


Scenario:

A circuit, as shown in **figure 1**, is to be installed to supply electric vehicle supply equipment (EVSE) purchased by the owner of the property (**details below**), the (EVSE) is to be located on a domestic driveway mounted onto a solid oak purpose made post.



Home 7 Plus

PRODUCT OVERVIEW	
 Home Series chargers UNTETHERED MODEL HOME 7 HOME 7 PLUS HOME 22 PLUS	
FINISHES	PRODUCT ATTRIBUTES Materials of front panel. Powdered coated diecast aluminium Materials of lid. CNC anodised aluminium* Accoya timber finished in water based stain* Plastic ASA-PC finished in anthracite Colours: Up to 107 combinations of colours and finishes*
ATTRIBUTES	PRODUCT ATTRIBUTES Dimensions (mm) H: 286 x W: 196 x D: 111 Operating Temperature: -25°C to 50°C Weight: 3.3 kg IP Rating: IP54 enclosure Standby Consumption: <2.0W 3 Year manufacturer warranty
TECHNICAL	CHARGING Number of phases: 1 and 3 phases Charging Current: 1.4 - 7.4 kW (6A to 32A Per Phase) Connection: Type 2 socket 207-253v ~ 50/60Hz 32A 230V/400v 3N ~ 50/60Hz 32A Home Load balancing Solar charging Multi chargepoint load management Accuracy of built-in energy meters (+/- 2%)
SAFETY	PROTECTION SYSTEMS Built-in RCD for residual current imbalance protection RCD-30mA Type A 6 mA DC according to IEC 62955 Integrated overload protection according to BS EN IEC 61851-1:2019 Loss of PEN protection according to BS 7671: 2018/A1:2020 Impact resistance: IK08 Fire class: UL94 Insulation class: Class 2 Welded contact detection Thermal protection system Locking type 2 socket Fail safe wireless load management*
CONNECTIVITY	WIRELESS CONNECTIVITY Bluetooth Low Energy 4.0 Wi-Fi 2.4 GHz b/g/n connection Smart Home system wireless support* S&P App Open API

* Not available on Home 7

SIMPSON & PARTNERS

[Simpson & Partners EV Charger \(simpson-partners.com\)](https://www.simpson-partners.com)

The circuit is to be wired using Doncaster Cable Ultra EV/Cat5e three-core steel wired armoured 90 °C thermosetting XLPE insulated cable with copper Class 2 conductors.

