

Chapter 4

TRUCK BODY AND SPECIAL EQUIPMENT INSTALLATION PROCEDURE AND PRECAUTIONS

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In order to properly install the rear body and equipment on the Hino chassis, it is recommended that the following procedures be followed. In addition, everything related to the powertrain and emission control components must be satisfied with CEB00597. Failure to do so may result in serious damage to the Hino chassis.

1. GENERAL PRECAUTION

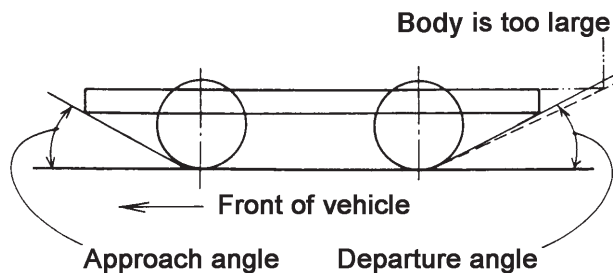
Any deviation from the original Hino chassis specifications will become the responsibility of the subsequent stage manufacturer or installer.

The final stage manufacturer has responsibility to certify that the completed vehicle conforms to all applicable CMVSS, Motor Vehicle Safety Regulations and other regulations.

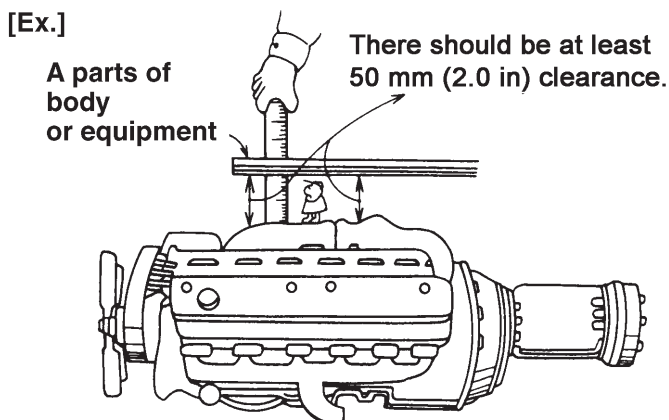
The body installed on chassis frame must have adequate strength. In order to prevent insufficient efficiency of brake or abnormal wear of tires, enough care is necessary to the weight distribution to be loaded as evenly as possible onto right and left wheels.

When installing the body, be sure that all the wheels are on the same horizontal plane so that the chassis frame is not inclined. (No difference in height from the ground on right and left sides.)

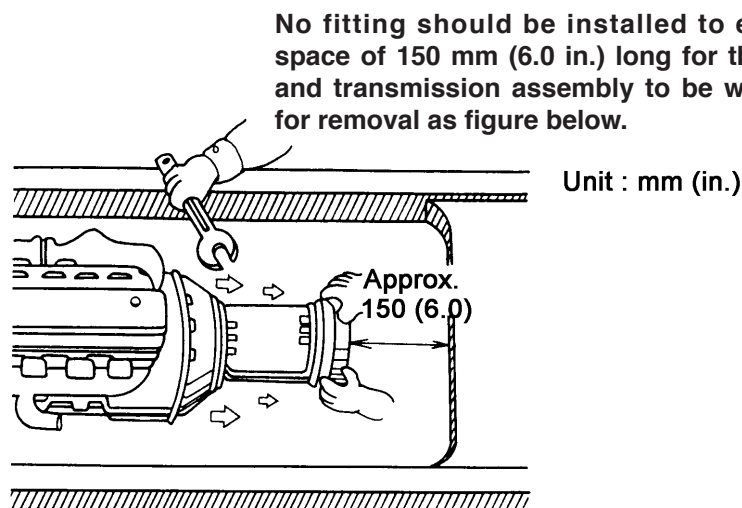
When rear body or equipment are mounted on the front or rear overhang, it is desirable that mounted position is not inside the approach and departure angle.



When installing rear body or equipment near the engine, clutch and transmission, allow a clearance at least 50 mm (2.0 in.).



When removing the transmission assembly from the engine, it is necessary to move the transmission assembly rearward about 150 mm (6.0 in.) in order to pull out the clutch spline. Therefore, proper consideration should be given to the arrangement of the fittings of body or equipment.



The fuel tank, DEF tank, battery and air tank supports should not be fitted with the side guard and anything like that which may give shock and external force to them.

When mounting the body, sufficient considerations are needed so that there will be no trouble in carrying out daily inspection and maintenance.

- Engine oil inspection, oil supply and discharge
- Cooling water inspection, water supply and discharge
- Air cleaner inspection
- Transmission oil inspection, oil supply and discharge (Special care is needed when installing P.T.O.)
- Differential oil inspection, oil supply and discharge (Care is needed when spare tire is mounted on the rear overhang.)
- Grease up (Special care is needed when shifting the fuel tank on vehicles.)
- Battery liquid inspection, water supply and discharge.
- Supply of fuel and DEF
- Air tank drain
- Attaching and detaching the spare tire
- Check valve and other valves relating to brake

When changing springs or installing additional spring leaves, check the wheelbase and the front wheel alignment and make adjustments if needed. (Tighten spring U-bolts and center bolts with the specified torques.)




After a vehicle has been properly fitted out, make sure that it is free from any defects such as the vibration of the cab and noise before delivering it.

When mounting all the required component parts on a vehicle, be careful not to damage to the Hino Chassis or impair its proper functioning. (For instance do not step on piping, wiring, air tank, fuel tank, air drier and other chassis frame component.)

Do not alter the component parts of the front axle and steering.

When using additional spring leaves, do not use more than we have provided for option for the excessively increased front spring leaves will cause interference with the position of the steering link and the excessively increased rear spring leaves will may cause the propeller shaft to be damaged by seizure or noises.

Be careful that the mounted body may not interfere with the front and rear field of vision.

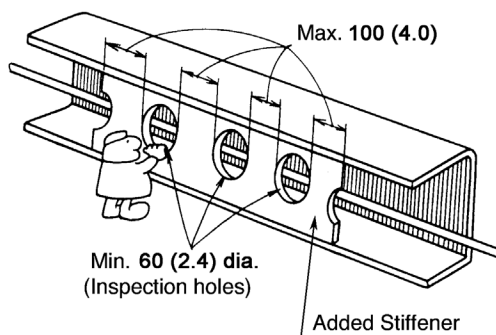
When a concentrated load is applied locally or the body is long, the amount of deflection may pose problems in some cases. So, it is advisable to use  or  or  shaped steel beams as the main sill, and joint them securely to the side members in order to obtain sufficient overall strength and rigidity.

When a body with a great rigidity is mounted as in the case of tank tanker and bulk cement carriers, please make reference to the paragraph devoted to the main sill to prevent a weak point appearing at the rear of the cab.

Cautions when mounting the body near brake units and brake pipe lines

- The valves shall be made serviceable and detachable.
- When a corrosive property is loaded on the body, use appropriate protective means to protect the pipe lines.
- Be careful to ensure sufficient clearance at least 30 mm (1.2 in.) between the brake pipe lines and the parts of body.
- Make the inspection and working holes if the side rail is stiffened as a closed section.

Unit : mm (in.)



Cautions needed when mounting the body above exhaust pipe and aftertreatment device.

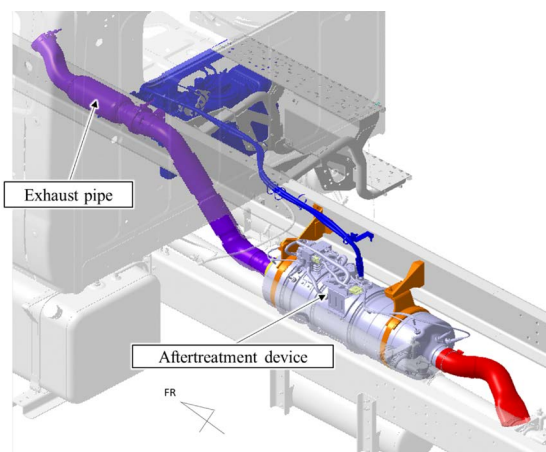
- There must be the following clearances between exhaust pipe and others to be mounted on the vehicle.

More than 100 mm (4.0 in.) from wood, rubber, cloth, resins and the like.

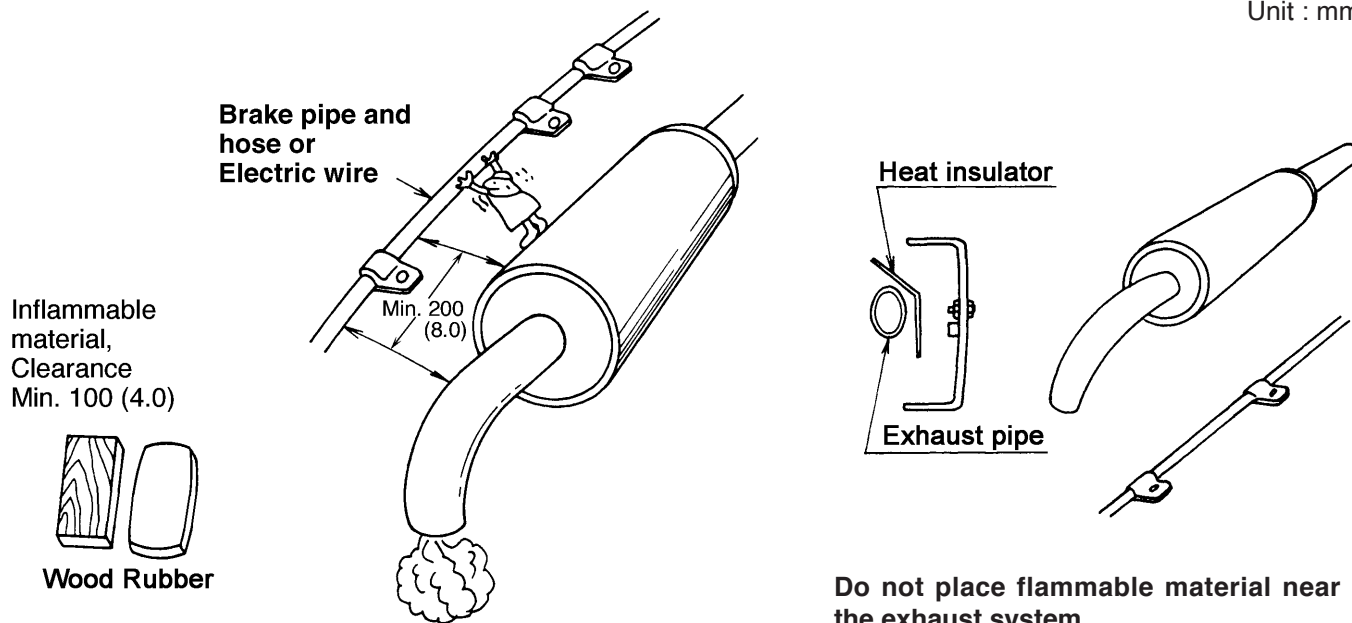
More than 25 mm (1.0 in.) from metal parts.

More than 200 mm (8.0 in.) from electric wire, brake hose or tube.

But, heat shields or insulators must not added to Aftertreatment device.



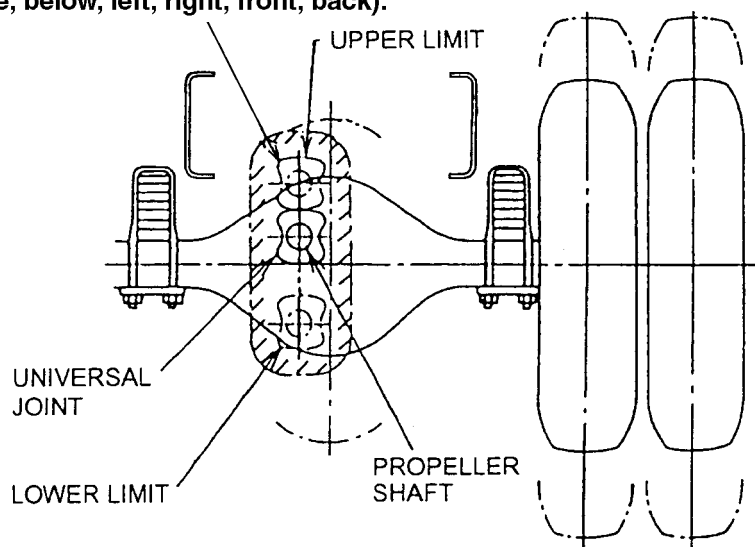
Unit : mm (in.)



- Care must be taken that there is no rope or sheet hanging close to the exhaust system. Do not place the rope hook near the exhaust system.

To prevent an interference of propeller shafts with the body parts due to the movement of propeller shafts, keep enough clearance at least 50 mm (2.0 in.) between propeller shaft (including joints) and body parts. (dump pump, brackets, etc.)

Allow 50 mm (2.0 in) clearance from limit of displacement of the propeller shaft (above, below, left, right, front, back).



2. WEIGHT DISTRIBUTION AND CENTER OF GRAVITY

Recommended Weight Distribution on Front Axle

To ensure satisfactory steerability of the vehicle under all conditions, proper weight distribution on front axle must be considered at the planning of body mounting.

In the case of 2-axle vehicle, ensure a minimum of 30% of the gross vehicle weight is on the front axle.

The permissible front axle load must not be exceeded.

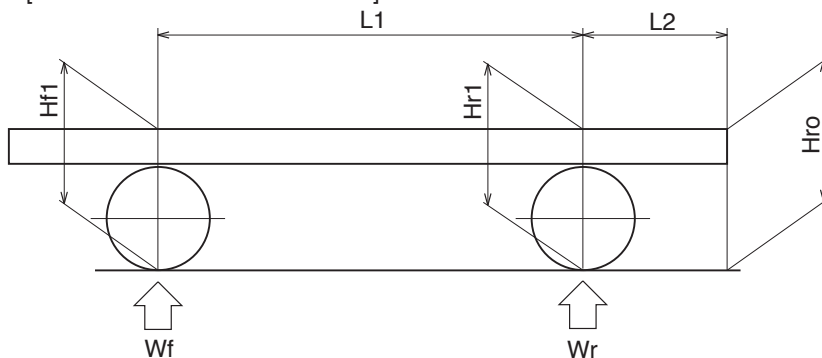
Calculation for Height of Frame Upper Surface from Ground

Before mounting rear body or equipment on chassis, must calculate height of frame upper surface from ground.

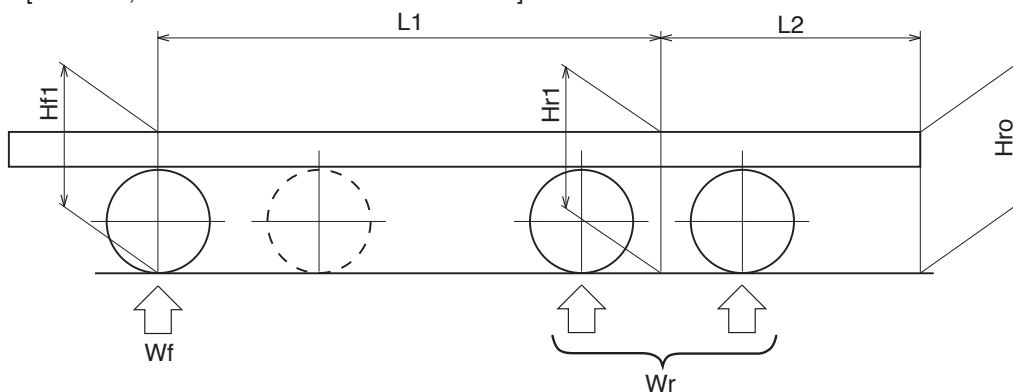
In order to confirm the vehicle posture as frame end upper surface from ground slightly higher than front end to ensure vehicle stability.

Following are as formula for how to calculate.

[FOR 4x2 DRIVE MODEL ONLY]



[FOR 6x2, 6x4 and 8x4 DRIVE MODEL ONLY]



W_f : Load on front axle (kg, lb.)
 W_r : Load on rear axle (kg, lb.)
 H_{f1} : Height of frame upper surface from ground on front axle center line (mm, inc.)
 H_{r1} : Height of frame upper surface from ground on rear axle center line (mm, inc.)
 H_{ro} : Height of frame upper surface from ground on frame end (mm, inc.)
 L_1 : Distance from front axle center line to rear axle loading center (mm, inc.)
 L_2 : Frame rear overhung (mm, inc.) · · · From rear loading center to frame end.

$$H_{ro} = H_{r1} + \frac{(H_{r1} - H_{f1})}{L_1} \times L_2$$

NOTE

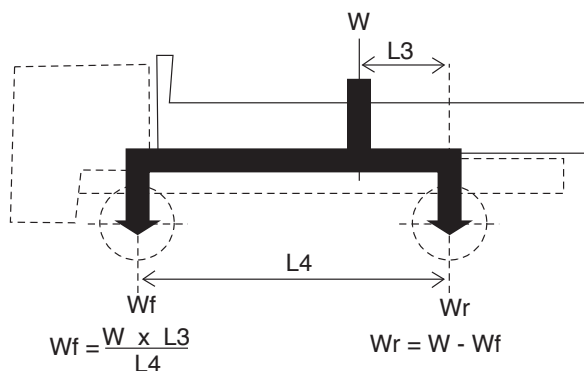
- Refer to the calculation formula below for how to calculate H_{f1} and H_{r1} .
- The calculation formula is not considered the deflection of tire.
- H_{f1} and H_{r1} must add the deflection of tire based on local standards.

