental Engineering Co., Ltd. (Aqsu)	Anti-corrosion paint of frame
3	11685956-00	Curing agent_ANA056	L	Shenzhen Green Breeze Environmental Engineering Co., Ltd. (Aqsu)	
4	11818918-00	Diluent_GTA007	L	Shenzhen Green Breeze Environmental Engineering Co., Ltd. (Aqsu)	
5	11296300-00	Primer_LT169_black_Penguard HB	L	PPG	Anti-corrosion paint of frame
6	11296299-00	Curing agent_LH169-20	L	PPG	Standard
7	11312272-00	Curing agent_LH169-30	L	PPG	Fast dry
8	10674637-00	Diluent_LN140-20	L	PPG	
9	13421883-00	Primer_LM-220A_black_Penguard HB	KG	SEMEKA	Anti-corrosion paint of frame
10	13421837-00	Curing agent_LM-220B-10_special for Penguard HB	KG	SEMEKA	Select one from the two options: above 40℃
11	13421838-00	Curing agent_LM-220B-20_special for Penguard HB	KG	SEMEKA	Select one from the two options: below 20℃

S/N	Material No.	Part name	Unit	Name of supplier	Remarks
12	13421839-00	Diluent_LM-220C-10_special for Penguard HB	KG	SEMEKA	Select one from the three options: 15℃-28℃
13	13421840-00	Diluent_LM-220C-20_special for Penguard HB	KG	SEMEKA	Select one from the three options: above 28℃
14	13421841-00	Diluent_LM-220C-30_special for Penguard HB	KG	SEMEKA	Select one from the three options: below 15℃
15	13552044-00	Degreaser_LM-500	KG	SEMEKA	
16	10233247-00	Curing agent_JRQ-A	KG	Hebei Jinzhou Welfare Automobile Materials Factory	When ordered vehicles require damping rubber, select one from the two options
17	11771514-00	Curing agent_F-205-1_chassis rubber	KG	Txyuyan	
18	11140375-00	Spray adhesive_R2000SH_1L/Pcs	Pcs.	HENKEL	When ordered vehicles require chassis armor

5.3.2.2 Replacement of steering fluid

System capacity: 8 L.

Operating steps for replacing steering fluid:

1 Remove the steering fluid reservoir, empty it of fluid, and remove the steering fluid return pipe.

2 Place the end of steering fluid return pipe to which the steering fluid reservoir is connected in a suitable container.

3 Power up the vehicle to high voltage, turn the steering wheel from one extreme position to the other, and turn it back and forth for several times. When the fluid stops flowing out from the steering fluid return pipe, power off the vehicle.

4 Install the steering fluid reservoir and connect the fluid return pipe to the reservoir.

5 Fill the steering fluid reservoir until the fluid level reaches the "MAX" mark;

6 Start the steering motor, turn the steering wheel from one dead centre to the other and turn it back and forth several times to release air from the system;

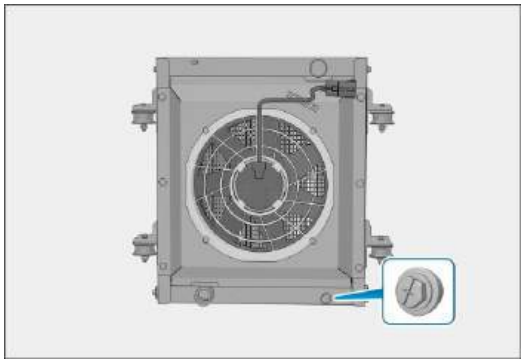
Recheck the oil level. Repeat the steps 5 and 6 until the fluid level is between "MIN" and "MAX" marks.

NOTICE

- When replacing the steering fluid, please carefully collect the fluid so as not to allow the body or parts to be stained by fluid drops. Immediately wipe off the fluid if splashed.
- Fluid discharged shall be collected in a container for disposal as per provisions for environmental protection.

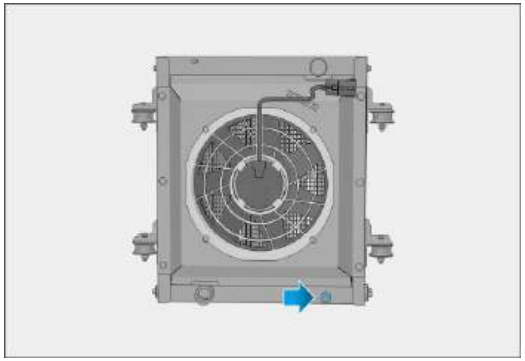
5.3.2.3 Replacement of coolant

1 The position of the radiator drain valve is shown in the following table.



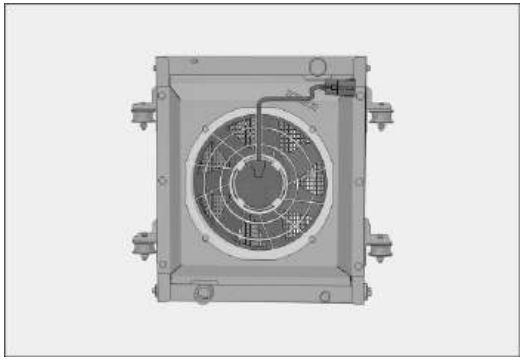
Radiator drain valve

2 At the radiator of rear compartment, place the drain pan under the radiator drain valve, unscrew the drain valve with a M8 wrench socket (or screwdriver), and then open the expansion tank cover. The coolant will flow out from the drain valve port (as marked in the following figure), and the drained coolant will be stored in the drain pan.



Replacement of coolant 1

3 After discharging some coolant, power up and allow the coolant pump to run for about 1 minute and power it off to discharge the remaining coolant, and tighten the drain valve.



