**Document Number: EDS 07-1120**

**Version: 1.0**

**Date: 07/07/2023**



## ENGINEERING DESIGN STANDARD

# EDS 07-1120

# SUBSTATION ELECTRIC VEHICLE CHARGING POINTS

| | |
|---|---|
| **Network(s):** | EPN, LPN, SPN |
| **Summary:** | This standard details the requirements for the provision of electric vehicle charging points (EVCP) at grid and primary substations. |

| | | | |
|---|---|---|---|
| **Author:** | Stephen Tucker | **Date:** | 07/07/2023 |
| **Approver:** | Barry Hatton | **Date:** | 15/07/2023 |

This document forms part of the Company's Integrated Business System and its requirements are mandatory throughout UK Power Networks. Departure from these requirements may only be taken with the written approval of the Director of Asset Management. If you have any queries about this document please contact the author or owner of the current version.

**Circulation**

**UK Power Networks**

- ☒ Asset Management
- ☒ Capital Programme
- ☒ Connections
- ☐ Health & Safety
- ☐ Legal
- ☒ Network Operations
- ☐ Procurement
- ☐ Strategy & Regulation
- ☐ Technical Training

**External**

- ☐ G81 Website
- ☒ Contractors
- ☐ ICPs/IDNOs
- ☐ Meter Operators

## Revision Record

| | | | |
|---|---|---|---|
| **Version** | 1.0 | **Review Date** | 07/07/2028 |
| **Date** | 07/07/2023 | **Author** | Stephen Tucker |

- New design standard on the provision of electric vehicle charging points at new and upgraded grid and primary substations.
- Incorporates content from bulletin EBB 07-0057 which has been withdrawn.
- Installation request contact details changed (Section 8).

## Contents



## Tables



## Figures

# 1 Introduction

This standard details the requirements for the provision of electric vehicle charging point (EVCP) at grid and primary substations.

As part of UK Power Networks Environmental Action Plan (EAP) Ofgem required that DNO's achieve a verified carbon reduction target with the Science Based Target Initiative (SBTi). The EAP currently includes the following carbon commitments:

- For our **full carbon footprint**, including losses and indirect scope 3 emissions, we will exceed our reduction target approved by the Science Based Targets initiative (SBTi) at well below 2 °C. We will commit to the business ambition for 1.5°C SBTi campaign (which will see us upgrade our carbon targets and adopt the Net Zero standard early in ED2).
- We will reduce our **directly controllable emissions** (scope 1 & 2, excluding losses) exceeding a 1.5°C reduction trajectory and offset any remaining residual emission to achieve Net Zero by 2028 using high quality verified offsets.
- As part of our verified Science Based Target, we will work with our suppliers to reduce our **supply chain carbon emissions** (scope 3) by 25% by 2028, compared to a 2018/19 baseline. We will report our progress through our Annual Environmental Report.

This will require the transition of our fleet to electric vehicles where practical and develop the associated EV charging infrastructure. As part of the EAP a provision is included to support the funding of this for new chargers, predominantly for home charging but also some depot and onsite charging.

Therefore, an EVCP shall be installed at all **new** and **upgraded** grid and primary substations where practical using the process and guidance in this standard.

This document includes:

- A brief overview of the electric vehicle charging system used by UK Power Networks (Section 4).
- Substation EVCP requirements (Section 5).
- Substation EVCP request process (Section 6).
- Approved charging point details (Section 7).
- Contacts (Section 8).

The installation of an EVCP at a grid or primary substation shall be funded as part of the ancillary electrical services provided for the new or upgraded substation.

UK Power Networks Services (UKPNS) is currently providing EVCP installation, commissioning, and maintenance services to UK Power Networks.

# 2 Scope

This standard applies to the design and installation of electric vehicle charging points at grid and primary substations.

This standard does not apply to secondary substations or 132kV, 33kV and 11kV substations/switchrooms associated with customer demand or generation connections.