<CALCULATION FORMULA OF H_{f1} & H_{r1} >**<CALCULATION DATA TO BE REFERED>**

ITEM	CHAPTER TO BE REFERED		ELEMENT	
	CHAPTER	NAME OF SECTION	FRONT	REAR
SPRING CONSTANT (kgf/mm, lb/in.)	12	SUSPENSION DEFLECTION CHART	T_f	T_r
HIGHT OF FRAME UPPER SURFACE FROM GROUND (mm, inc.)	9	CHASSIS DRAWINGS	H_f	H_r

<CALCULATION DATA TO BE PROVIDED>

ITEM	ELEMENT	
	FRONT	REAR
MASS DISTRIBUTION OF BODY OR EQUIPMENT (kg, lb.) *Mass of payload must calculate mass distribution, Front and Rear, if need.	W_f	W_r

CALCULATION FORMULA OF MASS DISTRIBUTION

W : BODY (EQUIPMENT) MASS
 W_f : FRONT DISTRIBUTION MASS OF BODY (EQUIPMENT)
 W_r : REAR DISTRIBUTION MASS OF BODY (EQUIPMENT)
 L_3 : GRAVITY CENTER OF BODY (EQUIPMENT) MASS
 L_4 : WHEELBASE

<CALCULATION FORMULA OF H_{f1} >

$$H_{f1} = H_f - \left(\frac{W_f}{2} \div T_f \right)$$

<CALCULATION FORMULA OF H_{r1} >

$$H_{r1} = H_r - \left(\frac{W_r}{2} \div T_r \right)$$

Permissible Height of Center of Gravity of the Completed Vehicle with Payload

The height of center of gravity of the completed vehicle must be considered at the planning of body mounting.

The height of center of gravity from the ground to the completed vehicle with payload should not exceed the guidelines as shown in the table.

If the body is mounted in such a way that the height of center of gravity exceeds the guideline, the directional stability at braking and roll stability at cornering or rolling will be adversely affected.

GUIDELINE

Unit: mm (in.)

Model	Height of center of gravity from ground
ALL	Less than 1778 (70)

[NOTE]

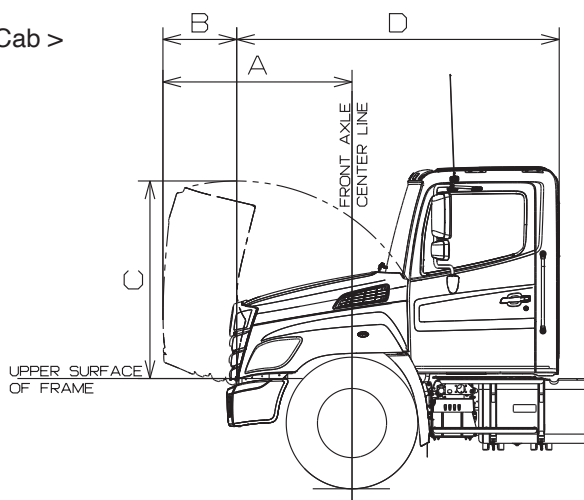
This guideline is applied to the truck body only.

3. THE TILT HOOD

Since the Hino truck has the tilt hood in front of the cab.

Be sure that not to obstruct the tilting range of the hood in described following figure when perform to mount the body or equipment.

< Day Cab >



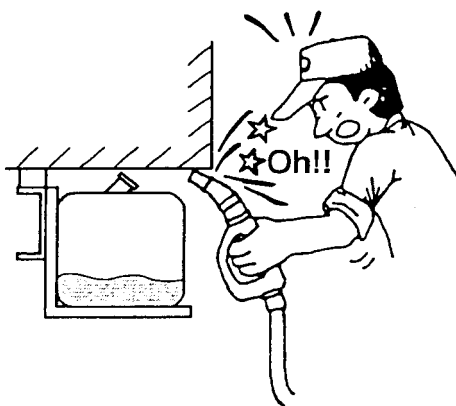
Unit: mm (in.)

Cab Type	A	B	C	D
Day	1,560 (66.42)	610 (24.02)	1,635 (64.37)	2,667 (105.00)

4. FUEL TANK

Fuel Filler for Fuel Tank

When mounting body or equipment, make sure that allow sufficient clearance with fuel filler, and enough working space for filling the fuel.



**Allow space to open the
filler cap and fill fuel.**

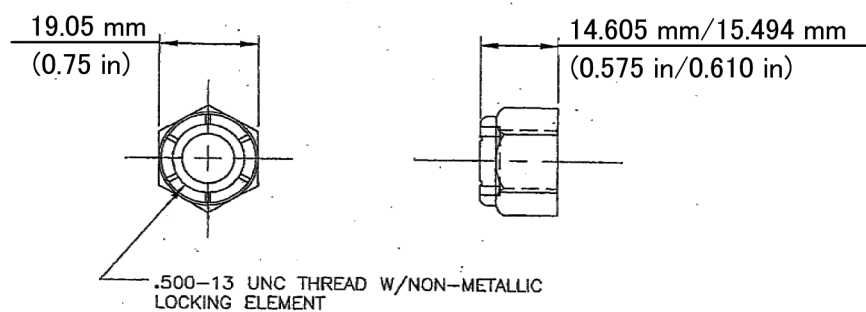
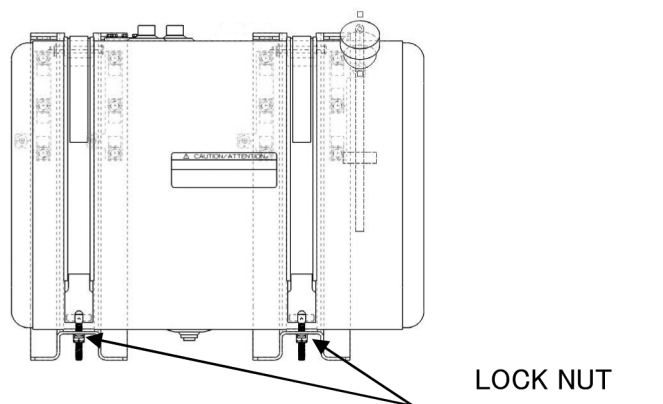
Handling of Fuel Tank Lock Nut

The lock nut has been provided with plastic locking element.
Therefore, the lock nut should be changed with new genuine one when the lock nut is loosen.

Part No. SZ177-12005

It is strictly prohibited that the loosen lock nut is re-used.
Be sure to tighten the lock nut with satisfied torque when installing new one.

Tightening torque : 265 ± 31 kgf·cm (19 ± 2.2 lb·ft)



Detail of Lock Nut

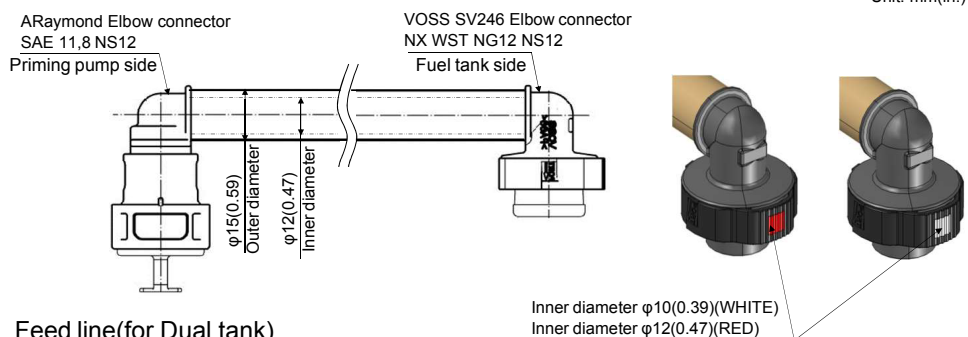
5. THE FUEL NYLON TUBE

Be sure to observe the following instructions, if it will be changed a fuel nylon tube by a movement or an addition of a fuel tank.

Always use the fuel nylon tube which is same diameter as original and the HINO genuine parts.

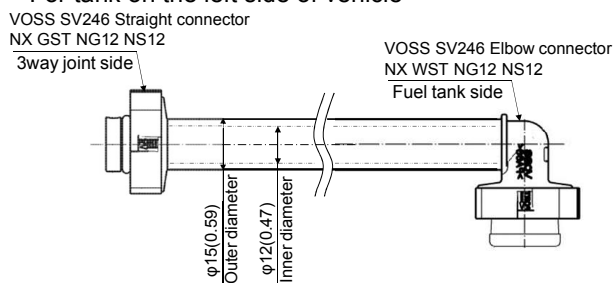
The following figure is an example of genuine parts.
(The material and quality of each component are based on the standard of HINO.)

Feed line(for Single tank)

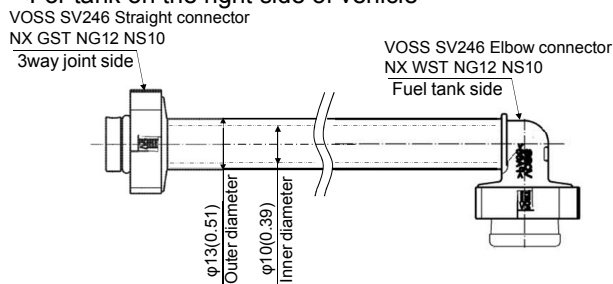


Feed line(for Dual tank)

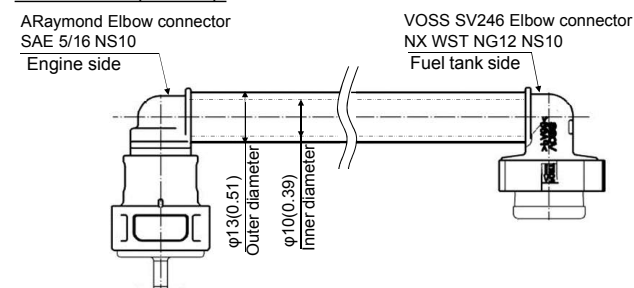
<For tank on the left side of vehicle>



<For tank on the right side of vehicle>



Return line(For all)



If HINO genuine parts cannot be obtained, please procure parts made of the following materials as a substitute.

Nylon tube : Composed of PA11 or PA12 material.

Rubber hose : Fluorine coated inner surface.

Steel pipe : Ni-Plated inner surface.

Use of unsuitable materials may cause engine damage.

The length shall be such that it meets the pressure drop requirements specified by Cummins.

For more detailed information, please contact HMC or Hino authorized dealer.

6. CAUTION LABEL OF FUEL TANK

Instruction to use ultra low sulfur diesel fuel is requirement of Part 86 of Title 40, Code of Federal Regulations (40 CFR 86).

The Caution Label is stuck near the filling port of fuel tank.

Be sure to observe the following instructions when installing body or equipment.

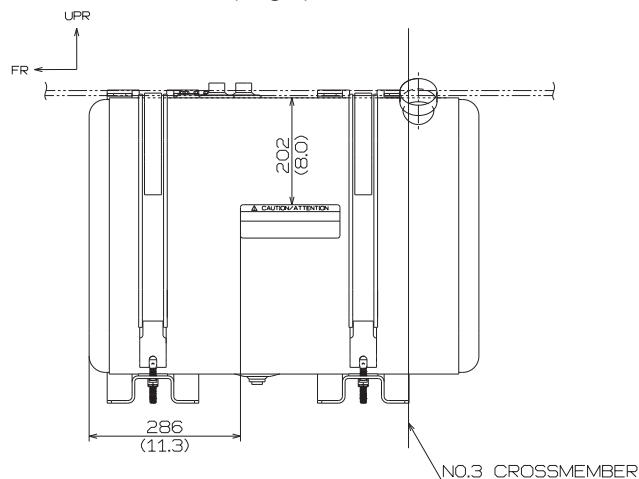
- Do not remove the caution label.
- Do not block the caution label by body or equipment.
 - The caution label must remain visible at all time.
- Mask the caution label completely when painting.
- Do not use thinner or solvent when wiping off the caution label.
- If the caution label becomes dirty or scratched, replace with a new caution label.

Please contact HMC or Hino authorized dealer if a new caution label is required.

Refer to “FUEL TANK” in Chapter 10 for installing position of Fuel Tank.

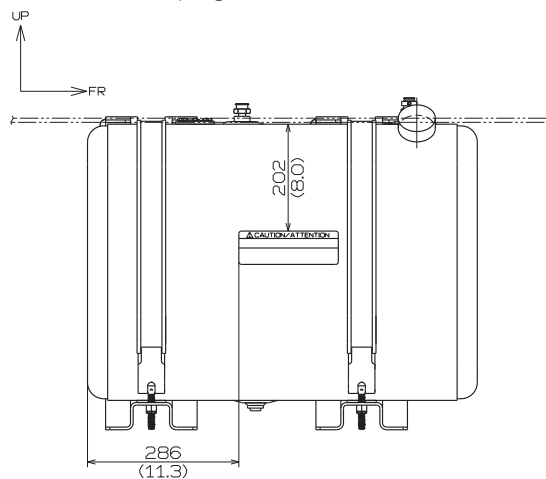
- Location of Caution Label

CAPACITY : 189L (50gal)



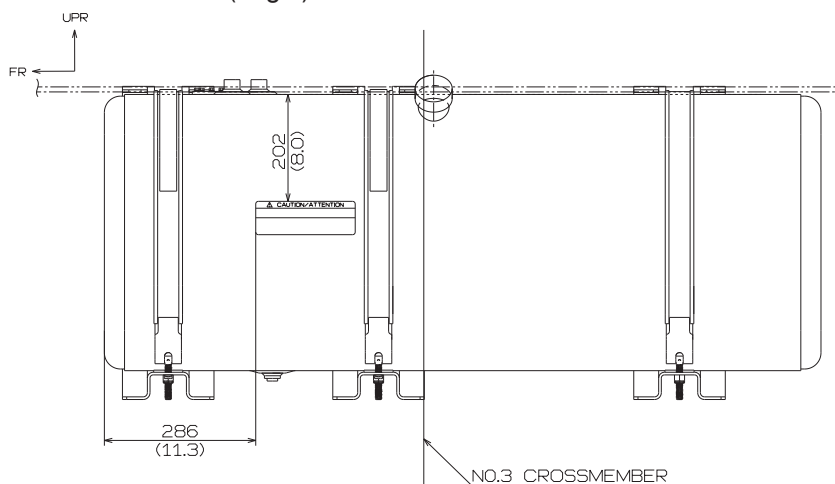
LH SIDE VIEW

CAPACITY : 189L (50gal, ADDITIONAL TANK : OPT)



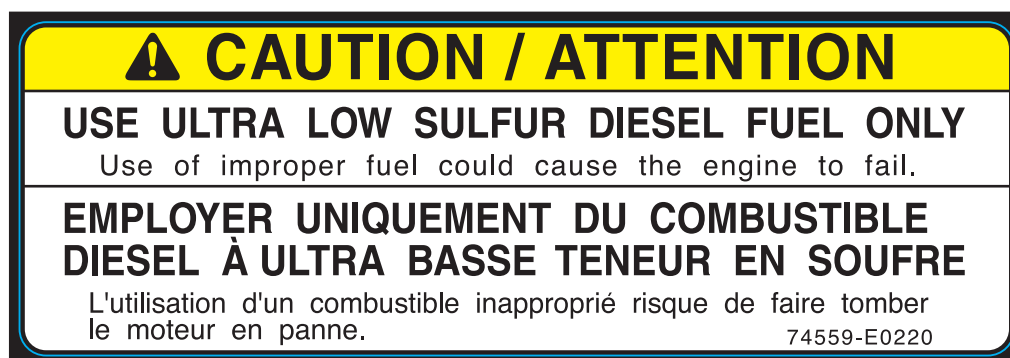
RH SIDE VIEW

CAPACITY : 340L (90gal)



LH SIDE VIEW

- Detail of Caution Label



PART No. 74559 - E0220

7. INSTALLATION OF FENDER AND MUDGUARD

Refer to “MOUNTING OF REAR FENDER AND MUDGUARD” in Chapter 6, determine the dimensions of the fender and the underside of the floor so that the fender will not contact the tires.

The use of tire chains also should be taken into consideration.

The mudguards also should be installed by referring to the above-mentioned chapter.

8. WELDING WORK

Turn the starter switch to “LOCK” position, wait at least 10 minutes, and disconnect the negative terminal of battery before start welding work.

Electric equipments such as ABS-ECU and Engine control computer and other electric parts which always need electric power are connected directly to the battery and the ground.

If the welding is performed in this condition, an electric current of welding may flow reversely into the electric parts from their ground circuit resulting in damage to the electric parts.

Since welded parts becomes extremely hot and sparks are present, dismount the fuel tank or batteries when welding near those units. Make sure that there are no items present such as harnesses, nylon tubes, pipes, resin clips for piping, suspension components such as spring brackets and spring leaves which may be damaged.

Do not arc strike on the chassis frame flanges.

Do not weld any components such as engine, transmission, axle, spring, propeller shaft, or steering. Do not weld any body parts or mounting brackets on the chassis frame for mounting of the rear body.

Avoid welding additional parts onto the chassis frame except for parts used for the purpose of reinforcement.

The ground of the arc welding machine must be connected to a low resistance parts such as the side rail.

Never connect the ground to plated parts such as fuel pipes, brake pipes or exhaust pipe.

When ground to the side rail, be sure to scrape off the paint and apply under coat paint after work.

