For Dismantler

High Voltage Battery Disposal Manual

Target Model

MX-30 Rotary-EV

Mazda Motor Corporation
Customer Service Div,Recycle Promotion Gr.

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Contents

1. Introduction

Some vehicles manufactured by Mazda Motor Corporation is mounted the high voltage battery.
This manual describes how to remove the battery from the End-of Life Vehicle(ELV).
Read this manual carefully and observe the precautions before handling the battery.

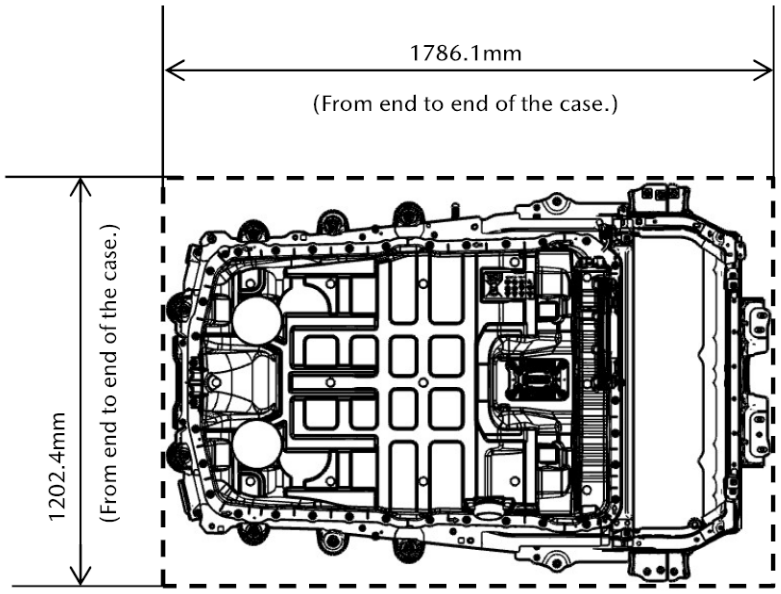
<Warning>
Pressing and shredding the vehicle with high voltage battery attached will generate such as heat, fire, smoke, and rupture from the high voltage battery.

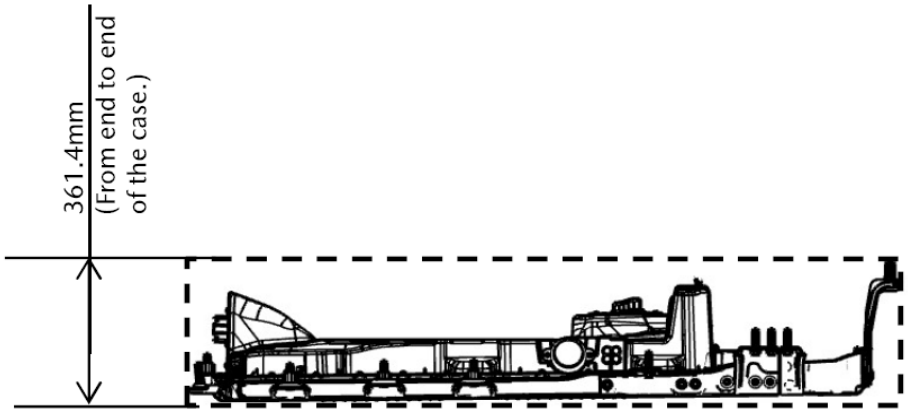
2. Overview of the high voltage battery

- Specification

Item	Specification
Pack composition	Direct series, 96cells
Nominal capacity	50 [Ah]
Nominal voltage	355 [V]
Mass	185[kg]
Extremal dimensions	W 1,185×D 1,459×H 323 [mm]
Electrolyte volume	9.6 [L] or less

- Appearance





3. Precautions in Handling the high voltage battery

● Introduction

- For this battery, chemical materials are stored in a hermetically aluminum case, designed to withstand temperatures and pressure encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials leakage.
  However, if exposed to a fire, added mechanical shocks, decomposed, add electric stress by miss -use, gas release valve will be opened, or the product case will be breached at the extreme, hazardous materials may be released.
  Moreover, if heated strongly by the surrounding fire, acid gas may be emitted.
  Nominal voltage of this product is 355V, therefore in case of electric shock, there is a risk of death.

● Handling of the high voltage battery

- Technical measures
  - — Do not throw into fire or heat.
  - — Do not throw into water and soak in water and seawater.
  - — Do not expose strong oxidizer.
  - — Do not throw and give a strong mechanical shock.
  - — Never disassemble, modify or deform.
  - — Do not connect positive terminal and negative terminal.
  - — In case of charging, charge according to the condition specified.
  - — Keep children away from battery.
  - — Do not connect connectors and plugged-in service plugs until battery is installed in a vehicle.
  - — To avoid electric shock, keep isolation of terminals and ware isolation grove.

● First-aid measures

Internal material such as electrolyte leaked from battery

- Inhalation
  Move to the place where is well-ventilated and seek medical attention if necessary.
- Skin contact
  Wash with soap and plenty of water immediately.
- Eye contact
  Do not rub one's eyes. Immediately flush eyes with clean water continuously for 15 minutes at least. Seek medical attention immediately.
- Ingestion
  Wash mouth with water and seek medical attention immediately.

● First aid treatment for electric shock

- Do not touch he/her with bare hands, during victim contact to the battery in order to prevent secondary electric shock.
- Pull victim apart from the battery by using not conductive materials in order to prevent secondary electric shock.
- Check pulse and breath, or react on stimulus, contact with emergency hospital and seek medical attention. If victim's breath stops, perform the cardiopulmonary resuscitation as needed.

Fire fighting measure

- Suitable extinguish material
  Plenty of water from fire hydrant (avoid using slam amount of water as it may gain force of fire), Carbon dioxide gas, powder fire extinguisher.
- Specific method of fire-fighting
  When the battery burns with other combustibles simultaneously take fire extinguishing method which correspond to the combustibles.
  Extinguish from the windward as much as possible.
- Specific hazardous hazards
  Corrosive gas may be emitted during firefighting. And when the battery temperature becomes high, its components may scatter.

Accidental release measure

Internal material, such as electrolyte, leaked from battery are carefully dealt with according to the following.

- Precautions for human body
  Prohibit the entry other than related personnel. Removes spilled materials wearing with proper protection described in
  Do not inhale the gas as much as possible. Moreover, avoid touching with as much as possible.
- Environmental precautions
  Do not throw out into the environment.
- Method of cleaning up
  The spilled are put into a container. The leaked place is wiped off with cloth which must be incinerated.
- Prevention of secondary hazards
  Avoid re-scattering. Do not bring the collected materials close to fire.

Exposure controls / personal protection

In case of scatter due to electrolyte leakage or demolishing, the following protection equipment and/ or protection must be used.

- Protection equipment for reducing exposure
  Operate the local exhaust equipment or improve ventilation.
- Proper personal protection
  Respirator with cylinder, dust mask, protective gloves (insulating, oil resistance), protective eyewear, protective clothes and shoes.

4. The high voltage battery removal cautions

Warning

- The removal of the high voltage parts of this vehicle must be performed by persons who have acquired qualifications specified by the laws and regulations.

- Vehicles damaged in an accident could have electrical leakage due to internal damage of the high voltage battery. If servicing is carried out under electrical leakage conditions, it could cause electrical shock and result in serious injury or, in the worst case, death.

- The protective equipment indicated in the disposal manual is recommended by Mazda. Use equipment specified by the laws and regulations of each country.

- Wear insulating gloves when removing the high voltage parts.
  Touching the high voltage parts without wearing insulating gloves could cause electrical shock and result in serious injury or, in the worst case, death.

- Before removing the high voltage parts, remove the service plug and wait until 10 min have elapsed. Servicing without removing the service plug or before 10 min have elapsed after removing the service plug could cause electrical shock and result in serious injury or, in the worst case, death.

- Do not spin the tires while removing the high voltage parts.
  If the tires spin, power generation occurs even if the service plug is removed.
  If power generation occurs, it could cause electrical shock and result in serious injury or, in the worst case, death.

- Verify that the charge connector is not connected to the vehicle when removing the high voltage parts. If the charge connector is connected to the vehicle, high voltage may be supplied to the vehicle. If this occurs, it could cause electrical shock and result in serious injury or, in the worst case, death.

- Always observe the following thoroughly to ensure safety when removing the high voltage parts. Otherwise, the high voltage circuit may operate on the vehicle regardless of whether or not the main power is switched OFF or ON (READY off or on). If this occurs, it could cause electrical shock and result in serious injury or, in the worst case, death.
  - Do not open/close doors frequently with main power switched OFF.
  - Do not perform normal charging or quick charging.

- When removing the high voltage parts, place a high voltage work sign on the vehicle to alert other workers.

Caution

- Do not switch the main power ON (READY on) after removing the service plug.
  If the main power is switched ON (READY on) after removing the service plug, a malfunction may occur with the vehicle.

- The high voltage parts can be identified as follows.
  - Parts that are connected using orange wiring harnesses
  - Parts with a high voltage warning label attached

Identification of high voltage wiring harnesses and equipment

The following measures are applied to the high voltage equipment and wiring harnesses so that they can be distinguished from other non-high voltage areas. Never touch the high voltage wiring harnesses, high voltage connectors, and equipment with a high voltage warning label attached without wearing insulating gloves before cutting off the high voltage.

- The high voltage cable and connectors are covered by orange insulation as a standard.
- A warning label is attached to the high voltage equipment (high voltage battery and inverter) indicating the presence of high voltage inside the equipment.

