Operating Instructions

Precautions on work sites

There are many different types of work sites, some of them could be:

- Dusty areas
- Rocky areas
- Wet, swampy or muddy areas
- Seashore or salty areas
- Altitude above 1000 m
- Steep driving
- Extremely hot areas
- Underground areas (mines)
- Transit, long distance drive-away (more than 3 km)
- Extremely cold areas

Rules and guidelines are listed below to increase the lifetime of the dump truck. Pay attention to these guidelines and let the safety always get first priority.

General

On work sites where extra heavy-duty operations are occurring, reduce the maintenance intervals and carry out greasing more frequently.

Clean the machine regularly. Keep grease fittings, breathers and oil level gauges clean and avoid dirt to enter these items.

Dusty areas/Underground areas (mines)

- Watch the air filter warning light, to see whether the engine air filter is clogged. Clean/replace the engine air filter at shorter intervals than specified, clean as often as necessary (see 1000 hours service for procedure).

Extremely dusty applications may require to clean the air filter every day!

- Clean the radiator core frequently, every week if necessary, to avoid clogging (see 500 hours service for procedure).
- Clean and replace the fuel filters frequently (see 1000 hours service for procedure).
- Check daily the cab ventilation filter and pre-filter. These filters will very soon be clogged in dusty areas, therefore it is necessary to clean and replace the cab ventilation filter and pre-filter more frequently than usual (see 40 and 500 hours service for procedure).

Never remove a filter element/pre-filter without replacing it with a new one!

- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.

Rocky areas

- Check for damage to the undercarriage and for looseness, flaws, wear and damage in wheel bolts and nuts.
- Check tires for damage and wear. Remove foreign object from the threads as soon as possible, these will sooner or later penetrate into the tire. Also protect the tires from falling stones during loading.

Wet, swampy or muddy areas
(see also page 2-62 - Working in water)

- The wear of the seals will also increase when driving in wet or swampy areas, check and replace sealing's as often as necessary.
- If mud sticks to the callipers or discs on parking brake, and the brakes are left in that condition, the wear of the lining will increase, therefore always wash the area well with water after operations. E.g. when clay is dried up it is hard as concrete, this will cause breakage and wear of the machine.
- Do not let the water flow through the grill or into the different breathers and air filters.
- Do not operate the dump truck in water/rivers permanently for a long period. And do not under no circumstances let the water flow through the grill.

Seashore or salty areas

- Before starting working, check the tightness of plugs and valves.
- Spray exposed areas with anti-corrosive.
- Check the parking brake linings more often (see 500 hours service for procedure). When driving in wet salty/sandy areas the wear of the lining will increase.
- Check the sealing's more often. The wear will increase in salty/sandy areas.
- Lubricate components more frequently than usual.
- Do not operate the dump truck in water/rivers for a long period of time.
- It is important to wash the machine immediately after use to protect the components from rusting and to remove dirt and sand.
- See also item above "Wet, swampy or muddy areas"

High altitude (above 2000 m)

- Be aware that the engine power and torque will be reduced due to low air density.
- Do not remove the air filter!

NOTE

The graphs of altitude power reduction are in chapter 8

Steep driving

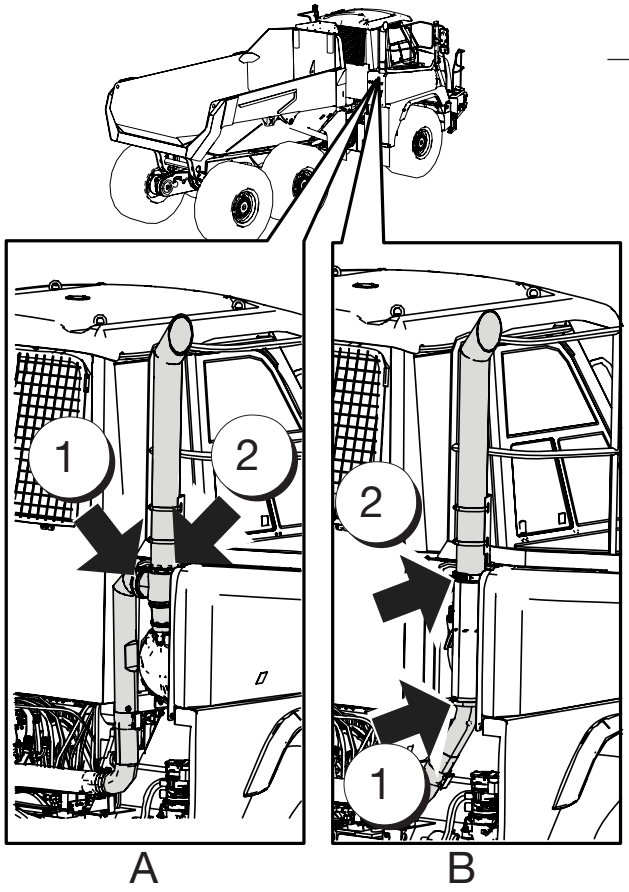
- When driving downhill and loaded, always use correct gear and the retarder brake for retarding. Refer to table on the downhill sticker in cab .The service brake (foot brake) must only be used for complete stop (see also page 2-34 - Operation of brakes and chapter 5, item 2.12 - Up, down and cross gradient travel).
- See also engine and retarder brake capacity chart at chapter 8.
- Operating the machine on slopes with a gradient above 30°=57% will reduce the machines lubrication and cooling capabilities etc., and increases risk of damage to components.

Extremely hot areas

- Observe the engine coolant temperature gauge, the engine coolant temperature warning light and the transmission oil temperature gauge. If the temperatures are at the limit, check the engine radiator for clogging (see 500 hours service).
- Observe the air filter warning light on the display screen. This will illuminate if the air filter is clogged. Clean/replace the engine air filter at shorter intervals than specified and clean as often as necessary (see 1000 hours service for procedure).

Extremely cold areas (see also chapter 5, item 8 - Cold weather)

- Use the engine heater.
- Check that the correct oils are used (see oil specification sheet, chapter 6).
- Check that there is enough glycol in the coolant (see 2000 hours service for freezing point and correct coolant).



Body heating (Option)

CAUTION

Turn off engine and allow dump truck to cool down before performing any work on exhaust system.

Enabling exhaust body heating

A - Only Engine T4F

B - Only Engines T2 /T3/ StageV

- Remove clamps (1) and (2) carefully.
- Restrictors are loose and only held in place by clamps.
- Remove the restrictors currently assembled.
- Replace with supplied restrictors, reducing exhaust flow to outlet and increase exhaust flow to body.

See also transport guide stored in cab.

Transit, long distance drive-away (more than 3 km)

- Check and adjust the tire pressure of cold tires before starting. Do not reduce pressure during driving.
- Generally replace the mineral based oil with fully synthetic oil. A mineral based oil will rapidly break down lubrication ability and cooling ability when operated at high temperatures (120 ^{O}C).
- Make sure that the inter axle differential is disconnected when driving, as the 50/50 torque split will generate a lot of heat increasing the risk of shaft wind up.
- Drive only without load.
- Drive for 1 hours and stop for minimum of 30 minutes, repeat. Monitor temperatures during driving. During stop , inspect the truck for sing of overheating (oil leaking, spatter or smoke from breathers. Etc.)
- Upper speed limit for this operation is : **55 km/h** Must not be exceeded!

Some simple rules to be observed prior to operation.

- Read and understand this Operating & Maintenance Manual before you begin to operate the dump truck.

- Never operate the dump truck if you are under the influence of alcohol, medicines or other drugs.

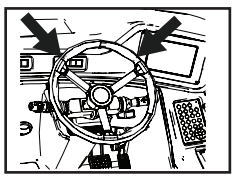
- You must wear personal safety equipment for safe operation.

- Wear a helmet to protect your head.

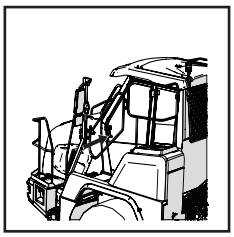
- When you climb up or down from the dump truck, always climb facing towards the truck using the steps and handles. Always use two feet and one hand or vice versa.

  DO NOT JUMP!

- Do not climb on surfaces which are not intended for climbing, always use the surfaces which are provided with anti-slip coatings.



- The cab is the driver's protection and conforms to the requirements for roll over protection (ROPS) and falling objects (FOPS), specified in the standard for these. The precondition for providing protection is that the driver uses the seat belt and remains in the cab. Therefore, hold on to the steering wheel (as indicated) if the dump truck should roll over.



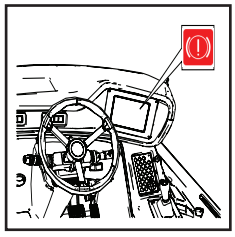
- When the dump truck is operated, the door should be shut.

- Check that the seat is adjusted for comfortable and safe operation of controls before operation.

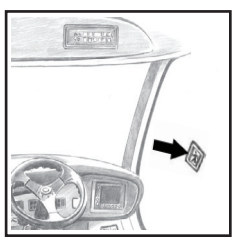
- Check that the steering column is adjusted for comfortable operation, confirm that it is fixed before operation. DO NOT ADJUST POSITION OF THE STEERING WHEEL WHILE DRIVING!

- Always use the seat belt during driving! If there is an instructor or passenger in the cab, be sure that they are seated on the instructor seat and are using seat belts!

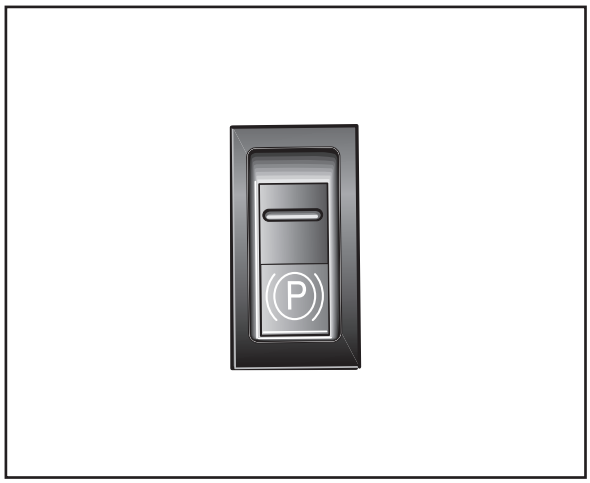
- If instructor seat is not installed, instructor or passenger may not stay in the cab during driving.



- Check that the brake system warning light is not illuminated before driving.



- The cab has two exits, one door and the front side window on the right hand side as emergency exit. The emergency exit can be used by removing the hammer from the storage location and breaking front side window.

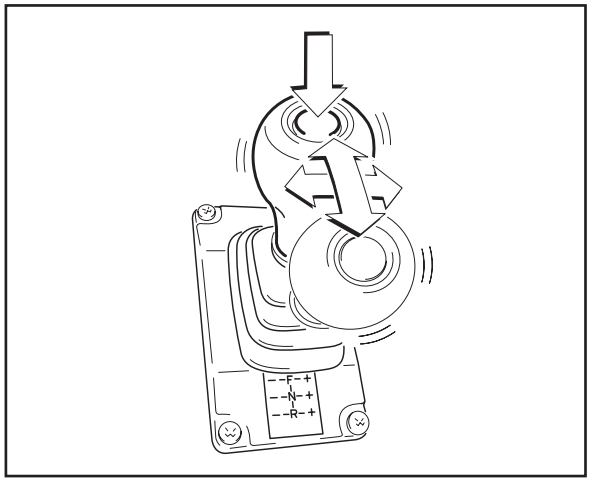


1. Starting the engine

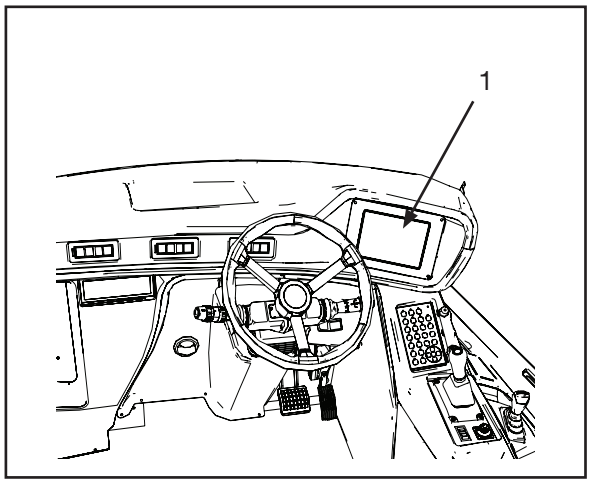
Before starting the engine in the morning, perform the Daily Service, see chapter 7.

Remember to connect the battery main switch on the front right hand fender next to the mount rail (if disconnected) otherwise there will be no power supply.