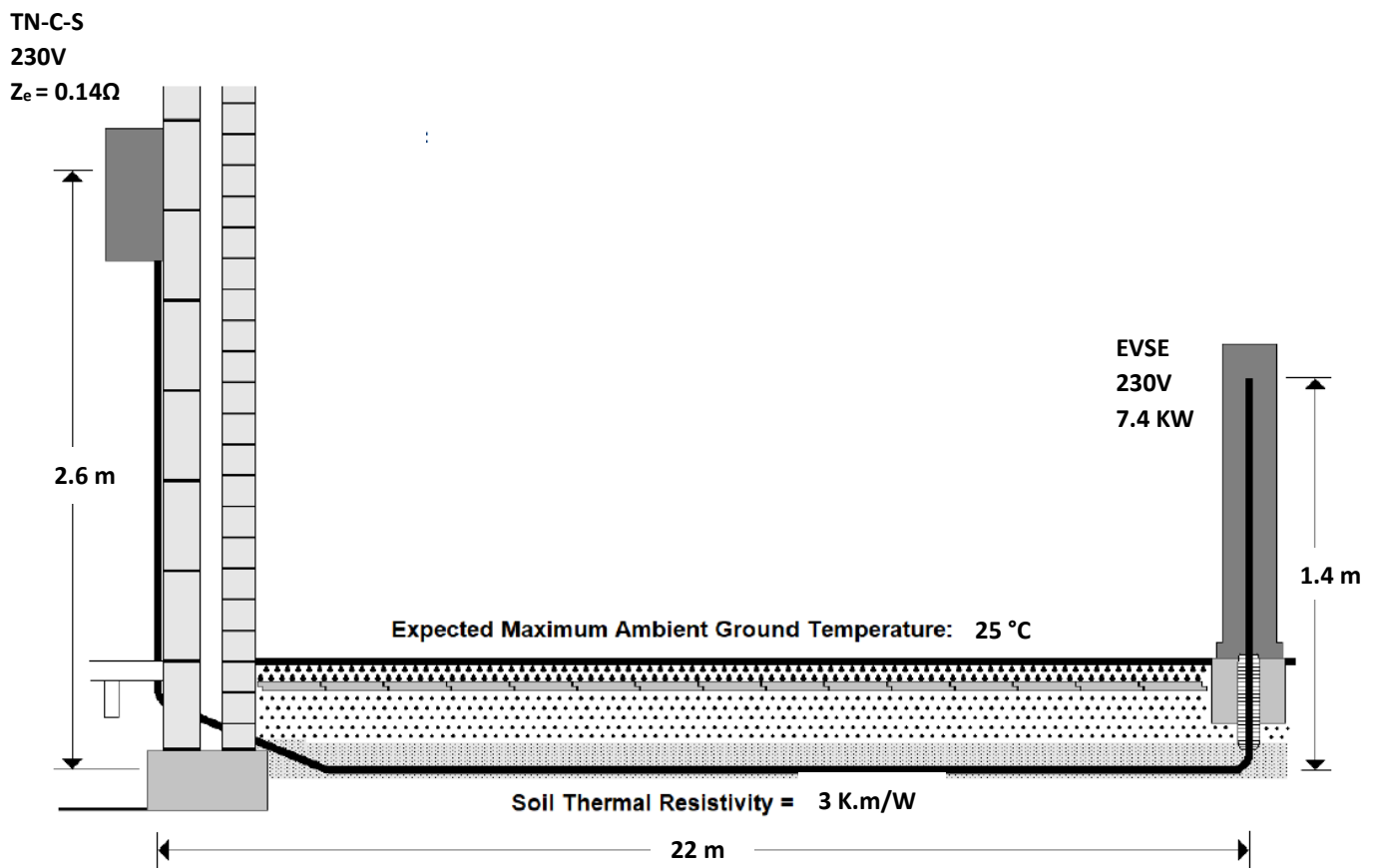
(See Doncaster Cable Data Sheet)

One core of the cable is to be utilised as the cpc.

The installation is supplied via a public low-voltage distribution system.

The cable is to be fixed directly to a masonry wall for part of the route and is to be installed directly in the ground at a depth of 0.5 m prior to entering the EVSE.

Figure 1



1. Determine the:

a) design current (I_b)

32.17 Amps

b) **minimum** nominal rating and type of protective device (I_n).

40 Amps

2. Determine the:

d) reference method used to calculate the current capacity of the circuit live conductors

Ref Method D

e) appropriate rating factors and their values.

$C_a = 0.96$ (Ground Ambient Temperature) 25 °C

$C_c = 1$ (Buried Circuits) OVERLOAD (**NOTE** - 5.2 - Appendix 4 BS 7671 (2022))

$C_d = 1.03$ (Depth of Burial) 0.5m

$C_s = 0.9$ (Resistivity of Soil) 3 K.m/W

f) minimum current carrying capacity, in amperes, that the cable must be capable of carrying.

$I_z = 36.52$ Amps

3. Select a suitable cable for current-carrying capacity including the:

vii. appropriate table and column number

Table 4D4A / Column 6 BS 7671 (2022)

viii. tabulated value of current carrying capacity I_t

$I_t = 37$ A

ix. **minimum** cross-sectional area.

4.0mm²

4. Determine the:

c) voltage drop for the circuit.

9.2 Volts

d) **maximum** permissible voltage drop in volts, to the EVSE terminals.

11.5 Volts

5. Determine the R_1+R_2 for this circuit at full operating temperature.

0.31 Ω

6. Determine for this circuit the:

- a) total earth fault loop impedance

0.45 Ω

- b) maximum permissible earth fault loop impedance (Z_s).

1.09 Ω

7. Determine, in respect of thermal constraints, for this circuit:

- a) the prospective earth fault current at the extremity of the circuit

511.11 Amps

- b) the actual disconnection time.

