

Overview

This standard is designed for those who provide a recovery service to a broken down or accident damaged electric vehicle, for example, those working for roadside recovery operators and the emergency services; the standard would also be appropriate for those involved in the dismantling and disposal of electric vehicles. It covers the working practices and knowledge needed to carry out a risk assessment and work safely around an electric vehicle that may have damage to its high and/or low voltage systems.

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).

This standard does not deem someone competent to maintain, service or repair an electric vehicle's high voltage systems and their components.

N.B. This NOS may be used in conjunction with other vehicle recovery NOS, for example IMIRR0406. It may also be used in conjunction with NOS for EV first responders – IMIEV02a and IMIEV02b.

**Performance
criteria**

- You must be able to:
- P1 Identify the electric **vehicle** type, collect relevant information about the **vehicle** and associated electrical hazards and mark the **vehicle** as an EV
 - P2 Wear personal protective equipment (PPE) and use vehicle protection equipment (VPE) appropriate to the work activities you are carrying out
 - P3 Identify the hazards and assess the risks presented by the electric vehicle
 - P4 Follow the correct procedures to make the **vehicle** safe prior to starting any work activities, in line with your dynamic risk assessment, including where necessary, isolating high voltage electrical systems, within your level of authority and competence
 - P5 Carry out work activities in a way that minimises risks to yourself and other people
 - P6 Refer any problems with the **vehicle** that you cannot deal with yourself to a relevant person in your organisation and follow their instructions
 - P7 Establish a safe and appropriate transportation route and location for delivery
 - P8 Follow workplace procedures in case of emergency
 - P9 Record and report the work activities you have carried out on or near the **vehicle** to relevant colleagues.
 - P10 Follow a robust handover procedure

Knowledge and understanding

You need to know and understand:

Use of technical information

- K1 How to identify an electric **vehicle** and its type
- K2 How to find, interpret and use sources of information applicable to electric vehicles as appropriate to your job role
- K3 Why industry recognised guidance and recommendations are important and the implications of not following them
- K4 How to identify high voltage electrical components in an electric vehicle

Legislative and organisational requirements and procedures

- K5 The health and safety legislation, industry codes of practice or guidelines and workplace procedures relevant to working on, near or with electric vehicles, including the appropriate personal protective equipment and its use, and the safety of the working environment
- K6 The hazards associated with high and low voltage systems including batteries and other high voltage electrical vehicle components
- K7 The manufacturer's and your workplace procedures for:
 - K7.1 assessing and managing the risks associated with damaged and broken-down electric vehicles
 - K7.2 ensuring that the vehicle has been made safe as appropriate to the work you are carrying out, in line with your dynamic risk assessment, including isolating high voltage systems when necessary, within your level of training
 - K7.3 referring/reporting problems when working with electric vehicles
 - K7.4 recording and reporting work carried out on electric vehicles
 - K7.5 ensuring safe receipt and handover of a damaged electric vehicle, including marking the vehicle as an EV
- K8 The implications of video recording equipment on a vehicle and the relevant workplace procedures to follow if fitted.
- K9 How to carry out a dynamic risk assessment on damaged and broken-down electric vehicles, including components and cabling, battery integrity, shorting and loss of coolant
- K10 The implications and effects of electricity through the human body

You need to know
and understand:

- K11 The signs and symptoms of electrocution
- K12 The implications of strong magnetic fields and the effects on medical devices
- K13 Organisational procedures that must be followed in the event of electric shock
- K14 The hazards associated with electric vehicles when exposed to extreme temperatures, impact and other adverse conditions
- K15 What to do in an emergency, within your level of authority
- K16 The importance of adhering to a robust, documented handover procedure

High voltage component construction and layout

- K17 The fundamental features and principles of high voltage components, including battery modules, electric motors, associated components and auxiliary systems
- K18 How to identify the location of high voltage cables and components, for example, by labelling and colour and their associated voltages
- K19 The different types of energy storage systems and voltages associated with electric vehicles
- K20 The components of all fuel sources and systems on electric vehicles, including alternative fuels and hydrogen fuel cells
- K21 The hazards associated with all fuel systems, including alternative fuels and hydrogen fuel cells

Vehicle system operation

- K22 The main differences in recovery techniques between an electric vehicle and a non-electric vehicle
- K23 How to safely operate an electric **vehicle**
- K24 The charging systems associated with electric vehicles and how to use them safely, including the use of plug-in charging equipment
- K25 The specific manufacturer's guidelines and the precautions necessary when charging, connecting an auxiliary power source to, moving or towing an electric **vehicle**
- K26 How to immobilise an electric **vehicle** safely
- K27 The implications of remote vehicle control
- K28 When vehicle systems may self-operate

Scope/range

1. **Vehicle** - any vehicle that is in part or wholly electrically propelled. This would include
 - 1.1. Hybrid (HEV) - to include mild/micro hybrid vehicles where the voltage is considered dangerous
 - 1.2. Plug-in Hybrid (PHEV)
 - 1.3. Extended Range Electric Vehicle (ER-EV) or Range Extended Electric Vehicle (RE-EV)
 - 1.4. Battery Electric Vehicle (BEV) or Pure Electric Vehicle (PEV)
 - 1.5. Fuel Cell Electric Vehicle (FCEV)

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**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.

Handover procedure – to include mark up of vehicle and detailed incident record, including hazards encountered and actions taken.

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 $> 60 \text{ V}$ and $\leq 1\,500 \text{ V DC}$ or $> 30 \text{ V}$ and $\leq 1\,000 \text{ V AC}$ 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. Also, Department for Transport guidance for recovery operators, phone apps for recovery operators

Status of vehicle – broken down, with damage which may present a hazard, end of life.

Work activities –dealing with electric vehicles as part of carrying out recovery/collection activities.

FINAL DRAFT

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