1.1. Confirm that parking brake is ON



1.2. Confirm that gear selector is in neutral position



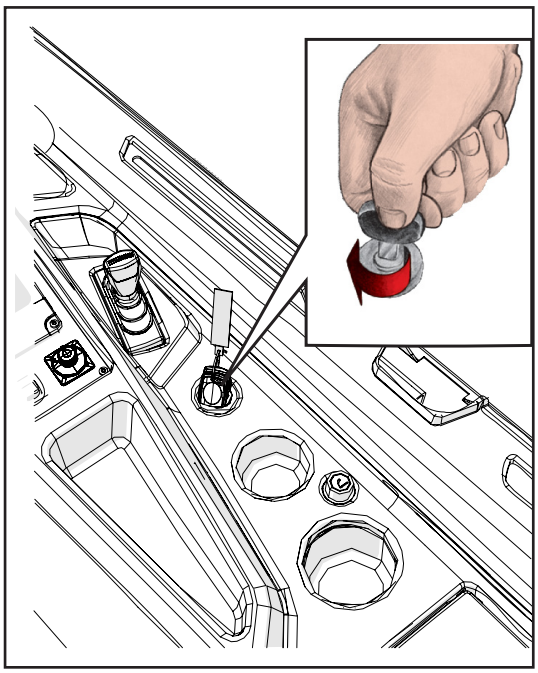
1.3. Turn the starter switch ON, pos 1

Check the warning lights illuminated on the display screen (1) before starting:

- parking brake.
- brake system - could light up if the fluid pressure is too low. If the light does not switch off after engine is started, check for possible fault.

If any of these lights do not light up, there is a fault in the electrical system. This should be checked and fixed before starting if necessary.

Before starting engine wait 2 sec on pos 1. Control system will inhibit any attempt to start engine until 2 sec has elapsed.

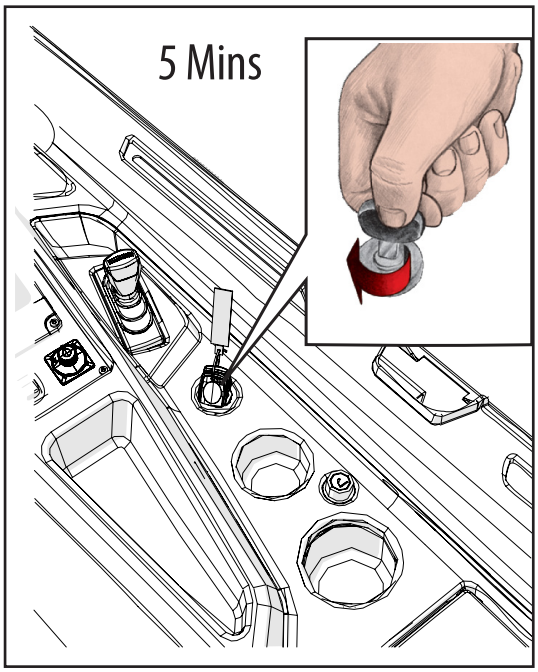


1.4. Start the engine

1. Turn the starter switch key to the right, pos. II to engage the starter.
2. Hold until engine starts (Max. 30 sec).
3. Check that warning lights for engine oil pressure and battery charge switch off.

WARNING

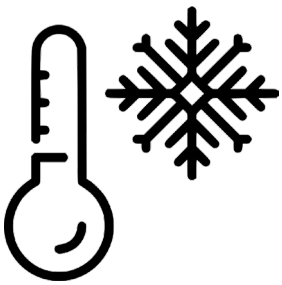
- **Never use starter gas or similar agents to help start the engine. An explosion may occur in the intake manifold with a risk of personal injury.**
- **Only start the engine in a well ventilated area. When operating the engine in an enclosed space, there should be an effective device to extract exhaust gases and crankcase gases.**



1.5. If engine does not start

1. Turn starter switch OFF, and wait until engine has stopped completely before attempting to start again.
2. After that it must rest for at least 5 minutes before restart.

1.6. Starting in cold weather at low temperatures



At extremely cold areas the engine heater should be used to avoid starting problems and white smoke.

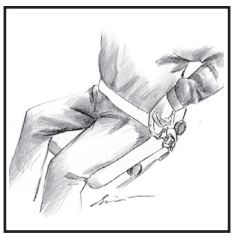
After the start keep engine running at low speed with moderate load to warm up.

2. Operating the dump truck

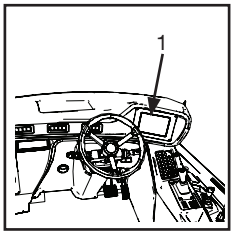
2.1. Before operation

When the engine is running properly and the fluid pressures are within operating range:

1. Clean/defrost the windows before driving.



2. Fasten the seat belt before driving.

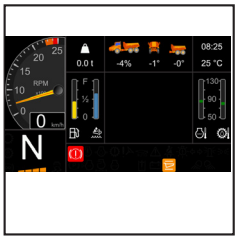


3. Check that gauges and warning lights on the display screen (1) do not indicate any abnormalities.

4. Accumulators charging.

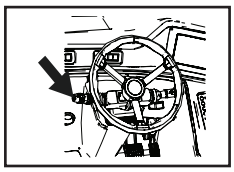
   Accumulator symbol will fill up and show the percentage.

   The symbol will change to green when it's almost full.

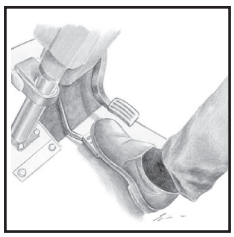


5. Confirm low idle speed.

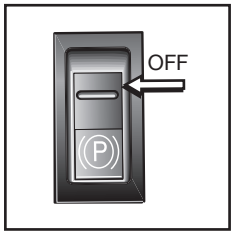
6. Check that there are no persons or objects in front of the dump truck, or in the articulation area, before you drive off.



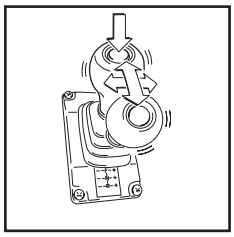
7. Sound the horn as alert.



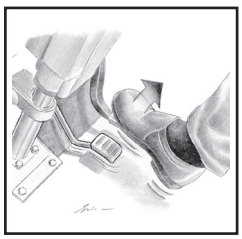
8. Depress the brake pedal.



9. Release the parking brake and confirm that the indicator light turns off.



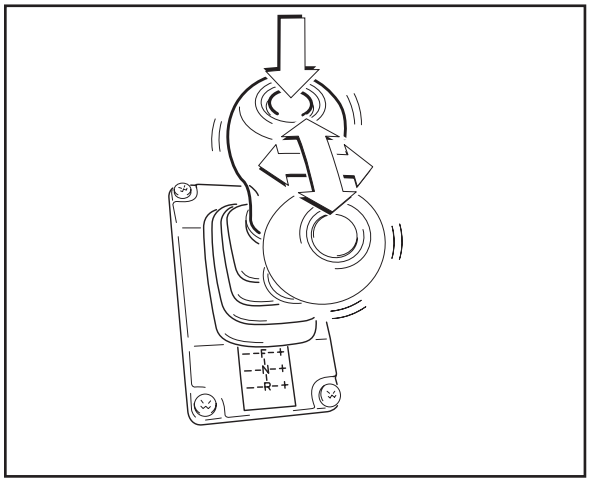
10. Select a suitable gear position at low idle (see item 2.3, Gear shifting).



11. Release the brake pedal and increase the engine speed by pressing the throttle pedal down.

2.2. Warming up period

When driving a cold dump truck, operate gently with reduced engine load and rpm to warm up until all gauges indicate operating range. This is important to avoid reduction in the dump trucks operating performance potential.



2.3. Gear shifting

The transmission has automatic gear shift to match the travel speed. The shifting is electronically controlled and a lock-up clutch is installed in the transmission to increase efficiency in all gears. Connection/ disconnection is automatic but speed and engine load related.

Gear position N: Neutral gear position

The engine will not start if the gear selector is out of neutral position.

When the gear selector is in neutral position it is always necessary to depress the knob on top of the selector to shift to forward or reverse position. Also, always depress the knob when shifting directly between forward and reverse direction.

Gear position F: Forward drive position

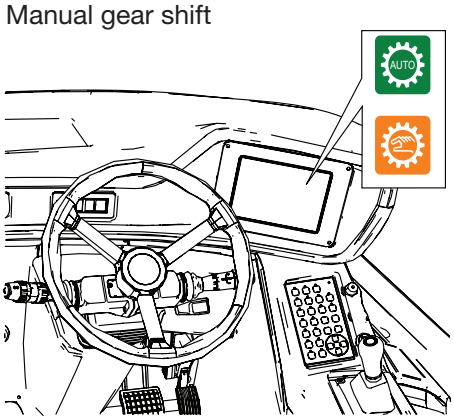
The transmission shifts automatically between 1st and 8th gear, according to dump truck speed and engine load.

The transmission will normally start in 2nd gear. If the conditions are heavy, it will automatically shift down to 1st gear.

Gear shift program

The gear shift program is decided automatically by the dump trucks computer. The computer chooses the gear shift program that is most relevant to the throttle pedals position.
Shifting at low rpm happens when the pedal is partially depressed. If the throttle pedal is further depressed, the gear shift will take place at higher rpm. With the throttle pedal fully depressed, the gear shift will either be prevented or close to the maximum engine rpm.
When the throttle pedal is released the retarder brake is engaged, the down shift will take place at high rpm.

Manual gear shift



Preselection of gears

The gears can be preselected by the driver as follows: Push the gear selector to the right (+) for upshifting or to the left (-) for downshifting.

When a gear is preselected and the gear selector is pushed either to the left or right, the gear system will switch to manual gear shifting.
The gear selector must then be pushed in order to change gear.
When the selected gear is engaged, the transmission will only operate in this gear until the selector is pushed to another position or changed back to automatic gear shift by depressing the knob on top of the gear selector.

When a gear is preselected and not engaged, the digits on the gear display will flash.

Manual gear shifting

To avoid repeated up and down shifting when driving in heavy conditions it is an advantage to use manual gear shift. When changing from automatic gear shift to manual gear shift, push the gear selector either to the left for downshift or to the right for upshift, or manual gear shift can be obtained by depressing the knob on top of the gear selector while driving in automatic.
In manual gear shift mode the selector must be pushed in order to change gear. Preselection of gears is also possible in manual gear shift.
When the selected gear is engaged the transmission will only operate in this gear until the selector is pushed to another position. If the dump truck is stationary, the selected gear will be engaged directly.

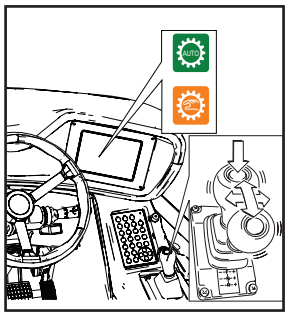
To return to automatic gear shift while driving in manual, depress the knob on top of the gear selector.

CAUTION

With the dump truck stationary, do not engage a gear at high engine speed.

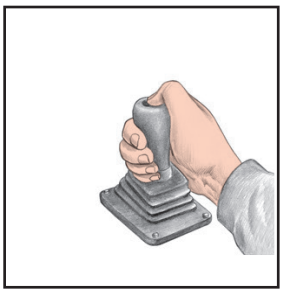
Operating hints

Different types of terrain require different operating techniques.



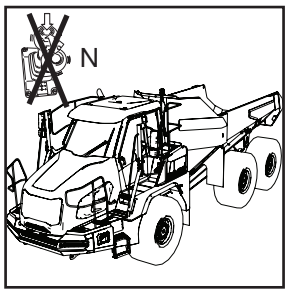
- Use automatic gear shift, for normal travel.
- In terrain, before uphill/ downhill driving, manually select a suitable position for the estimated speed in the area. Avoid repeated up and down shift in hilly terrain.

- The knob on top of the gear selector is used for:



- Shifting from neutral to forward or reverse position.
- Shifting directly between forward and reverse direction.
- Changing between automatic and manual gear shift.

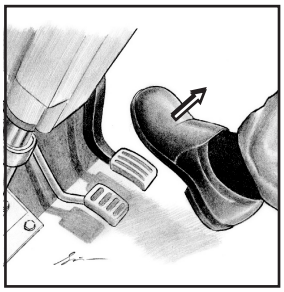
- When selecting a gear from the neutral position and when shifting between forward and reverse gears:



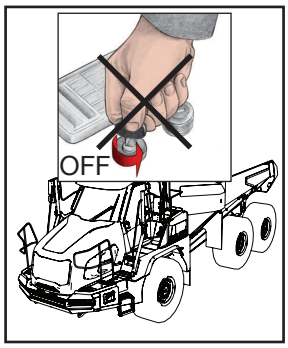
- Neutral position **must not** be selected during driving.

NOTE

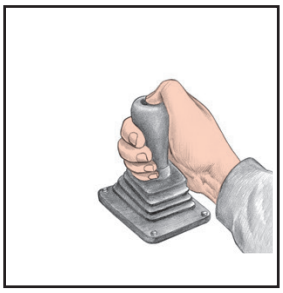
Added increased idle and alarm if machine is moving in neutral



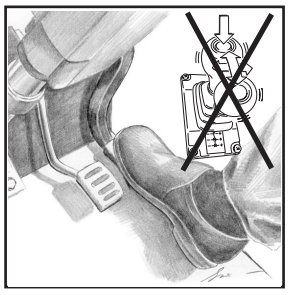
- Stop the truck and release the throttle pedal completely.