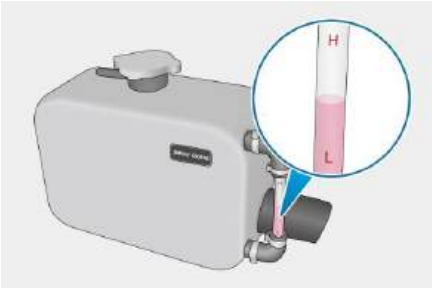
Replacement of coolant 2

4 Add the coolant as per the operating procedure for adding coolant until the level rises to the middle level (between the "H" and "L" marks) of the indicator. The reference coolant capacity (single side) is 20L.

5.3.2.4 Replacement of power battery coolant

Inspection of coolant

(1) Observe the coolant level in the expansion tank. Confirm that the level is between H (MAX) and L (MIN) marks.



Inspection of power battery thermal management system coolant

(2) If the coolant level is at or lower than "L" mark, add coolant to the expansion tank until coolant reaches "H" mark and check if the cooling system is subject to leakage.

Operating procedure for adding coolant

(1) Open the expansion tank cover. Add specified coolant and tighten the end cover. Power up the vehicle and allow the coolant pump to run for about 5 min, and then power it off. Check the coolant level.

(2) If the coolant is insufficient, repeat the above steps, until the expansion tank is full of coolant.

(3) Close the expansion tank cover and tighten it completely.

Replacement of coolant

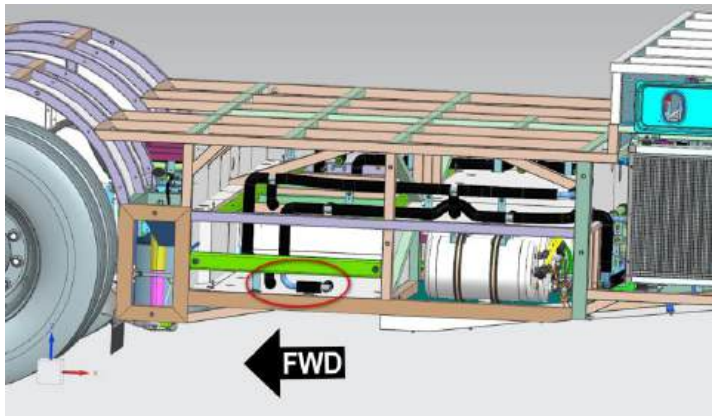
Steps:

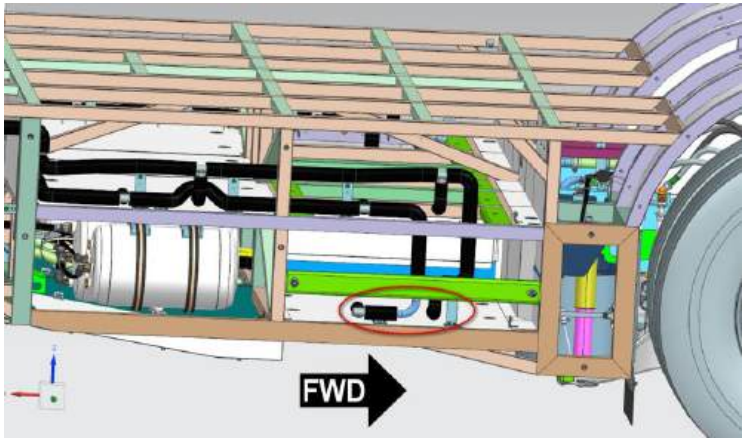
a) Tool preparation: Clamp plier, coolant stop plier, sleeve, torque wrench, coolant collection container (needed to be easy to weigh) and external circulating water tank system (see annex for detailed construction).

b) Confirm whether the vehicles waiting for rectification report electric leakage alarm, if so, firstly troubleshoot whether the alarm reports electric leakage of the battery pack; if it is confirmed that the alarm reports electric leakage of the battery pack, it is necessary to replace the battery pack with electric leakage according to normative process of replacing the battery pack;

c) The vehicle is parked at the maintenance station where safety protection measures is provided for maintenance upon the vehicle roof. Remove the cover panel at the bottom of rear left battery compartment with a tool;

d) Disconnect the connecting pipeline of the battery pack at the lowest layer as shown in the following figure and prepare coolant collection container under the disconnecting position in advance so as to collect all coolant outflowing completely;



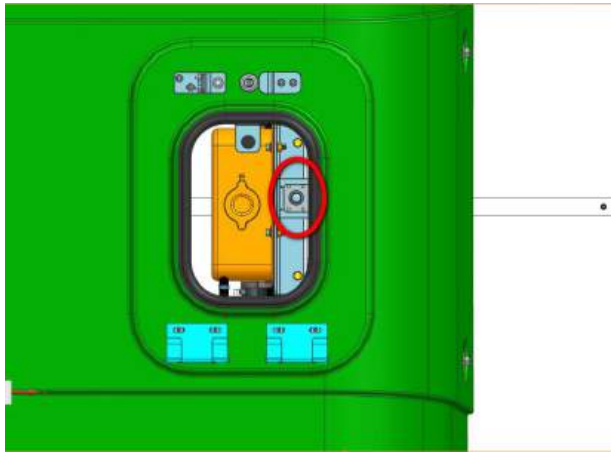


e) With the vehicle powered on, go to the rear compartment. Open the coolant pump injection switch, make the coolant pump operate to discharge the coolant until there is no continuous drop falling down at the disconnecting position of the pipeline, at this time, power off the vehicle; pay attention that the coolant pump needs intermittent operation during the discharging of coolant since coolant pump is likely to be damaged if it keeps in idle state for a long time; measure all coolant volume collected and record as “discharged volume of BYD coolant”;

f) Restore all connection of the pipeline disconnected during step d) and it is necessary to fix them temporarily;

g) With the vehicle powered on, operators go to the rear compartment. Open the coolant pump injection switch, and fill deionized water to the battery cooling tank until it is filled up and circulated for over 0.5h, during the period when the liquid level drops, it is necessary to replenish deionized water; record the volume of barreled water consumed in this step (need to subtract the loss volume), record it as "filling volume of deionized water", and filling volume of deionized water is required to be no less than “discharged volume of BYD coolant” in step e);