 

# 3 Glossary and Abbreviations

| Term | Definition |
|---|---|
| 1P+N | Single-phase and neutral |
| 3P+N | Three-phase and neutral |
| Customer Switchroom | A substation that typically only contains 33kV or 11kV switchgear required to provide a connection to a generation or demand customer |
| DNO | Distribution Network Operator |
| EAP | Environment Action Plan |
| ED2 | Electricity Distribution 2. The RIIO-ED2 price control sets the outputs that each DNO needs to deliver for their consumers and the associated revenues they are allowed to collect for the five-year period from 1 April 2023 to 31 March 2028 |
| EV | Electric Vehicle |
| EVCP | Electric Vehicle Charging Point |
| Grid Substation | A substation with an operating voltage of 132kV or 66kV and may include transformation to 33kV, 22/20kV, 11kV or 6.6kV |
| LS0H | Low Smoke Zero Halogen |
| MCB | Miniature Circuit Breaker |
| Primary Substation | A substation with an operating voltage of 33kV and may include transformation to 11kV, 6.6kV or LV |
| RIIO | Revenue = Incentives + Innovation + Outputs |
| RFID | Radio Frequency Identification |
| Secondary Substation | A substation with an operating voltage of 20kV, 11kV or 6.6kV |
| SBTi | Science Based Targets Initiative |
| SWA | Steel Wire Armour |
| UK Power Networks | UK Power Networks (Operations) Ltd consists of three electricity distribution networks:<br>• Eastern Power Networks plc (EPN).<br>• London Power Network plc (LPN).<br>• South Eastern Power Networks plc (SPN). |
| UKPNS | UK Power Networks Services |

# 4 Overview

Many UK Power Networks sites already have EVCPs installed, some examples are shown in Figure 4-1. The same system is used at substation EVCPs.

Figure 4-1 – Typical UK Power Networks EVCP Installations

The charging points are typically 7kW, 11kW or 22kW Mode 3 Type 2 with single or dual socket outlets. The charger size is dependent on the available supply capacity and selected to minimise infrastructure expenditure.

**Note:** Multiple 7kW chargers will usually provide a more flexible solution than a single 11kW or 22kW charger.

Users of UK Power Networks fleet vehicles utilise a RFID card at the charging points to initiate and complete a charging session. The RFID card is issued by Transport (Section 8). The charging costs are passed directly to the business.

Staff and visitors may register to use the EVCPs at UK Power Networks sites through use of a third-party mobile phone app. The app requires the user to register their own debit/credit card details for payment of any electric vehicle charge.

Third-party suppliers are used to provide payment processing facilities and to manage, operate and maintain the system on behalf of UK Power Networks.

A brief overview of the user interaction with the system is shown in Figure 4-2.

**Note:** Distribution Licence Condition 31F does not permit DNOs to provide electric vehicle charging for public use. Refer to BS 96 for further information.


Figure 4-2 – UK Power Networks EV Charging Setup

## 5 Installation Requirements

An EVCP shall be installed at:

- All **new** grid and primary substations (refer to Section 2 for exceptions).
- All **existing** grid and primary substations where assets are being replaced or upgraded and sufficient electrical capacity exists. It is not the intention that the installation of an EVCP will drive an upgrade to LVAC supply or switchboard unless it is required for the wider substation upgrade works.

**All EVCPs shall be installed in accordance with the process in Figure 6-1. All substations with an EVCP shall include metering in accordance with EDS 08-1112.**

The EVCP shall be:

- Located within the confines of the substation perimeter fence such that it is only accessible by authorised staff and are not accessible to the general public[1].
- Positioned next to a suitable parking area to allow the simultaneous charging of two vehicles (typically via a 5-metre cable).
- Positioned such that the parked vehicles and the associated charging cables do not cause an obstruction or impede access/egress to/from the substation.
- Positioned such that the parked vehicle does not from a climbing aid.
- Mounted on an adjacent building wall or within an EVCP column.
- Physically protected by bollards or barrier where required to prevent accidental damage from parked vehicles.
- Designed and installed to allow future repair, upgrade, or rewire with minimal disruption.
- Installed in accordance with the IET Code of Practice for Electric Vehicle Charging Equipment Installation.