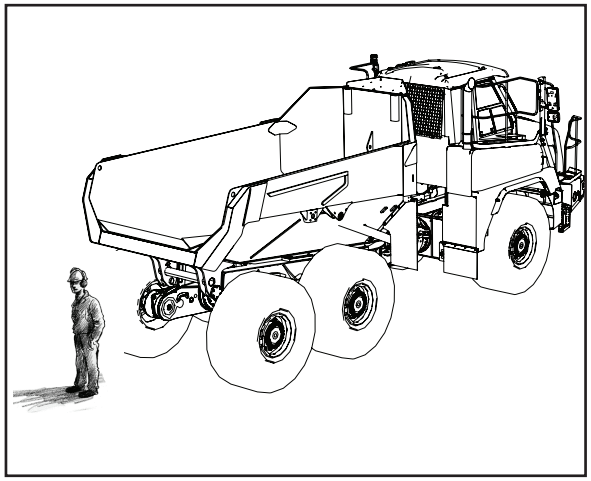
- The starter switch must NEVER be turned off (position 0) during driving, if you do not intend to stop the engine! The engine can be stopped by turning key in ignition to position "0", gear selector must be in neutral to start machine again.



- Depress the knob on the top of the gear selector, select the desired gear and wait until the gear is engaged before increasing the engine speed.



- Do not operate the gear selector with the throttle pedal depressed. This will cause a big shock, and will also reduce the life of the dump truck.



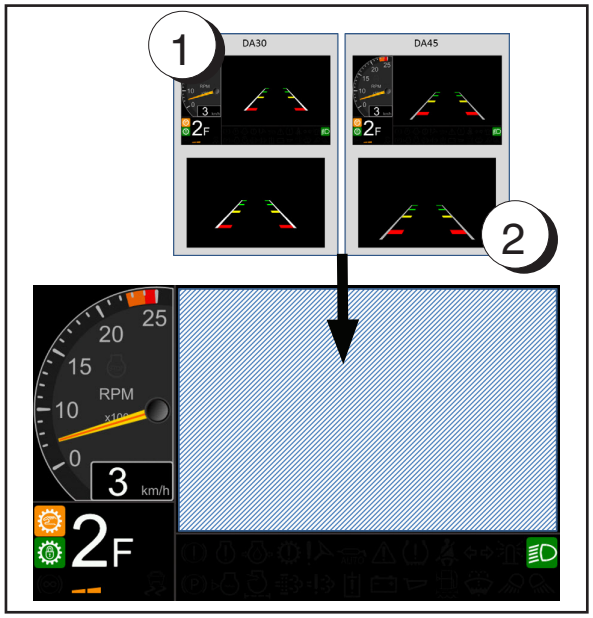
2.4. Reversing (back-up) operations

1. Before reversing, make sure that no persons or objects are behind the dump truck or in the articulation area.
2. Stop the dump truck completely before selecting the reverse gear.
3. Depress the knob on top of the gear selector and place the gear selector in position R with engine running at low idle. The transmission will always select 1st reverse.
4. Increase the engine speed.

The reverse drive position has only manual gear shift between 1st, 2nd, 3th and 4th gear. The selector must be pushed in order to change gear. When a gear is engaged, the transmission will only operate in this gear until the selector is pushed to another position.

WARNING

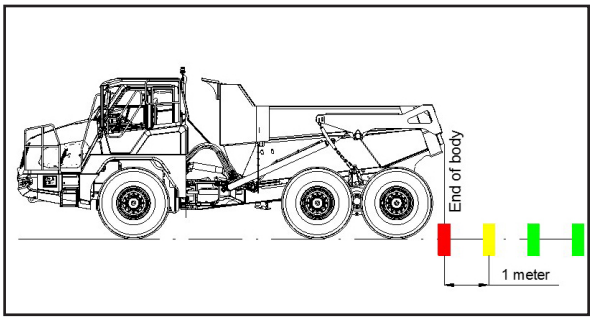
Be careful when reversing, the rear visibility is limited!



Rear camera view

When driver shift a gear selector in position R, the back-up camera automatically turns on. A video display shows an image of the area behind Dumper.

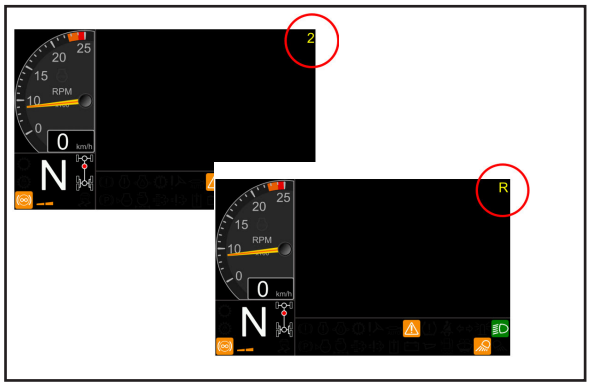
1. Small camera view
2. Full screen camera view.



The camera is adjusted when the truck is empty and the front suspension is at normal (auto) level.

A loaded truck will push the body (and camera) down. This causes an error.

When loaded, the real distance between the colour bars is less than 1 meter. However the red bar is still indicating the end of the body



Optional camera

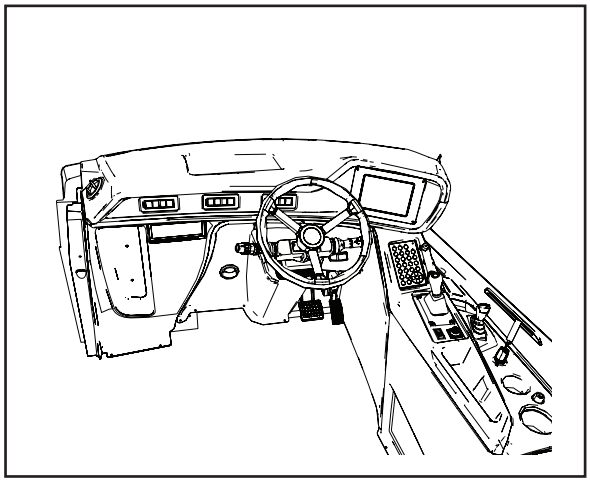
The dumper can be equipped with an additional view camera.

If camera is mounted then the selection is done by a function key on the keypad. This can be configured under

Menu > Display > Optional camera

When used, the camera picture is identified by a “2” on the screen.

Also the reverse camera will then have a “R” token visible.



2.5. Normal operation

Always operate the dump truck with caution. Careful driving is recommended for safe and comfortable operation. Regulate dump truck speed in accordance with the ground conditions and surrounding environments.

In manual gear shift mode, always drive allowing the lock-up clutch to connect.

If abnormal noise, vibration, smoke or odors occur during operation, check for possible faults and remedy.

Check at regular intervals that all gauges are indicating normal values, and that no warning lights are on.

- Normal Transm. oil temp.: 50 - 115°C,

NOTE

For more information about the transmission oil temperature see also Chapter 3

2.6. Brakes

There are three different brake systems on the dump truck. Check the brakes every day to ensure function.

Service brake

All hydraulic operated wet multiple disc brake on each wheel. There are two separate circuits. If a fault occurs in one of the circuits, the dump truck can still brake with the intact circuit. Self-adjusting system.

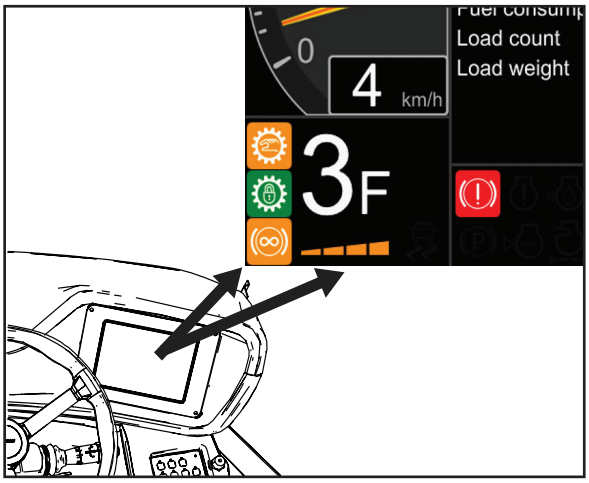
Retarder brake (Main brake)

The integrated hydrodynamic retarder is installed in the basic transmission between converter and gear box.

The installation position of the retarder at the transmission input (so-called primary retarder) increases the brake torque at the output by the given transmission ratio. Thus a high retarder brake torque is available in the lower speeds which can be used almost until standstill of the vehicle. The retarder is usually controlled by actuating the brake pedal, a hand lever or automatically.

Parking brake

Spring actuated, hydraulic released single disc brake on the rear prop. shaft. Self-centering system.



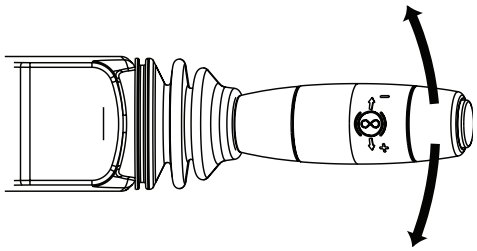
2.7. Retarder brake operation

When the operator releases his foot off the accelerator pedal, the retarder brake is automatically engaged.

Pressing the accelerator pedal slightly will reduce retarder brake power.

Pressing accelerator pedal further down, until meeting the engine rpm, will disengage the retarder brake.

Retarder reducing button

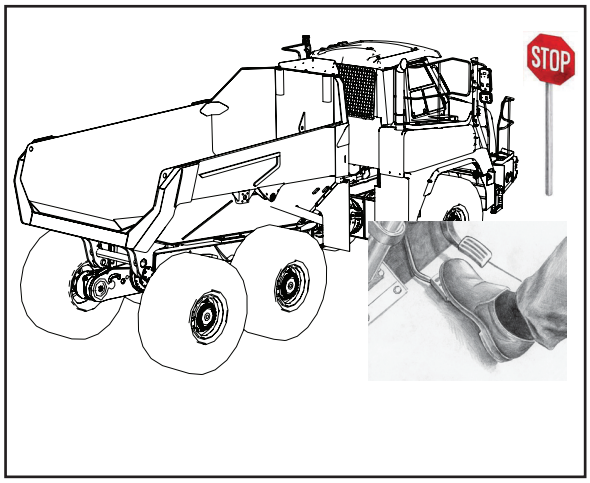


The Steering column is equipped with a Retarder reducing lever , if the retarder reducing lever is engaged, operation of the retarder brake can be setup on request.

Standard retarder setting is 100%, and can be reduced from 100% to 75%,50%,25% with a Retarder Lever on the steering column. Last state is restored when ignition is switched off/on.

NOTE

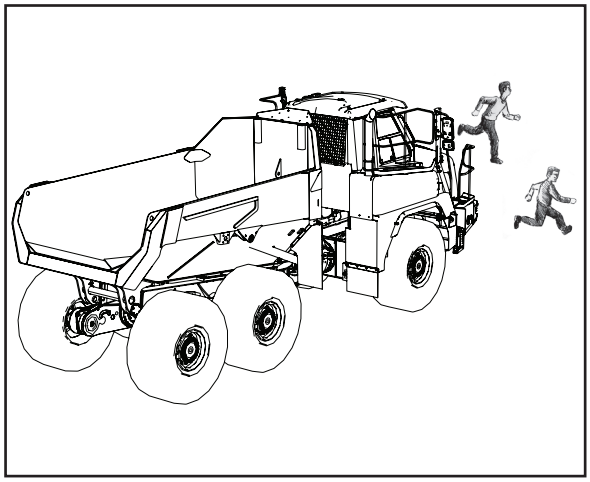
- **To avoid engine over speed, the retarder brake will automatically engage if the engine speed exceeds acceptable operating speed. This will happen regardless to the accelerator pedal.**
- **Reduce the engine speed immediately!**



2.8. Braking/stopping the dump truck

Learn to associate the braking requirements for loaded and unloaded machine.
(See also chapter 2. Safety Instructions)

1. Release the throttle pedal.
2. The retarder will apply automatically with the force in depends to how it is set up.
3. Depress the brake pedal gradually, until desired deceleration is obtained.
4. When the dump truck is completely stopped, move the gear selector to neutral.
5. Apply the parking brake.



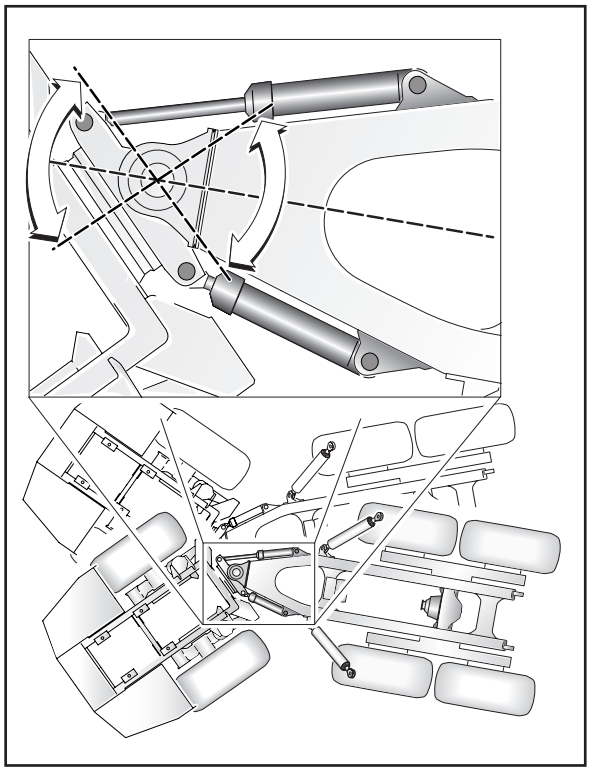
2.9. Emergency braking

If braking effect is lost in both brake circuits, the dump truck can be braked as follows:

1. Release the throttle pedal.
2. Move the parking brake to locked (ON) position.
3. Move the gear selector to 1st gear manually as quickly as possible.
4. When the dump truck has stopped, immediately put wheel chocks under the wheels.