0.1s

- c) the value of k for the protective conductor.

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- d) compliance in respect of Regulation 543.1.3.

Minimum size CPC 1.13mm²

8. State a suitable type of RCD that can be used to protect this circuit, to comply with manufacturer's instructions and BS 7671 (2022).

30mA Type A  **BS EN 61008 / BS EN 61009**

Integral RCD non-compliant with BS EN 61008 product standard and therefore not recognised by BS 7671 (2022) (currently)

Electronic device as opposed to mechanical and therefore no test button.

9. Verify from the manufacturer's technical guidance documentation compliance with Regulation 722.411.4.1 of BS 7671 (2022) including NOTE 1.

Indent (v) utilised within charger as per the manufacturers technical data.

INSTALLATION

INSTALLATION FEATURES

No earth rod or upstream S1-PEN unit required

Installation earthing: TNC-S/TN-S/TT

Advanced S1-PEN technology 722.411.4.1 (v)

Install on 1-phase or a 3-phase supply

Automatic over the air updates

Current adjustment in 1 amp increments

Optional shunt connection

G100 compliant fail safe wired and wireless load management

Cable diameter: 2.5-10 mm²

Terminal tightening : 1.8-2.0 Nm

Cable strip length: 10 mm

Mounting:

Flush mounting location using x3 fixing points, handy drilling template provided within our packaging.

Cable entry:

Rear/Bottom 20-25mm removable compression gland.

25mm compression gland provided

NOTE 1: See Section 511. BS 7671 does not deal with the safety requirements for the construction of electrical equipment.

Where equipment to be used is not covered by a British or Harmonized Standard, or where there is no British or Harmonized Standard for the functionality of a piece of equipment used, it is the responsibility of the electrical installation designer or other person responsible for specifying the installation to establish that:

- (i) the equipment meets the requirements of the Electrical Equipment (Safety) Regulations 2016 (as amended), the Electromagnetic Compatibility Regulations 2016 (as amended) and other relevant legislation, and
- (ii) the equipment has either a CE, UKCA or UKNI mark and a Declaration of Conformity; where third-party approval is required, the equipment is marked appropriately.

The **Declaration of Conformity** is to be **appended** to the **certification** for **initial verification**.

Where **the above** is **satisfied**, it is **not considered to be a departure** from **BS 7671:2018+A2:2022**.

Append the declaration of conformity certificate to the EIC.

ELECTRICAL INSTALLATION CERTIFICATE (REQUIREMENTS FOR ELECTRICAL INSTALLATIONS – BS 7671)		Certificate No.:
DETAILS OF THE CLIENT		
INSTALLATION ADDRESS		
DESCRIPTION AND EXTENT OF THE INSTALLATION Description of installation:		New installation <input type="checkbox"/>
Extent of installation covered by this Certificate:		Addition to an existing installation <input type="checkbox"/>
(Use continuation sheet if necessary) See continuation sheet No.:		Alteration to an existing installation <input type="checkbox"/>
FOR DESIGN I/We, being the person(s) responsible for the design of the electrical installation (as indicated by my/our signatures below), particulars of which are described above, having exercised reasonable skill and care when carrying out the design, hereby CERTIFY that the design work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with BS 7671:2018, amended to(date) except for the departures, if any, detailed as follows:		
Details of departures from BS 7671 (Regulations 120.3, 133.1.3 and 133.5):		
Details of permitted exceptions (Regulation 411.3.3). Where applicable, a suitable risk assessment(s) must be attached to this Certificate. Risk assessment attached <input type="checkbox"/>		
The extent of liability of the signatory or signatories is limited to the work described above as the subject of this Certificate. For the DESIGN of the installation: ** (Where there is mutual responsibility for the design)		
Signature: Date: Name (IN BLOCK LETTERS): Designer No 1		
Signature: Date: Name (IN BLOCK LETTERS): Designer No 2**		
FOR CONSTRUCTION I, being the person responsible for the construction of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the construction hereby CERTIFY that the construction work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671:2018, amended to(date) except for the departures, if any, detailed as follows:		
Details of departures from BS 7671 (Regulations 120.3 and 133.5):		
The extent of liability of the signatory is limited to the work described above as the subject of this Certificate. For CONSTRUCTION of the installation:		
Signature: Date: Name (IN BLOCK LETTERS): Constructor		
FOR INSPECTION & TESTING I, being the person responsible for the inspection & testing of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the inspection & testing hereby CERTIFY that the work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671:2018, amended to(date) except for the departures, if any, detailed as follows:		
Details of departures from BS 7671 (Regulations 120.3 and 133.5):		
The extent of liability of the signatory is limited to the work described above as the subject of this Certificate. For INSPECTION AND TESTING of the installation:		
Signature: Date: Name (IN BLOCK LETTERS): Inspector		
NEXT INSPECTION I/We, the designer(s), recommend that this installation is further inspected and tested after an interval of not more than years/months.		