The EVCP electrical supply shall be designed in accordance with BS 7671 and shall be:

- Supplied via a suitable substation distribution board.
- Supplied via a single-phase or three-phase circuit protected by a suitable MCB (or equivalent fuse for existing substations).
- Supplied via a suitable LS0H SWA cable.
- Supplied via an adjacent lockable rotary disconnector.
- Bonded to earth.
- Typical EVCP supply requirements are included in Table 5-1.

**Note:** The EVCP requires a mobile phone signal to operate correctly, and this should be considered during the site survey. There is not currently an option to utilise an alternative comms medium e.g. substation LAN.

Table 5-1 – Typical EVCP Supply Requirements

| Charger Size (kW) | Voltage (V) | Current (A) | Supply Type | MCB (A) | Minimum Cable ($mm^2$) |
|---|---|---|---|---|---|
| 7 | 230 | 32 | 1P+N | 40 | 6 |
| 11 | 400 | 16 | 3P+N | 20 | 4 |
| 22 | 400 | 32 | 3P+N | 40 | 6 |

[1] Distribution Licence Condition 31F does not allow DNOs to provide electric vehicle charging for public use. Refer to BS 96 for further details.

# 6 Installation Process

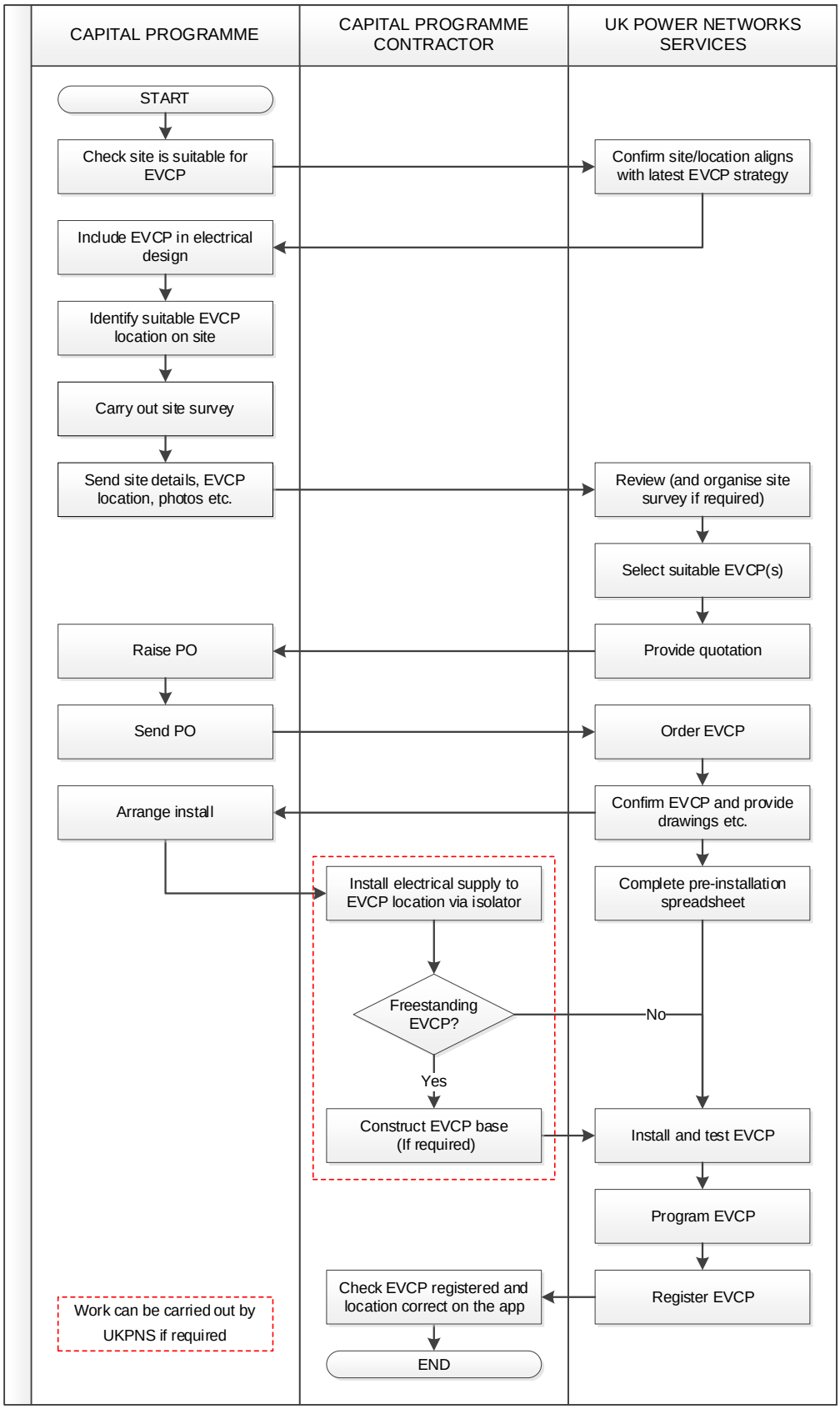


Figure 6-1 – Substation EVCP Process

## 7 Approved EVCP

The EVCP charger market and usage is constantly evolving therefore the approved EVCP will also evolve as required. A summary of the basic EVCP specification is included below.

- Provides a charging capacity per outlet of 7kW, 11kW or 22kW.
- Provides single or dual Mode 3 Type 2 socket outlets.
- Supports OCPP 1.5 (JSON) and OCPP 1.6 (JSON) protocols.
- Supports RFID and third-party app authorisation.
- Includes freestanding and wall mounted options.