Handling of high voltage connectors and terminals

- When touching a high voltage terminal not covered by insulation, wear insulating gloves and verify that the voltage is 0 V using a tester in advance.
- Protect a disconnected high voltage connector using insulation tape immediately after being disconnected so that the terminal is not exposed. Handle one terminal at a time to avoid both terminals being exposed at once.
- Before connecting a terminal, thoroughly remove any adhesive on the terminal using a clean cloth.
- Securely tighten the screw terminals of the high voltage parts to the specified torque. Insufficient or excessive tightening torque could cause a malfunction of the vehicle.

Items prohibited from being held or worn

- Before servicing, remove metal objects. An electric vehicle has high voltage areas, and if metal scales, mechanical pencils, or accessories such as necklaces fall onto a high voltage area while servicing, it may cause short circuit leading to an arc flash and part damage.
- Do not carry magnetic recording media. An electric vehicle has parts which have strong magnetic force, and if magnetic recording media (such as cash cards and prepaid cards) are being carried while performing an inspection or servicing, the recorded data could be destroyed.

High voltage work indication

- When removing the high voltage parts, place a high voltage work sign on the vehicle to alert other workers.

● Protective equipment

Warning

- The protective equipment indicated in the disposal is recommended by Mazda. Use equipment specified by the laws and regulations of each country.

- Perform periodic inspections specified by the laws and regulations for protective equipment to be used when performing high voltage work and use products that have no defects and are in good condition.

- If insulating gloves that are defective or are in poor condition are used when performing high voltage work, it could cause electrical shock and result in serious injury or, in the worst case, death. Perform an inspection before using insulating gloves and verify that they are not defective and in good condition.

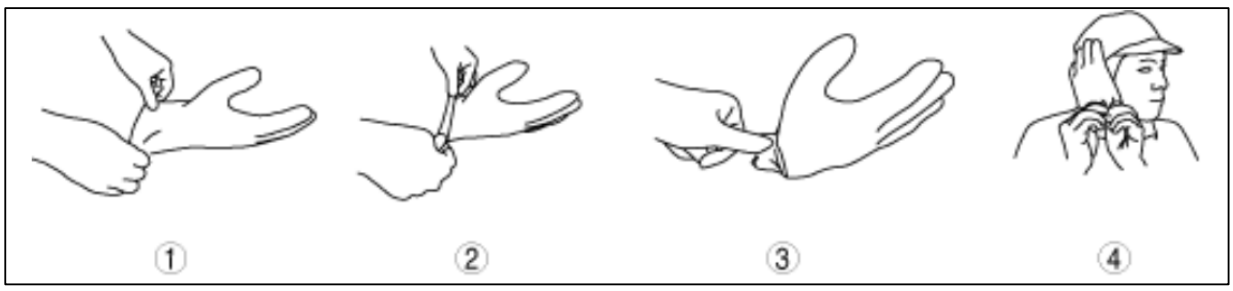
- Do not test insulating gloves by blowing exhaled air into them. Moisture in the gloves could cause electrical shock and result in serious injury or, in the worst case, death.

Inspection before use

- The person who is going to perform the work must inspect the protective equipment and tools for wear and damage before using them.

- Always verify that the insulating gloves are free of scratches, holes, tears, and cracks before use using the following methods. In addition, do not use wet or damp insulating gloves.

1) Visually inspect the entire outer surface of the insulating gloves to verify that they are free of damage.
2) Open the cuff of the insulated glove and put air into it. (Fig. 1)
3) Fold the cuff and roll it up to the wrist of the glove to prevent air from leaking. (Fig. 2)
4) Fold the rolled cuff to seal the air in. (Fig. 3)
5) Hold the glove against an ear to verify that there is no air leakage. (Fig. 4)
   *If there is a hole or tear in the insulated glove, an air leaking sound is heard.



- High voltage work sign

APPLY GLUE HERE

MOUNTAIN FOLD

MOUNTAIN FOLD

MOUNTAIN FOLD

APPLY GLUE HERE

5. Recommendation for safe collection of the high voltage battery

- In an accident car, submersible car, etc., there is a possibility that the battery pack for may be deformed , cracked, short circuit, leaked, etc, and a short circuit may cause accidents such as smoking, ignition, or electric shock.

- Always disconnect the lead battery before removing high voltage battery.
  - If you work without disconnecting the lead battery, short circuit may cause smoke, fire, electric shock, etc.

- Do not leave/discard/divert/modify/disassemble/resell/transfer the high voltage battery.

  - Touching of the high voltage battery that has been Improperly left or discarded, or diverting, remodeling, or disassembling it for purposes other than its intended use may cause accidents such as electric shock, emitting smoke, firing, heat generation, explosion, or electrolyte leakage.

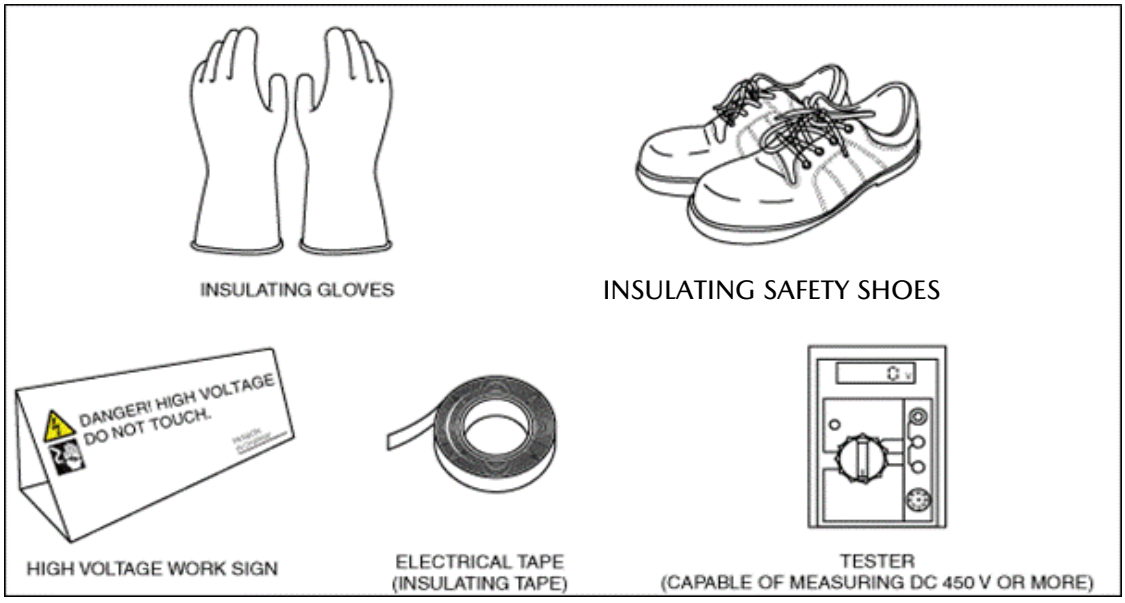
Mazda cannot be held liable for any accidents / damages caused by diversion / modification / disassembly of the high voltage battery, or any accidents / damages caused after neglect / discard / resale / transfer. The responsibilities of the business operator who performed these actions may be held.

6. Removing the high voltage battery

Warning

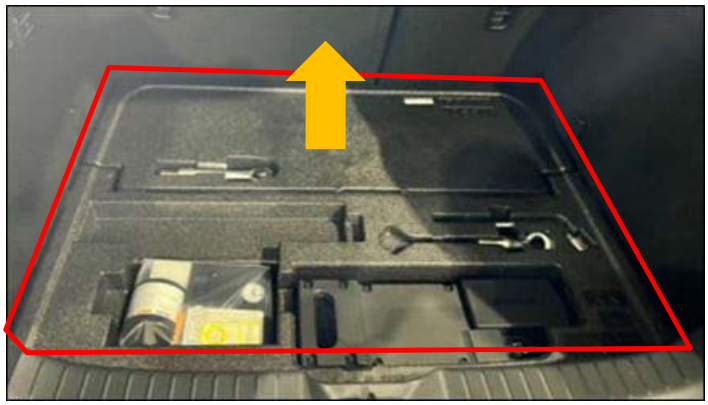
- If the necessary measures are not taken before removing the high voltage battery, it could cause electrical shock and result in serious injury or, in the worst case, death. Before removing the battery, please to implement the necessary measures.
- Wear insulating gloves when removing the high voltage parts.
- Before removing the high voltage parts, remove the service plug and wait until 10 min have elapsed.
- Do not switch the main power ON (READY on) after removing the service plug. The high voltage parts can be identified as follows.
  - Parts that are connected using orange wiring harnesses
  - Parts with a high voltage warning label attached

● Items to be prepared



1) Open the lift gate. While working, leave the door open.

2) Remove the trunk covering and the trunk board.



3) Remove the rear tire, the rear mudguard (RH).

4) Switch the main power OFF and start measuring the time since the main power was switched OFF using a stopwatch.

5) Switch the main power OFF and wait for 5 min.

Caution

- If the cooling fan does not stop after 5 min have elapsed since the main power was switched OFF, wait until it stops.

6) Disconnect the negative lead-acid battery terminal within 25 mi from switching the main power OFF using the following procedure.

Warning

- Before servicing after disconnecting the negative lead-acid battery terminal, wait for 1 min or more.