DECLARATION OF CONFORMITY

In accordance with EC Directive 768/2008/EC

OBJECT OF THE DECLARATION:

PRODUCT	S&P electric vehicle charging station
MODEL	HOME 7, HOME 7 Plus, HOME 22 Plus
MANUFACTURER	Simpson-Partners Ltd
ADDRESS	Unit 8, Kemble Business Park, Crudwell, Malmesbury, SN16 9SH, UK

This declaration is issued under the sole responsibility of the manufacturer.

The object of the declaration detailed above is in conformity with the relevant harmonised legislation:

2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive
	Electrical Equipment Safety Regulations 2016

Conformity is shown by compliance with the applicable requirements of the following documents:

REFERENCE & DATE	TITLE
EN 61851-1:2019	Electric vehicle conductive charging system Part 1: General requirements
IEC 62955:2018	Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles.
EN 50581:2012	RoHS compliance
	The Electric Vehicles (Smart Charge Points) Regulations 2021 Inclusive of Schedule 1

Signed for and on behalf of: Simpson-Partners Ltd
Place of issue: UK
Date of issue: 24th May 2022
Name: David Simpson
Position: Managing Director
Signature: *David Simpson*

SIMPSON-PARTNERS LTD Reg No: 13124938
CC-01240522

SIMPSON & PARTNERS

10. list any other considerations to ensure compliance with BS 7671 (2022).

Ensure compliance with Regulation 443.4

443.4 Overvoltage control

443.4.1 Transient overvoltages due to the effects of indirect lightning strokes

Protection against transient overvoltages shall be provided where the consequence caused by the overvoltage could result in:

- (i) serious injury to, or loss of, human life
- ~~(ii) failure of a safety service, as defined in Part 2~~
- (iii) significant financial or data loss.

For all other cases, protection against transient overvoltages shall be provided unless the owner of the installation declares it is not required due to any loss or damage being tolerable and they accept the risk of damage to equipment and any consequential loss.

[BEAMA Guide to Surge Protection Devices \(SPDs\) – Selection, Application and Theory](#)



Ensure compliance with **Regulation 132.16**

132.16 Additions and alterations to an installation

No addition or alteration, temporary or permanent, shall be made to an existing installation, unless it has been ascertained that the **rating** and the **condition of any existing equipment, including that of the distributor**, will be **adequate for the altered circumstances**. Furthermore, the **earthing and bonding arrangements**, if necessary for the protective measure applied for the **safety of the addition or alteration**, shall be adequate.

Ensure compliance with **Regulation 133.5**

133.5 New materials and inventions

Where the use of a **new material or invention leads to departures from the Regulations**, the **resulting degree of safety of the installation shall be not less than that obtained by compliance with the Regulations**. Such use shall be **recorded on the appropriate electrical certification specified in Part 6**.

Ultra EV cable is not recognised currently in Table 4A3 of BS 7671 (2022) so therefore the use of it will constitute a departure and shall be recorded on the EIC.

The manufacturers technical information should be appended to the EIC.

