



SAFETY ASSESSMENT
FEDERATION

Guidance

In-Service Inspection Procedures

Formal inspection and testing of electric
vehicle charging equipment

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SITUATION

Electrical Vehicle Charging Equipment (EVCE) as defined by the BS7671 IET Wiring regulations are rapidly being deployed across the UK to meet the demand for low emission vehicles and the UK Government Industrial Strategy: [Road to Zero](#). This uptake for EVCE means that standards must also adapt quickly.

Employers, the self-employed and employees have duties under the Electricity at Work Regulations 1989. Specifically, there is a requirement that “systems shall be maintained so as to prevent, so far as is reasonably practicable, such danger”. (Regulation 4.2).

At the time of publishing the following are additional relevant resources for technical guidance. Although non-statutory the following may be used in a court of law to demonstrate compliance with statutory obligations of the Electricity at Work Regulations 1989 including Regulation 4.2:

- BS7671 Requirements for electrical installations (IET Wiring regulations 18th Edition)
- Specifically, section 722 – Electric Vehicle Charging Installations
- IET Code of Practice for Electric Vehicle Charging Equipment Installation
- IET/APEA joint publication: Electric Vehicle Charging Installations at Filling Stations

Despite many EVCE installations being relatively new installations, we are still seeing many faults and defects across the board. Usually, this equipment is installed outside and vulnerable to external influences such as water ingress and ultraviolet light. Equipment is also often vulnerable to mechanical impact from moving vehicles and often has been incorrectly installed and non-compliant with fast evolving regulations and guidance.

SAFed Member companies may choose to provide inspection and testing services specifically for EVCE. This document sets out the recommended scope of the service that SAFed Member Inspection Companies should provide if contracted to undertake formal inspection and testing of electrical vehicle charging equipment.

GUIDANCE

It is recommended that the following aspects are covered by the agreed scope or works if contracted to undertake formal inspection and testing of electrical vehicle charging equipment in accordance with BS7671 and associated guidance as detailed above.

A formal EVCE condition report should be produced as evidence of the inspection and testing. The inspection report will provide an engineering view of electrical safety and the compliance status include:- observations and recommendations, schedules of test results and give an assessment of the condition of the installation. Dangerous defects should be notified in writing to the client whilst the Engineer Surveyor is still on site.

The recommended next inspection frequency should also be stated on the report. The recommended frequency should be determined based on the condition, age and use of the EVCE. For example, the use of the EVCE in a domestic setting might be infrequent and by the same person who is familiar with the equipment. Alternatively, EVCE installed at motorway service stations would be high use by many users.

The following checks should be done in relations to electrical safety and compliance:

1. Available records, check that records are available such as the following:

- A. Electrical Installation Certificate (EIC)
- B. Operations & Maintenance (O&M) records

2. Visual Inspection external and internal visual inspection of all components and enclosures with regards to the following:

- A. Insulation of conductors
- B. Wear and Tear
- C. Corrosion
- D. Damage
- E. Overloading
- F. External influences (e.g. water ingress)
- G. Signs of overheating/burning
- H. Correct identification of equipment

3. Protective Conductors

- A. Assessment of earthing arrangement (special requirements apply for PME)
- B. Continuity of protective conductors

4. Polarity should be confirmed as part of visual inspection and or testing at the following points:

- A. The Over Current protection device (OCPD) supplying the EVCE
- B. Any device of OCPD including RCDs internal to the EVCE
- C. Any associated accessory connected to the EVCE (e.g. lighting)

5. Earth Loop Impedance*

Should be checked by appropriate and calibrated test instrument in relation to the disconnection time and maximum values required for the final circuit supplying the EVCE.

6. Prospective Fault Current*

Should be checked by appropriate and calibrated test instrument in relation the breaking capacity of the associated equipment.

7. RCD Testing*

EVCE typically incorporates type A RCDs these should be tested using an appropriate test instrument. Testing in line with below should be done on all RCDs associated with the EVCE. Functional (trip button) tests should only be done after the instrument test so as not to influence the results of the instrument tests.

- A. 0.5 x rated current
- B. 1 x rated current
- C. 5 x rated current
- D. Functional Test (trip button)

8. EVCE Functional Testing

Should be done in line with manufacturers recommendations, this will typically include simulating the following states using an EVCE adaptor:

- A. EV disconnected EVCE in idle state, EV not ready to receive energy, EVCE does not supply energy.
- B. EV connected EV detected, EV not ready to receive energy, EVCE does not supply energy.
- C. EV charged without ventilation EV ready to receive energy, EVCE is supplying energy if ventilation is not required.
- D. EV charged with ventilation EV ready to receive energy and requires ventilation, EVCE is supplying energy only if ventilation exists.
- E. Pilot fail EVCE doesn't supply energy (no power). The EV supply equipment unlocks the socket outlet.

*RCD, Earth loop impedance and prospective fault current testing is typically done from the socket using an EVCE adaptor and an appropriate test instrument.