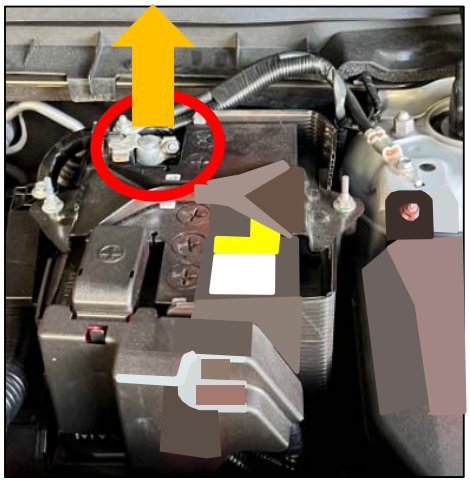
Caution

- If the time since the main power was switched OFF in Step 3 to the disconnection of the negative lead-acid battery terminal exceeds 25 min, perform the procedure from Step 1 again.
- In order to prevent it from falling off, the negative lead-acid battery terminal nut cannot be removed.
- After the negative lead-acid battery is disconnected, there is no restriction on opening/closing the door.

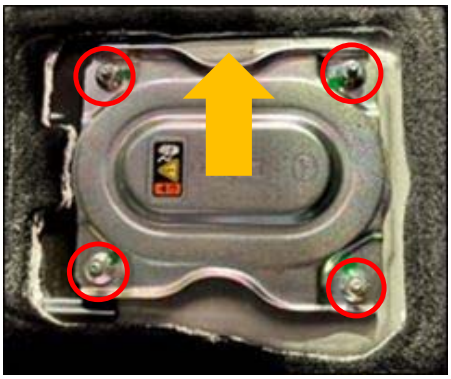
(1) Disconnect the current sensor connector.

(2) Disconnect the negative lead-acid battery terminal.

- When disconnecting a negative lead-acid battery terminal with deformed plastic, expand the gap of the negative lead-acid battery terminal using a flathead screwdriver, and remove the terminal.



7) Partially peel back the cover and remove the service hole cover.



8) Wear insulating gloves and remove the service plug using the following procedure.

Warning

- Touching the terminal on the vehicle side can result in serious injury or death from removing the service plug, cover the vehicle-side terminals with insulating tape so that they cannot be touched.

- Do not touch high voltage parts for 10 min after removing service plug.
  Electric charges may be stored on the condenser for 10 min after the service plug is removed, and touching high voltage parts during that time can result in serious injury or death from electric shock.

- Service plugs must be removed by workers removing high voltage parts.
  Keep the removed service plug on your person until removal of the high voltage parts is completed to prevent other workers from accidentally installing the service plug.

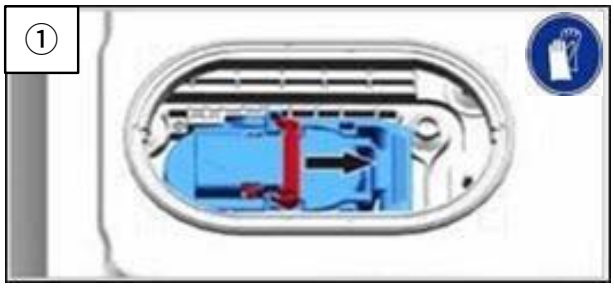
Caution

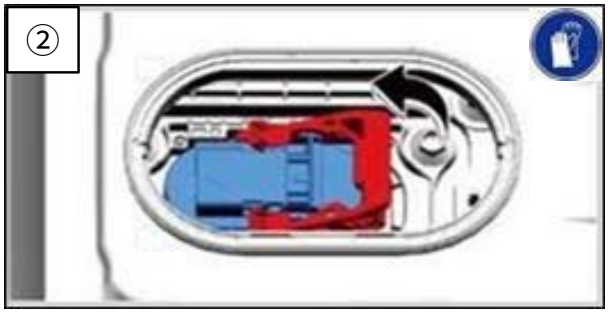
- After removing the service plug, cover the vehicle side terminals with insulating tape to prevent foreign matter from adhering to them.

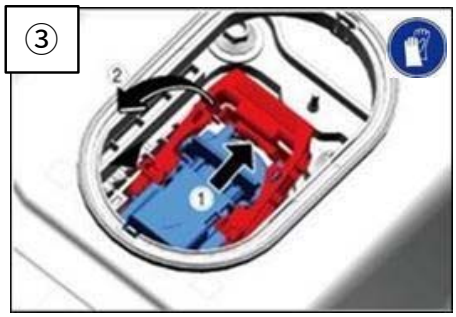
- When you are keeping the service plug on your person, cover the service plug terminals with insulating tape to prevent damage to them.

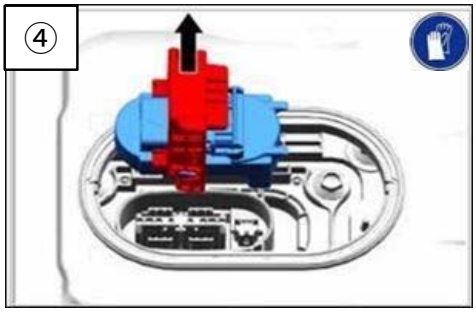
- Do not switch the main power ON (READY on) after removing the service plug. If the main power is switched ON (READY on) after removing the service plug, the vehicle may malfunction.

(1) Slide the lock in the direction of the arrow shown in the figure. (Do not Pull out completely)
(2) Raise the lever.
(3) Press the area indicated by arrow (1) shown in the figure, release the tabs, and then raise the lever until it is perpendicular.
(4) Hold the lever and pull the service plug straight up.







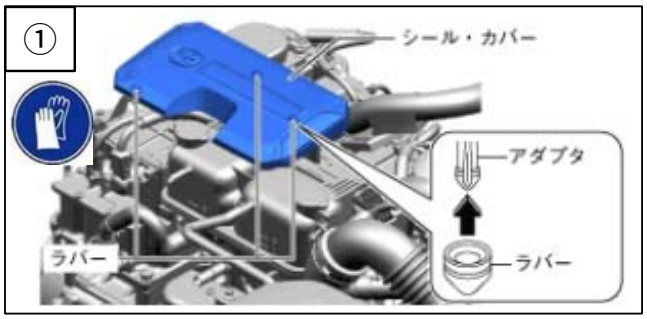


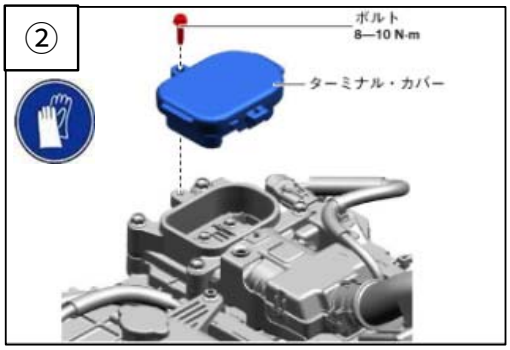
9) After removing the service plug, leave it for 10 min.

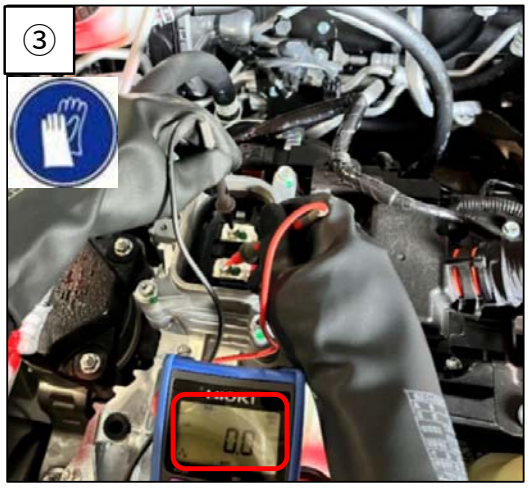
10) Wear insulating gloves and measure the voltage at the high voltage cable connection (power control unit side) using the following procedure.
   (1) Remove the seal cover adapters from the rubber.
   (2) Remove the terminal cover.
   (3) Measure the voltage at the high voltage cable connection.
      - Verify that the tester indicates 0V and go to the next step.
      - Use a taster with a measurement range of 450V DC or more.

Caution

- Be careful not to allow foreign matter or water droplets to enter the junction box Since the junction box has a high voltage circuit, there is a risk of malfunction if foreign matter or water drops enter it.