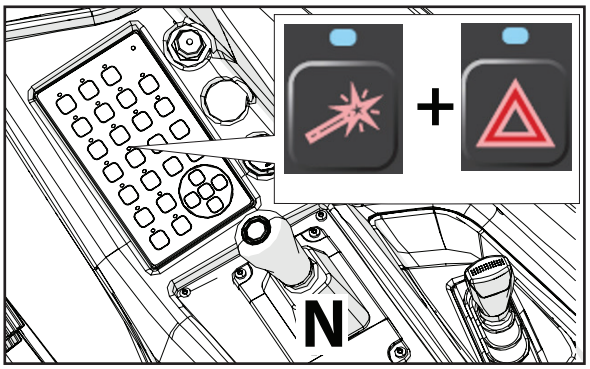
WARNING

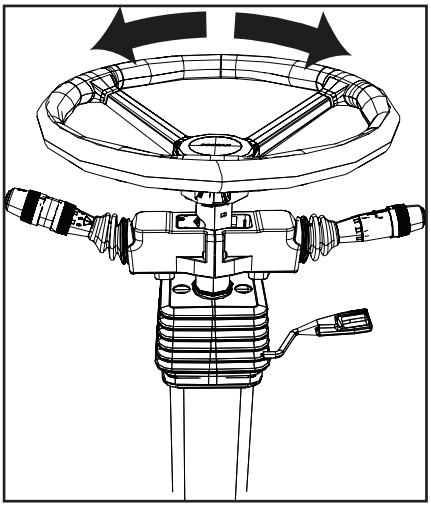
After an emergency stop: DO NOT CONTINUE!
The parking brake MUST be checked as well as the reason for the service brake failure! Consult your Hyundai Dealer.



2.10. Steering

- The dump truck has 2 frames. The steering movement is created by articulation of the frames in relation to each other. The steering is fully hydraulically controlled and there are no mechanical links between the steering column and the steering cylinders. The steering circuit has priority over the tipping circuit, ensuring hydraulic oil available to the steering at any time.
- The dump truck is equipped with an emergency steering system, which will deliver oil through a ground-driven pump as long as the truck is in motion. It will then be possible to steer the dump truck if the engine stops. The steering movement will then be slower and the warning light for emergency steering will light. Repair the fault before operating the dump truck again!



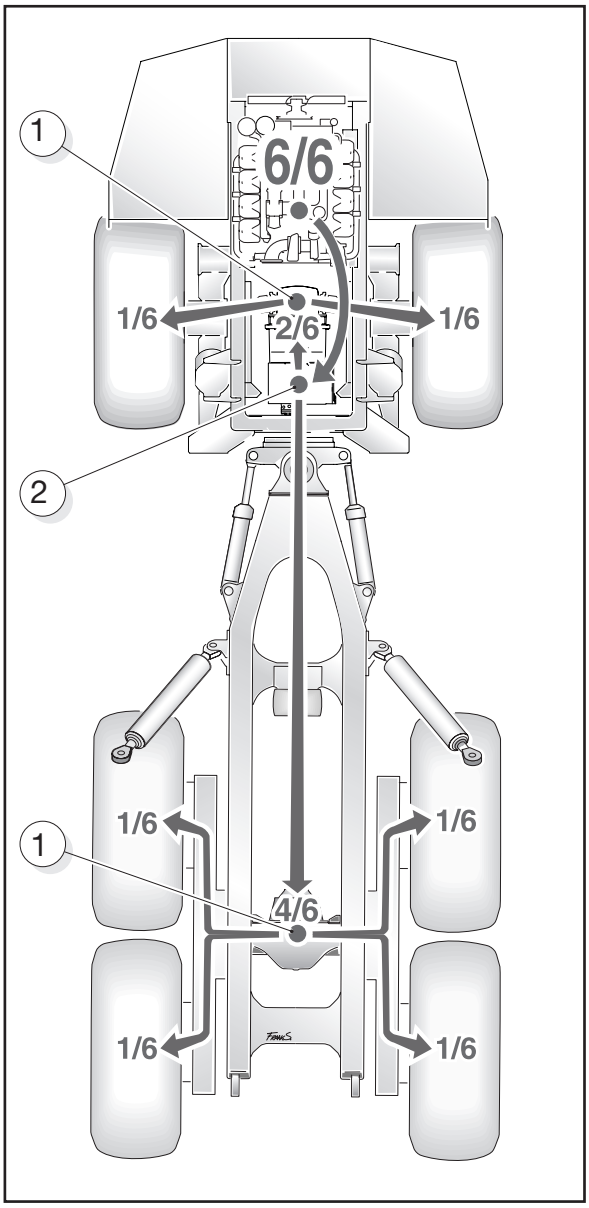


Test of emergency steering

- If testing of the emergency steering need to be performed, the daily routine start up inspection must be carried out first.
- Perform the starting machine operation.
- Drive the machine to the desired speed (8 to 20 km/h) and then release the throttle.
- Put the gear selector in neutral position.
- Press the override button + hazard lights buttons. Hold it until the engine stops completely.
- At this point the driver must perform the steering test by turning to the left and right several times and making sure that the machine turns in the desired direction.
- During this test the steering system is in emergency mode, it means that the functionality of the system is reduced.
- After fulfill emergency steering test stop the machine completely engage the park brake and restart the engine to continue the driving.

WARNING

This test must only be performed on a flat, open, demarcated area. The width of the demarcated area shall be at least twice the overall width of the test machine to be enable the operator to test the steering to the left and right without moving out of the demarcated area. No other vehicle or pedestrian must under any circumstances be allowed within the test area or be parked closer than 2 meters from the test area as long as the test is in progress.



2.11. Differentials

The dump truck has permanent 6-wheel drive with 2 differentials.

1. Front differential, automatic differential brake (limited slip type) fitted to the transmission and. Transfers the power to left and right front wheels.

   The differential will automatically provide highest torque to the wheels which have best grip. The locking ratio is 45% on the front differential, i.e. the differential is capable of compensating for a 1:2.64 front and 1:1,85 rear difference in friction between left and right wheels.

2. Inter axle differential, 100% lockable torque divider integrated in the transmission. Transfers the torque by 1/3 to the front axle and 2/3 to the rear axle. The differential lock can improve dump truck performance and should be used to avoid wheel spinning in severe conditions, i.e. slippery surfaces. Engage the differential lock before entering an area with a slippery surface, soft ground, or if the dump truck is stuck in the terrain. The differential lock must not be used when driving on firm ground!

The criteria for engaging the centre differential lock is:

- Vehicle speed <18 km/h
- Transmission input torque < 1000 Nm.

The centre differential lock will automatically disengage if vehicle speed >20 km/h.

CAUTION

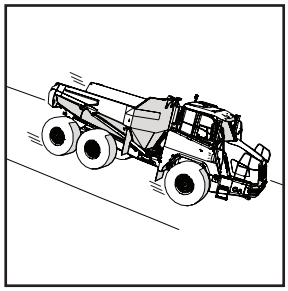
Use the differential lock to avoid spinning on front and rear axle.

Inter-axle differential lock.

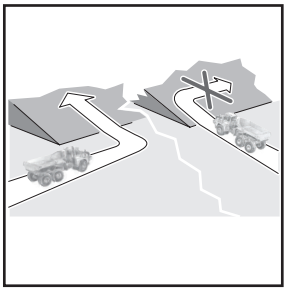
The centre lock button on the panel are requests for diff-lock. The differential lock are engaged only if conditions are in valid ranges. If differential lock is released automatically due to exceeded protection conditions, then the panel buttons (requests) will also be forced off.

If conditions are in valid ranges again then the differential lock are forced back to on.

2.12.Up, down and cross gradient travel



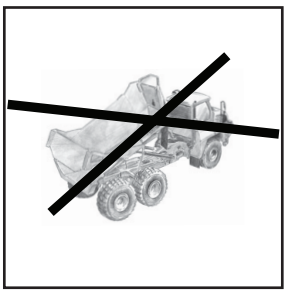
- When travelling on gradients, consider the ground condition, and maintain a safe speed according to the grade of the path, the surface, degree of curves and road width.



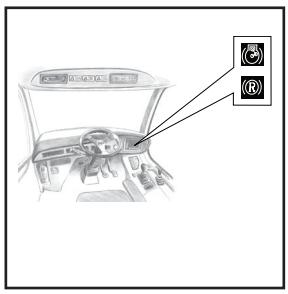
- Operate the dump truck sensibly and avoid cross gradient travel. Select a low speed and negotiate the terrain without exaggerated steering movements and sudden braking.

- Before starting downhill, release the throttle pedal and slow down the dump truck to a safe speed for the downhill slope. Move the gear selector to a suitable position (1st, 2nd or 3rd).

Rule: Select the same gear for operating downhill as you would for operating up the same hill.

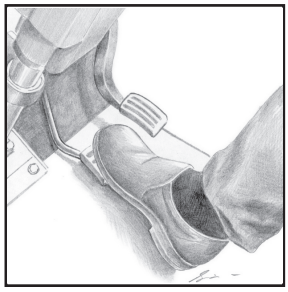


- Do not under any circumstances drive the dump truck with raised body.



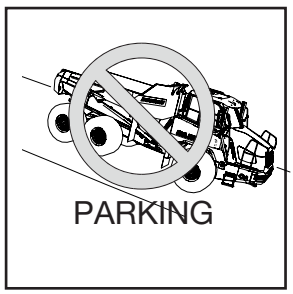
- Long time engagement and unnecessary use of the service brakes can cause excessive wear and a possibility of loss of braking effect due to over-heated brakes.

- Keep engine speed at the upper area, 1500 - 1900 rpm in heavy conditions and for hill travel. Select a manual gear position for steep hill travel.



- If use of the retarder brake is insufficient to keep the dump truck within a safe speed, reduce the speed by depressing the brake pedal. The travel must then continue in a lower gear.

To avoid engine over speed, the retarder brake will automatically engage if the engine speed exceeds acceptable operating speed.



- Do not park or leave the dump truck on grades or slopes. The risk for spontaneous rolling is high!

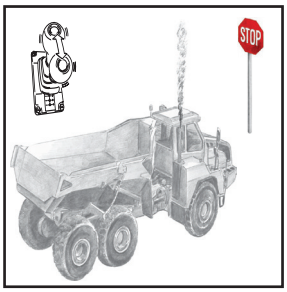
- Pay attention to the transmission oil temperature when the retarder brake is applied.

- ALWAYS keep the engine speed below max. allowed rpm when travelling downhill! The retarder brake (emergency retarder) will be automatically engaged.

2.13. Important operating instructions

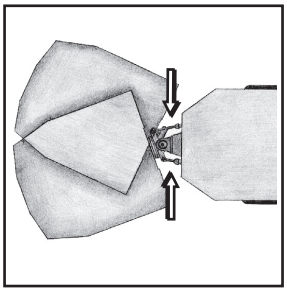
- The dump truck must not coast with gear selector in neutral position.

- Engine speed within 1500 -1900 rpm with engaged lockup is recommended during driving.

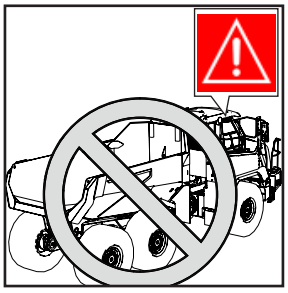


- Engine speed must be reduced, and the dump truck must be stopped completely before changing between reverse and forward gears.

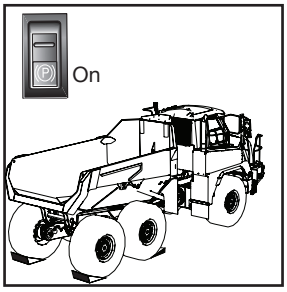
- The retarder brake (emergency retarder) will be automatically engaged if the engine speed exceeds the acceptable operating speed. This will also increase transmission retarder braking to 100%, to avoid over speed of the engine.



- Do not keep turning against the mechanical end stops, or force it into this point when making maximum turns.

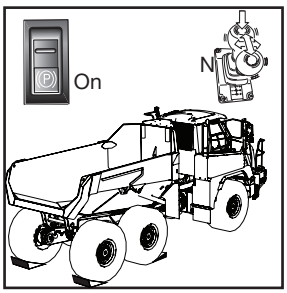


- Do not continue to operate the dump truck if a warning lamp lights, a gauge shows abnormal value, or if the warning buzzer sounds.



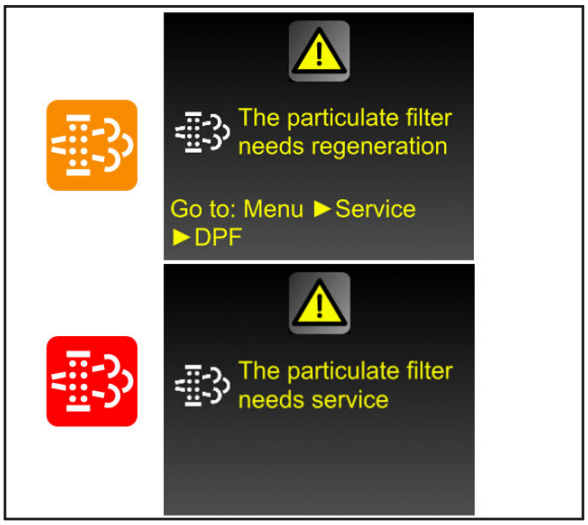
- There is no braking effect from transmission when the engine is stopped.

