

HOWO Series Vehicle Drive's Manual 4th Version



AZ9725870904

China National Heavy Duty Truck Group Co., Ltd.

Preface

This Driver's Manual introduces the operating method, daily maintenance and vehicle maintenance of New HOWO series vehicles, and relevant safety regulations to be observed during vehicle use.

Please read this Manual carefully before driving the vehicle for the first time.

Refer to relevant manufacturer's documents for detailed description of assembly, modification parts or accessories produced by other companies other than SINOTRUK.

As vehicle models are numerous, and it is possible that the vehicle photos in This Manual are inconsistent with the vehicle model you have purchased. These illustrations are only representative examples. This Company reserves the right to modify vehicle shape, configuration and technical performance at any time. So, we will not accept any claim about data, legend or text description in This Manual.

Vehicle configuration is subject to purchase order, and Driver's Manual will be updated from time to time.

The Driver's Manual is a part of vehicle, so please carry it about for use from time to time.

Wish you have a safe and enjoyable drive!

China National Heavy Duty Truck Group Co., Ltd. (SINOTRUK)

2015.11

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WARNING

- Engine must use special oil for MC engine, engine oil filter element and fuel filter element; otherwise, it may cause premature wear of engine, and SINOTRUK will only provide paid service!
- Transmission must use special transmission gear oil of SINOTRUK; otherwise, it may cause transmission damage, and SINOTRUK will only provide paid service!
- Drive axle must use special drive axle gear oil of SINOTRUK; otherwise, it may cause drive axle damage, and SINOTRUK will only provide paid service!
- When replacing air filters, only use SINOTRUK original parts, otherwise dust may enter engine inlet. SINOTRUK only provides paid service.
- Please use special coolant for SINOTRUK; otherwise it may cause engine damage, and SINOTRUK will only provide paid service!
- Please go to the Sinotruk-appointed service station for the replacement of fuel and oil filter elements, and first or regular maintenance.

Vehicle nameplate

The vehicle nameplate is located inside the co- driver's side door (visible after the door is opened). Vehicle model, main quality parameters and engine model are indicated on nameplate.

VIN is printed on outside of frame right girder web at front axle center line and vehicle nameplate.

Please verify whether VIN is consistent with certificate of conformity.

Engine nameplate is mounted on the cooler's cap.

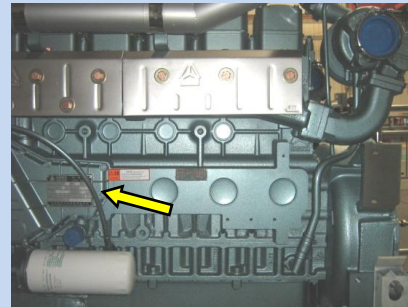
Engine nameplate information includes engine model, rated power/speed, factory number, etc.



Vehicle nameplate



VIN



Engine nameplate

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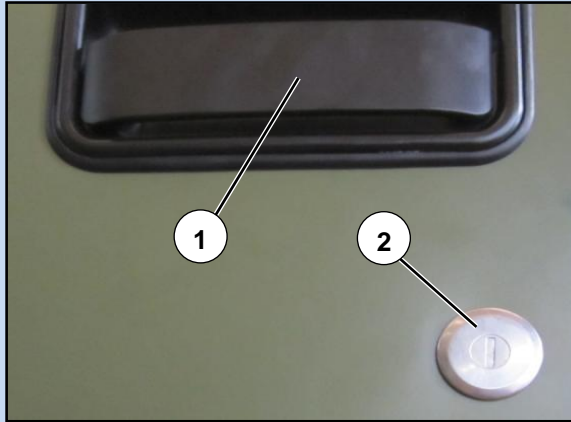
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Chapter I Vehicle Operation

Door operation



Door operation



WARNING

- Do not drive vehicle before vehicle door is closed normally!

Door operation (outside vehicle)

Open vehicle door

- If the door is at non-locked state, press the handle① and pull outwards, and the door can be directly opened.
- If the door is at locked state, insert the key into the lockhole, rotate the key 180 degrees anticlockwise. Pull the handle① and open the door.

Lock vehicle door

- Close the door, insert the key into lockhole②, rotate the key 180 degrees clockwise, remove the key and the door is locked.

Door operation (inside door)

Open the door

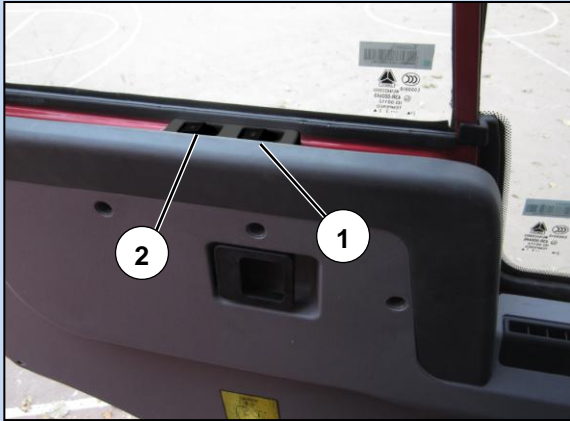
Pull handle ① (rotate it to a certain angle), push the door outwards, and the door can be opened.

Lock the door

- Close the door with proper force
- Press the lock switch ②, and the door can be locked. Pulling the handle outside or pulling handle ① inside the vehicle can not open the door.

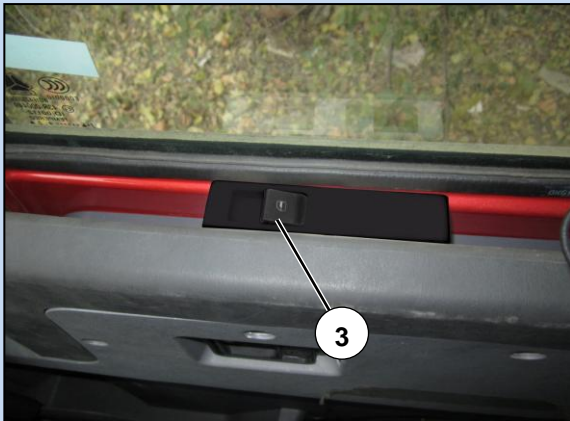


Door operation



Electric window lifting (at driver's side)

- Window lifting can be controlled by the switch located between trim panel and door glass.
- Press rocker switch ① or ②, glass left (right) begins to fall; Release the switch ① or ②, glass left (right) stops falling.
- When you lift switch ① ②, left (right) glass window begins to rise; when you release switch ① or ② left (right) glass window stops rising
- Lifting or pressing switch ① or ② for more than 2S, the window will automatically lift to the top or fall to the bottom.

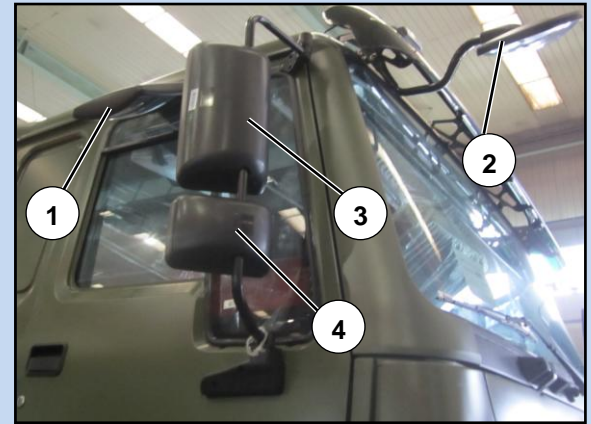


Electric window lifting (at co-driver's side)

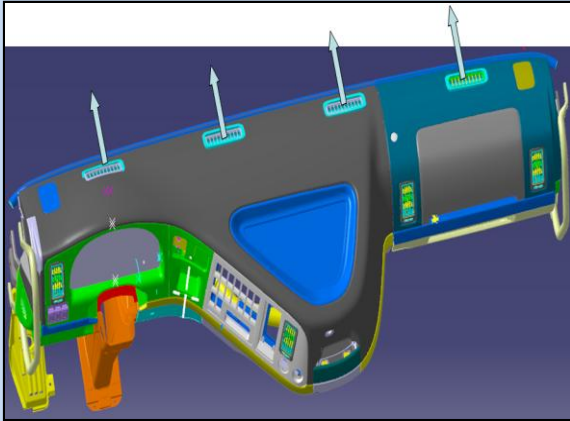
There is only one button on the window-lifting rocker switch at co-driver's side which controls rise and fall of door window glasses at single one side.

Rear-view mirror regulating

- Blind spot mirror: hold the circumference of blind spot mirror ①, and apply a proper force to press the mirror surface to adjust it to the required angle of view.
- Downwards-view mirror: hold the view mirror ② and randomly rotate it to the required angle of view with proper force.
- Main rearview mirror: hold the frame of main rearview mirror ③, and apply a proper force to press the mirror surface to adjust it to the required angle of view.
- Wide angle rearview mirror: hold the frame of main rearview mirror ④, and apply a proper force to press the mirror surface to adjust it to the required angle of view.



Heating of front windshield



Heating of front windshield

See "Air conditioning air mode".

Storage box

Standard and lengthened cab (the right arrow indicates cup holder).



Storage box



High-roof cab (indicated by the arrow)

Storage box is where the arrow points, but the right arrow shows where a thermoelectric cooler can be installed (optional)

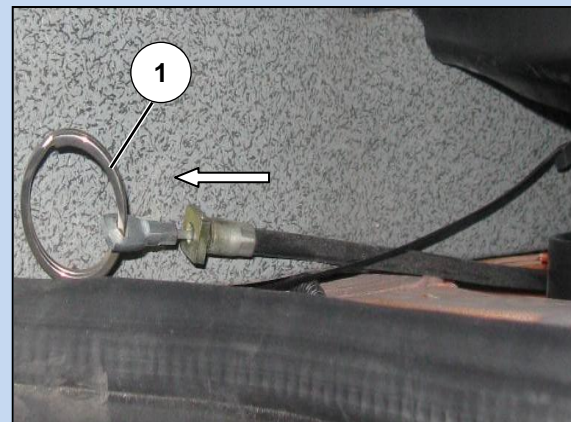


Tool kit

There is one tool kit ② at the left side of the cab.

Open the door of tool boxes

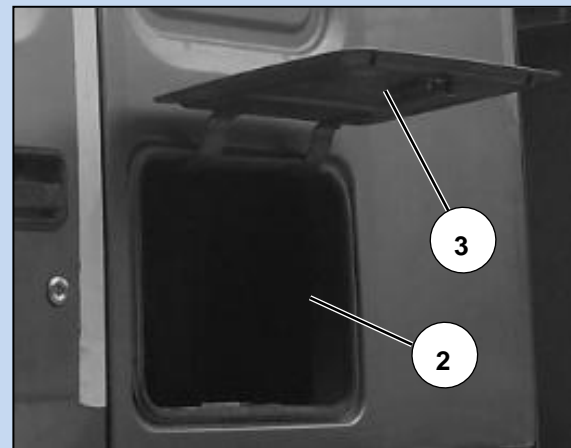
- Find the cable ① of tool box outside the seat, and pull along the direction where the arrow shows.



- Open the cover of tool box ③ and uplift it to the highest point, then the height of the cover will be locked.

Close the door of tool boxes

- Pull downwards the cover of tool box ③ with proper force, and the cover will be automatically unlocked fall until it is locked again by gravity.



Dashboard



Dashboard

- Driver's side: The vehicle control and information display area.



- Middle and co-driver's side: Material storage area.

Sun visor

- The position when the front sun visor is lowered is shown in the figure.
- Front sun visor can be rotated inwards to any angle as required.





Manual sunroof



WARNING

- When leaving the cab, please ensure that the sunroof is closed, so as to ensure burglary prevention as well as avoid no entry of rainwater and dust.

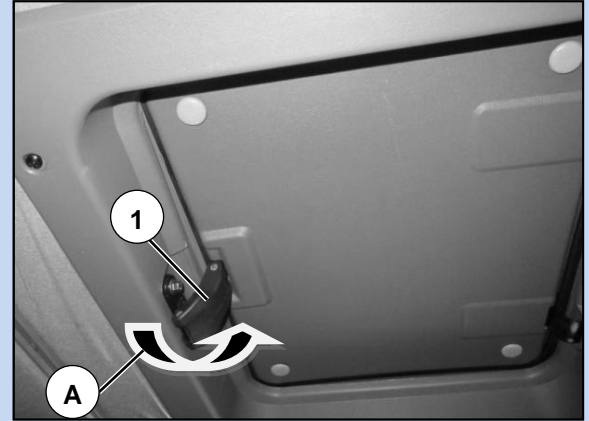
- This is when the sun roof is closed



- This shows the utmost angle that sun roof can operate.

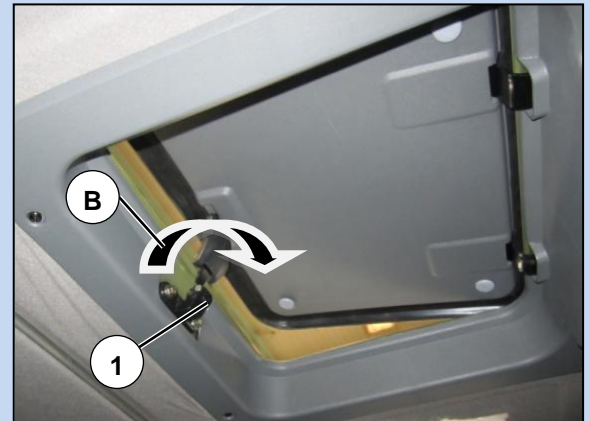
Open the sunroof

- Pull handle ① along the direction of the arrow A to open the sunroof.



Close the sunroof

- Pull handle ① along the direction of the arrow B to close the sunroof.





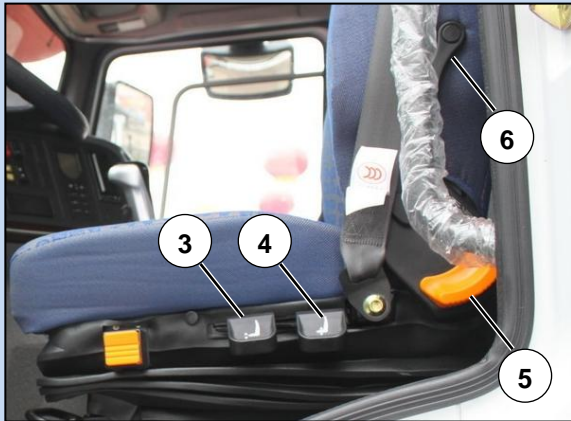
Seat adjustment

Air suspension seat



WARNING

- Do not adjust seat when the vehicle is running, and the seat can be adjusted only when the vehicle is stationary!
- Luxury seat can only be adjusted when the load is picked up and the air pressure is not under 8bar.
- Make sure you can hear the click of seat locking device!
- Do not fix children's seat on driver's and co-driver's seat!
- Please fasten your safety belt before driving, see "Safety belt"



- 1 Seat F/R adjusting handle
- 2 Waist support device adjustment
- 3 Height adjusting for front end
- 4 Height adjusting for rear end
- 5 adjusting handle for small back support
- 6 Seat angle adjustment

Seat F/R adjusting handle

- Pull the handle ① up and downward for to and fro movement

Waist support device adjustment

- Press the lower end of the control valve ② to inflate the air bag;

Press the upper end of the control valve to deflate the air bag;

Release the button at the required position.

Height adjusting for front end

- Pull the handle ③ gently to apply (reduce) force to the front end of the seat downwards (upwards).

Release the handle when the front end of the seat lowers (rises) to the required height.

Height adjusting for rear end

- Pull the handle ④ gently to apply (reduce) force to the rear end of the seat downwards (upwards). Release the handle when the rear end of the seat lowers (rises) to the required height.

Adjusting handle for small back support

- Rotate the handle ⑤ to adjust the back support to required position.

Release the handle to lock it.

Seat angle adjustment

- Leaning back and push back the seat backrest to unlock the position of the seat angle.

- Pull up the handle ⑥

- Adjust the backrest till the required position.

- Release the handle ⑦



Bunk



WARNING

When using the upper bunk, safety device must be applied and firmly fixed.

Bunk adjustment

- Push forward the driver's /co-driver's seat or the backrest if necessary (See "Seat adjustment").
- Double berths are mounted in the high-roof cab. The upper berth can be stopped at any angle during the lifting.



Adjustment of steering wheel

To meet driving habit of different drivers, the steering wheel can be adjusted forward and backward about $\pm 25\text{mm}$ in height and about $\pm 5^\circ$ in angel.

Steering wheel adjusting:

- First, adjust driver's seat (see "seat adjustment"), then adjust steering wheel ①.
- release the adjusting wheel ② (see the right figure), adjust the steering wheel to a proper driving position.
- Fastnen the adjusting wheel ② to lock the wheel position

Instruction:

Moving steering wheel forward can make it easier to enter and exit the cab and move to the codriver's side.



WARNING

- Do not adjust the steering wheel during driving.
- Do it when vehicle is stopped and parking brake is activated



Seat belt



WARNING

- Before each driving, fasten the safety belt to ensure personal safety.
- One safety belt for each person
- To ensure seat safety belt fits your body, it is prohibited to wind safety belt.
- Only when seat backrest is almost in vertical position, safety belt can provide you with best protection. Refer to “seat adjustment”.
- Keep your back close to seat backrest, safety belt close to between neck and shoulder.
- Safety belt shall be located in the middle of shoulder, not throat.
- Safety belt at thigh position must have an appropriate tightness, and pass through lower abdomen not stomach.
- Do not adjust seat to the position where seat safety belt does not fit your body.
- During driving, pull shoulder safety belt frequently to adjust the tightness of seat safety belt.
- Do not make safety belt pass through pockets in which hard or fragile.
- Make sure safety belt is clean and dry.
- Install new safety belts to replace the damaged or seriously-deformed safety belts in accidents and check safety belt anchorages at the service station of Sinotruk.
- Seat safety belt modification is not allowed.

Fasten the seat belt

Before the safety belt is fastened, adjust driver and assistant driver seats according to their body size. Refer to “driver and assistant driver seats”.

- Hold the seat belt buckle and pass it through the shoulder and thigh.
- Insert safety belt buckles①into seat belt clip③, until bucket engagement sound is heard.
- Tightness of seat belt on upper body and thigh must be appropriate.



WARNING

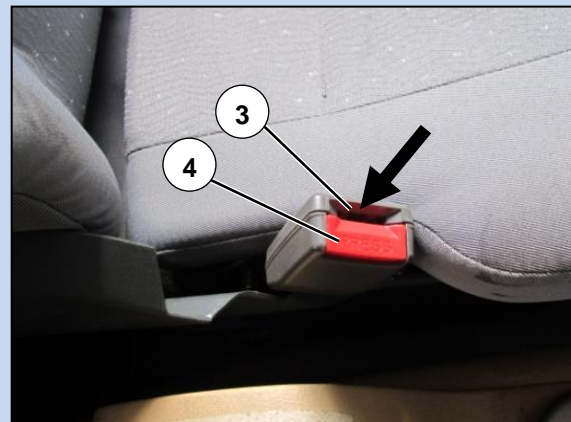
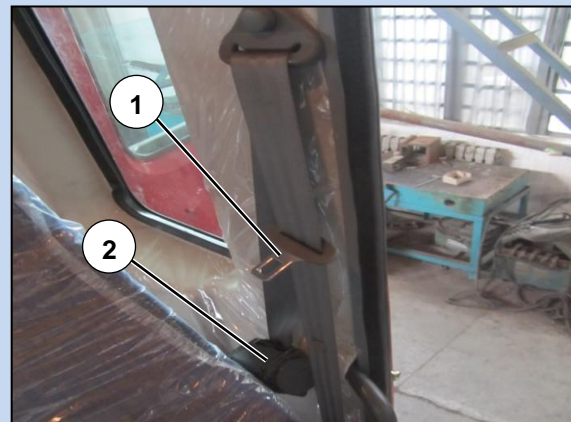
- Safety belt shoulder passes over the central part of shoulder, not your throat.
- The condition and performance of the seat belt should be frequently checked. Fasten the seat belt again if necessary.

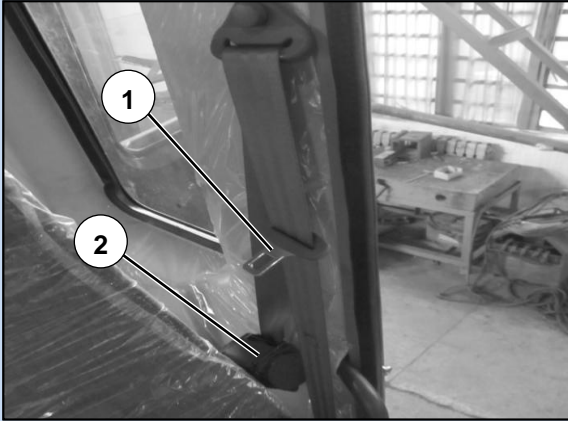
Check the safety belt lock (everyday)

- Fiercely pull and drag the safety belt, and its roller ②shall be locked.

Release

- Press the red button ④ on the safety belt clip towards the arrow direction.
- Hold the safety belt buckle①till the safety belt automatically retracts





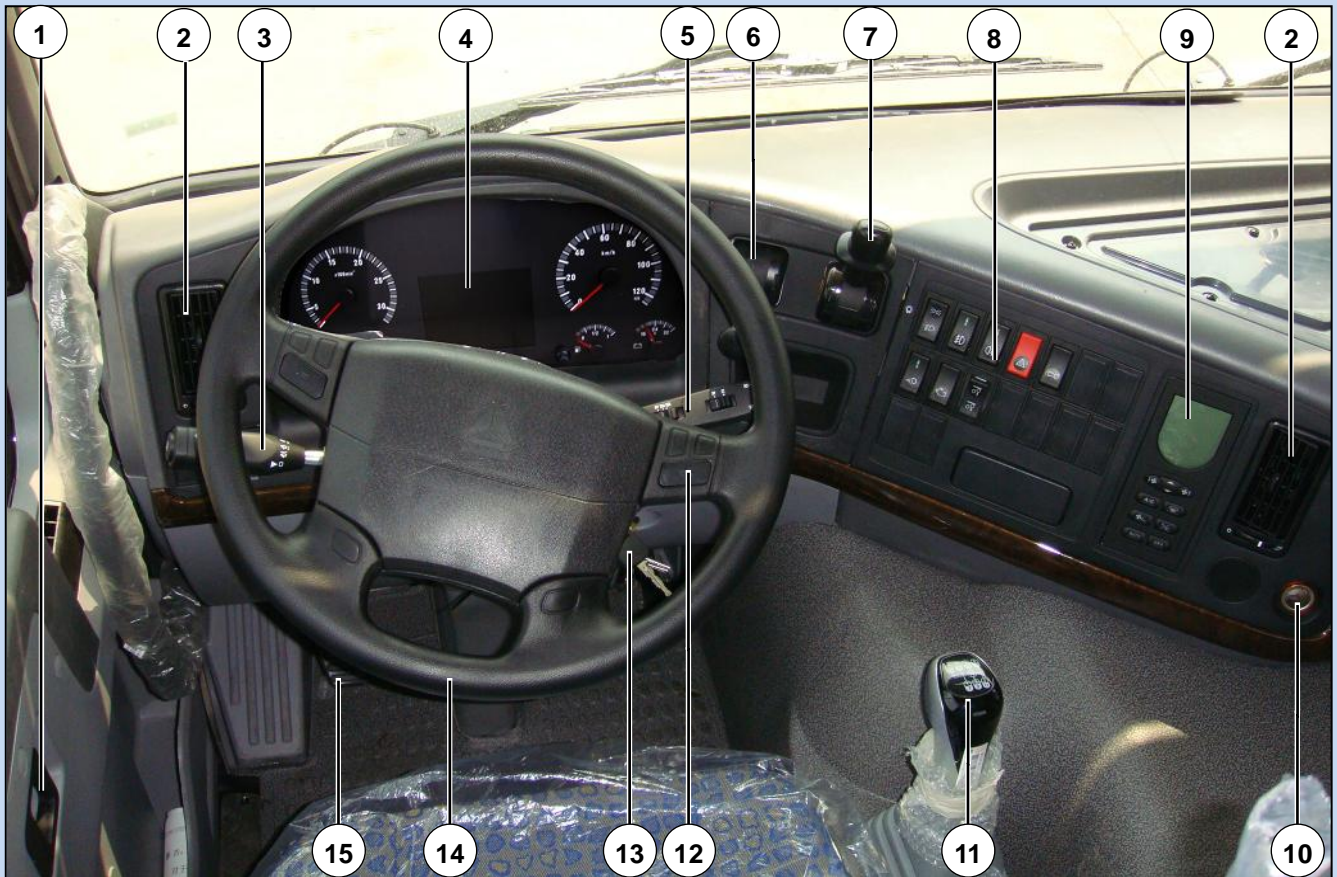
Inertia retractor

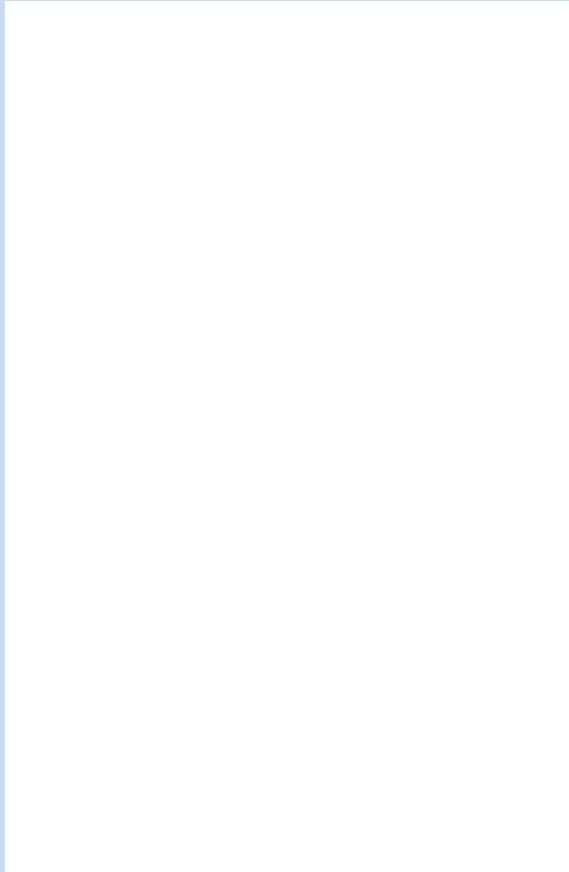
In following conditions, the retractor ② shall lock the safety belt to avoid pulling out the safety belt:

- The vehicle suddenly decelerates at any direction.
- When quickly pulling out the safety belt.

Description of seat belt alarming:

- Rotate the starting key to the driving position. If the seat belt is fixed, the seat belt locking signal light on the instrument panel will be off. Otherwise the signal will be on.
- After the engine starting, if your seat belt is not fastened, the seat belt lock signal light will be on, and the buzzer will alarm at low frequency.
- After 6s the alarm will stop. Insert the seat belt and the signal light will be off and the buzzer will be stop alarming at the same time.
- If the seat belt is pulled out when the engine is on, the signal light will be on and the buzzer will alarm at low frequency for 6s at the same time.





Cab inside overview

1 The door handle

2 Vent

3 Left combined switch

4 Dashboard

5 Right combined switch

6 Parking brake

7 Trailer brake

8 Rocker switch

9 Air conditioning control panel

10 24V cigar lighter

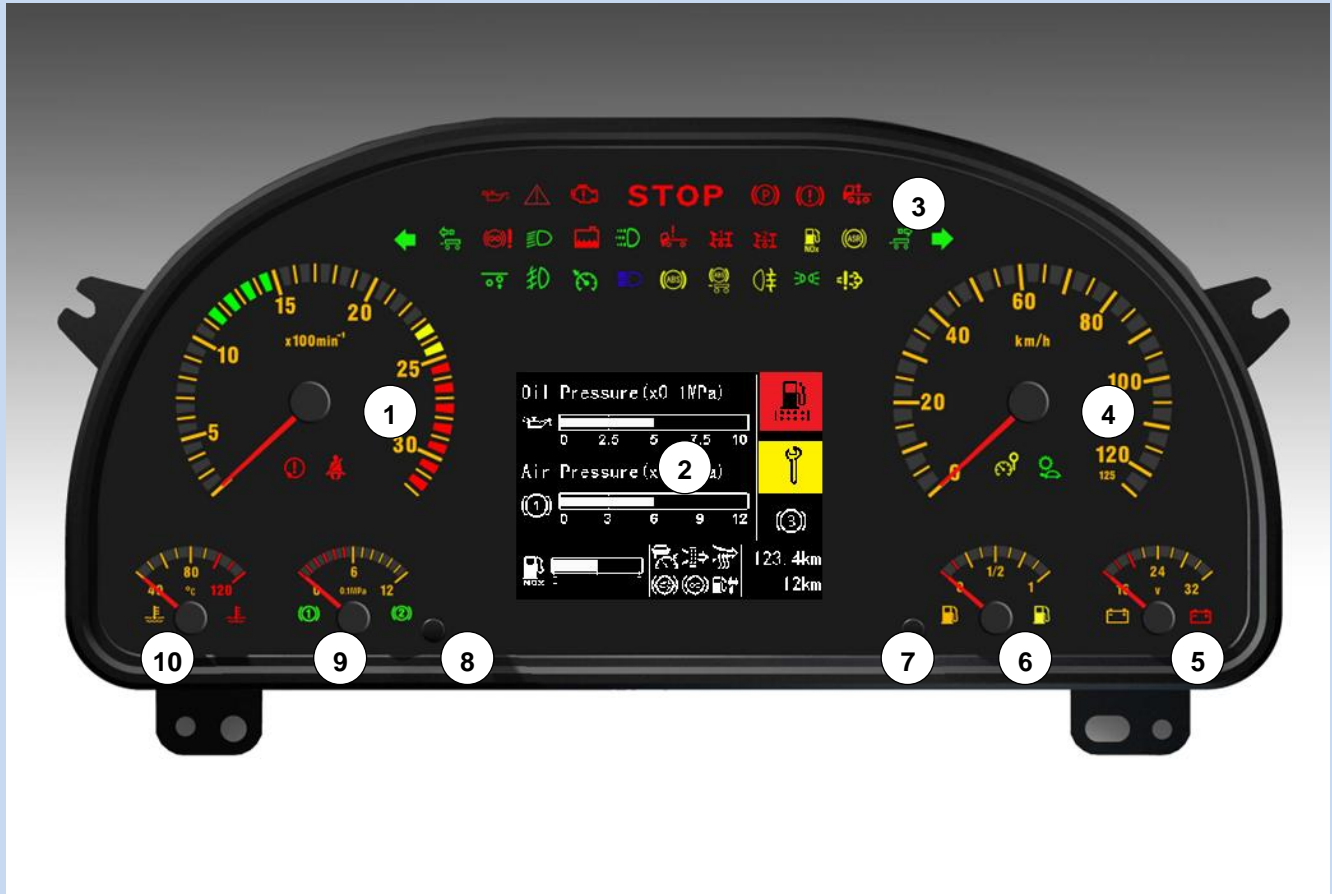
11 Shift handle

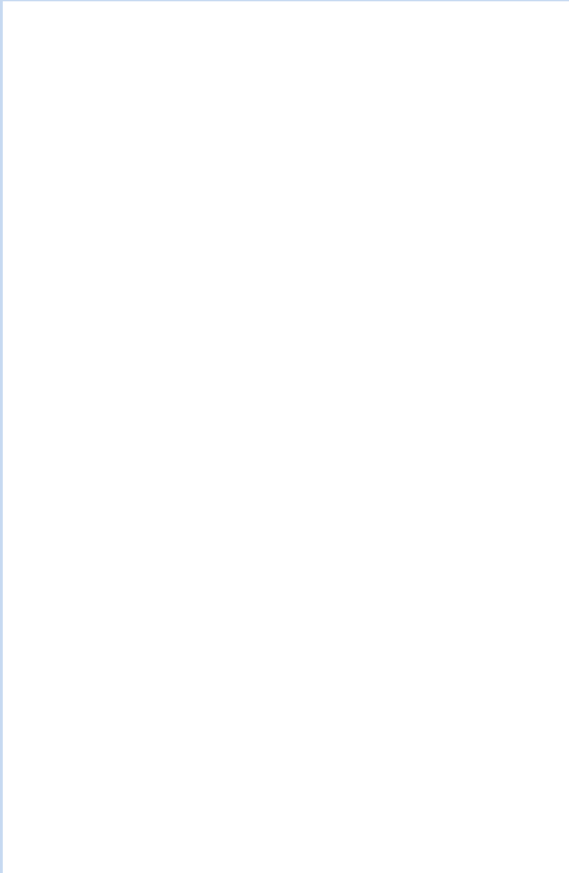
12 Horn button

13 Key switch

14 Steering wheel

15 Clutch pedal





Instrument panel

1 Engine tachometer

2 Driver display screen

3 Detection and alarm lamp panel

4 Speedometers

5 Voltmeter

6 Fuel gauge

7 Button 1

8 Button 2

9 Barometer

10 Coolant thermometer

Speedometer

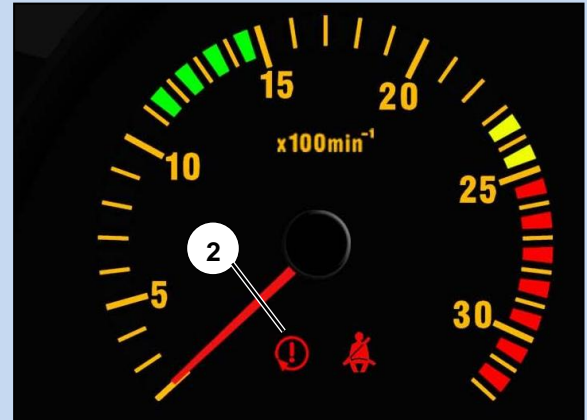
It is used to indicate vehicle running speed, indication range is 0-125km/h, each small scale means 5km/h and each big scale means 20km/h.

When the speed is too fast, the overspeed indicator lamp at position ① will be on.

**Engine tachometer**

It is used to indicate engine speed, indication range is 0-3200r/min, each small scale means 100r/min and each big scale means 500r/min.

The green area refers to economic speed area of the engine; when the engine speed is too high, the high engine speed indicator lamp at ② is lit.





Voltmeter

It is used to display voltage of battery, ranging from 16V to 32V, and each small scale is 2V.

If the voltage is less than 20V or higher than 32V, indicator light ③ will be on.



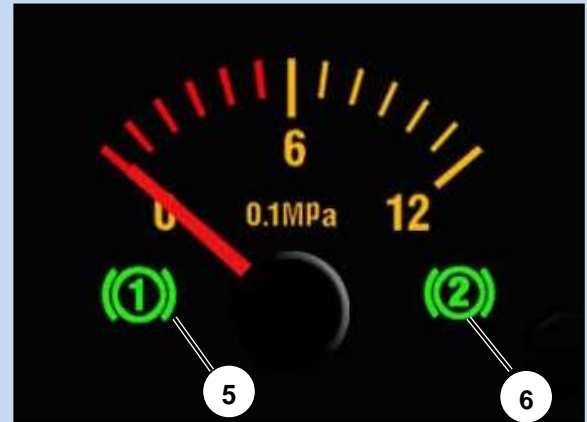
Fuel gauge

It is used to display the remaining fuel amount in the fuel tank. Each scale indicates $1/8$ of the total amount.

If the remaining amount is less than $1/8$, the low fuel level alarm lamp at position ④ will be on.

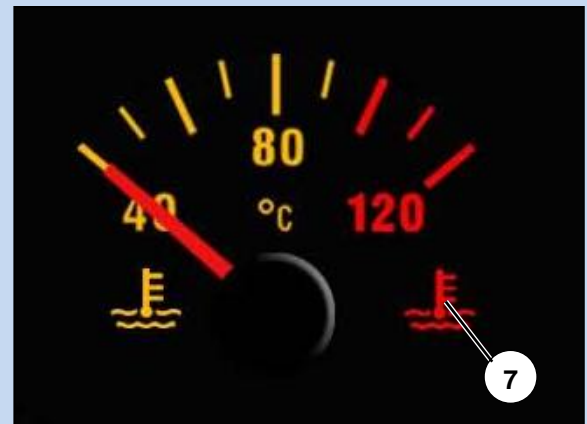
Barometer

It is used to display the air pressure of the brake circuit 1 or 2, which ranges from 0 to $12 \times 0.1 \text{Mpa}$. Each small scale shows $1 \times 0.1 \text{Mpa}$. If the pointer is in the red alarm area, which means that the air pressure is lower than $5.5 \times 0.1 \text{Mpa}$, the driver display screen will display relevant malfunction information. The barometer displays a lower air pressure of the brake circuit in default setting, and the indicator lamp at ⑤ or ⑥ will be on. The higher brake circuit pressure is shown on the driver's display



Coolant thermometer

It is used to display the engine coolant temperature, ranging from $40\text{--}120\text{ }^{\circ}\text{C}$, and each small scale indicates $10\text{ }^{\circ}\text{C}$. When the pointer is in the red zone, the engine coolant temperature is too high. The red coolant temperature overlimit indicator lamp at ⑦ will be on

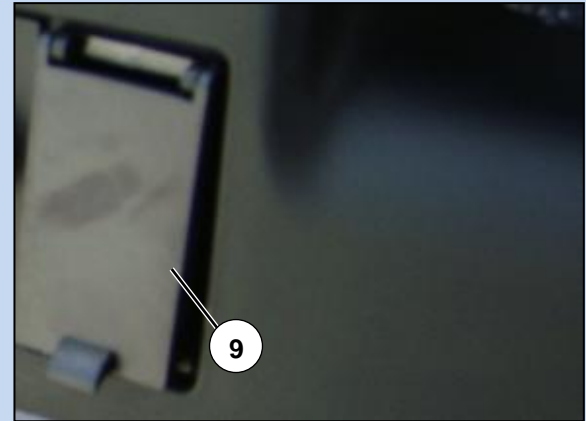


Rocker switches and buttons

Rocker switches and buttons

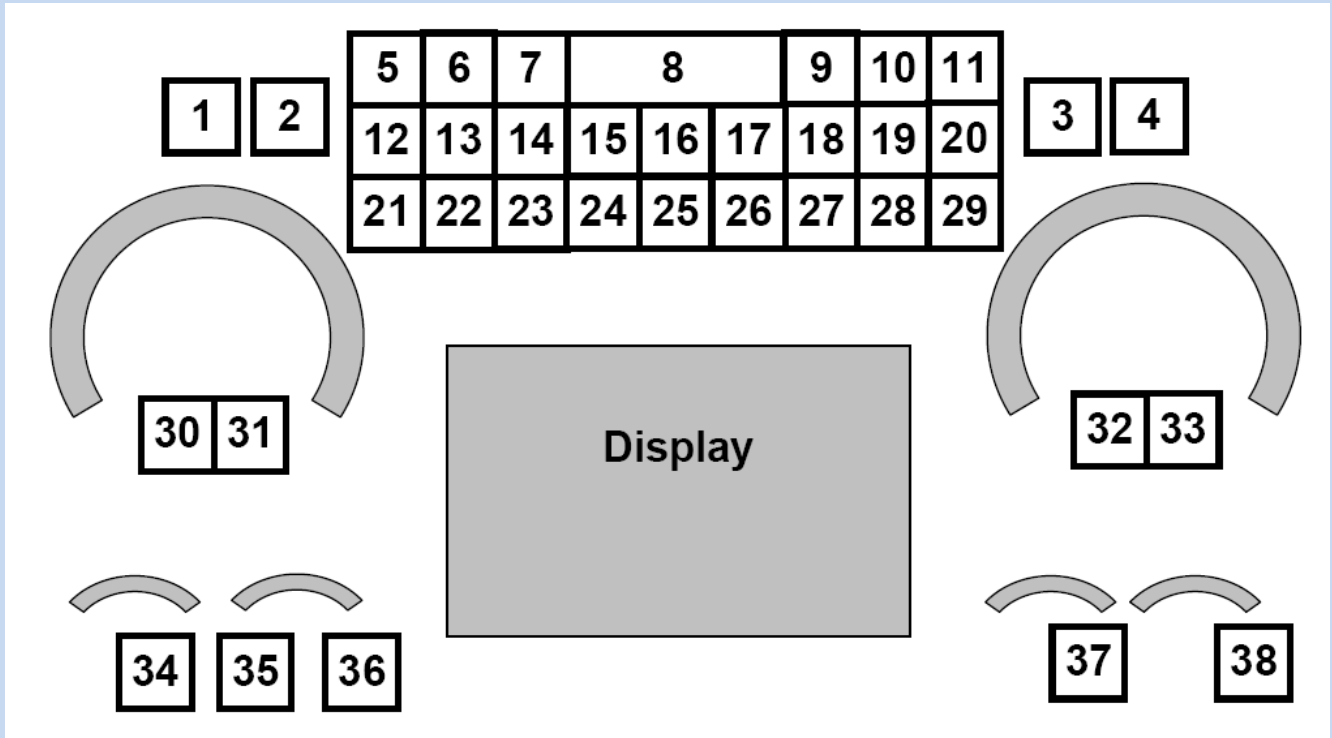


- 1 Light switch
- 2 Front fog lamp switch
- 3 Rear fog lamp switch
- 4 Emergency alarm switch
- 5 Horn change-over switch
- 6 Working light switch
- 7 Engine diagnosis switch
- 8 Supporting shaft lift and fall switch
- 9 Diagnosis interface


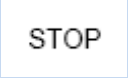


























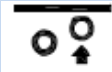
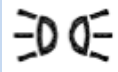
- 1 Light switch: Press the button, and the parking lights of the low beam will be on.
- 2 Front fog lamp switch: Press the button, and the front fog lamp will be on when the light switch is at position 1.
- 3 Rear fog lamp switch: Press the button, and the rear fog lamp will be on when the light switch is at position 2.
- 4 Emergency alarm switch: Press the button, and all turn lights will flash and the turning indicator lamp on instrument panel will also flash at the same time.
- 5 Horn change-over switch: If the switch does not work, press the horn button on the lift combination switch and the electric horn will honk; after pressing this switch, press the horn button on steering wheel and the air horn will honk.
- 6 Working light switch: press switch to turn on the working light in the rear part of the cab.
- 7 Engine diagnosis switch: Press the button and the fault indicating flash codes on the instrument panel can be read. After checking fault flash codes table, the faults existing in engine system can be identified.
- 8 Supporting shaft lift and fall switch: Press the button, and the supporting shaft will deflates automatically and steadily to the corresponding position. It is not possible to stop the supporting shaft in the middle position by operating the switch.
- 9 Diagnosis interface: It is used to connect EOL tools to write programmes of all the electronic control units and diagnose faults.

Detection lamps and alarm lamps















Detction lamps and alarm lamps

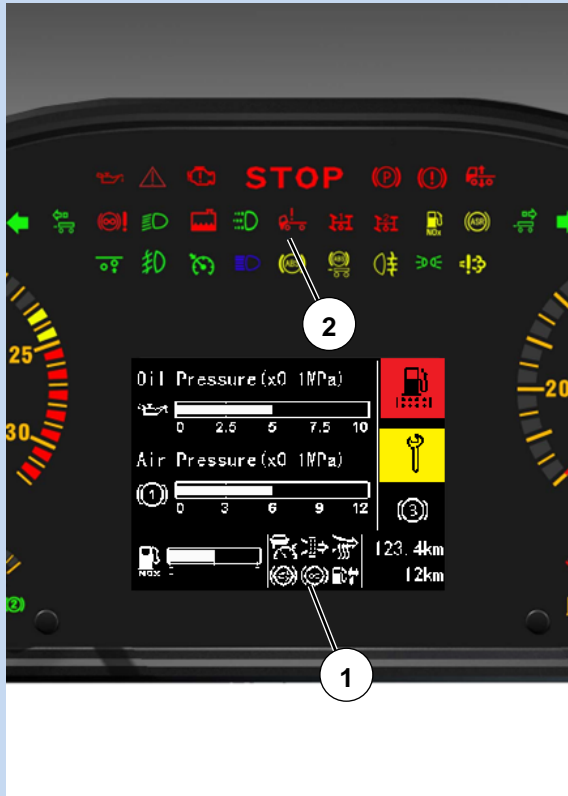
No.	Description	Signal	Color	No.	Description	Signal	Color
1	Main reuck left turning indication		Green	8	STOP (Emergent Braking)		Red
2	Left-turn indicator lamp trouble of trailer		Green	9	Parking brake		Red
3	Right-turn indicator lamp trouble of trailer		Green	10	Failures in braking system		Red
4	Main reuck right turning indication		Green	11	Air suspension alarm		Red, yellow
5	Engine oil pressure alarm		Red, yellow	12	Fault of retarder		Red, yellow
6	failure alarm		Red, yellow	13	Low beam		Green
7	Engine failure alarm		Red, yellow	14	Low coolant level		Red

No.	Description	Signal	Color	No.	Description	Signal	Color
15	Daytime running light		Green	22	Front fog lamp		Green
16	Cab lock		Red	23	Cruise		Green
17	PTO 1		Red, yellow	24	Hight beam		Blue
18	PTO 2		Red, yellow	25	ABS alarm for main truck		Yellow
19	Low urea level alarm		Yellow	26	ABS alarm for trailer		Yellow
20	ASR working indicator		Yellow	27	Rear fog lamp		Yellow
21	Lifting shaft		Green	28	Lamplet		Green

Detction lamps and alarm lamps

No.	Description	Signal	Color	No.	Description	Signal	Color
29	Emissions exceed standards		Yellow	36	Barometric indication 1		Green
30	Engine overspeed		Red	37	Low fuel level		Yellow
31	Failure in seat belt		Red		Low CNG		Yellow
32	Overspeed of the vehicle		Yellow		Low LNG		Yellow
33	Low gear		Green	38	Low (high) Voltage Alarm		Red
34	High coolant temperature		Red				
35	Barometric indication 1		Green				

Driver's display and detection lamps panel



Driver's display and detection lamps panel

Driver display screen① and detection lamps panel② provides information on vehicle condition to the driver.

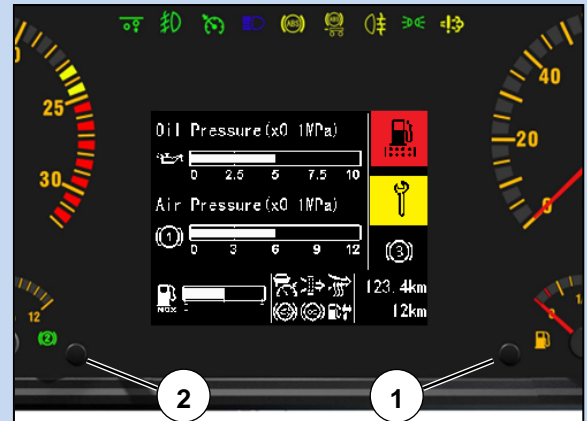
When alarm condition is met, alarm symbol will appear on display screen.

Driver's display screen

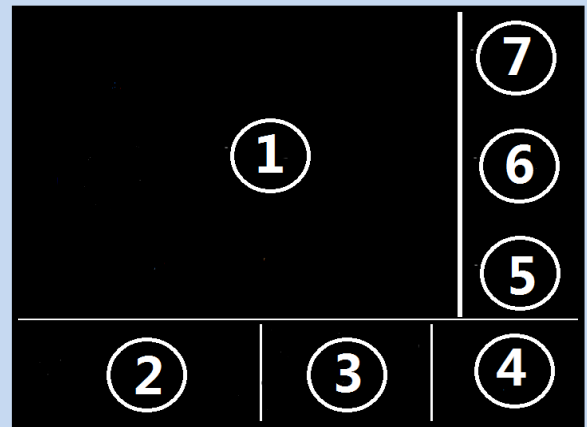
Button 1: Short press ($<3s$) to slip the screen, long press ($\geq 3s$) to reset the last trip.

Button 2: Long press to adjust the instrument backlight brightness.

When it is connected with electricity, simultaneous press on both button 1 and button 2 for over 10s will activate diagnostic mode. Then long press on button 1 to exit. When engine speed is $\geq 300rpm$ or vehicle speed is $\geq 5km/h$, diagnostic mode can also be closed



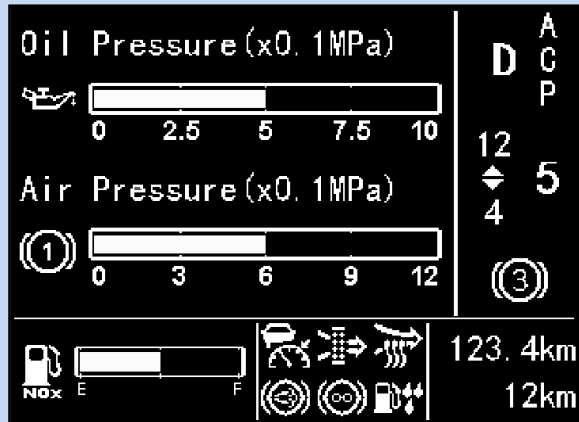
Driver's display screen is divided into 7 areas with different information.





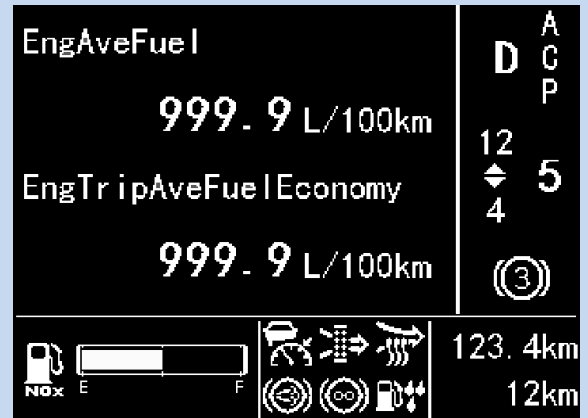
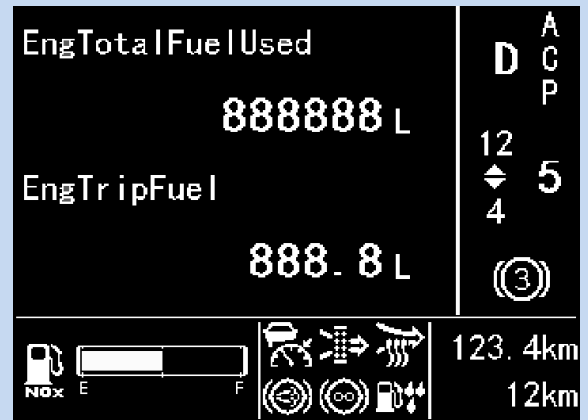
Driver's display screen area 1

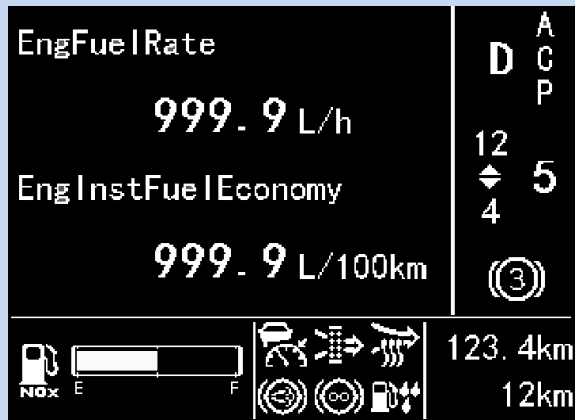
When key is at ON position, "SINOTRUK" will be displayed on the screen



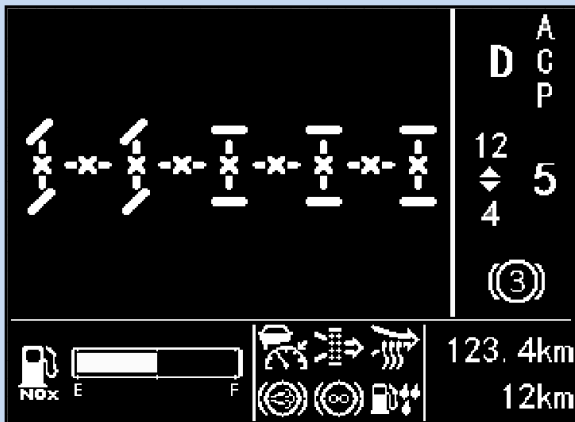
After 3 seconds of self check, driving information will be displayed on the screen

Turn MCS knob to the right or give a short press on button to the right of this instrument to enter this interface:



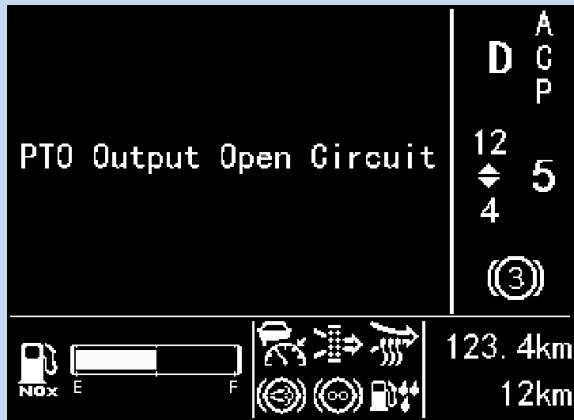


Display this interface after turning the MCS rotary knob to the right or briefly pressing the right button



Display this interface through turning the MCS rotary knob to the right or briefly pressing the right button:





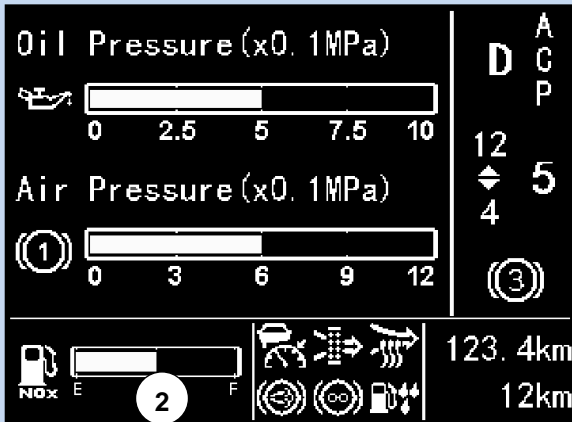
Driver's display section 1 also has a warning display:

If the vehicle has power take-offs with AMT gearbox, the screen will display this interface when the PTO solenoid has open circuit or short trouble:



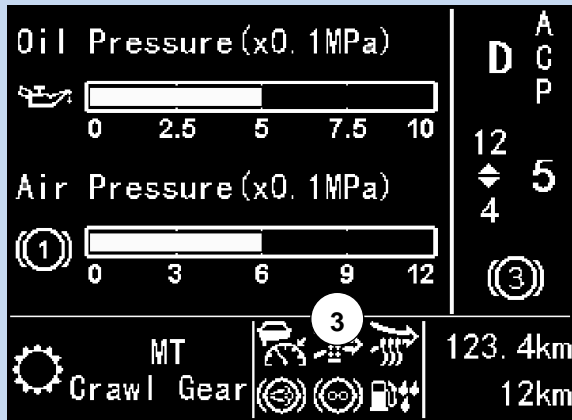
Turn on the ignition key without releasing the handbrake. When the vehicle is still stationary, the screen will display this interface






















Driver's display section 2

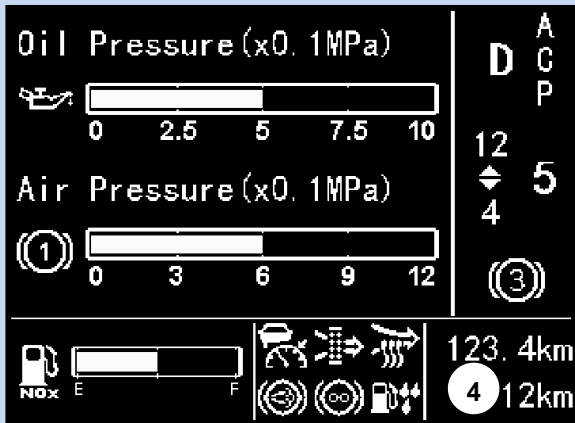
For diesel engine with Euro IV and above emission standard, area 2 display the level of ure, and for gas engine, no information will be displayed



Driver's display section 3

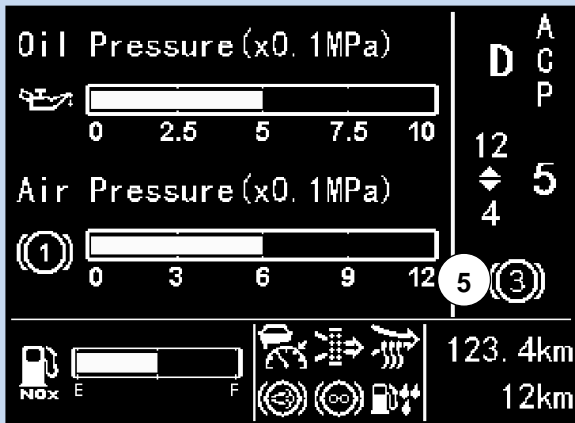
Signal lamps on the driver's dash board

No	symbol	colour	Description	No	symbol	colour	Description
1		White	Air filter blockage	10		Yellow	tyre pressure alarm
2		White	Exhaust brake	11		Yellow	ESC closed
3		White	Intake air preheating	12		Yellow	ACC headlamp
4		White	Fuel blends with water	13		Red	ACC fault
5		White	Retarder operation	14		Red	Emergent prewarning activated for crash
6		White	ACC(self-adaptive cruise control)	15		Red	Fuel filter blocked
7		Yellow	Maintenance tips	16		Yellow	DPF carbon fouling indicator lamp
8		Yellow	ESC normal	17		Yellow	DPF active regeneration indicator lamp
9		Yellow	Hill-start				



Driver's display section 4

This section displays total mileage and subtotal mileage (trip).