h) After repeating step d) ~ step e), restore all connection of the pipeline disconnected and it is necessary to fix them temporarily. Power ON the vehicle, go to the rear compartment and turn on the pump filling switch, and fill the coolant to the battery cooling tank until it is filled up and circulated for over 0.5h, during the period when the liquid level drops, it is necessary to replenish the coolant; record the volume of the coolant consumed in this step (need to subtract the loss volume), record it as "filling volume of the coolant for the 1st time", and filling volume is required to be more than “filling volume of deionized water” in step g);



i) After repeating step d) ~ step e) again, restore all connection of the pipeline disconnected and fix them. With the vehicle powered on, operators go to the rear compartment and turn on the pump filling switch, and fill the coolant specified in material information table to the battery cooling tank until it is filled up and circulated for over 0.5h, during the period when the liquid level drops, it is necessary to replenish the coolant; record the volume of the coolant consumed in this step (need to subtract the loss volume), record it as "filling volume of the coolant for the 2nd time"; it is considered as fill-up if the filling volume of the coolant is more than "filling volume of the coolant for the 1st time” in step h); if the filling volume of the coolant is less than "filling volume of the coolant for the 1st time” in step h), turn on the coolant pump and run it for 0.5H to observe the change of the liquid level of the coolant tank, add coolant if the liquid level drops, and repeat the operation until the liquid level of the coolant tank remains unchanged.

j) Restore the vehicle state, put the pipeline sponge, re-fix the pipe clamp and bracket, install back the cover panel at the battery bottom;

k) The discharged coolant waste liquid needs to be properly disposed of, and cannot be dumped at will to pollute the environment;

l) It is required that the BYD coolant must be supplemented when the coolant is lacking during the subsequent operation of the vehicle, and other brands of cooling or clean water cannot be used.

Note: Only the first 5 rectification vehicles are required to carry out the contents marked in red of the above steps, and follow-up rectification can be omitted.

The reference for tabular form of recording the information:

Vehicle information (VIN)	Discharged volume of non-BYD coolant (L)	Filling volume of barreled water (L)	Filling volume of BYD coolant for the 1st time (L)	Filling volume of BYD coolant for the 2nd time (L)

5.3.2.5 Operation of circulating air exhaust of battery fluid cooling system

Description:

1 Due to long circulation pipeline, large height drop, low position of water tank, weak ability of coolant pump and other causes of battery fluid cooling system, it is hard to fill the coolant and discharge air completely in the pipeline. General yield status requires to be discharged and filled by using vacuum extraction equipment. In order to meet the after-sales service and production and maintenance under certain conditions, this operation guide is formulated. Without large-scale vacuum equipment, the water tank and coolant pump materials are used to discharge air and fill the coolant.

2 Scope of application:

a) After assembly of the new vehicle model and when the vacuum filler equipment is not available;

b) After removal of the battery pack or pipeline;

c) During the flow test, it is doubtful whether there is too much gases into the pipeline when flow meter generates no stable readings

3 Influences of poor circulation:

a) In the case that there exists excessive air in the loop of battery fluid cooling pipeline, the system suffers from poor cooling effect, which leads to quick rise in temperature during charging/discharging of the battery. Charging/discharging power limited, a high temperature alarm message are issued and the service life of the battery is badly shortened;

b) Excessive air into the fluid cooling pipeline and unstable operation of coolant pump make the service life of the coolant pump badly shortened;

c) Some vehicle models adopt the scheme that combines the system with the complete vehicle saloon A/C as an integration. If there is excessive air into the pipeline, collection water temperature in the loop continuously fluctuates, the compressor frequently switches between “ON” and “OFF”, which makes the service life of the compressor badly shortened.

Tool:

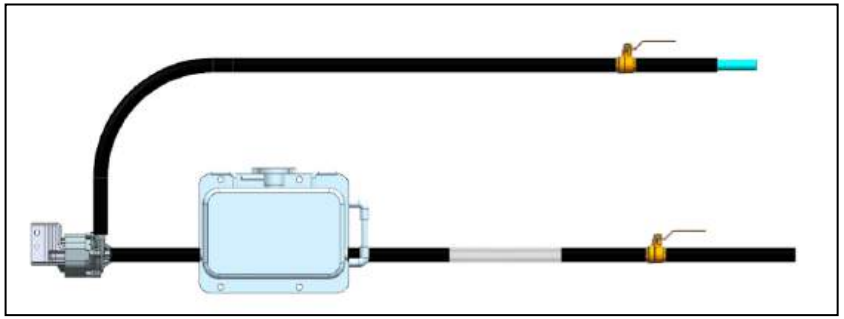
2 for coolant stop plier (for control the leakage of coolant by clamping the rubber hose when plug or unplug the pipeline)

Details of material required for external circulating tank system:

S/N	Material No.	Part No.	Part name	Unit	Quantity	Name of supplier
1	12171302-00	C8A-8125130E	Expansion tank 1	Pcs	1	Xiangshan Hengfeng Automobile Parts Co., Ltd.
2	11926430-00	C8A-8125120	Electric coolant pump assembly	Pcs	1	Electric Bus Research Institute of Division 14
3	11912490-00	/	Rubber hose	M	2	Shenzhen Air Conditioner Factory of Division 15
4	12562355-00	TK-8125212	Coolant pipe 102	Pcs	1	Guangzhou Kingkee Metal Manufacturing Co., Ltd. / Shanghai Yangtong Iron and Steel Co., Ltd.
5	10537920-00	BYDQ67327	Steel strip type circlip	Pcs	12	Tianjin Heding Industry and Trade Co., Ltd.
6	/	/	Transparent tube	M	0.1 m	(Drain hose with wire of A/C can be used)
7	11912431-00	KB-8101322	Ball valve	Pcs	2	Hebei Hongye Yongsheng Vehicle Heater Co., Ltd.
8	12615658-00	C8A-8111515	Electric coolant pump wire	Pcs	1	Shenzhen Wiring Harness Factory of Division 15

4 Operation guide of air exhaust in circulating tank

1) Close the ball valve of circulating tank shown in the following figure completely, and fill about 3/4 of coolant into the tank.