Welding processing to avoid damaging of Hino chassis electric parts.
Be sure to observe the following precautions when operating electric welding

Welding Process

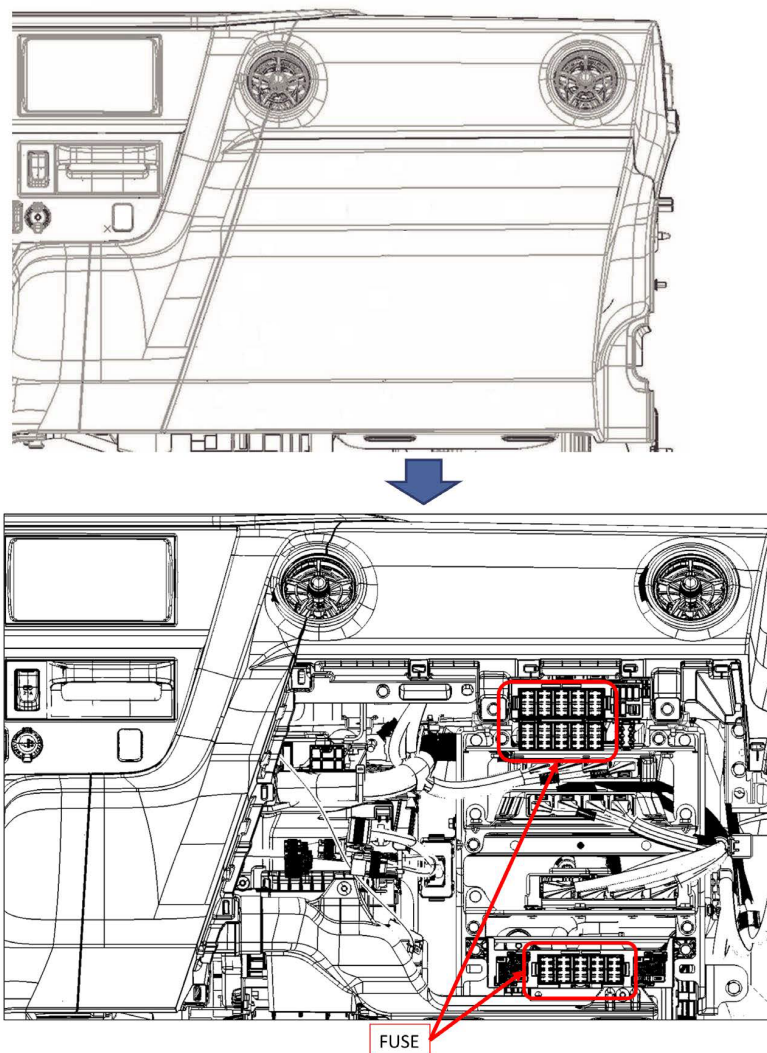
Procedure before Welding

- Turn the starter switch to “LOCK” position.
- Wait 10 minutes.
- Disconnect the negative terminal of the battery.
- Disconnect the ABS-ECU connector.
- Disconnect fuse of ECU of each electric equipment.

See the figure below for the detail of position of fuse block.

Location of fuse block

The fuse block is located inside the instrument panel as shown below.



See the “FUSE BLOCK, RELAY PANEL AND FUSIBLE LINK BLOCK” in Chapter 7 for detail of position of fuse.

Ground of the Welding Equipment

Connect the ground of the welding equipment near the location to be welded.

Welding to the chassis frame

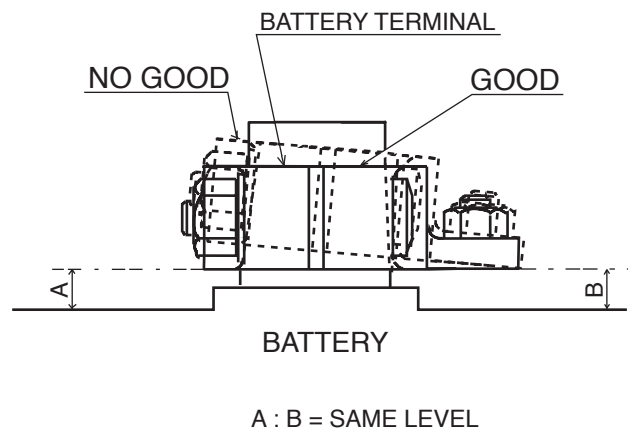
- Connect the ground to the bolt (plating bolt) or chassis frame near the place where to be welded.
- Remove component finish to be welded.
- Do not connect the ground to the chassis spring to prevent damage of spring.

Other Precautions

- To protect ancillary equipment from sparks during welding, place fire-resistant covers over the rubber hoses, wire harness, pipes, chassis spring and tires, etc.
- Weld under proper conditions.
Minimize the heat generation of the work area as much as possible to maintain the weld integrity.

After Welding

- Reinstall fuses (s).
- Be sure to connect the negative terminal of the battery, and the terminal should be horizontal.



- Replace finish carried out in previous step where welding work was carried out. Finish should be of equal or greater quality and remain the same color.

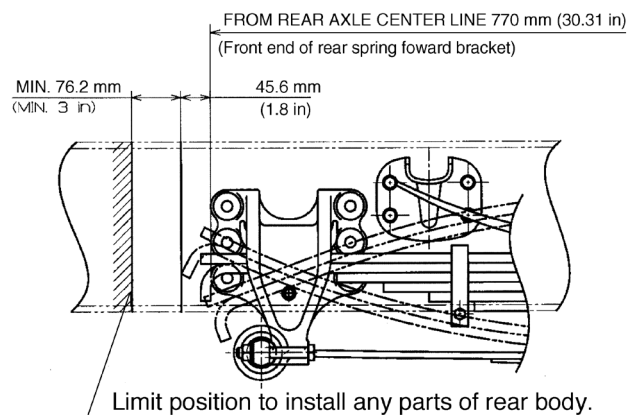
Final Inspection after Welding

- Reinstall each electronic equipment to original place.
- Inspect the operation and function of all electronic equipment.
- For the detail of inspection's procedure, please consult HMC or Hino authorized dealer.

9. MINIMUM CLEARANCE WITH REAR SPRING AND REAR SPRING HANGER

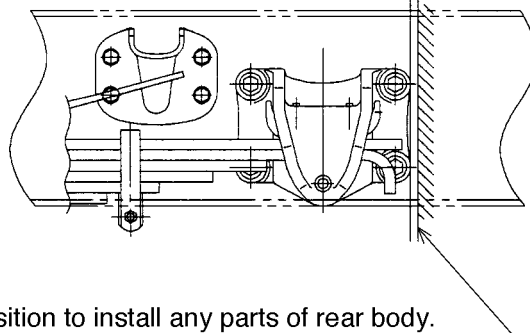
For Spring Suspension

Model : ALL



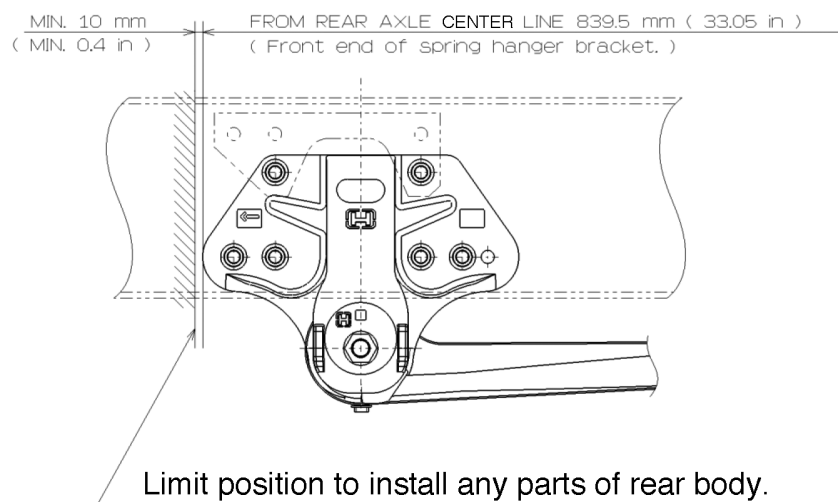
FROM REAR AXLE CENTER LINE 765.0 mm (30.12 in) (Rear end of rear spring rearward bracket.)

MIN. 10mm (MIN. 0.4 in)

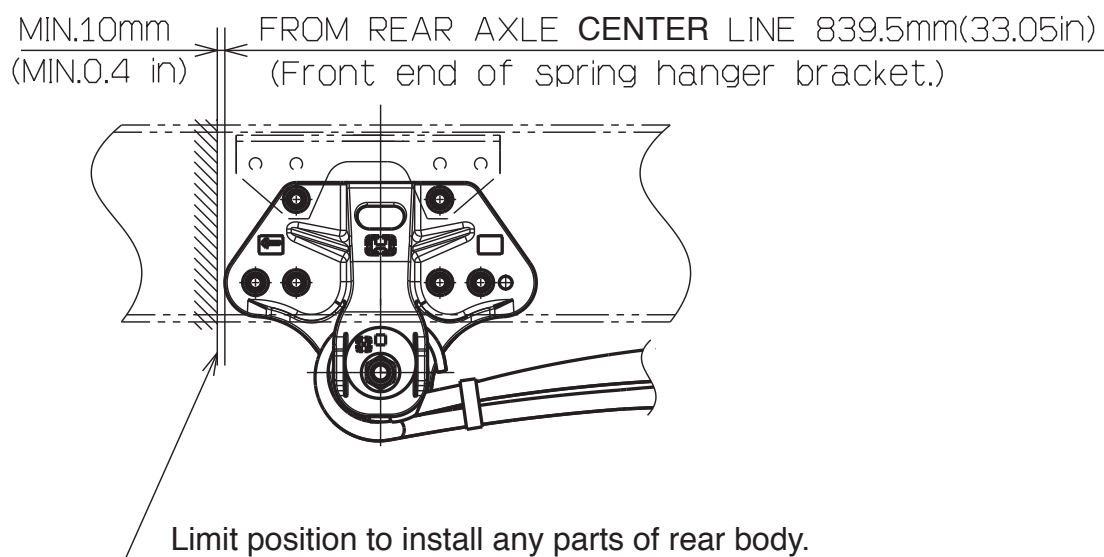


For Rear Air Suspension

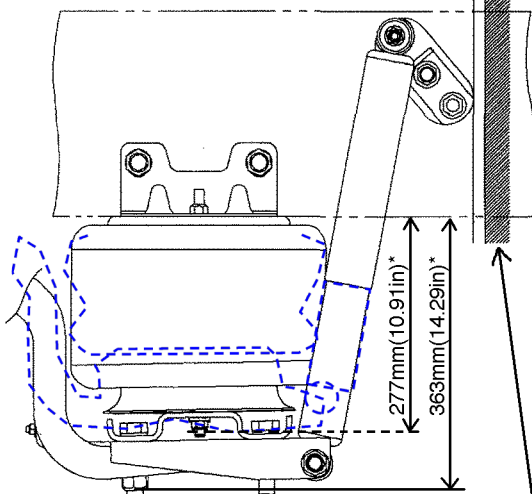
Model : ALL



- OPT : REINFORCED AIR SUSPENSION FOR MODEL NF, NV & NH



FROM REAR AXLE CENTER LINE 720.5mm (28.37in)
(Rear end of rear shock absorber bracket.) MIN. 15mm
(MIN. 0.6 in)



Limit position to install any parts of rear body.

*Design value

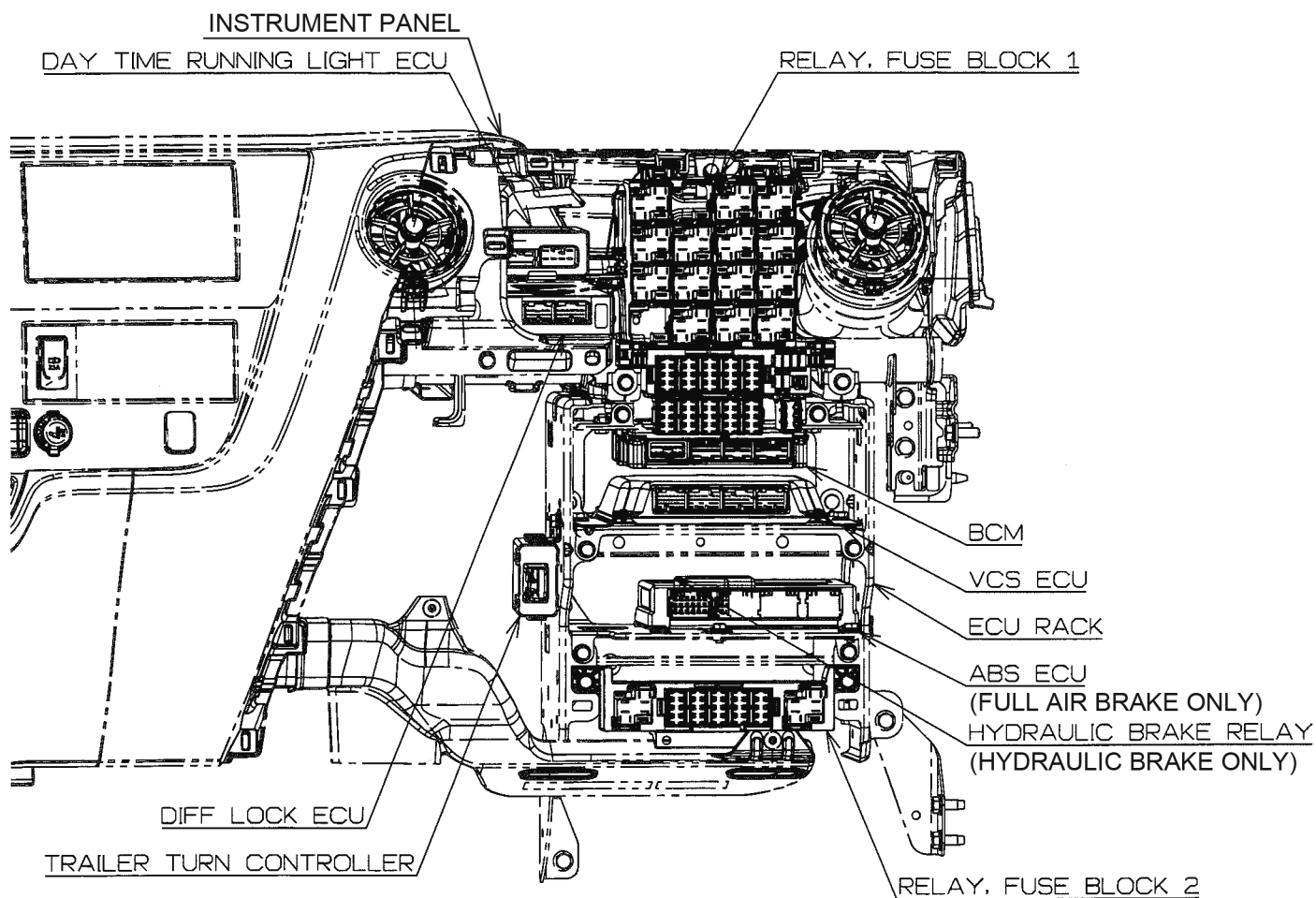
10. SYSTEM CONTROL COMPUTERS

Vehicle control, brake ABS and other control computers are installed on the right side of the instrument panel as described following figure.

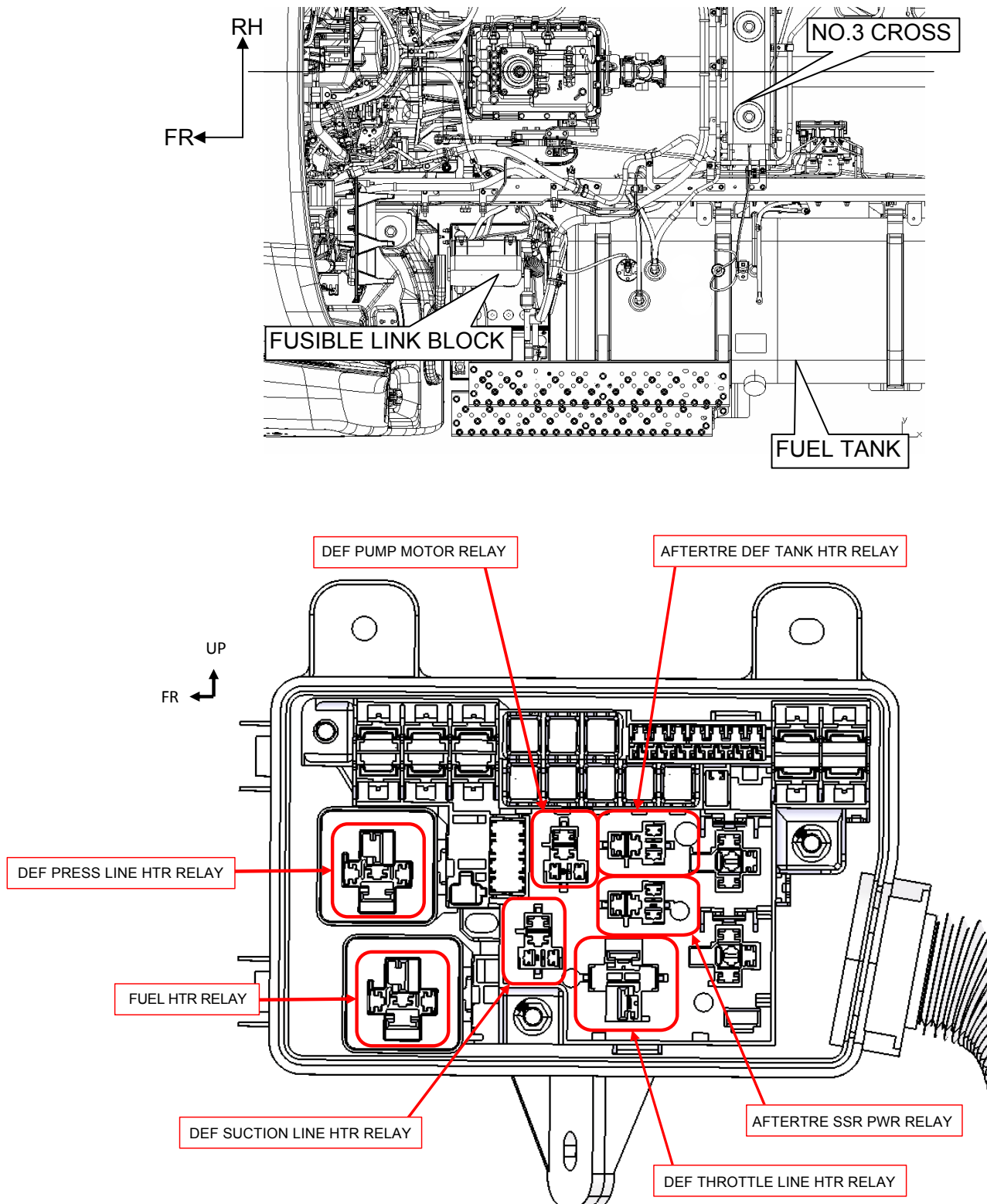
Therefore, give great care to the computer when performing any body mounting work or modification as following points.