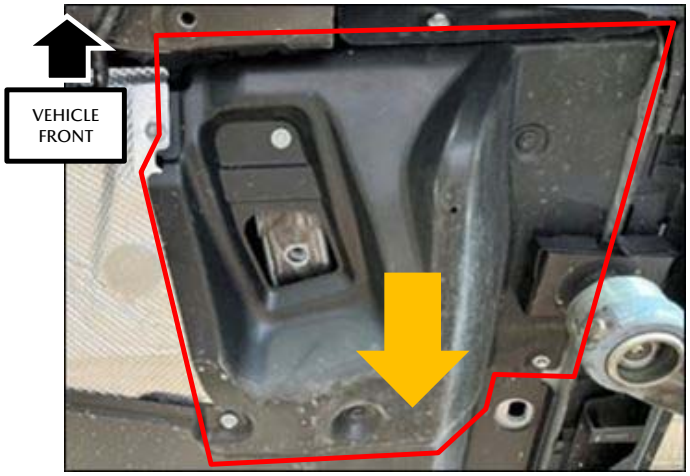


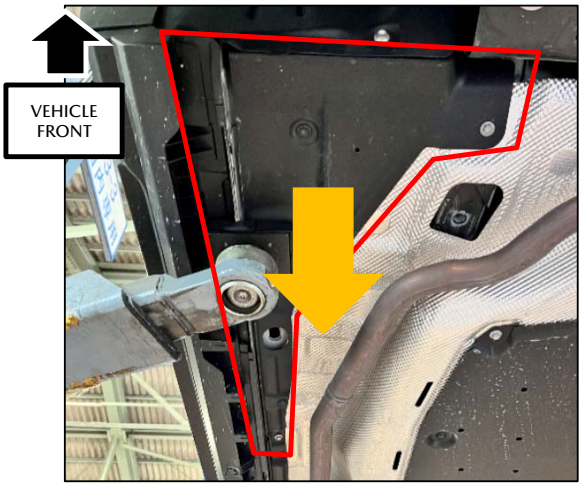


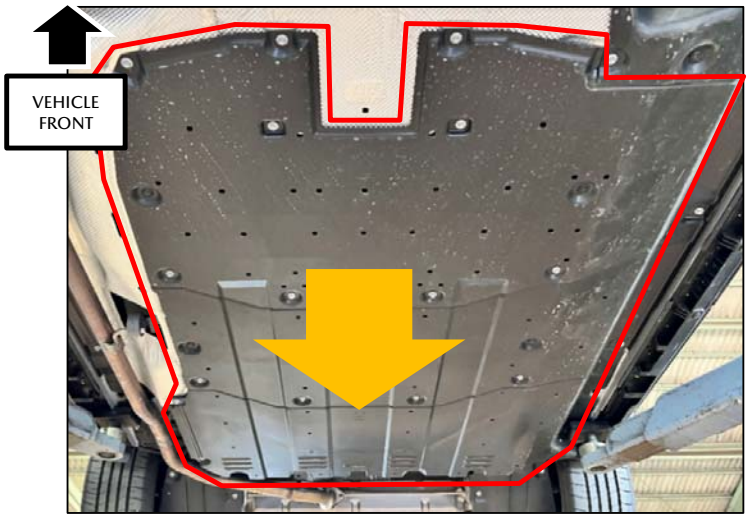
11) Drain the refrigerant.

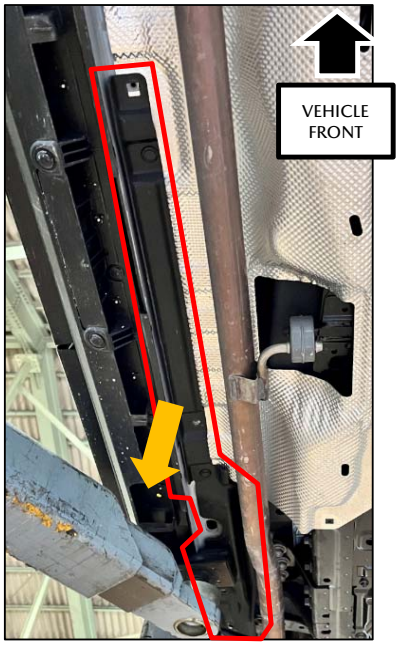
12) Lift up the vehicle and remove the gussets.

13) Remove the floor under covers.





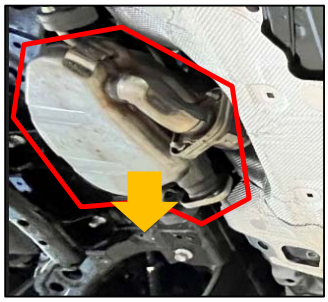




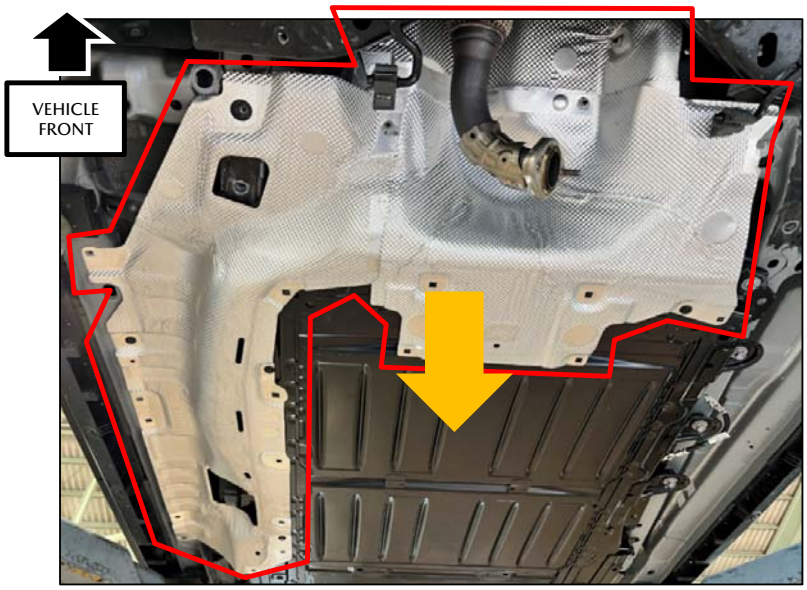
14) Remove the middle pipe and the presilencer.

Warning

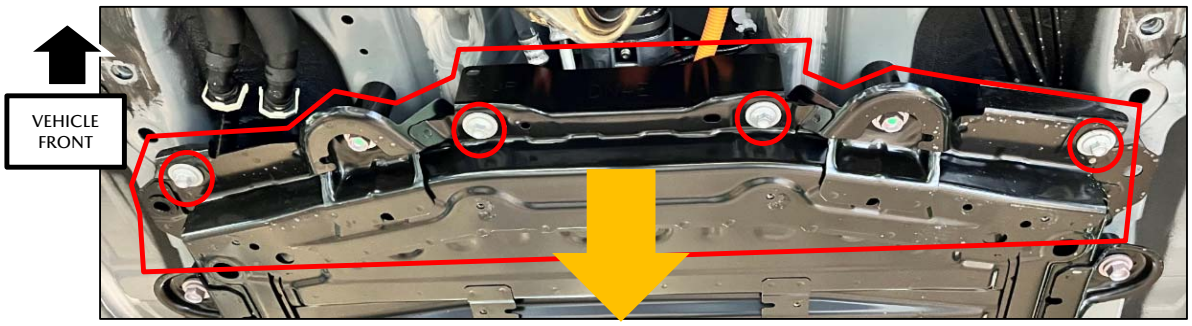
- A hot engine and exhaust system can cause severe burns. Turn off the engine and wait until they are cool before removing the exhaust system.



15) Remove the insulator.

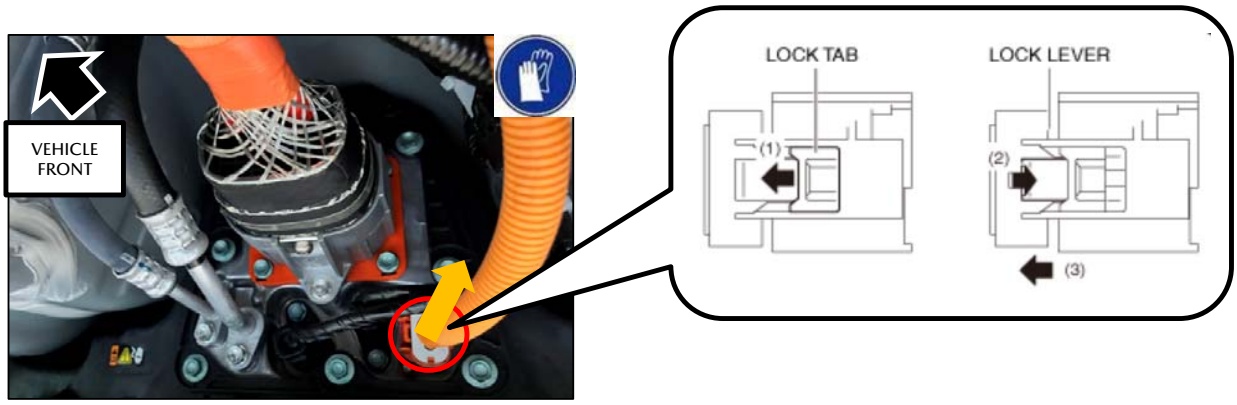


16) Remove the bracket.



17) Disconnect the cooler pipes and the connectors.

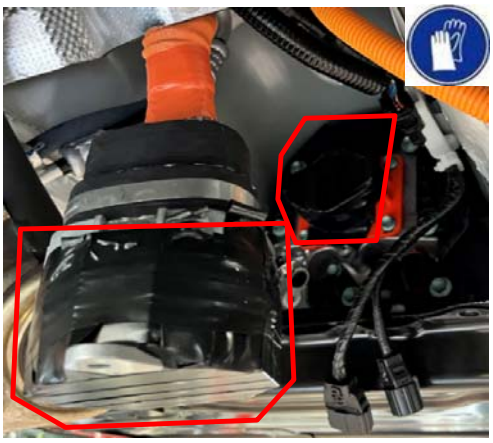
18) Wear insulated gloves and disconnect the high voltage cable connector.



- After disconnecting the high voltage cable, wear insulated gloves and wrap the terminals with electrical tape to insulate them.

19) Wear insulated gloves and disconnect the high voltage cable connector (high voltage battery side).