- Complies with BS EN IEC 61851-1 and BS EN 61851-22.
- Complies with BS 7671 (and the latest amendments).
- Includes a minimum IP54 rating (to BS EN 60529).

The charger and the associated items are available from UK Power Networks Services (Section 8).

## 8 Contacts

For further information contact the relevant department detailed in Table 8-1.

Table 8-1 – EVCP Contacts

| Service | Department | Contact |
|---|---|---|
| EVCP installations | UK Power Networks Services | EVHelpline@ukpowernetworks.co.uk |
| RFID cards | Transport | employeecharging@ukpowernetworks.co.uk |
| Onsite assistance with the charger or app | | 01224 980052 |
| Other queries or issues | Asset Management | Document author |

# 9 References

## 9.1 UK Power Networks Standards

| | |
|---|---|
| EDS 07-1119 | Substation Electrical Services |
| EDS 08-1112 | Substation LVAC Supplies |
| BS 96 | Licence Condition 31F. Requirements relating to Electric Vehicle Recharging Points |

## 9.2 National and International Standards

| | |
|---|---|
| Code of Practice for Electric Vehicle Charging Equipment Installation (4th Edition) | |
| BS 7671:2018+A2:2022 | Requirements for Electrical Installations (IET Wiring Regulations 18th Edition) |
| BS EN 60529:1992+A2:2013 | Degrees of protection provided by enclosures (IP code). |
| BS EN 61851-1:2019 | Electric Vehicle Conductive Charging System. General Requirements |
| BS EN 61851-22:2002 | Electric Vehicle Conductive Charging System. AC Electric Vehicle Charging Station |

# 10 Dependent Documents

The documents below are dependent on the content of this document and may be affected by any changes.

| | |
|---|---|
| EDS 07-1119 | Substation Electrical Services |