- Be sure to cover the computer to protect from water penetration when cleaning up the inside of the cab.
- When installing CB radios or other wireless communication devices, ensure such devices use built-in or additional noise filters such as a condenser or diode. Install such devices & harnesses as far as possible from computers/ECMs.
- Do not install high output (over 50W) devices in the cab.
- Be sure to check for abnormal electromagnetic waves (EMI) after installed the device, which could affect the electronic signals passing through in computer harness.
- Do not alter the computer harness or sensor wires (ex. acceleration sensor).
- As you will see on the following figure, various kind of computers are installed inside the cab. When fitting and modifying the inside of the cab, be careful not to give any shock in the vicinity of these computers.

INSIDE THE CAB



OUTSIDE THE CAB



Engine control unit

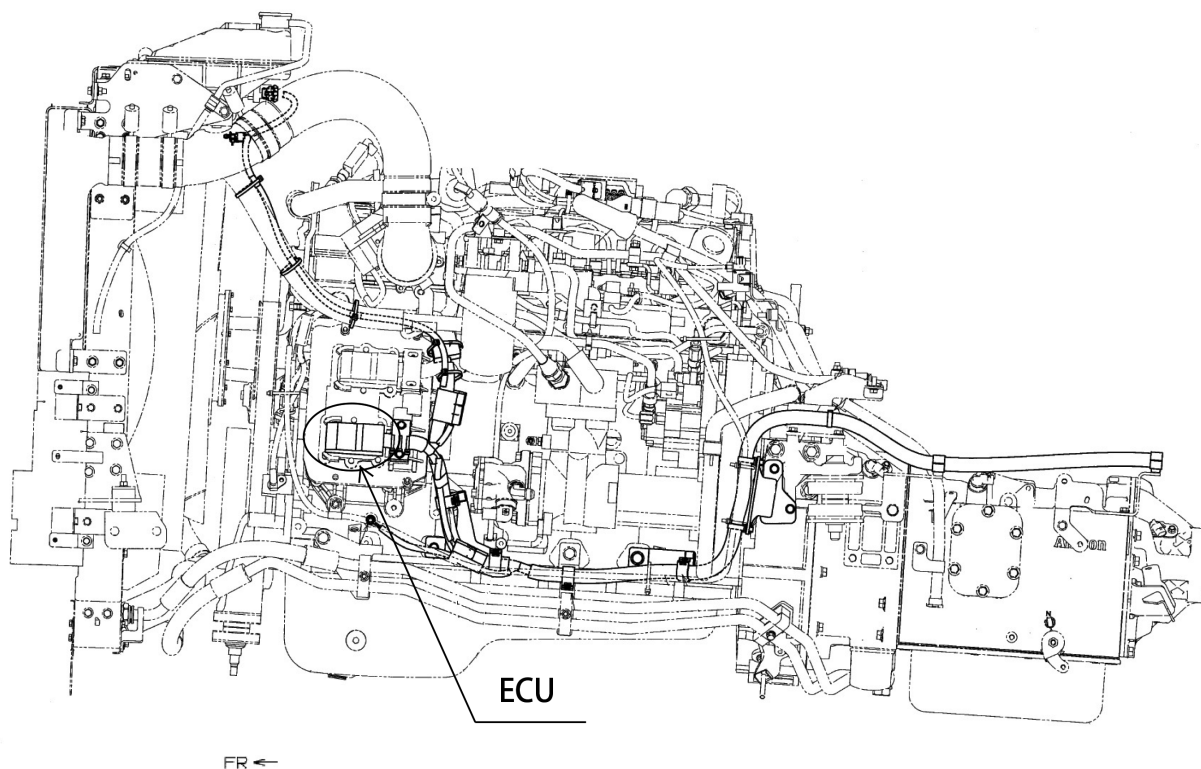
The engine control unit (hereinafter termed ECU), the connector and harness are installed in the left side of the cylinder block.

Never do the following work to the ECU, connector and harness.

- Alteration
- Remove
- Movement
- Paint

Be sure to observe the following instructions when mounting body or equipment.

- Do not give any shock to the ECU.
- Should put a cover on the ECU and connector to avoid a paint adhere to it when painting the engine.
- Do not put a cover around of the ECU to prevent deteriorating function by heat.
- Should put a cover on the ECU and connector to protect from water when washing the engine with water.



11. PRECAUTION FOR ABS AND VSC

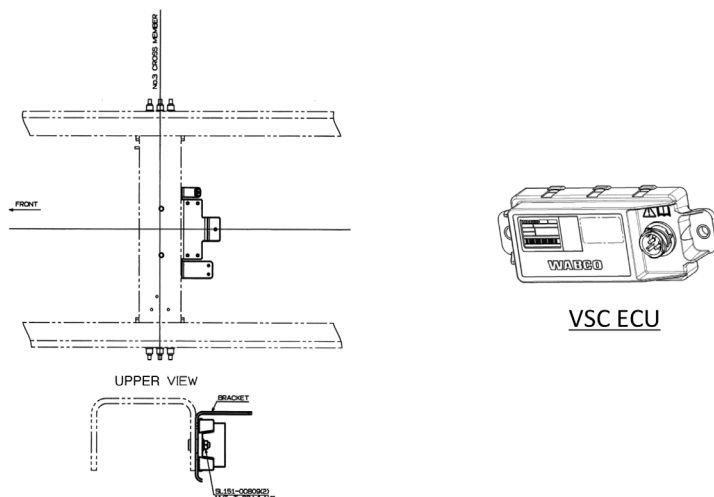
Be sure to observe the following precautions for proper operation of each equipment when mounting body if ABS or VSC※(Vehicle Stability Control) is equipped.

1) Strictly prohibited item

(1) Alteration, modification and taking off the electric power

Do not move, alter and modify ABS and VSC-ECU full air brake system, brake piping and ABS and VSC harness.

Do not use ABS and VSC harness as power supply for audio device and auxiliary light.



(2) Change of tire size

Do not change the tire size, because the information of tire size has been installed in ABS and VSC-ECU.

The meter indicates different speed from actual speed if changed a tire which size is not specified standard specification.

(3) Shock/impact

VSC-ECU full air brake system is installed No.3 cross member.

Do not give any shock to VSC-ECU such as step on by foot, because it is a delicate device.

When washing vehicle, avoid watering directly with high pressure to VSC-ECU.

(4) Change of installing position and direction

Do not alter and change of installing direction of the yaw rate sensor which is provided in the instrument panel to avoid malfunction of VSC.

(5) Change of wheelbase length

Do not alter the wheelbase length to avoid malfunction of ABS and VSC.

Because the information of wheelbase length has been install ABS and VSC-ECU.

※ “VSC” is used for function explanation only.

2) Precaution

(1) For electric welding

Be sure to follow the all instructions about electric welding work in chapter 4.

(2) About noise

If install the following parts near ABS and VSC-ECU full air brake system, allow sufficient clearance more than 100mm(3.94in.) from it.

Radio transmitting and receiving apparatus such as two-way radio and related antenna or harness, motor, relay or other machinery which causes noise.

(3) For wiring

Do not wire antenna wiring of two-way radio along with vehicle harness which goes through inside of the frame, as it may affect the wiring of ABS and VSC-ECU which is in the vehicle harness.

(4) For valves

Do not block the exhaust ports of each ABS valves by the body.

Do not block the exhaust ports of each ABS valves by foreign matter such as gravel, dust, ice, and snow.

ABS, ASR, and VSC function are not work properly if exhaust ports of each ABS valves are blocked.

Keep the manufacture shipping condition about clearance between ABS valves and the lower surface of the frame.

When installing a body that generates heat, please make sure that the surface temperature of each ABS valves are 70 °C(158°F) or less.

(5) For replacement of parts

When performing the following items the vehicle with VSC, should conduct default adjustment to G-sensor or yaw rate sensor.

For the detail of default adjustment , please consult HMC.

- Replacement of ABS and VSC unit
- Removing and reinstalling of yaw rate sensor

(6) After completion of body mounting

- Check carefully if there is any damage to the piping or harness after mounting body.
- ABS/VSC needs the inspection after mounting body.
- If the harness for the rear combination lamp circuit is disconnected, it will cause an ABS diag-code fault & for the ABS warning lamp to stay illuminated.
- Check the rear combination lamp harness and erase the fault code from the ABS computer.
Turn the ignition switch to the "ON" position to confirm the ABS warning lamp is OFF.
Consult HMC for detailed information to erase the ABS diag-code.

Please consult HMC for detailed information of inspection.

(7) Others to check

If two-way radio or other electric device for use while moving is set, conduct ABS and VSC inspection with such device working.

If electric device for use while parking is set, put it in action while starter switch on or engine is running and check if there is malfunction of ABS and VSC or warning light is on.

12. PRECAUTION FOR LDW AND CMS

If vehicle is equipped with LDW (Lane Departure Warning) & CMS (Collision Mitigation System), be sure to observe the following precautions for proper operation when mounting a body.

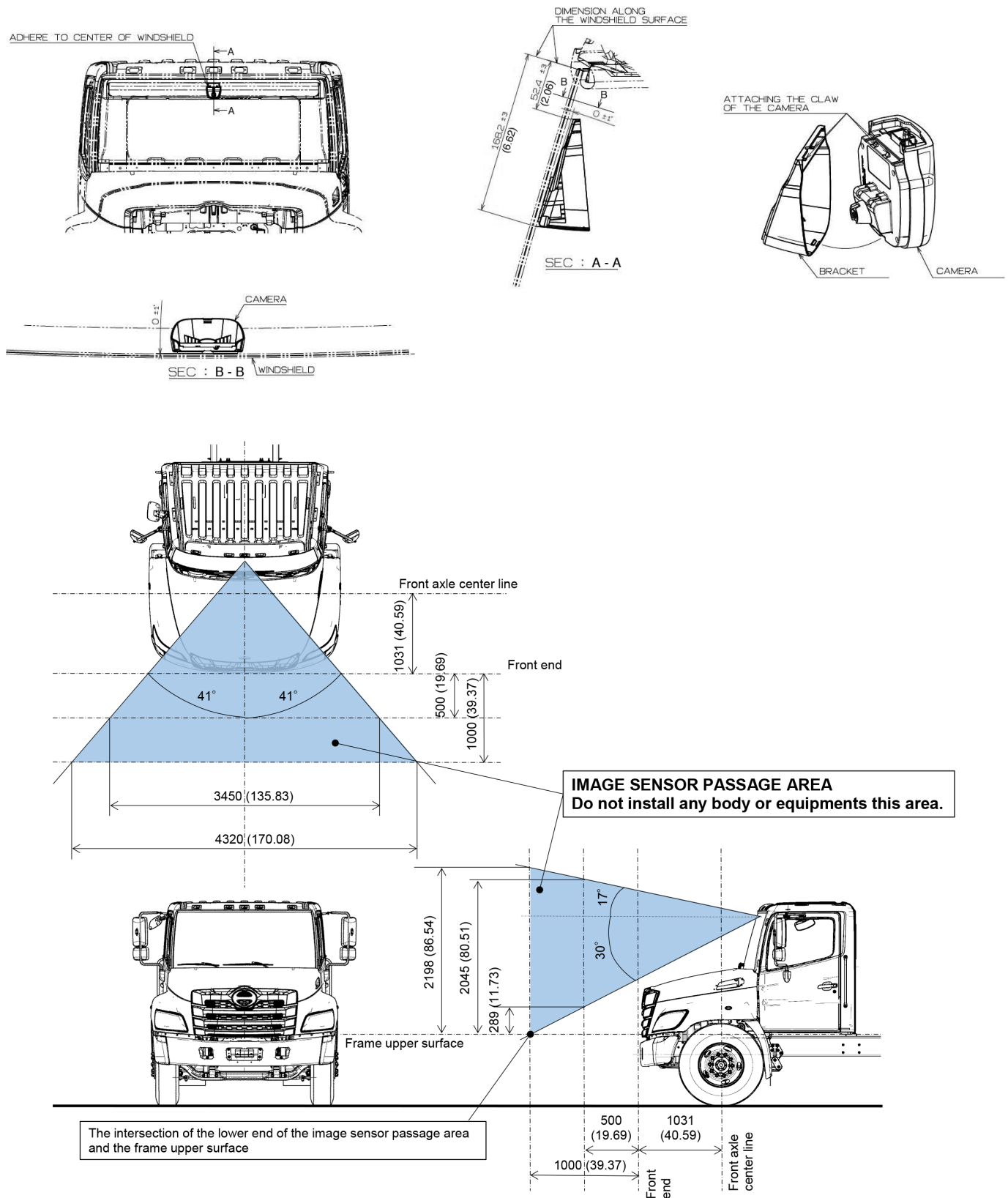
The lane recognition sensor (camera) for LDW is installed on the upper parts of the windshield and the radar sensor (millimeter wave radar) for CMS is installed on the No.1 crossmember.

See the following figures for installed positions of LDW and CMS sensors.

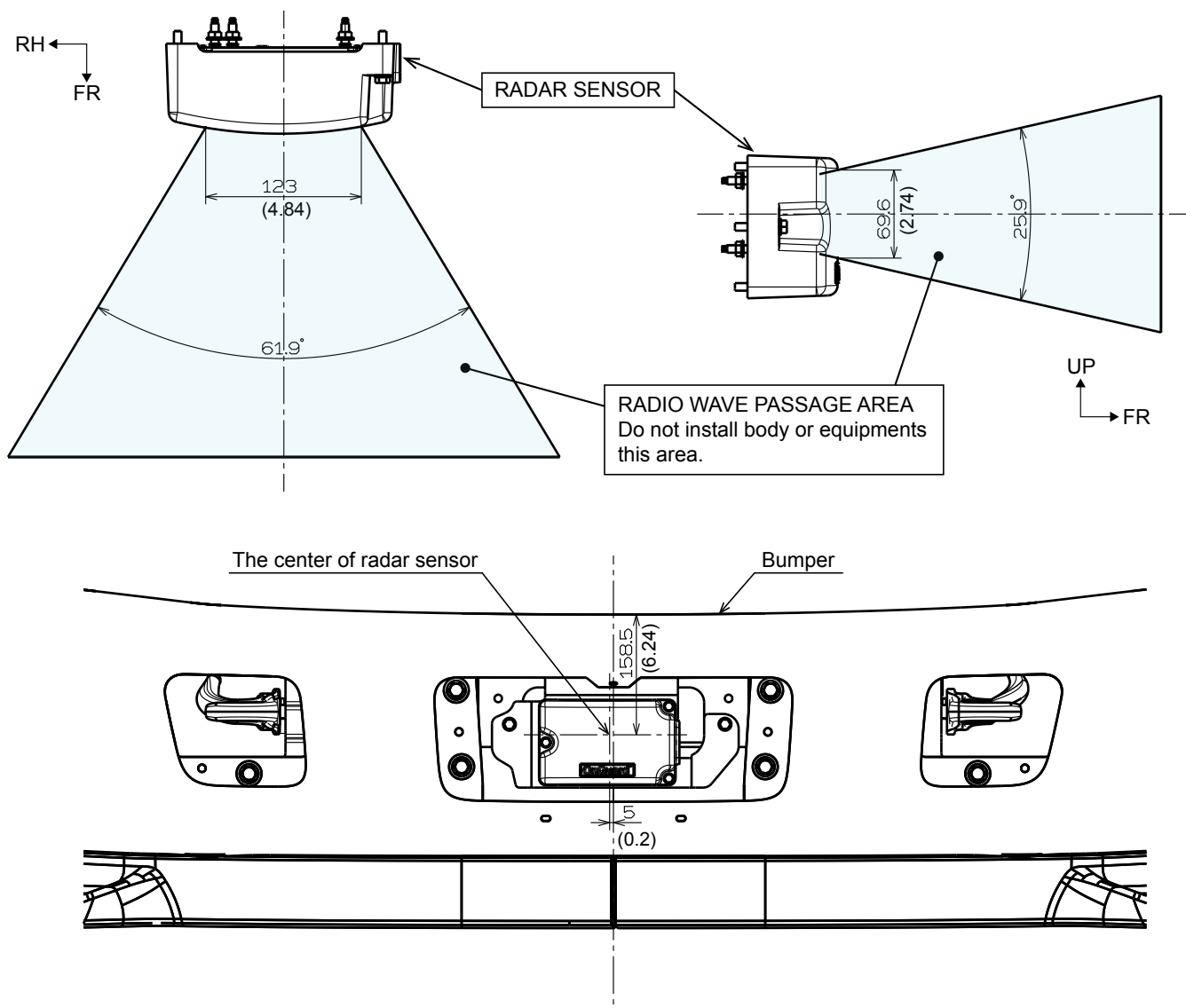
- 1) Do not install equipments such that said equipment creates an obstruction in front of the lane recognition sensor lens and the radar sensor. Also, avoid the radio wave passage area when installing equipments around these sensors. If there are any obstacles in front of these sensors, the radio wave will be blocked and the system will not operate properly. The radio wave passage area is indicated by hatching in the figures.
- 2) Do not move, alter and modify the lane recognition sensor and the radar sensor.
- 3) Do not remove the cover of lane recognition sensor. If the lane recognition sensor bracket is damaged, the windshield may require replacement as removing the lane recognition sensor bracket could damage.
- 4) Be sure to connect the connector of the sensors if disconnected when mounting body. See the figure for connector's position of the lane recognition sensor.
- 5) Do not paint the radar sensor and bumper cover when painting the cab and the front bumper.
- 6) Do not bump/strike/hit the radar sensor when removing and installing the front bumper.
- 7) Do not interfere with the radar sensor when installed the front bumper.
- 8) Do not alter the wheelbase length to avoid malfunction of LDW and CMS.
- 9) Calibration of the lane recognition sensor and the radar sensor are needed after mounting body because the vehicle posture is changed by mounted body. Please consult HMC for instructions on how to calibrate the lane recognition sensor and the radar sensor.
- 10) When installing a sunvisor that is mounted on the outside of the vehicle, use the sunvisor specified by Hino.