ELECTRICAL INSTALLATION CERTIFICATE
(REQUIREMENTS FOR ELECTRICAL INSTALLATIONS - BS 7671) Certificate No.:

DETAILS OF THE CLIENT	
.....	
INSTALLATION ADDRESS	
.....	
DESCRIPTION AND EXTENT OF THE INSTALLATION	
Description of installation:	New installation <input type="checkbox"/>
Extent of installation covered by this Certificate:	Addition to an existing installation <input type="checkbox"/>
	Alteration to an existing installation <input type="checkbox"/>
(Use continuation sheet if necessary) See continuation sheet No:	
FOR DESIGN	
I/We, being the person(s) responsible for the design of the electrical installation (as indicated by my/our signatures below), particulars of which are described above, having exercised reasonable skill and care when carrying out the design, hereby CERTIFY that the design work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with BS 7671:2018, amended to (date) except for the departures, if any, detailed as follows:	
Details of departures from BS 7671 (Regulations 120.3, 133.1.3 and 133.5):	
Details of permitted exceptions (Regulation 411.3.3). Where applicable, a suitable risk assessment(s) must be attached to this Certificate.	
Risk assessment attached <input type="checkbox"/>	
The extent of liability of the signatory or signatories is limited to the work described above as the subject of this Certificate.	
For the DESIGN of the installation: ** (Where there is mutual responsibility for the design)	
Signature:	Date: Name (IN BLOCK LETTERS): Designer No 1
Signature:	Date: Name (IN BLOCK LETTERS): Designer No 2**
FOR CONSTRUCTION	
I, being the person responsible for the construction of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the construction hereby CERTIFY that the construction work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671:2018, amended to (date) except for the departures, if any, detailed as follows:	
Details of departures from BS 7671 (Regulations 120.3 and 133.5):	
The extent of liability of the signatory is limited to the work described above as the subject of this Certificate.	
For CONSTRUCTION of the installation:	
Signature:	Date: Name (IN BLOCK LETTERS): Constructor
FOR INSPECTION & TESTING	
I, being the person responsible for the inspection & testing of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the inspection & testing hereby CERTIFY that the work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671:2018, amended to (date) except for the departures, if any, detailed as follows:	
Details of departures from BS 7671 (Regulations 120.3 and 133.5):	
The extent of liability of the signatory is limited to the work described above as the subject of this Certificate.	
For INSPECTION AND TESTING of the installation:	
Signature:	Date: Name (IN BLOCK LETTERS): Inspector
NEXT INSPECTION	
I/we, the designer(s), recommend that this installation is further inspected and tested after an interval of not more than years/months.	

Available in both CarbonTek® PVC Tuff-Sheathed or CarbonTek® SWA variants.

Conductor: Plain Annealed Copper Class 2 Stranded to BS EN 60228
Insulation: Thermosetting XLPE Type GP8 to BS 7655-1.3
Bedding: CarbonTek®
Steel Wire Armour: Galvanised steel wire armour (where applicable)
Sheathing: CarbonTek®
Energy Monitor Cable: Cat5e FTP—Foil Screened 4 twisted pair

Manufactured in the UK

This cable is designed for use in the installation of electric vehicle charge points. The cable incorporates power conductors and an enhanced Cat 5 screened data cable, encapsulated in a double sheathed design for extra protection. Whilst designed for use in electric vehicle charge points, the cable is also suitable for other installations where power and data is required.

These cables are designed to be installed in air, clipped to surface, on cable tray/ladder work and embedded in concrete. The cables can be laid direct in the ground providing that suitable mechanical protection is in place.

STANDARD CORE COLOURS
 3 core
 5 core

MINIMUM OPERATING TEMPERATURE -15°C
 MAXIMUM OPERATING TEMPERATURE 90°C
 MINIMUM BENDING RADIUS 8xØ

The British Cable Company You Can Trust

Sales Office: Millfield Industrial Estate, Arksey Lane, Bentley, Doncaster, South Yorkshire, DN5 0SJ
 Tel: 01302 821700 Email: sales@doncastercables.com