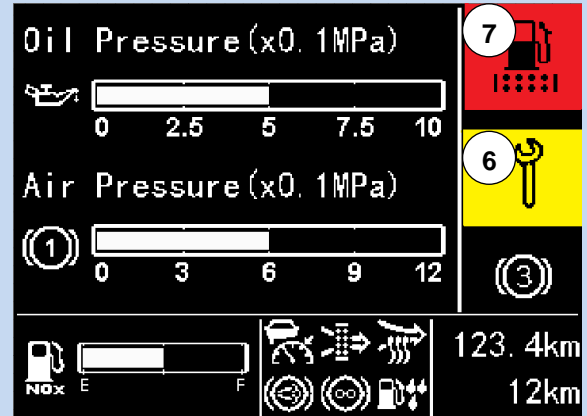


Driver's display section 5

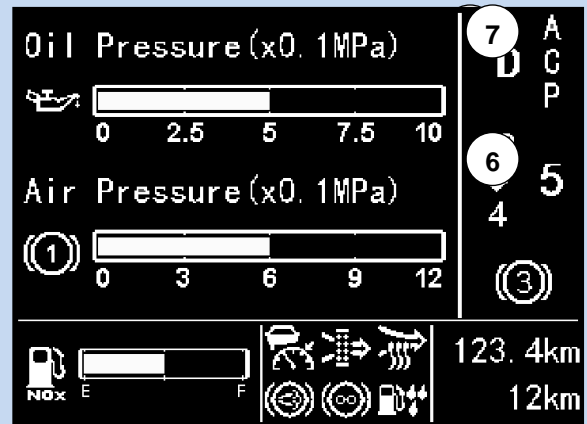
This section displays the warning signal of braking circuit 3 and 4. As shown in this interface, this section indicates the fault in braking circuit 3. If braking circuit 3 and 4 have faults at the same time, it will display respectively for 3s in turn

Driver's display section 6 and 7





Display yellow and red warning signals respectively, descriptions of meanings see "Alarm signals displaying". If there is more than one warning signals, it will display respectively for 3s in turn








If there is no warning signal, these sections are used to display transmission gears information. If the mechanical transmission box is employed, its gear information is displayed in section 7.






Display information on driver's display screen and detection lamps panel

Information Description	Detector lamp panel		Sound Signal	Significance	Suggestions/Further Measures
Left-turn indicator lamp of the vehicle		Green	Yes	Information – Main left-turn signal lamp: This lamp flashes when there is a fault with left-turn lamp of the vehicle.	<ul style="list-style-type: none"> ● Replace bulb immediately! ● Detect turn light. ● If necessary, immediately ask SINOTRUK service station for assistance.
Left-turn indicator lamp		Green	Yes	Information- Trailer steering indicator lamp This lamp flashes when left-turn indicator lamp of tractor fails	<ul style="list-style-type: none"> ● Replace bulb immediately! ● Detect turn light. ● If necessary, immediately ask SINOTRUK service station for assistance.
Right-turn indicator lamp trouble of trailer		Green	Yes	Information – Trailer steering indicator lamp It flashes when there is a fault with the steering lamp	<ul style="list-style-type: none"> ● Replace bulb immediately! ● Detect turn light. ● If necessary, immediately ask SINOTRUK service station for assistance.
Right-turn indicator lamp of the vehicle		Green	Yes	Information – Main right-turn signal lamp : This lamp flashes when there is a fault with right-turn lamp of the vehicle.	<ul style="list-style-type: none"> ● Replace bulb immediately! ● Detect turn light. ● If necessary, immediately ask SINOTRUK service station for assistance.







Display information on driver's display screen and detection lamp panel

Information Description	Detector lamp panel		Sound Signal	Significance	Suggestions/Further Measures
Engine oil pressure alarm		Red	Yes	Safety - Engine oil pressure: Engine oil pressure is too low or too high.	Check engine oil level, and fill or drain a part of engine oil or ask SINOTRUK service station for assistance as required.
Serious failure shutdown alarm symbol		Red	No	Safety – it flashes together with other trouble lights or with abnormal behavior of the instrument sensor.	<ul style="list-style-type: none"> ● Stop the vehicle immediately, and notice traffic condition! ● Ask Sinotruk service station for help immediately.
General failure alarm symbol		Yellow	No	Information -it flashes with other trouble light.	<ul style="list-style-type: none"> ● Please drive carefully and slowly. ● Ask Sinotruk service station for help immediately.
Engine serious failure alarm		Red	Yes	Information –engine system failure	<ul style="list-style-type: none"> ● Ask SINOTRUK service station for help immediately.
General failure alarm of engine		Yellow	Yes	Information –engine system failure	<ul style="list-style-type: none"> ● Please drive carefully and slowly. ● Ask SINOTRUK service station for help immediately.







Display information on driver's display screen and detction lampss panel

Information Description	Detector lamp panel		Sound Signal	Significance	Suggestions/Further Measures
Emergency brake	STOP	red	Yes	Safety -it is lit with other fault alarm lights	<ul style="list-style-type: none"> • Stop the vehicle immediately and pay attention to traffic ! • Seek help from Sinotruk service station.
Parking brake trouble		Red	Yes	Information: handbrake is applied; alarm will sound if handbrake is not release when vehicle speed is more than 10kph.	
Brake system failure		Red	Yes	Safety - low pressure is detected in the brake system circuits.	<ul style="list-style-type: none"> • Vehicle is unprepared for driving! • Stop the vehicle immediately, and notice traffic condition! • Maintain engine idle at high speed until air pressure reaches rated value (display information disappears). • If the brake circuit air pressure cannot reach the rated value: do not move the vehicle and ask SINOTRUK service station for help.
ECAS alarm		Yellow	No	Repair station - ECAS If frame is lowered, braking effect is reduced. If frame is lifted higher than the normal driving position, there are risks of absorber damage.	<ul style="list-style-type: none"> • Please drive carefully and slowly. • Ask SINOTRUK service station for help immediately.





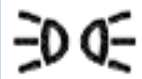
Display information on driver's display screen and detection lamp panel

Information Description	Detector lamp panel	sound signal	Significance	Suggestions/Further Measures
General fault of retarder	 Yellow	No	Information -retarder fault	<ul style="list-style-type: none"> • Drive carefully and slowly • Seek help immediately from Sinotruk Service Station
Serious fault of retarder	 Red	No	Information -serious retarder fault	Seek help immediately from Sinotruk Service Station
Low beam	 Green	No	Information - low beam is on	
Low coolant level	 Red	Yes	Information -Engine coolant level is too low.	Add coolant in time
Driving lamp for daylight	 Green	No	Information -driving lamp for daylight is on.	
Cab locking	 Red	Yes	Safety-cab lock: Cab is not locked completely. At least one touch sensor of cab locking system is in open state.	Lock cab correctly.



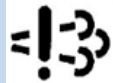
Display information on driver's display screen and detection lampss panel

Information Description	Detector lamp panel		Sound Signal	Significance	Suggestions/Further Measures
PTO 1		Yellow/Red	Yes	Information -Yellow lamp flashes when PTO is working. At this time if vehicle speed is over 30 kph with engine speed more than 1900 rpm, red lamp flashes with alarm sound.	lower vehicle speed or engine speed
PTO 2		Yellow/Red	Yes		
Low urea level alarm		Yellow	No	Information - Urea tank liquid level is below 10%	Fill AdBlue
ASR working indication trouble		Yellow	No	Information -ASR	<ul style="list-style-type: none"> • Please drive carefully. • Ask SINOTRUK service station for help immediately.
Lifting axle		Green	No	Information -lifting axle is lifted	
Front fog lamp		Green	NO	Information -Front fog lamp is on	






Display information on driver's display screen and detection lamp panel

Information Description	Detector lamp panel		Sound Signal	Significance	Suggestions/Further Measures
Cruise		Green	NO	Information -vehicle is cruising	
High beam		Blue	NO	Information -high beam is on	
ABS failure		Yellow	No	Information -ABS failure	<p>Please drive slowly and carefully!</p> <ul style="list-style-type: none"> ● Wheel lock risk increases. Please brake carefully. ● Ask SINOTRUK service station for help immediately.
Rear fog lamp		Yellow	NO	Information -rear fog lamp is on.	
lamplet		Green	No	Information - Sidelights are turned on	







Display information on driver's display screen and detection lamp panel

Information Description	Detector lamp panel		Sound Signal	Significance	Suggestions/Further Measures
ABS failure		Yellow	No	Information -ABS failure	<p>Please drive slowly and carefully!</p> <ul style="list-style-type: none"> ● Wheel lock risk increases. Please brake carefully. ● Ask SINOTRUK service station for help immediately.
ABS alarm of trailer		Yellow	No	Information - ABS fault of the trailer	<p>Please drive slowly and carefully!</p> <ul style="list-style-type: none"> ● Wheel lock risk increases. Please brake carefully. ● Check plug connection of tractor and trailer; if necessary, clean plug and ensure reliable connection. ● Check connection cable of tractor and trailer, if necessary, replace new connection cable. ● Ask SINOTRUK service station for help immediately.
Emissions exceed standards		Yellow	NO	Information -emissions have exceeded the standard.	Immediately seek help form Sinotruk service station

Display information on driver's display screen and detection lamp panel

Information Description	Detector lamp panel		Sound Signal	Significance	Suggestions/Further Measures
Over-speed of engine		Red	Yes	Function – Engine speed is too high.	Shift to high speed gear, or reduce driving speed.
Safety belt trouble		Red	Yes	Function -safety belt control: Driver does not fasten the safety belt.	Driver must fasten the safety belt.
Vehicle speed limitation		Red	No	Function -Vehicle speed is over set value.	<ul style="list-style-type: none"> • Lower driving speed!
Low Gear		Green	No	Information -transmission is working with low gear.	
High coolant temperature		Red	NO	Repair station – Engine: Coolant temperature is too high.	<ul style="list-style-type: none"> • Shift to low gear to improve engine cooling. • Check liquid level of coolant, and add coolant if necessary.

Display information on driver display's screen and detction lamps panel

Information Description	Detector lamp panel		Sound Signal	Significance	Suggestions/Further Measures
Indication of air pressure for brake circuit 2		Green	No	Safety - Indication of air pressure for brake circuit 2	
Indication of air pressure for brake circuit 1		Green	No	Safety - Indication of air pressure for brake circuit 1	
Low fuel		Yellow	No	Information - liquid level of fuel is below 12.5%	Fill fuel
Low CNG		Yellow	No	Information -CNG is low	Fill CNG
Low LNG		Yellow	No	Information -LNG is low	Fill LNG
Low (high) voltage alarm		Red	Yes	Service station -Electricity charging control	Seek help from Sinotruk service station immediatetly.

Left combination switch



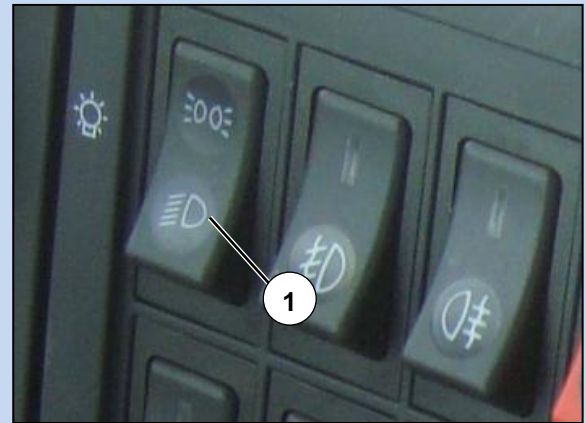
Left combination switch

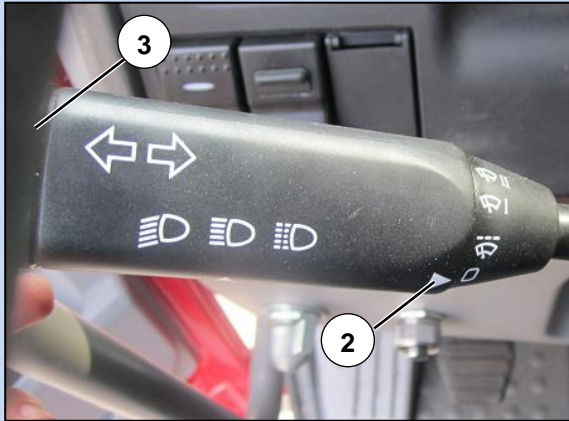
Turn light operation

Turn upwards the left combination switch and the right-turn signal indicator lamp on instrument panel will flash. Turn downwards the left combination switch and the left-turn signal indicator lamp on instrument panel will flash.

Combination switch handle is in the middle position. When the key switch is put in the position of "ON", low beam will be on when the light switch is turned to position 2. At this time, when lifting the combination handle 4°, the low beam and high beam will be on. And this can be used as transient light for overtaking or crossing at night. Release left combination switch, combination switch will return to the 0 position automatically. The high beam will be on when lifting the switch for another 10°. Release left combination switch, combination switch will return to the 0 position automatically.

When overtaking or crossing at daytime is necessary, lift the combination handle 4°, and the high beam will be on. Release left combination switch, combination switch will return to position 0 automatically





Windshield wipe

When handle arrow ② is at the position 0 shown in figure, it indicates “close windshield wiper”, and other positions rightward indicate “intermittent wiping”, “normal wiping” and “quick wiping” righttowards


Windshield washer system

- Press button ③ once in the arrow direction (at most 1 second), windshield washer system will spray washing liquid to windshield and conduct cycle wiping for one time.
- Press button ② once in the arrow direction (over 1 second), windshield washer system will spray washing liquid to windshield and conduct cycle wiping for three times
- Press button ③ in the arrow direction and hold on for a while, windshield washer system will spray washing liquid to windshield and conduct cycle wiping continuously.

Right combination switch

Cruise control

There are 4 positions on the right combined switch: MEM, OFF, SET+/, SET-/, when

cruise is operating, green light  is lit.

Cruise functions

Function activation: Press MEM to open, and SET+ or SET- for increase and decrease

cruise speed adjustment: press SET+ or SET-.

When conditions are met, press SET+ or SET- to set the current vehicle speed as cruise speed.

When you tap SET+ or SET-, you can adjust the speed by an increment of 3km/h a time.

When you press SET+ or SET- without releasing it, the set speed will increase or decrease continuously.





Cruise exit conditions

Exit cruise (set speed not canceled):

Depress the brake, clutch and exhaust brake etc.

Exit cruise (set speed canceled):

Press cruise switch, and the engine will stop running.

Exhaust brake

Push EVB to the right side, and the engine exhaust brake will be activated (precondition: not in neutral, vehicle speed is more than 10km/h and engine speed is over 800rpm).

Key switch

Key switch ① is located on right side of steering column.

- When the key is in the “LOCK” position, the engine will be shut down and the key can be pulled out
- When the key is in the “ACC” position, the vehicle is parked with engine shut off, and power will be supplied for electricity consumers
- When the key is in the “ON” position, the vehicle will be at driving position
- When the key is in the “START” position, the engine starts up





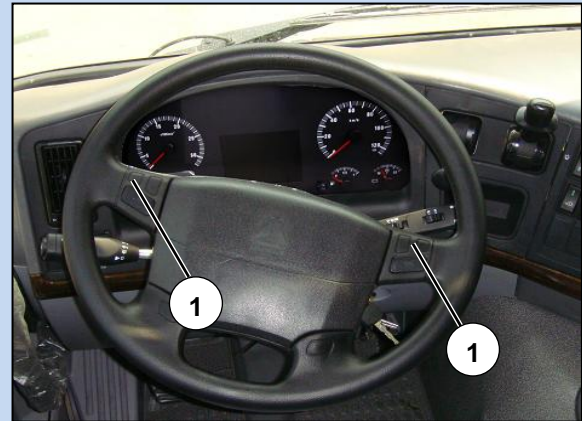
WARNING

- When starting engine, key shall be rotated to “START” position, and after being released, key will return to “ON” position automatically.
- If you try to turn the key to “START” position again to start engine, key must be turned to “LOCK” position first and then to “START” position to start engine.
- Key switch shall not be turned to “LOCK” position while driving; otherwise, key switch will lock the steering wheel, which will make the vehicle unable to turn.
- When you leave vehicle, even though for a short time, key must be taken off from key switch. Otherwise, child or some unknown person may start engine and even drive the vehicle.

Electric horn/air horn

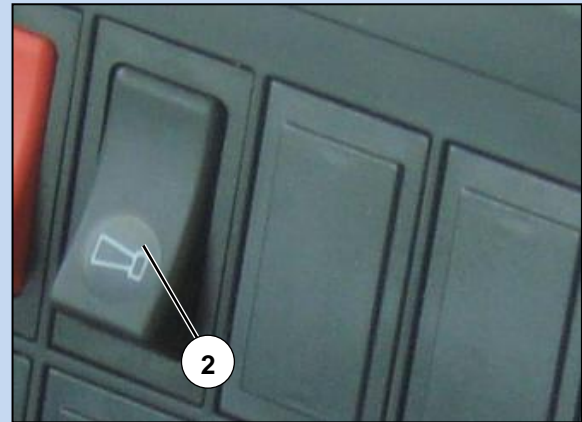
Electric horn

Press horn button ① on the steering wheel, to connect electric horn

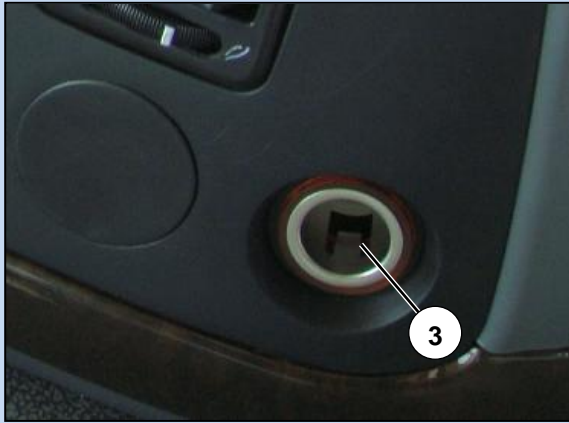


Air horn

Press horn change-over rocker switch ② on instrument panel, and then horn button ① of steering wheel, to connect air horn



24V cigar lighter



24V cigar lighter

Push cigar lighter inwards (③) until locking sound is heard. When resistance wire at cigar lighter head becomes red and hot, cigar lighter will pop up automatically



WARNING

- Cigar lighter socket can only supply power to direct current equipment with maximum power 240W (24V/10A). Otherwise, cigar lighter may be damaged. For other socket, refer to 24V power socket.
- Heated cigar lighter may cause scald, use it carefully.
- If there is a child, cigar lighter shall be removed to avoid scald or fire.
- Your primary task is to pay attention to road vehicles and traffic condition, and ensure cigar lighter is only used when the traffic condition permits.
- Any external inverter device which changes alternating current to direct current will bring unpredictable damage to the electric system. Sinotruk will only provide paid service.



Ash tray

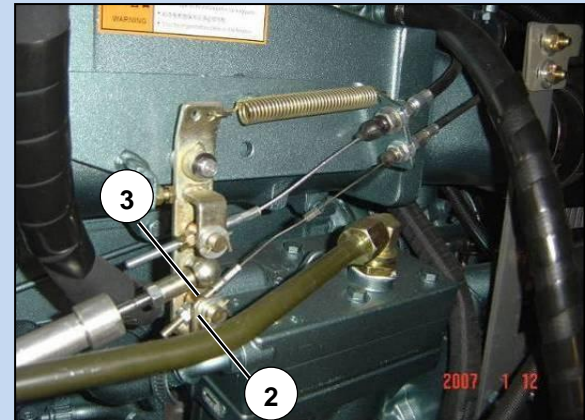
Pull ④ ash tray when you want to use it. Please ensure the butt is stubbed out to avoid fire accident.

Manual accelerator control (Euro II standard)

The Manual accelerator control ① is installed on the switch panel. When engine is started, you can keep the throttle at a certain level by just controlling this manual accelerator without the need to step on the pedal during driving, thereby reducing the feel of driving fatigue.



At idle speed, the nut ② and spacer bush ③ should have a clearance of 0~1mm.





Manual accelerator operation

- When the throttle pedal reaches a position for appropriate engine speed, you can push the manual accelerator in the middle and pull the whole button gently and stop pulling when you feel there is a sudden increase of resistance.
- You can rotate the button top for engine speed fine tuning (counter-clockwise to increase, and clockwise to decrease).
- Please restore the manual accelerator before shifting.

Note:

- At idle speed, please ensure a clearance of 0~1mm between the nut and the spacer bush.
- If the vehicle is stopped for check-up driving, please ensure an engine speed of 2150~2200 r/min for manual accelerator operation.
- Do not use manual accelerator in high speed range to avoid cable break-up.
- Do not use manual accelerator on hills.



WARNING

In case of emergency, restore manual accelerator immediately.

Lighting

Front fog lamp operation

Turn the light switch to position ①

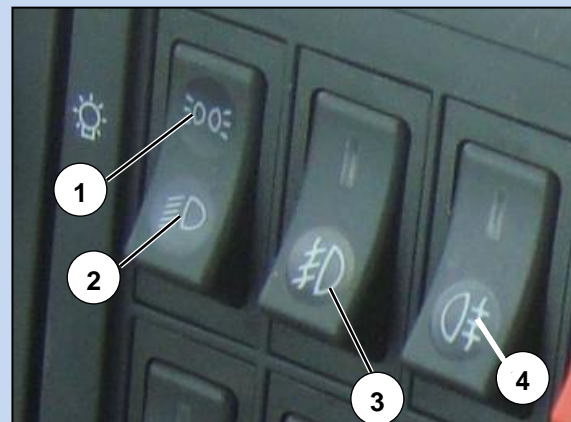
Press front fog switch ③, and the front fog lamp will connect and front fog lamp indicator on the instrument panel will be on

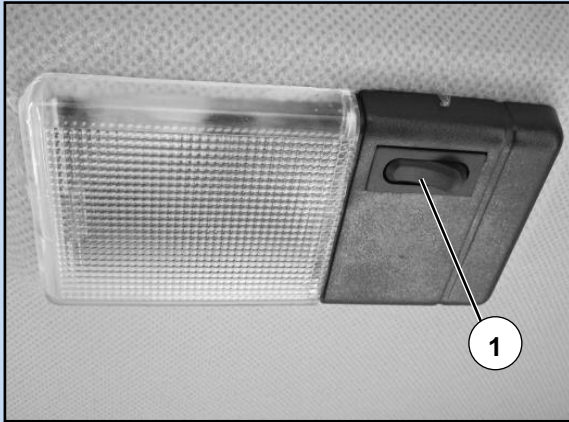
Rear fog lights operation

Turn the light switch to position ②, or connect the front fog lamp

Press rear fog switch ④, and the rear fog lamp will connect and rear fog lamp indicator on the instrument panel will be on.

Notice: The front and rear fog lamp can only be operated after turning on the light switch





Indoor light

Press button ①, and the indoor light will be on



Emergency alarm switch

When emergency alarm switch ② is pressed, all turn lights and turning indicator lamps will flash

MP3 player

Panel function description:

1—Panel frame 2—Front panel 3—Power 4—Clock function H

5—Clock function N 6—Volume rotary knob 7—Mode 8—Play/Pause

9—Fast forward/ Next track 10—Select the radio band

11—Stop 12—Fast reverse/ Prev. track 13—Glass 14—Mute 15—Flip lid

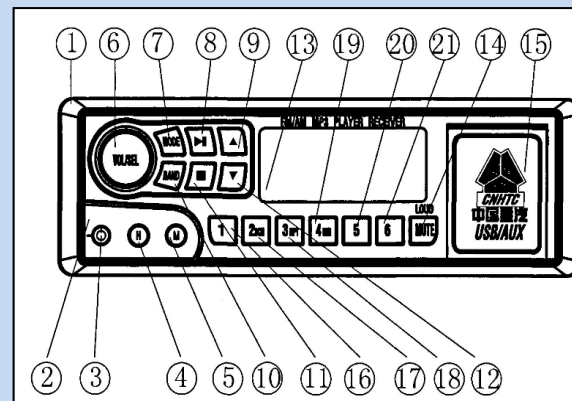
16、17、18、19、20、21—Function button

Audio adjustment:

On & off—Press power button 3 to turn on and off;

Volume—Volume rotary knob 6 can adjust the volume

Notice: Please adjust the volume to the proper level. Do not cause trouble in hearing the traffic information (such as car horns, sirens).



Brake system

Brake system function:

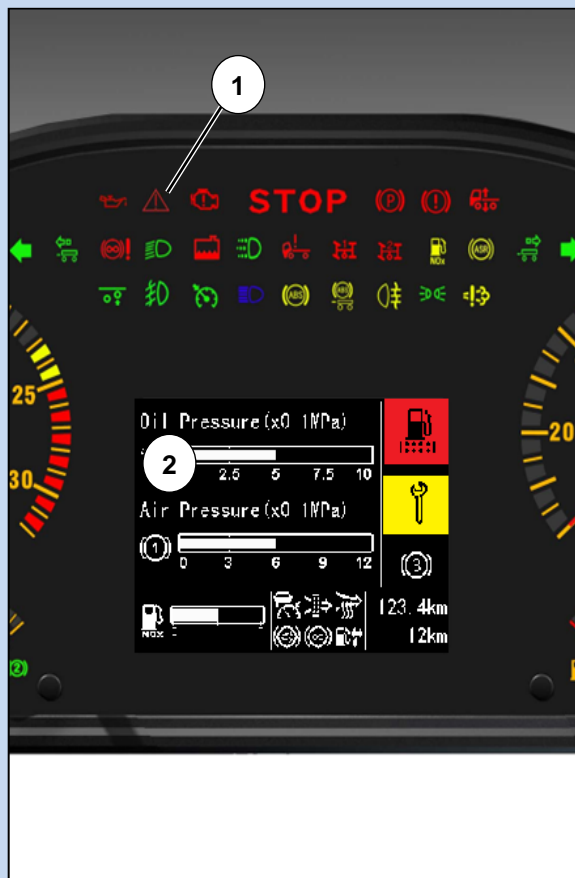
- Service brake
- Parking and emergency brake
- Auxiliary brake (engine exhaust brake etc)
- Trailer brake (apply to tractor)

Service brake is double-circuit air pressure brake, and independent from parking brake control device. Parking brake can make vehicle lock the brake by mechanical device even without driver, and park on certain ramp reliably. Emergency brake and parking brake control devices are interoperable.



WARNING

Brake system can not surpass its own physical limit. Bear this in mind especially when vehicle runs on slippery, wet or poor roads. Adapt your driving to different road conditions and traffic conditions.



Function check of brake system

When key switch is open, functions of brake system will start automatically

Failure display of brake system

When the brake system has a trouble, the driver display screen will show symbol

① of "brake system". Text information will be shown in position ②.



WARNING

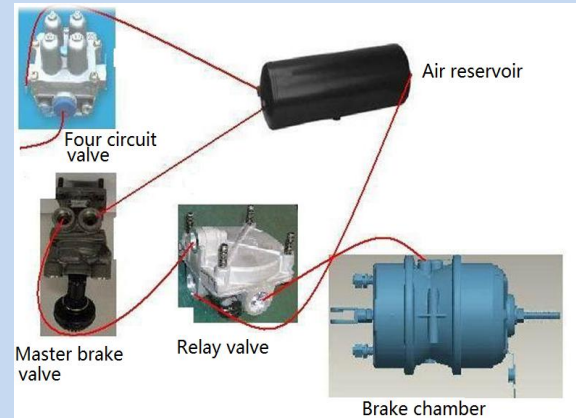
- When the braking system has failure, general braking or emergency braking should be applied to stop the vehicle. And the vehicle should not be started again until the braking failure is solved.
- In case of ABS malfunctions, wheel may be locked when braking, and braking force may get smaller.
- In case of brake system malfunctions, ask SINOTRUK service station for assistance.

Service brake

Pedal operation acts on all wheels by two independent circuits.

Working pressure is 0.75MPa, and cut-out pressure of built-in pressure regulating valve in the dryer is 0.85MPa. The first circuit acts on rear axle (or double rear axle) wheel, the second circuit acts on front axle wheel. Once any air reservoir pressure of the two circuits drops to below 0.55MPa, pressure indicator lamp of air reservoir will be lit. In this case, vehicle shall be stopped immediately and pressure drop cause shall be found out to ensure driving safety.

If full travel brake is conducted for many times in a short time, the pressure may drop to below 0.55MPa





Air pressure display

Position ① on the barometer indicates the air pressure for brake circuit I of rear axle

Position ② on the barometer indicates the air pressure for brake circuit II of front axle

If the pointer is within the red area ③, the air pressure is too low, and pressure alarm light ① or ② will be lit.

If the pointer is within the white area ④ the air pressure is normal.



WARNING

- If air pressure is too low (lower than 0.55MPa), don't drive the vehicle until the alarm lamp is out and warning information disappears.
- After startup, test brake performance (service brake and parking brake) of vehicle on dry road surface with good adhesion!
- Ensure there is no foreign matter in control pedal area.

Parking brake (hand brake)

Parking brake (hand brake) can also be used as emergency brake. Operating hand brake valve handle ① can make spring energy storage brake chamber work, thus activating parking brake. When service braking system has malfunctions such as leakage, operate hand brake valve to activate emergency brake.

Hand brake valve is installed at the rear of shift handle. Only when hand brake valve is operated with brake system pressure higher than 0.55MPa and hand brake signal lamp out, parking brake can be relieved completely and vehicle can be driven away.



WARNING

- **Make sure to use parking brake during parking! When necessary, use wheel block to prevent slide.**
- **Do not drive vehicle before hand brake signal lamp is out!**
- **Make sure to place hand brake valve at brake position before engine is started. Otherwise, when brake pressure rises, original parking brake will relieve!**



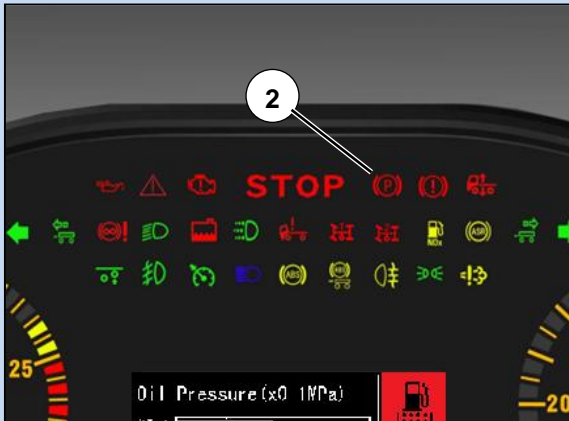
Parking brake (hand brake)

Pull backward the handle ① until it is locked and the parking brake indicator lamp ② will be lit. At this time, parking brake is locked completely.

Partial brake

Pull handle back gradually and maintain it in required position, otherwise, it will bounce back to release position automatically. At this time, parking brake indicator lamp ② on instrument panel will be on

If operation handle of parking brake is not pulled to complete brake position, operation handle may return to release position automatically. At this time, as vehicle is not braked fully, vehicle slide may occur.



Parking brake handle release

Release handle latch, handle will return to release position automatically. At this time, parking brake indicator lamp ② will be out.

Air cylinder pressure shall keep over 0.55MPa at least, ensuring parking brake can be relieved completely. If pressure is lower than the above value, fault display lamp "STOP" on instrument panel will be on.



Auxiliary brake (engine exhaust brake)

When all the following conditions are met, vehicle will achieve exhaust brake.

- Clutch is not depressed.
- Transmission is not in neutral.
- Engine speed is over 800rpm.
- Push EVB switch to the right ① to activate exhaust brake.

Exhaust brake can be used to decelerate the vehicle during crossing and passing on bad roads. Exhaust brake can reduce the frequency of using service brake, thereby reducing the wear and heating of tyre and hub brake for longer service life, lower fuel consumption and better safety.



WARNING

- Be careful, do not use engine exhaust brake on wet, dirty or frozen road, otherwise vehicle may slip and skid!
- Do not use exhaust brake when vehicle drives on a long slope, as transmission neutral position can not provide auxiliary brake.
- The engine speed should not be more than 1900rpm when applying exhaust brake.

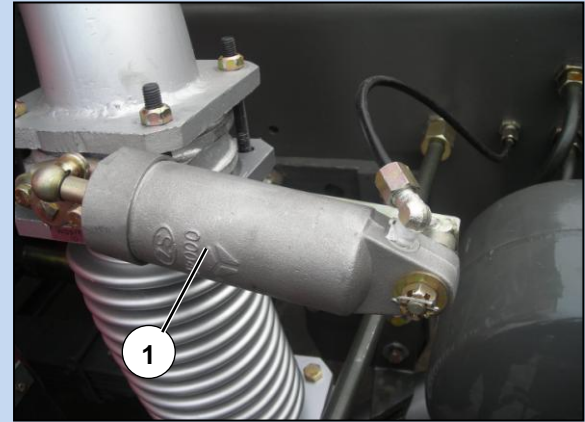
Exhaust brake

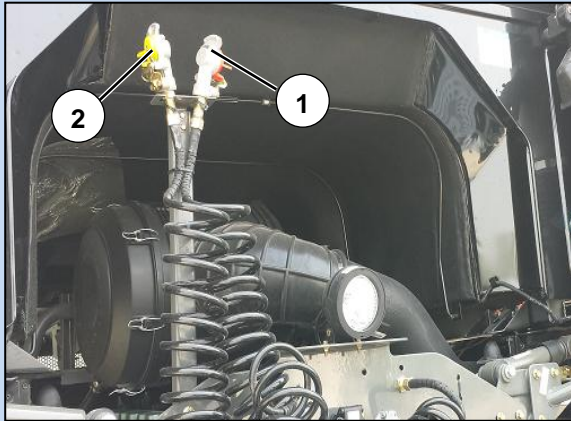
Exhaust brake, based on the traditional exhaust brake butterfly valve ① to further improve the engine brake efficiency. Reasonable use of exhaust brake can increase braking torque generated by diesel engine, keep vehicle decelerating continuously or stabilize vehicle speed, reduce use frequency of service brake, decrease wear of both brake and tire, prolong replacement cycle of brake shoe, and reduce running costs of the whole vehicle.



WARNING

- Exhaust brake is a kind of auxiliary brake device not parking device, and can not substitute for service braking system of vehicle. Thus, if you want to stop vehicle completely, service braking system must be used, that is, footbrake. To meet deceleration demands, auxiliary brake device can be used to make service brake keep cold, thus providing maximum braking force quickly when required.





Trailer brake (applicable to the tractor)

It is brake system on the tractor for controlling the semi-trailer or full-trailer. The air charging connector (red) ① and the brake connector (yellow) ② of the trailer are connected with the corresponding connectors (red-red, yellow-yellow)

Connect the compressed air pipeline

Connect the brake control pipeline connector (yellow)

Connect the trailer air charging pipeline connector (red)



WARNING

- Based on the vehicle loads and road gradients, start the vehicle with the 1st - 4th gear; After starting, immediately test its service brake and parking brake
- When performing such operations, please pay attention to the traffic conditions. To ensure that the vehicle not getting off the direction, please park it safely

Disconnect the compressed air pipeline

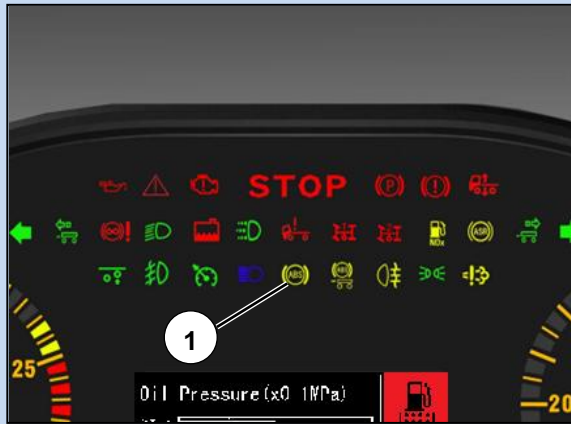
Please separate the trailer connector in the following order; or else, the trailer brake will be released and the trailer will move.

- Apply the parking brake handle to park the tractor
- Engage the parking brake of full/semi trailer (Refer to operating instruction of manufactory)
- Disconnect the charging pipeline hose (red), and the trailer and the semi-trailer brakes will automatically work
- Engage the mechanical brake of full/semi trailer (Refer to operating instruction of manufactory)
- Disconnect brake connector(yellow)



WARNING

- **Start up the vehicle with 1-4 gear according to vehicle load and slope gradient. Test the service brake and parking brake when you have started the vehicle.**
- **Pay attention to the traffic when you do such test.**



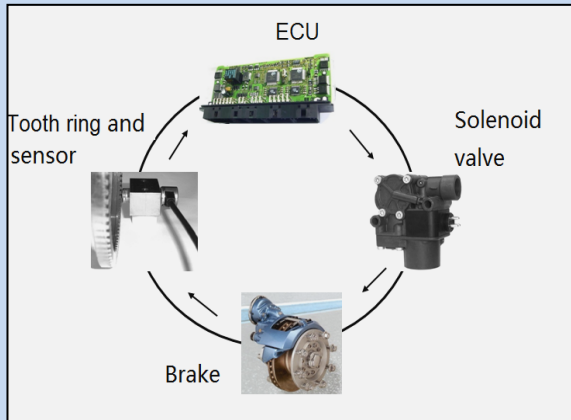
Antilock braking system (ABS)

ABS is abbreviation of “Antilock Braking System”. It can be used to lock the wheel during brake. Even under the emergency brake, the vehicle can keep the steering and direction stability. Regardless the road conditions, the brake pedal shall be fully stepped down to ensure the shortest brake distance



Warning

- ABS can not work at low vehicle speed.
- ABS can't compensate the driving failures (for example the safe distance between vehicle ahead is too short; too high speed, steering without deceleration, etc.)



Check ABS function

When turning on the key switch, ABS will automatically start.

When the ABS detection indicator lamp ① is constantly on, it means ABS has malfunction. Change the display screen to diagnosis model to check the currency fault code.

LCD displays the ABS fault code and fault reason

defective part	SPN	FMI	Fault reason
ABS sensor on the left wheel of front axle	789	1	sensor clearance
	789	2	wrong tyre
	789	3	battery short-circuit
	789	4	short circuit to the earth
	789	5	open circuit
	789	6	short circuit
	789	7	wrong tooth ring
	789	8	sensor loose
	789	9	wrong wiring
	789	10	speed signal lost
	789	11	speed signal abnormal
	789	12	frequency high
ABS sensor on the right wheel of front axle	790	1	sensor clearance
	790	2	wrong tyre
	790	3	battery short-circuit
	790	4	short circuit to the earth
	790	5	open circuit
	790	6	short circuit
	790	7	wrong tooth ring
	790	8	sensor loose
	790	9	wrong wiring
	790	10	speed signal lost
	790	11	speed signal abnormal
	790	12	frequency high

Brake system

defective part	SPN	FMI	Fault reason
ABS sensor on the left wheel of rear axle	791	1	sensor clearance
	791	2	wrong tyre
	791	3	battery short-circuit
	791	4	short circuit to the earth
	791	5	open circuit
	791	6	short circuit
	791	7	wrong tooth ring
	791	8	sensor loose
	791	9	wrong wiring
	791	10	speed signal lost
	791	11	speed signal abnormal
	791	12	frequency high
ABS sensor on the right wheel of rear axle	792	1	sensor clearance
	792	2	wrong tyre
	792	3	battery short-circuit
	792	4	short circuit to the earth
	792	5	open circuit
	792	6	short circuit
	792	7	wrong tooth ring
	792	8	sensor loose
	792	9	wrong wiring
	792	10	speed signal lost
	792	11	speed signal abnormal
	792	12	frequency high

defective part	SPN	FMI	Fault reason
ABS sensor on the left wheel of axle 3	793	1	sensor clearance
	793	2	wrong tyre
	793	3	battery short-circuit
	793	4	short circuit to the earth
	793	5	open circuit
	793	6	short circuit
	793	7	wrong tooth ring
	793	8	sensor loose
	793	9	wrong wiring
	793	10	speed signal lost
	793	11	speed signal abnormal
	793	12	frequency high
ABS sensor on the right wheel of axle 3	794	1	sensor clearance
	794	2	wrong tyre
	794	3	battery short-circuit
	794	4	short circuit to the earth
	794	5	open circuit
	794	6	short circuit
	794	7	wrong tooth ring
	794	8	sensor loose
	794	9	wrong wiring
	794	10	speed signal lost
	794	11	speed signal abnormal
	794	12	frequency high


Brake system

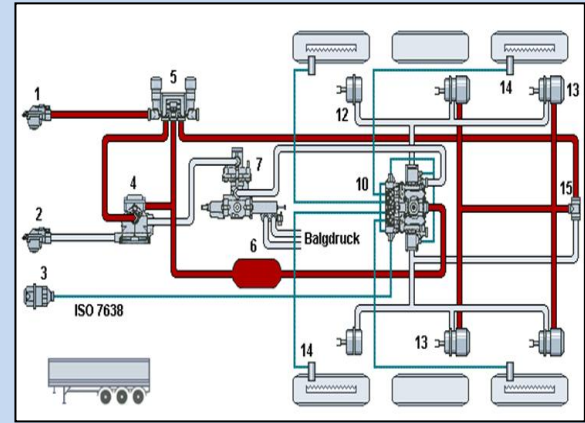
defective part	SPN	FMI	Fault reason
solenoid vale on the left wheel of front axle	795	3	power short circuit
	795	5	open circuit
	795	6	short circuit to the earth
solenoid vale on the wright wheel of front axle	796	3	power short circuit
	796	5	open circuit
	796	6	short circuit to the earth
solenoid vale on the left wheel of rear axle	797	3	power short circuit
	797	5	open circuit
	797	6	short circuit to the earth
solenoid vale on the wright wheel of rear axle	798	3	power short circuit
	798	5	open circuit
	798	6	short circuit to the earth
solenoid vale on the left wheel of axle 3	799	3	power short circuit
	799	5	open circuit
	799	6	short circuit to the earth
solenoid vale on the wright wheel of axle 3	800	3	power short circuit
	800	5	open circuit
	800	6	short circuit to the earth
DBR retarder	801	3	power short circuit
	801	5	open circuit
	801	6	short circuit to the earth
diagonal 1 relay	802	4	diagonal 1 low voltage/open circuit
	802	5	open circuit earth wire 2
	802	7	relay fault of diagonal

When towing the semi-trailer with ABS

When turning on the key switch, ABS will automatically start.

The ECU of the trailer ABS is independent; thus, the power shall be supplied, and the instrument display screen shall be used to warn the trailer ABS malfunction state.

When the trailer ABS has malfunction, the trailer ABS alarm mark  will be displayed on the driver display screen. Refer to the "Information Displayed on the Driver Display Screen and the Detection Lamps Panel" for details.





Daily precautions for the braking system

Charging connector

The charging connector① is located at the air dryer . After the charging hose is connected with charging connector, the tyre can be charged and the vehicle braking system can also be charged through the external air source

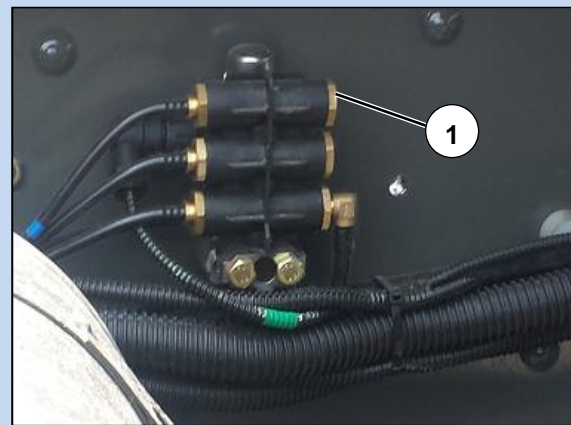
Auxiliary air module

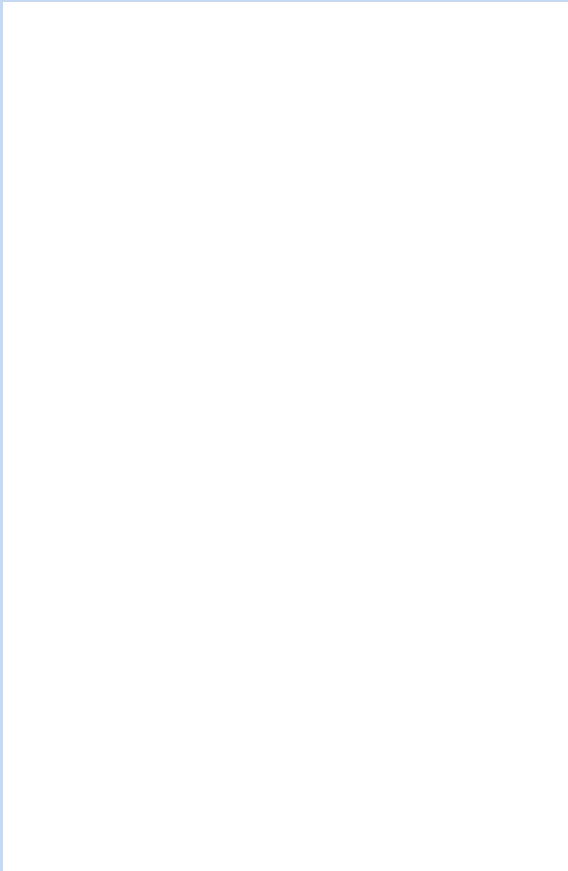
The auxiliary air module is on the frame; the air can be supplied through the quick plug connector ① after releasing the plug.



WARNING

The ferrule-type pipe joint can't be connected here.





Brake pipeline protective measures



WARNING

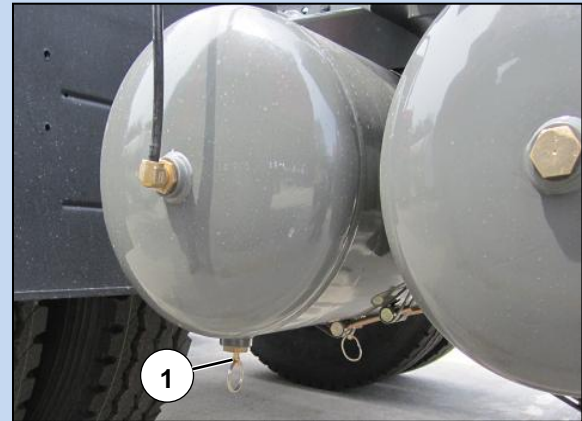
When performing welding, cutting or drilling near plastic brake pipe, the followings shall be observed:

- Exhaust the pipeline firstly.
- Cover the pipeline to avoid damages due to sparks, flames and hot chips

Please check and drain the air reservoir of the braking system

When the vehicle stops, apply the manual water drain valve ① at the bottom of the air reservoir, water in the air reservoir can be completely drained. If oil-water mixtures are found, it means the air dryer has malfunction and the upper drying tank of the air dryer shall be immediately replaced. The upper drying tank of the air dryer shall be replaced once per 2 years at the least.

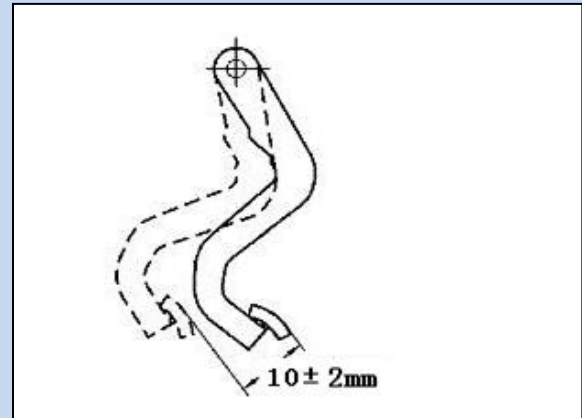
For details of the braking system maintenance, please refer to the braking system in the “Complete Vehicle Maintenance”



Brake pedal route examination

Step slightly on the brake pedal. Check the free stroke. The normal distance should be $13\text{mm} \pm 2\text{mm}$

When you step the brake pedal to the bottom there should no sticky feeling.



A/C system

Control panel

- 1 Display screen
- 2 Air volume adjusting key
- 3 Defrosting
- 4 Intake mode
- 5 OFF
- 6 AUTO
- 7 Air blowing mode
- 8 AC key
- 9 Temperature setting

Display descriptions

- 10 Air volume mark
- 11 Air intake mark
- 12 Air blowing mark
- 13 Temperature setting and environment temperature
- 14 Air blower operation mark
- 15 A/C mark



Innstructions

- Set the required indoor temperature

Press the temperature setting button to set the required indoor temperature. Setting range: “LO”, 18°C--29°C,“HI”. If lower temperature is needed, set the temperature at “LO”. Otherwise the temperature should be set at “HI”.

Tip: The temperature from 22°C to 26°C is proper for common environment.

- **Setting air volume**

Generally, the system automatically adjusts air volume according to the set temperature. The air volume can also be set separately as required.

Tip: there are 9 levels of air volume in total. After pressing the air volume button, the air volume will be adjusted gradually at slow

speed.

- **Function of night vision**

Turn on the lamplet, the signal of the button and other signals will be displayed synchronously

- **Air blowing mode selection**

4 blowing modes can be selected by pressing blowing mode selection button nad defrosting button. Face blowing, foot blowing, foot blowing and defrosting, and defrosting

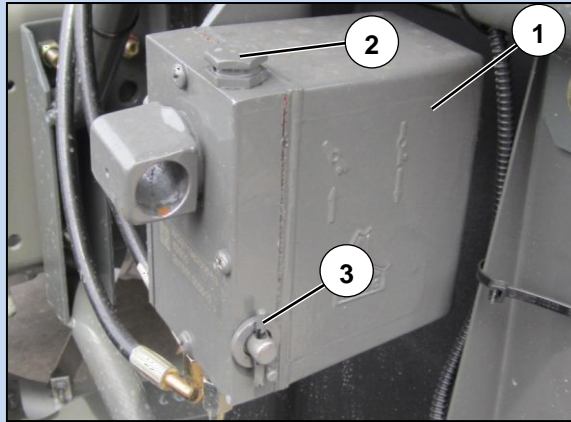
- **Air intake mode selection**

Interior circulation can be applied for a short period under the following conditions:

- Increasing the indoor temperature in a cold weather
- Air quality is poor outside the vehicle because of dust, bad smell, etc.

Notes:

- Please maintain the A/C system regularly.
- Use soft and dry cloth to wipe the surface of the panel, do not use wet cloth or dry and hard object to scratch the surface of the panel, otherwise the panel or the display screen will be damaged.
- Do not touch the display screen with finger, oily or dry and hard objects; otherwise the screen will be damaged with unclear display or incomplete stroke segment.
- If the failure of system is confirmed, please go to Sinotruk service station for professional maintenance



Cab tilting mechanism

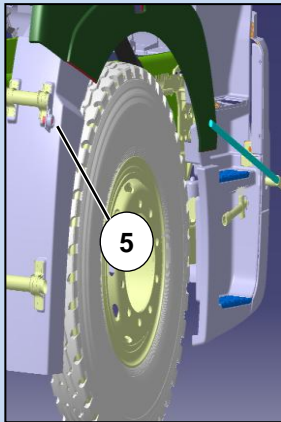
1 Hydraulic handle oil pump 2 Oil plug 3 Change-over valve lever 4. Rocker switch of the cab 5. power lifting switch

Cab tilting operation



WARNING

- The change-over valve lever ③ shall be operated only to turn the cab; it must be always maintained in the position of ↓ in all other conditions like driving or adding oil.
- The tilting area in front of the cab should be free of persons or obstruction!
- During the tilting, No person is allowed to enter between the cab and chassis!
- The cab has to tilt over the top end before initiating the operation after the cab tilting.