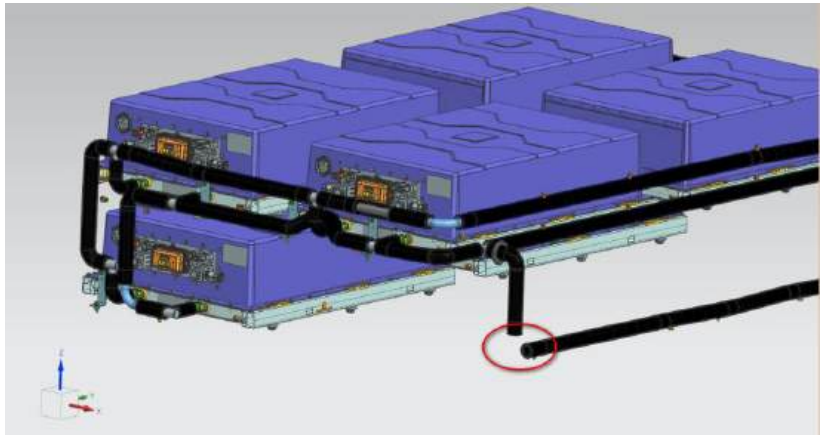


2) Operation under the condition that the complete vehicle is powered off:

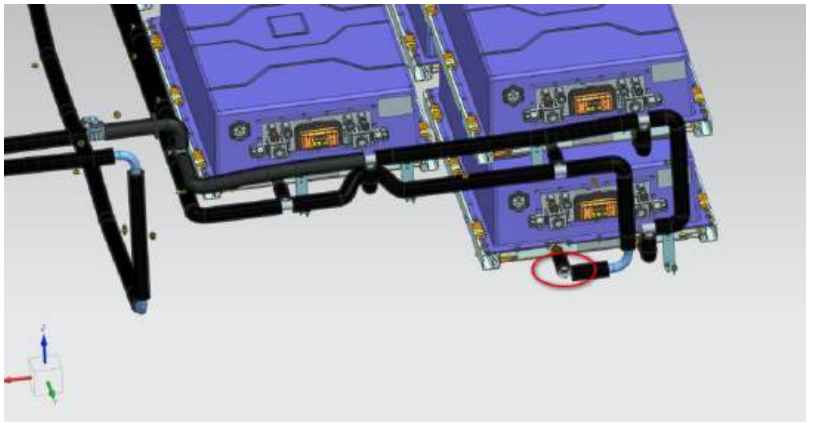
- Carry out the exhaust operation according to the following picture and text description.

3) Air exhaust point:

- Coolant outlet of the battery pack at the bottom of the rear compartment on the left side of the vehicle body



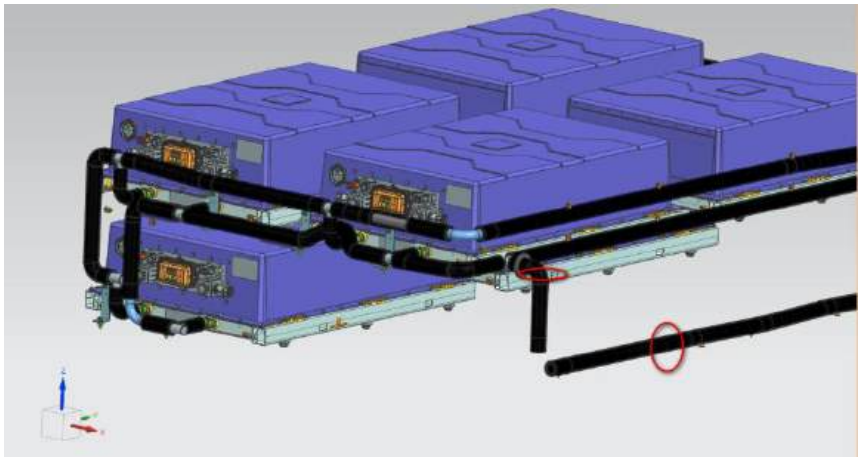
- Coolant inlet of roof power battery pack

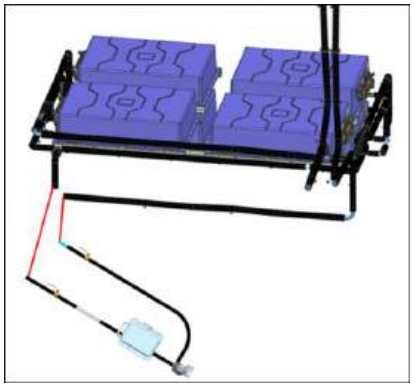


Carry out within the red circle in the figure.

4) Before removal, clamp the hoses on the removal position by coolant stop plier, so as to prevent leakage during removal.

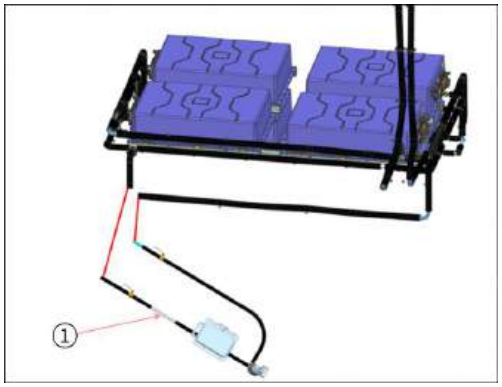
Connect the tooling and the complete vehicle pipeline as shown in the figure.





Connect the air exhaust fixture and vehicle pipeline by following the red lines

5) Open the ball valve of external circulating tank, remove the coolant stop plier on the pipeline, and install the coolant pump for circulating fixture with +24V power, making it work for 5min (or longer), and the circulation can end when there is no bubble in the transparent tube (observe the bubble situation by shining the transparent tube with cellphone flash from behind). During the operation of coolant pump, upper cover of the circulating tank ca be opened, and discharge air in the system (the situation that the coolant outflows from the tank opening occurs in some vehicle models due to low pressure of single 50W coolant pump, lifting up the circulating tank slightly is enough); during the operation, it is necessary to fill the circulating tank and keep 3/4 of coolant in it. During the circulation, it is necessary to check the tank coolant level of the original vehicle twice or three times and keep the level at 1/2~3/4.

