Rescue Guide

TEV75B Battery Electric Vehicle

ISSUE 01 – 2022

Introduction

This guide is intended only for the use of trained and certified rescuers and first responders. It assumes the reader has full knowledge of how the safety systems operate and completed all of the appropriate training and certification necessary to safely work in, and manage rescue situations.

Therefore, this guide provides only the specific information required to understand and safely handle the vehicle in an emergency situation. It contains important warnings and instructions that must be followed when working with the vehicle in an emergency situation.

WARNING

Always use the appropriate tools, and always wear the appropriate Personal Protective Equipment (PPE) when you are working on the truck. Failure to follow these instructions can cause serious injury or death.

WARNING

Regardless of the disabling procedure you use, always assume that all of the High Voltage components are energised. Cutting, crushing, or touching High Voltage components can result in serious injury or death.

WARNING

After deactivation, the high voltage circuit requires 5 minutes to de-energise.

WARNING

When there is fire involved, always consider the entire truck as energised and do not touch any part of the truck. Always wear full PPE, including Self-Contained Breathing Apparatus (SCBA), high voltage safety gloves (approved to IEC/EN 60903 standards), goggles and boots. Remove all metallic jewellery, including watches and rings. Failure to follow these instructions may result in serious personal injury or death.

WARNING

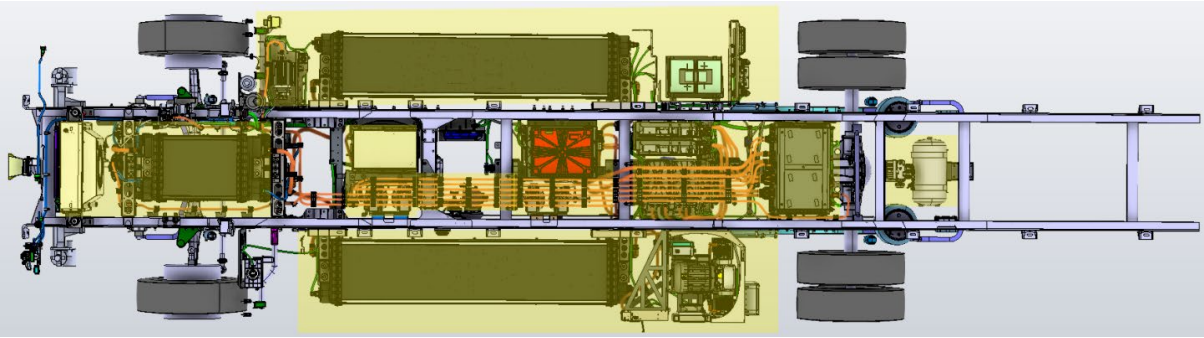
Handling a submerged truck without the appropriate PPE can cause serious injury or death.

High Voltage Battery Packs

Observe the following precautions when working on or around high voltage batteries:

- Do not cut or attempt to open the high voltage battery case or expose to excessive external force
- Do not penetrate the batteries or case in any way
- The high voltage battery packs are located to the side members of the chassis and under the cabin.
- The total voltage of the battery pack is approximately 400 volts DC
- The battery case is water resistant with connectors in place
- The battery cells contain a base electrolyte consisting of lithium hexafluorophosphate and organic solvents as the dominant active ingredient, absorbed in special polymeric film. The electrolyte will not leak from the battery under most conditions. However, if the battery is crushed, it is possible for electrolyte to leak.
- If possible, isolate and avoid contact with any electric vehicle components. If contact with the high voltage system cannot be avoided, Personal Protective Equipment (PPE) such as safety goggles, high voltage safety gloves (approved to IEC/EN 60903 standards), an apron or overcoat, and rubber boots are required when handling damaged batteries. Exposure to electrolyte could cause skin and/or eye irritation/burns. If exposed, rinse with large amounts of water for 10-15 minutes

Observe the no step zones (marked in yellow) below:

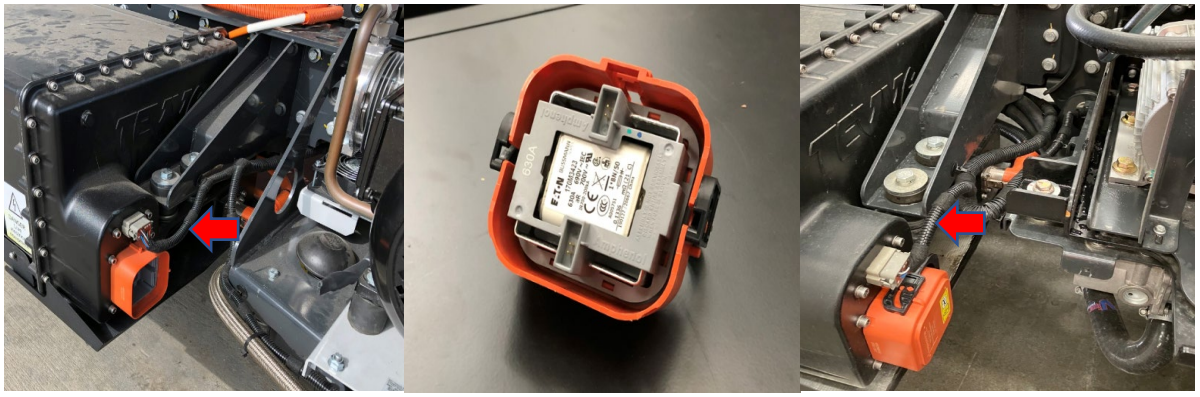


How to Verify if the Truck is Safe to Approach

Visually check the truck for signs of external damage. Pay attention to the front, rear and underside of the truck.

If there is extensive body damage, visually check that no HV cabling is exposed or badly damaged, to the point where the orange insulation has been removed, exposing bare wires. If damage is seen on HV components such as the motor, charger, inverter or battery or if any HV wire is exposed, then access to the ignition switch on the steering column should be gained by breaking the driver's window. The key should be switched to the off position and removed.

If the above checks do not raise any concerns, then isolate the truck by locating and removing the Manual Service Disconnects (MSDs) fitted to both of the two side batteries.



When these checks have been completed, it should then be safe to continue with the incident response.

If the MSDs cannot be removed, and as a last resort in an emergency, the low voltage wiring to each of the side batteries can be cut through (as indicated by the arrows above) using suitable insulated cutters. This will isolate the power to the battery contactors and should make the vehicle safe to work on.

WARNING

Removing the high voltage Manual Service Disconnects (MSDs) does not dissipate voltage inside the battery. The battery pack retains charge and should still be considered dangerous. Contact with the high voltage battery pack internals may result in serious personal injury or death.

Essential Tools and Equipment

Appropriately rated and insulated automotive hand tools should be used on the truck. Care should be taken to ensure isolation procedures have been followed prior to commencing any work, repairs or emergency access activity.

Hazard Identification

Following an incident that has caused catastrophic damage to the battery assembly, either as a result of fire or crushing, leakage of specific chemicals or combustion products could cause concern. The severity of any incident must be significant to achieve penetration of the outer battery casing and the inner box before the individual cells can be damaged. Potential for exposure should not exist unless the battery leaks, is exposed to high temperatures or is mechanically, physically or electronically abused.

Providing First Aid

Emergency first responders may not be familiar with specific EV hazards. The risk is relatively small if proper measures are carried out and could only appear due to a catastrophic crash or through gross mishandling. If there is any visual evidence of damage to or near HV cables

and components, then great care should be taken when approaching the truck. If persons are trapped, specifically if they are in contact with any damaged HV cables or components then they MUST be initially removed from such contact using an approved, insulated rescue hook.

In the event of such potential exposure, it is always important to wear relevant PPE. This includes goggles, high voltage safety gloves (approved to IEC/EN 60903 standards), and protective clothing with electrical resistance and isolating properties. All persons contaminated by or exposed to leaking fluids should be referred to a medical facility for treatment.

In the Event of an Electrical Fire

Always assume the high voltage batteries and associated components are energised and fully charged. Lithium-ion battery cells are difficult to extinguish as they create oxygen when burning and are therefore self-sustaining. A Class ABC powder-type extinguisher should be used to contain and smother the flames. Water can cause some degree of arcing/shorting across battery cells and/or battery terminals; it can also react with the electrolyte from the cells to generate additional combustible gas and other by products such as hydrofluoric acid. However, the cooling and smothering effects of flushing the affected article with large amounts of cold water is still beneficial for minimising the severity of the event. Do not use salt water as this can cause batteries to explode.

Under no circumstances should the batteries be removed from the truck or opened in the event of an incident as the live HV connections could be exposed.

Submerged Vehicles

Damaged electric vehicles submerged in water present a potential high voltage electrical shock hazard. Exercise caution and wear appropriate Personal Protective Equipment (PPE) including high voltage safety gloves (approved to IEC/EN 60903 standards), goggles and boots. Remove all metallic jewellery, including watches and rings.