4



Preparation before tilting cab

- Park the vehicle on a plane ground, without hindrance to other traffic
- Use parking brake
- Place the shifting lever in the neutral gear
- Shut down the engine
- Prior to tilting, fix or take out the free goods inside the cab
- Make sure the storage box is cleaned up
- Close the door

Cab turnover operation

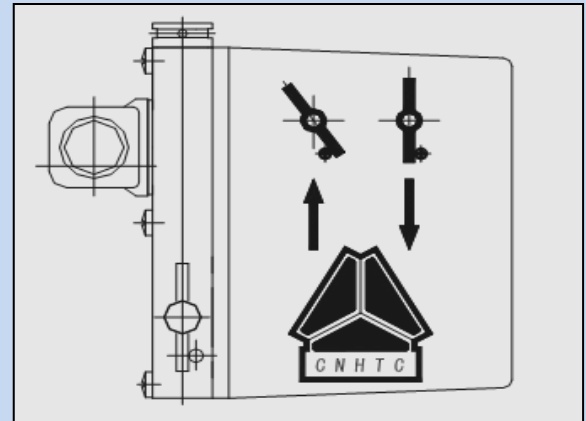
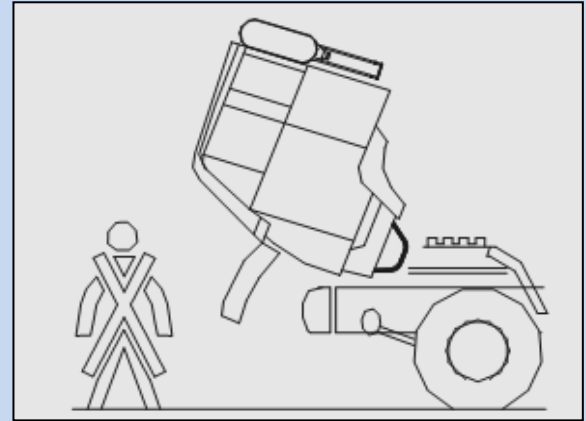
- Prior to tilt the cab, the face cover has to be opened
- Press the rocker switch ④ and close the door.
- No person is allowed to stand near the front of the cab when the cab is tilting !
- Turn change-over valve lever to “↑” and press power lifting switch ⑤ to tilt the cab.
- Turn the change-over valve lever to “↓” and shake the hand pump (or press switch ⑤) to turn back the driving cab.

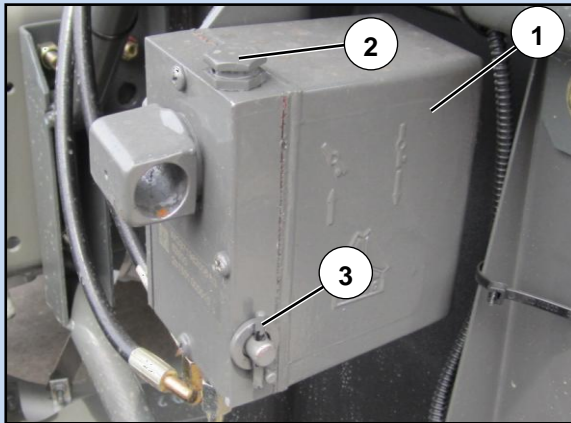


WARNING

As oil cylinder has the characteristic of automatic dropping at fallback end, when lock pin is 40~150mm away from lock hook, cab will drop automatically.

- When cab is dropped down, rubber bellows connected with upper air inlet must fit closely with lower air inlet, to keep dust out.
- Finally, check lock signal lamp on instrument panel, and cab is not locked, lock signal lamp will be on.
- Close the rocker switch ④.





Filling hydraulic oil and exhausting for tilting system



WARNING

Filling oil and tilting system's exhausting should be proceeded after the cab turning back to normal position and being locked.

Hydraulic oil selection: aviation hydraulic oil 10#. Oil amount:900 ml -1050ml.

Check the cleanliness of the hydraulic oil before filling

Filling steps:

- Open the oil plug ② and tanked up with the specified aviation hydraulic oil 10#
- Shake the pump to slowly tilt over the cab while filling the oil.
- Drop the cab and the extra oil spills
- Use oil pump to tilt up the cab, check and refill the oil after the cab falling back to normal position until the tank is fully filled.
- Finally screw up the oil plug

Check the function of tilting system

- Turn the cab over the top dead centre to check the condition of cab falling. If the tilting system functions normally, the cab should fall slowly under the condition of damp without any shock.
- When tilting the cab about 30°, the cab should not fall but remain at that position for 20 mins.

Cab suspension system

Front suspension

Swing arm assembly must be checked for lubricating grease before it is assembled.

After assembly, it also must be checked for tightness of the profile gasket

After the cab is tilted, air spring of the front suspension still has 1~2Kg pressure.

Check the air bag pressure before you restore the cab. Use push rod to adjust the

pressure of the air bag if necessary. After the cab is restored, check the air bag to

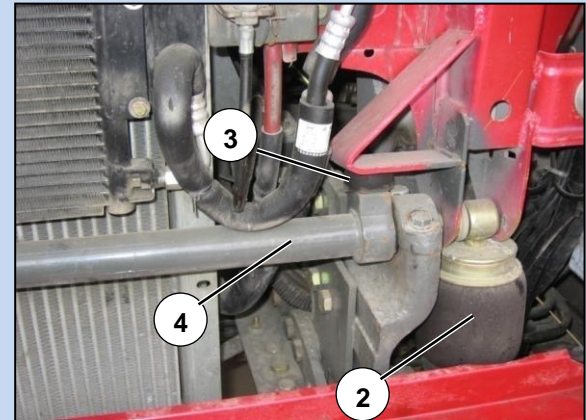
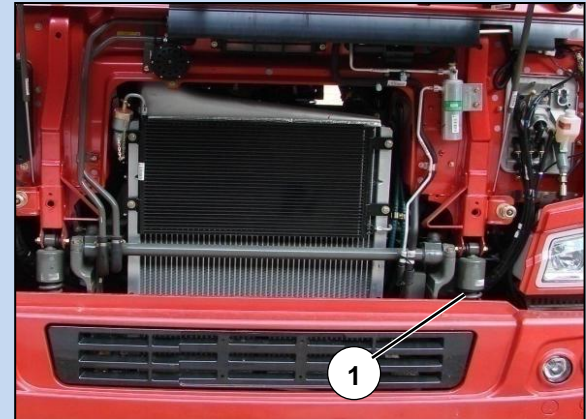
ensure there is no fouling and skewing. Otherwise, tilt the cab again and restore it.

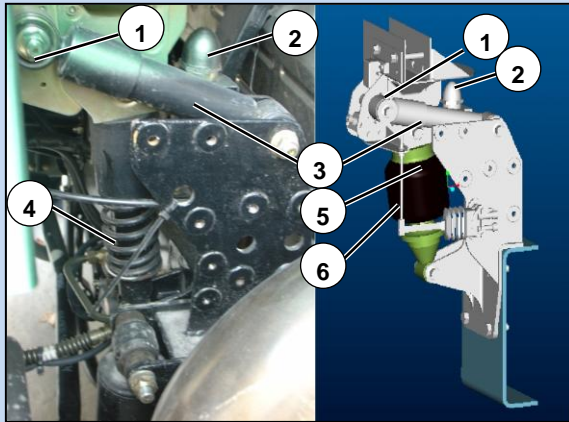
①. Front spiral spring assembly

②. Front suspension air spring assembly

③. Height control valve assembly

④. Swing arm assembly





Rear suspension

①. Hydraulic lock assembly	②. Stop block assembly
③. Roll stabilizers	④. Rear suspension shock absorber (spiral spring)
⑤. Rear suspension shock absorber (air bag)	⑥. adjustment push rod assembly

Hydraulic lock assembly and the matched lock shafts should apply lithium base grease.

The height of the main shock absorbers for left and right rear suspension should be the same. Adjust the nut of propelling rod to keep the length of main shock absorbers for left and right rear suspension 270 ± 2 mm.

Note: if the front and rear suspension are air bag-supported, please keep them clean when using and maintaining them to avoid aging.

Check of suspension system

After the cab being mounted on the frame, carry out the “turnover the cab →turn back the cab” operation:

Check the inflation/ deflation of the airbags of front and rear suspension and the flexibility of turning of front swing arm.

Check the engagement and disengagement of the hydraulic lock, and check the working condition of the locking signal lamp of hydraulic lock (when the hydraulic lock engages, the signal lamp goes out; when the hydraulic lock disengages, the signal lamp is lit)

Extinguisher

Extinguisher is put under the bunk or one side of the driver's seat. Please refer to instructions on the extinguisher body for use and maintenance.



Overvoltage alarm device(special device)

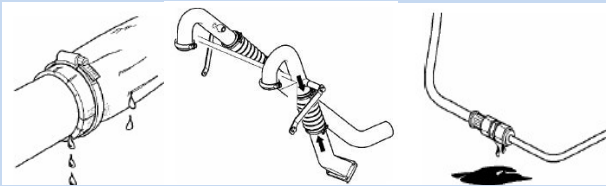
when system voltage is over $30.5 \pm 0.5V$, there will be voice prompt from the device, saying “ motor voltage is too high please lower the motor speed and go to service station for repair. When system voltage is over $31.5 \pm 0.5V$, voice prompt will be: “motor voltage is extremely high, please cut off motor wiring connection and go to the service station for repair.”



Chapter II Driving Preparation

Inspection and maintenance overview

Please develop the habit of check the diesel engine before it is started and after it is shut down. it can help find in time if there is air inside, and fuel, coolant leakage or other abnormal conditions.



The following aspects shall be inspected before engine startup:

Every day:

- Engine: Engine oil level
- Cooling system: Coolant level
- Light and signal systems: Function (refer to relevant contents in Chapter I)
- Seat safety belt: Condition and function (refer to relevant contents in Chapter I)
- Cab turnover system: Condition (refer to relevant contents in Chapter I)
- Fuel: fuel level.
- Urea: amount of remaining urea (Euro IV and V models, see related content in Chapter I)
- Traction device, saddle: Function, connecting line and cable (refer to relevant contents in Chapter III))
- Extinguisher and basic hand tools

Every week:

- Tire: air pressure and condition
- Wheel nut: Whether it fits tightly¹⁾²⁾
- Windshield washer: Cleaning liquid level, winter adaptability, function
- Observe appearance to ensure there is no leakage: Engine, transmission, transfer case, drive axle, steering mechanism, heater, and hydraulic turnover system
- Fuel oil primary filter: Driange1) (refer to relevant contents in Chapter IV)
- Transmission: Lubricating oil level

Every month:

- Power steering system: Liquid level
- Cluth storage tank: liquid level
- V-belt and multi wedge belt: Condition

Every six months

- Cab turnover mechanism: Oil level
- Battery: Electrolyte liquid level
- Hydraulic system of dumper (or other hydraulic devices): liquid level

Note: If vehicle is installed with special equipment; it is possible that required inspection item is not listed in the table.

Note:

¹⁾: Inspection frequency can be increased properly according to local climate, use and driving conditions.

²⁾: New vehicle shall be inspected every day

Inspections after engine startup

Every day:

- Engine: Engine oil pressure
- Brake system: Function is normal and effective
- Air suspension system: Whether the vehicle is inclined
- Steering: Whether operation is normal

Every week:

- Air suspension system: Check compressed air bag

Every month:

- Air dryer: Function 1¹⁾

Note: If vehicle is installed with special equipment; it is possible that required inspection item is not listed in the table. ◦

Note:

¹⁾: Inspection frequency can be increased properly according to local climate, use and driving conditions.

Inspection and maintenance before engine startup

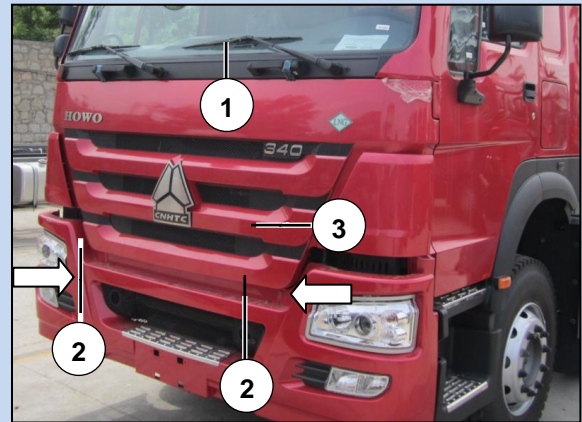
Open front face shield



Note:

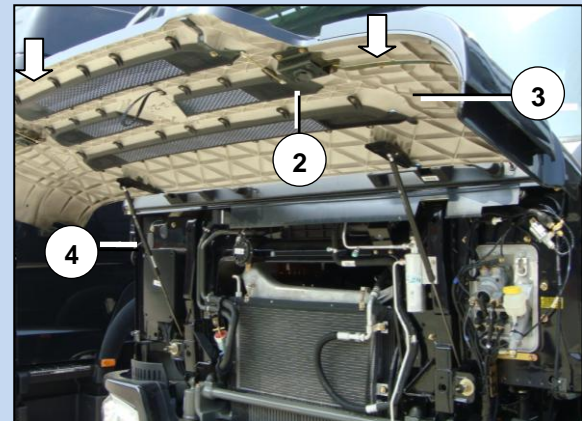
Before opening the radiator grille, keep the windshield wiper ① at returning state.

- Open the locking devices ② at both sides of radiator grille along the indicated direction,
- Lift front face shield ③, two pneumatic springs ④ will help to open front face shield and fix it at the final position.

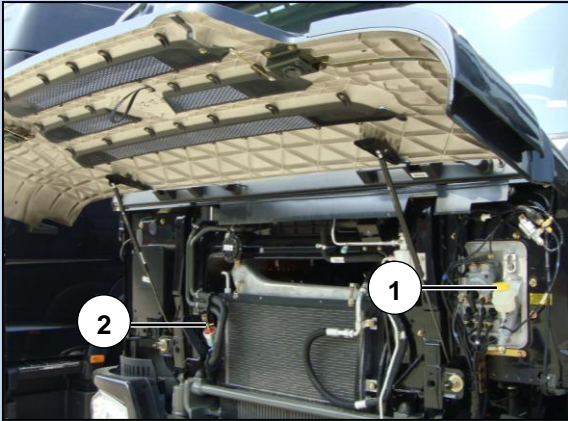


Close front face shield

- Pull front face shield ③ down along both sides of front face shield to close it.
- Gently close the radiator grille ③ so as to hear the locking sound of locking devices ②



Inspection and maintenance before engine startup



Inspection and maintenance points:

After front face shield is opened, the following inspection and maintenance parts can be seen:

- ① Clutch hydraulic oil tank
- ② Oil filler

Inspection and maintenance before engine startup

Inspection and maintenance before engine startup



WARNING

Please inspect and clean the site thoroughly before inspection and maintenance!

Before engine startup, daily checks:

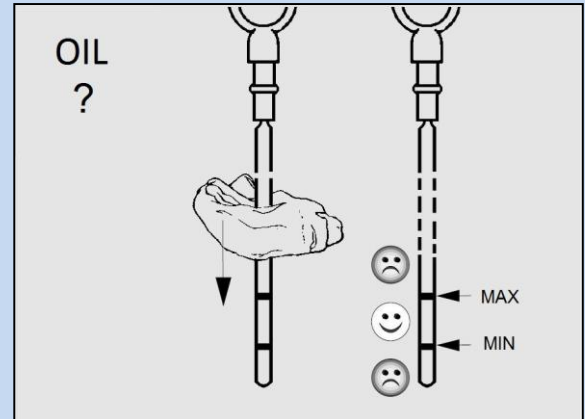
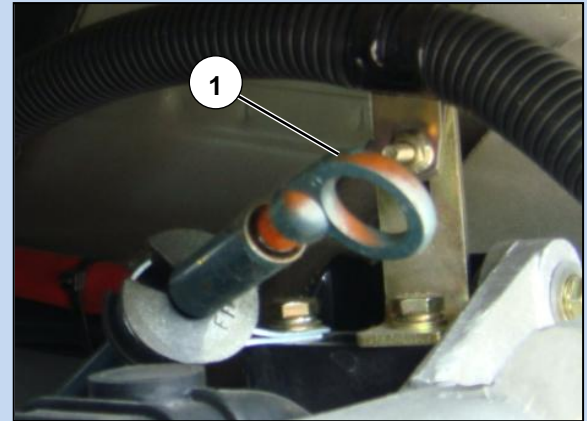
Engine oil level

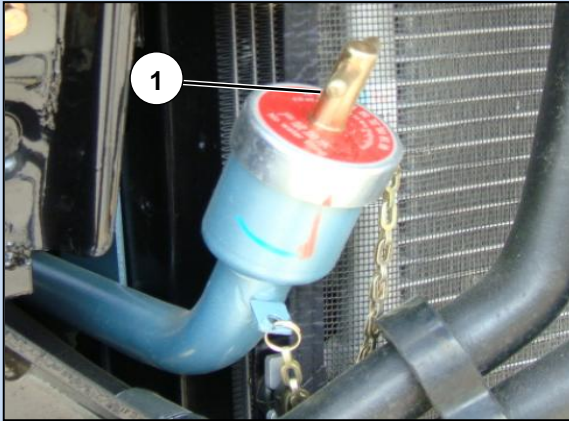
- Park vehicle on a level road, close diesel engine, and then check engine oil level 20min later.
- Pull oil level gauge ① out, wipe oil level gauge with clean lint-free cloth, insert oil level gauge into pipe and then pull it out again, engine oil level shall be between maximum and minimum markers of oil level gauge, and not lower than minimum scale. Perform many inspections to confirm whether engine oil level is too low, if so, fill engine oil.



WARNING

Do not fill engine oil to exceed the maximum scale. Excessive engine oil may damage diesel engine!





Fill engine oil

- Turn off key switch



WARNING

- Be careful not to damage engine!
- Only engine oil certified by SINOTRUK can be used.
- Do not fill excessive engine oil!

- Open the front face cover
- Unscrew filler cap ①
- Fill engine oil.
- Tighten filler cap ①.

Inspection and maintenance before engine startup

Cooling system (daily inspections)

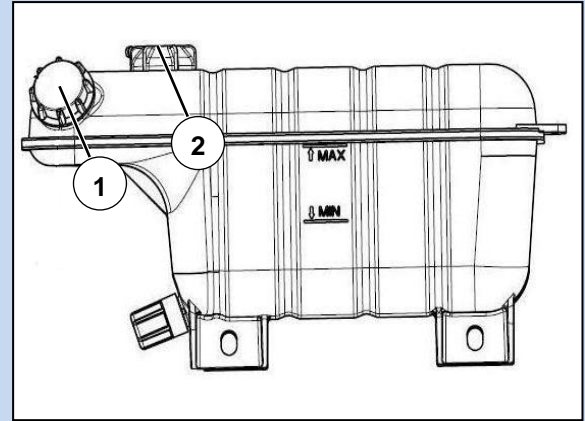
- Vehicle must be parked on level ground when cab is tilted. (For vehicles whose expansion tank is installed on the back, there is no need of turning over the cab when checking the coolant level and replacement of it.)
- Observe the level of expansion water tank and the coolant level shall be between the MAX and MIN.

Fill coolant

① Filler cap ② relief valve cap

- Open expansion tank cover ①, and release cooling system pressure. Turn counterclockwise expansion tank cover for half a round, and then take down the expansion tank cover
- Turn the warm air temperature-regulating button to maximum air volume
- Fill coolant to MAX
- Close expansion tank cover and tighten it
- Keep engine operate for a certain time
- Check coolant level, and fill coolant when necessary.

Note: The relief valve can keep certain pressure inside the cooling system relative to atmosphere to increase boiling point of coolant; otherwise, damage will be caused to the water pump. It is especially important at plateau.





Cooling system adopts closed forced water cooling system and long life coolant.



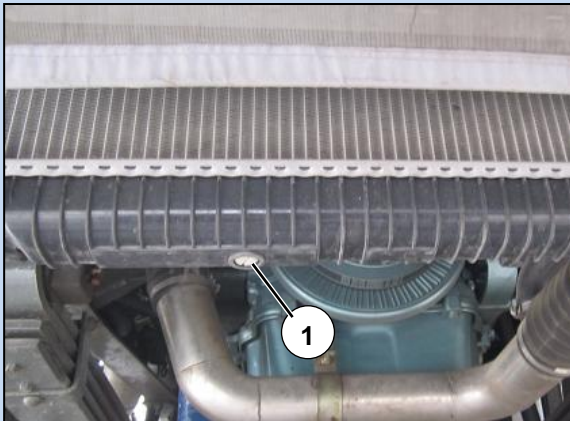
WARNING

- As coolant is poisonous, be careful not to take it into the body during use, storage and preparation!
- Do not open expansion tank cover immediately after engine stops running in case personnel are burnt by internal hot pressure gas
- While using the vehicle, in case the coolant reduces significantly, causing the entire system to overheat, at this point do not fill up coolant directly as the sudden changes in the coolant temperature may damage the engine

Even in areas where there is no requirement of anti-freezing (temperature is above freezing point perennially), do not use water to replace coolant.

Drain coolant

Unscrew drain plug at radiator ① to empty coolant of the complete vehicle; refer to "engine maintenance" for engine coolant emptying



Inspection and maintenance before engine startup

Fuel (daily inspections)



WARNING

- As fuel oil is flammable, caution fire and explosion !
- Shut down the engine and auxiliary heating device, before filling fuel
- When filling, 5% expansion space shall be reserved to prevent fuel overflow due to expansion.
- Check fuel quantity through fuel gauge, if indication is incorrect, check fuel gauge and sensor.


Check fuel quantity in fuel tank

- Turn on the key switch
- Check fuel quantity on fuel gauge ; if needed, fill fuel

Note:

Fuel in the fuel tank shall not be used up. Otherwise, it is needed to exhaust the air inside fuel system. Before the winter starts, check freezing resistance of fuel. Use proper octane grade diesel according to environment temperature. Please use diesel that satisfies relevant emission standard.






Inspect performance and condition of vehicle lamp and signal system (daily inspections)

- Check surface of each vehicle lamp.
- Check bulb, switch and control lamp.

Fire Extinguisher

Check the extinguisher to ensure normal conditions. Fill fire extinguishing agent or replace it with a new one every time after it is used

Basic hand tools



Check whether basic hand tools are prepared, such as jack, wheel wrench, wheel block and tire inflation hose

Before engine startup, inspection the following items every week:

Tire pressure and condition

Check (tire cold state)

- Check all tires (including spare tire), their air pressure shall be normal.
- Check the appearance, tire wear and tread depth of all tires (inspect according to the specified conditions).
- Find foreign matter inserted in tread or between tire and tire.
- Check whether external surface of tire is damaged.

Wheel nut

Check whether nuts are connected firmly.

- Retighten all wheel nuts according to the specified tightening torque.



WARNING

- Vehicle speed, safety and maneuverability, and tire service life depend on whether tire pressure conforms to relevant regulations.
- Insufficient tire inflation pressure will reduce driving safety and tire life. If tire pressure decreases continuously, check whether there is foreign matter in tire. In addition, check whether wheel hub and valve are tight.
- If tire gets hot after vehicle drives at certain speed, tire pressure will rise by 1bar. In this case, tire deflation is prohibited. Tire inflation pressure will change with air temperature, about 0.2bar every 10°C. Special attention shall be paid when checking tire indoor in winter.



Windshield washer system/wiper system

Windshield shall be cleaned weekly or more frequently according to climate

- Open the door on the driver's side
- Unscrew the cover ①
- Check the liquid level in reservoir.
- Fill cleaning liquid if necessary

Note: Fill the windshield detergent which is methanol (or isopropanol, glycol)

water solution of 50% volume ratio before the winter comes.

- Screw on the cover ①
- Check the function of windshield washer system/wiper system

Inspection and maintenance before engine startup

Check transmission weekly

Check oil level (HW transmission)

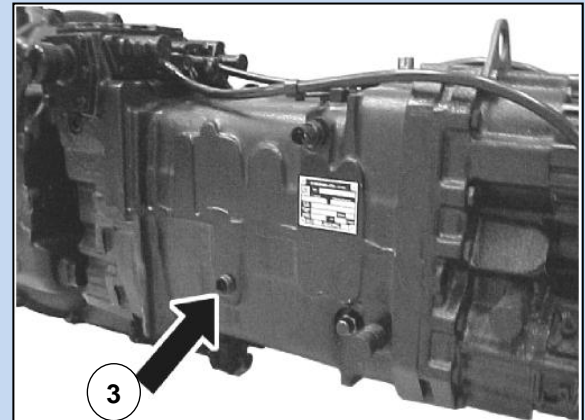
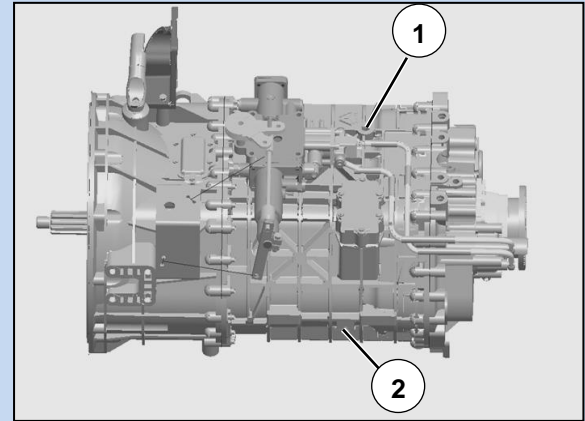
- Park the vehicle on a level road.
- When oil level stabilizes and oil temperature is close to normal temperature, unscrew plug ② at oil level observation port
- If oil level is lower than observation port position, add GL-5 85W-90 heavy-duty vehicle gear oil
- Unscrew plug ① at filler, and fill gearoil until it overflows from the observation port ②
- Tighten plug ① and ②

Check oil level (ZF transmission)

- Park the vehicle on a level road
- Do not check the oil level after a long distance driving because it may lead to inaccurate measurement. Oil check must be made when oil has cooled down (<40°C.)
- Unscrew plug to check oil level
- If oil level is lower than the filler edge, fill oil immediately.

Check whether engine, transmission, transfer case, drive axle, steering mechanism, heater and hydraulic turnover system are free from leakage.

When necessary, conduct inspection and repair at SINOTRUK service station





The following items shall be inspected monthly before engine startup:



WARNING

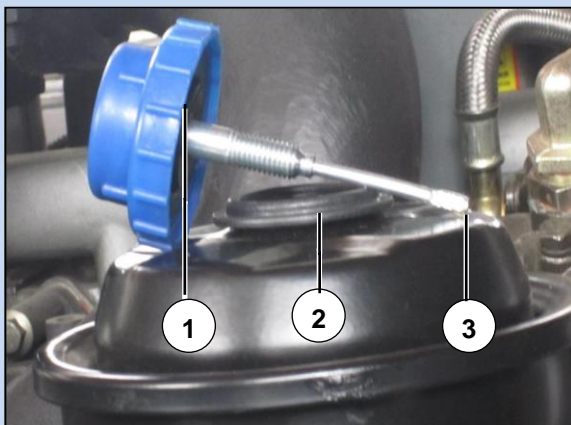
If hydraulic oil decreases due to leakage, hydraulic power steering system may not work. In this case, vehicle steering is very heavy. At this moment, slowly drive the vehicle to the nearest SINOTRUK service station for check and repair.

Liquid level inspection

- Park the vehicle on a level road, and turn cab over
- Pull oil gauge ① out and check liquid level.
- When the engine stops running, the oil level shall be above the mark at dipstick scale ③.

If liquid level is too low, fill ATF III automatic steering oil through filler ②.

When filling oil, start the engine and keep it running stably at a low speed; as adding new oil to the oil tank, repeatedly turn the steering wheel lock-to-lock from until no air appears inside return oil. Shut the engine out, fill oil storage tank with oil to the required level and then screw up the cover.



Inspection and maintenance before engine startup

Hydraulic power clutch (monthly)

Check brake fluid level of clutch oil storage tank

- Park the vehicle on level road
- Open the radiator grille
- Check liquid level in clutch oil storage tank ①.

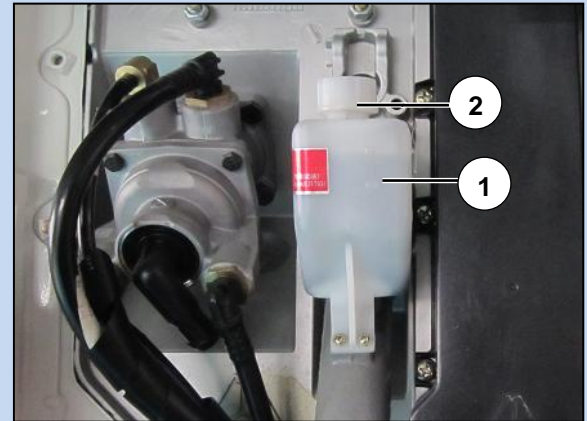
Note: Clutch brake fluid level in oil tank shall be between MIN and MAX scale.

- If necessary, unscrew cover ② and fill DOT3 /DOT4 brake fluid.
- Screw the cover ②



WARNING

If oil in the tank reduces to below MIN scale, transmission will stop working, thus causing serious accident.





The following items shall be checked once every six months before engine startup

Battery

(In tropical areas, check them monthly).



WARNING

- Caution hurt, explosion and short circuit danger!
- Comply with safety notices for battery treatment, refer to “safety instructions” in chapter VI.
- No smoking, open fire and spark are allowed nearby battery, and metal object cannot be placed on battery.

Check electrolyte level. (The maintenance-free battery is not required)

- Take battery box cover down.
- Check whether connecting clamp between battery electrode pile and conductor is loose.
- Check electrolyte liquid level.

The electrolyte liquid level of each battery shall be 10~15mm higher than separator upper edge, or flush with Max marker on side plate. If electrolyte liquid level is lower than Min marker, distilled water must be filled.

Inspections after engine startup

Inspections after engine startup

Pressure of engine oil (daily inspections)



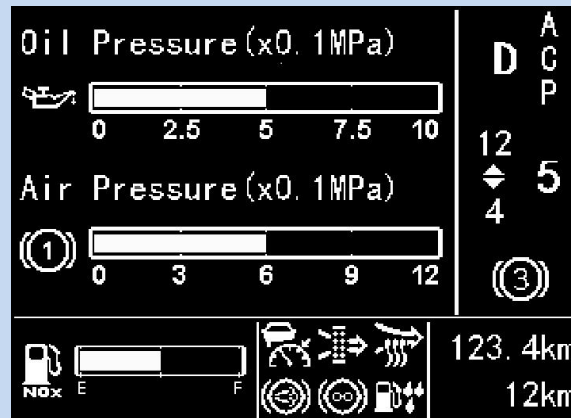
WARNING

- Be careful not to damage engine!
- If driver display screen indicates “engine oil pressure alarm” ①, immediately stop the vehicle and turn off engine. Find out the reason, check engine oil quantity, and fill or drain appropriate amount of engine oil to keep engine oil level at a suitable level when necessary.

During engine startup, none of the following indications is allowed to appear on driver display screen: “STOP” symbol, “engine oil pressure alarm”.

Troubleshooting

Check engine oil level, and fill appropriate amount of engine oil when necessary.





Brake system (daily inspections)

Before vehicle starts, check whether service brake system and parking brake system work normally.



Warning

- Vehicle can only start when alarm information (“STOP”) on driver display screen disappears.
- Pay attention to hear whether air dryer (pressure regulating valve) makes exhaust sound

After engine startup, hand brake handle can only be released for preparing start when system air pressure is over 0.55MPa (5.5bar), alarm lamp is out and alarm buzzer stops pealing. Before air pressure indicated on air pressure gauge reaches 0.7MPa (7bar), vehicle does not meet requirements for driving completely, and only after air pressure indicated on air pressure gauge reaches 0.7MPa (7bar), brake can achieve the stipulated brake performance.

Check brake function and efficiency

- Open key switch, air pressure gauge pointer is not in red area
- If necessary, start engine, inflate brake system until unloading pressure of air dryer is reached.



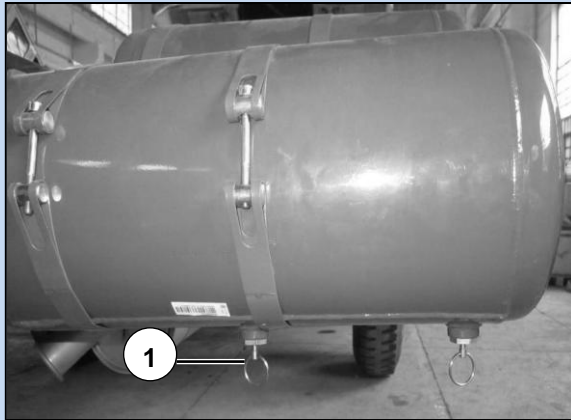
Inspections after engine startup

Steering system (daily inspections)

Check steering clearance

- Start engine and keep it idle
- Turn front wheel to straight travel position, and then turn steering wheel to the left and right in turns. The steering wheel angle required for making front wheel rotate in left and right direction shall not exceed 7.5° respectively. If steering clearance is too big, immediately check steering system and steering rod, and repair at SINOTRUK service station when necessary.





The following items shall be checked every month after engine startup:

Air dryer

Check whether air dryer works normally and effectively every month (or more frequently according to local climate condition, use and driving conditions). Air dryer can be checked by opening water drain valve of air reservoir.



WARNING

- In winter, invalid air dryer will cause brake system to freeze, thus failing.
- Pay attention to protect eyes and hands when operating water drain valve

Test:

During test, brake system must have sufficient air pressure

Pull string ring laterally ①

Chapter III Vehicle Driving

Driving/running-in

Driving/running-in

In the initial stage of driving, pay attention to the running-in of engine and other assemblies, it is very important to vehicle durability, reliability and economy.



WARNING

- After new vehicle and vehicle whose wheels are replaced drive for about 50km, wheel nuts shall be tightened according to torque requirements.
- In initial stage, wheel nut shall be tightened with the same torque until it is fastened.

So, we suggest you comply with the following specifications:

Before the first 2000km

- As vehicle is in run-in period, be careful to drive.
- Vehicle during run-in period shall drive on the flat road.
- Do not drive new vehicle under full load at high speed. Pay attention to observing indicator lamps and alarm lamps!
- Keep always an eye to temperature of the transmission, front and

rear axles, hubs and brake discs; find out causes, adjust or repair immediately in case of overheating.

- Do not draw trailer

Over 2000km of driving

- Vehicle speed can increase gradually to maximum speed or maximum speed allowed for engine. If certain mechanical assembly is updated or overhauled, be careful to drive.

Economical use of vehicle

Optimize working conditions of vehicle

– Maintain vehicle at SINOTRUK service station regularly

Only vehicle with good condition (for example, air filter is clean, and fuel injection system is adjusted correctly) can obtain the best fuel consumption indicator.

– Correct tire air pressure

If tire air pressure is 1bar lower than normal value; oil consumption will increase by 5%. Such additional consumption is caused by increase of tire deformability, which makes driving energy convert into thermal energy, and will reduce tire life.

Economical driving

– Start engine

Do not step on the accelerator pedal when starting the engine, because at such moment, the electronic diesel engine control device (EDC) can adjust amount of fuel injected according to various factors such as engine temperature. This can avoid unnecessary large fuel injection quantity, thus reducing smoke exhaust rate.

– Warm engine up

Under low load, engine temperature rise is very slow at idle speed, thus do not operate engine (to make engine temperature increase) when vehicle is in stationary state but warm engine up under medium load. This is the most effective way to make engine, transmission and drive axle reach respective operating temperature. As it is unnecessary to wait engine to be warmed up before vehicle driving, thus saving time.

– Cab heating

Vehicle engine is used to drive engine, so the heat source when engine is at idle is not the best! Auxiliary heater only consumes 1/4 to 1/3 of fuel oil quantity when vehicle engine is at idle. In addition, this will reduce vibration, noise and exhaust emission.

– Shutdown condition

If vehicle is in stationary state for quite some time, engine shall be shut down.

– Engine shutdown (Do not shut down the engine immediately after stopping)

Do not accelerate before the engine stops. The acceleration of engine will increase fuel consumption.

Economical use of vehicle

Economic running method

--low speed and big load

Turbocharged diesel engine has a economical working range of 50-70% of its rated engine speed and 80% of its maximum load. Therefore, try your best to keep the engine speed within the green area of the tachometer so that engine can run under big load.

Apply high engine speed for big power if necessary

When big power is needed in road conditions such as uphill, overtaking, expressway entry on uphill, please use the biggest power possible generated by rated engine speed.

Use tachometer

For economical driving of the vehicle, engine tachometer is a very important parameter for accurate judgement of the engine speed.

Shifting

- **Appropriate shifting timing**

Shift to low speed gear before driving uphill, so that you can obtain big enough engine speed to drive on the upslope to avoid repeated shifting

- **Do not random shift and reasonably use engine torque**

Because tractive force will be cut off during each shifting, there will be loss of time and speed, and increase of fuel consumption and accelerate clutch and synchronizer wear.

- **Gear skipping allowed if possible**

During shifting to high speed gear or low speed gear, it is allowed to skip gears.

- **Choose high speed gear for starting**

On flat road, vehicle under full load can be driven away with high speed gear. For example one can use the third or fourth gear to drive away the vehicle without the need of further shifting afterwards until the clutch is fully engaged, for the reduction of clutch wear.

- **Synchronized transmission: no need to disengage the clutch twice or cut off the accelerator**

For transmissions with synchronizer, there is no need to disengage the clutch twice or cut off the accelerator. This means quicker shifting and less time for tractive force cut-off and lower fuel consumption.

Ideal running method

- **Drive smoothly**

Keep driving smoothly and has no obvious acceleration or deceleration, high average speed and low oil consumption. For example, listen to traffic announcement issued by radio broadcast, to avoid road with traffic congestion.

- **Keep safe distance**

Keep enough distance from the front vehicle to ensure safe driving, and driver will have the chance to adapt to the changing traffic condition.

- **Make the best use of vehicle inertia**

Truck has great inertia. Once vehicle has great inertia, even if there is no driving force, vehicle will decelerate slowly and can climb or slide on flat road by inertia.

In case traffic condition permits and highway is flat, accelerator pedal can be released at 800m distance from highway exit, and the lost time is very short.

Before vehicle gets to the ramp bottom, release brake pedal when appropriate and make vehicle obtain momentum (if traffic condition and traffic management ordinance permits). In this way, vehicle will not require accelerate to obtain required momentum, and avoid additional fuel consumption.

- **Avoid unnecessary parking and brake**

Slow and smooth driving, not parking (such as at traffic signal lam) will reduce fuel consumption. Because this can avoid vehicle starting from

stationary state, and reduce drive system mechanisms wear.

For example, it consumes about 0.5L fuel to accelerate from 0km/h to 60km/h for a 40ton tractor trailer.

- **Use cruise control reasonably**

If cruise control is used reasonably, driving will become more comfortable.

However, cruise control can not predict traffic condition during vehicle speed management. Thus, misuse of cruise control will increase unnecessary fuel consumption. This is similar to the case that driver does not predict road condition ahead of time.

- **Close cruise control before vehicle gets to ramp top**

As cruise control can not detect ramp length, so vehicle will continue driving under full load condition until vehicle speed reaches its set value. After that, as vehicle speed increases during downhill, vehicle must be braking immediately. Therefore, closing cruise control before vehicle gets to ramp top can make vehicle drive through ramp top in sliding state, and the required fuel injection quantity is very little. After vehicle drives through ramp top, vehicle brake will be decreased or not required.

- **Close cruise control when appropriate**

When driver realizes that vehicle will be decelerated, for example, before highway exit or there are many blocked vehicles in front, he shall close cruise control. As cruise control can not distinguish that vehicle will decelerate, vehicle will drive at set speed until clutch or braking device is used. If driver closes cruise control device before he realizes that vehicle will decelerate, vehicle will slide over obstacles or curve without fuel consumption. After that, vehicle brake will be decreased or not required.

Tachograph

Use the Tachographs to record the vehicle relevant information

Main Technical Parameters:

Max. speed range: 125km/h

Effective pulse range: 4000-25000imp/km

Main Functions:

MTCO1324 tachograph can record the time of driving, rest, preparation, working, and different operation conditions, etc.

The fault code can also be stored by tachograph.

Vehicle speed will be recorded in ROM as system parameters after its signal has been processed by CMOS chip.

Operation and Display

•Contents on the panel include:

Communication interface: located at left and upper of panel, and used to connect standardization device.

Display: Data, time, millage, driver's information, initial configuration, fault code etc.



- Button +, -: used to adjust time, date, page up and page down.
 - Button ^ : to open paper tray.
 - Paper tray is under panel and includes two layers: the upper layer is used to place recorder paper for first driver, the lower layer is for the second driver.
 - The nameplate is pasted in paper tray.
- User mode or servicing mode can be performed by operating the buttons on panel: press the button M shortly to enter user mode; press M after engine is started to enter service mode.

Tachograph

Press 'menu' button, the screen will show the average speed within 15 mins before parking, press upward and downward, you can check successively:

1. Real Time and Speed 2. Average Speed Within 15 Mins Before Parking

3. Fatigue Driving Record 4. Driver'S Code

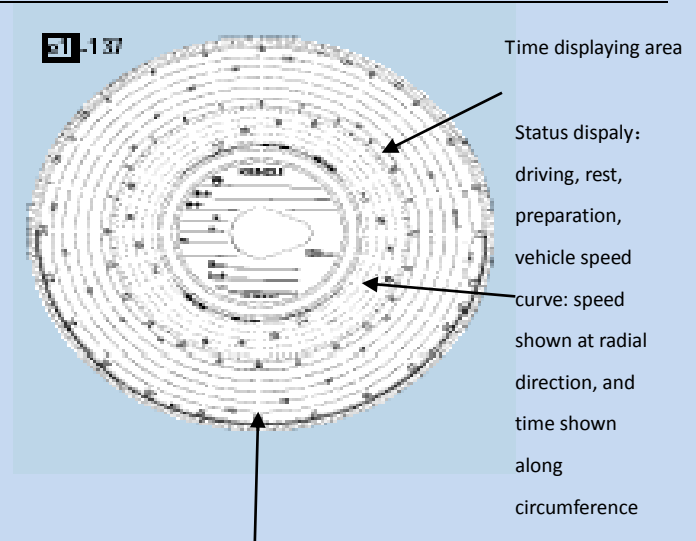
5. Driving License Number 6. Excessive Alarm Speed

7. Vehicle Character Coefficient

8.Total Mileage And Trip Mileage

9. Record Index and Parking Index 10.Serial No. Of Tachograph and Software Version.

Paper Recorder: record and print the information as vehicle speed, mileage, etc



Maintenance

Do not need additional maintenance except for daily cleaning. When faults occur, it is suggested to change the complete device or relevant parts. Use clean and soft cloth while cleaning the tachograph. At the same time, make sure no corrosive chemical can be used, and no water enter the interior of it.

Fault Codes and Fault Reasons:

Fault code	Fault reason
A00C	Inside error
A400	No power
A822	Sensor error
A423	Sensor communication error
A411	System communication error
A051	Driving without paper recorder
900B	CAN wire disconnected
900A	Other CAN errors
9430	Speed output error
9010	LCD error
9060	Paper tray function error
9061	Vehicle speed system error
9063	Paper tray bracket error
9064	Paper tray triggering error

900F	Button error
9051	No first driver's paper recorder
9052	No second driver's paper recorder
9053	Update setting of paper tray mechanism

Printing

Park the vehicle, then press 'print' button to print data according to operation instruction shown on screen.

Notice:

- 1. No printing when driving.**
- 2. It always prints data of current driver and no recognition of drivers.**

Specification Settings

IC card is for recognizing drivers and position of tachograph.

Notes: when inserting the IC card, make the CMOS chip upward and quickly insert or remove.

Vehicle character coefficient settings: insert the IC card and the screen will show 'vehicle coefficient settings: 624', then press 'upward' and 'downward' to adjust the value. Remove the IC card when coming to the needed value and the settings will be saved. Excessive speed and time can be set as well in the time way

Vehicle load

Vehicle load



WARNING

Pay attention to the following for vehicle loading:

- Current national laws and regulations on labor protection and accident prevention (e.g. health and safety regulations in Labor Law).
- National regulations on load safety and distribution of road vehicles
- On-vehicle manufacturer-specified operating instructions

Common Loading Errors

Errors	Results
Loading only on one side	One-sided overloading of suspension/tyre
Top-heavy loading only on one side	Potential to turn over when cornering
Cargo fixed improperly/not fully tied up to flat truck	For braking or turning -Cargoes shake -Body and cargoes are at risk
There is a clearance between the cargo and front/side/rear separator, or between cargoes	For braking or turning -Cargoes shake -Body and cargoes are at risk

Basic requirements for loading and unloading

- Do not exceed the max. axle load or permissible gross vehicle weight.
- Fix the cargoes to avoid falling during the driving.
- Check if the front sideboard of cargo compartment is firmly fixed. Fix the cargoes against the front sideboard by means of the entire carriage wherever possible to ensure they are evenly arranged.
- The cargoes shall have their center of gravity located in the middle of vehicle instead of shifting weight forward, or else, the front shaft will be overloaded.
- If the forklift is driven onto the car base plate during the loading, avoid placing the cargoes on a few supporting points.
- If cargoes are moved to the rear axle, the front shaft of steering axle must have its load maintained above the specified min. value (e.g. 25% of vehicle weight for two-axle truck, and 20% for other models, and always 25% of vehicle weight for rigid draw bar/centre axle draw bar trailer).
- During the braking, the load will move to the front axle and that on rear axle decreases accordingly, thus the front axle will have a risk of overload.
- Pay attention to the tyre size, rated carrying capacity and required air pressure.

Basic requirements for dumper loading

- Cargo's center of gravity must be close to dumper's center.
- Be careful if the vehicle is loaded with rocks and big rubber objects, to prevent them falling from high over the platform floor.
- Take measures to tighten those objects to prevent side door of the platform from deformation.
- Unload the vehicle when it stops on level and hard ground.
- Do not exceed the maximum rated load on the rear axle, if a hoist is mounted on the vehicle rear.

Vehicle use in winter

Vehicle use in winter

We suggest you to paint wax-based protective agent on cab, vehicle body and chassis before the winter is coming. For freezable positions, recoat seal protective agent. Clean the vehicle frequently and thoroughly, and remove corrosives containing salt.

When engine idling at below 0°C

More wear will be caused if the engine runs at idle speed below 0° for a long time; therefore, the running time under idling state cannot exceed 20min.

Fuel tank

Drain water in fuel tank before winter is coming.

Fuel

Please use the winter diesel oil in winter.

Fuel primary filter

When temperature is lower than -30°C, drain water in fuel primary filter every day.

Auxiliary heater

When the weather is very cold (temperature is lower than -20°C), vehicle shall be installed with auxiliary heater (optional). Check its function and condition, and ensure it works normally.

Cooling system

Check antifreezing solution. Fill antifreezing solution when necessary. Use antifreezing solution which is applicable to ambient temperature.

Windshield wiper

Fill antifreezing solution.

Battery

Check the acidity of electrolyte.

Charge battery completely before the winter starts. During the winter, electric quantity of battery must keep over 90% of total electric quantity.

Ensure battery can be used at any time.

Headlamp

Check installation condition, and make adjustment if necessary.

Snow chain

When vehicle drives on snow-covered road or road on which hard ice and snow layer is formed, drive wheel shall be installed with snow chains. Do not install snow chain too tightly. Ensure snow chain can move slightly (self-cleaning).

**WARNING**

- **When using snow chain, ensure there is sufficient gap between fender and tire. When necessary, sufficient gap shall be reserved between fender and vehicle!**
- **For vehicle installed with air suspension, if snow chain is installed, vehicle shall not drive when air suspension is low!**



Start engine

Before engine startup, check whether battery switch is connected.

Avoid unnecessary engine startup to protect battery.



WARNING

- During extended parking of vehicle or electrical system maintenance, disconnect battery main switch.
- Do not disconnect main switch during engine running.
- Do not loosen or take down battery terminal end during engine running.

Connect switch

Rotate main switch of battery box clockwise to horizontal position, power will be connected.

Disconnect switch

Rotate main switch of battery box counterclockwise to vertical position, power will be disconnected.



Caution accident!

- Do not turn switch key off during driving, and keep key switch at driving position “II” all the time.
- Take the key off when leaving the vehicle, even though in a very short time.


Turn key to the “II” position

All lamps on the instrument panel will be lit during vehicle self-check and all instrument pointers will swing from 0 to maximum repeatedly. In case fault is detected by system, corresponding fault content will appear on information display screen (if there are many faults, they will appear in turns).

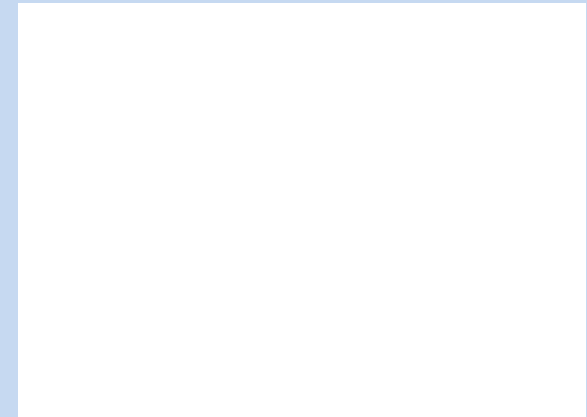
Air-intake heating

Air-intake heater which is resistance type is installed on the air-intake pipe. When the coolant temperature of the diesel engine is below -15°C , prewarming device can heat the air in the intake pipe before or during engine startup. Heating will be stopped when engine startup is finished and air heating indication lamp is out.

Operation process: Turn key to “II” position, ECU will activate automatically activate prewarming according to coolant temperature. When prewarming relay is

connected, heater begins to work. At this time heating indication lamp  on

the driver display screen will be lit. when prewarming lamp is out, it means prewarming process is finished and engine can be started.





Engine startup

- Use parking brake and turn transmission to neutral position or push clutch.
- Depress clutch
- Turn key to “on” position and turn steering wheel left and right to unlock it.
- Turn key to position “III” for engine startup
- Cranking time cannot exceed 15s. Release the key after the engine is started.



WARNING

- When engine starts, immediately check driver display screen. Refer to “driver display screen and detection lamps instrument panel”.
- If vehicle has been started, “engine oil pressure alarm” oil pressure control lamp on driver display screen will be on, and central alarm lamp will begin to flash. In this case, turn off engine

immediately and find out the reason.

Other lamps will be out after inspection/alarm function is completed. Do not drive vehicle before fault display symbol “STOP” on driver display screen disappears.

If engine can not be started

- Turn key counterclockwise to gear “0” position
- Wait for about 30s to make battery resume
- Repeat the above starting steps

Turbocharger use

Turbocharger located at the rear or middle of the engine is consisted of turbine parts and pump impeller parts. Turbines are driven by engine exhaust together with impeller, which send compressed air to engine air intake manifold to increase air intake pressure for greater engine power.

The rotor inside the turbocharger has a speed as high as 80,000~105,000rpm. The engine's main oil gallery provides pressure-feed lubricant to rotor's bearing for forced lubrication. If engine stops, lubricant supply will also be ended.

**WARNING**

- Do not step on the accelerator heavily until the engine runs for 3~5 minutes at idle speed and do not add load until engine oil pressure and temperature reach normal state, otherwise premature wear will occur for the turbocharger's bearing and sealing ring due to lack of oil.
- Do not shut down the engine until it runs for 3~5 minutes at idle and the turbocharger's speed reduces. Do not step on the accelerator when you are to shut down the engine, because it may lead to sudden increase of engine speed that in turn sends the turbocharger to a high speed as well. At this time a sudden engine shutdown will immediately stop oil supply to the turbocharger that keeps running at a high speed as a result of inertia, causing damages to rotor spindle, bearing and sealing ring for the lack of oil.
- Before starting the engine that has not been used for a long time, please lubricate the turbocharger first. You can do it by dismantling the oil intake pipe of the turbocharger and pour some clean lubricant into it; otherwise damage will occur to the turbocharger.



Turn off engine



WARNING

If engine keeps operating under high load, coolant temperature will be very high. In this case, do not shut down the engine immediately, and leave it to idle for 3-5min. Stall engine only after cooling temperature drops. Or damage will occur to the engine.

- Turn transmission to neutral gear
- Use parking brake
- Rotate counterclockwise key to "0" gear position and take down the key.
- Turn the steering wheel until you hear the locking sound.
- Turn off battery switch.

Lock steering wheel

Steering wheel can not move after above steps are finished.



WARNING

Do not lock steering mechanism during driving.

Start and stop switch under the cab

When the cab is tilted over, and engine is working, stay clear of and do not touch the moving parts and parts of high temperature, such as exhaust manifolds, belt and fans etc.

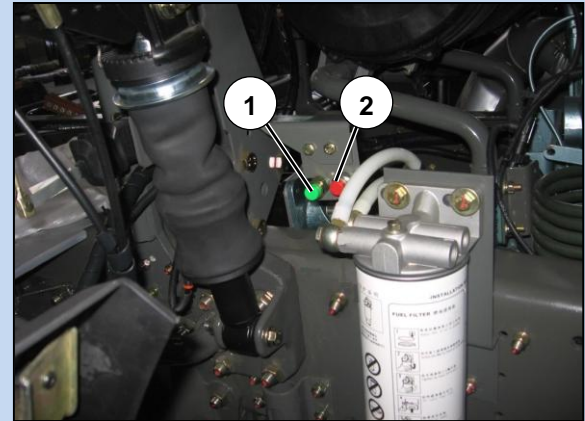
Operation method:

- You can find the following two switches after the cab is tilted over:
 - ① start button (green)
 - ② stop button (red)
- Start the engine: press ① until the engine begins to work.
- Shut down the engine: press ② until the engine stalls.
- Press ① and ② at the same time, the starter will drive the engine but the engine itself will not work.

Note:

Be careful of operation to avoid injury.

When transmission is not in neutral, to press ① does not work.



HW transmission

Sinotruk transmission features compact structure, light weight, ease of operation and repair, high reliability, good commonality of components and adaptivity to complete vehicles. Full synchronizing transmission can be equipped with shift booster that could substantially reduce the driver's labour intensity and make shifting lighter and easier to be operated.

Note:

In running, truck shall be driven at a high enough gear to ensure the economic engine speed.