- Always operate the dump truck within the rated limits and carry out maintenance according to the scheduled program. Overloading and lack of maintenance reduces safety and the life time of the dump truck is reduced.



- Select neutral gear and apply the parking brake when leaving the dump truck. Never leave the dump truck with a gear engaged!

- In case of problems with the dump truck, stop the vehicle and contact your local Hyundai Dealer to amend the fault.



2.14 Regeneration of the particulate filter (DPF) only Stage V engine.

The particulate filter is regenerated, i.e. cleaned, automatically. If a certain amount of soot is accumulated.

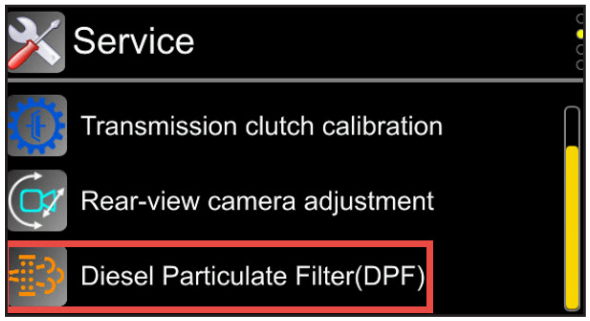
However, if the particulate filter becomes full, it must be regenerated manually. The engine cannot be used for approximately 45 minutes while manual regeneration is carried out.

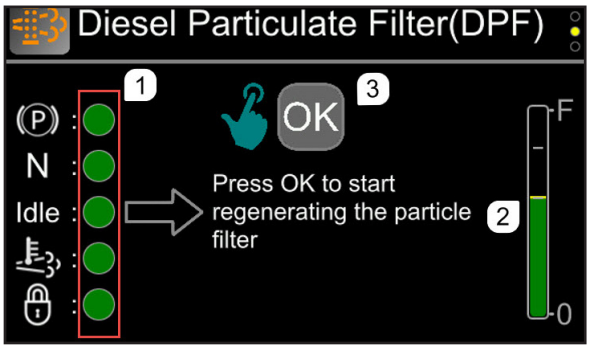
Amber

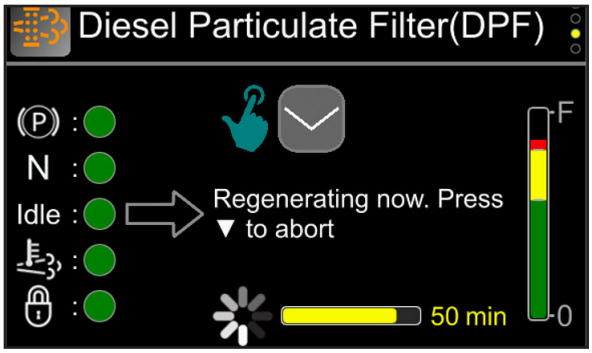
Warning. Blinking slow. DPF. Carry out manual regeneration as soon as possible

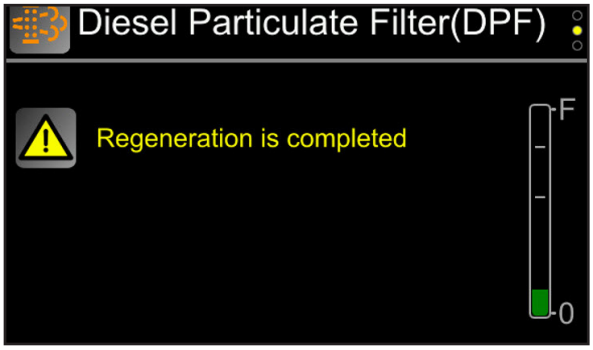
Red

Error. Blinking slow. DPF is overfull. Manual regeneration can only be service personnel.









Manual regeneration of DPF

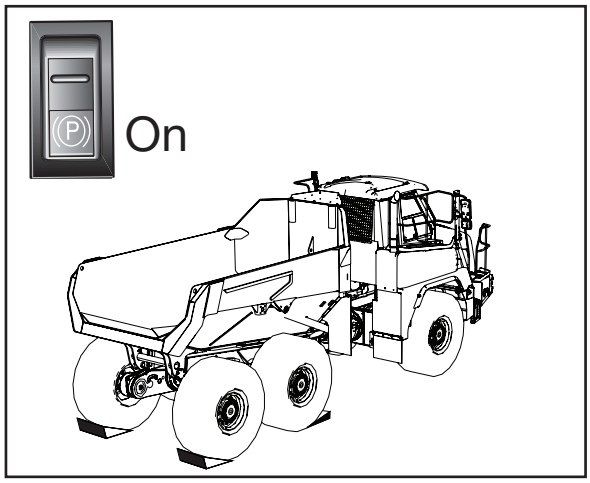
The manual regeneration of particulate filter screen will appear when the operator navigate to :
Menu > Service > Diesel Particulate Filter (DPF)

1.Make sure that the all requirements are fulfilled and confirmed with the green light.

- Parking brake on,
- Gear in neutral
- The RPM is controlled by the Engine Control Unit (ECU) , operator should not press the accelerator pedal.
- Temperature should in normal operation rage.

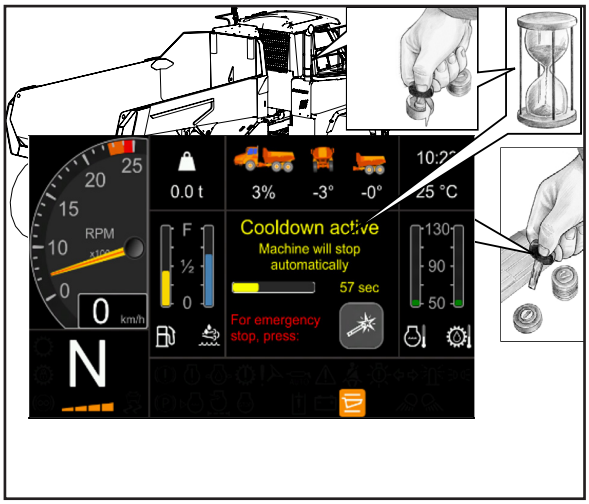
2. The level of exhaust soot need to be in specific lever to execute the regeneration.

3. Press the OK button to start the regeneration.



3. Parking the dump truck

1. Avoid parking with loaded body.
2. Do not park on grades or slopes.
3. Park on a safe ground, where it will not freeze in place, sink down, etc. A change of weather may affect the ground.
4. Move the gear selector to neutral position.
5. Apply the parking brake.
6. Lower the body completely.
7. Neutralise all operating controls.
8. Turn off ignition
9. Secure the dump truck from spontaneous rolling by adding wheel chocks under the wheels before leaving the dump truck.

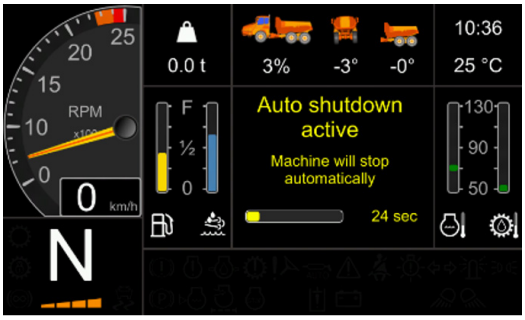


4. Stopping the engine

1. Stop the dump truck.
2. Before stopping the engine, check that the main warning lights for engine failure is not on or flashing. See chapter 3, Operating Controls for procedure if the warning lights are on or flashing.
3. Ensure the transmission is in the neutral position.
4. Turn the key in starter switch to OFF position.
5. If the dump truck has been driven with a heavy load and the key in starter switch is turned to position OFF, the cooling mode is activated to max 3 minutes after then the engine should be stopped.
6. Remove the key from starter switch.
7. Let engine cool down
8. Do not turn off battery main switch before engine has stopped completely and additional 5 minutes has passed.

WARNING

• If driver is aborting cooldown or stopping engine using either outside emergency switch or internal keypad sequence (only if >1km/h) the horn alarm will be activated by 15 horns cycles in 10 sec
• If engine is stopped suddenly before it cools down, engine life may be shortened.
• Never stop the engine immediately after driving except in case of emergency.
• Never turn off battery main switch when engine is running.
• Never turn off battery main switch when ignition is on.
• Leave battery main switch on for at least 5 minutes after engine has stopped.



Auto shut down (ASD)

This function will automatically shut down the engine after specified time.

The function is set as default in disabled, and need to be set up manually in the display.

After activation and fulfillment of certain conditions such as:

- Engine on and the engine temperature need to be inoperation temperature (approx. 60˚C)

- Kept the gear selection in N position.

ASD shut down time can be adjusted from 3-60 minutes

The Display will show warning message 60 seconds before shutdown.

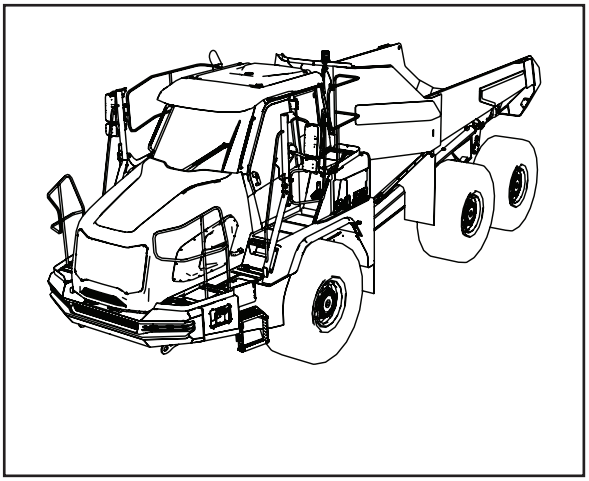
Buzzer will make short beeps 10 seconds before shutdown.

Ignition will be kept on after shut down

Function can be aborted by:

- Push accelerator pedal
- Disengage park brake
- Engage gear

Just after shutdown this indicator will show that the engine was stopped



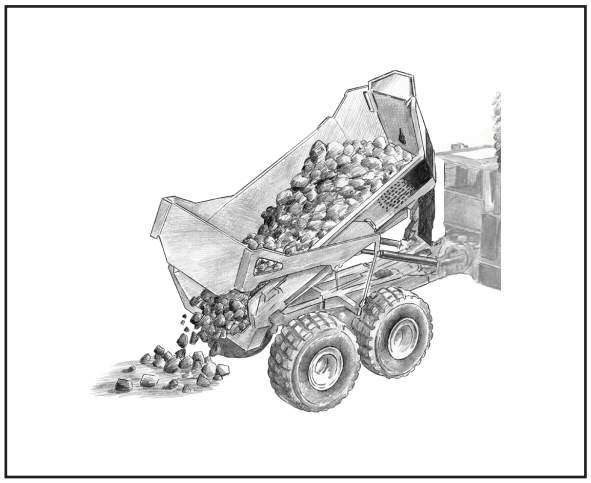
5. Checks after stopping the engine

1. Lock the sliding windows and the cab door.
2. Turn off the battery main switch.
3. Check for leakage of oil or coolant.
4. Fill up the fuel tank.
   Make sure that the filler cap and the area around the filler opening is clean to avoid contamination of the fuel.
5. Remove any waste paper or other flammable material which may cause fire in the engine compartment.
6. Remove any mud stuck to the chassis.

6. Loading and tipping

6.1. Loading

- The body must be lowered completely before loading materials. The tip control lever must stay in hold (float) position.
- When loading large rocks, cover the body bottom with gravel or start with the smallest stones first.
- During loading, the parking brake should be applied and gear selector should stay in neutral position.
- Before driving off, check that no danger can occur during travel. Maintain an even load distribution, avoid unbalanced loads.
- Never overload the dump truck. The operator's safety will be considerably reduced and lifetime of the dump truck will drop.



6.2. Tipping

1. Place the dump truck on a firm, level ground. Check that the tipping may take place safely.
2. The gear selector must be in neutral position, and the parking brake must be applied.
3. Move the tip control lever to body "up" position and increase the engine speed. The body will raise. The tipping speed is proportional with the engine speed.
4. Reduce the engine speed before the body reaches the top position.
5. To stop the tipping movement, release the tip control lever. It will then automatically return to hold position.
6. Move the tip control lever to "down", and the body will go down. The tip lever will magnetically hold in position. The tipping cylinders are double acting. The lowering speed is proportional with the engine speed.
7. The tip control lever must stay in hold (float) position when not operated.

NOTE

For safety reasons, the system slows down the tipping speed when the load starts to pull the hoist cylinders backwards. This feature notifies the operator and reduces chance for ”sticky” load lifting the front half of the truck.

WARNING

- **Reduce tipping speed when dumping large rocks!**
- **Do not load material into the body if the body is raised!**
- **Do not drive an empty or loaded truck with a raised body!**
- **Do not raise body near electrical power lines! See Chapter 2. SAFETY INSTRUCTIONS**
- **Avoid tipping on cross-gradients!**

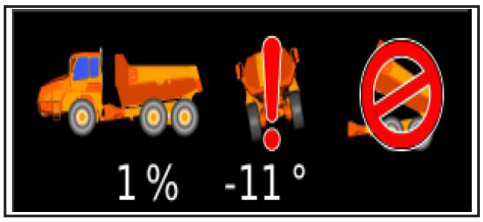
Tip up restriction

A blinking warning indication is added to indicate when a tip up restriction is active.