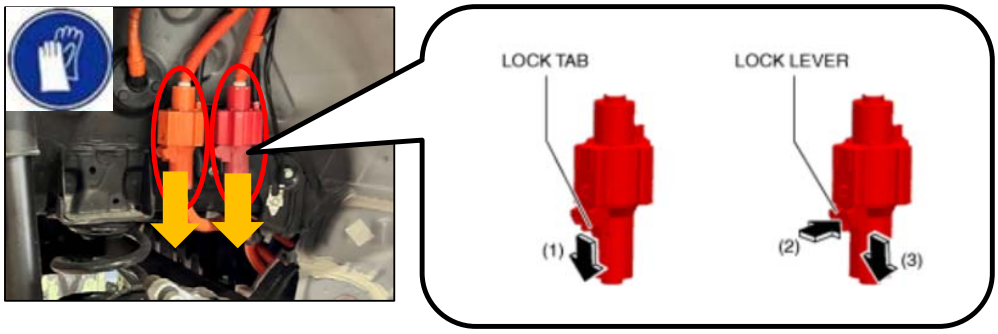
- After disconnecting the high voltage cable, wear insulated gloves and wrap the terminals with electrical tape to insulate them.



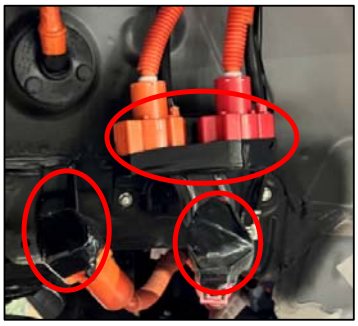
20) Wear insulated gloves and disconnect the high voltage cables connectors.

(1) Pull out the lock tab.

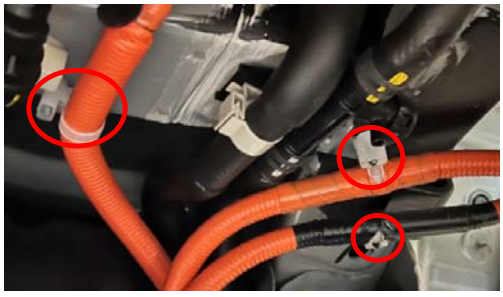
(2) Pull out the connector while pressing the lock lever.



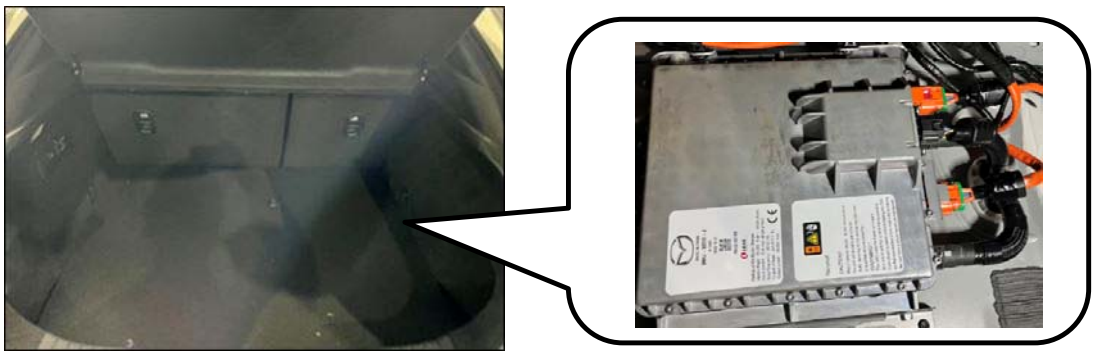
- After disconnecting the high voltage cable connectors, wear insulated gloves and wrap the terminals with electrical tape to insulate them.



21) Detach the wiring harness clips and the connector.



22) Lift down the vehicle, wear insulated gloves and disconnect the high voltage cable connector.

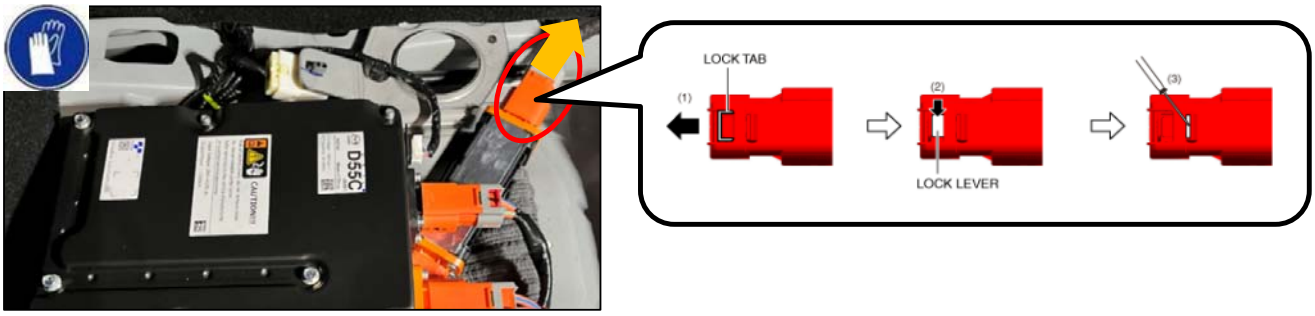


(1) Pull out the lock tab.
(2) Pull out the connector while pressing the lock lever.

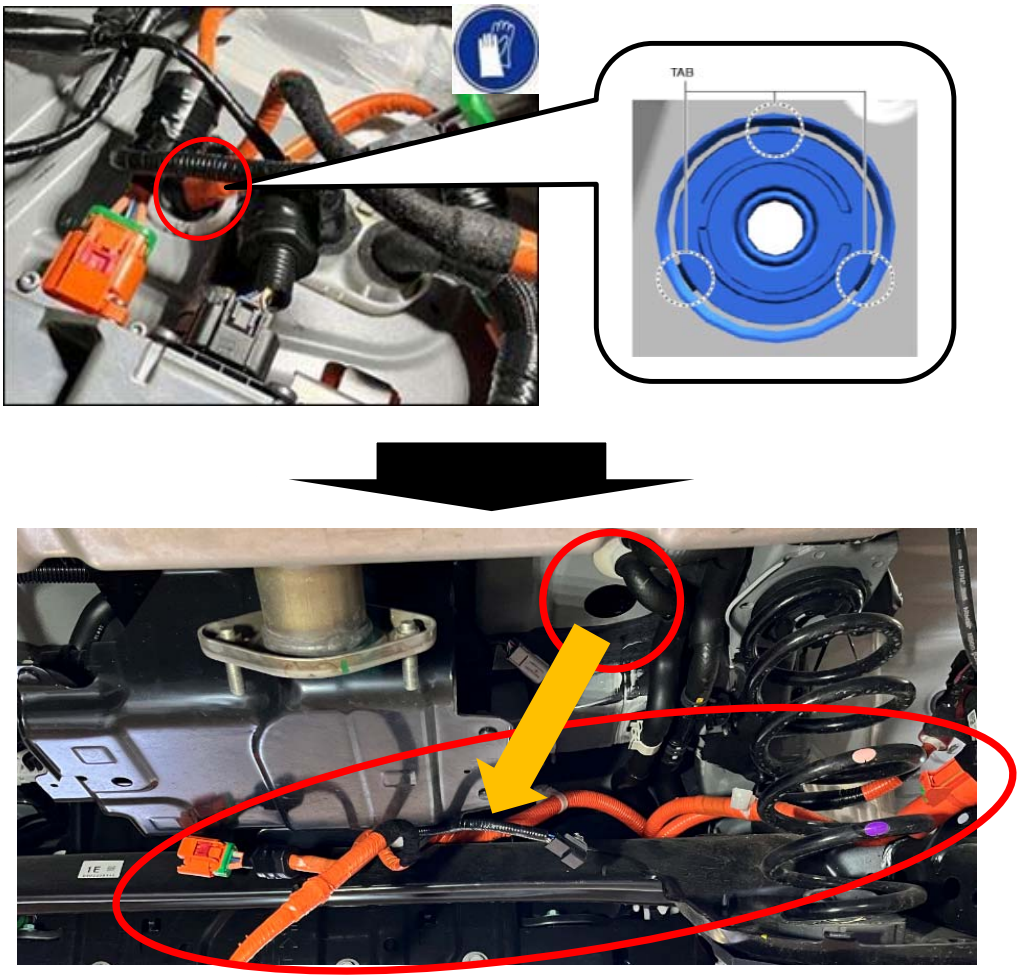
- After disconnecting the high voltage cable connectors, wear insulated gloves and wrap the terminals with electrical tape to insulate them.

23) Detach the wiring harness clips.

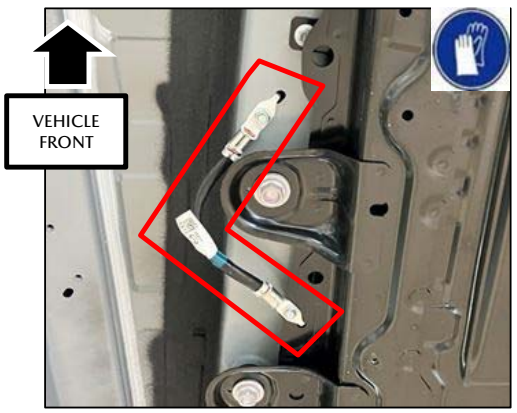
24) Wear insulated gloves and disconnect the connector.
(1) Pull out the lock tab.
(2) Pull out the connector while pressing the lock lever.
(3) Disconnect the connector while pressing the area shown in the figure with a flathead screwdriver.