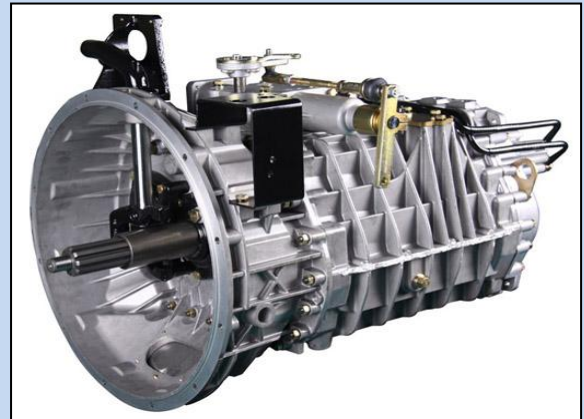
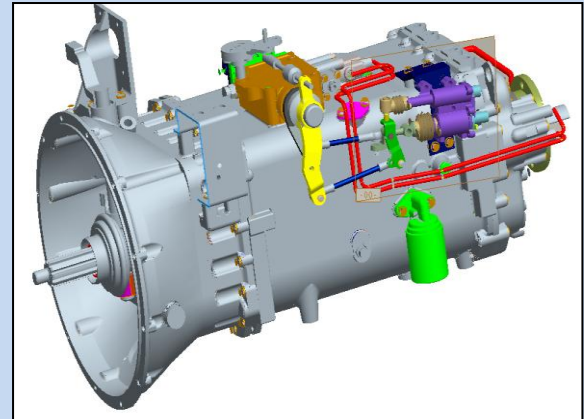
When parking the truck or leaving the driver's cab, the gear shift lever shall be shifted to neutral gear and be braked by hand. (for double H put the lever in neutral at low-gear zone)

Parking brake shall be released prior to starting the truck

For truck with air-cut parking brake, it shall not be engaged to a gear and started until air pressure is raised to the pressure for disengaging the parking brake.

If not necessary, do not frequently carry out emergency brake or violent acceleration on the truck

No free downhill running is allowed while transmission is at neutral gear.



Shift

Start the truck at gear 1 or gear 2 on the basis of road condition.

Shift within the range of low gears/high gears

- Floor the clutch before each shift.
- Engage or separate clutch slowly.
- Shift the control lever to gear position as per the gear marks on the knob.



WARNING

- In shifting, driver shall be familiar with the running range at each gear, without shifting to a gear inapplicable to the truck speed.
- While running downhill, truck shall be shifted to low gear to make full use of the engine brake.
- Reverse gear can be engaged only when truck is stationary and engine at idle speed.
- Hand brake shall not be released for shift control until truck pressure reaches the rated value.

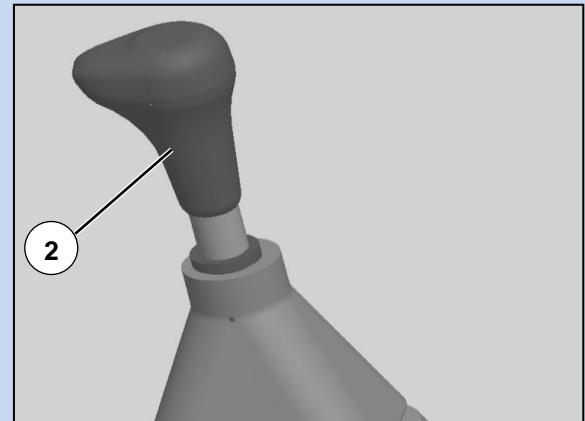
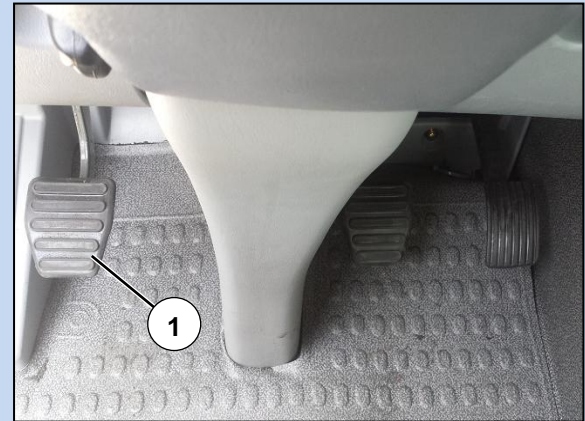
Transmission-with synchronizer

(HW19710T/HW19709XST(C)/HW21716ST(C)etc)

Shift pneumatic booster can be installed to save effort.

Shift steps:

- During shifting, clutch pedal① should be floored
- Move the shifting lever② stably to the needed gear. In case of resistance, increase effort gradually to finish shifting.
- Stably release the clutch pedal and accelerate to proper vehicle speed.

**WARNING**

Driver must be familiar with speed range of each gear and should engage gear suitable to vehicle speed to avoid damage of engine and transmission components.



Engage power take-off

Transmission - with synchronizer

Engagement: step on the clutch pedal, press the rocker switch ① to engage the power takeoff, and the power takeoff signal lamp ② on the instrument will be lit. If the transmission gear shifting and locking mechanism is provided, please place the shift lever to neutral position before the power takeoff is engaged.

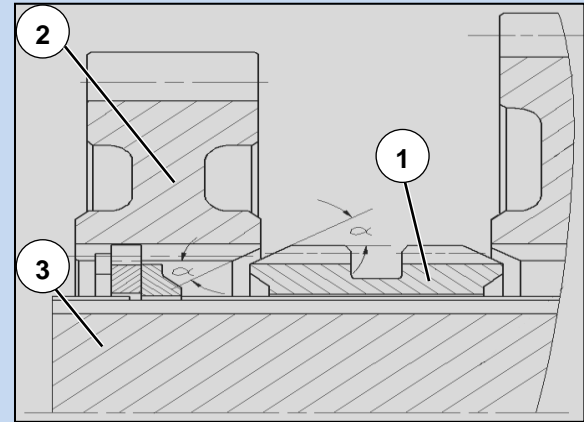
The transmission gear shifting and locking mechanism can prevent the vehicle from travelling continuously after the power takeoff is engaged.



Transmission- without synchronizer

(HW13710L(C)/HW19710(C)(L)/HW19712(C)(L)etc.)

Transmissions of this series haven't synchronizer, whose shifting relies on the sliding sleeve ①. the spindle sleeve is bind together with the spindle ③ through involute spline. Power is transmitted by the movement of the sliding sleeve, which makes the soldered tooth (external splines) engage with the gear of the spindle ②. There is a same taper angle $\alpha=35^\circ$ for each gear engagement of the spindle with the sliding sleeve. Because the gears of the spindle is not fixed relative to the spindle itself, the drive needs to apply big shifting force to counter the great resistance during shifting before the shift is smoothly engaged.

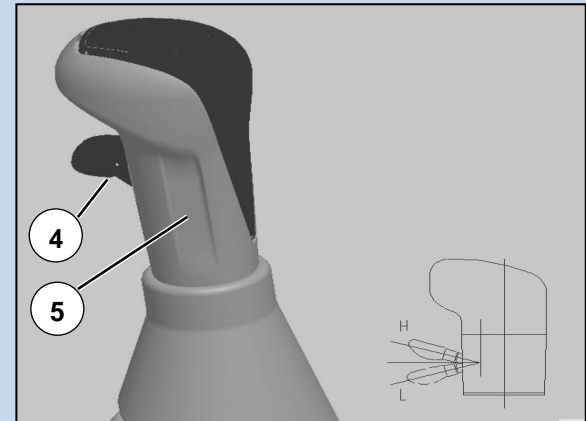


Shift steps:

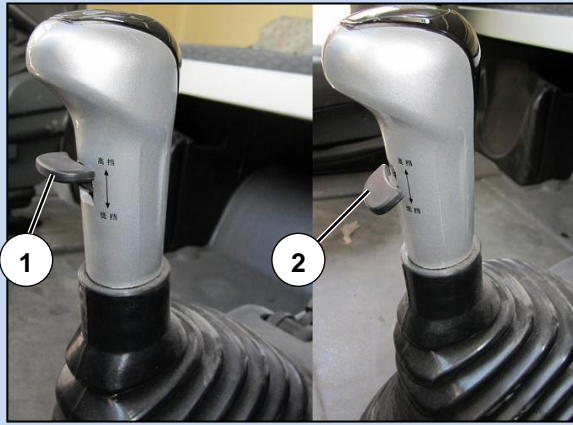
- During shifting, clutch pedal should be floored
- Shift from high gear to 1 and 2 gears during driving, “two clutch operations” shall be used for shifting.
- Reverse gear must engaged when vehicle stands still to avoid engagement sleeve damage

Note:

During shifting, clutch shall be released fully and shift lever shall be fully engaged. The switch valve ④ on the shift handle ⑤ has two positions, namely high and low gears. Switch valve must be in the low gear position when the



vehicle is stopped. Do not release the parking brake and start to move the vehicle until the air pressure rises to the required level.



Shift between high and low gears



WARNING

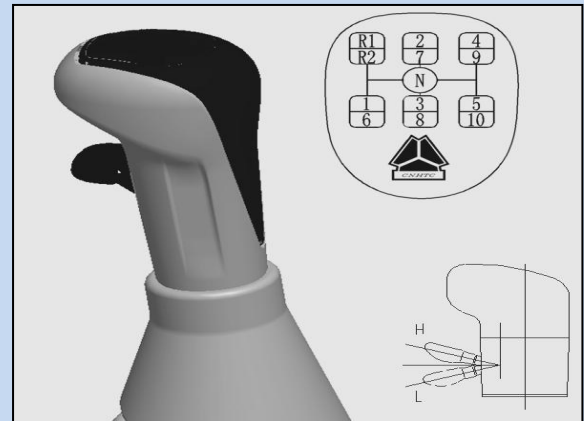
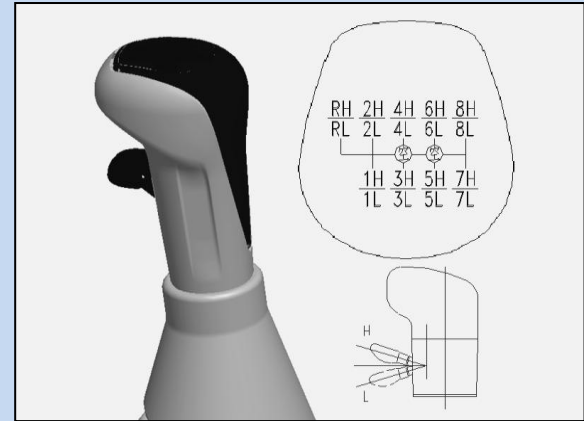
- Unless the current vehicle speed is in the range allowed by shift, otherwise, it is not allowed to switch to any gear ahead of time.
- Each time you shifts, push the clutch to the metal.
- When transmission shifts from low gear area to high gear area (vice versa), do not skip any gear.
- When vehicle drives down a hill, it is not allowed to change high and low.

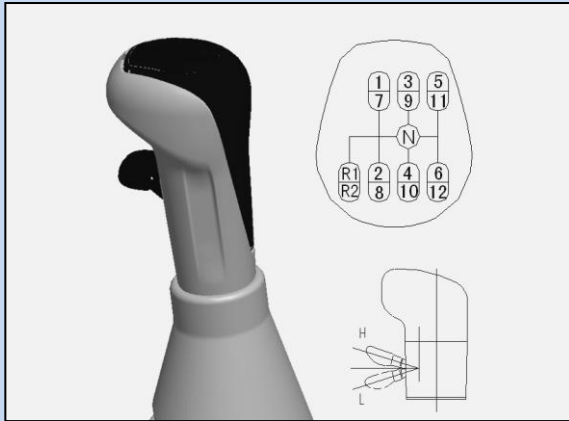
Switch valve of shift handle includes high gear ① and low gear ②

Switch between high gear and low gear

16 gears transmission: When shifting among gear interpolation points, firstly switch the switch valve on shift lever and the operational steps from 1L to 1H are: firstly switch the switch valve from L to H, step on the clutch (ensure that the clutch is floored) and release it to finish gear shifting (no movement of the handle is required during this process); the operating steps from 1H to 2L are: firstly switch the switch valve from H to L and step on the clutch to return the handle back to neutral gear; then put the shift lever into gear 2, and release the clutch to finish gear shifting. The rest may be deduced by analogy till the shift gear is switched to 8H; the down-shift operation is the same. Step on and release the clutch pedal and then turn the switch on the handle, the gear will not be switched.

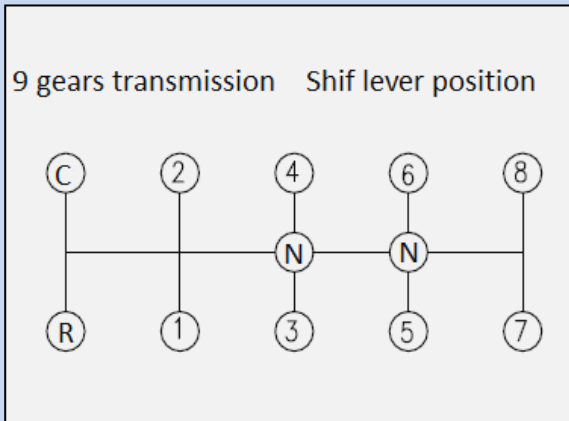
10 gears transmission: when shifting from low gear area to high gear area (vice versa), firstly place the handle valve at H (L) and then switch it to neutral gear; after a moment, put it into gear 6 (gear 5), but do not jumper gears; otherwise, the service life of deputy-box synchronizer will be impacted. When handle is at gear position, switch H-L of handle valve. High gear and low gear can only be switched at neutral gear position.





Switch between high gear and low gear

12 gears transmission: when shifting from low gear area to high gear area (vice versa), place handle valve at H(L) position firstly, and then turn to neutral position, wait for a moment, put into gear 7 (6) but do not skip any gear, otherwise, the service life of auxiliary box synchronizer will be affected. When handle is at gear position, switch H-L of handle valve. High gear and low gear can only be switched at neutral gear position



9 gears transmission sketch on the shif lever knob

Engage power take-off



WARNING

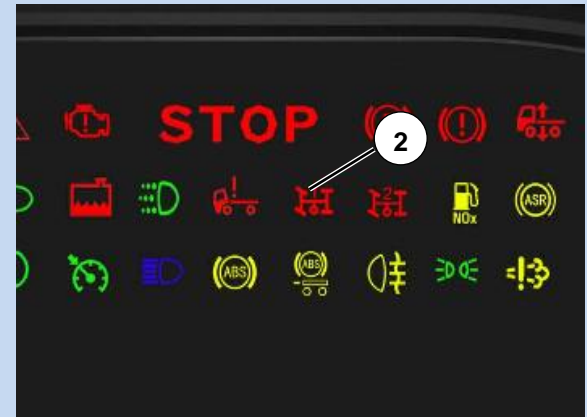
Power take-off can only be used in low gear section

Power take-off engagement

Step on the clutch pedal, press the power takeoff ① and engage the power takeoff, at this moment, the indicator lamp ② on the instrument will be lit; put the shift lever into a low gear, and release the clutch.

Power take-off disconnection

Step on the clutch pedal and reset the power takeoff ①; about 3s later, release the clutch pedal to disconnect the power takeoff. At the same time, indicator lamp ② on instrument panel will be out.



ZF transmission

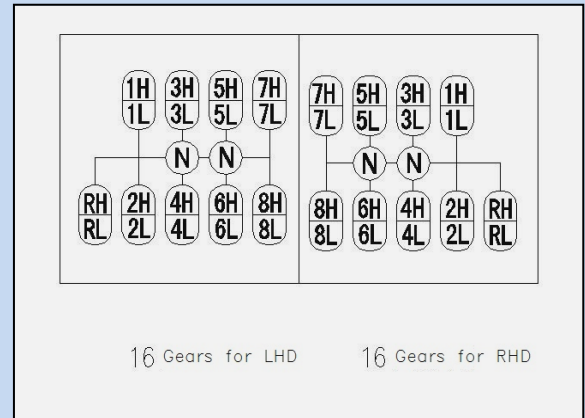
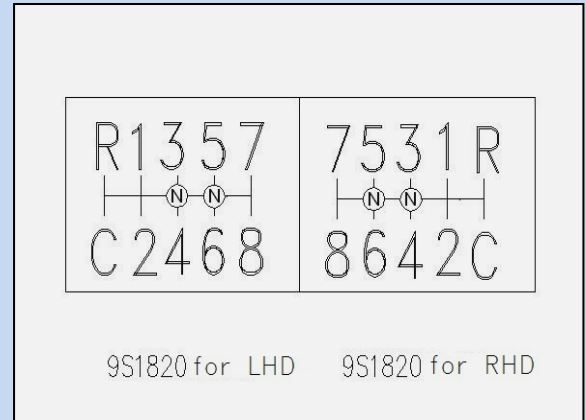
Product introduction (ZF 16S1850, ZF 16S1950, ZF 16S1930, ZF 16S2231TO, ZF 16S2230, ZF 9S1820, ZF 16S1830)

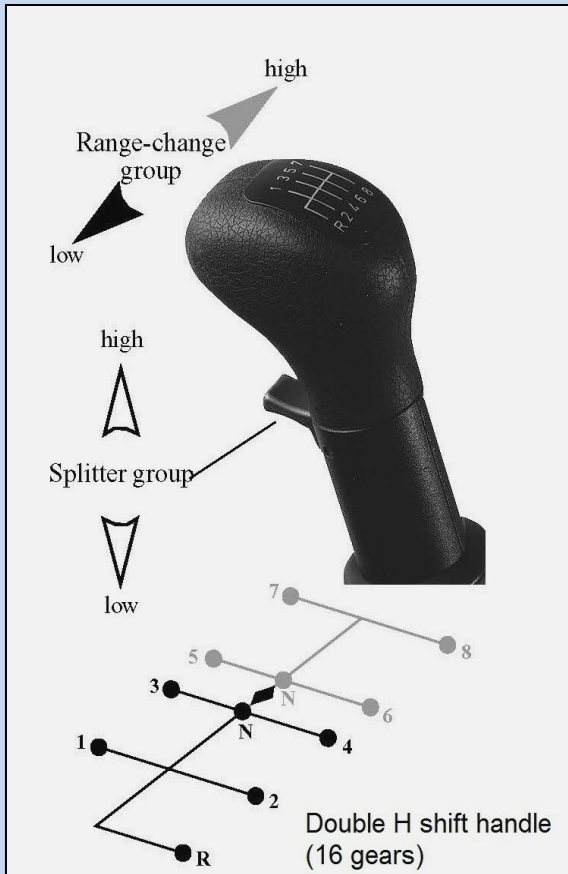
ZF transmission is consisted of 4-gear box, one high-low gear part and one semi-gear part.

Main box structure:

- Synchronizer shift, engage sleeve for revers gear
- Manual shift (rotating shaft control)
- Double H gear

Gear sketch map





Shift control

High-low gear is double H shif.

Shifting system is divided into 5 gear-selection positions. There is a spring at 3/4 gear and 5/6 respectively to allow a neutral gear. Because of the difference of acting force of the spring locking device, corresponding gears are very easy to find.

Shift from 3/4 gear to 5/6 or from 5/6 to 3/4, change between high and low gears is realized automatically by pneumatic control.

Operation instruction

Follow the steps below for the benefit of fuel economy:

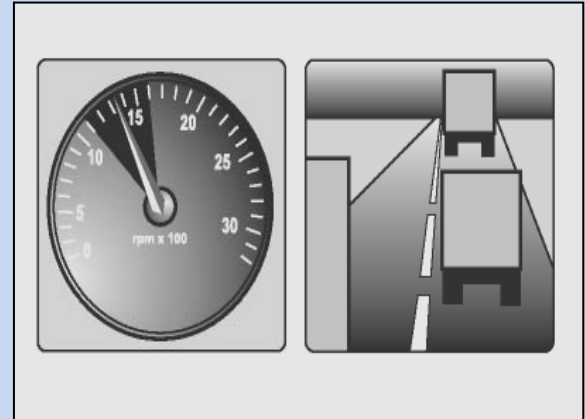
- Ensure engine speed is within the middle area (green area)
- Choose high gear as possible as you can
- Pay attention to traffic conditions ahead
- Avoid unnecessary acceleration and brake

Engine start and vehicle starting

- Lift handbrake (to avoid rolling back)
- Engage neutral for transmission
- Start the engine
- Shift engagement (1 gear recommended for clutch protection)
- Release handbrake and gently engage the clutch

Clutch operation

- Clutch must be floored whenever it is operated

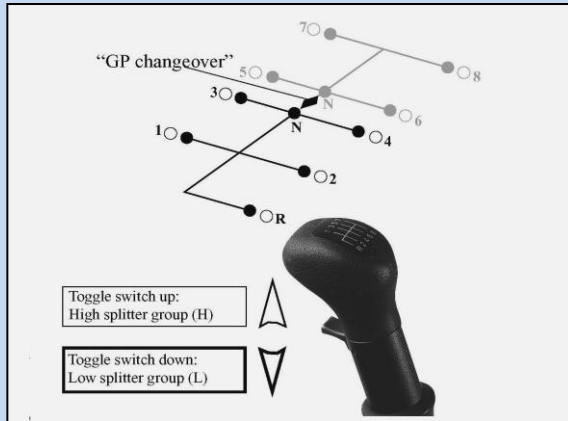


WARNING

- lift handbrake to avoid rollback before you leave.

Be careful!

- Incomplete disengagement of clutch during shifting may cause synchronizer wear.



Gear selection

ZF-ECOSPLIT transmission is a full synchronizing transmission.

Synchronizer can ensure the same speed and direction before the engagement of each gear.

- Two times of clutch operation are not needed during upshift
- No need to tip in the accelerator and depress the clutch for two times during downshift as well, even in complicated traffic conditions and on slopes.

Gear engagement

- To protect transmission, clutch must be fully disengaged whenever shift is needed.
- To avoid serious damage to engine and transmission, downshift should be made only when vehicle speed is lowered to the range of corresponding gear through brake.
- shifting lever should be operated in a quike and gentle manner. In particular when engine is cold, use you palm to control the shift lever (see the figure).
- Engaging the gear, please hold the shift lever to counter the resistance until gear is successfully engaged.

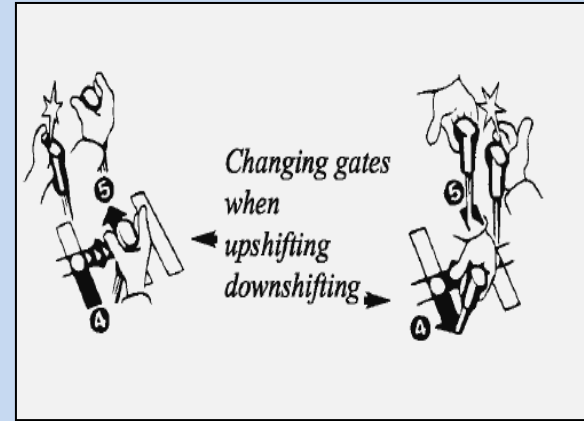
Double H Shift:

Shift from 3/4 neutral to 5/6 neutral, use you palm pat the knob and then hold it and make a quike engagement.



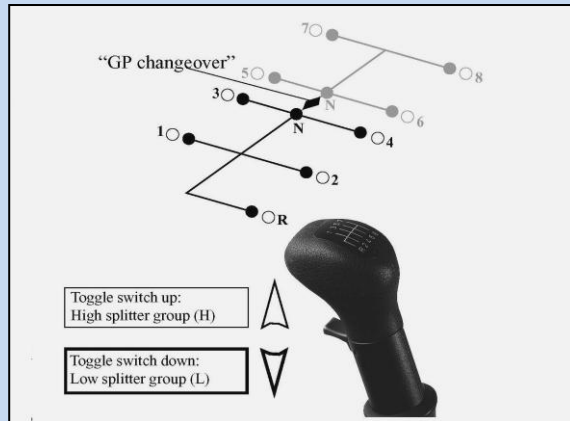
WARNING

When the vehicle is in cold condition, shifting force may be bigger than usual. If GP cannot go into low gear, when moving from 5/6 neutral to 3/4 neutral, please lower the vehicle speed and retry it again.



WARNING

- Over 28km/h vehicle speed, do not shift from 5/6 neutral to 3/4 neutral.
- Over 28km/h, change between high gear to low gear may cause premature synchronizer wear.



Shift with preselect valve

Change between high and low gear is controlled by the preselect valve on the shift lever.

When preselector valve is at H position, shift lever can engage

1H-2H-3H-4H-5H-6H-7H-8H and RH gears, and when it is at L position, shift lever

can engage 1L-2 L -3 L -4 L -5 L -6 L -7L-8L and RL gears. Change from H to L or from L to L, please change preselector valve position before you depress the clutch pedal.

H-L shift will be finished when the clutch is fully disengaged.



WARNING

Do not operate the high-low shift valve unless you need to shift immediately.

Reverse

Be careful

Do not engage reverse gear unless vehicle is stopped.

- Ensure full clutch disengagement during reverse engagement and disengagement.

- At idle speed, clutch must be fully disengaged

- Do not engage reverse gear until the countershaft inside the transmission get stationary, or it may cause tooth damage.

Attention: time may differ for the countershaft to get stationary based on different operation modes. You can reduce the waiting time by shortly activate the synchronizer at 1 gear.

- Engagement and disengagement of reverse gear doesn't allow any tooth knocking noise.

If necessary please wait a little longer before gear engagement, or check whether the clutch can be disengaged fully.

- Gradually engage the clutch



WARNING

- Service lift differs for different operation methods, and may be shortened because of short synchronizing time. Therefore please use 1 gear for vehicle start.
- Tooth knocking noise is not allowed during engagement and disengagement of reverse gear. If necessary, please lengthen the time needed for clutch disengagement. You may also refer to clutch operation section.
- Gently engage clutch
- Excessive synchronizer wear may be caused for frequent forcibly gear shift.
- Do not engage gear before the clutch is fully disengaged

PTO engagement and disengagement

PTO controlled by clutch

It can be operated when vehicle is both running and stationary.

Engagement/ disengagement

- PTO engagement and disengagement are only allowed when the clutch is fully disengaged.
- Clutch disengagement must be made at engine idle speed.
- Knocking noise may occur if PTO engagement is made when the countershaft is not stationary.



WARNING

- Service lift differs for different operation methods, and may be shortened because of short synchronizing time. Therefore please use 1 gear for vehicle start.
- Tooth knocking noise is not allowed during engagement and disengagement of reverse gear. If necessary, please lengthen the time needed for clutch disengagement. You may also refer to clutch operation section.

Slowly engage the clutch

- Gear shift is not allowed when PTO is working.
- PTO must be disengaged if vehicle is stopped for a long time such as overnight.

Parking

- Engage low gear(1-4 gear)
- lift handbrake

For safety:

- engage 1 gear when vehicle is stopped uphill.
- Engage reverse gear when vehicle is stopped on slope.
- For safety, please put blocks behind the wheels if vehicle is fully laden.

Start-up by towing

Engage high gear (5-8) when engine start is made by towing.

Be careful

To avoid transmission damage, engine start by towing is only allowed at high gear (5-8) . In additon, reverse gear is not allowed for engine start by towing.

Towing

Towing is noly allowed under the following conditions:

- Vehicle is equipped with emergency steering pump
- choose neutral in high gear area
- The maxium towing distance is no more than 100km
- The maxium woeing speed is dependant on axle gear ratio and type size.

Note

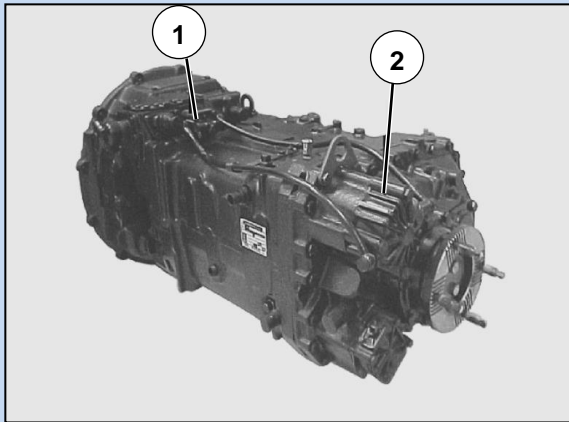
Follow closely related rules provided by the manufacture.

Followe the maxium towing speed stipulated in relevant laws.



WARNING

- **If conditions avove can not be satisfied, driving shaft must be disconnected at the connecting flange of the rear axle.**
- **If transmission has already been damaged, driving shaft must be disconnected at the connecting flange of the rear axle.**



Emergent operation

The following reasons can contribute to high-low shifting mechanism failure (e.g. change from 3/4 to 5/6):

- Pipeline of compressed air system is damaged.
- High-low shift vale or shifting air cylinder is damaged (because of water vapour condensation and other impurities)

- ① High-low shifting vale
- ② high-low gear shifting piston



WARNING

- Please drive the vehicle with low gear (1-4) if encountering the above conditions.
- If failure occurs when transmission is at high gear, towing is a must.

Engine start below 0°C

This transmission use oil indicated in the annex 1. When ambient temperature is below -15°C, transmission fluid can be chosen according to different temperatures.

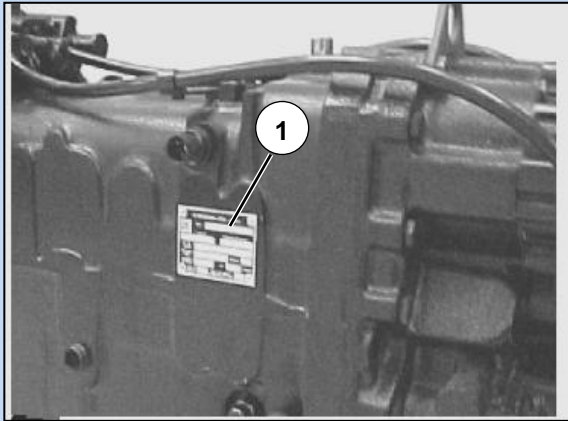
Change the fluid if necessary. Please warm the transmission fluid before engine start, by ways such as HVAC heating, but fluid temperature shall no exceed 130°C.

**WARNING**

If you leave the vehicle without shutting down the engine, please lift the handbrake to avoid rolling back.

Parking below 10°C

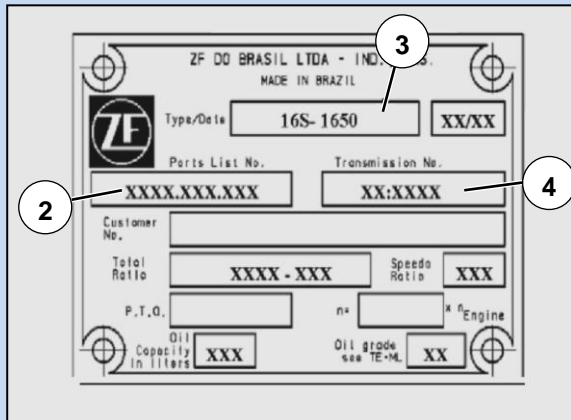
When outdoor temperature is below 0°C, ensure high-low gear is at low gear (engage the shift lever to 1 gear or 3/4 neutral)



Nameplate

Nameplate ① at the left side of the transmission carries most of the important information of the transmission.

provide the following information whenever you get contact with the ZF after-sale service agents:



③ Transmission assembly number

④ transmission type

⑤ Transmission series number

Transfer case operation(all-wheel drive vehicle)

There are high and low gears for transfer case. When the rocker switch is not connected, high gear of the transfer case is engaged. The low gear of the transfer case will only be engaged when the vehicle is stationary or moving at a walking speed.

Note: Disengage the clutch before low gear engagement of the transfer case and connection with the front axle(it means to press all-wheel drive)

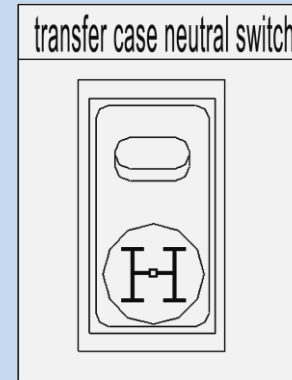
Switch operation of the transfer case

Engagement:

Press the transfer case switch to connect the transfer case by electronic control, and at the same time, indication lamp on the panel will be lit.

Disengagement:

Press the upper part of the switch, and the indication lamp will be out.



Transfer case operation (all-wheel drive vehicle)

Transfer case switch operation

Transfer case switch is a shift locking mechanism which is designed to enable the vehicle to use transfer case PTO for running.

- Operation of transfer case switch

Note: please engage low gear of transmission before transfer case switch operation!

- Engage low gear of transmission.
- Press transfer case switch and the compressed air will force the transfer case to be in neutral, making the vehicle stop. At this time the indication lamp on the panel will be lit.
- Press PTO switch to get connected.
- Transfer case neutral switch cancelation
 - Put transmission in neutral, and press the upper part of the transfer case neutral switch

Note: Put transmission in neutral before switch cancelation

Operation on all-wheel drive vehicle

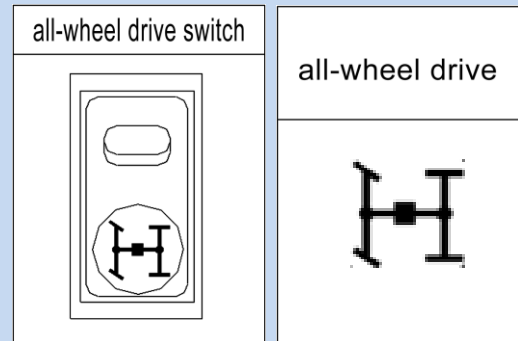
- Engagement: press all-wheel drive button, to connect the front drive axle through electrical control and the indication lamp on the panel will be lit.
- Disengagement: press the upper part of the all-wheel drive button, and the indication lamp will be out on the panel.

Note: Front drive axle can even be connected when the vehicle is

running, but the clutch must be disengaged or vehicle speed lowered before front drive axle connection.

All-wheel drive can only be used based on the following conditions for its best advantage.

- Driving on bad road
- Driving on slippery and icy road
- Driving downhill and uphill, but do not use all-wheel drive, when driving on hard road with good adhesion,



Differential lock

Differential lock—rear axle inter-wheel differential lock

Before driving on the poor or muddy road, the differential lock can be used for a short time to prevent the slip of single rear tyre. When engaging it, make vehicle stationary or drive it slowly



WARNING

- **During the use, the adjustment of anti-lock braking system (ABS) will have a certain delay. Before the adjustment, the wheel will be locked for a short time, and the steering capability and direction stability will be restricted.**
- **When the differential lock works, the vehicle steering capability will be impaired. During the use of inter-wheel differential lock, do not drive at the curve of hard road, as there is no differential function between both wheels on the same axle. When driving on the hard road, immediately disengage the differential lock.**



WARNING

- **The differential lock can only be engaged when the vehicle stops or runs straightly at low speed (equivalent to walking speed)**
- **When the inter-wheel differential lock indicator lamp is on, it is not allowed to turn or drive at high speed.**

Engagement of differential lock between wheels—4×2, 6×2 vehicles

- Release the accelerator pedal (to slow down)
- Push the upper part of inter-wheel differential lock switch ①

Inter-wheel differential lock of real axle engaged

Inter-wheel differential lock indication lamp lit

- Carefully depress the throttle pedal and slowly speed up

Disjointing of differential lock

- Release the throttle pedal and depress the clutch pedal.
- Push the upper part of inter-wheel differential lock switch ①

When the inter-wheel differential lock disengages, the inter-wheel differential lock indicator lamp of instrument panel will be off.

Differential lock between wheels—6×4, 8×4 vehicles

Operation principle of the engagement of differential lock: first engage the axial differential lock then engage the wheel differential lock

- The engagement of the axial differential lock (refers to the joint of axial differential lock)
- Release the accelerator pedal (to slow down)
- Push the upper part of inter-wheel differential lock switch ①

The rear axle inter-wheel differential lock engages.

The indicator light of differential lock between wheels lights on

- Step on the accelerator pedal slowly and speed up

Disengage the differential lock

- Release the throttle pedal and depress the clutch pedal.
- Push the upper part of inter-wheel differential lock switch ①

When the inter-wheel differential lock disengages, the inter-wheel differential lock indicator lamp of instrument panel will be off



WARNING

- The differential lock can only be engaged when the vehicle stops or runs straightly at low speed (equivalent to walking speed).
- When the inter-wheel differential lock indicator lamp is on, it is not allowed to turn or drive at high speed.



Inter-axle differential lock

Inter-axle differential lock: Used for locking the first and second drive axles

Engagement of Axial differential lock

- Release the throttle pedal (deceleration).
- Push the lower part of inter-axle differential lock switch ①.

When the inter-axle differential lock engages, the inter-axle differential lock indicator lamp of instrument panel will be on.

Disengage the differential lock

- Release the throttle pedal and depress the clutch pedal.
- Push the lower part of inter-axle differential lock switch ②.

When the inter-axle differential lock disengages, the inter-axle differential lock indicator lamp of instrument panel will be off.



WARNING

- The differential lock can only be engaged when the vehicle stops or runs straightly at low speed (equivalent to walking speed).
- When the inter-axle differential lock indicator lamp is on, it is not allowed to turn and drive at high speed.

Operation of semitrailer

General rules for operation of semitrailer

Tractor is equipped with dual-circuit brake system



WARNING

- Carefully check the notice board at one side of the fifth wheel when connecting semitrailer or operating fifth wheel for the first time.
- No one is allowed to stand between the tractor and semitrailer while the tractor is moving backward to semitrailer.
- After semitrailer is connected, check the handle to ensure the correct engagement of fifth wheel.
- If multiple semitrailers are used, pay attention to check the gap size between the center dowel and fifth wheel.
- The damaged or dilapidated joint may lead to failure of semitrailer brake system. Frequently check the joint between tractor and semitrailer while making connection, and, replace it if necessary.

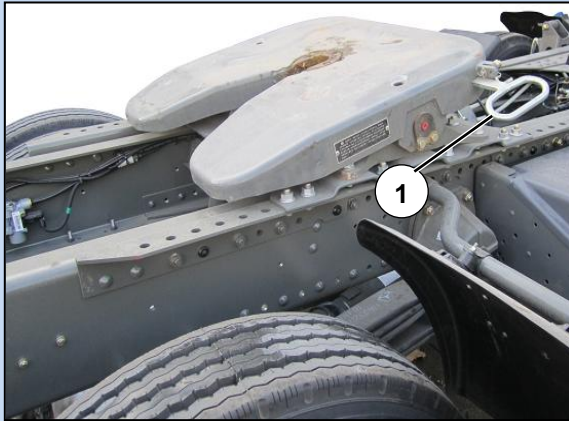


- Be carefully of the heat damage of wire
- The joint will subject to corrosion when wet gas, dust or sand grain enters into the socket of trailer, especially for ABS plug (always has a voltage load of 24 V). Under a loading condition, if relative more heat is produced at the same time, the joint and cable may be damaged. Thereby, the plug and socket should be dried up regularly with compressed air, if necessary, cleaned up with antiwear cloth.
- Frequently check the socket and plug, once any damage is found, timely go to the service station of SINOTRUK for replacement.

Cleaning the sockets of tractor and semitrailer

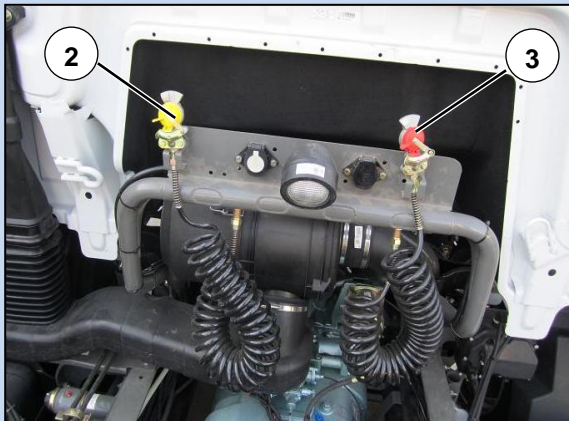
The sockets of tractor and semitrailer cannot be cleaned with water and mechanical object, and the 6-8bar compressed air shall be applied.

During the cleaning process, the key switch and lighting system shall be turned off.



Semitrailer connecting

- Fasten the semitrailer to prevent it from sliding
- Lift the fifth wheel handle ① up, get the handle entered into the upper long hole and then pull it out, till it arrives at the locating slot on the handle rod and clamps the fifth wheel shell. At this time, the fifth wheel is opened and is ready for coupling.
- Run the truck astern for opposite joint; when the traction pin enters into the fifth wheel interface, the hook and cheese block will automatically lock up the traction pin to finish the opposite joint. At this time, the handle will also automatically return back to the original position,



WARNING

Please be sure to check whether the lock handle is correctly locked after semitrailer is connected to the tractor.

- **The brake pipeline and electric joint connecting semitrailer and tractor.**
 - Connect compressed air pipeline. Pay attention not to tension, rub or tangle them when driving.
 - Firstly, connect the brake control pipeline connector (yellow) ②.
 - Secondly, connect the air charging pipeline connector (red) ③.
 - Check other functions.

Disengaging of semitrailer

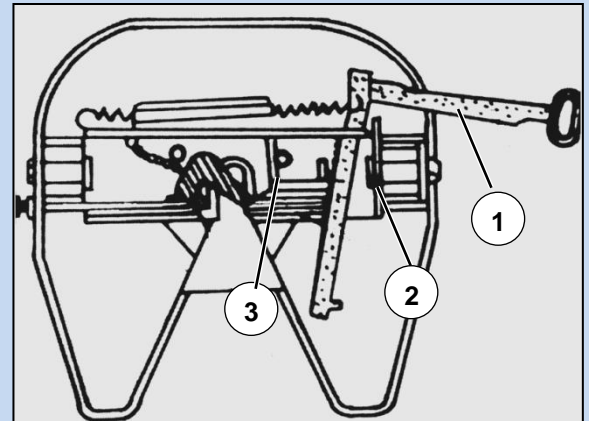
- Inspect the road condition and protect the semitrailer against sliding
- Fasten the semitrailer, making the wheel immovable
- Before the semitrailer or full trailer (equipped with dual-circuit brake system) is disengaged from the tractor, following sequences are required to strictly abide by: firstly disengage the charging pipe joint (red), and then disengage the brake control pipe (yellow), otherwise the trailer brake will be loosened.
- Pull out the fifth wheel handle ①, until it arrives at the locating slot and clamp the fifth wheel shell, so that the cheese block ② will disengage from the hook③, keep the tractor moving forward, and then rotate the hook③, loosen the traction pin, the disengaging action will be finished.

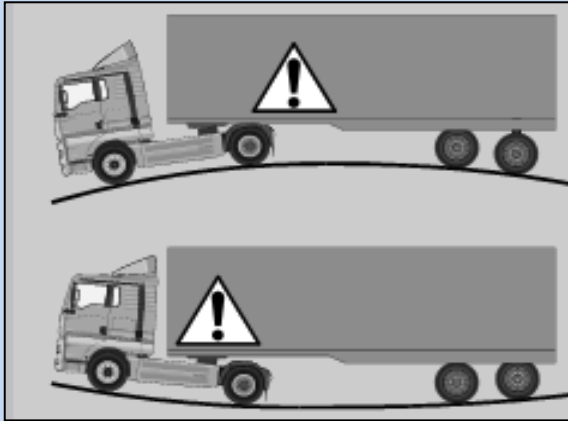


WARNING

Note: in case that the trailer is not engaged for long time, please reset the fifth wheel handle ①

- Always detach the joint in accordance with correct sequences. Otherwise the braking of semitrailer will be released, and may lead to the sliding of truck.
- After detachment, utilize cover to protect the joint from pollution.



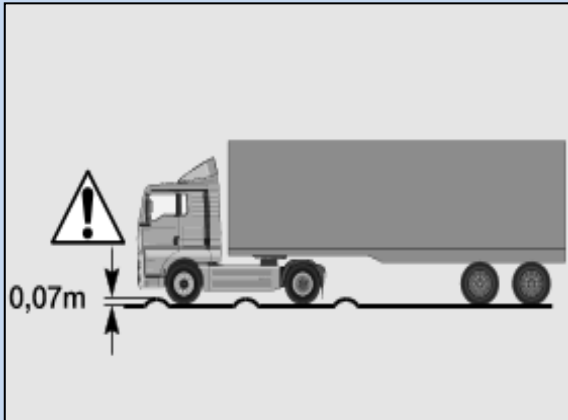


Tyre spacing



WARNING

- There is a risk of vehicle damage!
- The distance between semi-trailer and tractor is tightly constrained!
- The tractor and semi-trailer may be severely damaged if running on ponding, slope and muddy road.



Ensure sufficient clearance between tyres!



WARNING

- There is a risk of vehicle damage!
- To achieve the optimal carrying capacity, the clearance between the tyre and mudguard is confined. If the vehicle height decreases, only short-distance travel at walking speed is allowed, as detailed in "Winter maintenance" and "Operation of semi-trailer", otherwise the mudguard and tyre will be damaged.

Fifth wheel

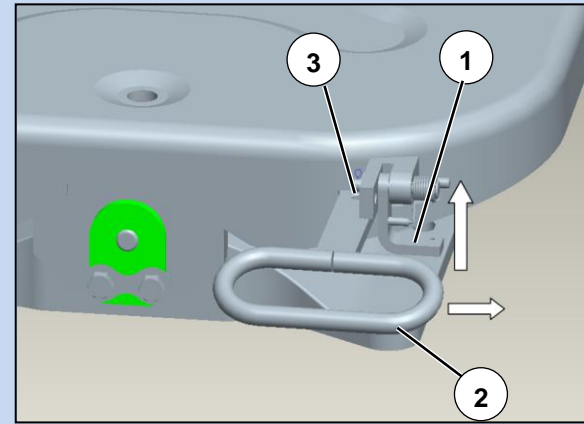
Open:

As shown in the Figure: rotate the stop block ① of pulling plug upward to the horizontal position, at the same time, rotate the handle ② forward, and make the quadrangular slot stuck at the front side of rectangular slot of fifth wheel plate.

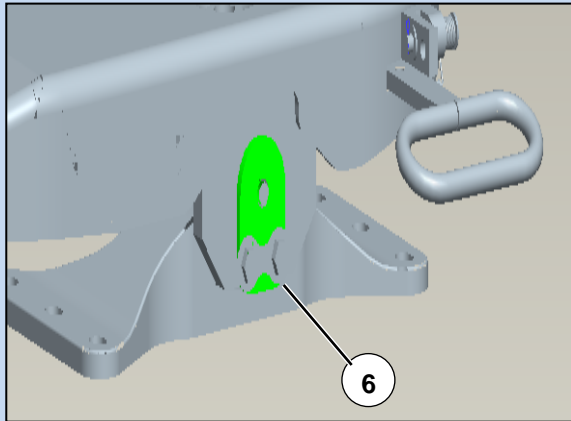
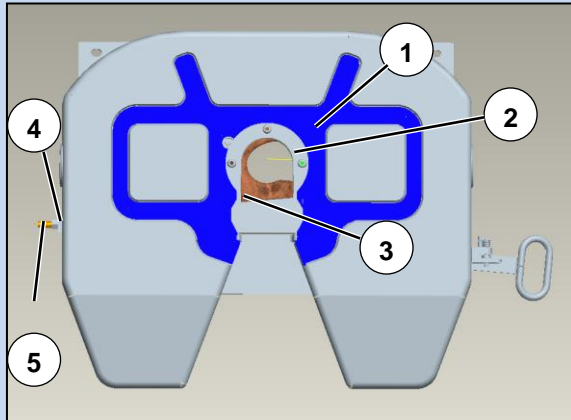
Inspection after the coupling of trailer:

Make sure that the stop block ① of pulling plug returns to the state as shown in the Figure, and the warning hole ③ locates at the exterior of fifth wheel plate, at this time the fifth wheel is locked securely.

If the stop block ① of pulling plug fails to drop onto the locking position, or the warning hole ③ locates far away from the exterior of fifth wheel plate, please inspect whether the fifth wheel is locked.

**WARNING**

Always operate as per the operation requirements.



Fifth wheel maintenance

- Before the tractor is engaged into the semi-trailer, please clean the upper surface of traction base and lubricating oil bath ①, and make sure that the lubricating oil bath ① is filled with heavy-duty lubrication grease (e.g. 2# lithium base grease), and the upper surface of traction base is evenly applied with the grease;
 - Clear lubrication grease away from the upper surface of traction base, hook ③ and U-shape mouth ② every 5,000km, clean these positions and use new heavy-duty lubrication grease to apply the upper surface of traction base and the mating faces between hook ③, U-shape mouth ② and the traction pin;
 - Adjust and inspect the following parts every 5,000km:
 - To avoid that the traction pin and hook ③ get worn and the traction block becomes too tight to pull handle out when connecting, screw out the adjustable bolt and then screw in it clockwise under the condition that the tractor and semi-trailer are engaged, until the adjustable bolt ⑤ contacts with the traction block; screw out the adjustable bolt ⑤ by half-turn anticlockwise, and then screw up the nut ④ on the adjustable bolt ⑤;
- Keep frequent inspection on the bolts of support shaft ⑥, and make sure they are tight.

Chapter IV Practical Suggestions

Replacement of wheels

Operation and maintenance of tires

-Air pressure

Inspect whether any inflated tire suffers from air leakage and repair leaking tires.

Keep tires at the normal pressure throughout their operation.

Regularly inspect tire pressure during long time running or operation. It is a must to support front and rear axles for long-time parking with full load.

In case of high tire pressure, crown is vulnerable to wear and explosion; in case of low tire pressure, tire is vulnerable to deformation and damage.

Two tires installed together shall have the same pressure.

-Speed

Different tires have different speed limitations. Overspeed running may lead to early damage of tires. Do not drive fast in case of poor road conditions and minimize sudden braking and sudden turn.

Temperature of tires will increase during high-speed running. Take measures in case of high temperature rise to prevent explosion of tires.

-Vehicle conditions

Constantly inspect and adjust toe-in of front wheels to prevent eccentric wear and early damage of tires.

Do not use deformed rim due to deformation or rim with unqualified dimension as it may lead to wear of valve.

Running over roadside step will cause internal damage (tire damage) hardly seen at the outside, which will lead to tire explosion or even severe accident. Therefore, avoid running over roadside steps and if inevitable, run slowly in the angle of 90° (lower than walking speed).

-Pattern

Circumferential patterns featuring little resistance and fast speed are applicable to hard roads such as cement and asphalt roads.

Transverse patterns boast good adhesion and sound climbing performance.

Mixed patterns integrating characteristics of circumferential patterns are applicable to asphalt and cement concrete roads.

Off-road patterns are applicable to roads without pavement or poor roads.

Stop use the tire when tread patterns are worn to the wear mark.

Replacement of wheel

-Load

The truck load should conform to the load as specified in current National Standard, no overloading is allowed.

Do avoid overloading, or it will cause abnormal abrasion, shoulder separation, delamination, edge blasting, etc.

The carried cargo on the truck should be distributed uniformly, do avoid any unbalanced loading.

The tire with high grade and heavy load should not run at high speed.

Reinforced tire must enhance load capacity according to the design standard.

-Assembly

The tire must be assembled on specified truck model and rim; when assembling/disassembling tires, special tool and appliance should be used; no prizing or breaking is allowed.

Same axle should be installed with the tire of same specification, structure, pattern and grade.

Bias-ply tire and radial tire could not be mounted in mixture.

The rotation direction indicator should be in line with the running direction of truck when the truck is installed with rib tire.

Antiskid chain should be installed symmetrically, and should be removed immediately once stop using.

-Rotation

The position of tire should be rotated regularly. The position of truck tire should be rotated once every 5,000km.

-Tubeless tire

Tubeless tire is divided into steering wheel and driving wheel. The steering wheel is characterized by excellent steering property, while the driving wheel is characterized by adhesive force. Therefore it is not allowed to apply driving wheel tire to the steering wheel.

Spare tire must be of steering wheel tire.

-Full-wheel-drive tire

If the truck adopts full-wheel-drive method, generally it is required to use the tire with same specification, size and structure.

The rolling circumference difference of front and rear axles should not exceed 2%, otherwise the power transmission system will produce stress in case that the front axle meshes or inter-axle differential locks, which will subsequently bring about severe damage to the safety and running performance, meanwhile may speed up the abrasion of tire.

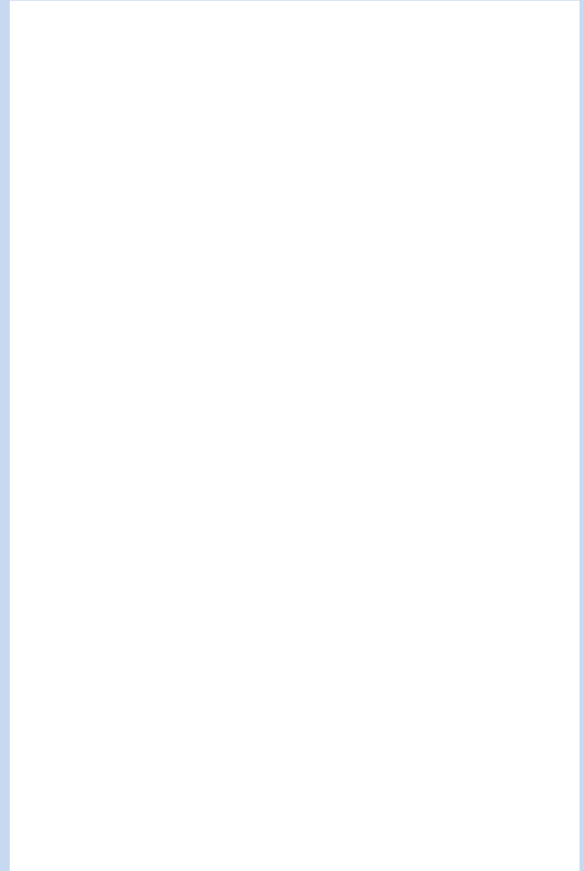
-Replacement of tire size

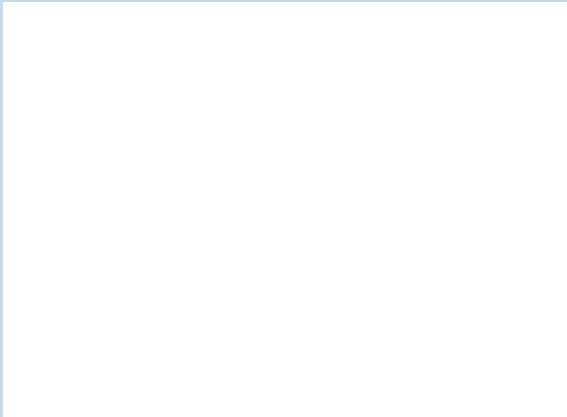
The truck is only allowed to install wheels and tires with specified sizes.

If replacing the size of tire, you should refresh programs of CBCU, ECU and tachographs, or else it will affect the accuracy of tachograph.

-Basic specification

Because of the solar radiation and environmental influence factors, tires will age gradually and rubber inside tire will gradually lose its elasticity. Tires will become hard and brittle with crack little by little. Tires shall be changed in time according to their use and wear situation.