If the truck is submerged in water, varying degrees of arcing/shorting within the battery will take place. Do not touch any high voltage components or orange cables while removing occupants. Do not remove the truck until you are sure the high voltage battery is completely discharged. A submerged high voltage battery may produce a fizzing or bubbling reaction to the water. If fizzing or bubbling is observed, the high voltage battery will be discharged when the fizzing or bubbling has completely stopped. The battery should still be treated as if it is not discharged. If the vehicle is submerged in salt water there is a risk of explosion.

The removeable towing eye can be fitted to the truck through a detachable cover in the front bumper. If access to the towing eye is not possible then a tow rope should be securely fastened to the vehicle underside using the rear axle or front lower suspension as fixing points. This process MUST ONLY be used for immediate recovery from the water.

Once the truck has been removed from the water, any water should be drained before transporting.

Failure to follow these instructions may result in serious personal injury or death.

Occupant Extrication and Do Not Cut Zones

Once the truck has been electrically isolated and, if necessary, stability has been restored, then occupant extrication can be completed following standard operating practice. Always use caution when cutting near the truck high voltage system components. Do not cut any of the high voltage under truck or under cabin cabling (all high voltage cabling is orange). High voltage cabling runs from the batteries and components under the cabin, along the chassis to side batteries and centrally mounted high voltage components. The charge port is located on the left side of the truck.

Access to the Truck

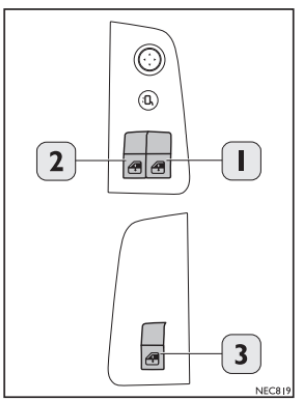
Doors

When the doors are open the two external light fixtures on the upper cross member and the white internal ceiling light illuminate. The external light fixtures switch OFF when the doors are closed (they are timer-controlled).

1. Lever for opening the door
2. Document pocket
3. Knob for locking the door from the inside
4. Handle for closing the door

Power Windows

The power window controls for both driver (1) and passenger windows (2) are located on the driver door side. The passenger can only operate the windows on the passenger side (3).



Steering Wheel Adjustment

If movement of the steering wheel or column position is necessary, loosen the adjusting lever on the steering column by rotating it counterclockwise until it stops.

Hold the steering wheel with your hands and adjust it by pulling it up or down to adjust the height. Push it forwards or pull it towards you to adjust the depth.

Seat Adjustment

If movement of the seat position is necessary:

Height adjustment

1. Lift lever to release the seat
2. Adjust height and release lever to lock

Seat back adjustment

1. Lift lever to release seat
2. Adjust seat back and release lever to lock

Forward and rearward adjustment

- Lift lever to release seat
- Slide forward or backwards and release lever to lock

Seat base adjustment

1. Lift lever to release seat
2. Tilt seat base up or down and release lever to lock

Moving Damaged Trucks

Select neutral and apply the parking brake, ensure the truck is switched off, activate the hazard lights, and remove the key from the vehicle until loading the vehicle for transport.

If you detect leaking fluids, sparks, smoke, flames, increased temperature, gurgling, popping or hissing noises from any of the HV battery compartments or electrical components, ventilate the passenger area and call the emergency services.

Always be alert. There is a potential for delayed fire with damaged lithium-ion batteries.

Avoid contact with orange high voltage cabling and areas identified as high voltage risk by warning labels.

Recovering the Truck

The truck should either be recovered on a flatbed recovery vehicle to avoid any possibility of causing further damage to the electric drivetrain and related systems or on a suspended tow with the half shafts removed. If unable to remove the half shafts, the prop shaft must be disconnected and supported.

Ensure there are no persons or objects behind the recovery vehicle when the vehicle is pulled onto the flatbed platform or tow truck.

In the event of an emergency breakdown on motorways, the truck can be towed very slowly for a very short distance.

Damaged Truck Storage

Recovery vehicle operators of tow trucks and vehicle storage facilities should ensure the damaged truck is kept in an open area instead of inside a garage or other enclosed building and not within 15m (50 ft) of any structure or vehicle.

Prior to placing vehicle in storage and while located in storage area/parking lot, continue to inspect vehicle for leaking fluids, sparks, smoke, flames, gurgling or bubbling sounds from the HV battery and call the emergency services if any of these are detected.

Ensure the passenger and cargo compartments remain ventilated at all times.