Ensure compliance with **Regulation 722.531.3.1**

722.531.3.1 RCDs shall disconnect all live conductors.

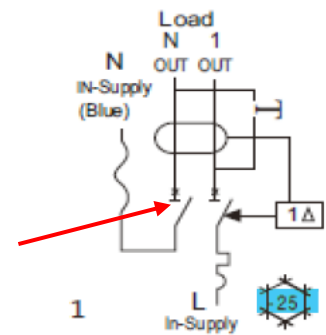


RTAM MINI RCBO 6kA **1P+N** (Switched Neutral)
Instruction Leaflet DOC:RCBOMINI2022

FuseBox®



Wiring Diagram

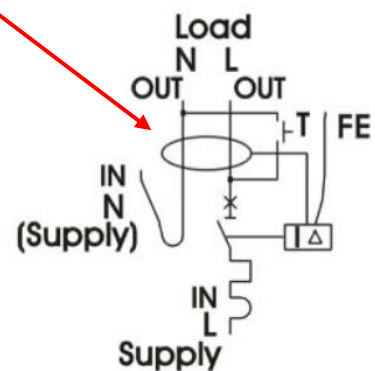


FuseBox®

CAUTION:
DISCONNECT L AND N BEFORE CARRYING OUT INSULATION
RESISTANCE TEST.
BLUE CABLE CAN BE CUT TO SIZE BUT MUST BE CRIMPED.



RCBO 6kA **1 pole** (B CURVE) TYPE A



Internal protection

The S&P Home 7, Home 7 Plus and Home 22 Plus all provide the installer with 30mA Type A RCD protection with the addition of 6mA DC.

Overcurrent device recommended at 40 amps.

Some jurisdictions may require an external RCD/RCCB/RCBO. The installer should take this into account when designing the installation.

Should an upstream RCD be required due to the reference method this is to be a Type A. **Ensure that no Type AC residual protection is upstream of an EV charger, the DC leakage could cause this not to function correctly under fault conditions.** More info https://www.electrical-installation.org/enwiki/Types_of_RCDs

All S&P's chargers have built in patent pending Gen 2.0 S1-PEN technology allowing for a much simpler install and the peace of mind that the installation is as safe as it can be.

Our GEN 2.0 S1-PEN design allows the charger to be installed on a 1-phase or a 3-phase supply and any type of earthing arrangement in the UK.

Consideration shall be given to any RCDs and their type present upstream within the existing installation in relation to DC currents generated from the EVSE and possible blinding of type AC RCDs.

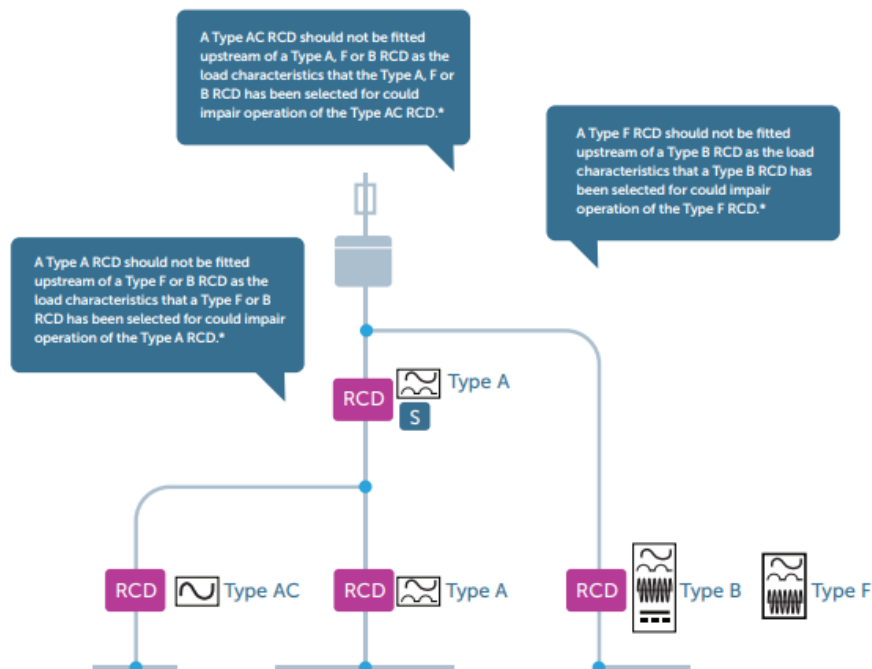


FIGURE 13 – EXAMPLE INSTALLATION ARRANGEMENT

* Note: Type AC, A or F RCDs may, when specifically declared as a suitable arrangement by the RCD manufacturer, be fitted upstream of a Type B RCD. Impaired operation is commonly termed as 'RCD blinding'.