Replace with spare wheel

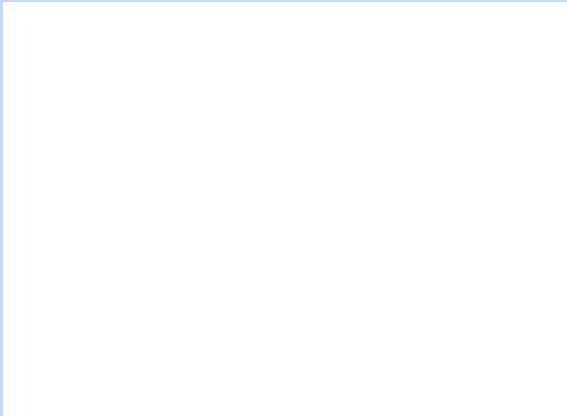


WARNING

When unloosing the spare tire, due to that the tire is heavy, the centre of gravity is variable, and therefore the spare tire is likely to be dropped or overturned to damage the operator or other people.

Removal of spare wheel

- Remove wheel nuts.
- Take down the spare tire pressing plate.
- Remove the spare tire.



Installation of spare wheel

The steps for mounting spare tire are converse to those for removal. Regularly check and fix nuts of the spare tire.

Replacement of wheels



WARNING

Turn off key switch before change with the spare wheel.

- When it is necessary to change with spare wheel, be sure to observe local traffic laws (such as place a triangle warning board) and make sure the vehicle will not slide for the sake of your safety.
- Remove fixing nuts of the wheel until only 3 evenly distributed nuts are left.
- Place a jack on the support point designed at one side of the vehicle to make sure it will not slide.

Note: Jack shall be inspected by professionals (professional service center) at least once per year according to relevant stipulations.

- Jack up the vehicle and ensure the foundation is solid
- Confirm the replacing wheel may move freely with the wheel nuts and then loose the last 3 wheel nuts.
- Pay attention not to damage thread when removing the wheel.
- Remove rust and impurities on contact surface among brake drum, rim, nut and bolt before installation of the spare wheel, clean wheel locating hole and mating excircle at the wheel edge and apply a proper amount of grease.
- Pay attention not to damage threads during installation of the spare wheel (tire inflation pressure must conform to specification).
- Tighten nuts in diagonal cross sequences until nuts are hardly moved by hand.
- Put down jack to lower wheels and cross tighten nuts with 550-600Nm torque.
- Retighten nuts of a new vehicle after running for 50km approximately inspect everyday to meet the specified tightening torque and if necessary tighten until nuts are tight.





Inflation of tires

Inflate tires with inflation connector installed on the air dryer in following steps:

- Remove dust cap ① of the connector.
 - Connect one end of the tire air-charging hose to the inflating valve of tire.
- Connect the other end of tire inflation hose with inflation connector of the air dryer.
- Speed up the engine.
 - Inspect tire pressure and correct the pressure if necessary.

Towing and Towing Start

Overview

The vehicle is equipped with a tow hook used for towing and towing start for the sake of self-rescue. The frame chassis is provided with assembling screw holes for mounting the towing fork. Generally, the hook is put inside the storage box at the driver side when not used and installed completely into the installation threaded hole ① when used.

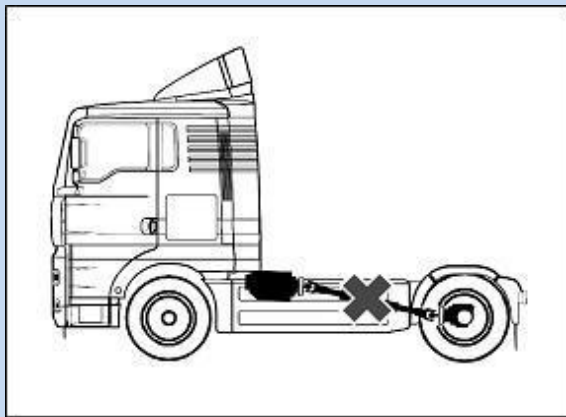
When towing the vehicle trapped in soft ground such as mud pit, goods on the vehicle shall be unloaded first and if this is not practical due to technical factors or actual conditions, as much force bearing points (points on axle are preferred) on vehicle as possible shall be selected when towing the vehicle.

In the towing, emergency warning lamps of the trailer and the vehicle shall be turned on.

General requirements

- Abide by the instruction on “electrical system”.
- Open the key switch.
- If possible, keep the engine running to start the brake system and auxiliary power steering system.
- Set the key to the driving position “II” and do not pull out.
- Shift the transmission to the neutral position.
- Slowly drag the truck if the air suspension has fault.
- If the truck is trapped, do not swing to the left/right or along the diagonal direction when dragging the truck; especially drag the truck from the side face.
- Lift the front axle if the steering system is damaged.





Towing preparation (traction)

Before towing, disconnect drive shaft and cut off power.



WARNING

- The steering system will be damaged if the static truck is steered without hydraulic power!
- The truck could be steered without hydraulic power only under running state.
- Larger force should be applied to the steering wheel to slowly drag the truck if the engine shuts down and if the hydraulic power becomes invalid.
- If the air pressure reserved in the brake system is insufficient and the spring brake is started up, external compression air could be introduced (0.55MPa at least) or mechanical means could be adopted to release the brake system, please refer to “Energy storage spring brake chamber – emergency release”, notice that the brake of truck has been released from then on!

Towing in case of axle damaged



WARNING

- If the truck is lifted, please turn off the ignition switch.
- Turn the key to the "0" gear.

Front axle

- Realize the traction action by specialized transportation equipment or after lifting the front axle.
- The driving shaft of rear axle should be disconnected if want to lift the front section of truck.
- For four-axle truck, only the front section is allowed to be lifted.

Rear axle

- Realize the traction action by specialized transportation equipment or after lifting the rear axle.
- The driving shaft of front axle should be disconnected for full-wheel-drive truck.

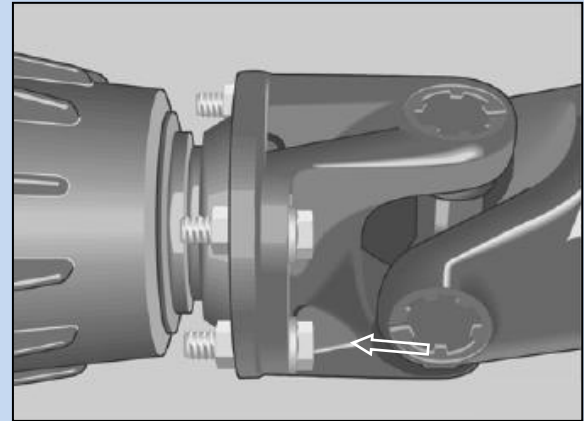
Support axle

Realize the traction action by specialized transportation equipment or after lifting the axles.

The emergency method for delivering truck to the nearest maintenance station:

- Screw off the support axle wheel and screw the nut back to the brake drum.
- Slowly drag the truck under the condition that the support axle is hanging on the shock absorber.

Make sure the air bag is located at the correct position after repairing.



WARNING

- If no any condition could be realized, disconnect the driving shaft at the flange of rear axle or disassemble the axle shaft.
- If the transmission is doubted as "damaged", disconnect the driving shaft at the flange of rear axle or disassemble the axle shaft.

Towing vehicle with tow bar

A driver must be on the vehicle to be towed to steer and brake.

- Start the engine.
- Charge the brake system with air until the air drier begins to unload.
- Turn the transmission to “neutral”.
- Disconnect the transfer gear.
- Release the parking brake (hand brake).
- Slowly tow the vehicle.
- The towing speed shall not exceed 60 km/h.

After towing

- Shut down the engine

Apply the parking brake; if necessary, wedge the wheels to prevent the vehicle sliding

Towing start

Sinotruk does not recommend starting the engine by towing. We recommend jump start, see “Jump start” (page 191). Please ensure the starting engine of the breakdown vehicle and the battery is in good condition.

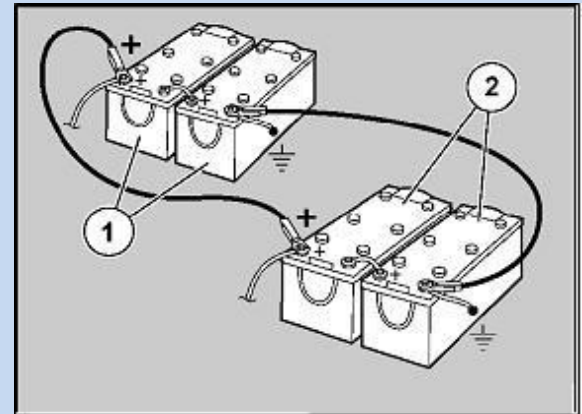
Jump Start

If engine fails to get started for low battery, it is allowed to use another battery for engine start. Please refer to operation instructions before using auxiliary equipment. Only jump wire with enough cross section is allowed.



WARNING

- Only up-to-standard jumper could be used.
- Please use jumper as per the instruction.
- The batteries with same rated voltages (24V) could be used.
- Do not use any charger or any jump starting device which is used for auxiliary starting.



① The battery providing jump starting ② The battery receiving jump starting

Connecting of positive and negative terminal (the engine is shut down)

- Connect the positive terminal
- Connect the negative terminal of charged battery to the earth point of transmission or engine.



WARNING

Do not connect negative point to the truck frame!



- It is also allowed to adopt the jump starting device with main switch. Keep main switch disconnected until the negative electrodes of two sets of batteries are connected successfully.
- Start the engine which provides jump starting.
- Start and operate the engine which requires jump starting, and maintain the engine running for 15 seconds maximally.

Disconnection of positive and negative terminal

- The disconnection sequence is contrary to the connection sequence.

Energy storage spring brake chamber – emergency release

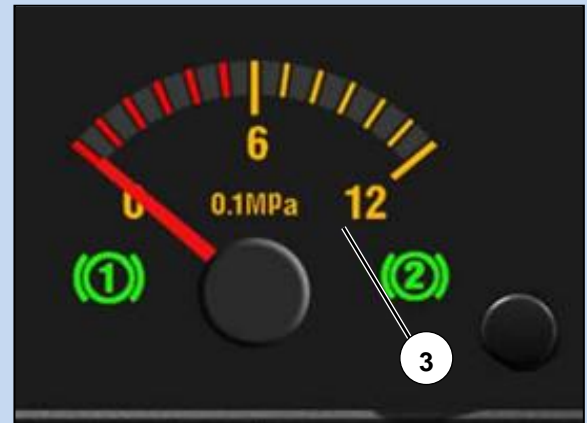
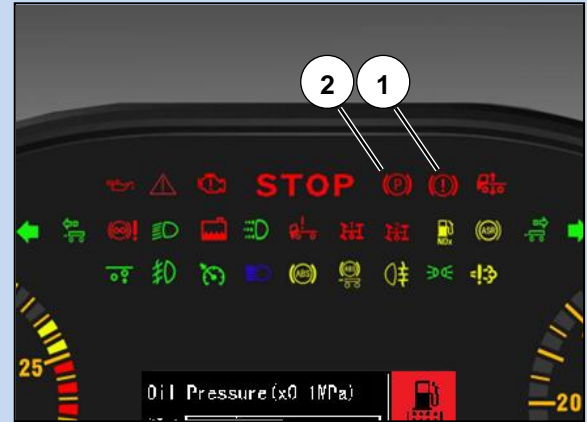
When the parking brake circuit pressure is lower than 0.55Mpa and the air pressure that acts on the cylinder diaphragm is lower than the spring force, the spring brake will take effect.

The signal of “STOP”, the fault lamp ① of brake system and the parking brake lamp ② will light up simultaneously. In case of emergency, or at the service station, the energy storage chamber of the spring brake could be released by pneumatic or mechanical means.



WARNING

- Before releasing the energy storage spring brake chamber, make sure the truck could not move automatically!
- The emergency release device of energy storage chamber of spring brake could only be used at the service station or under emergency situations.
- The running truck may result in accidents after the emergency release of energy storage chamber, as the effective brake could not be guaranteed by the air pressure in the service brake circuit I and circuitII (See air pressure gauge ③) !
- The truck should not be operated before all failure warnings disappear from the dash board.



Energy storage spring brake chamber – emergency release



Energy storage chamber spring brake-parking release

Push the handle ① of handbrake to the release position and the indicating lamp on the dash board will be out.



WARNING

- Only when the pressure of brake system is higher than 0.55Mpa and the corresponding indicating lamps are off can the parking brake be released completely.
- Never start the truck before the lamps are off.

Energy storage chamber-mechanical emergency release

Diaphragm spring brake chamber

In case that the pipe connecting to the spring brake chamber is leaking and subsequently cause automatic brake, the brake could be released only by unscrewing the bolt ① from the rear end of spring brake chamber to the release position.

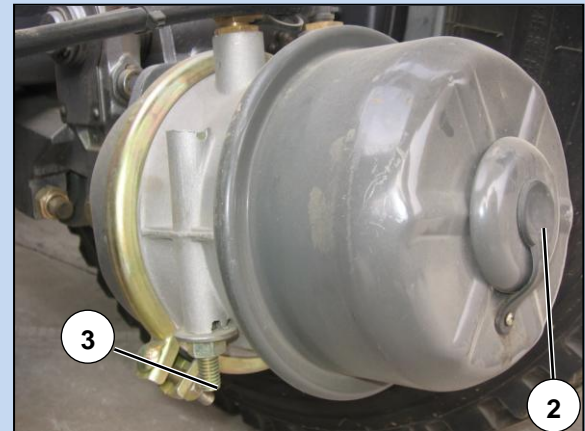
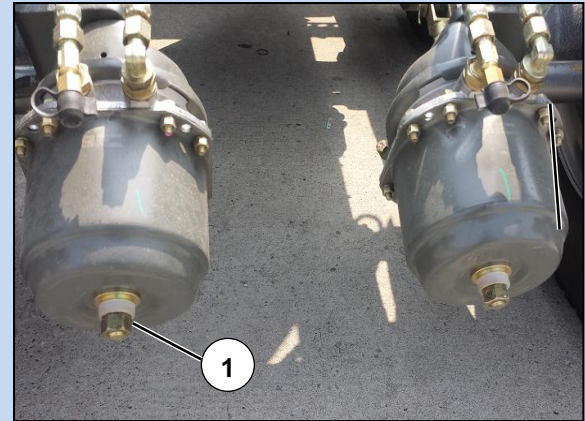
Dual-diaphragm spring brake chamber

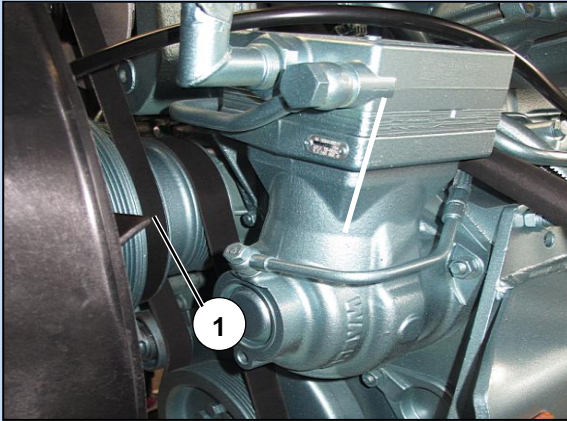
Open the rear cover ② of dual-diaphragm spring brake chamber, and screw out the bolt ③ by hands after inserting into rear cover, and then the parking brake will be released



WARNING

- Before releasing the spring brake cylinder, first shift to gear 1, and then inspect whether the function of service brake (foot brake) is normal.
- The wheels must be blocked to avoid sliding when releasing spring brake cylinder on the sloped road.
- Never start the truck before the parking lamp goes out!





Belt

Conditions check (per month)

See "Tilting mechanism of driver's cab" for the overturning of driver's cab.

- Inspect the cracks, oil spots, aging and wearing conditions of the belt ①.
- If there is any damage, oil spot, aging or wearing condition, please send it to the service station of SINOTRUK for replacement.
- Visually check whether the damping element leaks oil.

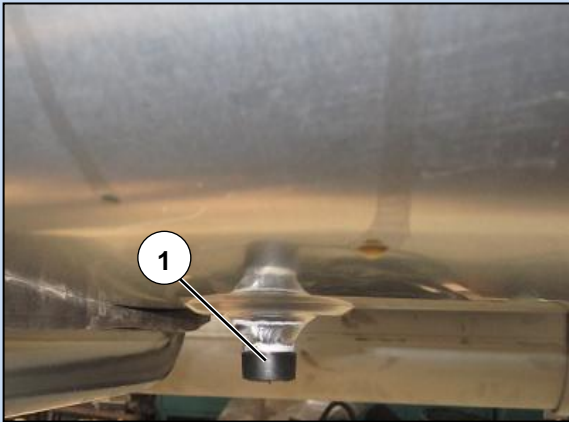
Inspect the belt pulley at the maintenance station of SINOTRUK.

- Belt change period: The vehicle running 2 years or 200000Km, whichever comes first.



Fuel system

- Inspect the status and tightness of fuel system
- Visually inspect pipelines and connections (especially those near heat sources) of the fuel system for damages and corrosion.
- In case of any leakage, please have the system repaired immediately at a SINOTRUK service station.
- Fuel must not exceed 95% of the fuel tank volume.



- Unscrew the screw plug ① of oil drain at the bottom of fuel tank to empty the fuel tank (diesel).

Fuel coarse filter (oil-water separator)

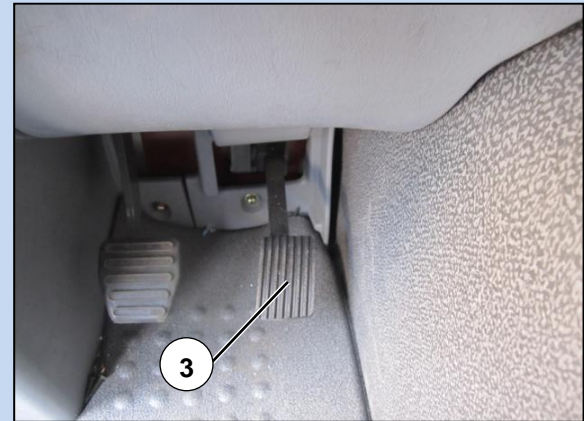
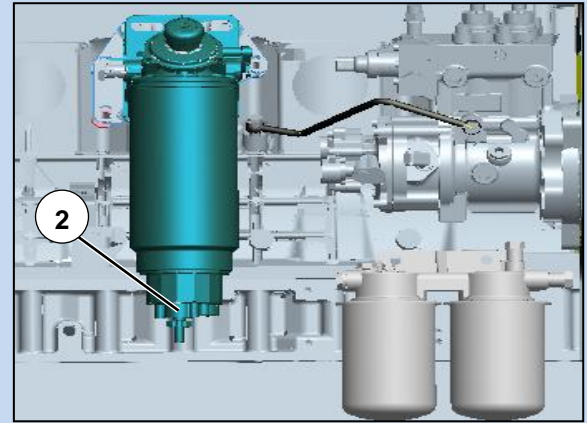
Check the impurities and water, remove them according to the requirement.

(weekly or more frequently, depending on the weather, use and operation situation)

- Park the vehicle.
- Unscrew the nut at the bottom of the fuel filter ②.
- Remove the impurities and water. Dispose them properly.
- Tighten the nut.

Accelerator device

Apply accelerator pedal ③ when the vehicle is starting and running if necessary.





Vehicle LNG supply system



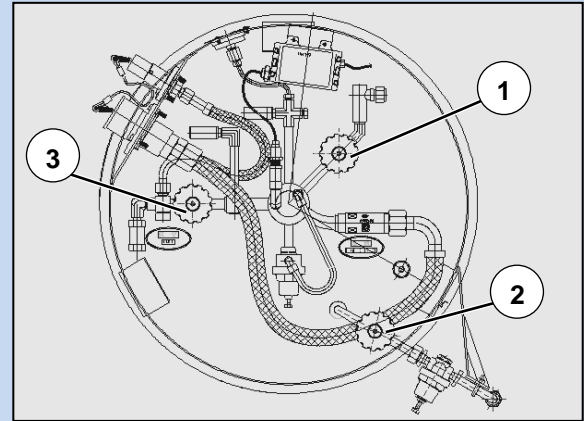
WARNING

- LNG with extremely low temperature in the ambient atmospheric pressure: -162°C .
- Natural gas can be suffocating.
- Natural gas is a flammable gas.
- Do not allow the non-professionals to operate the vehicles with LNG supply system.
- Do not allow the non-professionals (without relevant qualifications) to repair the LNG supply system.

Valves operation

LNG cylinder operation is simple, during daily normal usage, and it need no frequent valve operation. Only three valves may require user operation:

- Delivery valve ①: It is normally open, and shall be closed when failure; the opening should be slow after once closed, to prevent over-current valve automaticly cut-off;
- Booster delivery valve ②: It is normally closed, when cylinder pressure is too low, you need to open the valve for self-boosting;
- Vent valve ③: Open when the cylinder pressure relief.



Vehicle LNG supply system

LNG filling

Conventional filling

LNG filling according to this method is through a separate filling hose achieved. When filling, first release the inner cylinder pressure to 0.6 ~ 0.9Mpa. Second, connect fueling nozzle to aerated block. Then open filling machine filling switch, and the liquid will inject into gas cylinder through the inlet tube inside. Filling will stop automatically, when the level reaches the rated position.

Vent filling

- If the cylinder inner pressure is too high, resulting in extra time was difficult, it need for vent filling;
- Connect the fueling nozzle to aerated block of the cylinder, and gas-return gun to gas-return block of the cylinder.
- Open the vent valve to release the cylinder pressure to filling machine needed pressure or less, and then close the vent valve;
- Open filling machine filling switch to fill until it automatically stops, remove the nozzle and gas-return gun.

WARNING



- A completely filled cylinder pressure rises very rapidly and may lead to frequent safety valve open; therefore completely filled cylinder should be put into use as soon as possible to prohibit prolonged storage.
- When remaining liquid inside cylinder more than two-thirds, filling should be avoided.

Thermal cylinder filling

- Usually the vehicle LNG welded insulation cylinders before first filling and more than two weeks off work are called thermal cylinders. Thermal cylinders filling should be in accordance with the following procedures:
- First, fill about 30L LNG into the cylinder, standing. In the process of LNG vaporization boosting process, gas cylinder liner has also been cooled down.
- When the cylinder pressure reaches normal operating pressure, conduct system tightness test;
- You can follow the conventional filling or vent filling procedure after reducing the pressure through the vent valve.

System maintenance

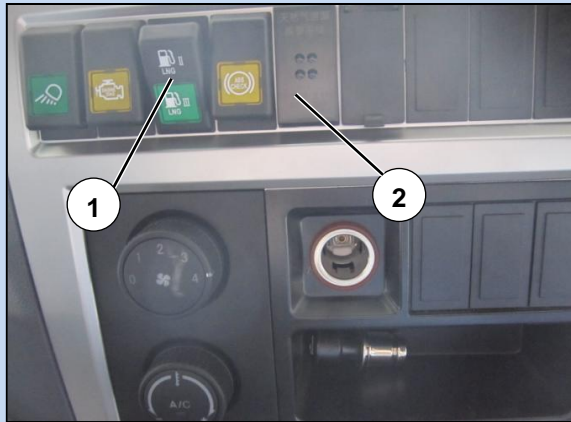
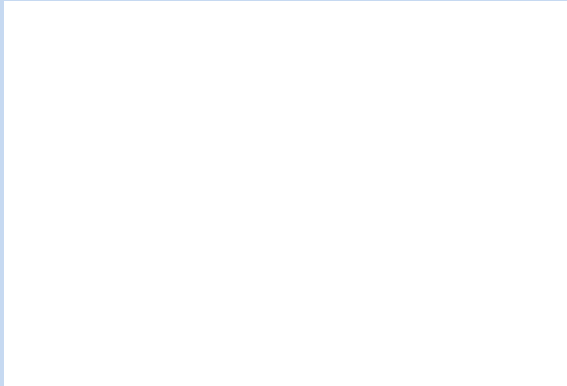
- To ensure the normal operation of the vehicle, periodically performed leak checks on the system are needed; it should be repaired immediately if leak was found.
- Any fuel leaks, once discovered should repair.
- A vacuum failure cylinder, the pressure will be about 0.1 ~ 0.4MPa/h rates rise rapidly, the pressure change is very obvious, shall contact SINOTRUK service station for processing.
- When removing or replacing parts, contact SINOTRUK service station for processing.

Applicable conditions

In bad road conditions, shall be kept at low speed, otherwise it could lead to fatigue failure of the supporting structure, and cause leaks and other accidents.

Regular maintenance requirements as follows:

Maintenance items	Maintenance intervals	maintenance method
Coupling nut on the cylinder pipe	Before each trip	Visual observation for leakage
Vaporizer	12 months	Clean up the scale on the coil
Valves	7500km or 2 months	Closed lax, leaks
Relief valve	12 months	Send to local technical supervision department
pressure gages	12 months	Send to local technical supervision department
Cylinder vacuum	12 months	Pressure test
Leak detection of Each connection point	7500km or 2 months	Tightness test or probe leak detection



Natural gas gauge

Natural gas gauge: Displays the amount of gas in cylinders.

If the pointer return to scale 0 or less, which represents the gas sensor signal failure, and gas alarm lamp will flash on the fuel gauge. When gas amount is less than 12.5% (the pointer is at red zone), the gauge will light on the low gas level alarm lamp to prompt the driver to fill gas timely. When the gas gets higher than 14.5% again, the gauge will shut down the lower gas level alarm lamp.

The number of LNG cylinder selection switch

The switch ① has three gears (the upper, the middle and the lower) which indicate the gas cylinders respectively. When installing cylinders fewer than gears and selects the corresponding gear, gas meter display is empty.

Gas leakage alarm

When a gas leak reaches the set alarm levels, alarm ② performed audible and visual alarm.

Note: According to the use environment of the vehicle, to ensure safety, please implement periodic inspection. Inspection period of 1-3 months, check the alarm host and the detector is operating properly or not. To avoid the impact of artificially high concentration of natural gas to the detector, otherwise it will reduce gas sensor sensitivity for a short period. Please avoid contamination of silicon component material to prevent damage to the detector during use! If the gas leak, the vehicle will alarm with sound and light. Park the vehicle and turn off the power as soon as possible. Immediately look for leaks, close the valves, turn on ventilation, etc. Do not plug or unplug the connector between alarm vehicle and detectors, as this may damage the system's internal chip. If detector sensor is damaged or has failure, no replacement is allowed without permission. It should be sent to Sinotruk service station for repair.

Vehicle CNG supply system

CNG system components

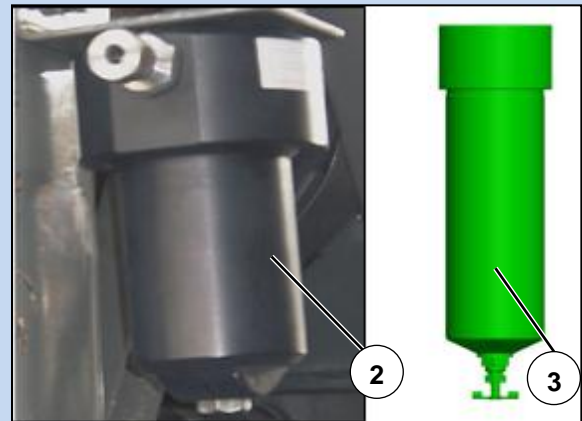
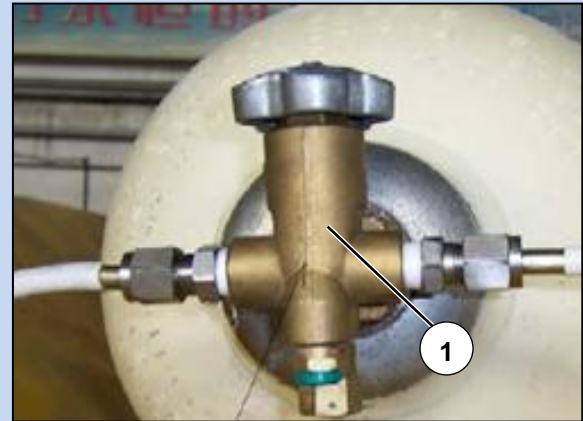
CNG system consists of gas cylinder, gas cylinder valve, high and low pressure filter, integrated control assembly, low pressure solenoid valve, pressure reducing regulator and pipelines, etc.

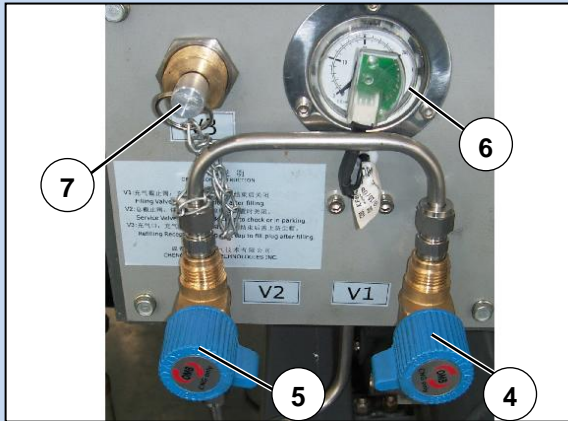
Gas cylinder and gas cylinder valve

Before the engine starts, ensure the gas cylinder ① is open. The gas valve integrates fusible plugs and rupture disks, which ensure the gas cylinder's timely releasing pressure under high temperature and high pressure. The overcurrent protection device in the gas cylinder valve ensures timely cutting the pipes when the gas supply system has leakage.

High and low pressure filter assembly

High pressure filter ② and low pressure filter ③ can effectively filter the water and impurities in the natural gas in order to better protect the engine.

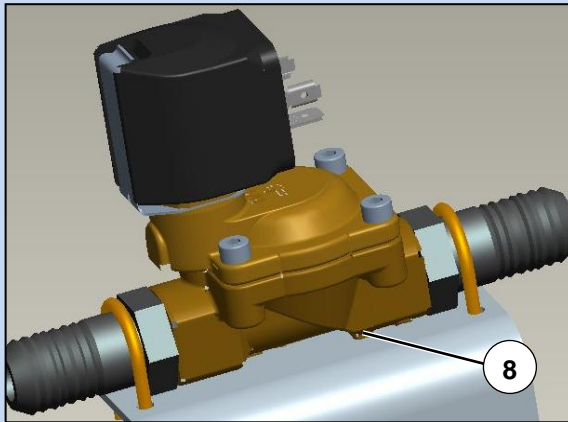




Integrated control assembly

Integrated control assembly includes stop valve V1 (4), stop valve V2 (5), barometer (6) and air charging port (7).

- Stop valve V1 is filling stop valve. Turn on the valve when inflating and turn it off when inflation is completed.
- Stop valve V2 is gas supply valve. Turn on the valve before starting the vehicle. Turn off the valve when the vehicle needs maintenance or parks for a long period.
- The barometer indicates gas pressure of the system.



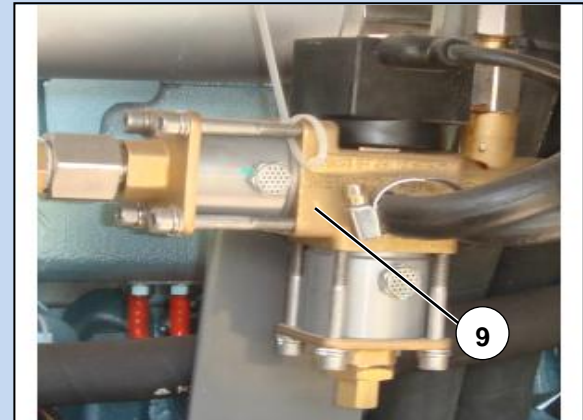
Low voltage solenoid valve

Low voltage solenoid valve (8) which is normally closed is used stop the flowing of natural gas. Turn the valve on when the vehicle is powered on.

High pressure regulator

High pressure regulator ⑨ is used to reduce the pressure of gas from 20Mpa to 1Mpa.

High pressure regulator is fixed on the bracket with its own retaining nuts. The connected outer threads should apply raw material belts or thread sealant: Loctite 565, Loctite 567, Loctite 592, Permatex 562xx or Permatex 8063x. Tightening torque of retaining nuts is 30Nm.



Vehicle CNG supply system

Filling of CNG gas system

Ensure the pressure of the gas cylinder is above 5Mpa. Consider to fill the fuel gas cylinder when the pressure of gas cylinder is below 5Mpa.

Fill the fuel gas immediately when pressure of gas cylinder is below 2.5Mpa.

CNG vehicle should apply the fuel gas according to ISO/FDIS 15403, otherwise the resulting reduction of power may damage the engine.

Sinotruk only provides paid service.

Notice:

Because of the high temperature of fuel gas filled, the process of filling will release great amount of heat. The phenomenon of reduction of fuel gas pressure is normal due to sufficient cooling of the gas.

CNG vehicle operation

Drivers of CNG vehicles should have specialized technical training and be familiar with the operation & maintenance and safety requirements of natural gas engine, especially the natural gas system to ensure the normal use and safe operation of natural gas system.

Check before starting the vehicle

After parking at night, observe the indicated pressure of the barometer in the integrated control assembly, and observe it again before starting the vehicle the next day. If there are no obvious decrease, the natural gas system has no leakage. Otherwise it has leakage in the natural gas system. Contact Sinotruk service station for maintenance.

Do not start the vehicle under the condition of leakage!

Notice: The instrument display panel in the cab indicates the remaining proportion of compressed gas in the gas cylinder rather than the actual pressure. The actual pressure is subject to the indicated pressure of the barometer in the integrated control assembly.

Treatments to the problems during driving

When the temperature of circulation water of the engine is normal while the vehicle is running, the pressure regulator will not be frozen and ice-blocked. In cold winter, a thin layer of thin frost may be attached on the surface of pressure regulator, which does not influence its normal functions.

In case there is leakage or big noise when the vehicle is running smoothly, park the vehicle and troubleshoot before continue driving.

Emergency treatments to the problems during driving

In case the vehicle has natural gas leakage due to cracked pipelines and loosened sleeves, pull over the vehicle to the side of the road immediately. Turn off the power and close all the valves of gas circuit. Contact Sinotruk service station for maintenance.

In case of severe leakage, failed throttle valve and failure of closing the throttle valves of gas cylinder, evacuate and keep people away from the scene. Keep away from fire source. Make the case to related departments of vehicle service, fire fighting and transportation. Dispose of the vehicle after the natural gas has fully exhausted.

In case of a fire, turn off the main switch of the battery and close all the valves of gas circuit as many as possible. Call the police immediately. And isolate the scene while putting out the fire with fire extinguisher. Spray fire fighting foamer to prevent the explosion resulting from excessive temperature of gas cylinder.

Requirements when the vehicle is parking:

Turn off the power and engine when the driver leaves the vehicle or temporarily parks for more more than 10 minutes.

Only the gas leakage detector, soapy water or other non-corrosive foam can be applied for inspection of leakage. Open fire is prohibited to inspect the leakage.

Do not strike or crush the devices of natural gas system. Keep away the fire source for over 10m.

Do not operate the vehicle with leakage or failures in the system!

Before starting the vehicle, slowly open all the valves of gas supply circuit and prevent the functions of throttle valves.

The engine should be stopped and the power should be turned off when filling the gas.

Do not privately dismantle and repair the CNG system assembly and parts when the vehicle malfunctions. Contact Sinotruk service station for maintenance.

Vehicle CNG supply system

Repair and maintenance

Routine maintenance

Besides the maintenance requirements of the complete vehicle, users should conduct routine maintenance to the natural gas system. Notice: the higher level includes all the items of the former level of the requirements.

Maintenance after 5000km:

Inspect the leakage and damage of all the high and low pressure pipe connection, valves of gas circuit, pressure reducing regulator and other system parts. Inspect whether the mounting of all the components is secure and fixed, whether the pipe clamps is fastened, and the pipelines' interference with other components. Troubleshoot the problems occurred.

Maintenance after 10000km:

Replace the low pressure filter element; inspect the leakage of pressure reducing regulator; inspect whether the pressure of the outlet of pressure reducing regulator is normal and whether the pressure release valves of the pressure reducing regulator function well.

Maintenance after 50000km:

Test the functions of pressure reducing regulator. If its performance cannot recover to the state near the ex-factory level, replace it. Inspect the damage and aging of the rubber hoses of circulating water.

Maintenance of high pressure filter:

Drain water every 5000km.

Replace the filter element every 30000km.

Maintenance of low pressure filter:

Discharge pollution for the assembly every 15-30 days.

Replace the filter element every 10000km or every 3 months.

Notices:

Information of the maintenance of CNG supply system can be get from Sinotruk service station. Do not privately dismantle and repair the CNG system assembly and parts when the vehicle mulfunctions. Contact Sinotruk service station for maintenance.

Carefully write and save the driving records regarding natural gas system for the reference of maintenance.

Air cleaner

Dry-type air cleaner



WARNING

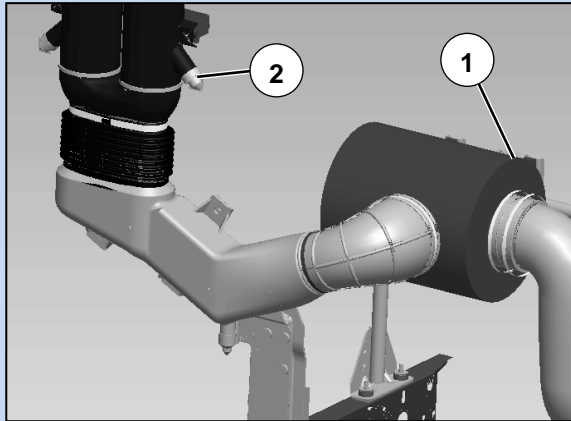
- Never clean it with oil or water!
- The safety filter element cannot be cleaned and shall be replaced together with the outer filter element.
- Please use original Sinotruk filter element for replacement. For non-Sinotruk filter element that leads to fouling in the engine airtake inlet, SINOTRUK only provides paid service.

- The filter element of dry-type air cleaner ① must be maintained properly to prevent blocking of filter element, decrease of engine power and increase of oil consumption.

Maintenance period: in ordinary areas 8000~12000km, in dusty areas or areas with bad conditions, the period shall be shortened as appropriate.

- When the filter element maintenance exceeds 4 times or it service has exceeded one year, replace it with a new one.





Cleaning method:

- Firstly, loosen those fixing latches on end cover ① of air cleaner and detach the end cover, remove dust in it and clean it.
- Pull out the main filter element, purge with compressed air from inside to outside and clean rubber gaskets at both ends. Take care to make sure the compressed air pressure will not exceed 0.5MPa or otherwise, the paper filter element may be broken.
- After cleaning, you should carefully inspect the filter paper to avoid damage and the end sealant for cracking, if any, the filter element must be replaced with a new one.
- After inspection, press the filter element into the housing in place, install the end cover and fasten the elastic buckles.
- Finally, inspect the seal of air intake pipeline for intactness, and particularly, check if the hose clamps are loose. Inspect the pipe wall for wear to prevent air accidentally entering the engine.

Cleaning dust bag

Used in winter and dusty conditions, the dust bag ② should be emptied and cleaned on a daily basis. Drop and poor tightness (caused by damage) of the dust bag will degrade the filtration effect, resulting in premature wear of engine and supercharger.

Oil bath air cleaner

**WARNING**

- The cleaner is not filled with engine oil before delivery of new vehicle.
- Before use, the cleaner must be filled with engine oil. The type of the engine oil filled should be the same as that applied by the engine!
- Fill the cleaner with engine oil up to 30 mm or 5 L.
- If the engine oil cannot flow easily when you are swinging the bottom case, the filter element shall be cleaned and the oil shall be replaced. In especially severe conditions, the cleaner shall be inspected daily. In normal conditions, the cleaner can work 80 to 150 hs. The filter element can be used for a long time without the need of replacement.
- Housing and connection bolt must be checked on daily basis to ensure that they are tightly fastened.





Oil bath air cleaner

Steps of disassembling, check and cleaning:

- Unlock the locking devices of upper and lower housings.



- Take down oil pan and pour 5L oil into it, or until oil level reaches 30mm.

- Clean the lower filter element assembly

Clean the fan blade and filter element until no visible oil sludge on the fan blade and filter element.



- Clean the upper filter element assembly according to the same method as that for lower filter element.



Air cleaner



- Fit the filter element assembly. Install the upper filter element first, then the lower filter element and finally fix them with rubber gasket, flat gaskets and butterfly nuts.



- Fit the bottom case. Securely fix the bottom case filled with oil by using draw hooks.

Electrical system

Electrical system

Caution:

For safety purpose, please cut off the battery or disconnect the master switch of battery before modifying the electrical system.



WARNING

Hydrogen-oxygen mixed gas will be generated in the enclosed battery box. When disconnecting battery terminals, the electric equipment or monitoring device in operation will generate sparks and ignite the gas. Therefore, you shall fully purge or clean the enclosed battery box with

compressed air before disconnecting the terminals.

- Do not start the engine unless the battery is securely connected.
- Do not disconnect the battery when the engine is running.
- The tow-starting can only be conducted when the battery is connected and has been partially charged. See “Towing & Tow-starting”.
- Jump starting of vehicle shall not be achieved by charger.
- Before charging, disconnect the positive and negative terminals.

Order of disconnection: negative first, then positive.

Order of connection: positive first, then negative.

- If left unused for long time, the battery shall be charged every four weeks.
- Only use proper measuring equipment to measure voltage.
- To avoid short circuit, the input resistance of measuring equipment shall be 10 MΩ at least.
- The ignition switch shall be shut down before disconnecting and connecting plugs of all electronic control units.
- Plugs or sockets with visible rust or cracks shall be replaced.

When cleaning the vehicle:

Sockets, engine and generator shall be protected against moisture (splash); sockets of tractor and trailer shall be cleaned with about 0.6 - 0.8 MPa compressed air rather than water or mechanical objects.

- If the vehicle is equipped with AC generator and 400 V 3-phase AC sockets (such as refrigerator truck), the cleaning can only be conducted after the engine and external power supply are shut down.

- When conducting electric welding:
 - disconnect the battery and connect the positive and negative cables unpacked
 - You must use DC power supply. Check if the polarity of electrode is correct.
 - Turn on the mechanical master switch of battery.
 - The electromagnetic type switch connector shall not be connected to the battery. In disconnection, you may also remove and connect those cables.
 - Place the earth wire of welding equipment as close to the welding area as possible and earth the equipment at the place with good electric conductivity.
 - Cables of welding equipment shall not be placed in parallel with cables of vehicle.
 - Make sure the welded parts are in good contact to ensure a good electric conductivity; e.g. use negative clip of welding equipment to press welded parts together.
- The battery box of truck, dump truck and cement mixer has an electrical connector for installing position lamp (one-side power shall be less than 100 W).



WARNING

Users shall not add new electric equipment or modify the electrical circuits on vehicle without permission, or else, the electrical system of vehicle may break down and result in serious consequence!



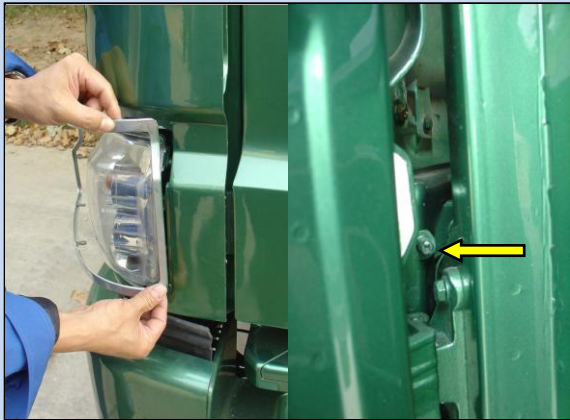
Lighting

Replacing bulbs

Shut down the defective electric equipment before replacing bulbs

Do not use bare hand to have direct contact with the bulb glass.

When installing new bulbs, please ensure that the identification label on the bottom of new bulb is the same as that of the old bulb.



Headlamp

Check the setting of headlamp after replacing high beam and low beam.

Adjustment of the headlamp

When the current headlamp is needed to be checked or replaced, the dismantling and installing should be operated in line with the following steps:

- Dismount the decorating frame of outside of the headlamp.
- Open the door of the same side and unscrew the bolts which fix the headlamp (as indicated by the arrow)

- Gently pull out the headlamp.

**WARNING**

Do not use bare hand to have direct contact with the bulb glass.

Adjustment of the light beam

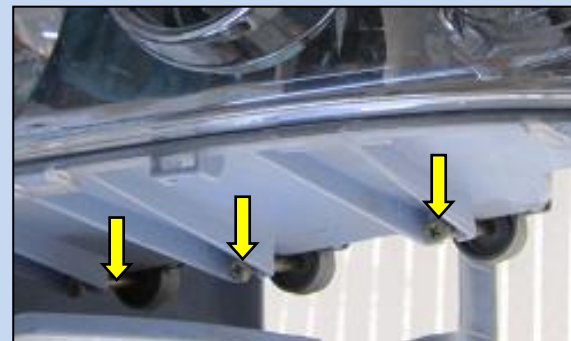
- Dismount the decorating frame.
- Adjust the three bolts as indicated in the image.

Fogging inside lamps

The heat generated by headlamps when they are lit dissipates through the ventilation hole through which outside cold air may come inside, thereby causing fog. This phenomenon usually appears in the winter, rainy seasons or in regions and climate with high humidity.

In this case, if the fog lamps light up 45 minutes, fog will disappear automatically.

This phenomenon is normal.



Vehicle cleaning & maintenance

Vehicle cleaning & maintenance

The periodic professional maintenance may help to maintain the vehicle value.

Vehicle cleaning



WARNING

If the vehicle is equipped with high voltage electrical system (with working voltage exceeding 24 V), please shut down the engine before cleaning the vehicle.

- You can only clean the vehicle at a completely equipped site with complete equipment and shall take measures to avoid environmental damage.
- In the first few weeks, you must frequently wash the new vehicle and newly painted vehicle with clear water. In the first 6 weeks, vapor cleaner shall not be used.
- The sponges used for vehicle cleaning shall be thoroughly rinsed.
- When cleaning, the vehicle shall not be exposed to the sun.
- Clean the wheels and wheel covers with brush and water.
- If the alloy wheel is very dirty, you may rinse it with cleaning solvent or special cleaning agent.
- Do not spray water on device at working temperature.
- Do not wet sockets (semitrailer tractor/trailer), AC generator and starter.
- If using vapor cleaner, please operate strictly according to the

manufacturer's instructions and keep the nozzle at least 30 cm away from the paint work surface.



WARNING

When using vapor cleaner, do not spray water directly into the steering knuckle.

- The vehicle shall be coated with lubricating oil after cleaning with vapor cleaner or oil soluble detergent.
- The vehicle shall be cleaned more frequently in winter.
- Do not spray paint or apply oil on brake pipes or treat with gasoline, benzene, petroleum, mineral oil, etc. In painting and lubricating, you shall ensure that the brake hose shall not be in direct contact with spraying or coating substances or lubricating oil and grease.

Cleaning sockets of tractor and trailer

Sockets of tractor and trailer shall be cleaned with about 6 – 8 bar compressed air rather than water or mechanical objects.

During the cleaning, the key switch and lighting must be shut down.

Paintwork maintenance

- Small damage shall be immediately repaired.
- The paintwork shall be protected against corrosion as appropriate.

Rearview mirror

- Clean the mirror surface with glass cleaner.

Cleaning cab

- Clean the steering wheel, gear shift lever, dirty trim and carpet with warm water and cleaning solution rather than detergent.
- Oil dirt can be removed with alcohol rather than gasoline.
- If the temperature is below 30 °C, curtains can be cleaned with flexible cleaning agent.
- Safety belts shall be cleaned with warm water and soap rather than chemical detergent.

In frosty days, seals of doors and windows shall be treated with talcum powder to prevent doors and windows are frozen together with sealing strips.

Cleaning and maintenance of seat & sleeper

- Plastic parts (e.g. belt, support and control lever) shall be cleaned with wet cloth; if very dirty, cleaned with solvent type cleaning agent (cleaning solution)

Trim and seat cushions may be cleaned with special wet cleaning cloth or dry foam and soft brush.

Vehicle cleaning & maintenance

List of dirt

Substances listed in the tables below can be purchased from chemical stores or specialty stores. Those substances shall not be sprayed on material surface. The following treatments are based on experience and you may test each substance at invisible places. We assume no responsibility for any loss incurred by using those substances.

Water-soluble Dirt

Dirt	Cleaning Agent	Treatment
Bloodstain, egg, excrement and urine stain	Cold water, shampoo, foaming solvent for carpet	Apply the reagent on soft cotton cloth until the dirt is dissolved. Do not wipe violently, otherwise, the surface will be changed; if necessary, wipe from periphery to center and rinse with clear water.
Fat-contained substances, e.g. vomit, coffee with cream, hot chocolate, lipstick, mayonnaise, milk, ice cream and seasoning	Warm water, shampoo, foaming detergent for carpet, benzene and detergent	Ditto.
Ordinary alcohol, beer, carbonated beverage, lemonade, liqueur, fruit or white wine and sugar-contained solution.	Warm water, shampoo and solvent (e.g. benzene, methylated solvent and detergent, only used after dirt is dried)	Ditto.

Water-insoluble Dirt

Dirt	Cleaning Agent	Treatment
Grease, polishing paste, pigment (bright-coloured) grease, varnish, resin, carbon, nail polish, oil, paint, cigarette ash and tar	Washing agent, detergent and shampoo	A) Apply the reagent on soft cotton cloth until the dirt is dissolved. Do not wipe violently, otherwise, the surface will be changed; if necessary, wipe from periphery to center and rinse with clear water.
Paraffin and stearic wax such as candle	Scraping with benzene if possible	Ditto
Chewing gum	Freezing spray	Spraying and knocking it away and into fragments with hard object (hammer)
Rust	15% sodium fluoride solution, 1 spoon every 100 ml water	As described in A).

Chapter V Vehicle Maintenance

Steering system

The hydraulic oil of steering system: ATFIII automobile automatic transmission fluid. No replacement is needed during the first warranty period. For

detailed replacement intervals under different conditions, please see the table below:

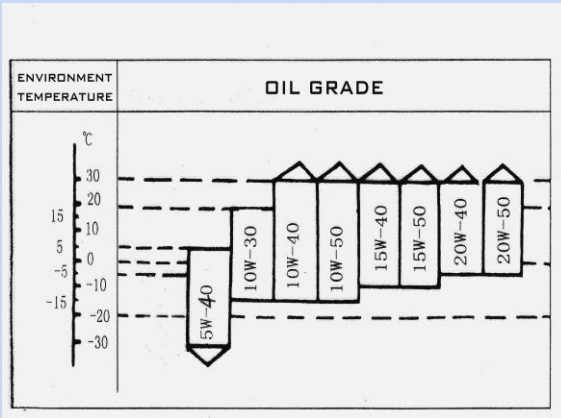
Assembly		Oil Product	Quality and Viscosity	Volume	Mileage or time of First Change	Change Interval Mileage or Time	Remark
Steering gear	Single steering axle	Steering hydraulic oil	ATFIII automatic steering oil	5L	No replacement is needed during the first warranty period	80,000 km or 10 months, whichever comes first	
	Double steering axle			6.5L			

Oil level must be checked every month for oil level and purity.

Oil change procedures:

- Support the front axle.
- Open the tank cover, and unscrew the oil return pipe on the steering gear.
- Start the engine, idle it for about 10 s and turn the steering wheel around to the limit positions for several times to drain the oil in the oil tank, booster pump and steering gear, and receive the oil with a container.
- Re-tighten the oil return pipe (keep the cleanness and prevent any dirt or foreign objects from entering the oil system), clean the oil tank, oil filter and filter element, and you'd better replace the filter element each time when changing the oil.
- After filling the hydraulic oil, idle the engine, and repeatedly turn the steering wheel around while constantly replenishing the hydraulic oil until the oil level no longer declines and no air bubble generates. The oil level shall be within the range of marker.

Caution: In the first maintenance and regular maintenance, check the clearance of rotating parts, such as the steering horizontal and vertical rod joints, and if the clearance is too large, replace it. In every regular maintenance, add the lubricating grease at each place.



Diesel Engine

Maintenance of lubricating system

- Oil Specification

Select diesel engine oil as per working environment temperature. Vehicles of Euro II emission standard should apply CF-4 grade of diesel oil and vehicles of Euro III or the higher emission standard should apply CH-4 grade of diesel. It is allowed to apply a higher grade of engine oil, such as the oil of CI-4 grade.

Select the type and brand of engine oil according to the table. Oil number of 15W-40 is recommended in the environment of the minimum temperature of no lower than -10°C. We recommend the brands of Mobil, Castrol and Shell.



WARNING

- Do not check the level of lubricant oil when the diesel engine is working.
- Different oil products cannot be used in a mixed way.

- Use of engine oil and replacement cycle (No replacement is required during first maintenance)

The service conditions of vehicle

Service condition 1:

Normal conditions	Bad conditions			
A	B	C	D	E
Good condition, long-distance transportation, the contain of the sulphur in fuel	Short-distance transportation, engineering truck, bus, municipal vehicle, etc.	Non-highway, mountain road, rough roads	Hot or cold area (The ambient temperature is often over +30°C or below -10°C).	The contain of the sulphur in fuel is more than 0.05%

Service condition 2:

WG I	WG II	WG III
Operating condition is very bad (very hot or cold weather, high dust, close transportation construction sit, and bus, municipal vehicle, snowplough and fireengine), annual service distance is less than 2×104km or annual working time is less than 600h.	Annual service distance is less than 6×104km, short-medium distance transportation (for delivery)	Annual service distance is more than 6×104km, long distance transportation.

Engine

First-time check, routine check and maintenance cycle:

Service Conditions Items	WG I	WG II	WG III
	Less than 20000km in a year	Less than 60000km in a year	More than 60000km in a year
First-time Check	After running 1000~1500km or running for 30-50h	After running 1000~2000km	After running 1000~2000km
Routine Check (P)	Every 5000km or every 150h (whichever comes first)	Every 10000km	Every 15000km
1st-Grade Service (WD1)	Every 10000km or every 300h (whichever comes first)	Every 20000km	Every 30000km
2nd-Grade Service (WD2)	Every 20000km or every 600h (whichever comes first)	Every 40000km	Every 60000km
3nd-Grade Service (WD3)	Every 40000km or every 1200h (whichever comes first)	Every 80000km	Every 120000km
4nd-Grade Service (WD4)	Every 80000km or every 2400h (whichever comes first)	Every 160000km	Every 240000km

Oil change cycle

Service Conditions Oil change interval	WG I	WG II	WG III
A	-----	15000km	20000km
B	5000km or 4 months or 200h of operating time	10000km or 6 months or 500h of operating time	-----
C	5000km or 4 months or 200h of operating time	10000km	15000km
D	5000km or 4 months or 200h of operating time	10000km	15000km
E	5000km or 4 months or 200h of operating time	10000km	15000km

1. For vehicles serves in various bad condition or always over-loads, interval of oil changing shall be shortened.
2. Ensure changing engine oil twice per year under whatever conditions.