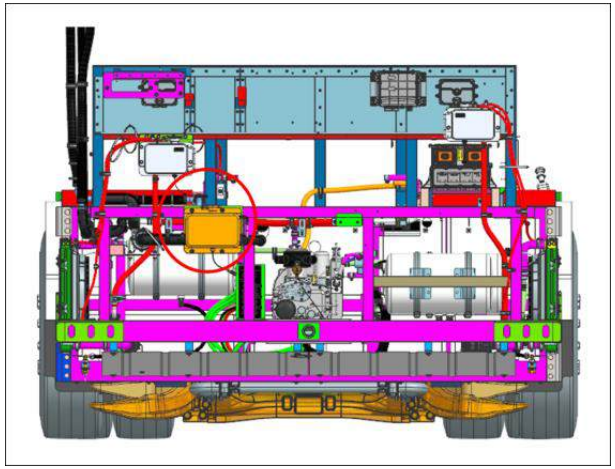


■ 1

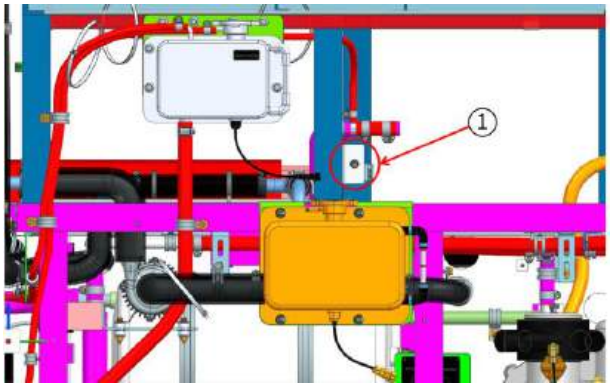
Check that there are no obvious bubbles in the transparent tube

6) Close the upper cover of the circulating tank, close the ball valve on the circulating tank fixture and disconnect the coolant pump power supply; clamp the rubber pipe for bottom pack inlet and outlet as shown in the above figure and close the ball valve on the circulating tank; after cutting off the battery coolant pipe by coolant stop plier, remove the circulating tank fixture and restore the vehicle pipeline (the operation requires to clamp the coolant stop plier tightly and the leakage amount of the coolant must be very few)

7) And fill up the coolant into the expansion tank on the original vehicle;



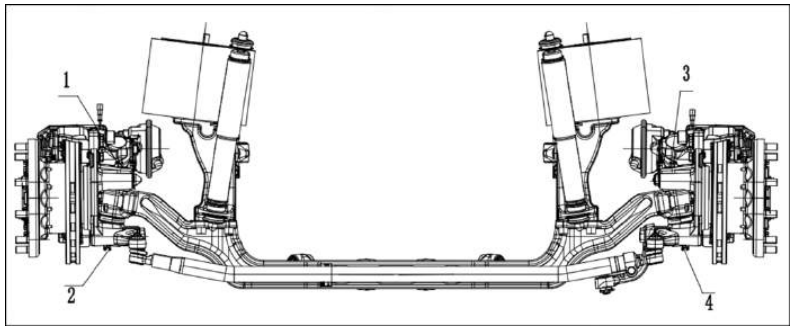
8) After the vehicle is powered on, press the coolant pump injection switch; after making the system coolant pump run for over 0.5h, restore the complete vehicle.



■ 1 The refueling switch is near the expansion tank on the left side of the rear compartment.

Pictures of practical operation (only for reference, slight differences of fixture are acceptable)

5.3.2.6 Grease the front axle



- ■ 1 King pin lubrication point (upper)
- ■ 2 King pin lubrication point (lower)
- ■ 3 King pin lubrication point (upper)
- ■ 4 King pin lubrication point (lower)

Lubrication of axle lubrication point for models without centralised lubrication

1 Unscrew the nozzle cap of each lubrication point of the axle.

2 Use an oil gun to add oil at each lubricating point until the oil overflows from the clearance of the joint part.

3 Reinstall the nozzle cap.

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Chapter 6 Special Tools

6.1 Previous

Special Tools

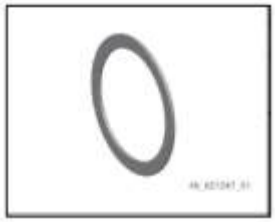
S/N	Tool	Model & specification or tool No.	Picture	Application
1	Torque wrench	#20	N/A	Motor oil filler plug
2	Torque wrench	#14	N/A	Motor oil drain plug
3	Eccentric screwdriver	5870.400.001		Remove the hub.
4	Assembling trolley	5870.350.000		Clamping shaft (varying with the drive axle) Assembling the axle housing

S/N	Tool	Model & specification or tool No.	Picture	Application
5	Clamp	5870.350.093		Assembling the axle housing
6	Clamping device	AA01.312.325		Removing the tie rod
7	Eyebolt M16 x 35	AA01.137.137		Removing the brake Installing the brake
8	Eyebolt	5870.204.002		Removing the brake Installing the brake The eyebolt set consists of two parts, including M8, M10, M12, M14, M16 and M20.

