IMIEV06

Test, remove and store electric vehicle high voltage batteries

Overview

This standard is about testing, removing, and storing high voltage battery systems in electric vehicles. This may be relevant for vehicle dismantling or recycling operations. For the purposes of this standard, an electric vehicle is any vehicle that is in part or wholly electrically propelled. This would include:

- Hybrid (HEV) - to include mild/micro hybrid vehicles where the voltage is considered dangerous.
- Plug-in Hybrid (PHEV)
- Extended Range Electric Vehicle (ER-EV) or Range Extended Electric Vehicle (RE-EV)
- Battery Electric Vehicle (BEV) or Pure Electric Vehicle (PEV)
- Fuel Cell Electric Vehicle (FCEV).

Warning: It has been recommended by industry experts that only those with suitable training and experience on working with electric vehicles should carry out the functions below.

Performance criteria

You must be able to:

P1 Collect and analyse relevant technical information prior to commencing work on the vehicle

P2 Carry out a dynamic risk assessment of the vehicle and the work to be carried out

P3 Wear **personal protective equipment** (PPE) and use vehicle protection equipment (VPE) appropriate to the work activities you are carrying out

P4 Carry out thorough inspection of the external and visible parts of the high voltage battery, connections and cables for signs of **damage**

P5 Follow your organisation's and manufacturers' instructions if **damage** to the high voltage battery, connections and cables is found

P6 Isolate the high voltage system as per manufacturer's guidance

P7 Use test **equipment** in line with manufacturer's guidelines to ensure the integrity of the high voltage battery and the high voltage system prior to commencing removal

P8 Ensure all work carried out takes place immediately following inspection where possible or carry out a re-inspection following timescales recommended by the manufacturer

P9 Select, check and use appropriate tools/lifting **equipment** in line with manufacturer's guidelines and specification

P10 Remove the high voltage battery following manufacturer's guidelines and place in a suitable, isolated area with restricted access and correct signage

P11 Ensure records of work are accurate complete and passed to the relevant person in the format required.

P12 Follow workplace procedures in case of emergency

Knowledge and understanding

You need to know and understand:

Use of technical information

K1 The different types of electric vehicle and their electrical storage systems

K2 The terminology used within electric vehicle systems

K3 How and where to access relevant information on the specific electric vehicle systems

K4 How to identify high voltage components and/or parts that are connected to the high voltage system within the battery

Legislative and organisational requirements and procedures

K5 The authorisation procedures to allow an individual to work on high voltage systems

K6 How to carry out a dynamic risk assessment of the vehicle and the work to be carried out

K7 The current health and safety legislation, industry codes of practice or guidelines and specific vehicle manufacturer's safety procedures relevant to working with electric vehicles

K8 Why an electric vehicle might be cordoned off

K9 How to inform and make others aware of the potential hazards prior to and when work is being carried out on high voltage systems

K10 The importance of storing the high voltage battery in a suitable, isolated area with restricted access

K11 The factors to consider when moving and storing high voltage batteries

K12 How to work in a way that minimises the risk of:

K11.1 injury to yourself and others

K11.2 **damage** to your working environment

K11.3 **damage** to other vehicle systems, components and units

K13 The hazards associated with electric high voltage vehicle batteries when exposed to extreme temperatures, impact and other adverse conditions

K14 The implications and effects of electricity through the human body

K15 The implications of strong magnetic fields and the effects on medical devices

K16 Workplace procedures that must be followed in the event of electric shock and other emergencies

You need to know and understand:

K17 How to safely dispose of or recycle battery components in line with legislation and organisational procedures

K18 How to accurately report the work that has been carried out on the vehicle to relevant persons and the importance of doing so

Use of equipment

K19 How to select, check and use the **equipment** required to test, remove and move electric vehicle high voltage batteries

Testing and removing high voltage batteries

K20 How to identify any **damage** to the battery and the high voltage connections and cables

K21 How to safely isolate the vehicle following manufacturer's guidelines

K22 The procedures for the safe removal and storage of the high voltage battery

Scope/range

1. **High voltage personal protective equipment** includes**:**
   - 1.1. insulated high voltage gloves
   - 1.2. face shield
   - 1.3. fire resistant clothing/apron
   - 1.4. insulated tools

2. **Damage** includes**:**
   - 2.1. overheating
   - 2.2. physical impact damage
   - 2.3. fluid leakage
   - 2.4. smoke
   - 2.5. water damage
   - 2.6. cable insulation
   - 2.7. mountings/fixings
   - 2.8. battery box
   - 2.9. gaskets and seals

3. **Equipment** includes:
   - 3.1. Voltage detector
   - 3.2. Lifting and moving equipment
   - 3.3. De-pollution station
   - 3.4. Neutraliser for spilt electrolyte

Additional Information

Glossary

This section contains examples and explanations of some of the terms used but does not form part of the standard.

Dynamic risk assessment - the practice of mentally observing, assessing and analysing an environment while working, to identify and remove risk. The process allows individuals to identify a hazard on the spot and make quick decisions in regard to their own safety.

Hazards associated with high voltage electrical vehicle components – exist not only during work on high voltage systems, as specified above, but also on all other high-power electrical drive systems and high-pressure storage systems. Vehicle and equipment manufacturers' guidance should be followed at all times.

High voltage – Regulation No 100 of the Economic Commission for Europe of the United Nations (UNECE) — Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train, states that: 'High Voltage' means the classification of an electric component or circuit, if its working voltage is > 60 V and ≤ 1 500 V DC or > 30 V and ≤ 1 000 V AC root mean square (rms). Electricity at Work Regulations (1989), and associated HSE guidance should be followed at all times.
N.B. Some electric vehicles may operate at voltages below or above industry recognised standards.

Sources of information applicable to electric vehicles
Examples include hard copy manuals, data on computer and data obtained from on- board diagnostic displays.

Suitable isolated area
Manufacturers' Common Information currently available in IDIS (International Dismantling Information System) states:

- Store the battery where it will be kept dry and not exposed to high temperatures, fire and/or direct sunlight.

- Protect the battery from mechanical loads and damage (punctured or crushed).
- Batteries should be stored by battery type (i.e. NiMH), according to applicable legislation.
- Keep the battery away from water and rain.
- Never place directly on the floor. Lay a High Voltage rubber insulation mat underneath the battery.
- Always store the battery in its normally installed orientation, never invert.
- Store the battery in well-ventilated areas in accordance with applicable legislation.
- Only store batteries which are sufficient insulated against short circuiting.
- Cover the battery with a high voltage rubber insulation mat.
- Mark the storage with a warning sign.
- Please refer to manufacturer specific information where available and national legislation on storage of high voltage batteries.

Defective and damaged high voltage batteries must be stored in quarantine in a special place on the premises, monitored and marked as "DAMAGED/DEFECTIVE BATTERIES"

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