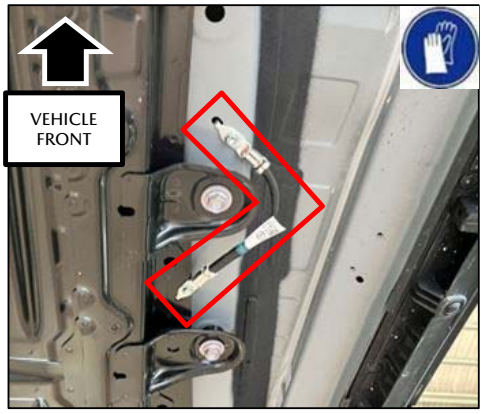


25) Wear insulated gloves, release the tabs shown in the figure, and get the grommet and the high voltage cable outsides.

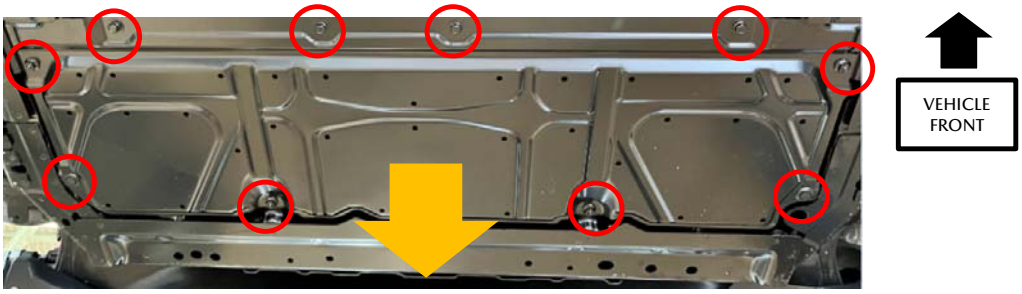


26) Lift up the vehicle, wear insulated gloves and remove the bolts and ground cables.

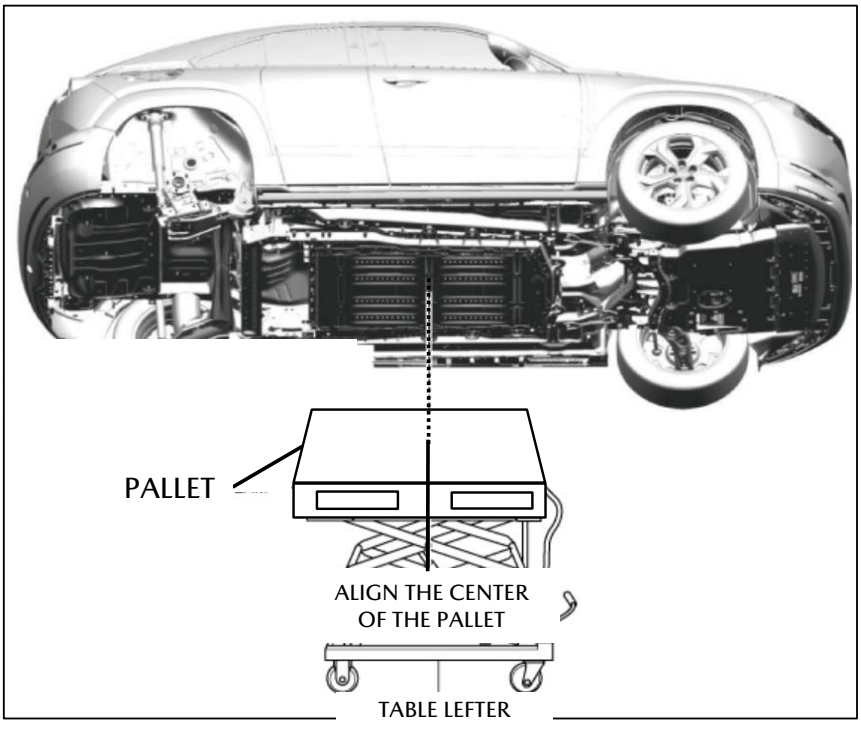




27) Remove the under cover.

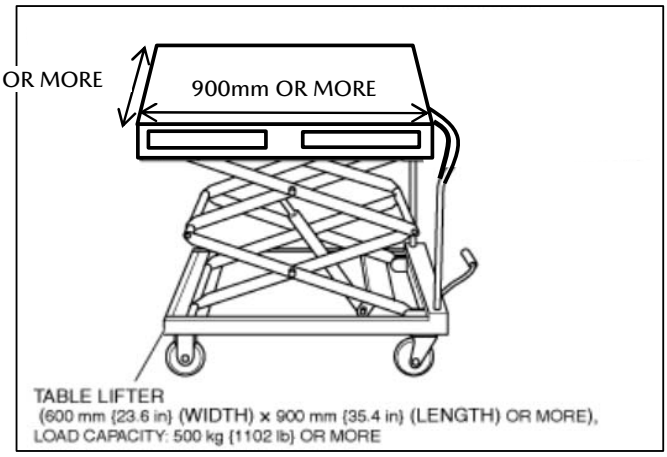


28) Wear insulated gloves and align the center of the table with the center of the high voltage battery to support the high voltage battery.



Warning

- Use a table lifter and a pallet of the sizes shown in the figure or larger. If the table lifter or the pallet are smaller than the specified sizes, they will not be able to support the high voltage battery (weight approx. 185 kg {407 lb}) and the table lifter will fall, which may cause serious injury or death, and equipment damage. In addition, the high voltage battery may be damaged and the high voltage parts may be exposed, which could cause electrical shock or a fire.

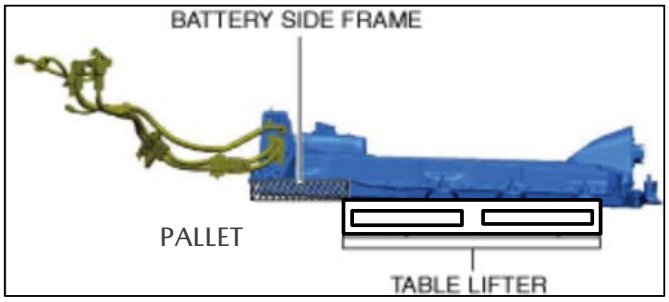


Caution

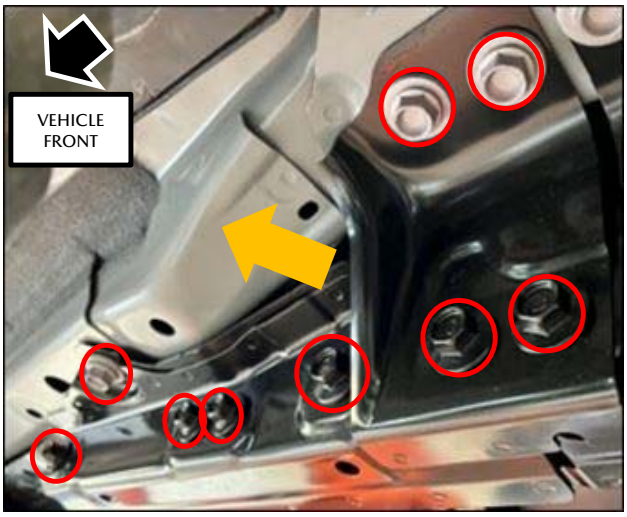
- The high voltage battery is a heavy object with a weight of about 185 kg {407 lb}. If handled incorrectly, the high voltage battery and the equipment could be damaged due to it falling over or falling down. Carefully handle the high voltage battery.

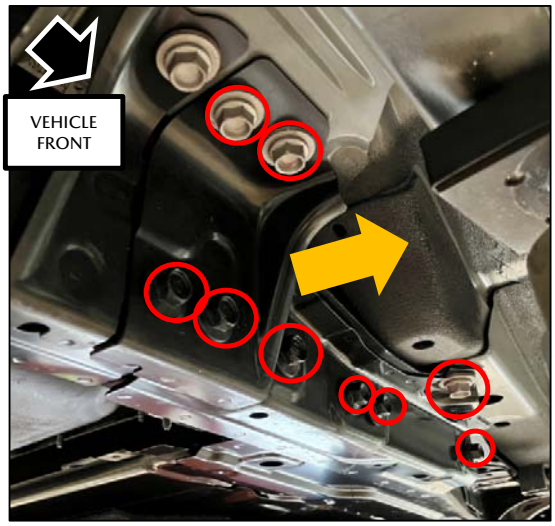
Note

- Install the pallet avoiding the battery side frame installation area.

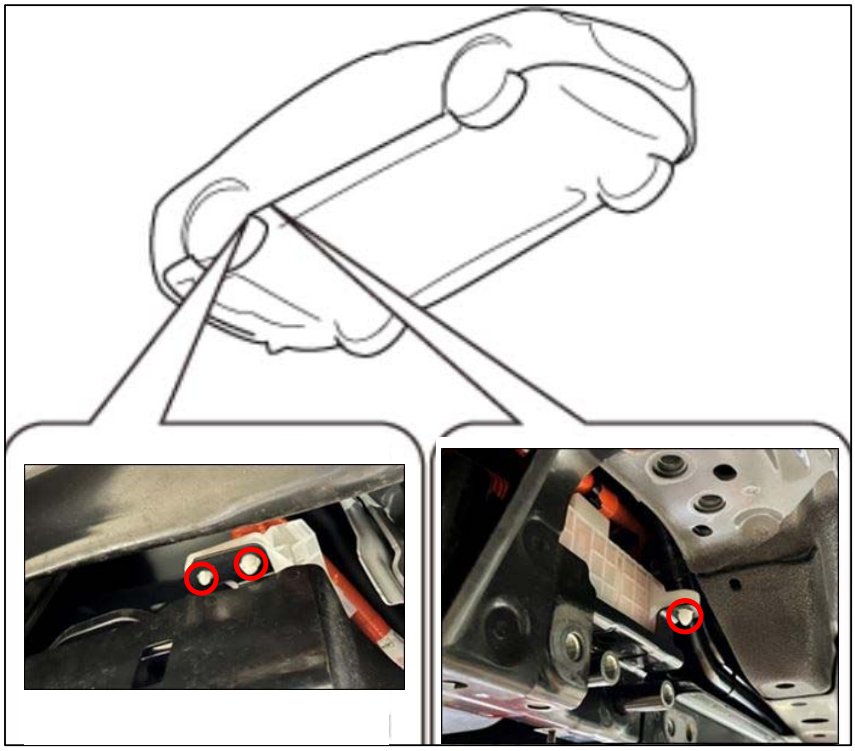


29) Remove the battery side frame.