Unit : mm (in.)

The Lane Recognition Sensor



Unit : mm (in.)

The Radar Sensor

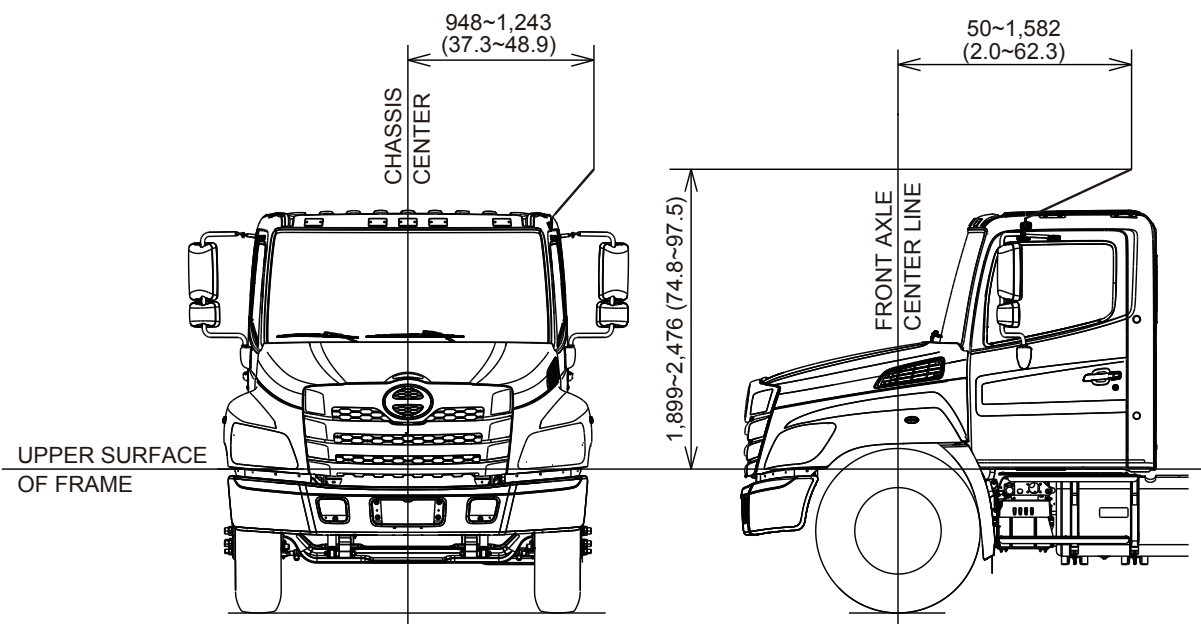
13. THE ANTENNA POSITION

The antenna which is installed on left corner top of the cab roof use right angle position in normal operation.

Make sure that do not obstruct the moving range of the antenna in described following figure when mounting rear body or equipment.

It may be cause of the noise or poor receiving of the radio if occur an interference with the antenna and rear body or equipment parts.

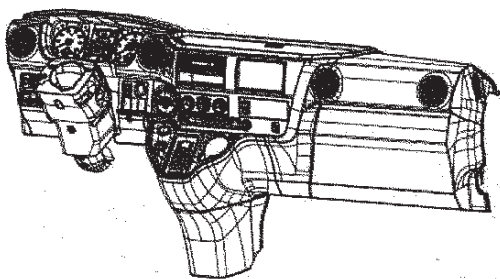
Unit : mm (in.)



14. REMOVING THE INSTRUMENT PANEL

When removing the instrument panel for installation of electric parts such as relay fuse and etc. which are related with a mounted body, refer to the instructions mentioned below.

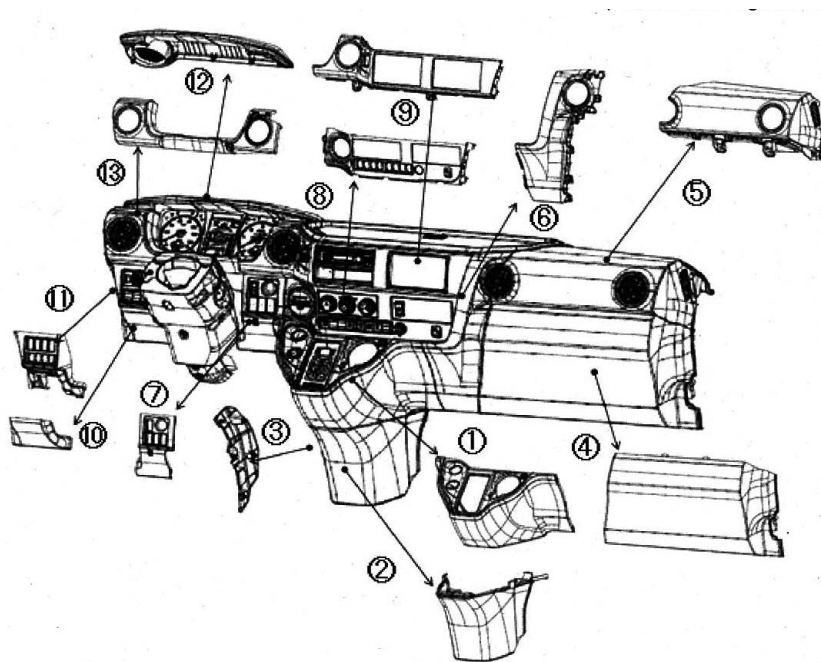
< Automatic Specification >



"Instrument panel component parts are modularized.
Please remove each part in the following order."

<Removing Sequence for Automatic Specification>

(1) ①→②→③→④→⑤→⑥→⑦→⑧→⑨→⑩→⑪→⑫→⑬



<Figure 1>

<Points to Note>

- “When removing ⑦ , ⑧ , ⑨ (Automatic Specification), please be careful disconnecting wire connection .”
- After removing ⑧ , please be careful when removing audio and its wire connection.
- When removing ⑫ , please be careful disconnecting speaker and its wire connection.
- When removing the parts, do not twist nor bend the parts as that might cause clip damage.

15. ADDITIONAL WIRING IN THE ENGINE COMPARTMENT

Since the engines in HINO chassis are covered with sound arrest plates, the engine compartment tends to heat up.

Avoid wiring in the engine compartment in the hood if possible.

Additional wiring harness or cable(s) should be kept away from heated elements, and should be routed along the original chassis harness.

16. RESETTING OF VEHICLE SPEED SENSING PULSE CONVERTER

In addition to the engine control etc., Hino chassis are equipped with such device as ABS that are obligatorily required by the CMVSS.

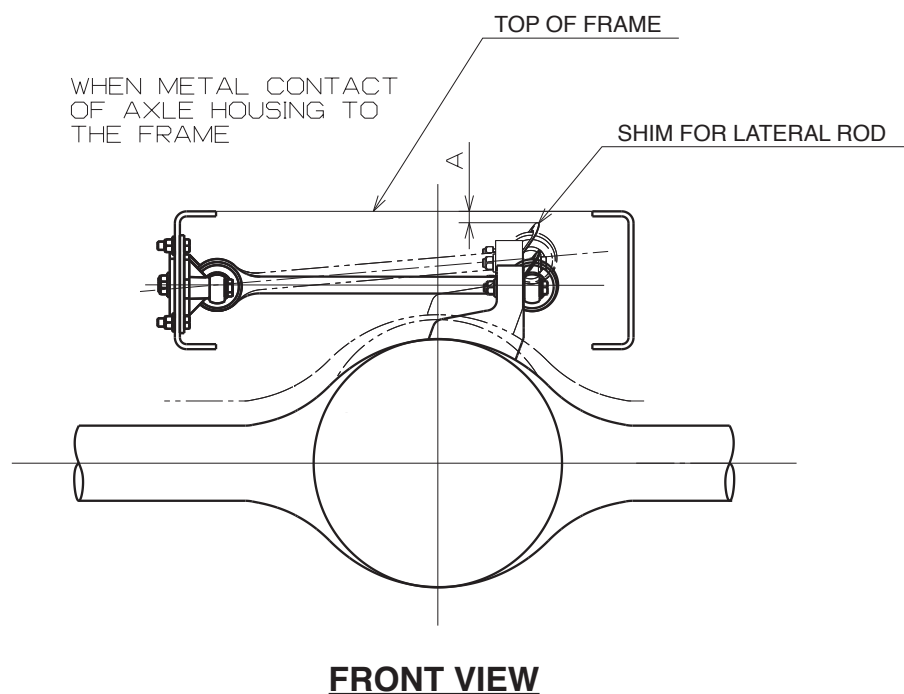
Never attempt to apply such modification as would be altered the vehicle speed conditions, as changing of rear axle ratios or tire sizes.

In the event that, you are obliged to apply those modification, please consult with HMC or Hino authorized dealer for any appropriate advice and, at the same time, don't forget to reset the PULSE CONVERTER for vehicle speed sensing.

17. MAXIMUM VERTICAL TRAVEL RANGE OF LATERAL ROD (REAR AIR SUSPENSION MODEL)

Measurement for maximum vertical travel range of the rear lateral rod is shown below.
When mounting body or equipment, allow a clearance at least 30mm (1.2in.) between shim for lateral rod and body or equipment.

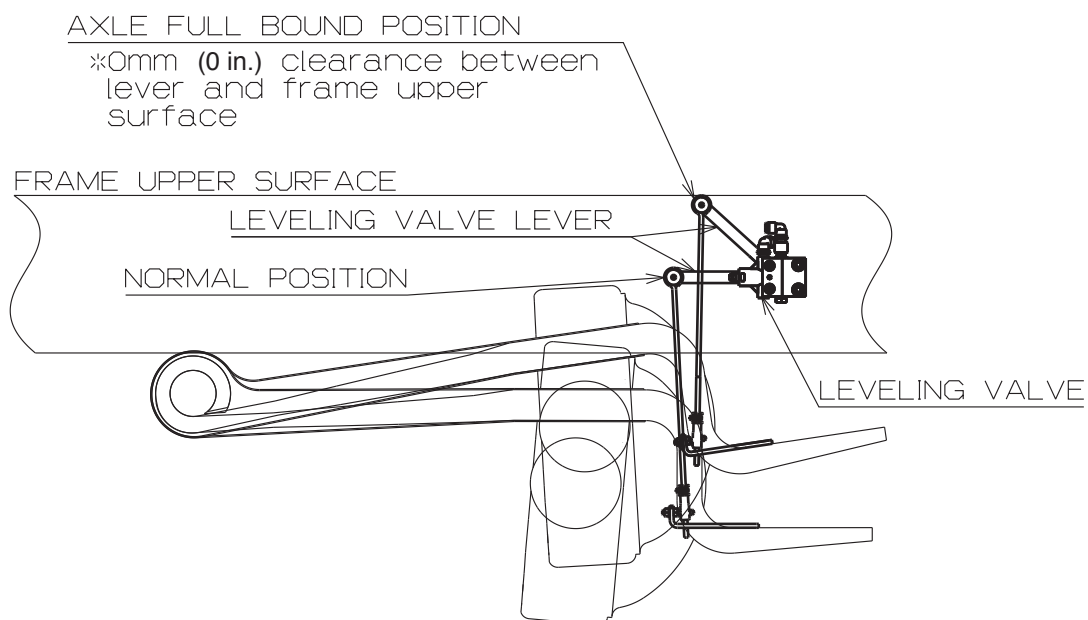
VERTICAL TRAVEL RANGE OF REAR LATERAL ROD



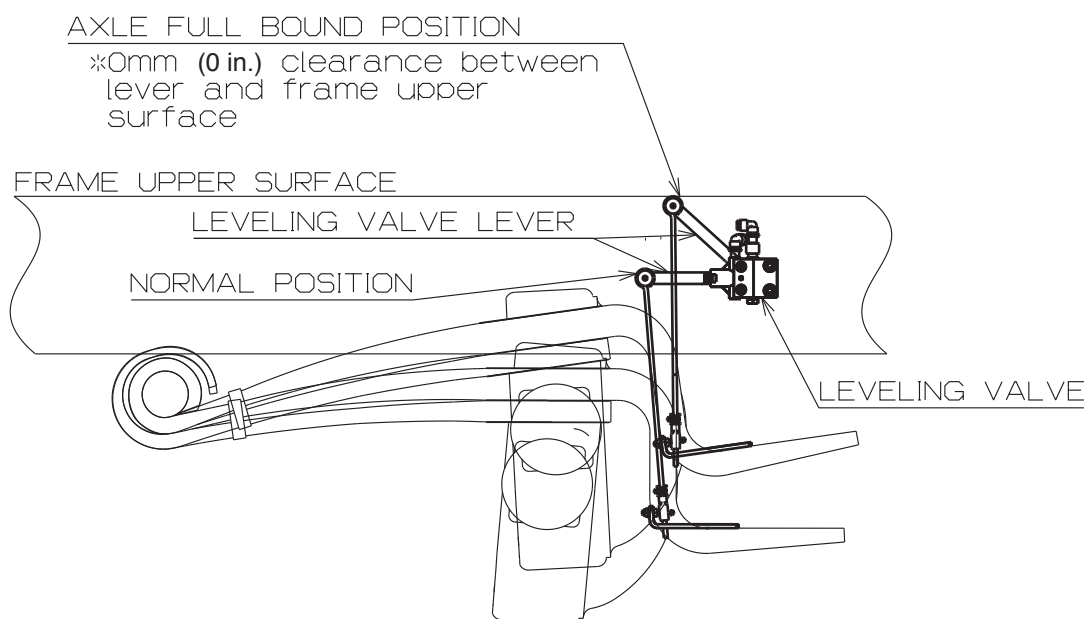
Model	Susp. Rating	A mm(in.)
NE / NJ	19000 lbs	9.8 (0.39)
NF , NV	21000 lbs	14 (0.55)
NV / NH	23000 lbs	9.6 (0.38)
NV / NH	23000 lbs (Reinforced air susp.)	27.9 (1.1)

18. LEVELING VALVE (REAR AIR SUSPENSION MODEL)

The leveling valve is installed with rear air suspension model to keep vehicle height. When mounting body or equipment, allow a clearance at least 30mm (1.2in.) between lever and body or equipment.



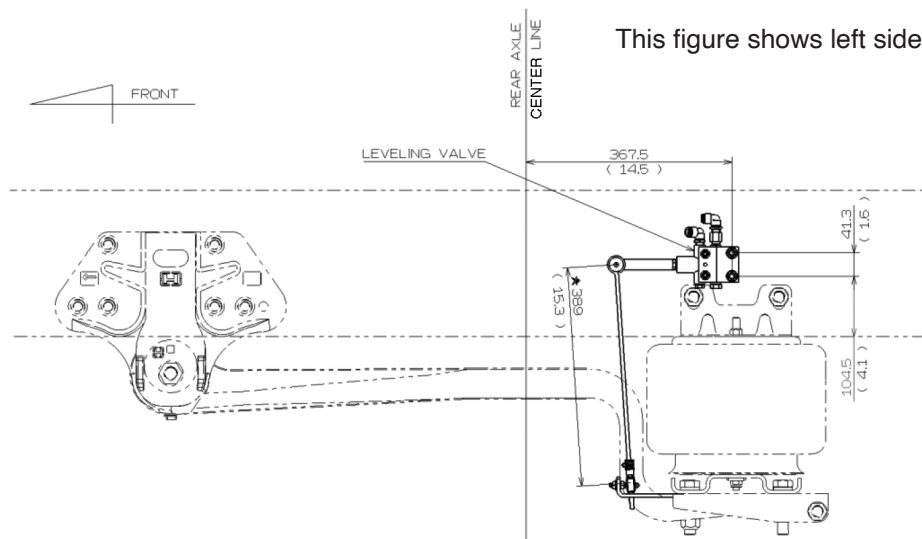
- OPT : REINFORCED AIR SUSPENSION FOR MODEL NF, NV & NH



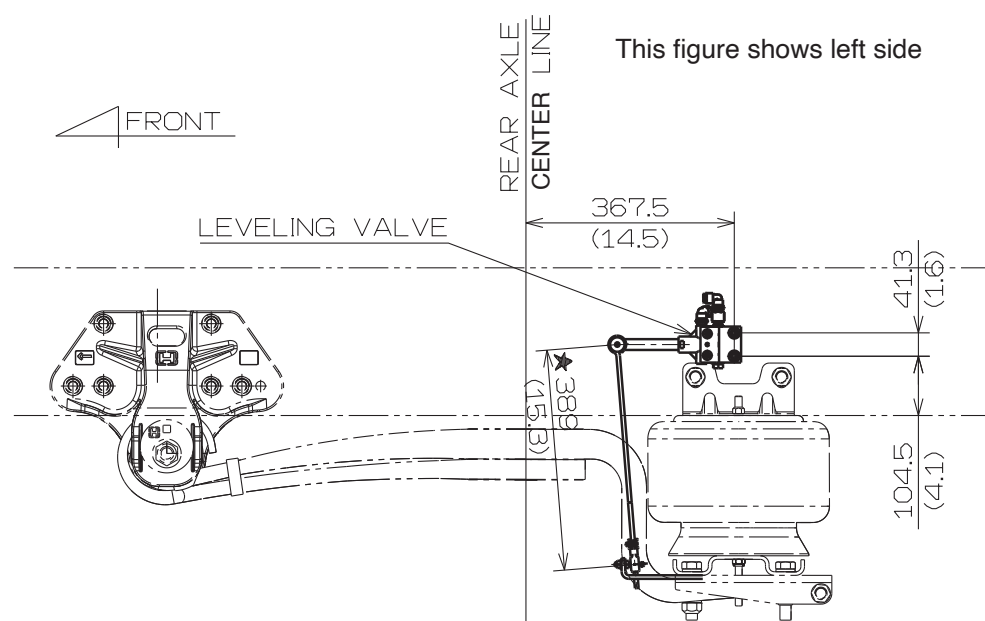
- The adjustment of Leveling Valve has already been made under the chassis condition before deliver the chassis to body or equipment manufacturer.
Therefore, do not re-adjust and disassembly the Leveling Valve at the time or after rear body mounted.
Should more detailed data or information regarding adjustment of Leveling Valve be needed, please contact HMC or Hino authorized dealer.
- Do not change the length of link rod.
(Marked ★ as following figure)

Unit : mm (in.)