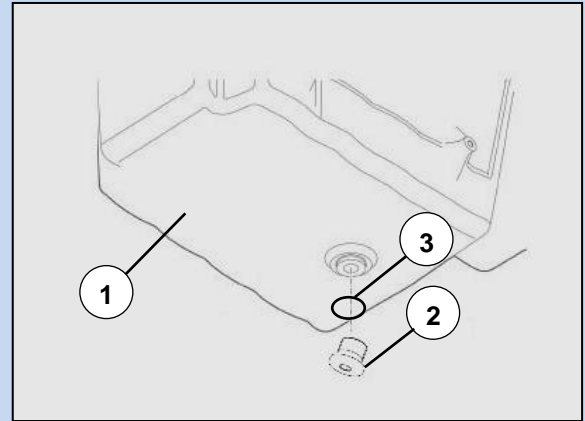
• **Engine oil change**

Engine oil shall be replaced after diesel engine is kept level and diesel engine is shut down for 10 minutes as a minimum.

Put an oil container under the diesel engine.

Loosen and remove the oil drain plug ② on oil pan ①, and empty waste oil.

After mounting a new compound seal ring ③, screw in a drain plug ② on the oil pan.



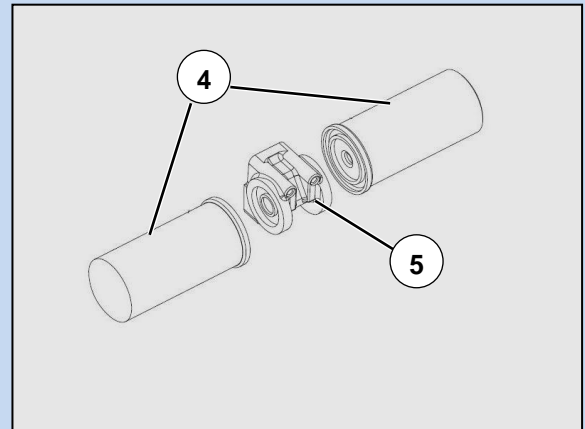
• **Replacement of oil filter element**

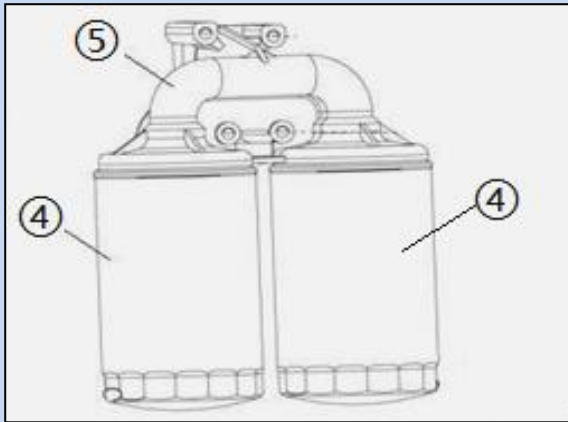
Draw out the two oil filter elements ④ of WD615/D10 series engine from oil filter

housing ⑤ from both sides.

Screw the new filter element ④ into the filter housing ⑤.

Note: Replace engine oil filter together with diesel engine oil.





Screw out the filter element ④ of D12 series engine downwards from the filter base ⑤.

Note: Replace engine oil filter together with diesel engine oil.



WARNING

The engine must use the engine oil and oil filter element specified by Sinotruk otherwise early abrasion may occur. Sinotruk only provides paid service.

• Filling engine oil

When replacing engine oil and engine oil filter, the filling volume for WD615 series and D10 series engine is approximately 25L. For D12 series engine, the filling volume is approximately 38L. The level of engine oil should be between the maximum and the minimum scale range. For other information please refer to "Inspection and Maintenance before Engine Start".

Maintenance of fuel system

- **Fuel specification**

Fuel with proper brand number shall be selected according to ambient temperature. SCR series diesel engine of Euro IV standard should apply the oil in accordance with European EN590:2004 standard. Applying the oil which does not meet the standard will lead to excessive emission of the diesel engine.

- **Replacement of oil filter element for engine with D10 Denso common rail system**

Fuel coarse filter:

Screw out the oil filter element ① of oil coarse filter downwards from the filter housing ②.

Apply lubricating oil to the seal ring ③ of the new filter element ①.

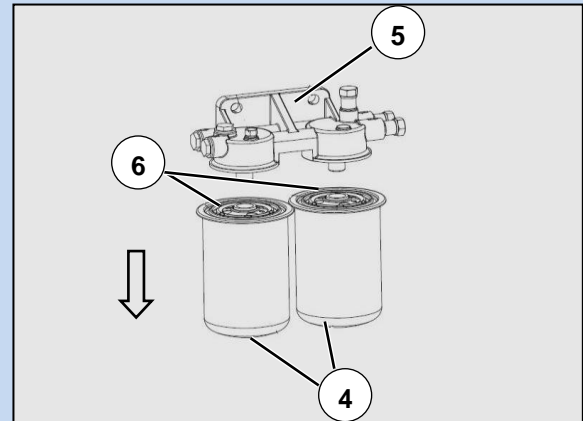
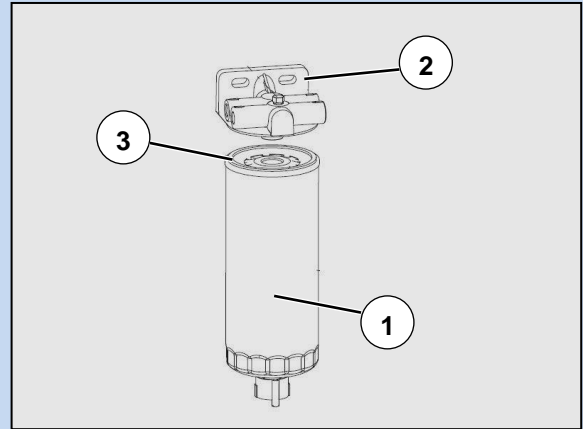
Screw the new filter element ① until it reach the filter housing ②, then continue screwing by hand for another $\frac{3}{4}$ round.

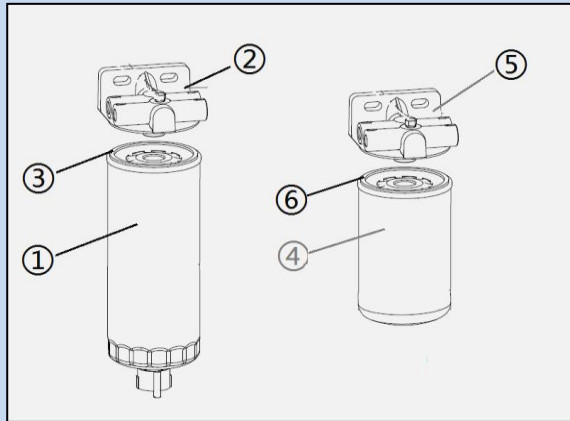
Fuel fine filter:

Screw out two oil filter elements ④ respectively of **fuel fine filter** downwards from the filter housing ⑤.

Apply lubricating oil to the seal ring ⑥ of the new filter element ④.

Screw the new filter element ④ until it reach the filter housing ⑤, then continue screwing by hand for another $\frac{3}{4}$ round.





Replacement of oil filter element for engine with D12 Denso common rail system

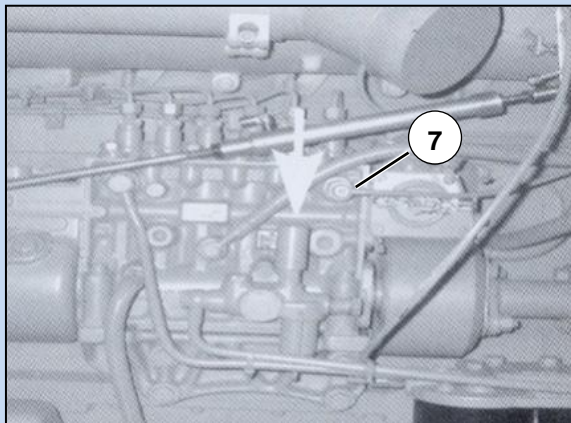
Fuel coarse filter: (the same as engine with D10 Denso common rail system)

Fuel fine filter:

Screw out two oil filter elements ④ of **fuel fine filter** downwards from the filter housing ⑤.

Apply lubricating oil to the seal ring ⑥ of the new filter element ④.

Screw the new filter element ④ until it reach the filter housing ⑤, then continue screwing by hand for another $\frac{3}{4}$ round.



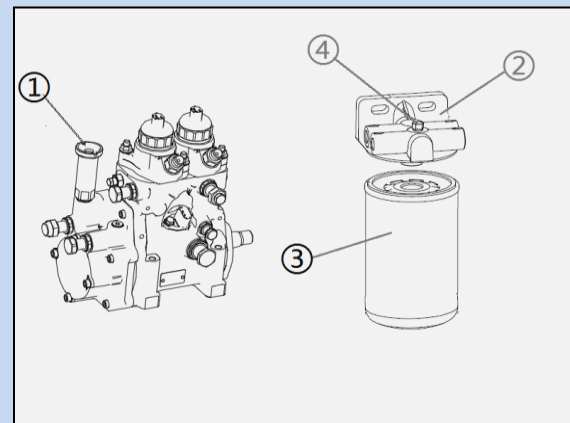
Exhaust of high pressure oil pump of WD615/D12 series Euro II engine

Put the manual accelerator control at the position of stopping oil supply. Use hand oil pump to pump out oil until the oil flowing out of the exhaust plug screw has no bubbles in it.

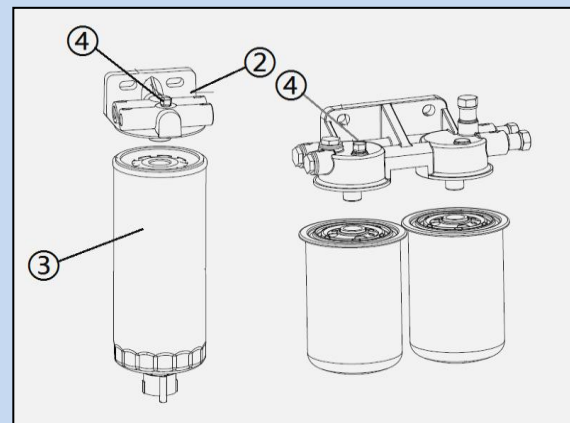
Release the pipeline at the injection nozzle carrier and widely open the accelerator, then operate the starter until the oil flowing out has no bubbles in it.

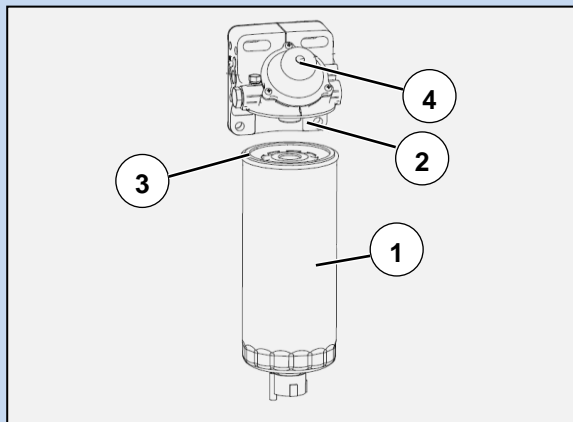
- **Exhaust of manual oil pump of D10/D12 Denso common rail system engine**

The exhaust device of manual oil pump of D10/D12 Denso common rail system engine is integrated in the high pressure oil pump. Rotate handle ① of manual fuel pump counterclockwise and pull it up. Then loose the bleed screw ④ counterclockwise. Press and pull handle ① repeatedly to exhaust air inside the fuel pipeline and stop pressing and pulling when the manual fuel pump receives certain resistance. Tighten up the bleed screw ④ clockwise with the tightening torque of $6\pm 1.3\text{Nm}$.



Then loose the bleed screw ④ counterclockwise. Press and pull handle ① to further exhaust air inside the fuel pipeline and let diesel oil fill up the filter. Stop pressing and pulling when the manual fuel pump receives certain resistance. Tighten up the bleed screw ④ clockwise with the tightening torque of $6.5\pm 1.3\text{Nm}$.





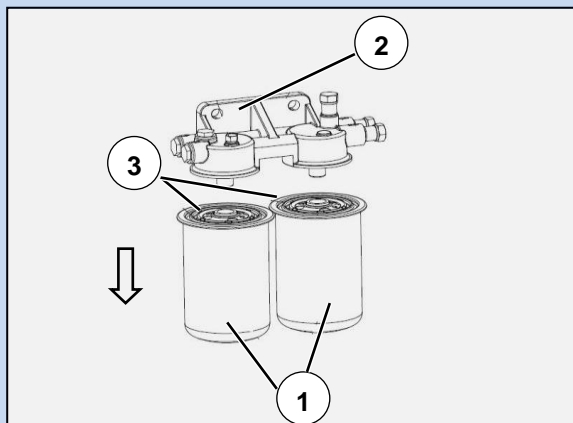
- Replacement of oil filter element for WD615/D10 engine with Bosch common rail system

Fuel coarse filter:

Screw out the oil filter element ① of fuel coarse filter downwards from the filter housing ②.

Apply lubricating oil to the seal ring ③ of the new filter element ①.

Screw the new filter element ① until it reach the filter housing ②, then continue screwing by hand for another $\frac{3}{4}$ round.



Fuel fine filter:

Screw out two oil filter elements ① respectively of **fuel fine filter** downwards from the filter housing ②.

Apply lubricating oil to the seal ring ③ of the new filter element ①.

Screw the new filter element ① until it reach the filter housing ②, then continue screwing by hand for another $\frac{3}{4}$ round.

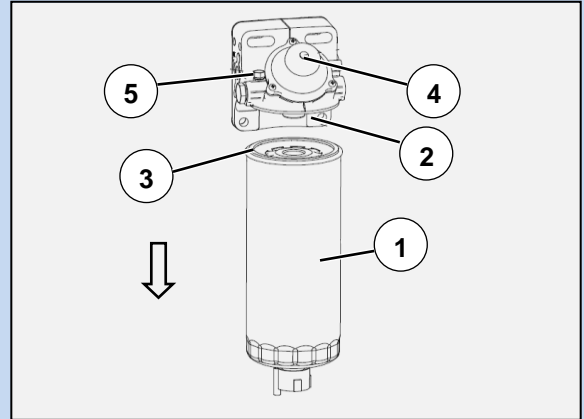


WARNING

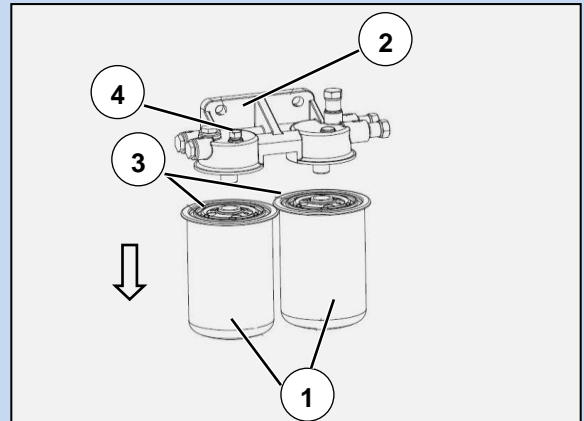
The engine must use the oil filter element specified by Sinotruk otherwise early abrasion may occur. Sinotruk only provides paid service.

- Exhaust of manual oil pump of WD615/D10 engine with Bosch common rail system

The exhaust device of manual oil pump of D10 Bosh common rail system engine is integrated in the fuel coarse filter. Loose the bleed screw ⑤ counterclockwise. Press the button ④ repeatedly to exhaust air inside the fuel pipeline and let diesel oil fill up the filter. Stop pressing when the manual fuel pump receives certain resistance. Tighten up the bleed screw ⑤ clockwise with the tightening torque of $6.5 \pm 1.3 \text{ Nm}$.



Then loose the bleed screw ④ of the fuel fine filter counterclockwise. Press the button ④ repeatedly to further exhaust air inside the fuel pipeline and let diesel oil fill up the filter. Stop pressing when the manual fuel pump receives certain resistance. Tighten up the bleed screw ④ clockwise with the tightening torque of $6.5 \pm 1.3 \text{ Nm}$.



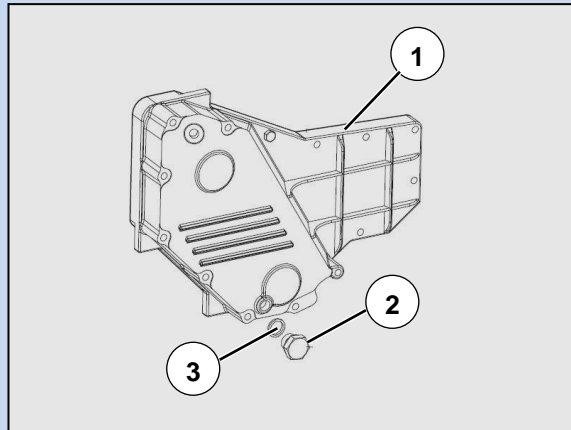
Engine

Maintenance of cooling system

- **Specification and replacement cycle of coolant**

Diesel engine should apply long-acting coolant (with rust-proof and antifreezing function). Refer the table below for the the ratio of coolant.

The lowest temperature for use °C	-10	-26	-35
Specification			
The content of glycol %	33	50	56
Proportion(15.6°C)	1.05	1.074	1.082
Boiling point °C	104.5 ±1	108.5 ±1	110.0 ±1
Freezing point °C	-18 ±1	-36±1	-45 ±1



Coolant is not necessarily replaced during initial maintenance of the entire vehicle.

The recommended replacement cycle is 200,000km or 4 years operation of the entire vehicle, whichever comes first.

Note: Coolant must be replaced immediately once it turns turbid or brown, regardless how long the interval shall be.

- **Drain coolant**

Put a large container under engine oil module ①.

Unscrew the water drain plug ② and compound seal ring ③ to drain all coolant.

Install a new compound seal ring ③ and tighten screw plug ② with a torque of 35Nm.

Handle drained coolant in a correct manner.

- **Fill coolant**

Refer to “Inspection and Maintenance before Engine Start”.



WARNING

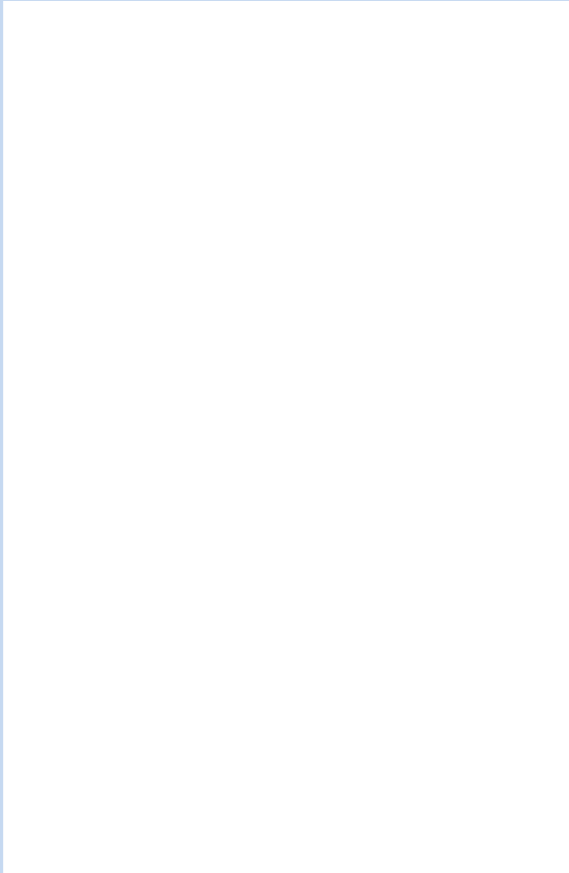
- **Do not use water as a substitute of coolant.**
- **Air inside coolant must be completely exhausted, otherwise water pump may fail.**

Thermostat

Thermostat is mounted at the rear end of the discharging tube. It can automatically adjust the water volume flowing into the radiator according to the temperature of the cooling water, alter the range of water circulation in order to regulate the heat dissipation capacity of cooling system and ensure the engine's working in the appropriate temperature range.

To ensure the normal function of the engine, the thermostat must remain good technical state. Thermostat must be inspected regularly. If the thermostat is jammed or has lax closure, do not continue using or it will seriously influence the normal function of the thermostat. It should be cleaned and repaired after removed from the vehicle. We suggest that the thermostat element should be replaced timely after using for a year.

When replacing a thermostat, open discharging tube and the thermostat element can be taken out. Pay attention to the direction of installing and ensure the right direction of venthole. Keep the thermostat in an upright position with good sealing.



Air-assisted SCR after-treatment system

The system mainly consists of catalytic muffler, urea pump box, urea injecting nozzle, after-treatment control unit of diesel engine exhaust (DCU), NOX, sensor of exhaust temperature, corresponding pipelines and wiring harness.

Regular inspection and filling urea aqueous solution

Urea solution (vehicle's urea solution in accordance with DIN 70700 or ISO 22241-1 standard) needs to be purchased from authorized retailers or professional manufacturers. When filling, it is recommended to use professional filling equipment charging urea aqueous solution, to prevent urea aqueous solution spill. In according with the factory setting, when the urea tank liquid level is lower than 10%, the dashboard urea low liquid level indicator lights flashes for warning, at this time it should be timely charged with urea aqueous solution.



WARNING

- Urea aqueous solution is corrosive to the skin. If it accidentally run into the skin or eyes when filling, rinse with water as soon as possible. If pain continues, please seek for medical help. If it is accidentally swallowed, immediately seek for medical help please.
- It is prohibited to use urea aqueous solution without authorization or the substandard urea aqueous solution as well as other alternative liquid, otherwise the normal function of the system will be affected and the system life will be shortened. Sinotruk only provides paid service.

Maintenance of air-assisted SCR after-treatment system

After using 2 years or running 40000 kilometers the urea filter element is needed to be replaced in specified service station. If driving condition is bad and urea aqueous solution is polluted seriously, the filter element is needed to be changed according to the actual situation.

Cleaning of vent pipe of urea tank and urea tank

Inspect and clean the vent pipe of the urea tank in the first maintenance. Clean the vent pipe every 5000km after the first maintenance.

Urea tank is required to be regularly inspected and filled urea aqueous solution. Keep the urea aqueous solution in the urea tank clean, and avoid dust, dirt and other turbid matter coming into the urea aqueous solution, otherwise the urea pump will be damaged, the resulting loss will not be included in the scope of quality warranty.

Other notices:

- It is prohibited to use personal configuration or substandard urea solution, as well as other alternative liquid, impurities and metal ion can affect system, shorten the system life. The resulting loss is beyond the scope of the warranty of quality.
- After diesel engine is shut down, system goes into back pumping stage, emptying urea aqueous solution in system, this phase will last two to three minutes, please don't turn off switch when system is still in the working state.
- At higher temperatures, disassembly time limit will be reduced. If time limit is exceeded, pre-operation must go before starting the system to ensure the normal start. steps are as follows:
 - ①. Refill the urea box with urea aqueous solution;
 - ②. Replace filter of urea pump box;
 - ③. Start the system;
 - ④. If abnormal system startup occurs, shut down the system. After DCU/ECU main relay stop working (stop time varies according to different application), restart the system, if it still fails to start, seek help from Sinotruk service station.

- System components should avoid direct exposure under mechanical and thermal shock. Stones, dust and other sundries should not be laid on the protection cover. Keep away from the exhaust pipe, turbocharger and diesel engine heat source.
- Urea supply unit and urea injection unit have certain waterproof and dustproof function, but they should avoid flooding as well as the impact of water. Hydraulic pipe joint's lubrication is not recommended and lubrication of electrical interface is absolutely forbidden.
- During the vehicle maintenance, pay attention to the following items:
 - ① Cleanliness of system surface, especially the waterproof and dustproof wiring harness connector. Any crushed stone soil or other sundries on the outer surface or the protection cover is needed to be removed in time;
 - ② The completeness and fastening of the pipelines and wiring harness. No looseness or bending is allowed.
 - ③ The need of replacement of the urea pump box filter.
 - ④ Inspection of whether there is any urea crystallization attached to the injection nozzle and exhaust pipe (when removing DM or the service station is equipped with endoscope).

Natural gas engine

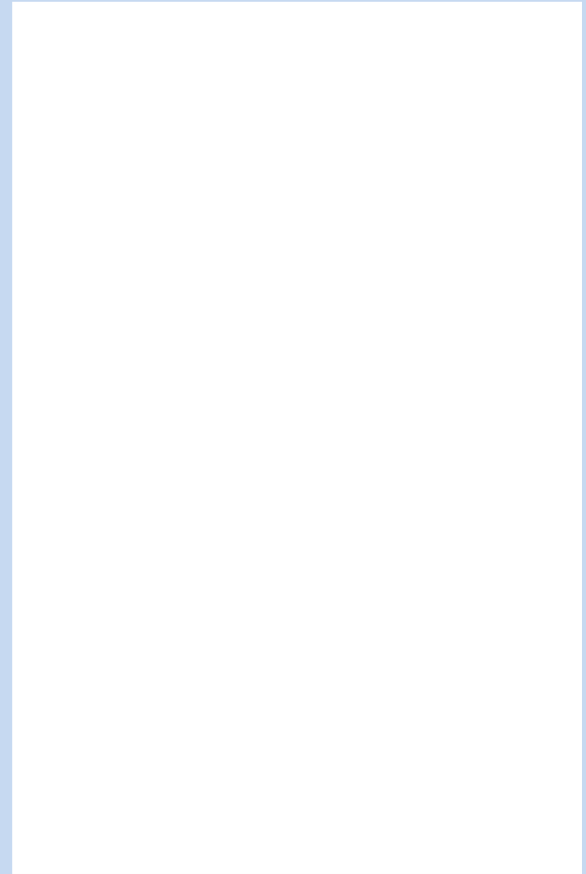
T10 and T12 series natural gas engine adopt special engine oil for Sinotruk natural gas engine. Replacement cycle of the engine oil is the same as D10 common rail diesel engine. When replacing engine oil and filter element, the filling volume for T10 series engine is approximately 25L; for T12 series engine, the filling volume is approximately 36L. The engine oil level should be within the maximum and the minimum scale range of the oil level gauge. For other information please refer to “Inspection and Maintenance before Engine Start”.

Engine coolant for T10 and T12 series natural gas engine is the same as that for D10 diesel engine.

T10 and T12 series natural gas engine should apply fuel gas in accordance with ISO 15403, otherwise the power decrease will occur and the engine will be damaged.

Sinotruk only provides paid service.

- **Maintenance of electronic control system and gas supply system**
- Daily maintenance
- Daily maintenance of gas supply system see “Vehicle LNG supply system” and “Vehicle LNG supply system”.
- Inspect whether the ignition system and the generator have electric leakage or flaming out. If so, repair them in time.
- Inspect and clean engine air filter regularly.
- Clean the natural gas filter in gas supply system regularly.
- Clean the heating water circulation system of the decompressor regularly.





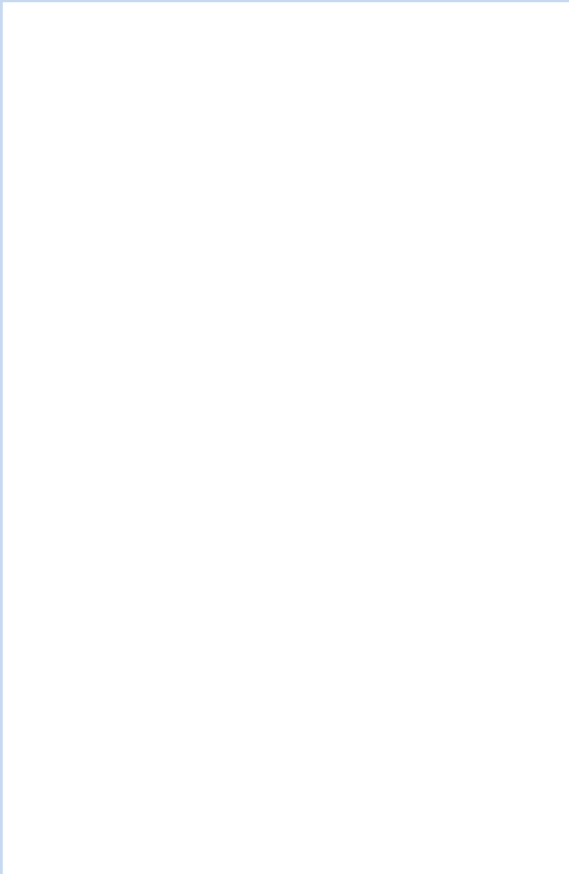
WARNING

- Turn off the ignition switch and battery main switch before pulling the wirings from the connection part of the sensor/ actuator or plugging into it. Then the daily maintenance of electrical components can be conducted.
- Wipe the accumulated greasy dirt and dust regularly and keep wirings and the connection part of the sensor/ actuator dry and clean.
- If water enters the electric components accidentally, for instance, the controller or wirings get wet or soaked, turn off the battery main switch first, then immediately seek help from the maintenance personnel. Do not turn on the engine on your own.
- Apply compressed air ($\leq 3\text{bar}$) to blow off the accumulated dust on the engine (especially on the controller) regularly.
- The electronic control components should be kept dry and without any water, grease, and dust on them.

• **First level maintenance (every 5000-6000km or every 150hs of running time)**

- Check whether there is any deformation or damage of the fixing device of the natural gas storage tank. Fasten the fixing device.
- Check the valve of natural gas storage tank.
 - Check whether there is leakage in the multifunction valve or inflation valve with air leakage detector or detection liquid. In case there is leakage, take measures in time.
 - Check the manual outlet valve. Ensure the pipe connection has no leakage and the switch should work smoothly.
 - Check the charging valve, pipeline connection and pipeline clamp, ensure there is no loosening and leakage.
- Check the pipelines and connections:
 - No damage and cracks of the pipelines. Check whether there is leakage with a leakage detector or detection liquid.
 - No loosening and leakage of the connections of the pipelines and the valve.
 - Check circulating pipe and connections:
 - Check whether the pipelines are clogged by dirt, if so, remove the dirt.
 - Check whether the pipeline is aging or damaged, and whether it has cracks or leakage.
 - Solenoid valve operation and installing inspection:
 - Check whether all the solenoid valves work normally with power sockets well contacted and whether it has leakage.
 - Check and fasten solenoid holder.





- Check the electrical system

Low voltage circuit connection should be firm and well contacted without insulation damage, short circuit and open circuit. The fuses in fuse box are complete and reliable with no other connecting with wires. Check and clean the sparking plug.

- **Second level maintenance (every 15000km or every 400hs of running time)**

High -tension ignition system: No insulation damage, electric leakage and flaming out of the rubber sleeves of ignition coil of each cylinder. And the bearings are firmly fastened.

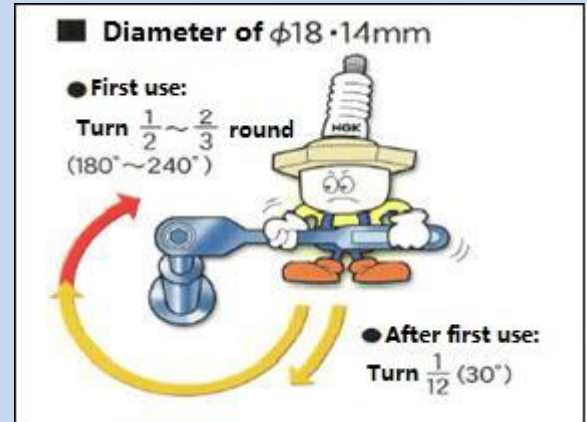
Requirements for ignition coil installing: Clean the dirt in the rubber sleeves when installing and fasten the mounting bolts of ignition coil to ensure the close contact of the inner spring of rubber sleeve in the ignition coil and the head of sparking plug.

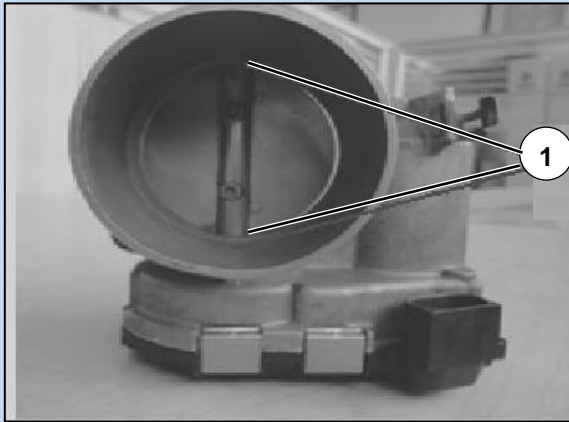
Sparking plug: Check whether the sparking plug gap meets the requirements. Replace the sparking plug as per the using condition; the suggested mileage of replacement: 60000km.

Dismantle the sparking plug after the engine's cooling down. Prevent burns and damages to the fastening thread of sparking plug.

Notice: Specified sparking plug sleeves must be used when fastening the sparking plug.

The fastening torque of M14 sparking plug is 25-30Nm, when mounting without torque wrench or the torque wrench does not function well, please refer to the right drawing.



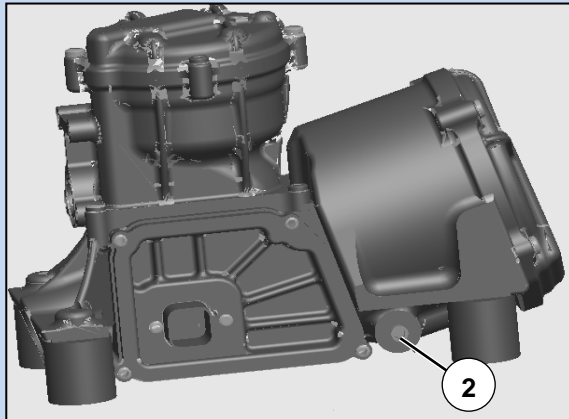


- **Third level maintenance**

Throttle: Clean the throttle ① with non-corrosive detergent every 30000km of running mileage.

Shorten the throttle cleaning cycle under bad running conditions.

If the inspection shows that throttle is stuck, clean the throttle irrespective of the cleaning cycle reached or not.



T12 CFV persistent current control valve: Release the pollution discharge bolt ① at the bottom of CFV to drain pollution every 3000 ± 100 km of running mileage.

Mixer: Clean the mixer with non-corrosive detergent every 50000km of running mileage.

Clean the valve carrier and guide slot: carefully examine the wear condition of the valve carrier. If serious groove wear exists, the assembly should be replaced.

When cleaning the guide slot, focus on the inner guide slot of fuel air valve. Clean up the excessive detergent with clean cotton after cleaning the valve carrier and guide slot.





Clean the diaphragm: Remove the dust and greasy dirt on the diaphragm with clean cotton. In case the greasy dirt is serious, use cotton with small amount of non-corrosive detergent to wipe the diaphragm. If the diaphragm has cracking or wear on it, replace the diaphragm.

High pressure filter: It is used to filter impurities of water and oil in the gas to ensure a clear gas circuit. It is a special part for CNG vehicles.

Requirements for installation: install according to the direction of gas flow on the filter base with the water outlet down. Do not install to the reverse direction.

Replace with a new filter element every 40000km of running mileage or every 6 months. Discharge pollutions every 10-15 days or every 2000km of running mileage.





Low pressure filter



Filter element

Low pressure filter: It is used to filter impurities of water, oil and solid particles in the fuel gas to protect the electronic pressure regulator, mixer and electronic throttle valve from damaged.

Requirements for installation: install according to the direction of gas flow on the filter base with the water outlet down. Do not install to the reverse direction. The fastening torque of the housing is 40 ± 5 Nm.

Replace with a new filter element every 20000km of running mileage or every 3 months. Discharge pollutions every 10-15 days or every 2000km of running mileage.

**WARNING**

- The special filter element for Sinotruk engines should be applied, otherwise early abrasion will occur. Sinotruk only provides paid service!

**WARNING**

- Do not dismantle filter element or discharge pollutions without unloading the inner pressure of the filter, otherwise serious damage will occur.
- Turn off the main valve of gas cylinder before replacing the filter element. Idling the vehicle until the engine's automatic flameout. Turn the starting key to the "OFF" position to drain the natural gas in gas supply system.
- Turn on the gas cylinder valve after replacement and start the engine. Inspect whether there is air leakage in the connection part of filter base and the housing as well as the threads of discharging pollution valve with soapy water. Ensure the good seal before further operate in a normal way. If there is gas leakage, retighten the body or discharge pollution valve. Then apply soapy water to check the leakage.

Engine maintenance

- **Initial maintenance**

The first maintenance is carried out between 2000km and 5000km.

- **Regular maintenance**

Regular maintenance performed every year (12 months) is independent from replacement of diesel engine oil.

- **Maintenance in winter**

Winter maintenance shall be given timely in case of decrease of air temperature in order to maintain operation of diesel engine and safe driving.

Select the proper-grade fuel based on environment temperature.

Drain water inside the fuel module.

Check and fill the cooling system with coolant.

Check the electric appliances.

• **Maintenance list (excerpted content, for all natural gas engines)**

Work	Cycle	Remarks
Cooling system		
Inspect liquid level	Daily inspections regulation	
Inspect function and airtightness	Initial maintenance and regular maintenance	
Retighten hose clamps of cooling and intake supercharging system	Initial maintenance	
Inspect for pollution of fin inside intercooler and radiator	Regular maintenance	
Replace coolant and inspect safety valve of expansion water tank (replace with new parts if necessary)	4 years or 200,000km	
Inspect coolant specification	Maintenance in winter and regular maintenance	
Inspect status and tightness of belt	20,000km or regular maintenance	
Injection system		
Inspect fuel level	Daily inspections regulation	
Inspect status and airtightness of fuel system	Initial maintenance and regular maintenance	
Fuel module; clean filter net of manual fuel pump and replace fuel fine filter element	Do not exceed 20,000km as a maximum according to hint of fuel pressure sensor	
Replace coarse filter element	To be replaced together with replacement of fine filter element.	

Engine

Work	Cycle	Remarks
Air intake and exhaust system		
Inspect for pollution of air filter element	During replacement of engine oil	
Replace filter element	Follow vehicle regulations	Replacement based on pollution conditions is recommended
Inspect status, function and airtightness of exhaust system	During initial maintenance and replacement of engine oil of diesel engine	
Valve mechanism system		
Inspect valve clearance, adjust if necessary	Regular maintenance	
Lubrication system		
Inspection of engine oil level	Daily inspections regulation	
Replace engine oil and filter element	Observe engine oil replacement cycle	
Electric equipment system		
Inspect status of actuator and generator	Initial maintenance and regular maintenance	

Clutch operating system

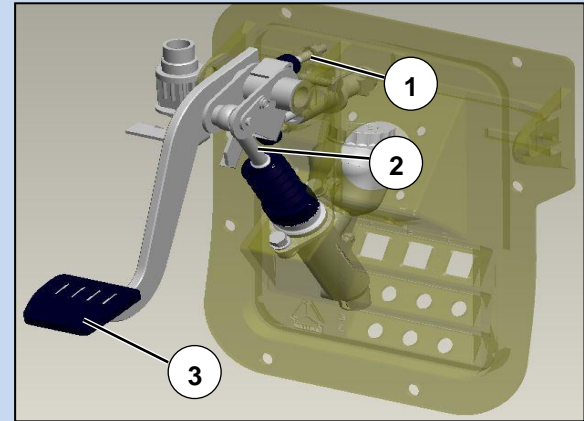
Check and adjust the free stroke of the clutch pedal:

Gently push clutch pedal ③ by hand to make the pedal move up and down. Adjust the position of upper-limit bolts ① to make sure the clearance of 3mm-10mm (free path) between the master pump push bar ② and master pump piston. Tighten the lock nut on the upper-limit bolts.

The clearance should not be excessive, otherwise the initial position of the clutch pedal would be so high that the operational comfort can be influenced.

Working parameters:

1. Working medium: compressed air, DOT3/DOT4 brake fluid;
2. Maximum working pressure: 4Mpa for brake fluid, and 0.85Mpa for air;
3. Working temperature: from - 40 ℃ to +80 ℃;
4. Pedal travel: 160mm-180mm; free stroke: 3mm~10mm;
5. Pedal force: less than 190N with assisting power.





WARNING

Remain sufficient brake fluid during the exhaust process.

Pay attention to release pedal after vent valve or coupling nut are tightened in the process of exhaust for fear of suction of air. Pedal shall be lifted to the maximum height to supply brake fluid inside oil reservoir to hydraulic chamber of main pump.

Exhaust the air in the hydraulic system

If there's air in the hydraulic system of the clutch, the effective travel of booster cylinder push rod will be reduced, so that the separation of the clutch is not complete and it's difficult to engage a gear. Therefore please exhaust air after assembling and disassembling the pipe or changing and adding brake fluid. Air exhausting requires coordination of two persons.

Take down the dust cap ② on the air bleed screw ①, rub clean the air bleed screw ①. Connect one end of ethene tube with the air bleed screw ①, put the other end in to a transparent container. Ensure sufficient brake fluid in the tank when exhausting the air. Tighten the air bleed screw ① and repeatedly depress clutch pedal for a few times and then floor it. Loosen the air bleed screw ①, and discharge brake fluid with bubbles into the container. Tighten the air bleed screw ①. Repeat the above procedure for a few times until there are no bubbles in the brake fluid discharged from the air bleed screw ①. Put the dust cap ② back on the air bleed screw ①. Pedal must be lifted to the maximum height so that brake fluid in the oil tank can go into the master cylinder.

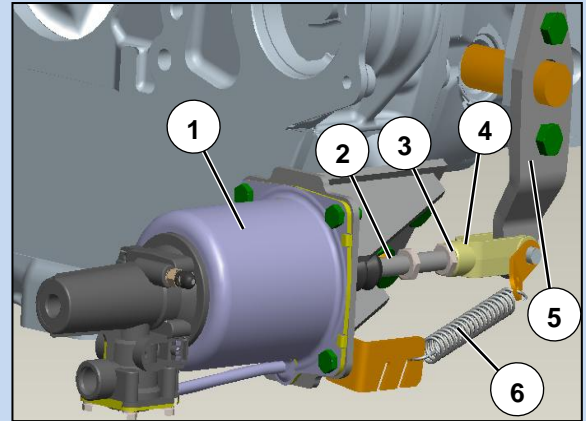
Adjustment of clutch operation system

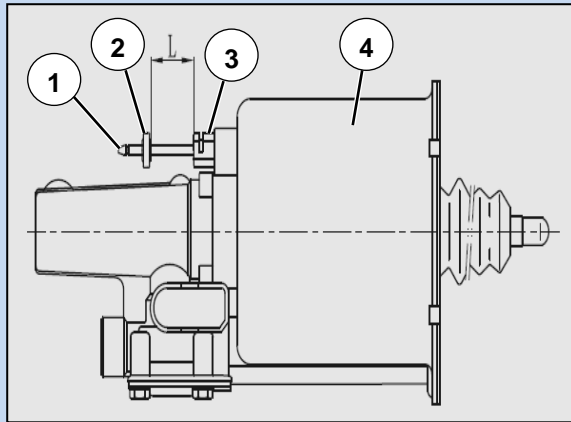
- **Inspect and adjust the gap at release bearing (Push type clutch)**

There should be a gap of 2 mm-3 mm at the clutch release bearing to ensure the release bearing's not being in half-linkage state due to long-term contact with the clutch. As the gap becomes smaller in the operation process, the gap should be adjusted regularly.

Push the release rocker arm ⑤ toward the clutch separation direction to the end and adjust the push rod fork ② and make its rear part touch the piston of the booster cylinder ①. Then adjust the push rod locknut ③ to maintain the gap at the release rocker arm being 3 mm-5 mm, and then tighten the nut. Rotate the push rod ② and make the nut touch the push rod fork ④ before tightening the nut ③. Adjust the position of the hook of release spring ⑥, and ensure the aligning force is between 60N and 100N.

For pull - type clutch, it is not necessary to adjust the gap.





Indicator of clutch wear

Indicator of clutch wear can be applied for vehicles with pull - type clutch. Through observing the position of indicator piece ② the information of whether the clutch driven plate is worn to the limit position can be get, which facilitates to replace the driven plate timely. Indicator of clutch wear is located above the valve body of clutch booster cylinder ④.

Along with the wear of clutch driven plate, the clearance L between measuring rod housing ③ and indicator piece ② will become larger gradually. When L=20mm, driven plate should be replaced for HW12706T、HW12710C transmissions. When L=23mm, driven plate should be replaced for other transmissions.

After installing the clutch booster cylinder ④ for the first time or replacing the driven plate, push indicating piece ② along with the measuring rod ① until it touches the measuring rod housing ③. This is called initialization. Do not move the indicating piece ② while the vehicle is running.

Precautions:

- **Clutch brake fluid: DOT3 /DOT4 brake fluid, no replacement is needed during the first warranty period.**

Assembly	Name	Quality grade	volume	Replacement interval by time or mileage	Remarks
Clutch	Brake fluid	DOT3/DOT4	0.5L	160,000 km or 2 years, whichever comes first	

- **Please ensure that oil tank and its periphery are clean before adding and replacing brake fluid and tighten up the oil tank cap after it is replenished.**
- **Never let oil, grease enter into the hydraulic pipeline, or it may damage the master cylinder and booster cylinder.**
- **When dismantling oil pipe, you can seal the place between pipe nut and joint with Loctit572 thread sealant.**
- **To replace brake fluid, completely drain residual fluids inside hydraulic system and use brake fluid with the designated brand no. and the same batch.**
- **Brake fluid is corrosive and it is necessary to prevent the brake fluid from spilling over person and vehicle paint surface.**

Clutch operating system

Common malfunctions and troubleshootings

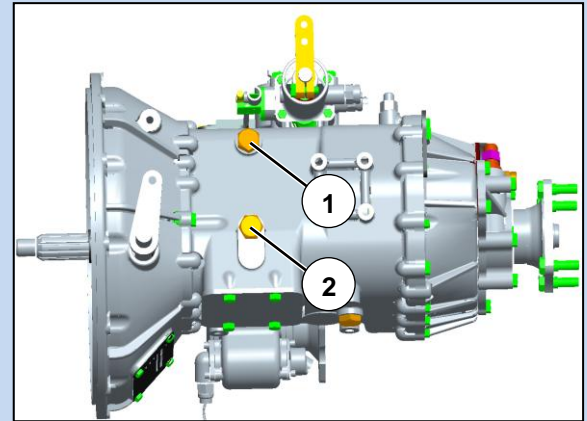
Malfunction	Cause	Troubleshooting Method
Clutch slip	oil dirt on the friction plate	Clean the dirt on the clutch pressure plate, driven plate and
	The friction plate of driven disk is worn to the limit position	change driven plate
Clutch disengagement	Air in the clutch hydraulic system, causing shorter effective travel for	Exhaust the air in the hydraulic system
clutch tremble during start	uneven pressure plate surface or diaphragm	Replace the pressure plate assembly
unable to disengage the clutch	unfitting assembly of the release bearing or release bearing breaks	Reassemble the release bearing and replace the hub and

HW transmission

Operate the transmission properly, and implement regular servicing and maintenance, which is crucial for vehicle's reliable driving and the transmission's long life expectancy. Please comply with the following requirements for use:

Precautions for HW series transmission operation:**Oil level check**

- Vehicle must parked on level ground
- Oil level should be stale and be close to normal temperature, unscrew the oil check bolt ②
- If oil level is below the required level, add 85W-90 (GL-4 grade) or 85W-90 (GL-4 grade) gear oil for middle load.
- Unscrew the bolt ①, add gear oil until it spills over from the check port ②
- Tighten bolts ① and ②.



- **Add Lubricating oil**

To avoid chemical reaction between different types of lubricating oil, please ensure consistence of oil type when filling. Oil filling amount also varies from transmission to transmission.

- **Operating temperature**

The maximum temperature must not exceed 120°C, and lowest temperatre -40°C for continuous working, or it may cause lubricating oil degradation and shorten the transmission life span. Any one of the following conditions may contribute to over 120°C of transmission operating temperature.

- Driving continuously <32km/h
- High engine speed
- High ambient temperature
- Exhaust system too close to the transmission
- Overrunning with great power

- **Working Inclination Angle**

The working inclination angle for transmission must not exceed 15°, otherwise, it may not be fully lubricated (the working inclination angle is equal to transmission's installation angle on the chassis plus slope angle).

- **Dragging and Sliding**

When the transmission works, its countershaft rotates and drives the oil pump to run, plus splash lubrication, which can fully lubricate the transmission. When the vehicle is dragged with rear wheels touching the ground and transmission system connected, the main shaft rotates comparing to main shaft gear and the planetary mechanism also rotates, although the countershaft gear and main shaft gear for main transmission do not rotate. This will cause great damage to the transmission's planetary mechanism and localization elements of main shaft due to insufficient lubrication.

Pay attention to the following points to prevent this kind of phenomena:

- Do not nutrual slide the vehicle when the power is shut off.
- Do not step on the clutch pedal to let the vehicle slid on neutral position.
- When the vehicle needs to be dragged, draw the half axle out or disconnect the drive shaft, or have the driving wheel lifted up from the ground.


WARNING

- For HW transmissions, when shifting into low gear (Creeping gear) or reverse gear, it must be stopped first and then shift into relevant gear to prevent the parts inside the transmission from being damaged. When shifting into reverse gear (Creeping gear), choose relatively greater gear force to overcome the resistance of reverse gear (Creeping gear).
- Release the brake before the vehicle starts. For the vehicle is equipped with air cut-off brake, do not shift to relevant gear and start until their brake valves are connected and the air pressure reaches the level required to release the brake.
- On the event of any unusual phenomenon, such as abnormal sound or heavy operation during the use of transmission, the vehicle must be parked immediately to check for any failure.
- Privately disassembly/knock down or assemble the transmission is strictly prohibited within warranty period.

Transmission

Lubricating oil No. and replacement interval

In order to prevent the chemical reactions between different types of lubricating oil, add the same type of lubricant as the original lubricating oil. The amount of oil added differs between different types of transmission.

Appendix I:

Asse mby	Oil Name	Quality grade and viscosity grade	Recommended suppliers and product specification	Oil Quantity		First replacement mileage or time	Interval Mileage or Time of Replacement	Remarks
HW gear box	Gear oil	GL-4/ GL-5 85W-90	Mobil Delvac Synthetic Gear Oil Castrol Syntrex Universal Plus Shell Spirax S6 AXME	HW19709XST	12L/12.5L (with PTO) Note: 8L for each PTO added	2000-5000k m	1 year or 100000km in highway environment; every 1000 hours for off-road environment; every 500 hours in bad environment.	Special after-sales gear oil designated by SINOTRUK must be used, otherwise transmission may break down, to which SINOTRUK only provides paid service.
		GL-5 75W-90 /80W-90 /85W-90		With filter HW19710T/ HW19712T	18L/18.5 L with PTO)	2000-5000km Only replace filter	The first maintenance cycle is required during 100,000km or 10 months for long-distance truck, whichever comes first. 80,000km or 10 months for municipal vehicle, civil engineering truck, transport dump truck and mixer truck, whichever comes first. 25,000km or 5 months for mine engineering truck, whichever comes first.	
				With filter HW19710/ HW23710	12L/12.5L (with PTO) Note: 8L for each PTO added	2000-5000km		
				With filter HW19712	13L/13.5L (with PTO) Note: 8L for each PTO added			
				HW13710L	13L/13.5L (with PTO)			
				HW21716STL	14L/14.5L (with PTO)			

ZF transmission

ZF transmission should be maintained regularly.

Transmission oil change

Oil specification and replacement cycle see Appendix II

Oil amount

Accurate filling amount can be ensured as long as you fill it in line with the specification. Oil amount is indicated on the nameplate of the transmission (at one side of the transmission) and on the technical document.



Transmission

Appendix II:

Assembly	Oil	Quality and Viscosity Level	Recommended suppliers and product specification	Oil Quantity		First replacement mileage or time	Interval Mileage or Time of Replacement	Remarks
ZF transmission fluid for heavy load vehicle	MTF manual transmission	<p>①The lowest environment temperature is -40°C: 75W-80/75W-85/75W-90;</p> <p>②The lowest environment temperature is -20°C: 80W-85/80W-90; ③The lowest environment temperature is 0°C: 85W-90.</p>	<p>Castrol: ①Castrol syntrax universal 80W- 90;</p> <p>②Castrol syntrax universal plus 75W-90;</p> <p>③Castrol manual EP 80W;</p> <p>④Castrol manual EP 80W-90;</p> <p>Shell: ①Shell spirax GX 80W;</p> <p>②Shell spirax GX 80W-90;</p> <p>③Shell spirax MX 80W-90;</p> <p>④Shell spirax S3 AM 80W-90;</p> <p>⑤Shell spirax S3 G 80W;</p> <p>⑥Shell spirax S3 G 80W-90;</p> <p>⑦Shell spirax MA 80W;</p> <p>ZF special oil: ZF-Ecofluid X SAE 80W-90</p>	16S1950	14.5L	Carrying capacity less than 44 tons, long distance transportation vehicle:120,000 km or 12 months, whichever comes first.	Carrying capacity more than 44 tons, long distance transportation vehicle: 80,000 km or 12 months, whichever comes first.	Lubricants which satisfy TE-ML 02 (table) of ZF company are recommended to be ZF transmission after-service lubricant.
				16S1930				
				9S1820	17L			

Note: Using PTO does not affect oil filling and oil level inspection. But there will be an increase of approximately 0.5L lubricant using according to the

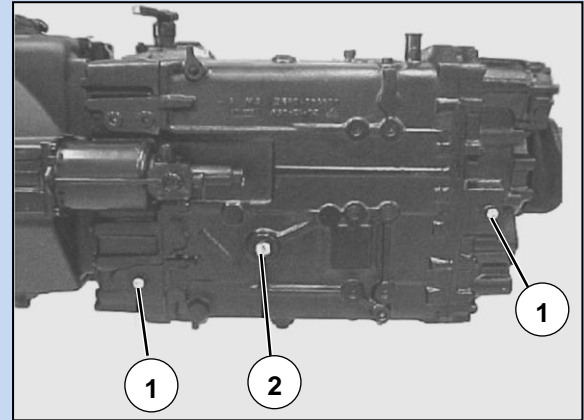
type of PTO mounted.