This occurs when the sideways angle of the truck is above a certain value.

Then lifting of the body is not allowed. Moving the body further down is still possible.

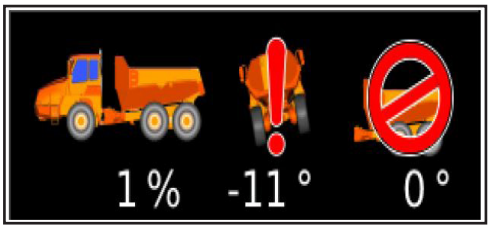
When the warning is active, both the exclamation mark and the prohibitory sign will blink at a rate of approximately 1Hz.



There are two separate situations when this warning is active:

1. No body angle sensor is installed.

   - This will show a body at a fixed angle.



2. Body angle sensor is installed

   - This will show the actual body angle.

Tip up restriction warning

This view will appear when the body cannot be lifted because the truck is leaning to much to one of the side. There is the danger that, the whole truck can tip over.

Refer to the machine's ability to warning alarm for tipping angle. The tipping restriction warning can be adjust between 2° to 15° (in default mode is off).

7. Tire handling

General

This is a general instruction for the standard tires. Contact the tire supplier or your local Hyundai supplier for exact specifications.
Off-road tires produce more heat during operation than ordinary car tires, therefore the tires must be used correctly to obtain long lifetime and safe operation. Please note that the following can cause overheating of tires:

- Too low tire pressure
- Overloading
- Driving long distances non-stop
- Travelling at high speed

CAUTION

Extremely low temperature (below -40°C) requires special operation!

7.1. Difference in tire diameter

If it is necessary to change a wheel as a result of puncture or in emergencies, Hyundai allows up to 3% difference in the tire diameter on the same side of the tandem. But the most ideal situation in all cases is to have the same tire diameter on the same side of the tandem. This is strongly recommended.

7.2. Correct tire pressure

Tire pressures mainly depend on operation speed and load. Road configuration, flotation/traction requirements, risk of cutting, hacking, shock damage and ambient temperatures are also factors to consider.

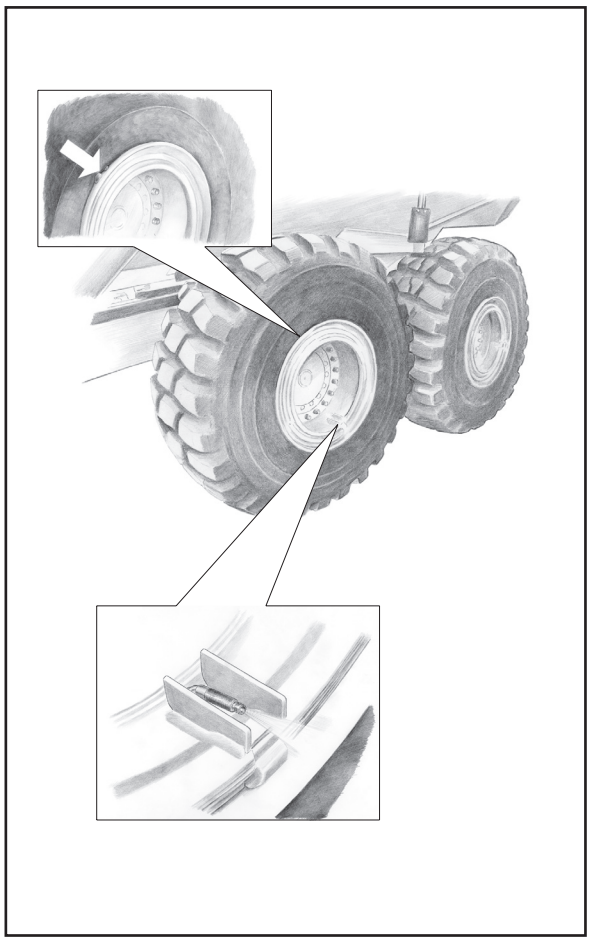
Both too high and too low tire pressure may result in damage and shortened lifetime of the tires. Tire pressure checks and corrections must be carried out on cold tires.

Basic pressure for cold tires (based on max. load and max. speed):

See chapter 8 for tire pressure

7.3. Specified loading

Do not overload the dump truck. Maintain an even load distribution, avoid unbalanced loads. Protect tires from falling stones during loading.



7.4. Proper maintenance

Perform tire inspections according to Maintenance schedule.

Also roads and driving paths should be maintained to achieve max. tire serviceability.

Damaged, excessively worn or aged tires should be replaced. Remove foreign objects from the treads, these will sooner or later penetrate into the tire.

Removal or repairing of tires should be performed by a tire specialist to avoid unsafe working conditions.

WARNING

Always let the air out of the tire before removing foreign objects and before demounting or repairing! See also chapter 2, Safety Instructions (High pressure).

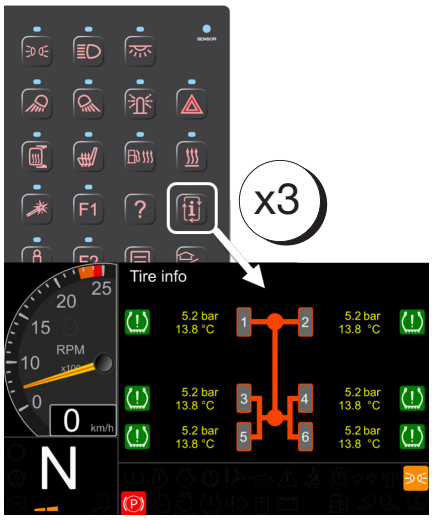
7.5. Transit, long distance drive-away on road

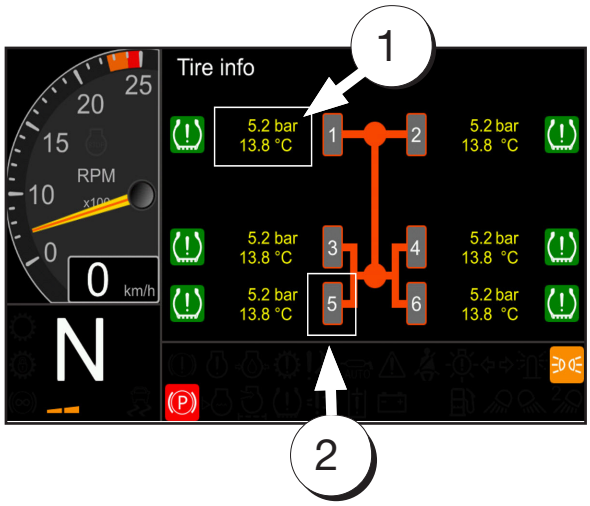
This special type of driving requires special operation:

- Check and adjust the tire pressure on cold tires before starting. Do not reduce pressure during driving.
- Drive only without load.
- Drive 2 hours and stop for minimum 30 min. Drive another 2 hours and stop for minimum 1 hour. Repeat.
- Upper speed limit for this operation: **2280 rpm at 8th gear. Must not be exceeded!**
- **Must not** have diff-lock engaged.

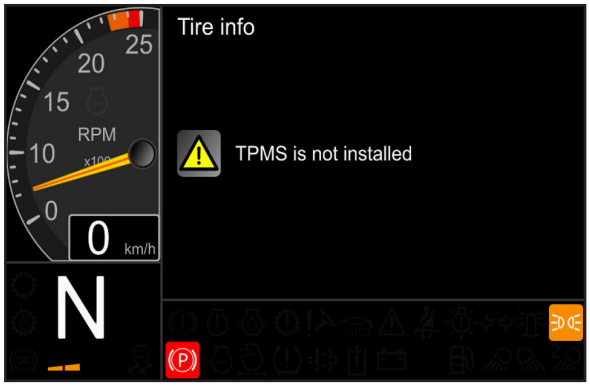
7.5. Tire Pressure Monitor System (Option)

The Tire Pressure Monitor System screen will appear when the operator repeatedly pressing "Info" button from the keypad. The purpose of this screen is to provide the available live data information about the tire pressure status on wheels.



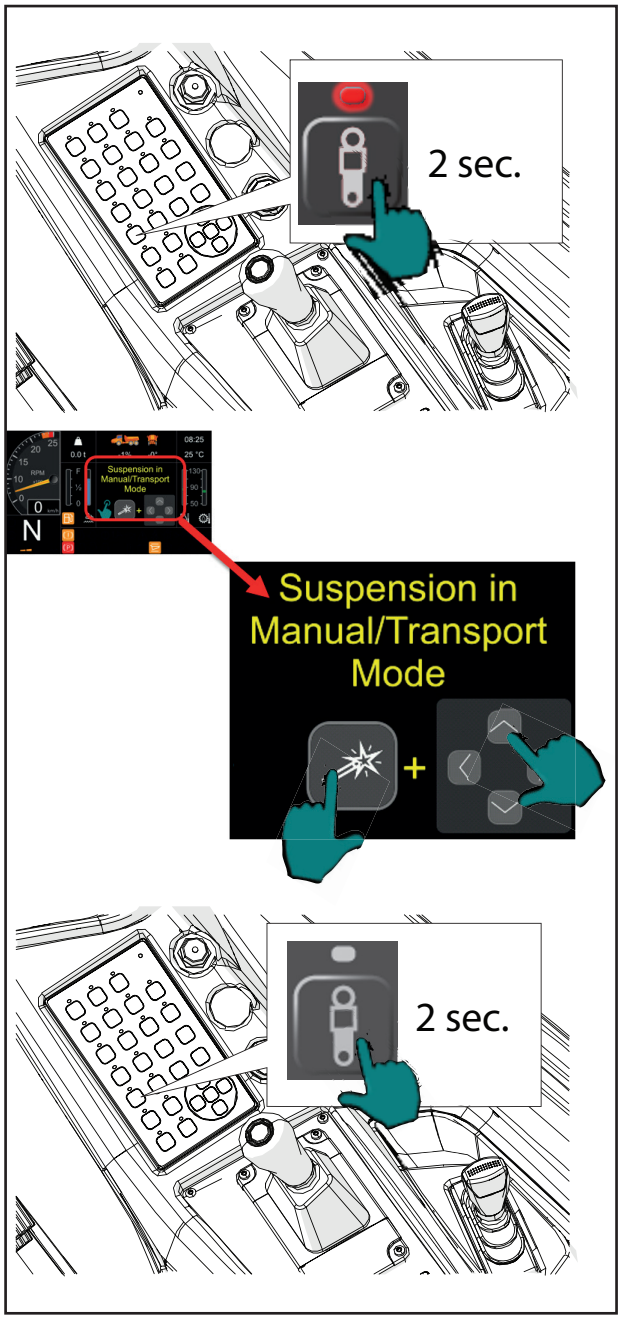


1. Shows pressure and temperature of the tire
2. Each tire location has a fixed number that is also used in the fault code



This screen appear when the TPMS is not installed on this machine.

8. Front suspension



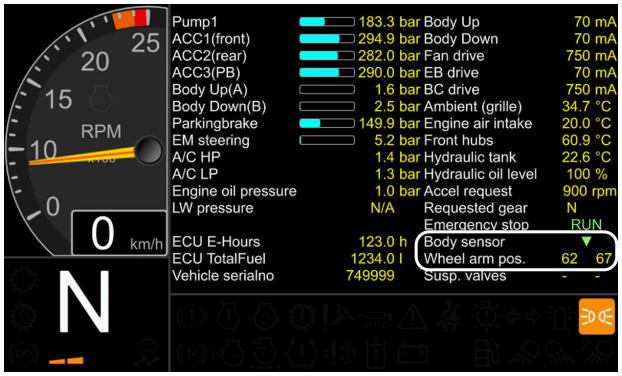
Front suspension is equipped with the self-leveling hydro-gass suspension cylinders one on each side.

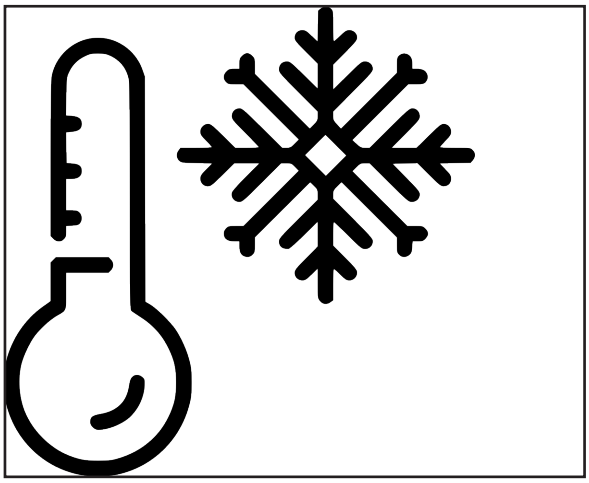
It's possible to switch between manual and the automatic mode on the front suspension.

1. The dump truck must be standing still.
2. The gear selector must be in neutral and confirm that the parking brake is ON.
3. Run the engine at low idle.
4. Depress and hold 5 sec. the suspension button the the keypad. The manual mode will be confirm by the light on the button.
5. When the manual mode is on adjustment of the suspension is available. To adjust the suspension the combination of the override and up/down arrows need to be used.
6. To switch back to automatic mode, hold the suspension button for the 5 sec.
7. The detail info screen showing the status level of the suspension of the machine

WARNING

For safety reasons, the mode of the suspension system cannot be changed if the machine is moving.