• STD : SINGLE LEVELING VALVE

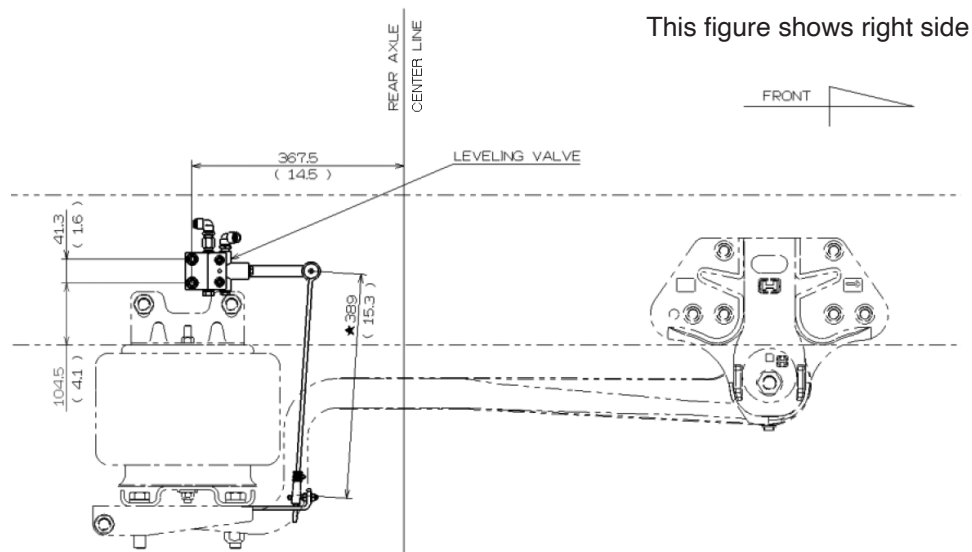


• OPT : REINFORCED AIR SUSPENSION
& SINGLE LEVELING VALVE FOR MODEL NF, NV & NH

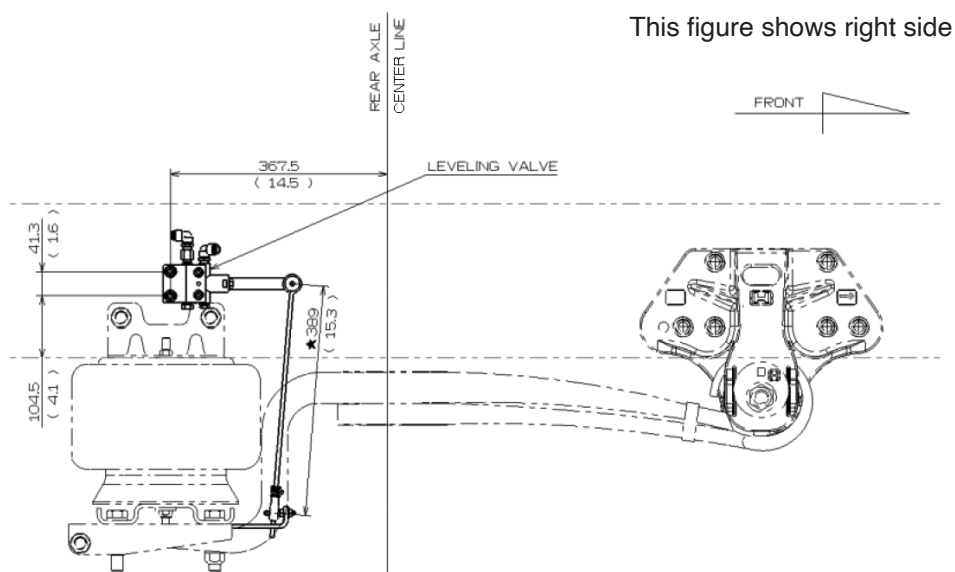


Unit : mm (in.)

- OPT : DUAL LEVELING VALVE



- OPT : REINFORCED AIR SUSPENSION
& DUAL LEVELING VALVE FOR MODEL NF, NV & NH



19. EXHAUST SYSTEM

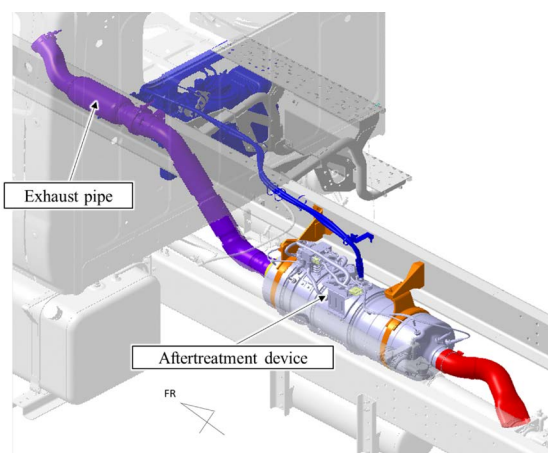
The effect and interference of the heat from the exhaust system have a significant influence to safety. Maintain adequate clearances between component of the exhaust system and a body or equipment, measure the temperature of the component as necessary to check for safe operation.

Clearances between Exhaust System Parts and Other Parts

The exhaust system become very hot during operation, therefore, be sure to observe the following instructions to prevent a unexpected problem.

- Clearances from a body or equipment
Observe the precautions for mounting a body or equipment described here and when stated later.
- Clearances from fuel system parts
Maintain a clearance at least 200mm (8.0 in.) between the fuel tank, fuel pipes and hot components of the exhaust system. If you cannot maintain the clearance 200mm (8.0 in.), fit heat shields or insulators to protect the fuel tank and fuel pipes. But, heat shields or insulators must not added to Aftertreatment device. When arranging fuel piping, make sure that even if a fuel line ruptures and fuel leaks out, no fuel will come into contact with the hot components of the exhaust system.
Never install connectors of the fuel pipes at the hot components or above of the exhaust system.
- Clearances from chassis parts other than fuel system parts
If you cannot maintain the clearances described below, fit with heat insulators or heat shields. But, heat shields or insulators must not added to Aftertreatment device.

CLEARANCE mm (in.)	CHASSIS PARTS
Min. 100 (4.0)	Air pipes, oil pipes
Min. 200 (8.0)	Electrical cables, rubber parts (rubber hoses, etc.), nylon tubes, resin parts, cables
Min. 25 (1.0)	Metal parts



Precautions for Mounting a Body or Equipment

- When mounting a body or equipment, maintain the following clearances from the exhaust system.

For wood, rubber, and cloth maintain a clearance at least 100mm (4.0 in.).

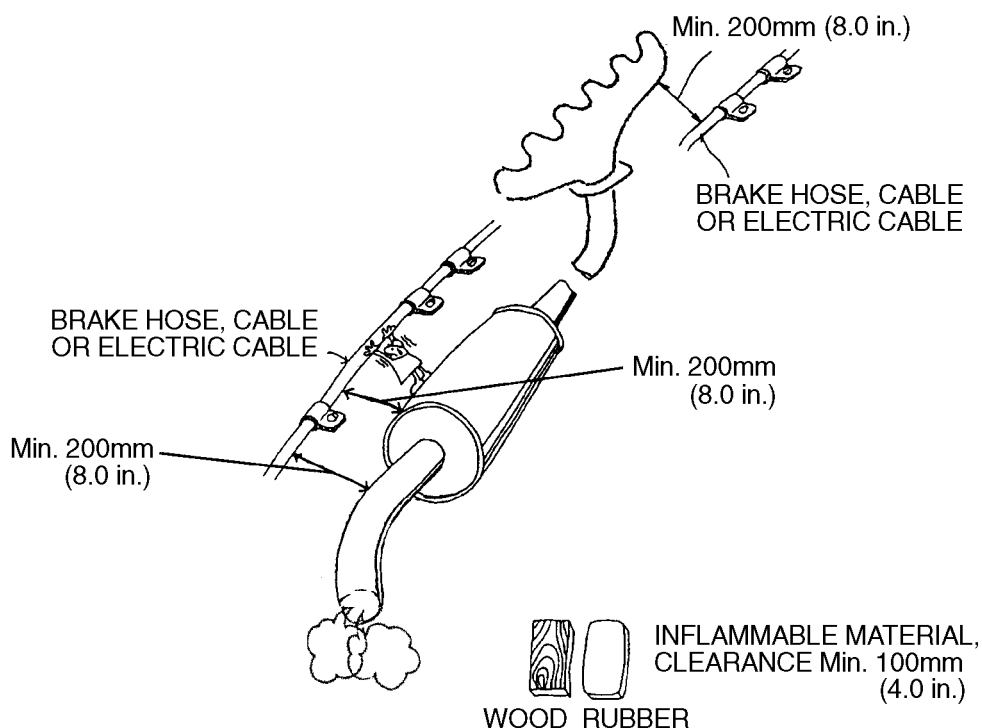
For cables, brake hoses, nylon tubes, electrical harness, and resin parts maintain a clearance at least 200mm (8.0 in.).

But, heat shields or insulators must not added to Aftertreatment device.

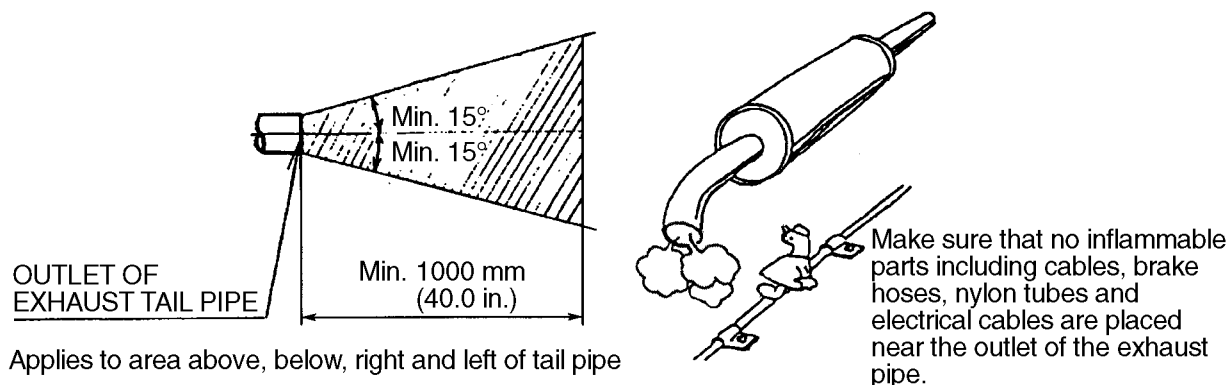
If it is impossible to maintain the above clearances, fit heat insulators or heat shields between the relevant parts, or measure the temperature of the exhaust system to ensure safe operation.

For metal parts maintain a clearance at least 25mm (1.0 in.).

When the heat insulators are removed during installation, be sure to reinstall the heat insulators or heat shields to their original position. Never paint the heat insulators or heat shields.

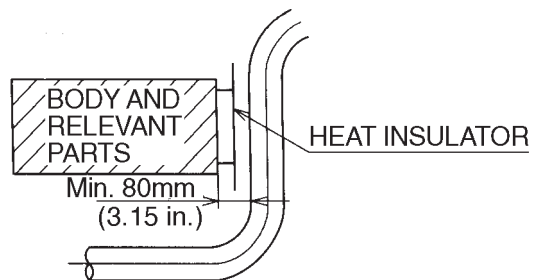


- When mounting equipment (tool box, etc.) or flammable objects behind the outlet of the tail pipe, avoid the shaded area shown below.



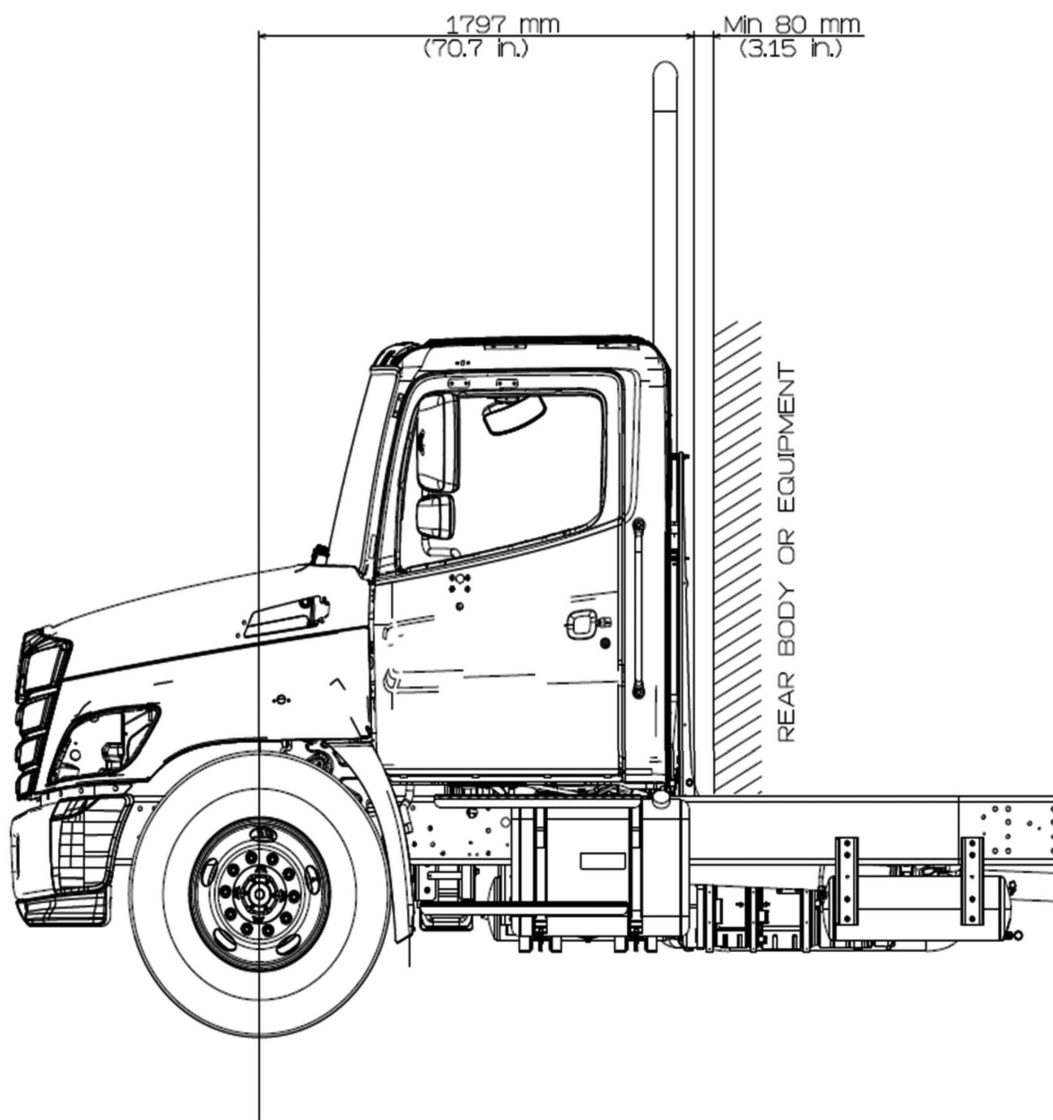
When mounting a body or equipment above and ahead of the outlet of exhaust system

When mounting a body and relevant parts near the pipe, maintain a clearance at least 80mm (3.15 in.) from the pipe as shown in figure below. If it is impossible to maintain the clearance at least 80mm (3.15 in.), fit a heat insulator or heat shield between the relevant parts.