S/N	Tool	Model & specification or tool No.	Picture	Application
9	Bearing clamp	AA01.395.095		Remove the hub. Installing the hub
10	Pulling device	5870.300.020		Remove the hub.
11	Extracting device	5870.300.019		Remove the hub. 0 56 mm to 110 mm
12	Clamping cylinder	5873.003.007		Removing the king pin and steering knuckle

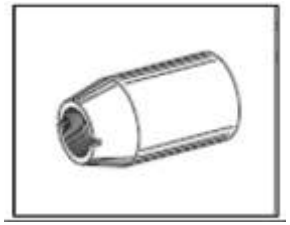
S/N	Tool	Model & specification or tool No.	Picture	Application
13	Pump	5870.287.010		Removing the king pin and steering knuckle
14	Pressure plate	5870.285.027		Removing the king pin and steering knuckle
15	Drag link	5870.285.028		Removing the king pin and steering knuckle
16	Guider	AA02.042.372		Removing or installing the king pin, and removing the steering knuckle

S/N	Tool	Model & specification or tool No.	Picture	Application
17	Handle	5870.260.003		Removing the king pin and steering knuckle Assembling the steering knuckle, and installing the steering king pin Length of 390 mm
18	Extracting device	5870.650.001		Removing the king pin and steering knuckle
19	Screwdriver tools	5870.055.107		Assembling the steering knuckle, and installing the steering king pin
20	Assembly clamp	AA01.046.851		Assembling the steering knuckle, and installing the steering king pin

S/N	Tool	Model & specification or tool No.	Picture	Application
21	Centering bolt	5870.912.018		Assembling the steering knuckle, and installing the steering king pin
22	Press-in ring	5870.345.092		Assembling the steering knuckle, and installing the steering king pin
23	Assembly clamp	5870.610.010		Assembling the hub Only used for connection of insertion pieces
24	Plug-in	5870.610.002		Assembling the hub Only for connecting the assembly equipment. M22 x 1.5

S/N	Tool	Model & specification or tool No.	Picture	Application
25	Screwdriver tools	5870.058.051		Assembling the hub
26	Handle	5870.260.002		Assembling the hub Length of 160 mm
27	Screwdriver tools	5870.058.089		Assembling the hub
28	Screwdriver tools	5870.058.089		Assembling the hub

S/N	Tool	Model & specification or tool No.	Picture	Application
29	Internal installer	5870.651.070		Assembling the hub
30	Screwdriver tools	5870.048.295		Assembling the hub
31	Spring scale	5870.230.005		Installing the hub 0 N~50 N
32	Socket wrench	AA02.247.297		Installing the hub WAF 8 mm

S/N	Tool	Model & specification or tool No.	Picture	Application
33	Installation method	5870 651 071		Installing the hub

6.2 Current

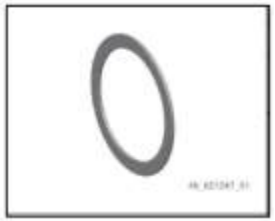
S/N	Tool	Model & specification or tool No.	Picture	Application
1	Eccentric screwdriver	5870.400.001		Remove the hub.
2	Assembling trolley	5870.350.000		Clamping shaft (varying with the drive axle) Assembling the axle housing
3	Clamp	5870.350.093		Assembling the axle housing

S/N	Tool	Model & specification or tool No.	Picture	Application
4	Clamping device	AA01.312.325		Removing the tie rod
5	Eyebolt M16 x 35	AA01.137.137		Removing the brake Installing the brake
6	Eyebolt	5870.204.002		Removing the brake Installing the brake The eyebolt set consists of two parts, including M8, M10, M12, M14, M16 and M20.
7	Bearing clamp	AA01.395.095		Remove the hub. Installing the hub

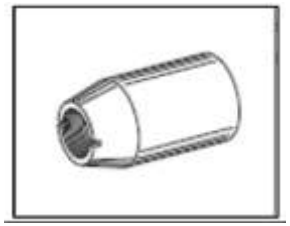
S/N	Tool	Model & specification or tool No.	Picture	Application
8	Pulling device	5870.300.020		Remove the hub.
9	Extracting device	5870.300.019		Remove the hub. 0 56 mm to 110 mm
10	Clamping cylinder	5873.003.007		Removing the king pin and steering knuckle
11	Pump	5870.287.010		Removing the king pin and steering knuckle

S/N	Tool	Model & specification or tool No.	Picture	Application
12	Pressure plate	5870.285.027		Removing the king pin and steering knuckle
13	Drag link	5870.285.028		Removing the king pin and steering knuckle
14	Guider	AA02.042.372		Removing or installing the king pin, and removing the steering knuckle
15	Handle	5870.260.003		Removing the king pin and steering knuckle Assembling the steering knuckle, and installing the steering king pin Length of 390 mm

S/N	Tool	Model & specification or tool No.	Picture	Application
16	Extracting device	5870.650.001		Removing the king pin and steering knuckle
17	Screwdriver tools	5870.055.107		Assembling the steering knuckle, and installing the steering king pin
18	Assembly clamp	AA01.046.851		Assembling the steering knuckle, and installing the steering king pin
19	Centering bolt	5870.912.018		Assembling the steering knuckle, and installing the steering king pin

S/N	Tool	Model & specification or tool No.	Picture	Application
20	Press-in ring	5870.345.092		Assembling the steering knuckle, and installing the steering king pin
21	Assembly clamp	5870.610.010		Assembling the hub Only used for connection of insertion pieces
22	Plug-in	5870.610.002		Assembling the hub Only for connecting the assembly equipment. M22 x 1.5
23	Screwdriver tools	5870.058.051		Assembling the hub

S/N	Tool	Model & specification or tool No.	Picture	Application
24	Handle	5870.260.002		Assembling the hub Length of 160 mm
25	Screwdriver tools	5870.058.089		Assembling the hub
26	Screwdriver tools	5870.058.089		Assembling the hub
27	Internal installer	5870.651.070	/	Assembling the hub

S/N	Tool	Model & specification or tool No.	Picture	Application
28	Screwdriver tools	5870.048.295		Assembling the hub
29	Spring scale	5870.230.005		Installing the hub 0 N~50 N
30	Socket wrench	AA02.247.297		Installing the hub WAF 8 mm
31	Installation method	5870 651 071		Installing the hub

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Chapter 7 Data and Specifications

7.1 Wheel alignment parameters

7.1.1 Front wheel

Front axle wheel alignment parameters

Camber	0.25°±20′
King pin caster angle	3.5°
King pin inclination angle	8°±20′
Toe-in	(0～2) mm
Maximum steering angle of wheels	53° (inner) / 39° (outer)
Air spring stroke	+80mm, -80 mm