[BEAMA Guide - RCD selection for protection of Electric Vehicle charging installations](#)

[BEAMA Guide - Selection and Application of RCDs - August 2022](#)

Schedule of inspections item 13.0 may require a separate list to ensure additional requirements of Section 722 BS 7671 (2022) have been met.



Schedule of Inspections					
Item No.	Description	Outcome ✓ / N/A	Item No.	Description	Outcome ✓ / N/A
1.0	Condition of consumer's intake equipment (Visual inspection only)		8.0	Circuits (Distribution and Final)	
			9.0	Isolation and switching	
2.0	Parallel or switched alternative sources of supply		10.0	Current-using equipment (permanently connected)	
3.0	Protective measure: Automatic Disconnection of Supply (ADS)		11.0	Identification and notices	
4.0	Basic protection		12.0	Location(s) containing a bath or shower	
13.0	OTHER SPECIAL INSTALLATIONS OR LOCATIONS				
13.1	Where the installation includes special installations or locations relating to sections of Part 7, additional inspection items should be added to the checklist.				
13.2	List all other special installations or locations present, if any. (Record separately the results of particular inspections applied)				

Schedule of Inspections					
Item No.	Description	Outcome ✓ / N/A	Item No.	Description	Outcome ✓ / N/A
1.0	Condition of consumer's intake equipment (Visual inspection only)		8.0	Circuits (Distribution and Final)	
			9.0	Isolation and switching	
2.0	Parallel or switched alternative sources of supply		10.0	Current-using equipment (permanently connected)	
3.0	Protective measure: Automatic Disconnection of Supply (ADS)		11.0	Identification and notices	
4.0	Basic protection		12.0	Location(s) containing a bath or shower	
5.0	Protective measures other than ADS		13.0	Other special installations or locations	
6.0	Additional protection		14.0	Prosumer's low voltage electrical installation(s)	
7.0	Distribution equipment				

Example checklist of items requiring inspection during initial verification

This checklist provides examples of items to aid completion of the schedule of inspections in the electrical installation certificate.

The inspection should include a check of all relevant items in relation to the electrical installation. However, the list of items is not exhaustive and so this inspection checklist can be adjusted to reflect the particular installation.

Numbers in brackets are Regulation references.



421.1.7 Arc fault detection devices (AFDD) conforming to BS EN 62606 shall be provided for single-phase AC final circuits supplying socket-outlets with a rated current not exceeding 32 A in:

- Higher Risk Residential Buildings (HRRB)
- Houses in Multiple Occupation (HMO)
- Purpose-built student accommodation
- Care homes.



RANGE FEATURES & SPECIFICATIONS

CODES :	CFEV1A	CFEV2	CFEV1RDA	CFEV3AFA	CFEV3AFW
POPULATED WITH :	1x 40A 30MA DOUBLE POLE TYPE A RCD, 1x TYPE 2 SPD, 1x 32A MCB FOR SPD, 1x 40A B-CURVE MCB	1x 100A MAIN SWITCH, 1x TYPE 2 SPD, 1x 32A MCB FOR SPD, 1x 40A B-CURVE MCB	1x 40A 30MA TYPE A RCBO DOUBLE POLE, 1x 100A MAIN SWITCH, 1x TYPE 2 SPD, 1x 32A MCB FOR SPD	1x 40A TYPE A B-CURVE AFDD, 1x TYPE 2 SPD, 1x 32A MCB FOR SPD	
INCOMER :	40A 30MA TYPE A RCD	100A MAIN SWITCH	100A MAIN SWITCH	40A TYPE A AFDD	
MODULES / WAYS :	5 MODULE / 5 WAYS				

ONE FOR ANOTHER TIME!!