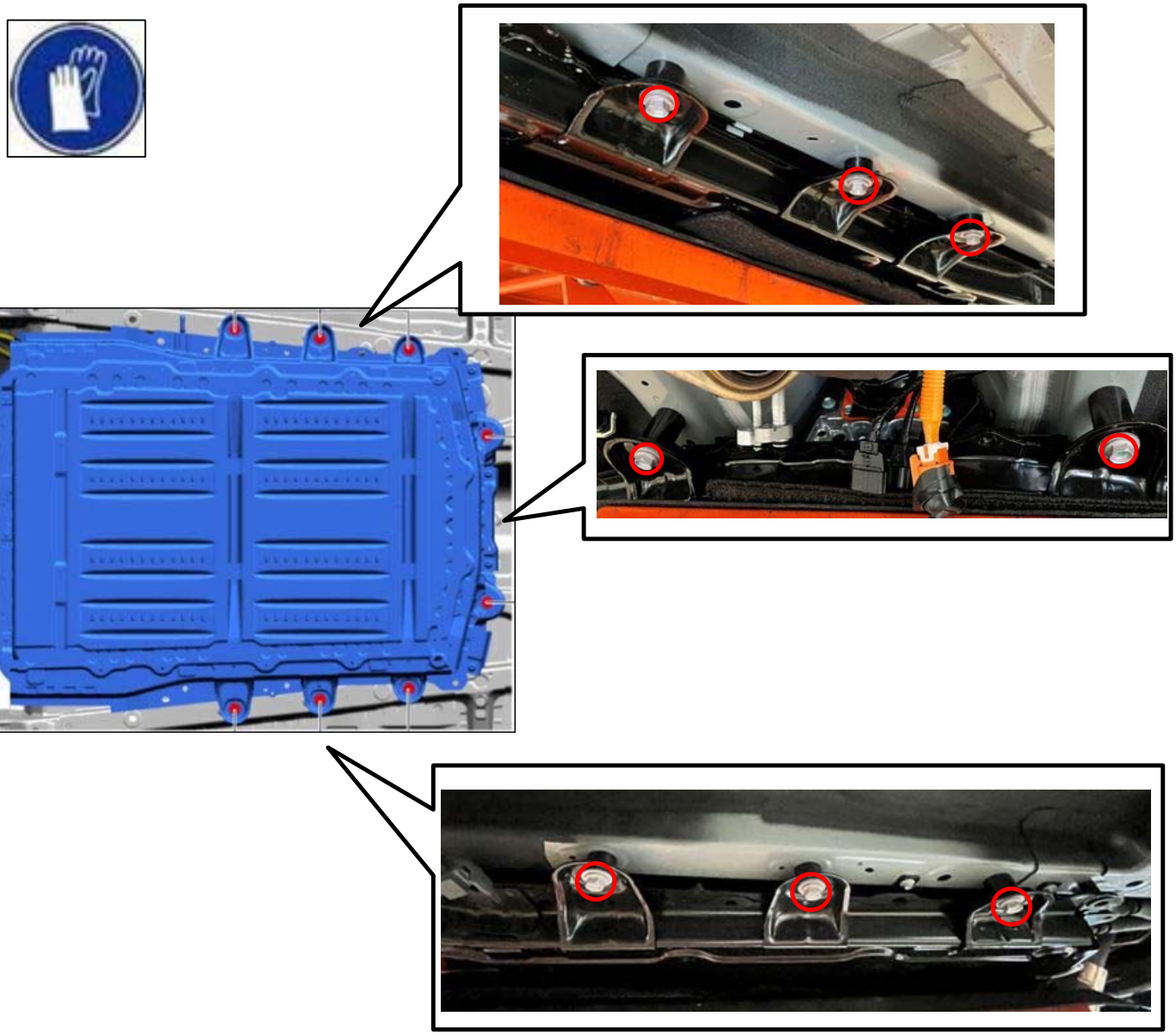




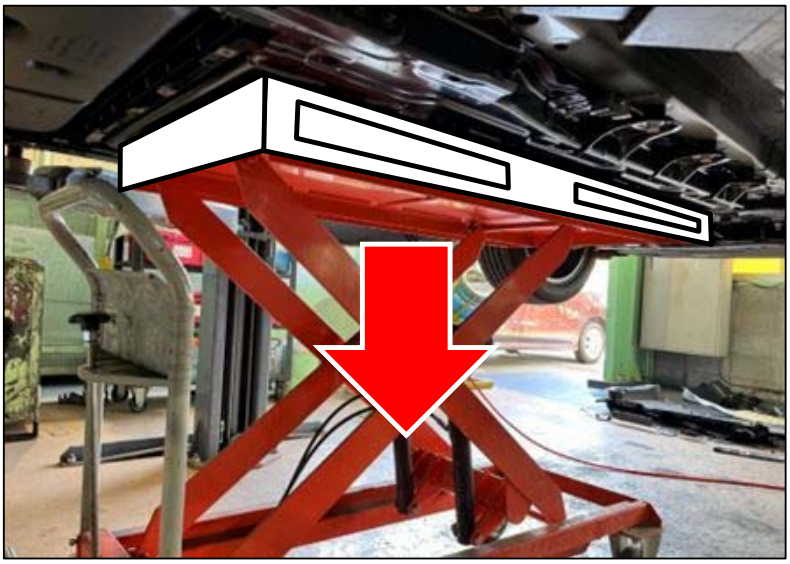
30) Disconnect the wiring harness clips.



31) Wear insulated gloves and remove the bolt shown in the figure.



32) Wearing insulated gloves, slowly lower the table lifter and remove the high voltage battery, making sure that the vehicle, high voltage battery and table lifter are not out of balance.



Warning

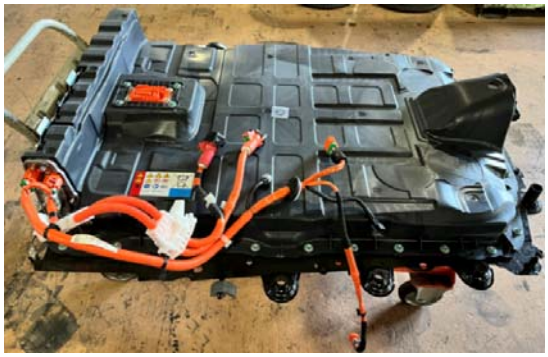
- When lowering the table lifter, verify that the vehicle on the auto lift is not tilted or unbalanced. If the vehicle is tilted or unbalanced, it may fall off the auto lift and cause a serious injury or death, and equipment damage.

Caution

- Verify that the vehicle, high voltage battery and the table lifter are not out of balance.
- Perform the work carefully while verifying that there is no interference with the fuel tank frame.

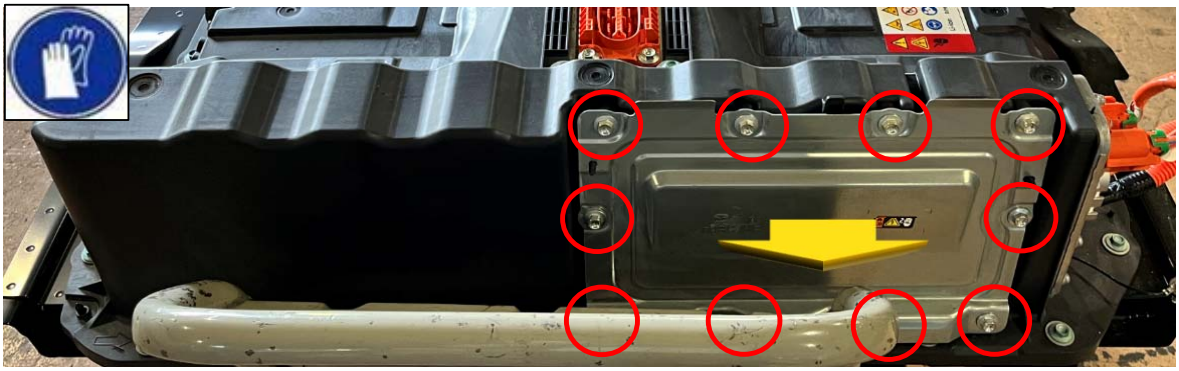
- Perform the work carefully while verifying that the high voltage cables is no interfere with other parts of the vehicle.
  Once the lifter has been lowered to a certain extent, stop it and, after securing sufficient working space, carefully pull the high voltage cables, check that all the cables have been pulled out and lower the lifter again.