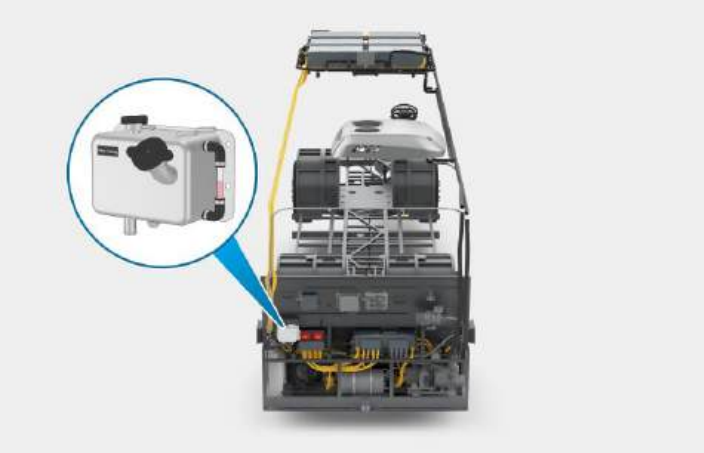
7.1.2 Rear wheel

Rear axle wheel alignment parameters

Camber	0
Toe-in	0
Air spring stroke	±90 mm

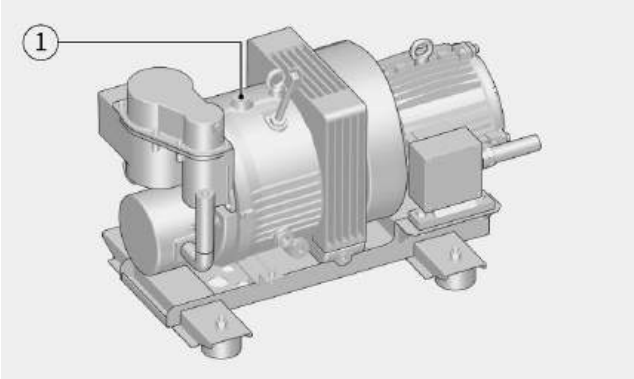
7.2 Fluid

7.2.1 Fluid filling location



■ 1 Expansion tank

Schematic diagram of position of expansion tank



■ 1 Fluid filler hole of air compressor

Fluid filler hole of air compressor

Schematic diagram of position of steering fluid reservoir

7.2.2 Specifications and capacity

Specifications and capacity of fluid

System	Product or system	Fluid name	Recommended grade and specification	Total capacity	Remarks
Chassis	Front axle wheel hub bearing	Vehicle grease	ZF 12G	0.2 kg	
Chassis	Front axle wheel hub bearing	Vehicle grease	ZF 12G	0.2 kg	Applicable to ZF axle
Chassis	Axle with grease nipple	Vehicle grease	Lithium grease #2		Keep injection until a slight amount of lubricating oil seeps from the gap
Chassis	Wheel-hub drive axle reducer	Gear oil	Total	5.1L～7.4L	SAE75W-90 GL-5 (suitable for use in an environment with a temperature not below -40℃ (-40℉))
Chassis	Steering hydraulic system	Steering fluid	Mobil ATF_Dexron Ⅲ	Calculated according to the length of the steering oil pipe and the arrangement position of the steering oil pump of each order. Model with steering oil pump front in the front is generally 6L. The model with steering oil pump at behind is generally 8L.	It is suitable for use in temperate and conventional areas. (Suitable for areas where the minimum temperature is higher than -20°C)

System	Product or system	Fluid name	Recommended grade and specification	Total capacity	Remarks
Chassis	Steering hydraulic system	Steering fluid	PENTOSIN CHF-202	Calculated according to the length of the steering oil pipe and the arrangement position of the steering oil pump of each order. Model with steering oil pump front in the front is generally 6L. The model with steering oil pump at behind is generally 8L.	It is suitable for use in frigid areas. (Suitable for areas where the minimum temperature is lower than -20°C (including))
Chassis	Air compressor	Air compressor lubricating oil	5116010011/ SHELL S4R synthetic oil #68/KLUBER SH68 synthetic oil/GULF WESTERN 30175 1L VG68 compressor & air tool oil	1.85 L	Before using a new type of lubricating oil, empty and clean the oil tank. Do not use the lubricating oil mixture of different brands.
Chassis	Cooling system	Coolant	Freezing point-40℃ /-25℃ coolant, Recommended brands in overseas markets: BASF, Arteco, Prestone, Dexcool	20 L	20 L for each side

System	Product or system	Fluid name	Recommended grade and specification	Total capacity	Remarks
Three-electricity (motor, electronic control and power battery)	Power battery thermal management system	Coolant	Coolant_freezing point -40°C_power battery thermal management system Recommended brands in overseas markets: BASF, Arteco, Prestone, Dexcool	48L	This is an estimated value, with a tolerance of ±2 L, subject to the actual vehicle.
Electrical appliances	Power battery thermal management system	Refrigeration oil	HAF68	Max.30 ml	In normal circumstances, there is no need to add refrigeration oil. The filling amount should be determined based on actual site conditions. The value provided here is the replenishment amount when the refrigerant is discharged too many times.
Electrical appliances	Power battery thermal management system	Refrigerant	R407C	830g/ system	

System	Product or system	Fluid name	Recommended grade and specification	Total capacity	Remarks
Electrical appliances	Driver's cab A/C	Refrigeration oil	HAF68	Max.30 ml	In normal circumstances, there is no need to add refrigeration oil. The filling amount should be determined based on actual site conditions. The value provided here is the replenishment amount when the refrigerant is discharged too many times.
Electrical appliances	Driver's cab A/C	Refrigerant	R407C	2.1kg	