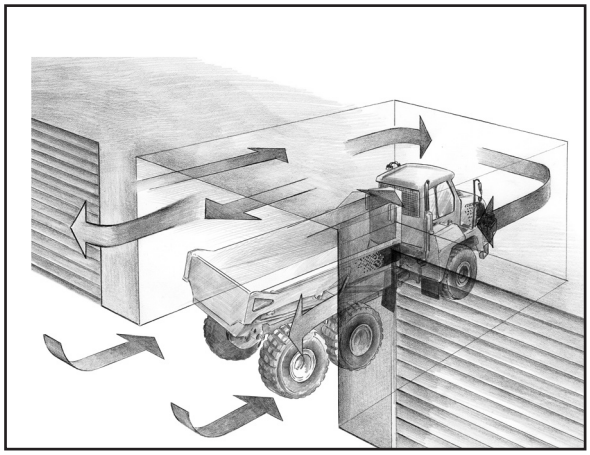


9. Cold weather

Cold weather operation (below 0 °C) requires special care to avoid problems and to maintain high comfort and safety.

- The viscosity of oils in engine, transmission, differentials, and hydraulic system should be of a suitable viscosity for the lowest expected ambient temperature, see Oil Specification Sheet, page 6-5.
- The coolant must contain anti-freeze to avoid ice in the cooling system and to protect against corrosion, see chapter 7, maintenance, 2000 Hours Service.
- As the temperature drops, the battery capacity drops accordingly. The batteries must be in good condition and fully charged when the dump truck is operated in low temperatures.
- Fuel must be of a low pour point, and the fuel tank must be filled up at the end of the shift. 0.5 - 2 % alcohol (isopropanol) can be added to avoid condensation.
- The washer fluid should contain a mix of alcohol (isopropanol) and water which at least is sufficient to avoid icing in the tubes.
- At very low temperatures (below -10 °C) use of engine heater can be necessary to avoid starting difficulties. It is recommended to use an engine heater (optional equipment) at low temperatures. The engine heater has an electrical element which heats the engine coolant.
- Extend the warm-up period to secure that component lubrication is obtained. The dump truck must be operated with light load and reduced rpm during warming up.
- Pay special attention to the ground surface. In case of snow and ice, use snow chains on the wheels to secure the wheel grip.
- If the dump truck is equipped with exhaust-heated body, this should be connected to avoid material freezing to the body.
- Run the A/C compressor once a week to perform internal seals lubrication.
- Start engine, making sure it is warm enough before running the AC (the compressor). This will allow the refrigerant stored as liquid on the bottom of the system to become gas. When the compressor sucks liquid it can damage the weak valves.

(See also chapter 3 Operating controls)

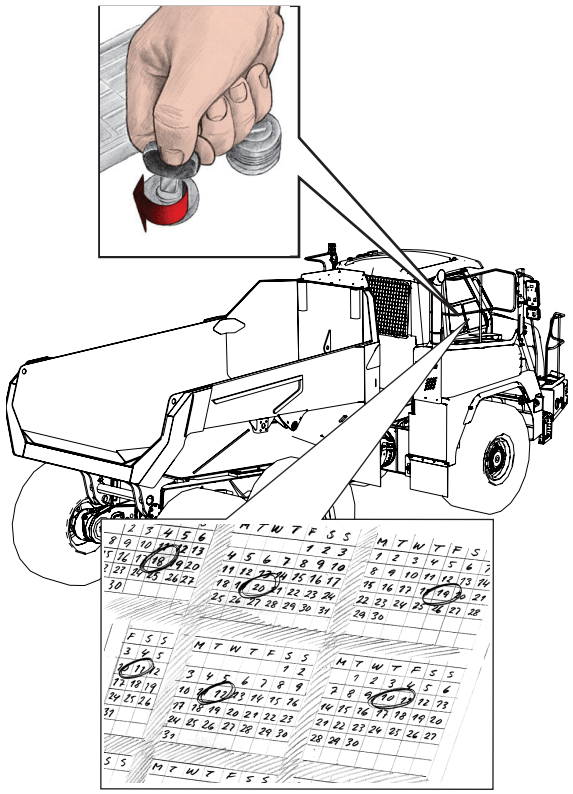


10. Long term storage

If the dump truck is to be stored for a longer period of time, special preparation must be carried out to avoid deterioration and damage. Store it preferably indoors in a dry and ventilated room or outdoors under shelter.

10.1. Before storage:

1. Neutralise all operating controls, place the gear selector in neutral position and apply the parking brake.
2. Thoroughly wash and clean the dump truck.
3. Completely fill the fuel tank.
4. Replace oil and filters with new and lubricate all nipples. Check viscosities to match the expected ambient temperature.
5. If the ambient temperature is expected to drop below 0 °C, always add anti-freeze to the cooling water.
6. Fully charge the batteries and disconnect terminals. The battery is preferably stored separately in a cold place.
7. Cover all cylinder piston rods with rust protecting fluid.
8. Inflate the tires to correct pressure (See chapter 8).
9. Lock the sliding windows, door, fender hatches and bonnet.



10.2. During storage:

Operate the truck once a month by driving it i.e. until engine temperature reaches normal operating temperatures. This will lubricate all moving parts. At the same time check for leakages and recharge the batteries. Grease the nipples.

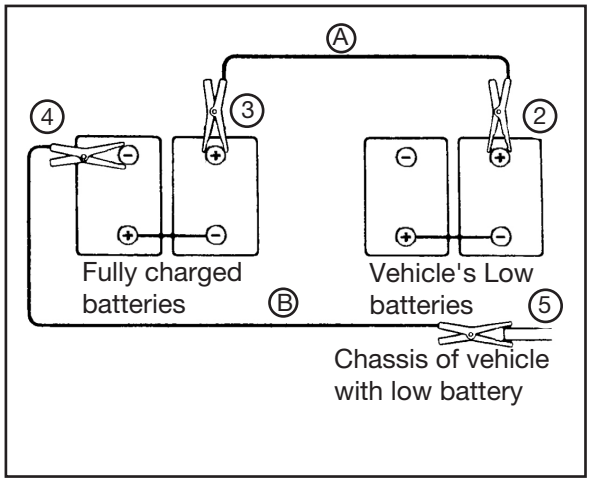
NOTE

Check oil and fluid levels before starting the engine! Drive slowly and with care the first 5 minutes or 1 km.

11.Battery power assistance

In case of discharged batteries, the dump truck can be started by connecting charged batteries, 24 volts with capacity approx. equal to the discharged batteries.

- If the batteries have been discharged, check the reason why (Are the batteries defective? Is there a short circuit somewhere on the dump truck? etc.).
- Discharged batteries should be charged as soon as possible.
- Check the electrolyte level and density after charging the batteries.



Connection:

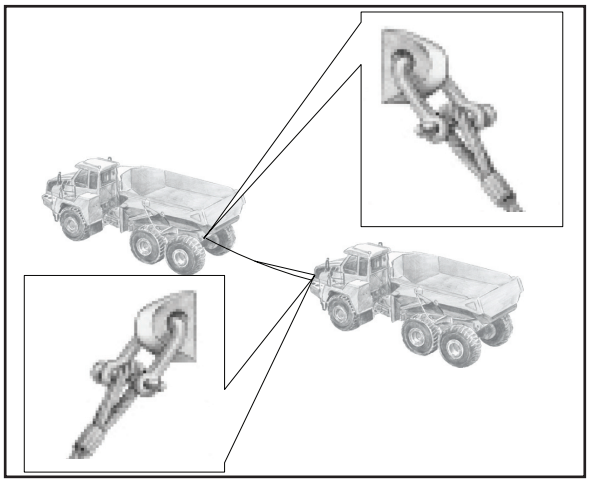
1. Turn off the battery main switch on the right hand side fender.
2. Connect first cable (A) from positive (+) terminal on discharged batteries....
3. .... to the positive (+) terminal on the assisting battery.
4. Connect second cable (B) from negative (-) terminal on assisting battery....
5. .... to chassis on the dump truck with the discharged batteries, some distance from the batteries.
6. Turn on the battery main switch and start the engine in the normal way.

Disconnection:

Disconnect cables in the opposite order, 5 - 4 - 3 - 2.

CAUTION

- **Use cables with min. 25 mm² cross section.**
- **Connect in sequence described above.**
- **Good clamp contact is essential.**
- **Do not stand near a battery when connecting the cable to the chassis.**
- **Do not disconnect the original battery cables.**



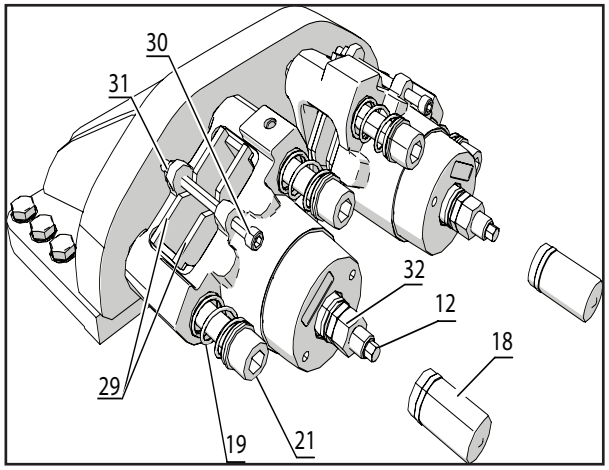
12.Towing the dump truck.

- The dump truck can be towed by attaching a wire/chain to the eyes on the front/rear of the dump truck.
- Check that the wire/chain is capable of towing the load.
- The towing distance must not exceed 10 km, and the maximum allowed speed is 10 km/h!
- The engine must run at low idle to steer the dump truck in the normal way. If the engine is stopped, the steering movement will be heavier and slower than normal because there is no oil flow from the main hydraulic pump.
- The maximum towing force is:
  - Front: 100 kN (each)
  - Rear: 200 kN

CAUTION

- **If fluid pressure is lost, the service brake will not function and the parking brake will be engaged.**
- **An engaged parking brake can be loosened even if there is no fluid pressure in the system, see item 12.**
- **It is not possible to start the engine by towing!**

13.Manual release of parking brake.

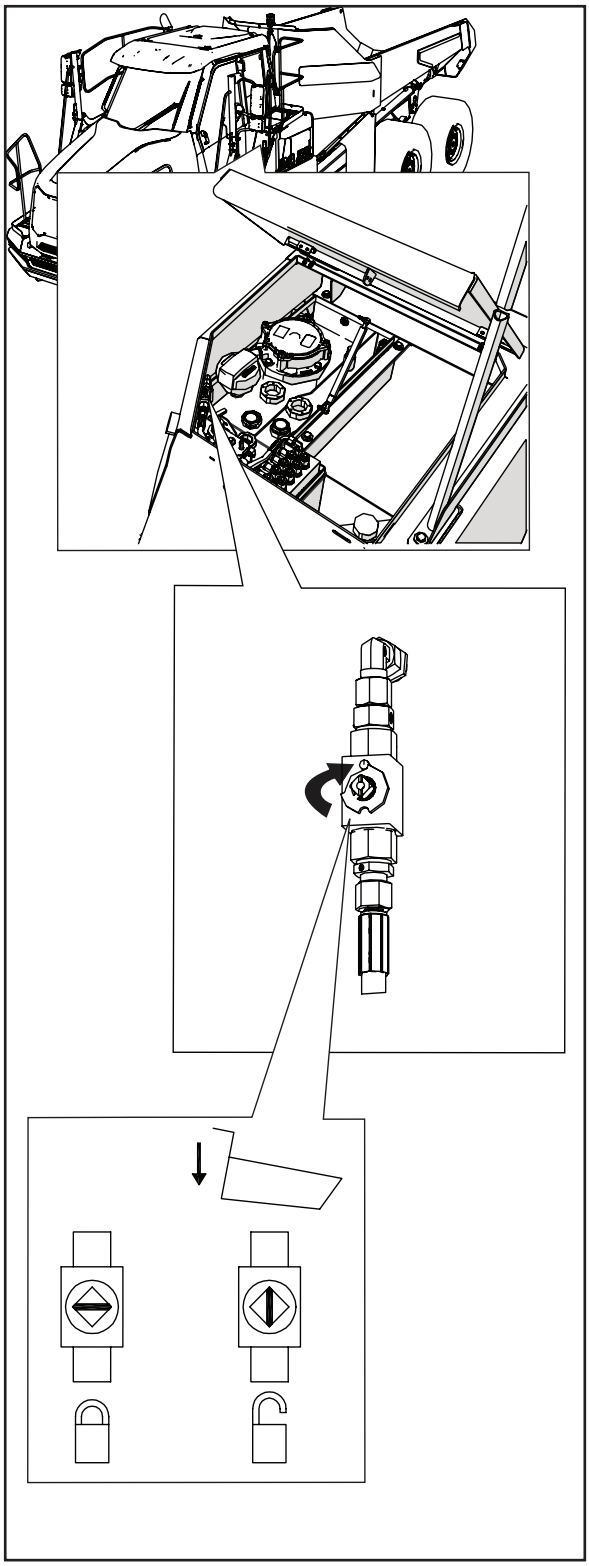


If the parking brake must be disengaged when hydraulic pressure is not available, the following procedure should be carried out (one unit on HA30/HA30A, two units on HA45/HA45A) :

1. Secure the dump truck with wheel chocks so that it will not move as the parking brake is disengaged.
2. Raise the body and secure it with the body support (see chapter 2 - safety instructions).
3. Remove the cap (item 18)
4. Loosen the hex nut (item 32) and rotate the screw-adjustment (item 12) in counter-clocIkwise until the piston assy is flush with the exposed end of the piston.
5. The brake assembly is now released.
6. Repair the dump truck so that hydraulic pressure is available to the parking brake.
7. Tighten the screw-adjustment (item 12) clockwise until brake pads are clamped onto the disc. The screw (item 30) must not contact the park brake bracket during this procedure.
8. Check or tighten the screw (item 21) until the spring-compression (item 19) should be 12.70-16.81 mm when properly adjusted.
9. Apply the hydraulic brake line. The brake is now ready for ıce adjustment procedure (See the 500 hour.)