- The battery after removing

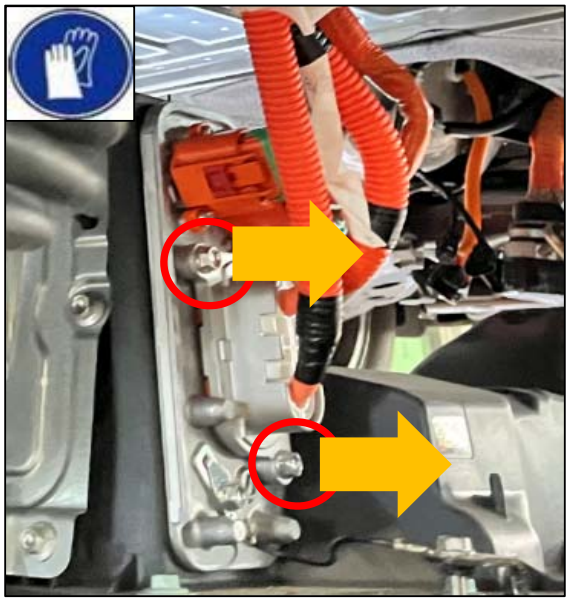


33) Wear insulated gloves and disconnect the high voltage cable connectors.

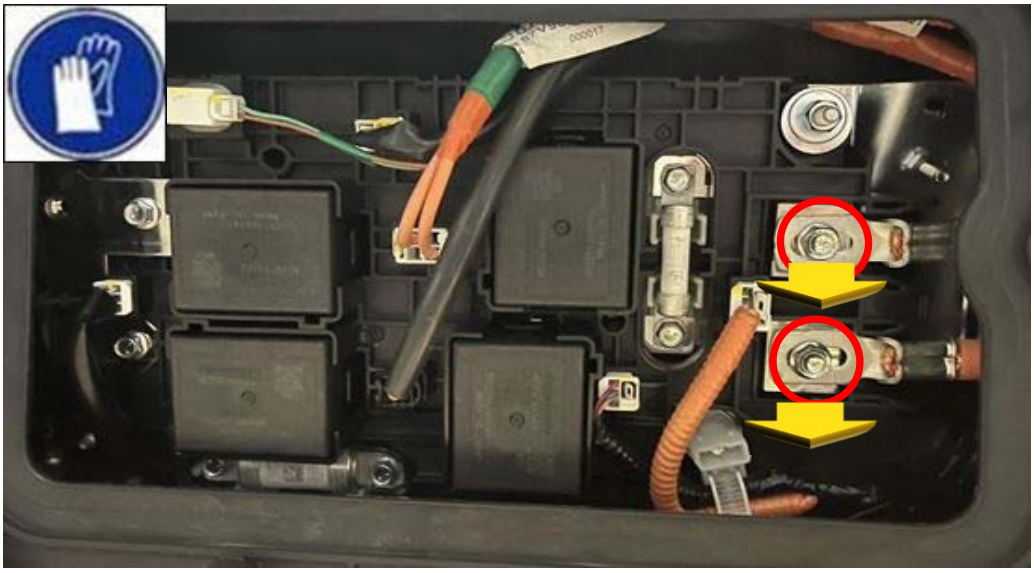
34) Wear insulated gloves and remove the cover.



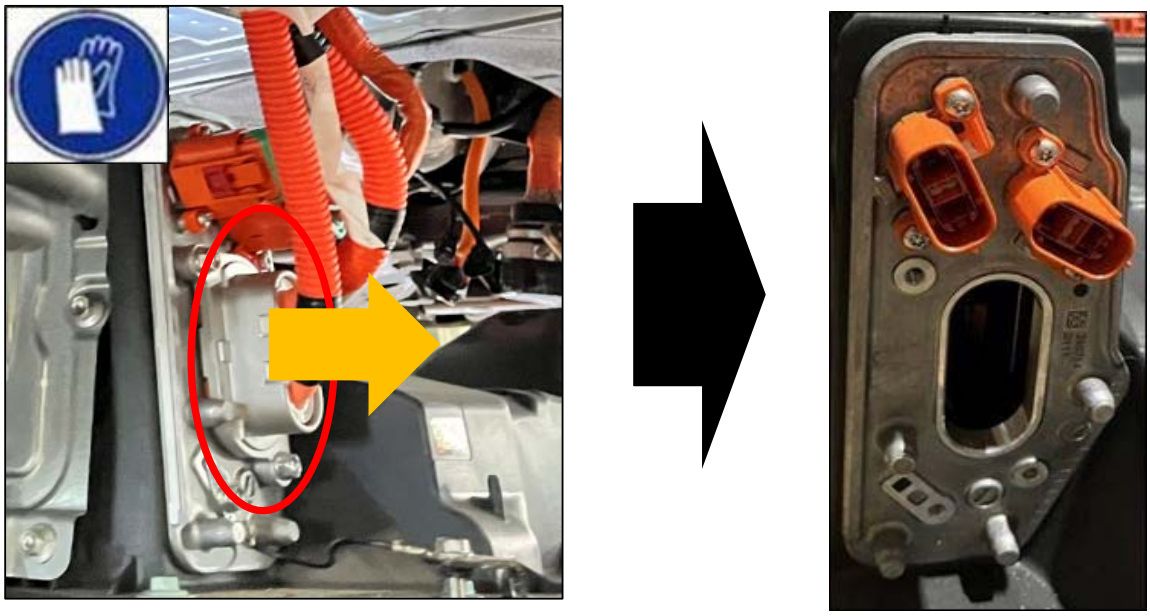
35) Wear insulated gloves and remove the bolts.



36) Wear insulated gloves and disconnect the battery terminals.



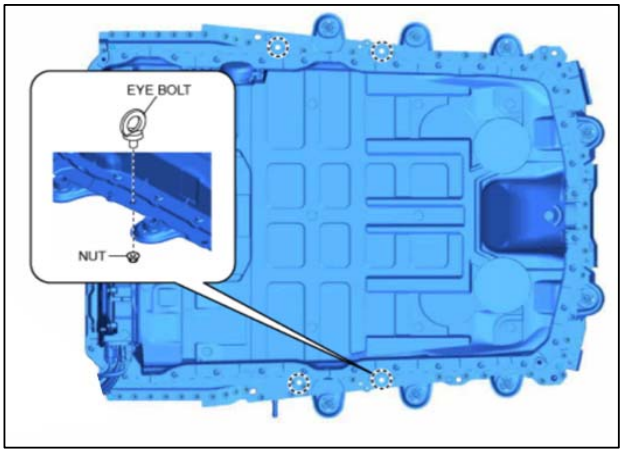
37) Wear insulated gloves and get the battery terminals outside.



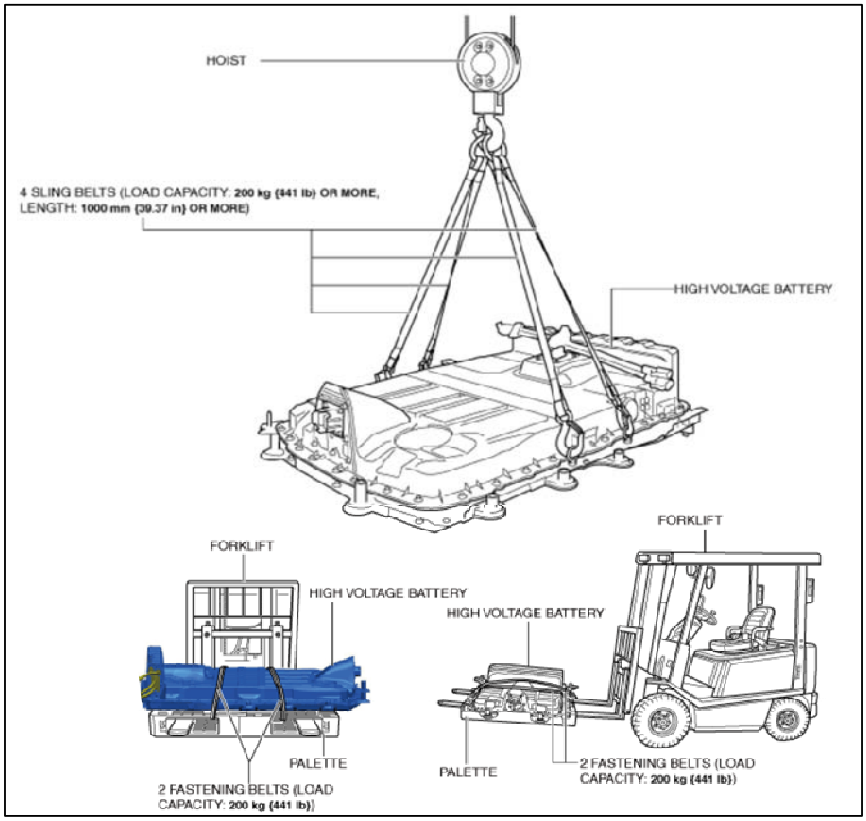
- The battery after removing the high voltage cable connectors and the battery terminals.

- Example of high voltage battery transportation method

  - Install the eye bolts (M12) using the nuts to the positions shown in the figure, suspend the high voltage battery, and then move it onto a palette.



  - Example of high voltage battery transportation method



7. Storage of the Remove high voltage battery

- Take care of the following situations with the removed high voltage battery.

Mixed touch prohibited substances	:	Metal products, water, seawater, strong oxidizers, and strong acids.
Appropriate storage conditions	:	In a cool, dark place (temperature: 0 to 35°C, humidity: 45 to 85%) and, away from rainwater.
Improper storage conditions	:	Direct sunlight, high temperature, and high humidity.