7.2.3 High voltage electrical appliances

Tightening requirements for high voltage electrical appliances

S/N	Product or system	Tightening position	Name and specifications of fastener	Tightening torque (N·m)
1	Vehicle controller	Four mounting holes	Hex flange nut (M6)	10±1
2	Integrated controller 6	Four mounting holes on both sides	Hex flange bolt with teeth on bearing surface (M12)	70
3	Integrated controller 6	Four mounting holes on both sides	All-metal hex flange lock nut (M12)	/
4	Integrated controller 6	Small side fuse (e.g. defroster)	M5 nut	2
5	Integrated controller 6	Big side fuse (A/C)	M8 nut	6
6	Integrated controller 6	Side fuse cover	M5*8 outer hex flange bolt	3.8
7	Integrated controller 6	Battery / charging wiring harness cover	M4*12 hexalobular socket combination screw	2
8	Integrated controller 6	Battery / charging wiring harness fixing bolt	Hex flange bolt (M6*16)	6.5
9	Integrated controller 6	Motor three-phase wire outer cover	M5*12 hexalobular socket combination screw	3
10	Integrated controller 6	Motor three-phase wire fixing bolt	Hex flange bolt (M6*16)	6.5

S/N	Product or system	Tightening position	Name and specifications of fastener	Tightening torque (N·m)
11	Integrated controller 6	Battery / charging wiring 8 pcs. Nut of high-voltage wiring harness	M8 nut	10
12	Integrated controller 6	4 top fuses (charging / discharging)	M8 nut	9
13	Integrated controller 6	2 top fuse covers (charging / discharging)	M4 hexalobular socket combination screw	2
14	Integrated controller 6	DC output fixing bolt	Hex flange bolt_M8×10	15
15	Integrated controller 6	GND bolt	Hex flange bolt (M8)	15

7.2.4 Torques for chassis

Torques for chassis

Product system	S/N	Tightening position	Name and specifications of fastener	Tightening torque (N·m)	Tightening torque (lb.ft)
Front/rear suspension	1	Front stabilisation bar – frame welding bracket	Hex bolt (M16×1.5)	290±20	214±15
Front/rear suspension	2	Stabilizer bar slotted nut - hanger rod	/	200±20	148±15
Front/rear suspension	3	Upper and lower end nuts of shock absorber	Hex flange lock nut (M18×1.5)	85±5	62±4
Front/rear suspension	4	Air spring nut	Hex thin nut (M18×1.5)	75±5	55±4
Front/rear suspension	5	Upper/lower push rod and frame bolt	Hex bolt (M18×1.5)	420±20	310±15
Front/rear suspension	6	Push rod clip	/	80±5	59±4
Front/rear suspension	7	Front wheel nut	Sleeve nut (M22x1.5)	650±50	480±37
Front/rear suspension	8	Rear air spring	Hex bolt (M18×1.5)	90±5	66±4
Front/rear suspension	9	Upper and lower lock nuts of rear shock absorber	Hex thin nut (M18×1.5)	75±5	55±4

Product system	S/N	Tightening position	Name and specifications of fastener	Tightening torque (N·m)	Tightening torque (lb.ft)
Front/rear suspension	10	Stabiliser bar support bolt - axle	Hex bolt (M18×1.5)	500±50	381±37
Front/rear suspension	11	Stabiliser bar hanger rod – frame	HEX NUT	260±20	192±15
Front/rear suspension	12	Stabiliser bar clamp torque - stabilizer bar	Hex bolt	90±5	69±4
Front/rear suspension	13	Rear push rod - frame	Hex bolt (M18×1.5)	420±20	320±15
Front/rear suspension	14	Rear wheel nut	Wheel nut (M22×1.5)	650±50	480±37
Front/rear suspension	15	Thrust rod - axle	Hex bolt (M18×1.5)	420±20	320±15
Front/rear suspension	16	Stabiliser bar mounting base - stabiliser bar	Hex bolt (M14×1.5)	160±10	118±7
Front/rear suspension	17	Steering tie rod - steering knuckle arm	Hex nut (/)	220±20	169±15
Front/rear suspension	18	Steering gear and drop arm	Steering drop arm nut (M45×1.5)	550±50	406±37
Front/rear suspension	19	Wheel - wheel hub	Vehicle wheel nut (aluminium wheel) (M22×1.5)	650±50	480±37

7.2.5 Torques for wheel-hub drive axle

Bolt torques for in-wheel drive axle

Product system	S/N	Tightening position	Bolt names and specifications	Tightening torque (N·m)	Tightening torque (lb.ft)
Drive axle	1	Bearing cover	Hex flange bolt (M10×25)	50	37
Drive axle	2	Motor	Hex flange bolt (M12×50)	79	58
Drive axle	3	Left second axle	Hex lobular socket countersunk head screw (M6×20)	10	7
Drive axle	4	Sleeve	Hex bolt (M14×105)	195±10	144±7
Drive axle	5	Sleeve	Hex bolt (M14×50)	195±10	144±7
Drive axle	6	Planetary reducer end cover	Hex flange bolt (M10×30)	40	30
Drive axle	7	Planetary reducer housing	Hex lobular socket countersunk head screw (M10×25)	45	33
Drive axle	8	PLANETARY CARRIER	Planetary carrier connecting bolt (M14×60)	195±10	144±7
Drive axle	9	Oil filler	Oil filler plug (M22×1.5×18)	35	26
Drive axle	10	Oil drain hole	Oil drain plug (M22×1.5×18)	35	26

Product system	S/N	Tightening position	Bolt names and specifications	Tightening torque (N·m)	Tightening torque (lb.ft)
Drive axle	11	Half shaft sleeve end surface	Round nut (M88)	1000±30	738
Drive axle	12	Planetary gear oil drain hole	Planetary gear oil drain plug (M22)	35	26
Drive axle	13	Air cantilever and motor base	Bolt (M20)	620±30	458±22
Drive axle	14	Motor base and axle housing	Connecting bolt (M16)	300±10	221±7
Drive axle	15	Brake caliper	Fastening bolt (M16)	360±10	266±7
Drive axle	16	Wheel hub flange	Fastening bolt (M16)	275±10	203±7

Thanks again for your purchase. Wish you a safe and smooth journey!