Minimum Clearance with Vertical Exhaust Tail Pipe

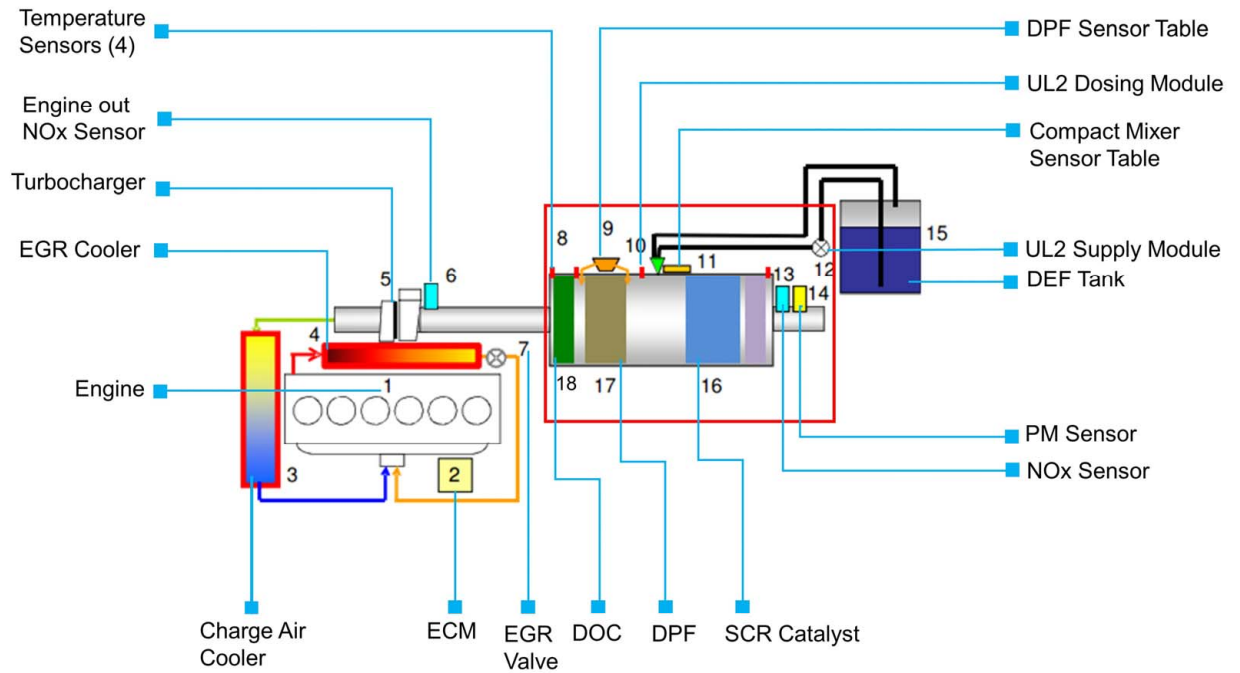
When mounting the rear body or equipment, allow clearance at least 80mm (3.15 in.) with vertical exhaust tail pipe.



20. DPF

DPF

(DPF = Diesel Particulate Filter)



Precautions

The DPF incorporate a catalyst that may be broken by mishandling or dropping.

Take extra care when handling the DPF during mounting of a body or equipment.

An exhaust gas differential pressure sensor and an exhaust temperature sensor are installed on muffler and a harness is attached to the sensor. When mounting the body, take extra care with these system. Do not remove sensors of muffler.

If these parts are damaged, purification of particulate matter may not be performed sufficiently.

Filter may be removed and remounted for maintenance.

Place the parts of the body so that it is easy to remove and mount the filter.

Painting

Never paint the filter (DPF) and pressure sensor.

21. DEF - SCR SYSTEM

Be sure to observe the following instructions when mounting body or equipment.

The DEF (Diesel Exhaust Fluid) - SCR (Selective Catalytic Reduction) system is installed for reducing NOx (nitrogen oxide) emission.

Do not remove sensors of DEF-SCR system.

28L (7.4gal) DEF-tank is installed under the passenger side chassis step.

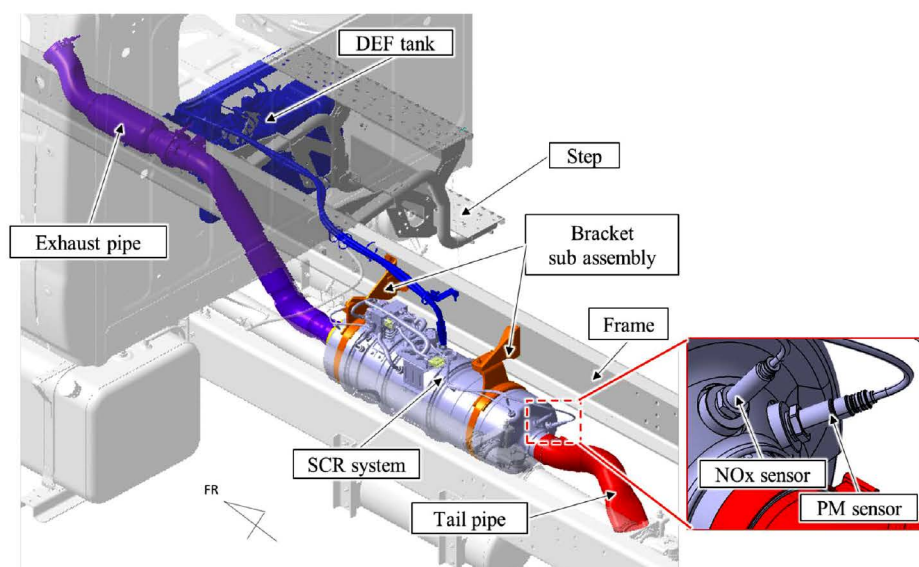
59L (15.6gal) DEF-tank is installed behind the fuel tank on the driver's side.

SCR system is installed inside the passenger side chassis frame.

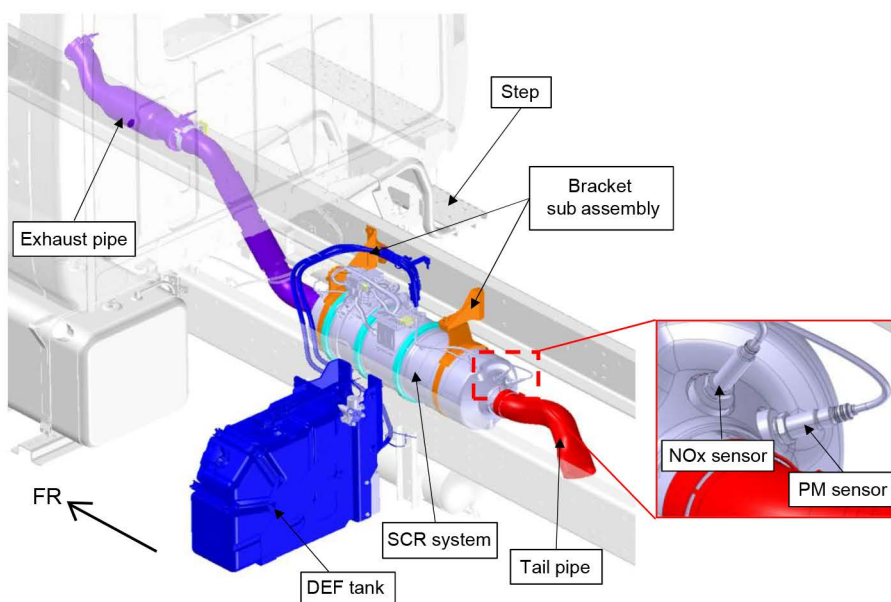
See the picture below.

Detail of DEF - SCR system

< Case of 28L (7.4gal) DEF tank >



< Case of 59L (15.6gal) DEF tank >



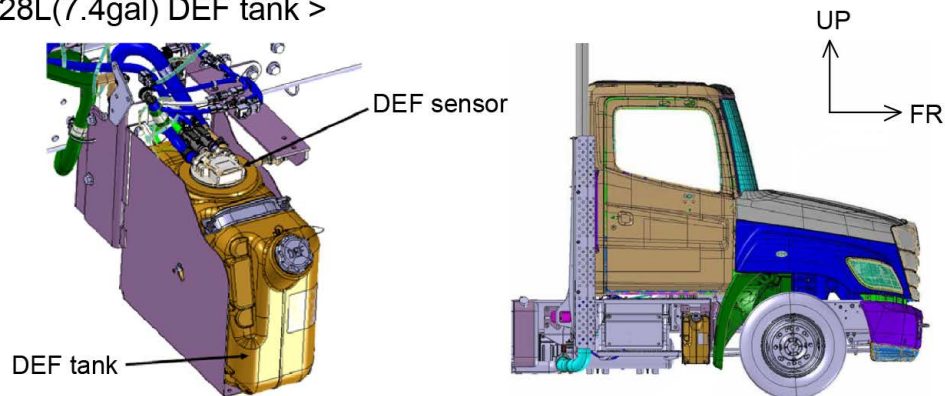
Precautions when body mounting and welding

WARNING

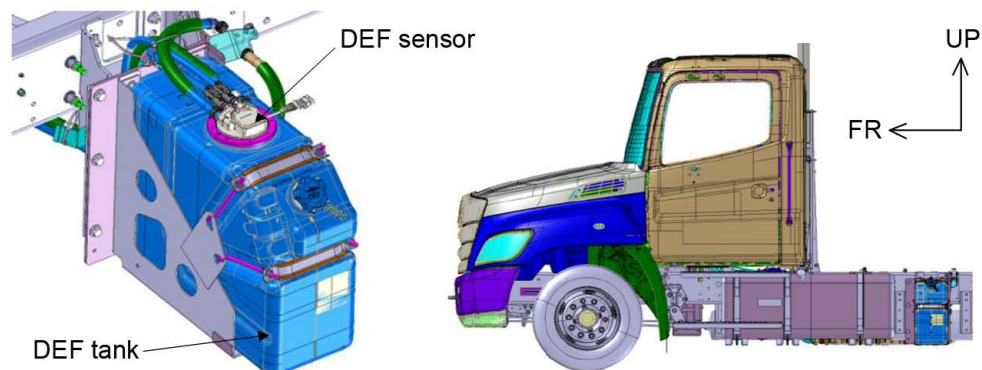
Removal, installing on different place, painting and modification of any parts of DEF - SCR system is prohibited.

- When mounting body and equipment, cover the whole system not to damage system parts, especially the sensor connectors of DEF, NOx and PM.
- Do not impact each system parts. Be careful not to impact the DEF tank because it is made of resin.
- When welding work, cover whole system with nonflammable material to avoid the damage by welding spatter, and the influence by heat.
Before welding, turn the starter switch to "LOCK" position, wait at least 10 minutes, and disconnect the negative terminal of battery.
- Be sure to wait for at least 10 minutes after the starter switch is turned to "LOCK" position before you disconnect the battery terminals from the battery, even with the starter switch is turned to "LOCK" position, the DEF-SCR system is still operating.
Otherwise, Engine ECU will not complete working properly (the DEF still remains in the exhaust gas after treatment system), which may result in the malfunction of DEF-SCR system.
- If remove the DEF tank temporary when mounting body, should protect DEF sensor connector from water.
- Around the filling port of DEF tank, body mounting or installing parts should not be done in a way to obstruct replenishing DEF.
See the figure below.
- If you need to replace any parts related to DEF- SCR system, use of Hino genuine parts is required for the proper function of DEF-SCR system.

< 28L(7.4gal) DEF tank >



< 59L(15.6gal) DEF tank >



Unit : mm (in.)

Precautions when painting

In the case of natural drying, in order to prevent adhesion of a paint, cover the whole system.
In the case of forced drying such as drying in dry oven, drying temperature must be under 80°C (176°F) because allowable heat limit of the DEF tank is 80°C (176°F).
Also, extract DEF completely from the DEF tank and cover whole system with heat-resistant material.

Precautions when extract DEF

Extraction Procedure

1. Turn the starter switch to "LOCK" position.
2. Wait 10 minutes.
3. Extract DEF.

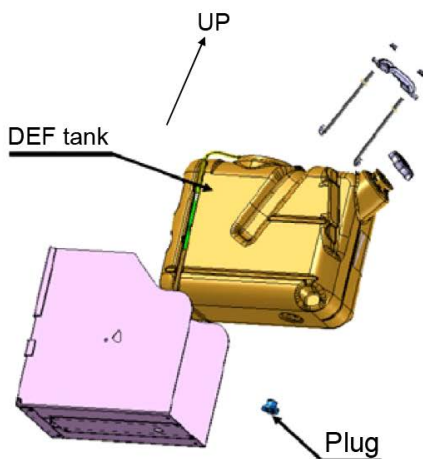
Do not re-use the extracted DEF.

Caution should be exercised during fluid extraction. If particulate matter is dislodged from the tank during extraction, the particulate matter needs to be removed from the tank. Failure to remove the particulate matter could cause damage other components.

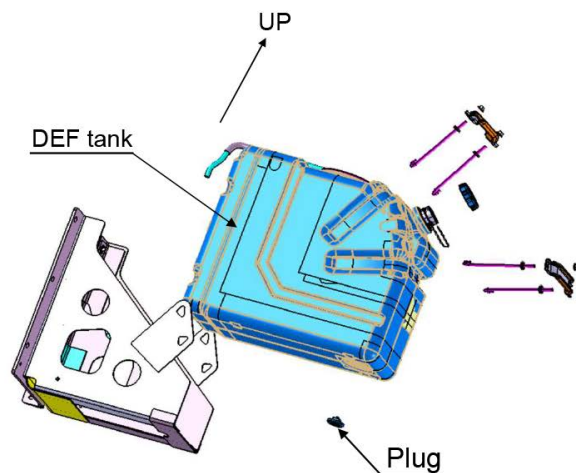
Always use API certified DEF for replenishment of the DEF tank.

See the figure below for detail of DEF tank.

< 28L(7.4gal) DEF tank >



< 59L(15.6gal) DEF tank >



Precautions for DEF

Always use API certified DEF for replenishment of the DEF tank.

Don't replenish the tank with DEF diluted even if it was API certified DEF.

Never replenish the tank with diesel fuel, kerosene, gasoline or other fluid than API certified DEF.

Use of the abovementioned unsuitable fluid causes not only the fall of an exhaust gas purification function but failure of each parts of DEF-SCR system.

If you replenish the tank with the fluid other than API certified DEF by mistake, extract the fluid completely and replenish the tank with API certified DEF before starting engine.

Never heat, dilute and never mix with non-approved or other fluids.

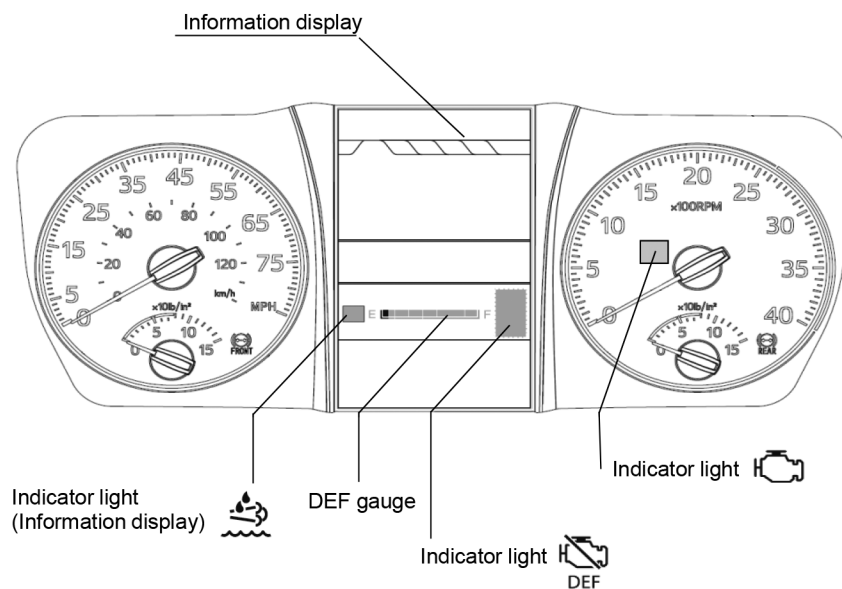
Precautions when handling DEF

Observe the following precautions when handling DEF.

- Put on the appropriate protective equipment (ex. safety goggles, rubber gloves and etc.).
- If DEF goes into eyes or adheres to the skin, wash 15 minutes or more with a lot of effluent immediately, and receive diagnosis of a doctor.
- Although there may be a smell like ammonia in DEF, there is no inconvenience in use.
- Wipe off DEF adhering to the floor, the body, a container, etc. with a rag securely. DEF is dried and crystallized. Crystallized DEF corrodes the metal side where it is not painted if it adheres.
- Do not drain DEF into the environment and it should be treated like an industrial waste.