DANGER

All braking systems are out of function when the parking brake is manual released. Extreme care must be taken to avoid spontaneous rolling.

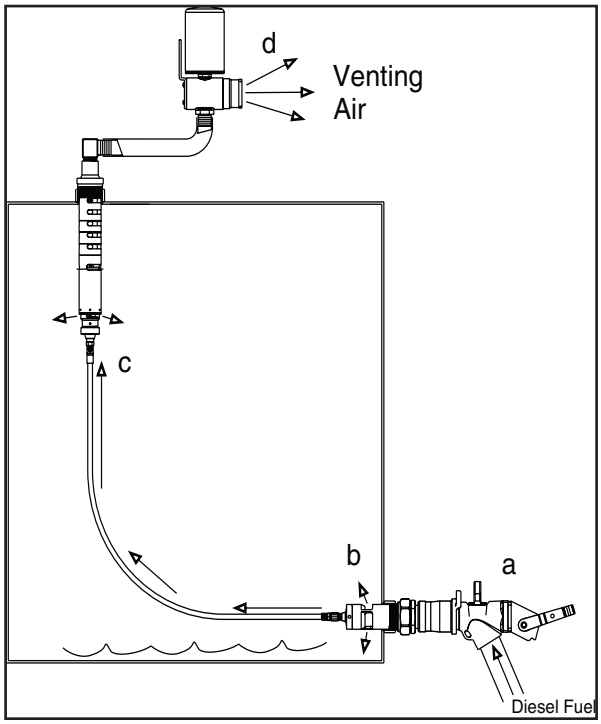


14.Manual release of tilted body.

If the body is lifted and cannot be lowered by the tip control lever, i.e. hydraulic pressure has been lost, the ball valve may be manually released.

1. The ball valve is located on top of hydraulic tank on the left side of the cab.
2. Open the hydraulic tank hatch.
3. Turn the valve lever to the vertical position.
4. Wait until the body is in the lowered position.
5. Turn the valve lever to the horizontal position.

15.Fast fill system (Option)

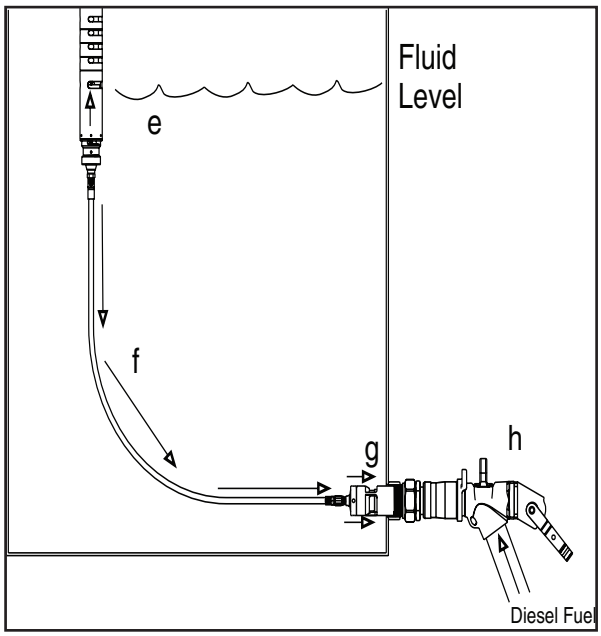


The Fast Fill Systems Pressureless Diesel Fueling System allows automatic shut-off with out introducing pressure to the tank structure. This is a positive shut-off system, which closes the shutoff valve by sensing the level in the tank.

Fueling Initiated

The diesel fuel nozzle (a) is connected to the receiver and is turned on. The incoming fuel pushes the inlet/shutoff valve open filling the diesel fuel tank (b). A small amount of fuel flows through the 3/8" signal line (c) to the vent/level controller and is bled off into the tank.

As diesel fuel fills the tank, the vapor (d) is discharged through the vent/level control and vent filter assembly.



Diesel Fuel Reaches Shut-Off Level

When the diesel fuel reaches the predetermined shutoff level (e) a float in the vent/level control is raised and pressure begins to build in the signal line (f).

Shutoff is Initiated

The inlet/shutoff valve (g) senses the pressure in the signal and closes. The pressure sensitive diesel fuel nozzle senses an increase in pressure, because the inlet/shutoff valve closed, and shuts off. The shutoff valve cannot be reopened until the fuel level is decreased to lower the float; the diesel fuel nozzle can not add fuel until the shutoff valve can be reopened.

Requirements

Maximum Operating Pressure: 14,5 psi / 100 kPa

Minimum Operating Pressure: 5 psi / 35 kPa*

Minimum Flow Rate: 25 gpm / 95 lpm

Diesel Fuel Nozzle Shut-Off Pressure: 7psi / 48 kPa or greater

Flow rates over 150 gpm / 568 lpm only possible with diesel fuel nozzles rated for such, e.g. N150SL800

* Requirement at the nozzle. Additional plumbing between the pump and the diesel fuel nozzle will add additional pressure drop to the system.

16.Troubleshooting

If the action below does not solve the problem or the fault cannot be found, contact Hyundai Dealer.

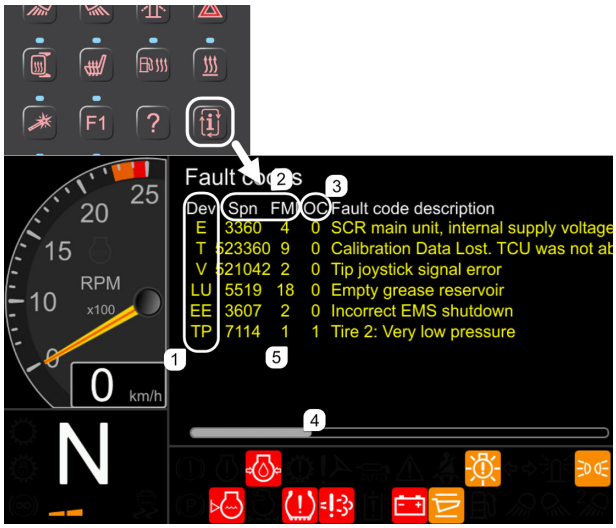
*= Always contact your Hyundai Dealer.

Area of dump truck	Symptom/Problem	Cause	Remedy/Solution
Engine	Dump truck will not start	Main switch disconnected	Turn on
		Out of fuel	Refill fuel, bleed system
		Low battery current	Recharge
		Blown fuse	Check circuit, replace fuse
		Defective wiring	Check connections, wires
		Hydrostatic lock	Repair *
		Starter motor defective	Replace *
		Electronic controller or sensors defective	Check/repair *
	Starts but engine cuts out sud-denly, runs un-evenly or hunts. Low output	Fuel system disturbance	Check fuel lines, bleed system
		Condensed water in diesel	Drain tank
		Bad fuel quality	Change fuel
		Low fuel level	Refill fuel
		Fuel filters clogged	Replace filters
		Air filter clogged	Replace or clean
		Fuel tank breather clogged	Clean tank cover
		Wrong injection setting	Adjust *
		Injector defective	Repair/replace *
		Turbo charger defective	Repair/replace *
		Worn engine or internal damage	Overhaul *
		Electronic controller or sensors defective	Check/repair *
	Overheated (Warning light)	Low coolant level	Add coolant, check for leakages
		Fan belt problem	Tighten/replace
		Air in cooling system	Bleed system
		Dirt inside cooling system	Clean and replace coolant
		Radiator fins clogged/damaged	Clean
		Thermostat faulty	Replace *
		Sensor/gauge defective	Replace *
		Coolant pump worn	Overhaul *
	Low coolant temperature	Sensor/gauge defective	Replace *
		Thermostat stuck open	Replace *
	Low oil pressure	Too low oil level	Add oil, check for leakage
		Incorrect oil type	Change to correct oil type *
		Sensor/gauge defective	Replace *
		Oil pressure red - valve faulty	Overhaul *
		Worn oil pump	Overhaul *
	Blue smoke, oil consumed	Too high oil level	Adjust to specified level
		Incorrect oil type	Change to correct oil type*
		Worn engine or internal damage	Overhaul *
	Black or white smoke	Clogged air filter	Replace or clean
		Fuel pump/injection system worn or faulty	Adjust/repair *
		Cylinder gasket defective	Replace *
		Turbocharger defective	Repair/replace *
	Oil in coolant or coolant in oil	Internal leak in engine cooler	Replace *
		Cylinder gasket defective	Replace *
		Worn engine or internal damage	Overhaul *

Area of dump truck	Symptom/Problem	Cause	Remedy/Solution
Engine	Knocking noise	Bad fuel quality	Change fuel
		Valves incorrectly adjusted	Adjust
		Injectors incorrectly adjusted	Adjust *
		Injector defective	Replace *
		Worn engine or internal damage	Overhaul *
	Main warning light illuminates	Engine/engine controller failure	Stop the dump truck at a safe place, check the error codes and contact your Hyundai Dealer.
Transmission	Too high temperature	Too high oil level	Adjust to specified level
		Incorrect oil type	Change to correct oil type *
		Cooling circuit failure	Check/repair *
		Lock-up fault	Overhaul *
		Worn oil pump	Overhaul *
	Will not drive in any gear or only possible to drive in some gears	Too low oil level	Add oil, check for leakage
		Blown fuse	Check circuit *
		Convertor prop. shaft	Replace *
		Electronic controller detection failure, neutral engaged	Check/repair *
		Electronic controller or sensors defective	Check/repair *
		Flywheel damper separated	Replace *
		Drive line failure	Check/repair *
		Internal transmission failure	Overhaul/replace *
		Automatic central lubrication failure	Check/repair *
	Low oil pressure	Too low oil level	Add oil, check for leakage
		Incorrect oil type	Change to correct oil type *
		Sensor/gauge defective	Replace *
		Pressure control valve failure	Check/repair *
		Worn oil pump	Overhaul *
		Internal transmission failure	Overhaul/replace *
	Noise	Too low oil level	Add oil, check for leakage
		Incorrect oil type in differential(s)	Change to correct type *
		Worn transmission or internal damage	Overhaul/replace *
	Main warning light illuminates	Transmission/transmission controller failure	Stop the dump truck at a safe place, check the error codes on the gear display and contact your Hyundai Dealer.

Area of dump truck	Symptom/Problem	Cause	Remedy/Solution
Brakes	Poor braking effect or truck pull to one side when braking	Insufficient oil pressure	Check charging and system*
		Worn out brakes	Overhaul/replace *
Hydraulic system	Emergency steering light	No oil flow from emergency pump	Check and repair *
	Truck will not go straight ahead, uneven steering movement or periodically sticking	Low hydraulic pressure	Add oil, check for leakage
		Air trapped in hydraulic system	Bleed system *
		Contaminated oil	Change oil and flush system *
		Incorrect oil type	Change to correct oil type *
		Steering cylinders internal leak	Overhaul *
		Orbitrol or steering valve failure	Check and repair *
	Not possible to tip or activate slow tipping	Low hydraulic oil level	Add oil, check for leakage
		Clogged oil filter	Replace
		Clogged tank strainer or breather	Replace/clean
		Low oil pressure	Check/repair *
		Worn oil pump	Check/repair *
		Tip valve failure	Overhaul *
	Main warning light illuminates	Hydraulic failure	Stop the dump truck at a safe place, and check the error codes on the main display and contact your Hyundai Dealer.
Lubrication system	Main warning light illuminates	Lubrication system failure	Check the error codes on the main display
Electrical system	No electrical power	Main switch disconnected	Turn on
		Batteries discharged	Recharge
		Battery terminals/wiring defective	Repair *
	Charge warning light on	Fan belt problem	Tighten/replace
		Defective/worn alternator	Replace *
		Defective wiring	Check connections, wires *
Chassis	Uncomfortable travel (jumping)	Defective Suspension Cylinder	Replace *
		Articulation turning ring worn	Overhaul *
	Vibrations	Engine or transmission mountings	Replace
		Fan or flywheel loose/imbalance	Check/repair *
		Defective elastic coupling	Check/repair *
		Prop. shaft failure	Check/repair *
		Drive line problem	Check/repair *

17.Fault codes



There is possibility to read the fault codes directly from the main screen.

The fault info screen (5) is shown after pressing the info button. If there is any problem with the machine the code will appear on the list.

1. The Device fault codes comes from
   - E = Engine
   - T = Transmission
   - V = VCU3
   - LU = Lubrication system
   - EE = Engine Exhaust gas aftertreatment system
   - TP = Tire Pressure monitor system (option)
2. Combination of Spn and FMI uniquely identifies the fault code
3. The OC= Occurrence count. Shows the number of times this error happened.
4. The arrow keys can be used to scroll through the list and also see the full line of text.