Oil drainage

- Unscrew oil drain plugs ① and ② from transmission and collect used oil in suitable container.
- Tighten the oil drain plugs ① to the indicated torque.
- Clean oil drainage plug and magnetic plug. Change seal ring and screw up the plug with specified torque ① oil drainage plug (50 Nm) ② magnetic oil drainage plug (140Nm)

Caution:

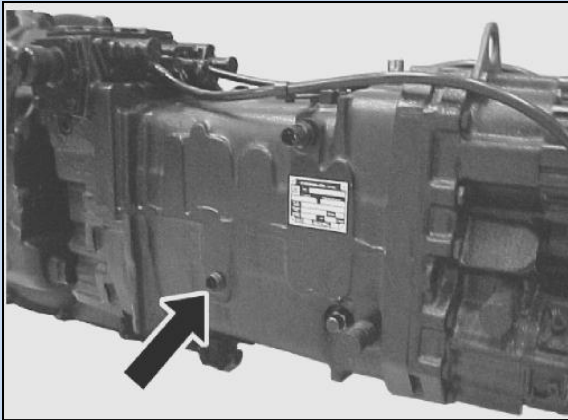
Do not pour the lubricating oil and cleaning fluid over the soil, pool and sewage system. Treat the left oil in line with regulations provided by the environment protection agency.

**WARNING**

Drive the vehicle for long distance before you drain the oil because oil temperature can rise to a proper level for drainage.

Danger!

Do not touch hot transmission and its fluid to avoid scald.



Oil filling

- Pour in the oil through the oil filler hole (see the arrow) until it spills over

Oil level check



Danger!

Insufficient oil may damage transmission and cause accident.

Check the transmission oil level at regular intervals:

- Check oil level with vehicle standing on level ground
- Don't check oil level immediately after long distance running (or incorrect results will be obtained). Only check the oil level after the oil in transmission has cooled down ($<40^{\circ}\text{C}$);
- Unscrew oil filler plug
- If the oil level has fallen below the edge of the oil filler hole, fill oil immediately.

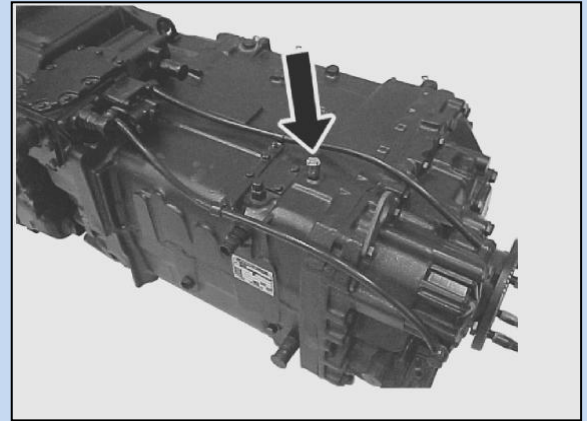


Note!

Check the transmission for leakage as you check the oil level

Transmission breather

The transmission oil heats up during travel, leading to an increase of air pressure inside. Therefore transmission breather can balance it by ventilation. Do not cover with a cap. Check it to ensure normal operation and keep it clean.

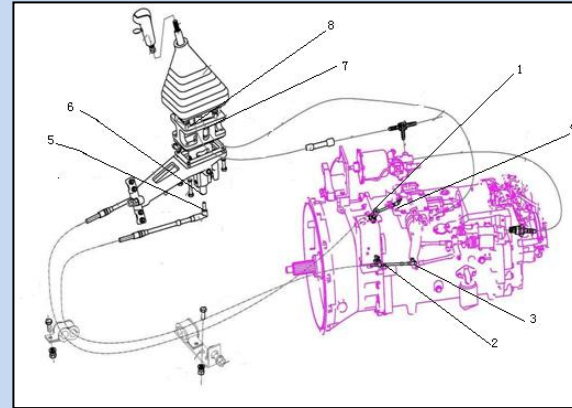


Installation and adjustment of flexible shaft operation system

- (1) Flexible shaft set up on the entire vehicle shall have a bending radius of no less than 300mm and its application temperature range is -40°C – $+100^{\circ}\text{C}$.
- (2) Connection between flexible shaft and shift and selector rocker shall meet following requirements:
 - a. Flexible shaft shall form a 90° angle with rockers to the extent possible;
 - b. Guide sleeve of flexible shaft, protective tube joint and push-pull rod must be on the same line.
- (3) Shift and selector flexible shafts shall be installed on the controller respectively.

Note: Ball joint threads of two flexible shafts shall be tightened fully.

- (4) After installation, set control lever to neutral gear and measure whether dimension of flexible shaft at transmission side complies with requirements. If failed, adjust connection length between flexible shaft ball joint and pull rod thread to adjust its dimension of flexible shaft.
- (5) Shift and select gear after installation to confirm all gears can be engaged. In case of difficult shifting and selecting at a side, inspect and adjust installation dimension of selector flexible shaft at the transmission side.
- (6) Refer to the figure for specific adjustment of flexible shaft:
 - a. In case front gear cannot be fully engaged during running-in after assembly, loose ① nut (or ⑤ nut) and turn ④ spherical hinge (or ⑥



spherical hinge) properly in counterclockwise direction (lengthening). On the contrary, if rear gear cannot be fully engaged, loose ① nut (or ⑤ nut) and turn ④ spherical hinge (or ⑥ spherical hinge) properly in clockwise direction (shortening). Repeat above steps to adjust until all gears can be fully engaged.

- b. If case gear in low gear zone cannot be fully engaged during running-in after assembly, loose ② nut (or ⑦ nut) and turn ③ spherical hinge (or ⑧ spherical hinge) properly in counterclockwise direction (lengthening). On the contrary, if gear in high gear zone cannot be fully engaged, loose ② nut (or ⑦ nut) and turn ③ spherical hinge (or ⑧ spherical hinge) properly in clockwise direction (shortening). Repeat above steps to adjust until all gears can be fully engaged.

Front axle

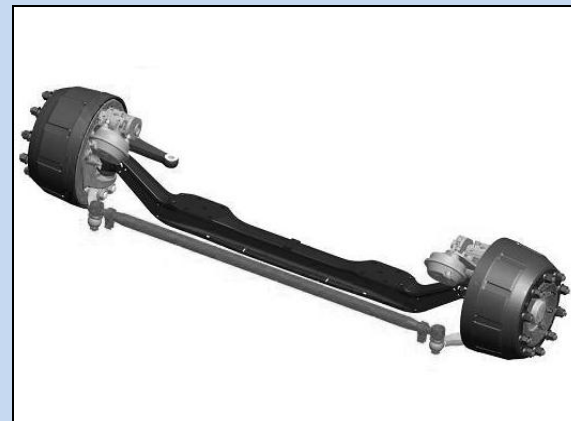
Structural Overview

The HF79 drum-type front axle comprise of the forged I-beam and V-shape knuckle plus the drum brake and diaphragm brake air chamber with the optional automatic clearance adjustment arm and anti-lock braking system (ABS).

The front wheel toe-in: the bias ply tire $12' \pm 4'$, radial tire $0' \pm 4'$

Kinclination angle: 3°

Braking clearance is 0.5-0.9mm.



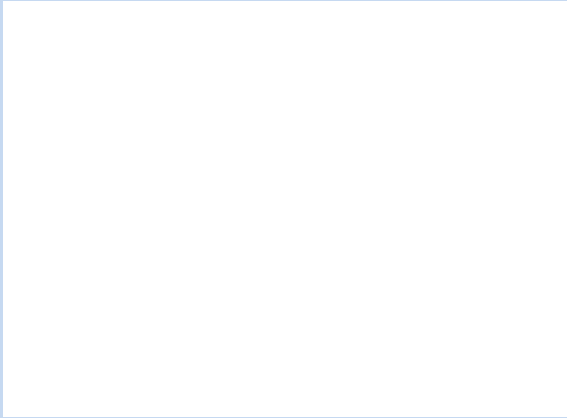
The HF79 disc-type front axle comprise of the forged I-beam and V-shape knuckle plus the disc brake and diaphragm brake air chamber with the optional anti-lock braking system (ABS).

The front wheel toe-in: the bias ply tire $12' \pm 4'$, radial tire $0' \pm 4'$

Kinclination angle: 6°

Braking clearance is 1.0-1.4mm.



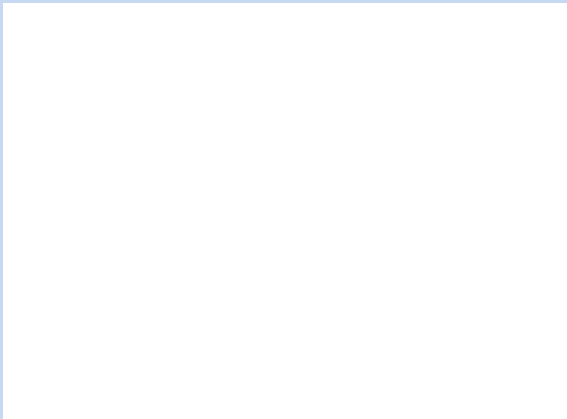


The VGD060QB drum-type front axle comprise of the forged I-beam , V-shape knuckle , maintenance-free wheel hub bearing units, the drum brake and diaphragm brake air chamber with the optional automatic clearance adjustment arm and anti-lock braking system (ABS).

The front wheel toe-in: the bias ply tire 2-4mm, radial tire-1-1mm

Kinclination angle: 6°

Braking clearance is 0.5-0.9mm.



The VPD060QB disc-type front axle comprise of the forged I-beam, V-shape knuckle , maintenance-free wheel hub bearing units, the disc brake and diaphragm brake air chamber with the optional anti-lock braking system (ABS).

The front wheel toe-in: the bias ply tire 2-4mm, radial tire-1-1mm

Kinclination angle: 6°

Braking clearance is 1.0-1.4mm (for QP20 disc brake)

0.7-1.2mm for (for QP19 disc brake)

Grease amount**HF7/9 front axle**

Amount of grease must be proper. Too much or little grease can damage relevant parts (brake pad surface, brake drum surface, rubbers).

Grease amount for each hub: 0.62kg (in total) for inner chamber and two hub bearings.

Grease amount for each brake camshaft and kingpin: 0.38kg

Brake clearance adjusting arm must be filled with grease.

HF7/9 front axle

Amount of grease must be proper. Too much or little grease can damage relevant parts (brake pad surface, brake disc surface, rubbers). Grease the tie rod ball socket before you install the brake chamber.

Grease amount for each hub: 0.62kg (in total) for inner chamber and two hubbearings.

Grease amount for each kingpin: 0.06kg.

VGD060QB front axle

Amount of grease must be proper. Too much or little grease can damage relevant parts (brake pad surface, brake drum surface, rubbers).

Grease amount for each kingpin: fill 0.05kg respectively to the upper and lower grease nipple.

Brake clearance adjusting arm must be filled with grease.

VGD060QB front axle

Amount of grease must be proper. Too much or little grease can damage relevant parts (brake pad surface, brake disc surface, rubbers). Grease the tie rod ball socket before you install the brake chamber.

Grease amount for each kingpin: fill 0.05kg respectively to the upper and lower grease nipple.

Maintenance

-Before starting driving the vehicle, fill plenty of 2# lithium base grease to each grease nipple.

- Press brake pedal of a new vehicle 20-30 times to adjust the braking clearance to normal working clearance. Avoid placing a hard brake of pressing the brake pedal for a long time during the first 50km.

- After a 1500 km of running-in period for a new vehicle, we recommend adjustment of braking clearance for axle. Check fasteners (except gummed bolts) in each part before putting the vehicle into use.

- Fill 2# lithium base grease to each grease nipple every 2000 km

-Check wheel nut and tightening nut of tie rod ball every time before driving.

Maintenance and repair of disc-type front axle

1. Regular inspection items

Check the following items periodically at least one time every 3 months.

The recommended check cycle is a minimum requirement; brake system may need to be checked more frequently according to different using conditions.

Table of Periodical Check Items of Disc-type Front Axle

Check Object	Detect Parameters	Specified Requirement
Friction plate (wear limit)	Minimum friction plate thickness	3mm /with soleplate 11mm
	Maximum asymmetry amount of wear	1mm
Brake disc (wear limit)	Minimum thickness	37mm
	Maximum worn thickness of each side	4mm
Horizontal slip of brake caliper relative to bracket	Maximum resistance	100N

Wear of friction plate must be checked manually periodically. Friction plate shall be checked while tire pressure is checked every time or wear

pattern of brake disc and friction plate shall be checked one time every three months.

Braking efficacy will reduce if brake disc and friction plate are worn to the designed minimum thickness and they must be replaced; friction plates must be replaced immediately if they are scorched or polluted by oil.

Friction plates must be replaced in unit and shall not be replaced in single piece. Be sure to use friction plates from manufacturers designated by Sinotruk. Warranty of vehicle will be terminated if failing to comply with instructions of Sinotruk.



2. Check of friction disc

Please confirm service (foot) brake, parking (hand) brake and temporary parking brake for passenger car are not applied, and vehicle is fixed properly and wheels cannot move before starting checking and repairing.

Remove sealing cap, rotate adjusting bolt counterclockwise with ratchet wrench so as to make friction plates loose. After dismantling friction plates, and measure distance between brake block undersurface (including soleplate) and friction surface as shown in the figure; minimum allowable thickness (including soleplate) is 11mm. It is required to measure on four uniformly distributed points with vernier caliper; avoid positions which are severely worn.

Check simultaneously whether wear of friction plate is uniform; maximum allowable asymmetry is 1mm (measure eight points); it is required to measure on eight uniformly distributed points with vernier caliper; avoid positions which are severely worn.

If wear is asymmetrical, check whether sliding function of brake caliper on sliding pin is normally, and check whether there is dust between friction plate soleplate and entire push disc, and whether clearance adjusting function of automatic adjusting mechanism is normal.

All friction plates of two brakes of wheel must be replaced at the same time and new friction plates to be replaced with shall select original spare parts designated by Sinotruk when friction plates are replaced.

Note: Wear extent of internal friction plates is more than that of external friction plates due to light braking.

3. Check of brake disc dimension

A = Thickness of brake disc

A = 45mm new disc

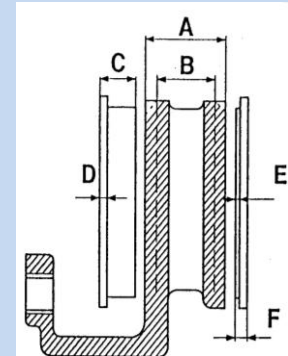
B = 37mm (after wear), be sure to replace

C = Total thickness of friction disc (new one) 30mm

D = Soleplate 8mm

E = Minimum thickness of friction material 3mm

F = Minimum allowable value of friction material and soleplate total thickness: with regard to 8mm soleplate, F=11mm. If $A \leq 39$ mm, it is recommended to replace with new friction plates and brake disc. If thickness of thickness of brake disc is smaller than 37mm, be sure to replace brake disc.



Measure thickness of thinnest position of brake disc; avoid measure thickness at the edge of brake disc as there is burr.

4. Check of flaws on surface of brake disc (as the right figure shows)

It is necessary to replace whether there are grooves and flaws on brake disc when replacing friction plates each time.

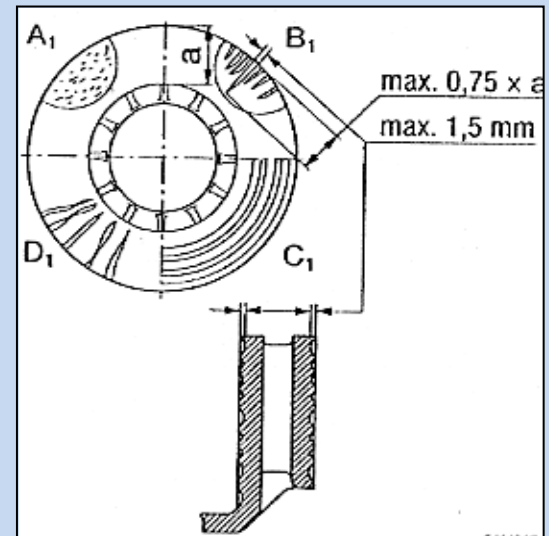
a = Contact area of friction plate

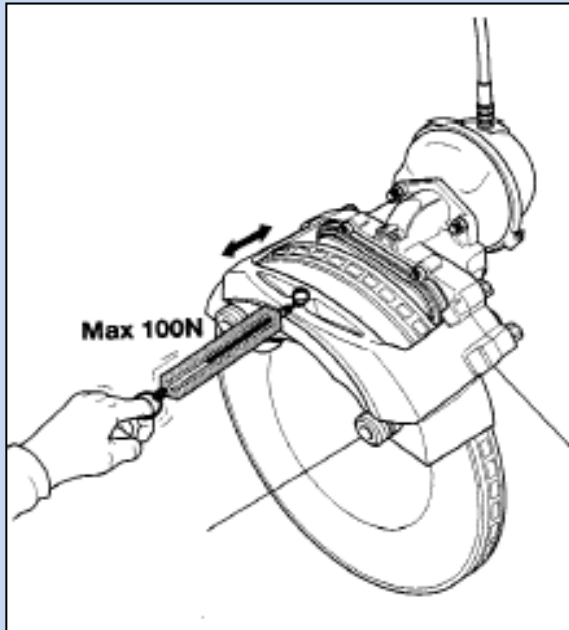
A1 = It is allowed to use if there are small spots distributed on the surface.

B1 = It is allowed to use if depth and width of flaw are smaller than 1.5mm and presents radiation form, and length is smaller than $\frac{3}{4}$ of contact area width of friction plate.

C1 = It is allowed to use if ring groove depth is smaller than 1.5mm.

D1 = It is not allowed to use if flaw is deep into ventilation cooling channel or is through outside (radial) from inside of friction plate contact area (a). Brake disc must be replaced at this moment.





Brake disc still can be used under circumstances of A1, B1 and C1 until it is worn to limit thickness of wear 37mm.

Brake disc is maintenance-free and it is unnecessary to polish surface when replacing friction plate but it would be better if polishing. After friction surface of brake disc has severe grooves, it can be polished so that contact area between friction plate and brake disc can be increased. To meet safety demand, minimum thickness of polished brake disc must be larger than 39mm.

5. Check of lubricating function of brake caliper (As shown in the left figure)

As shown in the figure, check whether maximum sliding resistance of brake caliper is larger than 100N, and whether there are dust or sundries etc. obstructing sliding of brake caliper.

6. Clearance adjustment

Push brake caliper to inside along guide pin. Separate push disc from internal brake block with proper tool, and measure clearance between push disc and internal brake block back; this value should be 0.7-1.0mm. If clearance is too larger or too small, automatic adjusting mechanism cannot work normally and it is necessary to check the following items.

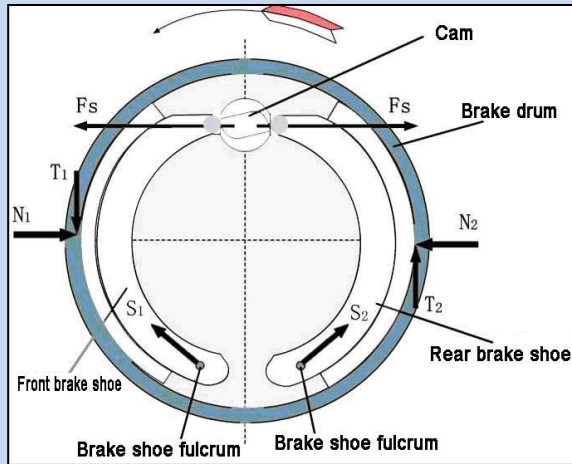
Open rubber cap, and screw hexagon head of hand adjusting shaft counterclockwise so as to produce clearance between brake block and brake disc.

Put wrench on hexagon head of hand adjusting shaft, apply brake for five times (about 2bar); if automatic adjusting mechanism works normally, wrench should rotate by small distance clockwise (rotation distance will reduce gradually as braking number of time increases). Automatic adjusting mechanism will adjust clearance to normal value after applying brake for several times.

Notices: Replace brake caliper if hexagon head of hand adjusting shaft cannot be rotated after 16N force is applied on the wrench because of inside troubles of brake caliper. It indicates this automatic adjusting mechanism cannot work properly and must be replaced if wrench cannot be rotated when braking, or can be rotated only in the first time, or can be rotated before and after braking each time.

7. Analysis of common troubles of disc-type front axle

Troubles	Causes	Measures
Off-track of braking	Whether friction plates are worn on one side	Replace friction lining
	Clearance between friction plate and brake disc is abnormal	Adjust initial clearance and check automatic adjusting function
	Friction plates cannot slide freely on bracket	Clean friction plates, sliding pin and bracket.
	Air pressure of air chambers of both side of axle is not consistent (measure air pressure of two sides with air pressure gauge)	Examine and repair brake chamber and valve
Insufficient braking force	Whether friction plates are worn on one side	Replace friction lining
	Clearance between friction plate and brake disc is abnormal	Adjust initial clearance and check automatic adjusting function
	Brake disc cannot work properly	Replace brake disc
	Air pressure of brake chamber is abnormal (measure air pressure of air chamber with air pressure gauge)	Check whether air way and valves leak air or cannot work properly etc.
Brake cannot be released completely	Clearance between friction plate and brake disc is abnormal	Adjust initial clearance and check automatic adjusting function
	Friction plates cannot slide freely on bracket	Clean friction plates, sliding pin and bracket.
	There is compressed air stored in brake chamber when brake is released	Repair brake chamber and valve
	Whether sliding function of brake caliper is normal	Replace with new sliding pin and new shaft sleeve



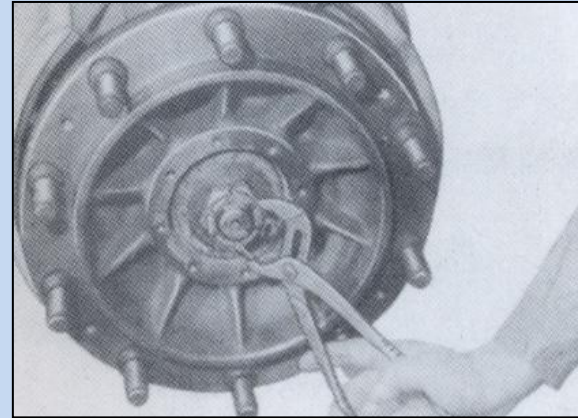
Drum-type brake front axle

Drum-type brakes used by Sinotruk are cam leading trailing shoe brakes. Brake drum on drum-type brake as rotating component shown in the figure is mounted on flange of wheel hub. As fixing component, brake shoe can rotate around fixed support (brake shoe rest pin fixed on backing plate).

Key points of use and maintenance of drum-type front axle system

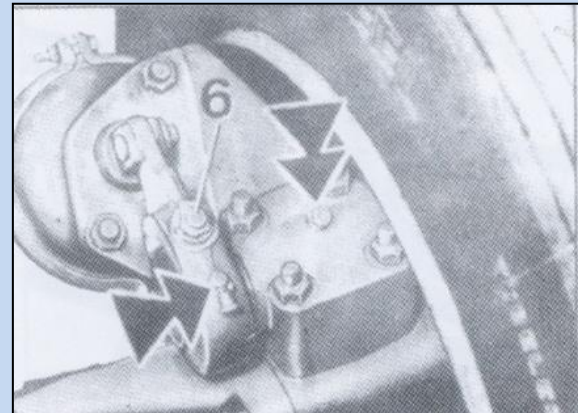
1. Start moving and park vehicle stably, avoid emergency stop and turn steering wheel to limit position and try to keep vehicle slide to stop and keep wheels straight. Use emergency brake as few as possible when traveling and travel at low speed on uneven road so as to prevent front axle suffering impact load and avoid early damage of front suspension components.
2. Keep normal tire pressure; front wheel: (235 ± 19.6) kPa; rear wheel: (314 ± 19.6) kPa. Bouncing frequency of wheels will increase if tire pressure is too high; rolling resistance and yawing force of wheels will increase if tire pressure is too low.
3. Implement daily maintenance and periodical maintenance properly; check connecting ball joints like steering tie rod arm and tie rod etc. frequently. Replace immediately if finding wear or looseness. Check quality of new spare parts before replacing. Service life will become shorter and it will result in early damage of other components if spare parts of poor quality are assembled.

4. Tires must be dismantled with tire changer; do not dismantle tires manually so as to prevent hub getting deformed. Implement dynamic balance test periodically for tires so as to prevent asymmetry of rotating mass causing radial run-out and horizontal swinging.
5. Be sure to replace swing arm ball joint dust cover when installing lower swing arm and fill up dust cover with lubricating grease. Do not apply any lubricating oil or lubricating grease on taper positions of ball joint.
6. Check whether shock absorber works normally or is installed firmly, whether spiral springs are damaged and whether elastic force of left and right springs is consistent before adjusting toe-in.
7. Replace lubricating grease in hub.
8. Lubricate steering knuckle king pin and brake arm brake camshaft.



Repair of common troubles of drum-type front axle

- 1 Heavy steering
 - (1) King pin and thrust roller bearing are not lubricated properly and get rusting;
 - (2) Adjusting shims of steering knuckle are too tight;
 - (3) Tire pressure is insufficient.



- 2 Abnormal wear of front wheel tires
 - (1) Toe-in is not adjusted properly;
 - (2) Front beam, steering knuckle and steel rim are deformed.
- 3 Swinging of front wheels
 - (1) Front wheel hub bearing becomes loose or brake drum is out-of-roundness;
 - (2) Wheel assembly is unbalanced; brake drum, hub and steel rim are not assembled concentrically;
 - (3) Clearance between front axle king pin and bushing is too large, tie rod ball joint pin becomes loose or thrust roller bearing is damaged;
 - (4) Front axle and frame are deformed;
 - (5) Plate spring fixing becomes loose or is on improper position; deflection or quantity of front plate springs is not consistent.
- 4 Abnormal noise or over-temperature of front wheel assembly
 - (1) Front axle bearing, thrust bearing and steering knuckle bushing etc. are damaged or pre-tightening force of hub bearing is too large;
 - (2) Hub bearing is not lubricated with sufficient oil;
- 5 Off tracking
 - (1) Steering tie/ straight pull rod is bent or deformed;
 - (2) Difference between pressure values of left front/right front tires is large so that front wheel is off-tracking;
 - (3) Front axle or frame is deformed so that wheel base of two sides is not equal;
 - (4) Difference between elastic force values of left/right front plate springs is large.

Hydraulic lifting axle

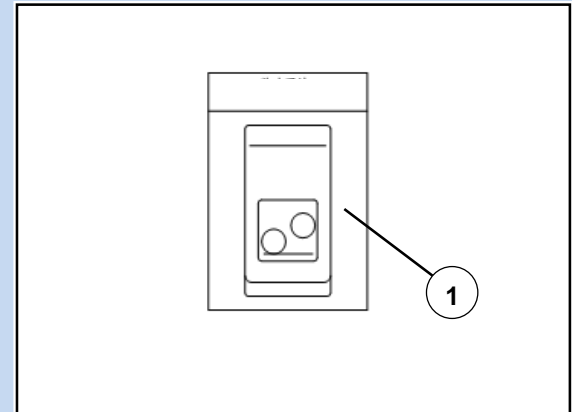
Overview

Rear-mounted 6×2 floating axle is electronic control hydraulic lifting axle which controls work of brake oil cylinder with hydraulic control valve to realize ascending and descending of rear axle.



WARNING

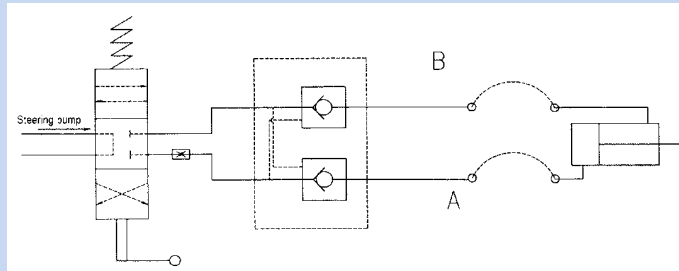
- Lifting device of driven axle can be operated only when vehicle is still and no-load.
- Driven axle must ascend to position of limit block when ascending.
- Rolling circle must rise up to highest position when driven axle reduces.
- Lock operating handle of lifting axle after finishing operation.



Hydraulic lifting axle

Lifting axle working principle and operation

The operating medium of lifting axle is high pressure oil provided by steering pump. Hydraulic cylinder is controlled by hydraulic valve. The working principle of hydraulic system is as shown in the figure below.



Lifting operation:

When vehicle stops and engine is idling, open protection unit of hydraulic control valve and lift up handle to lifting position so that hydraulic oil will enter lower chamber of working cylinder through high-pressure oil pipe, piston rod will be pushed out and push arm 4 on working cylinder will be driven to rotate on rotation shaft 2. Rolling circle 5 on push arm will press top end of balance arm 11 after reaching stroke. If working cylinder still stretches out, load of driven axle will reduce, leaf spring of rear suspension will get deformed; after load reduces to 0, deformation of plate spring will stop, hydraulic cylinder 8 will continue stretching out, balance arm 11 will turn over balance shaft so that driven axle will rise up. After deformation of plate spring stops, vehicle frame will start rising up; when lifting axle reaches limit position, handle will return to neutral position automatically after being released. Hydraulic working cylinder will be locked up by hydraulic pressure, lifting axle will rise up and operating handle will be locked.

Dropping operations:

When vehicle stops and engine is idling, open protection unit of hydraulic control valve and press handle to dropping position so that high pressure oil will enter upper chamber of working cylinder through high-pressure oil pipe, piston rod will withdraw and drive push arm 4 to rotate around rotation shaft 2, and axle will drop due to gravity. After axle drops to the ground, piston cylinder will continue withdrawing to limit position and drive push arm 4 and rolling circle 5 to highest position about 60mm to balance arm 11. Handle will return to neutral position automatically after it is released. Hydraulic cylinder will be self-locked. Rear axle will drop to the ground. Lock handle.

1. Rotation shaft bracket assembly
2. Rotation shaft
3. Push arm of hydraulic cylinder
4. Push arm
5. Rolling circle
6. High pressure oil pipe
7. Supporting arm
8. Hydraulic cylinder
9. Reinforcer of frame
10. Hydraulic cylinder bracket assembly
11. Balance rocker arm

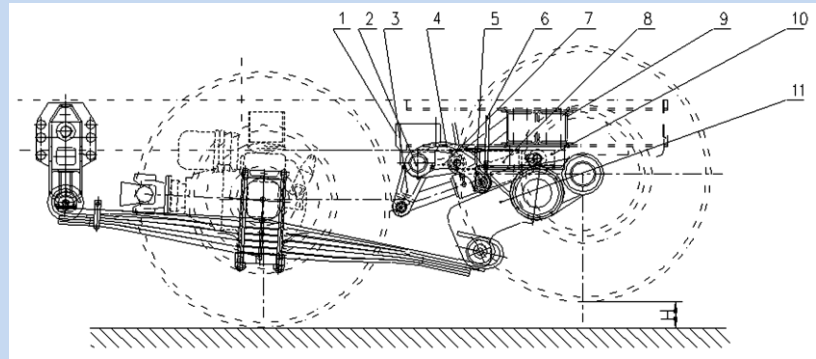


Figure a: After rear axle rises up

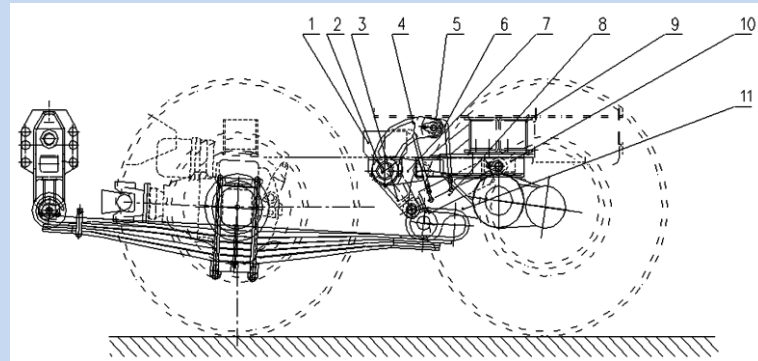


Figure b: After rear axle drops

Hydraulic lifting axle

Operating requirements:

It is necessary to ensure cleanliness of hydraulic oil first for hydraulic system. Generally, circulated and washed oil of hydraulic system cannot be used further and it is necessary to replace with new hydraulic oil; new oil can be injected into system after being filtered. Filter oil one time every 2 months, and clean oil tank during initial normal working period; replace hydraulic oil one time every half a year to a year (model: ATF III). This hydraulic system is configured with oil suction filter which shall be washed or replaced timely.

Normal working oil temperature of hydraulic system is -30°C - 50°C ; when temperature exceeds 55°C , it is necessary to stop the machine immediately and check causes for oil temperature rise.

Check oil tank oil level periodically, ensure oil level between marks on oil filler cap, and check viscosity of oil when temperature is -20°C .

Do not spray water directly toward pipe ports of shield and cable outlet otherwise wire may be burnt out due to short circuit.

Please turn off power supply immediately if there is abnormal noise or smoke is emitted, and operate after finding out causes and handling.

Do not open the air filter or oil window at will when hydraulic system is working. It is necessary to wash hydraulic components cleanly before re-installing when replacing hydraulic components.

Notices of overhaul

It is necessary to stop system; do not examine and repair system before pressure is released or control power supply is cut off so as to prevent accident.

Keep overhaul site clean; clean dirt on the surface before dismantling components or loosening pipes; seal up exposed port with clean covers in the process of overhauling so as to prevent pollutant entering system.

Do not polish, construct or weld on overhaul site.

Do not use sharp tool to replace seals; do not collide seals or working surfaces.

Parts must be washed cleanly when components are assembled.

Common troubles and troubleshootings

High noise

Troubles	Causes	Troubleshooting
Oil pump sucks air	Oil suction filter is blocked or is too small	Clean or replace oil filter
	Inner diameter of suction pipe is too small or suction pipe is bending too much	Replace with new pipe or install pipe with larger inner diameter
	(Section of) suction pipe shrink on local position. For example: Valve is closed or blocked partially, check valve spring is too strong, oil pipe is damaged or hose is damaged.	Open, repair or replace oil valve; repair or replace oil pipe and hose
	Oil is too cold	Heat oil to proper temperature
	Viscosity of oil is too high	Use hydraulic oil of recommended viscosity
	Oil produces steam	Reduce working temperature to proper temperature (specified temperature); supplement oil or replace proper oil
	Oil level in oil tank is too low	Fill oil to proper position
Oil produces foam	Oil level is higher than specified level after oil returns to (oil tank)	Drain return oil until oil level is lower than specified level
	Wrong oil	Replace with proper oil
	Seal of oil pump shaft leaks air	Replace seal ring
	Suction hose or connector leaks air	Replace with new hose, fasten connector or replace with new connector
	Air in system is not exhausted completely	Exhaust air in entire equipment
Mechanical vibration	Transmission center line is not aligned or coupling becomes loose	Align center lie or tighten screws
	Pipes vibrate	Fasten or add pipe clamp
Oil pump	Worn or damaged	Repair or replace with new oil pump
	Model is improper	Replace with proper model

Hydraulic lifting axle

Troubles	Causes	Troubleshooting
Motor	Worn or damaged	Repair or replace with new motor
	Model is improper	Replace with proper model
Overflow valve or	Instable	Replace with proper valve

Oil cylinder cannot move (pressure is insufficient or there is no pressure at all)

Troubles	Causes	Troubleshooting
Oil pump is over-temperature	Oil pump is worn or damaged	Repair or replace
	Oil viscosity is too low	Use hydraulic oil of recommended viscosity
	Cooling is insufficient or interrupted	Improve or adjust cooling system so as to make cooling water
Problems of overflow valve	Pressure adjusting screw becomes loose	Adjust properly
	Overflow valve cannot be closed, there is dirt or parts are	Wash and determine damaged parts; repair or replace
Problems of change valve	Electrical magnet cannot work	Check circuit
	Change valve gets stuck due to pollution	Wash or replace
Problems of oil	Inner wall, piston rod or piston seal of oil cylinder is damaged	Repair or replace the damaged components
Stop immediately	Problems of pressure switch setting or program	Increase set value of pressure switch or replace it

Driving axle

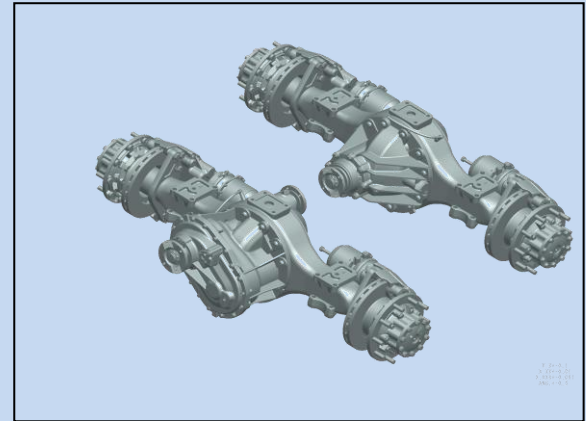
MCY13(Q) driving axle

- **Structural overview**

Structure of MCY13(Q) consists of central single-stage main reducer, press-welding axle housing and finish forged differential mechanism gear. Oil filter is installed to clean lubricating oil; adjustment-free hub bearing unit is configured; brake can be drum-type or disc-type brake; dual diaphragm brake chamber; ABS as option. It features such merits as simple yet reliable structure, long service life, low noise, light weight, high efficiency, easy operation and repair, etc.

- **Maintenance of axles**

Refer to the following table for recommended gear oil replacement cycle under different working conditions:



Assembly	Oil Name	Quality grade and viscosity grade	Recommended suppliers and product specifications	Oil Quantity		First replacement mileage or time	Interval Mileage or Time of Replacement	Remarks
MCY axle	Gear oil	GL-5 80W-90	Mobilube HD 80W-90 Castrol Syntrax Universal 80W-90 Shell Spirax S2 A 80W-90	MCY13	18L (Intermediate axle)	The first maintenance cycle is required during 100,000km or 10 months for long-distance truck, whichever comes first. 80,000km or 10 months for municipal vehicle, civil engineering truck, transport dump truck and mixer truck, whichever comes first. 25,000km or 5 months for mine engineering truck, whichever comes first.		Special after-sales gear oil designated by SINOTRUK must be used, otherwise drive axle may break down, to which SINOTRUK only provides paid service.
		GL-5 85W-90	Mobilube HD-A 85W-90 Castrol/ Shell		14.5L (rear axle)			

Driving axle

A new axle requires 1,500km running-in followed by reinspection of fasteners (except bolts applied with sealant) before official operation.

Oil level shall be inspected every 5,000km running or every month.

Lubricating grease of brake regulating arm and camshaft shall be replaced every 150,000km running or every year.

Regularly inspect quality of gear oil inside axle housing and replace with new oil in case it deteriorates or thins.

Always remove dirt and dust on vent plug of rear axle housing.

Always inspect oil filler hole plug and oil drain hole plug and tighten or replace the plug in case of oil penetration and leakage.

As semi-axle flange outputs huge torque with shock impact, tightness of semi-axle bolts shall be constantly inspected for fear of looseness and consequent rupture.

For every 2,000km running, fill every grease nozzle with 2# lithium-based lubricating grease; clean vent plug; and inspect gear oil level inside axle housing (inspect by removing oil filler plug on the main decelerator housing).

Brake clearance shall be inspected every 5,000km running.

For every 8,000km-10,000km running, inspect tightness of brake bottom plate; looseness of hub bearing; and wear of brake friction lining, and replace friction lining if its wear exceeds the limit pit.

Brake clearance adjustment

Item	Parameter
Clearance between brake shoes and brake drum (mm)	0.4-0.7



WARNING

Drive axle must use special drive axle gear oil of Sinotruk; otherwise, it may cause drive axle damage, and Sinotruk only provides paid service!

• Inspection and maintenance

Inspection and maintenance items	Inspection and maintenance cycle (Based on mileage or time, whichever comes first)			
	Initial inspection		Regular inspection and maintenance	
Regular inspection items	After 1,500km After 1st month	Every 15000km Every 3 months	Every 60000km Every 6 months	Every 120000km Every 1 year
Inspect for wear, sealing and damage of moving parts, inspect for wear of brake friction lining, inspect for quick return of camshaft, function inspect of regulating arm, and inspect for function and airtightness of brake chamber	○	○	○	○
Safety inspection (everyday)				
Inspect and adjust brake correctness	○	○	○	○
Inspect brake functioning	○	○	○	○
Retighten bolts with specified torque	○			○
Clean brake				○
Apply antilock agent to brake shoe backing pin and roller				○
Inspect operation of hub bearing and adjust or replace it if necessary	○			○

Note: Maintenance cycle of a vehicle running under harsh conditions shall be properly shortened; tighten wheel nuts with specified tightening torque after 50km running following installation or replacement of any wheel and tighten wheel nuts again with specified tightening torque after 150km running.



Styer drive axle

- **Structure overview**

Styer rear drive axles are dual-stage drive axles with both central one-stage reducer and wheel-side planetary reducer. There are two types of driving axles, dual drive axles and single rear driving axle, for different drive modes. Housing is either forged or stamped, with inter-axle and inter-wheel differential and differential lock..According to different housings, there are two types of rated axle load, 13T or 16T.

- **Axle maintenance**

Recommended gear oil replace interval in different working conditions:

Assembly	Oil	Quality and Viscosity Level	Recommended suppliers and product specification	Oil Quantity		First replacement mileage or time	Interval Mileage or time of Replacement	Remarks
STR	Gear oil	GL-5 80W-90	Mobil Mobilube HD 80W-90 Castrol Castrol Syntrax Universal 80W-90 Shell Spirax S2 A 80W-90	ST13	21L (intermediate axle) 18.5L(rear axle)	2000-5000km	Long-distance vehicle: 100,000 km or 10 months, whichever comes first. Municipal vehicle, urban construction engineering truck, transport dumper, mobile mixer: 80,000 km or 10 months, whichever comes first. Mine special truck: 25,000 km or 5 months, whichever comes first	Only the special gear oil specified by SINOTRUK can be used, otherwise it will result in damage of drive axle, for which SINOTRUK only provides the paid service.
		GL-5 85W-90	Mobil Mobilube HD-A 85W-90 Castrol / Shell	ST16 / HC16	23L (intermediate axle) 20.5L (rear axle)			

Check oil levels in hub reducer and final drive of the axle on a regular basis.

Oil starvation will cause premature wear of moving parts and, if serious, result in burn through. However, “the more the better” does not apply to lubricant because lubricant excess will cause high temperature even result in oil leak.

When changing hub reducer lubricant at initial maintenance of a new car, it is required that you should rotate the wheel until the drain plug is in its lowest position while the fill plug is at upside of the other half and open the drain plug to drain used oil for resh oil filling, and then install the drain plug properly, open the fill plug, add lubricant until this high liquid level, and finally screw in the fill plug. Rotate the wheel repeatedly for several turns. Then position the wheel until the drain plug is at its highest position while the fill plug is on the smaller half, and open the fill plug to allow redundant lubricant to flow out until the liquid level is kept at the position of the fill plug. Finally, install the fill plug properly.

There are two screw plugs on the rear axle housing: A drain plug at bottom of the bowl and a fill plug at approx. half height of the bowl. The normal liquid level should be always kept at the height of the fill plug.

Adjustment of brake clearance

Item	Parameters
Clearance between brake shoe and brake drum (mm)	0.4-0.7



AC16 drive axle

- **Structure overview**

AC16 rear drive axles are dual-stage drive axles with both central one-stage reducer and wheel-side planetary reducer. Currently there are two types, e.g. dual drive axles and single rear drive axle. Housing is either forged or stamped, with inter-axle and inter-wheel differential and differential lock.

- **Axle maintenance**

Recommended gear oil replace interval in different working conditions:

Assembly	Oil	Quality and Viscosity Level	Recommended suppliers and product specification	Oil Quantity	First replacement mileage or time	Interval Mileage or time of Replacement	Remarks
AC16	Gear oil	GL-5 80W-90	Mobil Mobilube HD 80W-90 Castrol Castrol Syntrox Universal 80W-90 Shell Spirax S2 A 80W-90	21L (intermediate axle) 17.5L (rear axle)	2000-5000km	Long-distance vehicle: 100,000 km or 10 months, whichever comes first. Municipal vehicle, urban construction engineering truck, transport dumper, mobile mixer: 80,000 km or 10 months, whichever comes first. Mine special truck: 25,000 km or 5 months, whichever comes first	Only the special gear oil specified by Sinotruk can be used, otherwise it will result in damage of drive axle, for which Sinotruk only provides the paid service.
		GL-5 85W-90	Mobil Mobilube HD-A 85W-90 Castrol/ Shell				

Following items must be observed when using and maintaining rear driving axle.

Oil starvation will cause premature wear of moving parts and, if serious, result in burn through. However, “the more the better” does not apply to lubricant because lubricant excess will cause high temperature even result in oil leak.

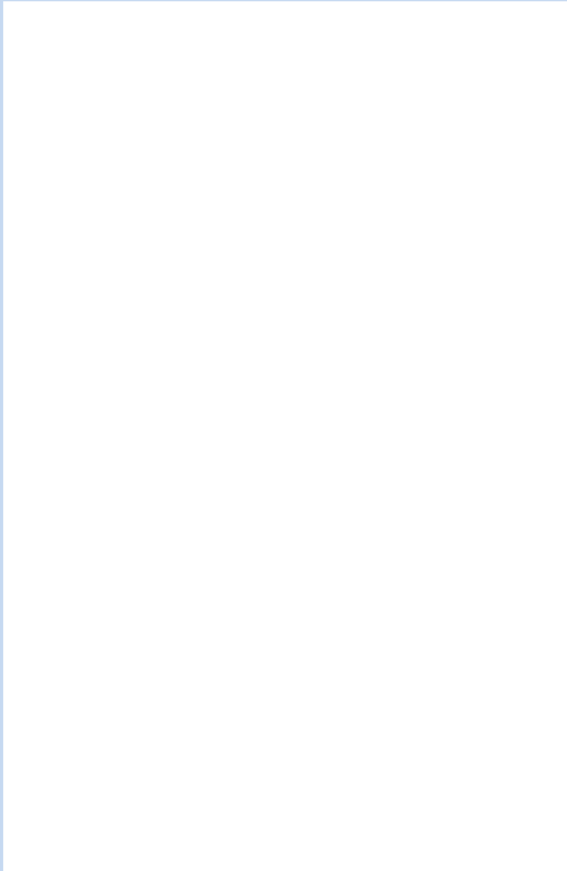
When changing hub reducer lubricant at initial maintenance of a new car, it is required that you should rotate the wheel until the drain plug is in its lowest position while the fill plug is at upside of the other half and open the drain plug to drain used oil for fresh oil filling, and then install the drain plug properly, open the fill plug, add lubricant until this high liquid level, and finally screw in the fill plug. Rotate the wheel repeatedly for several turns. Then position the wheel until the drain plug is at its highest position while the fill plug is on the smaller half, and open the fill plug to allow redundant lubricant to flow out until the liquid level is kept at the position of the fill plug. Finally, install the fill plug properly.

Note:the tightening torque for AC16 axle oil drainage plug is 100Nm. The rest bolts’ tightening torque is 35Nm.

There are two screw plugs on the rear axle housing: A drain plug at bottom of the bowl and a fill plug at approx. half height of the bowl. The normal liquid level should be always kept at the height of the fill plug.

Adjustment of brake clearance

Item	Parameters
Clearance between brake shoe and brake drum (mm)	0.4-0.7



Correct use of differential lock

the inter-wheel differential mechanism of the real drive axle makes the right and left wheel differ automatically for wheel speed to avoid tyre wear and mechanical damage during cornering. If one wheel slide on slippery or muddy road, making the vehicle unable to get out, engage the differential mechanism, to make the left and right axle shaft become a solidly coupled shaft. At this time the vehicle can get out of the slippery road.

Serious overweight and big load concentration will lead to axle housing deformation and breakage. Please ensure proper load in line with related instructions. When you assemble differential, driven gear and other connecting parts, you must rub the screw thread with Loctite 262 glue and tighten it with prescribed torque.

Note: when vehicle gets out of the slippery road, you should immediately disengage the differential, or it will cause serious tyre wear and damage the differential.

Suspension

Rubber suspension



WARNING

If there are cracks, fractures and serious corrosion on the hanging bracket of the vehicle frame, do not drive the vehicle, because it may lead to separation of components loss of vehicle control and personal injuries and property losses.

Check the rubber spring edges for fractures or signs of rives at least once a year.

Do not remove any fastners and rubber parts.

Do not grease any part of the rubber suspension system with grease or oil in particular the grease on rubbers.

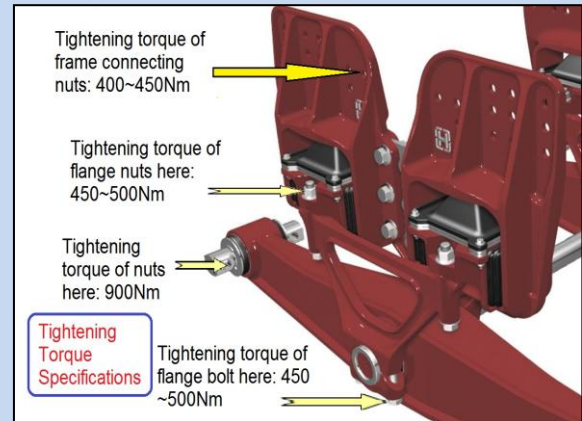
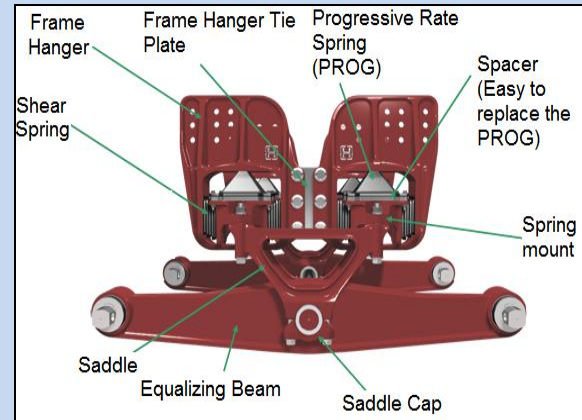
NOTE: SINOTRUK recommends the use of Class 10.9 bolts, hardened washers, and Class 10 locknuts. Hardened washers are not necessary when flange head fasteners are used.

NOTE: Do not screw the nut to install the cotter, or it may affect the tightening torque.



WARNING

Insufficient tightening torque will lead to damage and premature wear to legs, holes of the axle bracket and to connecting parts of the equalizing beam.



Advantages of rubber suspension:

a. Simple structure:

The simple structure facilitates installation, reduces assembly time, improves working efficiency, cuts cost, and increases benefit.

b. Light dead weight:

c. Lubrication free:

With such features as maintenance and lubrication free, the rubber suspension will also bring customers better economic benefits while saving their costs and time.

d. Good trafficability:

The rubber suspension has good trafficability so that tire wear is reduced while tire service life is extended and maintenance cost is cut while maintenance expense is saved effectively to bring customers good economic benefits.

e. Excellent comfort:

With the variable rigidity feature, the rubber suspension can provide your vehicle with excellent comfort, reduce the vibration caused by rugged road surfaces to the maximum extent, mitigate driver's fatigue, protect integrity of vehicle components and goods, and extend lives of on-vehicle components, whether the vehicle is in no-load or full load condition.

f. Damage of elastic components will not affect travel of the vehicle:

When a conventional leaf spring structure is used, once the leaf spring is damaged, the vehicle will be unable to run and you can not but replace the leaf spring with a new one. For a vehicle equipped with rubber suspension, if any of its elastic components is damaged when the vehicle is running, its travel will not be affected, so you can replace the component after you have sent the goods to your destination thus avoiding the customer's direct or indirect loss.

g. Tire wear can be reduced greatly:

When the vehicle is running, tire bounce will cause wear. Because the rubber suspension improves running smoothness greatly, tire wear can be reduced significantly.

Maintenance of rubber suspension

Correct inspection flow is extremely important to ensure correct maintenance and operation of suspensions system or suspension parts. Strict inspection of HUV 270t rear suspension system during 2,000km service maintenance and vehicle regular maintenance before vehicle start is recommended by Hendrickson. Non-road vehicles shall be overhauled more frequently compared with road vehicles. Overhaul items must incorporate following items and reference items of other parts indicated in the chapter.

Inspection interval

2,000km overhaul

(1) Visually inspect suspension parts

- a. Whether suspension functions properly
- b. Whether there is abnormal application and lost or missing part
- c. Whether there is severe scratch with other parts or wear

Whether any part is damaged or ruptured

(2) Inspect whether all fasteners are tight and pay special attention to following connections:

- a. Fastener of hanger assembly connecting piece
- b. Connecting part at balanced beam end, with reference to standards of the truck manufacturer
- c. Connecting part of suspension triangle supporting seat and spring bearing
- d. Connecting part of suspension bottom cap
- e. Hanger assembly and frame connection fastener

Preventive maintenance:

Every three months inspect progressive rate springs and shear springs.

Every six months inspect V-Torque rods, equalizing beam end connections.

Every twelve months:

1. Visually inspect suspension for proper assembly.

2. Visually inspect suspension components.

a. Proper suspension function

b. Signs of unusual movement, loose or missing components

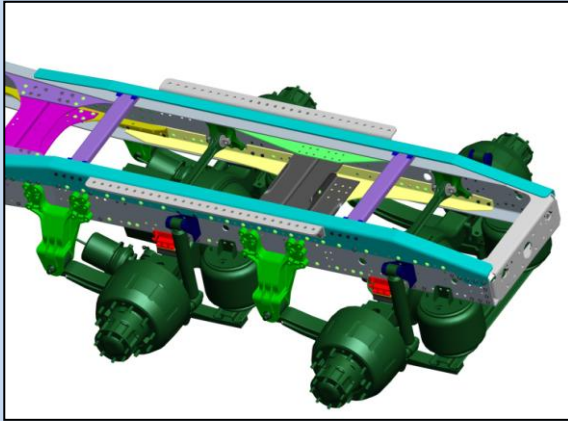
c. Signs of abrasive or adverse contact with other components

d. Damaged bent or cracked parts

Rubber suspension

Troubleshooting instruction

Conditions	Possible Reason	Solution
Jolt of suspension	Damage of variable-rigidity spring	Replace variable-rigidity springs in pair
	Damage of shear spring	Replace hanger assembly
	Replace hanger assembly	Redistribute cargo or reduce vehicle load
Inclination of vehicle	Damage of variable-rigidity spring	Replace variable-rigidity springs in pair
	Damage of shear spring	Replace hanger assembly
	Cargo	Redistribute vehicle cargo
Abnormal wear of tires	Out-of-parallelism of double rear axles	Guarantee parallelism of double rear axles and contact truck manufacturer
	Bending of horizontal pipe	Replace horizontal pipe
	Damage of suspension parts	Replaced damaged part
Loose suspension fasteners	Suspension overload	Redistribute cargo or reduce vehicle load
		Replace and tighten all fasteners according to torque specification
	Constant high-speed start and braking of vehicle	Shorten inspection interval of vehicle fasteners
		Change driving habit and reduce high-speed start and braking of the vehicle
		Replace and tighten all fasteners according to torque specification
Cracking of hanger assembly	Suspension overload	Replace hanger assembly
		Redistribute cargo or reduce vehicle load
	Loose fasteners	Replace hanger assembly
		Replace hanger assembly
		Replace and tighten all fasteners according to torque specification
Damage of hanger assembly	Replace hanger assembly	
Friction between suspension triangle supporting leg and balanced beam	Wear, bending, crack or damage of suspension	Replaced damaged part
	Bending or loss of horizontal pipe	Replace horizontal pipe
	Looseness or wear of bottom cap	Replace bottom cap and/or triangle supporting seat
	Triangle supporting seat is not right above the balanced beam	Adjust triangle supporting seat to be right above the balanced beam



Single swing arm air suspension

Overload is prohibited!