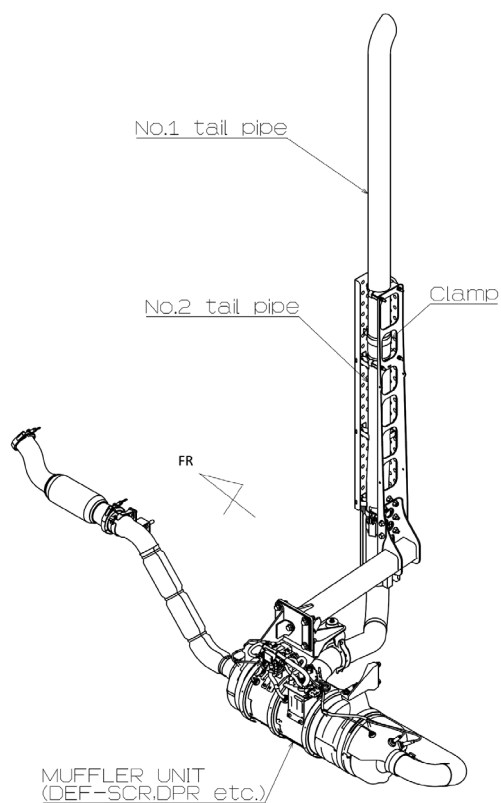
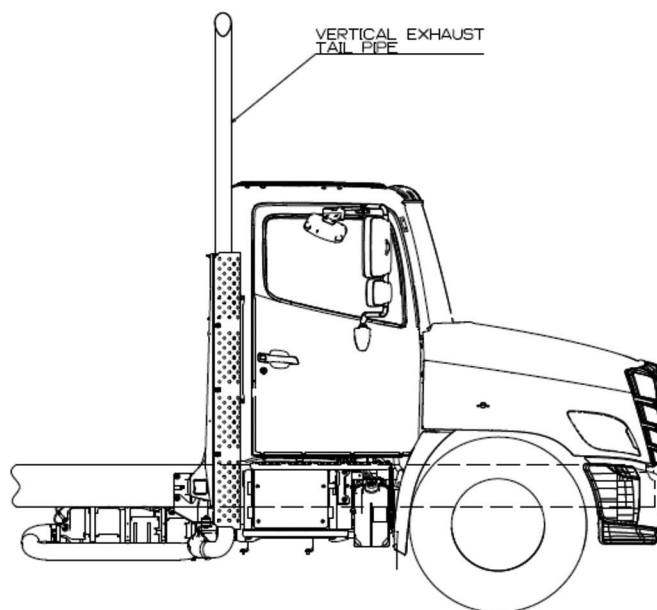
Indicator light on the meter panel

After finishing body mounting and when starting the engine, if following indicator light on the meter panel goes on do as the instruction of safety label which is attached on the cover of overhead console or contact HMC or Hino authorized dealer.



22. VERTICAL EXHAUST TAIL PIPE

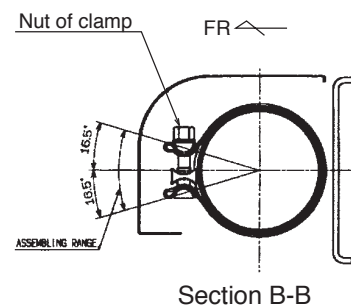
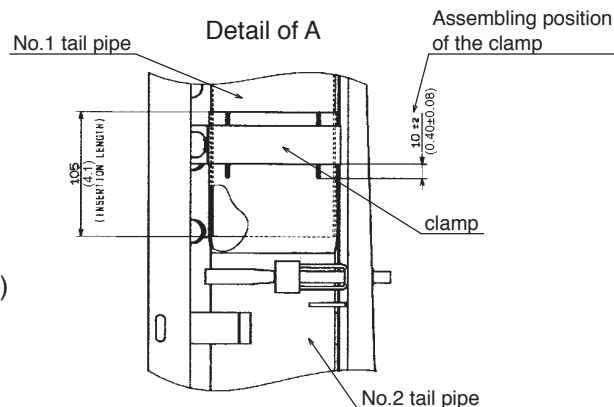
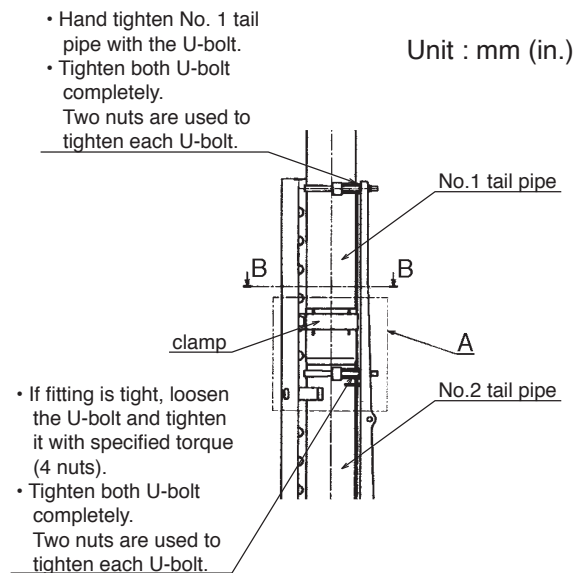
Prior to delivering the vehicle, assemble the vertical exhaust tail pipe as outlined in the following procedure.



Assembly Procedure

Park the vehicle, apply the parking brake, and apply wheel chocks at the front or rear tires. After stopped the engine, wait until the tail pipe cools adequately before starting the work. Make sure to be careful, for the location of tail to install is in a high position. If you drop foreign matter inside the tail pipe, contact a Hino dealer and have the foreign matter removed by taking off the lower tail pipe.

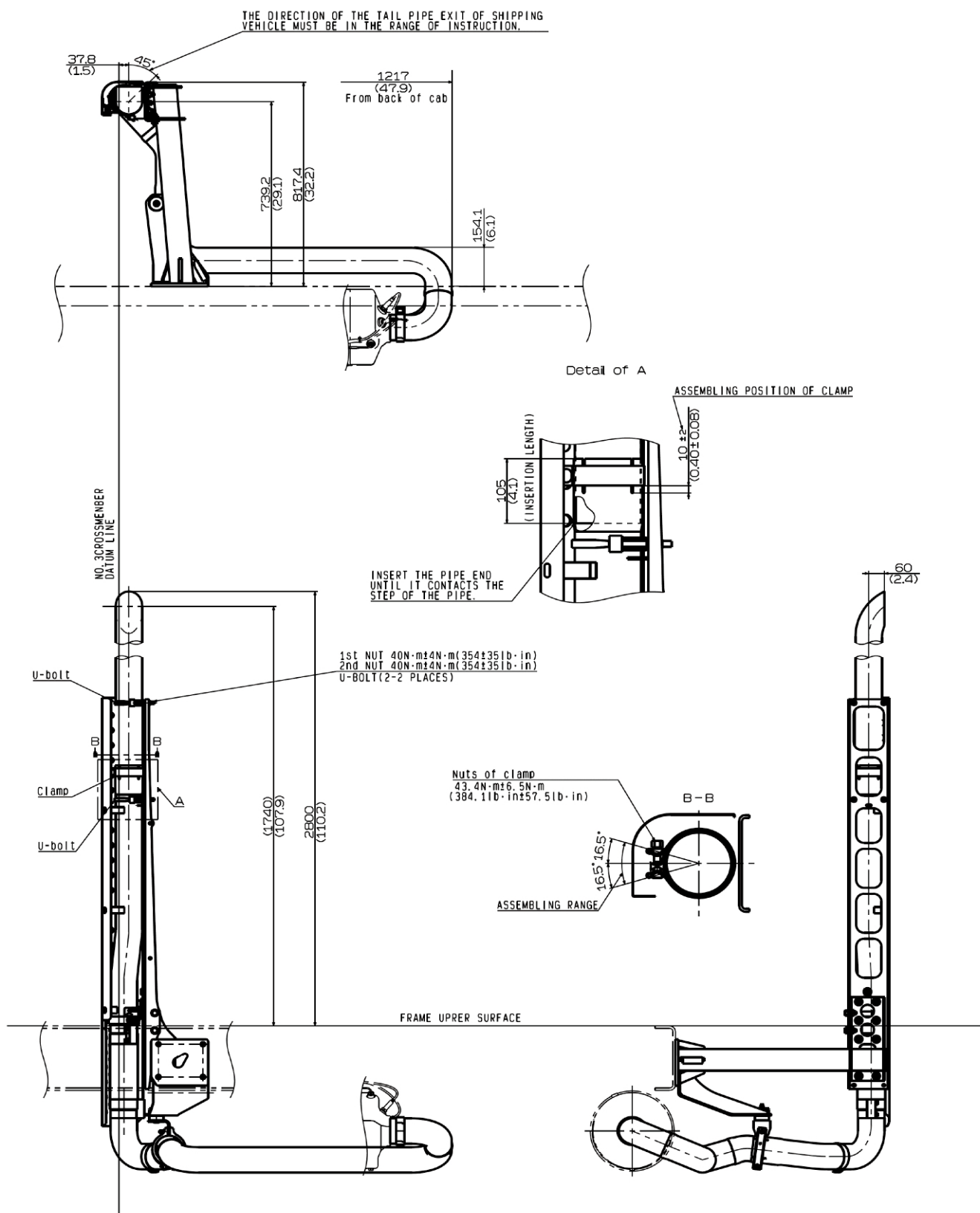
- Remove insulator (6 bolts).
- Temporary attach the clamp at No.2 tail pipe.
Do not tighten the clamp.
The clamp cannot be re-used once it is tightened.
- Insert No. 1 tail pipe inside No.2 tail pipe until it touches the shoulder on the inside of the No. 2 tail pipe.
Since hot exhaust gas comes out of No.1 tail pipe, make mouth of No.1 tail pipe the direction which is not applied to body or equipment.
(For direction of the mouth of No.1 tail pipe, refer to "ASSEMBLY DRAWING" in the next page.)
- If fitting is tight, loosen the U-bolt and tighten it with specified torque (4 nuts).
- Hand tighten No. 1 tail pipe with the U-bolt.
- Install the clamp $10\pm2\text{mm}$ ($0.40\pm0.08\text{in.}$) above the bottom end of the slit of No.2 tail pipe.
See Detail of A and Section B-B.
Tighten the clamp with the proper torque.
- Tighten both U-bolt completely.
Two nuts are used to tighten each U-bolt.
- Remove the protection sheet off of the insulator.
Do not forget to remove the protection sheet from the connecting side also.
- Install the insulator (6 bolts) with tightening torque $22\pm4\text{N}\cdot\text{m}$ ($195\pm36\text{ lb}\cdot\text{in}/16\pm2\text{ lb}\cdot\text{ft}$).
- If the insulator is deformed and there is not enough clearance between the insulator and U-bolt clamp, it may rub, causing noises.
Make sure there is clearance after installation.
If there is no clearance, adjust the insulator to ensure clearance.



[NOTE] For details of tightening torques, see the ASSEMBLY DRAWING on the next page.

Assembly Drawing of Vertical Exhaust Tail Pipe

Unit:mm(in.)



23. INSTALLING EQUIPMENT ON THE CAB ROOF

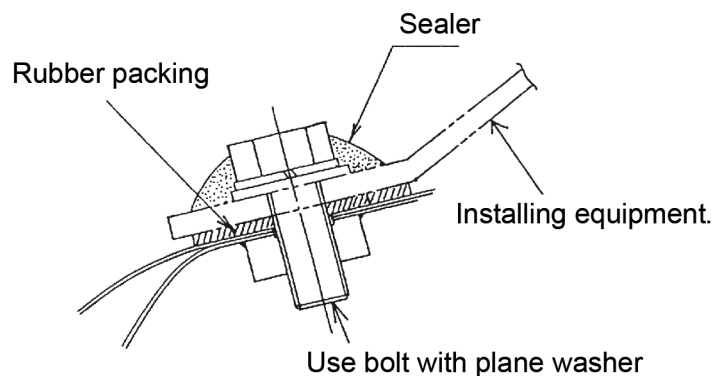
If need to install equipment such as the roof rack and roof step on the cab roof, please consult with HMC before installing.

There are some weld nuts (bolt holes) for making easy installing equipment such as the roof rack and roof step on the cab roof.

See the next page for detail of weld nuts.

Be sure to observe the following precautions for installing.

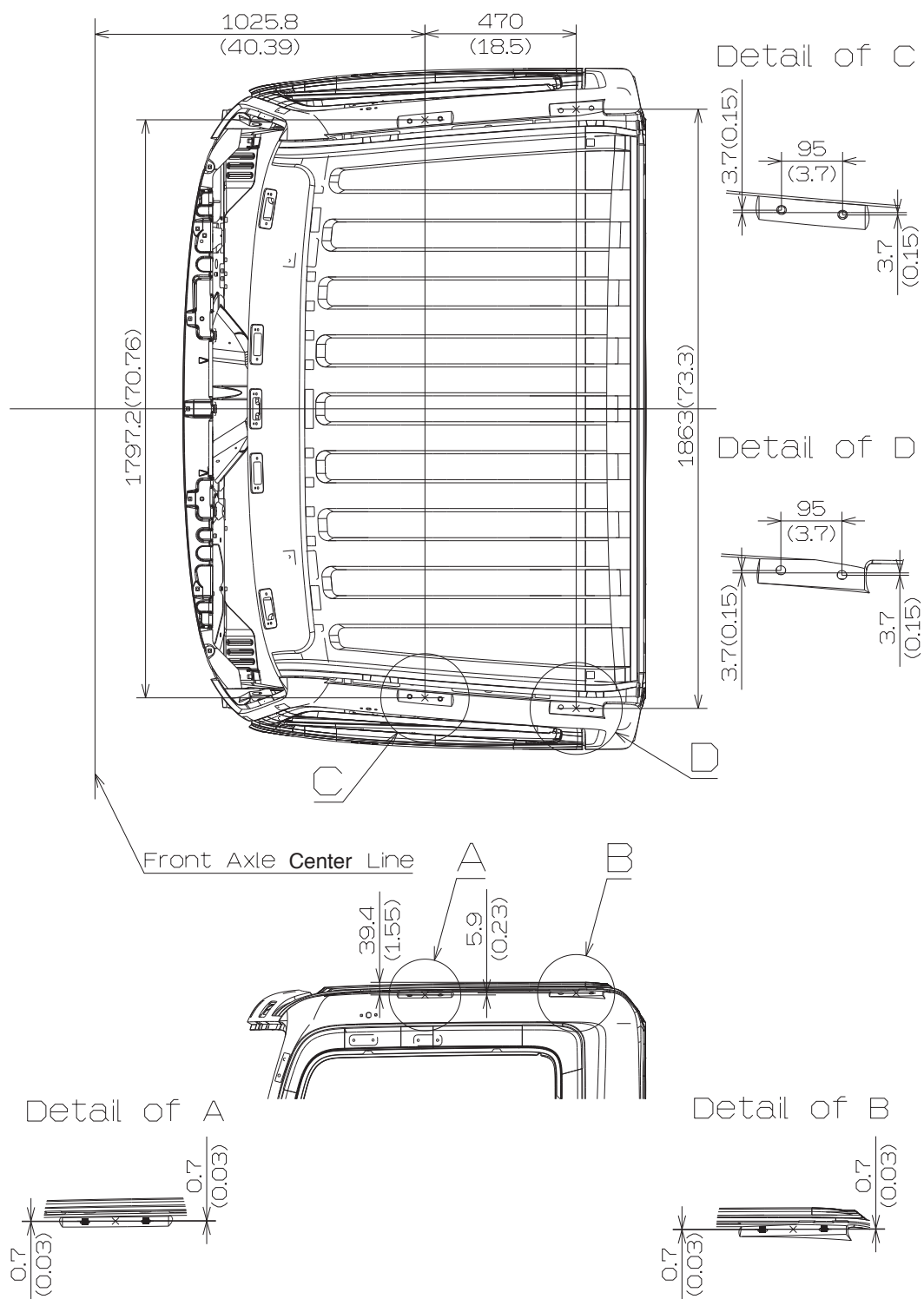
- Remove the bolts which were installed temporary at bolt holes, and do not use them for installing equipment.
- Install rubber packing between the equipment and the cab roof for preventing scratch of cab paint and penetration of water.
 - Detail of packing : RC710CP (EPDM) equivalent
 - Thickness --- 2 mm (0.08 in.) or less
 - Diameter --- 10 mm (0.39 in.)
- Should use a nickel chrome stainless for the installation bolt. It may be rusty if do not use a nickel chrome stainless.
 - Size of bolt : M10
 - Tightening torque : 320 ~ 480 kg·m (23.2 ~ 34.7 lb·ft)
- Should install equipment after completed final painting.
- Do not scratch the painting of the cab body when installing equipment.
- Make sure that apply a sealer to all around the bolt for prevention of water after tightening the bolt.
 - If insufficient seal with sealer, it may be the cause of rust.
 - Sealer : TEROSON MS9320 or MS9120 equivalent of Henkel
: Sikaflex-221 equivalent of Sika.
 - Color : Black



DETAIL OF WELD NUTS (BOLT HOLE) ON THE CAB ROOF

< Day Cab >

Unit : mm (in.)



24. VEHICLE STORAGE

We deliver only the vehicles which have passed our delivery inspection. However, it frequently happens that when the vehicles (chassis with cab) are kept in a storage of the dealers or rear body manufacturers for long periods of time, the vehicles are placed on the irregular-surfaced ground in the manner in which their frames are twisted. If the frame is kept in a twisted state for a long time, it will be permanently deformed, thus becoming a cause of complaints to be lodged later. So, you are requested to make sure that the surface of the ground on which the vehicles are stored be levelled to prevent the twisting the frame.

25. INSTALLATION OF FUEL FIRED HEATERS AND AUXILIARY HEATERS

Installation and use of fuel fired heaters or auxiliary heaters on Hino Trucks is prohibited unless approved by Hino and Cummins through Hino and Cummins' CEB00597 process.

Please contact your Hino representative to obtain the CEB00597 process description.

Any unauthorized modifications to the engine or aftertreatment system could adversely affect the vehicle's emissions certification and void the Cummins' Emissions Warranty.

The installation or modification of any system that adversely affects the emissions performance of the engine is strictly prohibited and is illegal.

Improper installation of a fuel fired heater or auxiliary heaters can cause the risk of a fire or the leakage of deadly carbon monoxide leading to serious injury or death.

Never try to install or repair a fuel fired heater or auxiliary heating system unless you have the necessary permission, technical skills, and you have the necessary technical documentation, tools, and equipment available to ensure you can complete the installation or repair work properly.

Hino rejects any liability for installation of unapproved fuel fire heaters and auxiliary heaters.

Hino rejects any liability for problems and damage caused by a fuel fired heater or auxiliary heater being installed by untrained or unlicensed personnel.