The vehicle should be running on the express way and first-class high way with the maximum load of one axle of 13 tons.

No lubricating and greasing on any part of the air suspension, in particular on its rubber parts.

Ensure normal air supply pressure which is about 8.5bar.

For vehicles which have air suspension with lifting function, any lifting operation should be conducted when the vehicle remains height of complete vehicle.

Daily checks and maintenance include: visual checks on the air spring for insufficient air inflation and balance, normal height of suspension, system leakage, oil leakage, damage and normal function of the shock absorber.

Maintenance of air conditioning system

The HOWO air conditioning system is composed by radiator, compressor, condenser, expansion valve, receiver drier, evaporator and fan and they are connected with pipes and form one closed system. The radiator takes engine circulating water as heat source, the compressor is driven by engine belt, the fan and compressor electromagnetic clutch is powered by vehicle and condenser is cooled by radiator fan. The refrigerant type is R134a which is green environmental protection and freon-free.

Main technical parameters

A/C system	Refrigerating capacity	4.8-4.9KW
	Refrigerant	R134a
Compressor	Type	SE5H14
Compressor	Displacement	138cc/r
Compressor	Working voltage	DC24V
Compressor	Belt	Triangle belt (Double A) 17-420
Compressor	Rate of electromagnetic clutch	50W
Compressor	Weight	5.1kg
Compressor	Refrigerator oil	RENISO PAG 100 Refrigerator oil
Condensor	Structure	Parallel-flow
	Core	650×380×20
	Face area	0.24 m ²
Evaporator	Structure	Tube and fin
	Core	369×204×64
	Face area	0.07 m ²
Expansion valve	Type	Internal equalizing thermal expansion valve 1.5T
System protection	Pressure protection	0.21MPa<P<3.14MPa

Maintenance of air conditioning system

Notices:

- Non-professionals are not allowed to disassemble or repair A/C system. The A/C system is always in pressure condition, the heating to the refrigeration filled system is prohibited.
- The direct touch of human body and liquid refrigeration will cause frostbite; hand, face and other exposed body are not allowed to be close with refrigeration. Before the filling of refrigeration, please identify the refrigeration R134a for the A/C system, any other refrigeration is not allowed to fill in.
- The drier shall be connected to system in the last step to avoid the absorbing of water in air and affect the water absorbing performance.
- The refrigerant oil needed in system is usually supplied by the refrigerant oil of compressor and not need to fill it any more. But it shall be filled if the refrigerant oil is lacked and caused by system leakage.
- In the seasons that not to use A/C, start the A/C cooling system by 2-3 times for 10 minutes every time in every month to avoid damage of evaporator, condenser or compressor.
- Strict implementation of care and maintenance procedures to ensure the best working conditions of the air conditioner.

Repair and Maintenance

	Maintenance Contents	Maintenance Period
Refrigeration	Obverse by level glass to check if refrigerant is enough, otherwise add in.	Every day
Receiver drier	Lowed water absorption performance, replace.	Every year
Rubber pipe	If it is aged or chapped, replace if necessary.	Every month
Pipe joint	If it has leakage or oil, tightening.	Every month
Expansion valve	Check if it is normal, otherwise make adjustment or replace.	Every year
Refrigerant oil	If it is enough or dirty, fill in or replace.	Every six months
Belt	Rate of tension, if it wore, replace if necessary.	Every month
Tightening bolt	If it is loosen or damaged, disassembly or remounting if necessary.	Every week
Evaporator	Cleaning	Every six months
Condenser	Cleaning	Every week
A/C external cycle filter	Cleaning	Every week
A/C wiring harness	If the connector is firmly connected	Every month

Maintenance of air conditioning system

- Troubleshooting List

Fault phenomenon	Possible Reason	Solution
1. High pressure is lower	System leakage	Check leakage and repair
	High pressure valve trouble	Change
	Return valve is closed	Open it
	Lacks refrigerant	Fill in refrigerant
	Receiver drier is blocked	Replace
	Compressor return air valve leakage	Change valve
	Damage of compressor reed valve	Replace
2. High pressure is higher	Air exist in system	Refill the refrigerant
	Condenser is blocked	Clean condenser
	Exhaust valve is closed	Open it
	Refrigerant is exceed in system	Exhaust more refrigerant
3. Returned air pressure is low	Lack of refrigerant	Fill refrigerant
	Compressor piston wore	Repair
	Compressor cylinder head gasket leakage	Replace cylinder head gasket leakage
	Hose twist or flat	Replace hose
	Compressor return air valve leakage	Replace air valve
	System is wetly	Replace drier
	Expansion valve filter is blocked	Clean and replace drier
	Compressor reed valve is damaged	Replace
4. Returned air pressure is high	Expansion valve temperature sensor is loosen	Tighten the temperature sensor fixing clip
	Refrigerant is exceed in system	Exhaust more refrigerant
	Expansion valve can only open but can not close	Replace expansion valve
	Compressor reed is damaged	Replace reed valve
	Compressor cylinder head gasket leakage	Replace cylinder head gasket

Maintenance of air conditioning system

Troubleshooting List (Continued)

Fault phenomenon	Possible Reason	Solution
5. Compressor is not working	Driven belt is broken	Replace belt
	Clutch cable is damaged	Replace cable
	Compressor piston cost long time	Replace compressor
	Constant temperature switch	Replace constant temperature
	Clutch coil is damaged	Replace coil
	Pressure valve has trouble	Replace pressure valve
6. Poor cooling performance	Gilled tube is frozen, temperature setting is too	Rotate the constant switch downwards, defrost
	Can not fully close hot water valve	Close hot water valve
	Receiver drier is blocked	Replace
	Lack of refrigerant	Fill in refrigerant
	Defrost temperature sensor trouble	Replace
	High pressure is too high	Refer to 2
	The pressure of return air is low	Refer to 3
	The pressure of return air is high	Refer to 4
	Drier is blocked	Clean, replace drier
	Expansion valve is trouble	Replace expansion
Constant temperature switch can not work	Replace constant switch	
7. Evaporator gilled tube is frozen	Improper adjustment of constant temperature	Adjust to working condition
	Not enough air is passing evaporator	Check the evaporating fan
8. Belt trouble	Pulley can not match	Adjust pulley bearing position
	Belt is too tight or looseness	Proper adjustment
	Wrong dimensions or size of the belt	Replace
	Idle gear is damaged	Replace bearing
9. Hose or joint leakage	Leakage of joint	Repair or replace
	Leakage of hose	Replace hose

Maintenance of complete vehicle

According to maintenance regulations of SINOTRUK, the first maintenance carried out in the service station designated in warranty manual is called initial maintenance, hereinafter referred to as “initial maintenance”. According to maintenance regulations of SINOTRUK, regular maintenance carried out in the service station designated in warranty manual is called regular maintenance, hereinafter referred to as “regular maintenance”.

Road vehicles refer to vehicles constantly running on classified highways such as towing truck, platform truck, stake truck and oil tanker. Non-road vehicles refer to vehicles constantly running on roads out of classified highways such as construction site vehicle, mine vehicle, dump truck and side dumper.

Assembly	Maintenance Items	First Maintenance	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Diesel engine	1. Check the engine harness for looseness, interference and rub	2000~5000	Per 10000	Per 5,000
	2. Check the pipeline for looseness, interference and rub	2000~5000	Per 10000	Per 5,000
	3. Check for the oil leakage	2000~5000	Per 10000	Per 5,000
	4. Check the fuel coarse filter level (if this function is provided)	2000~5000	Per 10000	Per 5,000
	5. Check and clean the float filter screen in the oil tank	2000~5000	Per 10000	Per 5,000
	6. Check if the oil and coolant levels are within the normal scale range	2000~5000	Per 10000	Per 5,000
	7. Change the engine oil	See Engine Maintenance		
	8. Replace the oil filter element	Replace the oil filter element meanwhile change the engine oil, and use the accompanying oil filter element for the first replacement		
	9. Check and clean air filter element; check whether air filter alarm sensor works properly	2000~5000	Per 10000	Per 5,000
	10. Change the coolant	See Engine Maintenance		
	11. Check the connection bolt of fan; check the fan and fan cover for the interference and possibility	2000~5000	Per 10000	Per 5,000

Maintenance of complete vehicle

Assembly	Maintenance Items	First Maintenance	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Diesel engine	12. Check the tension pulley and ensure the tension of belt	2000~5000	Per 10000	Per 5,000
	13. Check the idling of engine	2000~5000	Per 10000	Per 5,000
	14. Check the S&R	2000~5000	Per 10000	Per 5,000
	15. Check the connection bolts of engine for looseness	2000~5000	Per 10000	Per 5,000
	16. Check the support rubber gasket of engine for damage	2000~5000	Per 10000	Per 5,000
	17. Check the pressure of engine oil and water temperature	2000~5000	Per 10000	Per 5,000
	18. Check valve Squeaks and rattles and check and adjust valve clearance.	2000~5000	Per 10000	Per 5,000
	19. Check the fuel supply advance angle	2000~5000	Per 10000	Per 5,000
Check with the EOL tools for diesel engine	20. Read the fault code of engine, and check for the fault	2000~5000	Per 10000	Per 5,000
	21. Read the fault code of SCR and check for the fault	2000~5000	Per 10000	Per 5,000
	22. Select the type of common rail system on EOL, and check if the throttle pedal is able to change from the OFF to OPEN (only for DENSO)	2000~5000	Per 10000	Per 5,000
	23. Check if K value is correct	2000~5000		
	24. Check if fuel water warning sensor is normal	2000~5000	Per 10000	Per 5,000
	25. Check if common rail pressure is normal	2000~5000	Per 10000	Per 5,000
	26. Check if the intake manifold pressure is normal	2000~5000	Per 10000	Per 5,000
	27. Other parameters	2000~5000	Per 10000	Per 5,000

Assembly	Maintenance Items	First Maintenance	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Natural gas engine	28. Check the engine harness for looseness, interference and rub	2000~5000	Per 10000	Per 5,000
	29. Check the pipeline for looseness, interference and rub	2000~5000	Per 10000	Per 5,000
	30. Check for the oil leakage	2000~5000	Per 10000	Per 5,000
	31. Check low pressure gas filter element,ensure the cleanness of the element	2000~5000	Per 10000	Per 5,000
	32. Check high pressure gas filter element,ensure the cleanness of the element	2000~5000	Per 10000	Per 5,000
	33. Check leakage, damage, looseness of connection of gas pipelines	2000~5000	Per 10000	Per 5,000
	34. Check if the oil and coolant levels are within the normal scale	2000~5000	Per 10000	Per 5,000
	35. Change the engine oil	See Engine Maintenance		
	36. Replace the oil filter element	Replace the oil filter element meanwhile change the engine oil, and use the accompanying oil filter element for the first replacement		
	37. Check and clean the air cleaner element and check if the air cleaner warning sensor is effective	2000~5000	Per 10000	Per 5,000
	38. Change the coolant	See Engine Maintenance		
	39. Check the connection bolt of fan; check the fan and fan cover for the interference and possibility	2000~5000	Per 10000	Per 5,000
	40. Check the tension pulley and ensure the tension of belt	2000~5000	Per 10000	Per 5,000
	41. Check the idling of engine	2000~5000	Per 10000	Per 5,000
	42. Check abnormal sounds	2000~5000	Per 10000	Per 5,000
43. Check the connection bolts of engine for looseness	2000~5000	Per 10000	Per 5,000	

Maintenance of complete vehicle

Assembly	Maintenance Items	First Maintenance	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Natural gas engine	44. Check the support rubber gasket of engine for damage	2000~5000	Per 10000	Per 5,000
	45. Check the pressure of engine oil and water temperature	2000~5000	Per 10000	Per 5,000
	46. Check rubber sleeve ignition coil	2000~5000	Per 10000	Per 5,000
	47. Check spark plug gap	2000~5000	Per 10000	Per 5,000
Check with the EOL tools for natural gas engine	48. Read the fault code of engine, and check for the fault	2000~5000	Per 10000	Per 5,000
	49. Wash throttle	2000~5000	Per 10000	Per 5,000
	50. Check condition of gas mixer, clean gas mixer	2000~5000	Per 10000	Per 5,000
	51. Check whether the pressure value of exhaust vent valve is normal	2000~5000	Per 10000	Per 5,000
	52. Check the synchronization of the opening of throttle and accelerator pedal	2000~5000	Per 10000	Per 5,000
	53. Check ignition of each cylinder	2000~5000	Per 10000	Per 5,000
	54. Other parameters	2000~5000	Per 10000	Per 5,000
Clutch	55. Check if the clutch separates completely and engages	2000~5000	Per 10000	Per 5,000
	56. Check the clutch hydraulic oil level	2000~5000	Per 10000	Per 5,000
	57. Check the vent of clutch booster for blockage or clog	2000~5000	Per 10000	Per 5,000
	58. Lubricate the clutch pedal shaft	2000~5000	Per 10000	Per 5,000
	59. Check the clutch for assistance stroke	2000~5000	Per 10000	Per 5,000
	60. Lubricate the sliding sleeve of release bearing	2000~5000	Per 10000	Per 5,000
	61. Replace the clutch oil	See "Clutch operating system" in Chapter V		

Assembly	Maintenance Items	First	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Transmission	62. Check the level of lubricant ; refill oil if necessary ; clean the filter	2000~5000	Per 10000	Per 5,000
	63. Replace the transmission lubricant	See "Transmission in" in Chapter V		
	64. Lubricate the supporting position of clutch fork shaft / lubricate the	2000~5000	Per 10000	Per 5,000
	65. Check and clean pressure reduction valve of air cleaner (only for	2000~5000	Per 10000	Per 5,000
	66. Lubricate the clutch fork shaft	2000~5000	Per 10000	Per 5,000
	67. Lubricate the shift mechanism /Check the joint bolt of transmission	2000~5000	Per 10000	Per 5,000
	68. Check the blow vent of transmission	2000~5000	Per 10000	Per 5,000
	69. Check the shift mechanism normal or not	2000~5000	Per 10000	Per 5,000
	70. Check PTO normal or not	2000~5000	Per 10000	Per 5,000
	71. Check is there oil leak or air leakage	2000~5000	Per 10000	Per 5,000
	72. Check is there the noise	2000~5000	Per 10000	Per 5,000
73. Check the joint bolt between engine and transmission loose or not	2000~5000	Per 10000	Per 5,000	
MCYdrive axle	74. Change the lubricating oil of drive axle	See the "Drive axle" in Chapter V		
	75. Lubricate the adjustment arm of brake clearance	2000~5000	Per 10000	Per 5,000
	76. Check if the brake return is normal	2000~5000	Per 10000	Per 5,000
	77. Check if the differential lock works normal	2000~5000	Per 10000	Per 5,000
	78. Check the venting hole	2000~5000	Per 10000	Per 5,000
	79. Check the clearance between the brake shoe and brake drum and	2000~5000	Per 10000	Per 5,000

Maintenance of complete vehicle

Assembly	Maintenance Items	First Maintenance	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Other drive axles	80. Change the gear oil of main reducer of drive axle	See the "Drive axle" in Chapter V		
	81. Lubricate the adjustment arm of brake clearance	2000~5000	Per 10000	Per 5,000
	82. Check if the brake return is normal	2000~5000	Per 10000	Per 5,000
	83. Check if the differential lock is normal	2000~5000	Per 10000	Per 5,000
	84. Check the venting hole	2000~5000	Per 10000	Per 5,000
	85. Check the clearance between the brake shoe and brake drum	2000~5000	Per 10000	Per 5,000
Front steering axle and steering gear	86. Lubricate the front steering main pin	2000~5000	Per 10000	Per 5,000
	87. Lubricate the brake adjustment arm	2000~5000	Per 10000	Per 5,000
	88. Depending on the tyre, check and adjust the front wheel toe-in	2000~5000	Per 10000	Per 5,000
	89. Check the steering horizontal rod clamp bolts and ball head for	2000~5000	Per 10000	Per 5,000
	90. Check the steering vertical rod clamp bolts and ball head for	2000~5000	Per 10000	Per 5,000
	91. Check the plumbing arm of traversing mechanism for looseness	2000~5000	Per 10000	Per 5,000
	92. Check the double steering middle plumbing arm for looseness	2000~5000	Per 10000	Per 5,000
	93. Check the steering lever system for abnormal wear	2000~5000	Per 10000	Per 5,000
	94. Check if the oil level of traversing mechanism is normal, and	2000~5000	Per 10000	Per 5,000
	95. Check the power-assisted steering pipeline for aging and oil	2000~5000	Per 10000	Per 5,000

Assembly	Maintenance Items	First Maintenance	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Front steering axle and steering gear	96. Check the oil and gas pipelines for interference and wear	2000~5000	Per 10000	Per 5,000
	97. Check the clearance between the brake shoe and brake drum	2000~5000	Per 10000	Per 5,000
	98. Check if the brake return is normal	2000~5000	Per 10000	Per 5,000
	99. Change the steering gear oil	See "Steering system" in Chapter V		
Transmission shaft	100. Lubricate the telescopic sleeve and the universal joint	2000~5000	Per 10000	Per 5,000
	101. Check the hanger bolt of transmission shaft	2000~5000	Per 10000	Per 5,000
	102. Check the attachment bolt of transmission shaft	2000~5000	Per 10000	Per 5,000
Chassis	103. Lubricate the all leaf spring pins and bushings	2000~5000	Per 10000	Per 5,000
	104. Tighten up the front and rear U-bolts	2000~5000	Per 10000	Per 5,000
	105. Connection bolts of leaf spring support lug	2000~5000	Per 10000	Per 5,000
	106. Check the effectiveness of leaf spring limit block	2000~5000	Per 10000	Per 5,000
	107. Check the mounting bolts of tube beam of frame	2000~5000	Per 10000	Per 5,000
	108. Check the bolts of V-shape push rod and lower push rod	2000~5000	Per 10000	Per 5,000
	109. Check the clearance between the balance suspension leaf	2000~5000	Per 10000	Per 5,000
	110. Check the balance shaft for oil leakage	2000~5000	Per 10000	Per 5,000
111. Complement the balance shaft gear oil	1 L GL-5 85 W/90 gear oil for single side, oil change is unnecessary			

Maintenance of complete vehicle

Assembly	Maintenance Items	First Maintenance	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Chassis	112. Check the bolts connecting the balance shaft and frame	2000~5000	Per 10000	Per 5,000
	113. Check the wheel nuts	2000~5000	Per 10000	Per 5,000
	114. Check the positions for oil, gas and water leakage	2000~5000	Per 10000	Per 5,000
	115. Check the line for wear and the potential wear	2000~5000	Per 10000	Per 5,000
	116. Check the water pipes for interference and the potential damage	2000~5000	Per 10000	Per 5,000
Brake system	117. Check the air tightness of service and parking brake status	2000~5000	Per 10000	Per 5,000
	118. Check if the brake air pressure achieves the specified value	2000~5000	Per 10000	Per 5,000
	119. Drainage of air tank	2000~5000	Per 10000	Per 5,000
	120. Check if the brake works normally	2000~5000	Per 10000	Per 5,000
	121. Check the brake pipeline for wear and the possible damage	2000~5000	Per 10000	Per 5,000
	122. Check the system for air leakage	2000~5000	Per 10000	Per 5,000
Electrical Appliances	123. Check if the lighting and instrument work normally	2000~5000	Per 10000	Per 5,000
	124. Check if the engine is charged normally	2000~5000	Per 10000	Per 5,000
	125. Check the tightening of power line and ground line of storage battery;	2000~5000	Per 10000	Per 5,000
	126. Check the harness for interference, and determine that the harness is away from the heat source and sharp objects	2000~5000	Per 10000	Per 5,000
	127. Check the connectors of harnesses and electrical equipments.	2000~5000	Per 10000	Per 5,000

Assembly	Maintenance Items	First Maintenance	Regular Maintenance	
		First Maintenance Mileage (km)	Regular Maintenance Mileage (km)	
			Road Vehicles	Non-road Vehicles and Cement Mixer Truck
Electrical Appliances	128. Check if the wiper system is working normally and if the detergent shall be added	2000~5000	Per 10000	Per 5,000
	129. Check the fuss and specification	2000~5000	Per 10000	Per 5,000
	130. Check if MP3 works normally	2000~5000	Per 10000	Per 5,000
Cab	131. Check and tighten the bolts of dumping gear	2000~5000	Per 10000	Per 5,000
	132. Check if the control mechanism of door works normally	2000~5000	Per 10000	Per 5,000
	133. Check if the locking mechanism is reliable and lubricated	2000~5000	Per 10000	Per 5,000
	134. Check if the control mechanism of seat works normally, and add the lithium-based lubricating oil in the sliding groove of control mechanism	2000~5000	Per 10000	Per 5,000
	135. Check if the steering wheel and steering rotation mechanism work	2000~5000	Per 10000	Per 5,000
	136. Check the suspension air bag, height adjustment and shock	2000~5000	Per 10000	Per 5,000
	137. Check if the safety belt works normally	2000~5000	Per 10000	Per 5,000
	138. Check the lift pump for the volume of hydraulic oil	2000~5000	Per 10000	Per 5,000
	139. Complement the hydraulic oil of lift pump	See " Cab Tilting Mechanism"		
SCR system	140. Clean the urea tank ventilation valve	2000~5000	Per 5,000	Per 5,000
	141. Replacement of urea pump filter	2000~5000	40000km or 2 years	

Chapter VI Safety and Environmental Protection

Safety instruction

Safety precautions

Plastic hose, rubber tubing and wiring harness

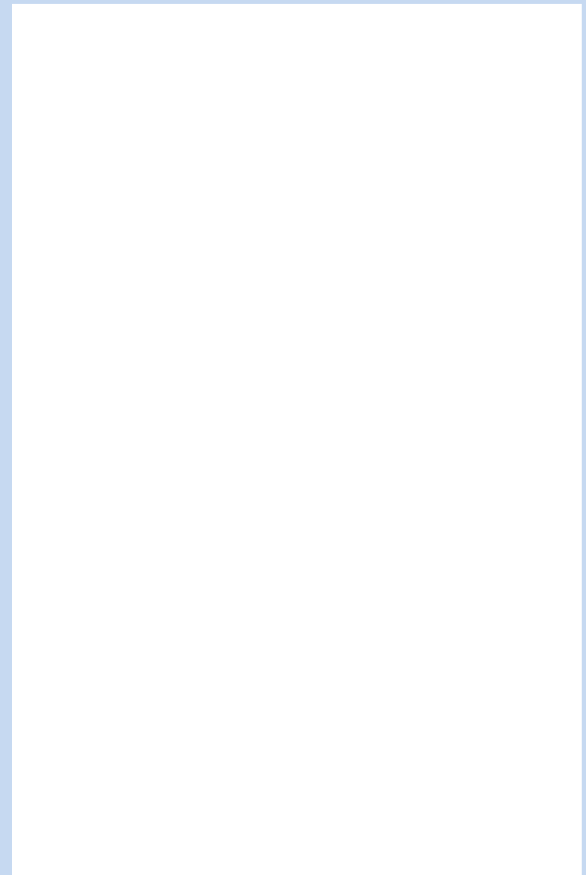


WARNING

Do not weld or drill near the plastic hoses, rubber pipes and wiring harness.

Retighten the wheel nuts

For the new vehicle or the vehicles with new wheels, re-tighten the wheel nuts after 50 km, and see Replacement of Wheel.



Towing suggestions

Please refer to “Towing and Towing Start”.

Prevent damage to electrical system.

Accessories and parts

Sinotruk recommends you to use SINOTRUK “partner” accessories only for the sake of your benefits. Such accessories and parts are specially certified in terms of reliability, safety and adaptability. These performances of other products available in market can hardly judged despite our constant investigation, to which SINOTRUK is not responsible even if there is certification of an official institute.

Safety devices and attached tools

Inspect whether following equipment is complete:

Jack, fire extinguisher and basic hand tools,etc.

Refit parts and additional devices

Installation must be carried out in accordance with refitting manual of relevant Sinotruk vehicle model.

The user must obtain written approval of relevant manufacturer.

Any change incompliant with Sinotruk vehicle structure requires written approval of designated Sinotruk department.

The requirement is applicable to additional vehicle devices such as A/C system, rear baffle, retarder, etc.

Overload protection of brake system/energy storage air chamber

If parking brake is acted due to pressure reduction of spring, use of service brake device (foot brake) is not allowed. as it may lead to overlap of braking force of parking brake and service brake that damages mechanical parts of transmission system.

Battery service life

For a vehicle to be stored for more than 12 weeks, please operate as following to prolong service life of its battery:

- Disconnect battery negative if the battery is not removed.
- Inspect acid liquid level of battery (not necessary for maintenance-free battery). In case of low liquid level, fill liquid to the maximum liquid level mark (be sure to use distilled water).
- Daily discharge rate of a battery at 20°C is 0.2% its rated capacity.

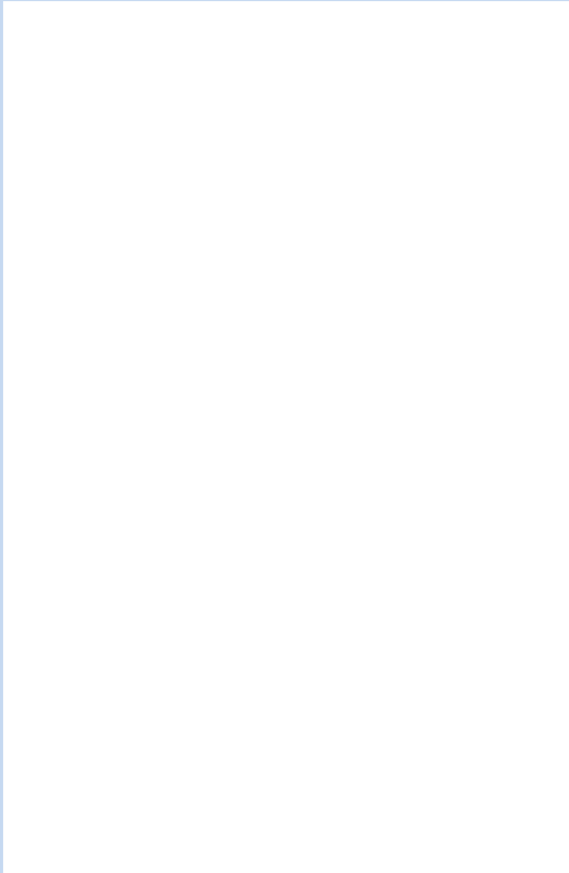
It is required to regularly measure standby voltage (at least once every month) to prevent low-voltage discharge. or regularly inspect concentration of acid liquid. Description on allowed voltage:

12.6 volt = Voltage when storage battery is fully charged

12.3 volt = Voltage when storage battery discharges by 50%

12.25 volt or less = Storage battery should be re-charged immediately but shall not be charged rapidly.

Open-circuit voltage of battery shall be measured 10 hours after last charging or 1 hour after last discharging.



Description on density of acid liquid

It is required to charge the battery when density of acid liquid reduces to be less than 1.21kg/L. Charging current recommended by SINOTRUK is 1/10 capacity.

Battery in acute discharging will be filled with lead sulfate. In this case, battery cannot be recovered by charging.

Start the vehicle at least 1 hour after charging of its battery.

Do not start the vehicle before dry-charged battery is placed for half an hour after filling with liquid.

For the batteries with sulfate, silvery white coating and turbid acid liquid may be on the plate. This condition is beyond the warranty range, thus those batteries can not be replaced.

Precautions for Safe Operation of Storage Battery

- Beware of the risk of explosion! Storage battery must be away from fire, spark and open flame. No smoking!

When connecting or disconnecting any electrical consumer, or using the instruments to make contact directly with the storage battery for measurement, be careful not to produce any sparks! Before connecting or disconnecting any electrical consumer to storage battery (tachograph, interior lighting, etc.), be sure to first turn it off. Disconnect all grounding wires and electrical consumers by removing the corresponding fuses in the central control box.

Avoid connecting the wrong polarities or using a spanner without insulation head to cause a short circuit. Unless necessary, do not twist off the insulating cap of terminal.

After all appliances are installed, connect the grounding wire.

- Wear the goggles or other protective masks!

- Keep the children away from acid and storage battery!

- Acid is corrosive! Storage battery contains the corrosive acid which will harm you!

Wear the suitable protective clothing, acid resistant protective gloves and goggles.

Do not tilt the storage battery; Acid may pop out of the venting hole.





- Follow the operation manual and other relevant instructions of storage battery manufacturer.

- Beware of the risk of explosion! - Pay particular attention to the explosive oxy-hydrogen mixture after the long-distance running and charging. Ensure the adequate ventilation!

- Storage battery contains the contaminants which shall be handled properly. See Environmental Protection!

Storage and Transport of Storage Battery

- Storage battery shall be stored in a cool and dry place. The storage battery without acid may be stored for a long time.

- If the acid concentration of storage battery is less than 1.21 kg/l, charge the storage battery.

- In order to prevent any acid leakage of storage battery, it shall be stored and transported with front upwards to prevent the tipping-over.

- Only when connecting the storage battery terminal, you can unscrew the safety cap from the positive pole. For the removed storage battery (old battery), the safety cap shall be kept at the positive terminal.

- When transporting the waste storage battery, at least one unobstructed venting hole shall be retained.

Storage battery enters operating state.

- Fill up storage battery with acid liquor.
- Inject dilute sulphuric acid with concentration of 1.28kg/L into empty battery (concentration of dilute sulphuric acid is 1.23kg/L in tropical zone) until highest value of liquid level is 15mm higher than edge of plate. Temperature of storage battery and acid liquor should be above 10°C when implementing this operation. Tilt fully charged battery for several times after about 15min. supplement according to needs and add acid liquor to scale line. Then, loosen spiral plug and wipe off splashing acid liquor.

If electricity for starting engine is insufficient, please re-charge storage battery.

Charging battery



WARNING

There is risk of damaging refrigerator.

Cut off power supply for refrigerator first before connecting battery charger.

- Dismantle storage battery from vehicle.
- Use proper DC battery charger and comply with operation manual of electrical appliance manufacturer.
- Please connect positive terminal post of storage battery on positive output terminal of battery charger, and then connect negative electrode of storage battery on negative output terminal of battery charger.

Note: It is necessary to ensure room for charging storage battery well ventilated.

- Be sure to connect charger on storage battery before turning on power supply for battery charger. After completing charging of storage battery, it is necessary to disconnect switch of battery charger first and then disconnect connection between storage battery and battery charger.

It is recommended that charging current should be 1/10 of storage battery capacity.



WARNING

Be aware of risk of explosion!

Stop charging battery immediately if acid liquor temperature in storage battery rises up to be above 55°C

- It indicates storage battery is fully charged if density of acid liquor and charging voltage do not rise up within two hours.
- Check acid liquor level and add distilled water to upper scale when necessary

Note: Do not add acid liquor!

Disconnect connection of storage battery and turn on master switch of storage battery

Be sure to disconnect connection of storage battery and turn on master switch of storage batter in the following sequence:

- Switch off engine and all electrical devices (such as electronic monitoring device, hazard alarm lamp etc.).
- Turn off key switch.
- Close door.
- Wait for about 20s before disconnecting connection of storage battery (disconnect negative terminal first).
- Wait for another 15s before turning off master switch of storage battery.

- Disconnect connection of storage battery with reference to the column on the left.
- Disconnect negative terminal of storage battery when dismantling storage battery.
- Eliminate any foreign matters on mounting position for battery, put storage battery on designated position and fix it with clamp.
- Clean positive terminal and wiring terminal of storage battery.
- Connect positive terminal and then connect negative terminal when installing storage battery. Ensure wiring terminals of both electrodes to be fixed on their positions reliably.
- Apply little grease on battery electrode and wiring terminal.
- Dismantle accessories on used battery and install them on new battery such as wiring terminal cap, exhaust container, bracket, hose connector and wiring clamp etc.
- At least reserve on unobstructed vent hole.

Maintenance of storage battery

- Keep storage battery clean and dry.
- Maintenance-free battery also should be maintained. Maintenance-free only means it is unnecessary to check acid liquor level of storage battery.

**WARNING**

Wipe storage battery only with wet cloth; static electricity generated by dry cloth may cause explosion hazard!

- Check acid liquor level height and supplement distilled water in storage battery periodically. Please go to service station of Sinotruk to check alternator regulator if water consumption is high.
- Do not use so-called ameliorant.

It is necessary to re-charge if acid strength in storage battery is lower than 1.21kg/L.

Storage of storage battery

- Dismantled storage battery shall be stored in cool place. Or storage battery can be stored on vehicle is negative terminal is not connected.
- Check charging situation of storage battery periodically; re-charge timely if necessary.

Compressed air reservoir

- Air reservoir is special air storage device for brake system and auxiliary equipment of vehicle and trailer.
- Housing of air reservoir is marked with product model and manufacturer name.
- Fix bracket of air reservoir on vehicle with fastening strip. Do not contact welding point at the bottom of air reservoir when installing fastening strip so as to prevent tension yield of air reservoir damaging safety.
- Clean only with non- alkaline detergent.
- Check inside of air reservoir through opening on connecting position. Drain water sufficiently to prevent water storing in air reservoir. Water drain valve is at the lowest position of air reservoir.
- Avoid welding, thermal treatment and other treatment which may damage safety of air reservoir on pressure-carrying surface of air reservoir (housing of air reservoir, foundation, threads and accessories etc.).

Air conditioning system and refrigerating components



WARNING

Refrigerant and its volatilized steam will be harmful to human health!

- Avoid contacting with refrigerant and its volatilized steam.
- Wear gloves and protective goggles! Please go to a doctor immediately if refrigerant is splashed on skin or eyes.
- Do not exhaust refrigerant in gas state in closed room as there is risk for suffocation!
- Pump out refrigerant with special handling system.
- Do not weld on parts of refrigeration system or on position near parts of refrigeration system. Such operation is not allowed even if refrigerant is discharged. There are risks for explosion and poisoning!
- Do not clean parts of refrigerant system with steam detergent.
- Please examine and repair refrigerant system at service state of Sinotruk.
- Do not use dimethylmethane or butane refrigerant on vehicles produced by Sinotruk.
- Air conditioning system is charged with fluoride-free R134a refrigerant.

Be sure not to mix fluoride-free refrigerant R134a and refrigerant R12 (with fluoride) in refrigeration system.

- Be sure not to use R12 refrigerant in system using refrigerant R134a.

Waste oil

Instructions on handling waste oil:

Frequent or prolonged contact with waste oil may eliminate your skin sebum, resulting in dry skin or skin swelling.

Experiments on animals show that waste oil contains carcinogen.

However, waste oil is not hazardous material if basic safety and health instructions are observed in handling it.

Warnings on health protection

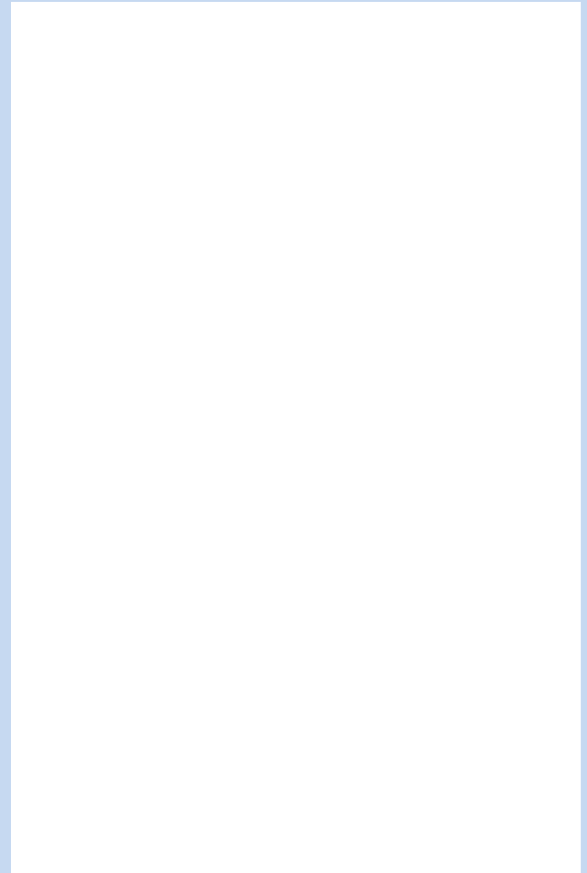
- No frequent or prolonged contact with waste oil
- Use proper protective agent or gloves to protect skin
- Clean the skin contacted with waste oil
 - Use soap and clean water to clean the skin contacted with oil
 - Brush your skin clean
 - Stains clean easily with special detergent
 - Do not use gasoline, diesel oil, kerosene, diluents and solvent for cleaning
- Apply some skin care grease to the skin after cleaning
- Change oil-stained clothes and shoes
- Do not put oil-stained rag in the pocket.

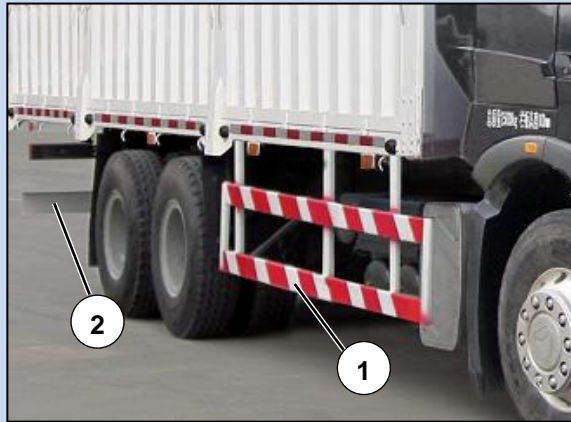
Be cautious when dealing with cold detergent or fuel.

- Keep it away from the reach of children
- Keep it away from fire
- Immediately deal with stained clothes polluted with such chemicals.
- Do not throw these chemicals into the sewer.

Be cautious of danger when dealing with detergent, coolant, engine oil or fuel.

- Flammable
- Be cautious of toxic chemicals. No inhalation, swallowing and skin contact!
- Long time contact with detergent, coolant, oil and fuel may damage your health
and bring risks of other complications
- Carcinogen (Fuel only)

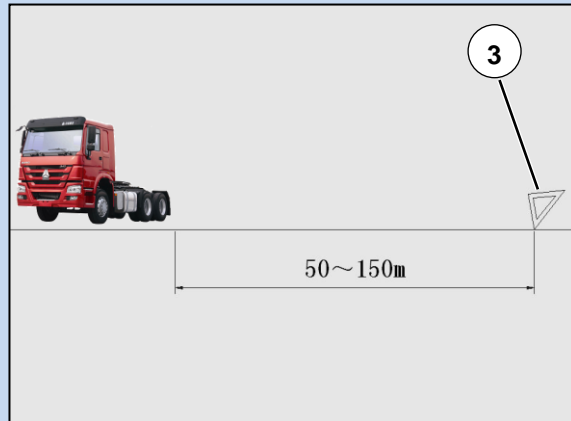




Rear side protection of cargo truck

Side protection ①: prevent people from being drawn into under vehicle

Rear protection ②: protect the vehicle in an rear-end accident and prevent vehicle behind running into under the chasis

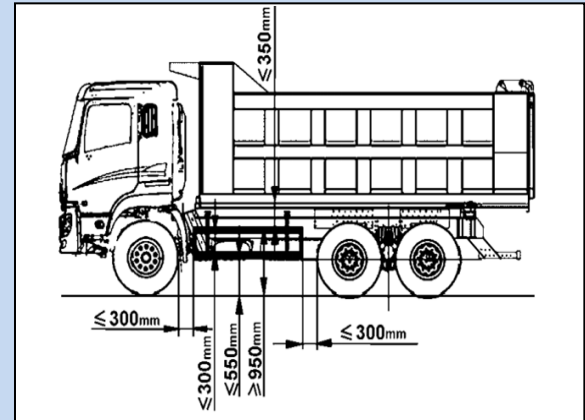


Triangle warning sign

triangle warning sign ③: put it 50~150m away from behind the vehicle, and make it visible to other cars running from the rear.

Basic requirements for side protection of engineering truck:

Side protection of HOWO engineering truck consists of vertical supportings and cross bars at present. The vertical supportings, made of bent and welded steel tubes, are fixed on the side of subframes. Made of M-shape steel and C-shape steel, the cross bars are welded on the vertical supportings.



Basic requirements for rear side protection of engineering truck:

Rear side protection of HOWO engineering truck uses stationary structure at present. It consists of protection brackets, diagonal supportings and cross bars.

Protection brackets and diagonal supportings are made of bending channel steel or angle steel and diagonal supportings strengthen in the bracket. Cross bars are welded on the protection brackets which are welded in the rear of frame.



Environmental Protection

Waste oil (engine oil, transmission gear oil, etc.)



WARNING

- Pay attention to proper disposal of the used oil.
- Used oil will damage the quality of underground water.

The used oil shall not fall to the ground, water or sewer and drain, or you may be alleged.

Carefully collect and dispose of the used oil.

Filter element, Filter element, Filter and Dry Can

Waste filter elements, filter element and filter (oil and fuel filters, dry can of air dryer) are included in the emergency waste which must be handled properly.

Please observe the provisions of the relevant local authorities.

Coolant

Undiluted antifreeze is emergency. In disposing of used coolant (mixture of antifreeze and water), please observe the regulations issued by local authorities.

Chapter VII Technical Parameters

Technical parameters

Technical Parameters

Euro II Engine Parameters

Model	WD615.62	WD615.87	WD615.69	WD615.47	D12.38	D12.42
Emission standard	Euro II					
Number of cylinders	6					
Bore (mm)	126				126	
Stroke (mm)	130				155	
Displacement (L)	9.726				11.596	
Compression ratio	17.5:1				17:1	
Rated power (kW/Ps)	196	213	247	273	279	309
Rated speed (rpm)	2200				2000	
Max. torque (Nm)	1100	1160	1350	1500	1650	1820
Speed at max. torque	1100~1600		1300~1600		1100~1500	
Idle speed (rpm)	650±50				600±50	
Ignition sequence	1-5-3-6-2-4					
Rotation direction of	Clockwise (seen from the free end)					

Euro III Engine parameters

Model	WD615.92C	WD615.93C	WD615.97C	WD615.95C	WD615.96C	D12.38-30	D12.42-30
Emission standard	Euro III						
Number of cylinders	6						
Bore (mm)	126					126	
Stroke (mm)	130					155	
Displacement (L)	9.726					11.596	
Compression ratio	17.5:1					17:1	
Rated power (kW/Ps)	198	213	220	249	279	279	309
Rated speed (rpm)	1900				2000	2000	
Max. torque (Nm)	1190	1290	1340	1490	1590	1650	1820
Speed at max. torque	1200~1500					1100~1500	
Idle speed (rpm)	600±50					650±50	
Ignition sequence	1-5-3-6-2-4						
Rotation direction of crankshaft	Clockwise (seen from the free end)						

Technical parameters

Euro IV Engine Parameters

Model	D10.38-40	D10.34-40	D10.31-40	D10.28-40	D12.38-40	D12.42-40
Emission standard	Euro IV					
Number of cylinders	6					
Bore (mm)	126				126	
Stroke (mm)	130				155	
Displacement (L)	9.726				11.596	
Compression ratio	17.5:1				17:1	
Rated power (kW/Ps)	276	249	228	206	279	309
Rated speed (rpm)	2000	1900			2000	
Max. torque (Nm)	1560	1490	1390	1190	1650	1820
Speed at max. torque (rpm)	1200~1500				1100~1400	
Idle speed (rpm)	650±50				650±50	
Ignition sequence	1-5-3-6-2-4					
Rotation direction of crankshaft	Clockwise (seen from the free end)					

Euro V Engine Parameters

Model	D10.38-50	D10.34-50	D10.31-50	D10.28-50	D12.38-50	D12.42-50
Emission standard	Euro V					
Number of cylinders	6					
Bore (mm)	126				126	
Stroke (mm)	130				155	
Displacement (L)	9.726				11.596	
Compression ratio	17.5:1				17:1	
Rated power (kW/Ps)	276	249	228	206	279	309
Rated speed (rpm)	2000	1900			2000	
Max. torque (Nm)	1560	1490	1390	1190	1650	1820
Speed at max. torque (rpm)	1200~1500				1100~1400	
Idle speed (rpm)	650±50				650±50	
Ignition sequence	1-5-3-6-2-4					
Rotation direction of crankshaft	Clockwise (seen from the free end)					

Parameters of Natural-gas Engine

Model	T10.27-50	T10.29-50	T10.32-50	T10.34-50	T12.38-50	T12.42-50
Emission standard	Euro V				Euro V	
Number of cylinders	6				6	
Bore (mm)	126				126	
Stroke (mm)	130				155	
Displacement (L)	9.726				11.596	
Compression ratio	11: 1				11:1	
Rated power (kW/Ps)	196	213	235	250	279	309
Rated speed (rpm)	2200				2000	
Max. torque (Nm)	1160	1230	1300	1350	1650	1820
Speed at max. torque	1200~1500				1200~1500	
Idle speed (rpm)	600±50				600±50	
Ignition sequence	1-5-3-6-2-4				1-5-3-6-2-4	
Rotation direction of crankshaft	Clockwise (seen from the free end)				Clockwise (seen from the free end)	

Transmission Parameters

Model		HW19709XST	HW19710	HW19710C	HW19710T	HW23710	HW23710C	
Input torque Nm		1900		1900	2100	1900	2300	2500
Gear		9		10	10	10	10	10
gear ratio of each gear	1	C	15.28	14.28	10.73	14.36	14.28	10.73
	2	1	12.47	10.62	7.98	10.66	10.62	7.98
	3	2	8.79	7.87	5.91	7.88	7.87	5.91
	4	3	6.17	5.88	4.38	5.82	5.88	4.38
	5	4	4.375	4.38	3.29	4.38	4.38	3.29
	6	5	2.85	3.27	2.45	3.28	3.27	2.45
	7	6	2.01	2.43	1.82	2.44	2.43	1.82
	8	7	1.41	1.8	1.35	1.80	1.8	1.35
	9	8	1	1.34	1	1.33	1.34	1
	10			1	0.75	1	1.00(1.00)	0.75
11								
12								
R1	14.06		13.91	10.45	14.01	13.91	10.45	
R2			3.18	2.39	3.20	3.18	2.39	
Weight (kg)		395		355	355	430	359	359
Oil amount(L)		12		12	12	18	12	12

Technical parameters

Transmission Parameters

Model	HW19712	HW19712L	HW19712C	HW19712CL	HW21716STL	HW21716STLC	ZF16S1950	ZF16S1670	ZF9S1820	
Input torque Nm	1900	1900	2100	2100	2100	2300	1900	1760	1800	
Gear	12	12	12	12	16	16	16	16	9	
gear ratio of each gear	1	15.01	15.01	11.8	11.8	15.59	13.12	11.64	15.39	15.16
	2	11.67	11.67	9.17	9.17	13.12	11.05	9.70	13.09	11.26
	3	9.03	9.03	7.10	7.10	10.89	9.17	8.00	10.57	7.90
	4	7.14	7.14	5.61	5.61	9.17	7.72	6.67	9.00	5.67
	5	5.57	5.57	4.38	4.38	7.48	6.30	5.73	6.96	4.07
	6	4.38	4.38	3.44	3.44	6.3	5.30	4.77	5.92	2.76
	7	3.43	3.43	2.70	2.70	5.2	4.38	4.07	4.58	1.94
	8	2.67	2.67	2.10	2.10	4.38	3.68	3.40	3.90	1.39
	9	2.06	2.06	1.62	1.62	3.56	3.00	2.86	3.36	1.00
	10	1.63	1.63	1.28	1.28	3	2.52	2.38	2.86	
	11	1.27	1.27	1.00	1.00	2.49	2.10	1.96	2.31	
	12	1	1	0.79	0.79	2.1	1.76	1.64	1.96	
	13					1.71	1.44	1.41	1.52	
	14					1.44	1.21	1.17	1.29	
	15					1.19	1.00	1.00	1.00	
	16					1	0.84	0.83	0.85	
R1	13.81	13.81	10.85	10.85	14.29	12.03	9.41	12.44	12.26	
R2	3.16	3.16	2.48	2.48	12.03	10.13	7.84	10.59		
Weight (kg)	393	300	379	300	335	335	360	390	360	
Oil amount(L)	13	13	13	13	14	14	14.5	14.5	17	

Technical parameters

Parameters of Bulb

Lamp name		Bulb model	Bulb votage and power	Quantity for each vehicle
head lamp(high beam and low beam)		H1 P14.5s	24V 70W	4
Steering lamp		PY21W BAU15s	24V 21W	2
Front side lamp		R5W BA15s	24V 5W	2
Auxiliary high beam lamp		H1 P14.5s	24V 70W	2
Front fog lamp		H3 PK22s	24V 70W	2
Side steering lamp		P21W BA15s	24V 21W	2
Front position lamp		R10W BA15s	24V 10W	2
		or W5W W2.1×9.5d	or 24V 5W	2
Rear position lamp		W5W W2.1×9.5d	24V 5W	based on actual need
Side marker lamp		W5W W2.1×9.5d	24V 5W	based on actual need
Combined rear lamps	Steering lamp	P21W BA15s	24V 21W	2
	Side lamp	R5W BA15s	24V 5W	4
	Brake lamp	P21W BA15s	24V 21W	2
	Reverse lamp	P21W BA15s	24V 21W	2
	Rear fog lamp	P21W BA15s	24V 21W	2
	Rear position lamp/ sidemarker lamp	R10W BA15s	24V 10W	2
	Licese plate lamp (left)	R10W BA15s	24V 10W	1
Interior lighting lamp		R10W BA15s	24V 10W	based on actual need

Drive axle parameter table 1

Model	MCY13 drum-type	MCY13Q drum-type	MCY13 disc-type	MCY13Q disc-type
Type	Central single-stage reducer, stamping and welding housing		Central single-stage reducer, stamping and welding housing	
Rated axle load(kg)	2×13000		2×13000	
Gear ratio	3.08/3.36/3.7/4.11/4.63/5.29		3.08/3.36/3.7/4.11/4.63/5.29	
Wheel track (mm)	1816/1830		1816	
Leaf spring center distance (mm)	950/1010		950	
Brake	Drum-type $\phi 410 \times 220$		disc-type P20WA/P22JA	
Weight (kg)	Intermediate axle 850/ rear axle 741	Intermediate axle 832/ rear axle 723	Intermediate axle 807/ rear axle 693	Intermediate axle 788.5/ rear axle 674.5
Wheel bolt circle	$\phi 335-10 \times M22 \times 1.5$		$\phi 335-10 \times M22 \times 1.5$	
Lubricant amount (L)	Intermediate axle 18, rear axle 14.5		Intermediate axle 18, rear axle 14.5	

Drive axle parameter table 2

Model	ST13 single axle	ST13 dual axle	ST16 single axle	ST16 dual axle
Type	Central reducer + hub reducer, stamping and welding housing		Central reducer + hub reducer, stamping and welding housing	
Rated axle load(kg)	13000	2×13000	16000	2×16000
Gear ratio	3.93/4.42/4.80/5.73/6.72/9.49		3.93/4.42/4.80/5.73/6.72/9.49/10.89	
Wheel track (mm)	1850	1850	1850	1850
Leaf spring center distance (mm)	1010	1020	1010	1020
Brake	Drum-type φ420×185		Drum-type φ420×185	
Weight (kg)	780	Intermediate axle 840/ rear axle 780	800	Intermediate axle 860/ rear axle 800
Wheel bolt circle	φ335-10×M22×1.5		φ335-10×M22×1.5	
Lubricant amount(L)	18.5	Intermediate axle 21, rear axle 18.5	20.5	Intermediate axle 23, rear axle 20.5

Drive axle parameter table 3

Model	HC16 single axle	HC16 dual axle	AC16 single axle	AC16 dual axle
Type	Central reducer + hub reducer, and forged housing		Central reducer + hub reducer, and forged housing	
Rated axle load(kg)	16000	2×16000	16000	2×16000
Gear ratio	3.93/4.42/4.80/5.73/6.72/9.49		4.77/5.45/6.5	
Wheel track (mm)	1850	1850	1850	1850
Leaf spring center distance (mm)	1010	1020	1010	1020
Brake	Drum-type φ420×220		Drum-type φ420×220	
Weight (kg)	815	Intermediate axle 895/rear axle 815	825	Intermediate axle 927/ rear axle 825
Wheel bolt circle	φ335-10×M22×1.5		φ335-10×M22×1.5	
Lubricant amount(L)	20.5	Intermediate axle 23, rear axle 20.5	17.5	Intermediate axle 21, rear axle 17.5

Wheel Parameters

Model	8.00V-20	8.5-20	8.5-24	22.5×8.25	22.5×9.00	22.5×9.75
Rim	2 Rims	2 Rims	2 Rims	1 Rim	1 Rim	1 Rim
Tyre specification	11.00-20 11.00R20	12.00-20 12.00R20	12.00-24 12.00R24	11R22.5	12R22.5 315/80R22.5 295/80R22.5	12R22.5

Tire pressure parameters

Model	Single tyre(kPa)	Dual tyre(kPa)
11.00-20(18 RP)	910	840
12.00-20(18 RP)	810	740
12.00-24(18 RP)	810	740
12.00-24(20 RP)	880	810
11.00R20(18 RP)	930	
12.00R20(18 RP)	830	
12.00R24(18 RP)	830	
12.00R24(20 RP)	900	
12R22.5(16 RP)	830	
13R22.5(18 RP)	830	
295/80R22.5(18 RP)	900	
315/80R22.5(18 RP)	830	

NOTE: Data in the table is a reference value; please refer to the marked values on the side of tire carcass when in actual use.

Maintenance of Leaf Spring

Assembly	Oil	Quality grade and viscosity level	Quantity	Maintenance intervals and items
Leaf spring grease	Grease	2# Lithum base grease	350g	Check the vehicle every 2500-3500km, and fill grease when needed.

Balance Shaft Maintenance

Assembly	Oil	Quality grade and viscosity level	Quantity	Maintenance intervals and items
Balance shaft	Gear oil	GL-5 85W-90	1L for a single one	No replacement.