Modification	At what stage is this document in the process?
# DCRP/21/04 EREC G12 Issue 4 - Final Modification Report ## Revision of Engineering Recommendation (EREC) G12 Issue 4 Amendment 2 - *Requirements for the Application of Protective Multiple Earthing to Low Voltage Networks*	01 Modification 02 DCRP report 03 Public Consultation 04 Final Modification Report

The purpose of this document is to assist the Authority in its decision to implement the proposed modifications to EREC G12 Issue 4.

The proposed modifications were subject to industry consultation between 9th April 2021, until 7th May 2021.

Date of publication: 23rd November 2021

Recommendation

The Distribution Code Review Panel (DCRP) and distribution network licensees recommend that the proposed modifications are made to Engineering Recommendation (EREC) G12 Issue 4.

	The DCRP and distribution network licensees recommends that this modification should be: Submitted to the Authority for approval.
	High Impact: Manufacturers
	Medium Impact:
	Low Impact:

Contents

Timetable

Workgroup Report presented to DCRP	1st April 2021
Draft report issued for public consultation	9th April 2021
Consultation Closed	7th May 2021
Final Modification Report available for Panel	24th June 2021
Final Modification Report submitted to Authority	5th July 2021
Second submission of revised Report	23rd November 2021

Any questions?

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1. Purpose of the Modification

ENA Engineering Recommendation (EREC) G12 is an Annex 2 document to the Distribution Code which provides recommendations for the application of protective multiple earthing (PME) to low voltage networks. EREC G12 is referenced in Annex 2 of the Distribution Code and is incorporated within the Distribution Code as part of the Code's technical requirements. Therefore any change to EREC G12 constitutes a change to the Distribution Code and has to be approved by the Distribution Code Review Panel (DCRP).

The current version, EREC G12 Issue 4, came into effect in February 2014 followed by its 1st amendment which was implemented in January 2016.

Public policy supports a long term shift from internal combustion engine vehicles towards eco-friendly vehicles, most likely wholly electric vehicles (EV). It is highly likely that the rollout of infrastructure supporting the widespread use of electric vehicles will result in significant investment in electric vehicle technology and installation of on street devices to meet increasing demand.

An EV Charge Point Earthing Project Team was initiated by ENA in 2020 to update the guidance in EREC G12 Issue 4. This project team had expertise drawn from the ENA Earthing Cooridnation Group (ENA ECG), the ENA Low Carbon Technology Group (ENA LCT) and the ENA Safety Health and Environment Group (ENA SHE).

This edition of EREC G12 issue 4 incorporates Amendment 2, which modifies the requirements for earthing of electric vehicle charging points connected to street electrical fixtures and takes into account the use of open neutral detection and earth disconnection devices. A further modification of EREC G12 (Issue 5) is currently planned for 2022.

With no product standard currently in place to cover these devices, on the grounds of the Electicity Safety, Quality and Continuity Regulations (ESQCR) 24(4) and 25(2)a that place duties on the Distributor which are discharged by the caveats within section 6.2.16 and whilst some manufacturers are claiming compliance with BS7671 this does not satisfy the obligations on the Distributor as BS7671 is an installation standard not a product standard

2. Details of the Proposal

The major technical revision elements included in EREC G12 Issue 4 Ammendment 2 encompass the following changes:

- A new Section 6.2.16 added to include specific requirements for earthing of electric vehicle charging points connected to street electrical fixtures. This includes the use of open neutral detection and earth disconnection devices.
- The Section numbers from 6.2.16 onwards have been updated.

The document has been imported into the latest ENA engineering document template. Any editorial changes necessary to comply with the conventions and formatting in the ENA engineering document template and Engineering Recommendation EREC G0 Rules, for structure, drafting and presentation of ENA engineering documents have been carried out.

Clause numbering of this EREC has changed significantly to conform to the latest ENA engineering document template.

Following presentation to Authority some editorial changes have been made to the new Section 6.2.16 to address comments made at public consultation, these are incorporated in Engineering Recommendation G12 Issue 4 Amendment 2 November 2021 and summarised below.

Words have been added in 6.2.16 to clarify that the main area of concern is Street Electrical Fixtures of class 1 construction as defined in BS7671 (where the exposed-conductive-parts are connected to the Distributor's earth terminal).

Words have been added in 6.2.16 to give examples of where it may not be reasonably practical to install a TT system earthing arrangement. It is worth noting that in a TT system earthing arrangement there is segregation between the earthed metalwork of the TT system and any metalwork associated with the PME system Distributor's earth terminal which removes the risks associated with an open neutral on the 3-phase mains cable servicing a Street Electrical Fixture as well as an open neutral on a single phase service cable to the Street Electrical Fixtures; an open neutral detection and earth disconnection device only removes the risks associated with an open neutral on a single phase service cable to the Street Electrical Fixture.

The wording has been modified to clarify that section 6.2.16 is not attempting to dictate how a consumer designs, installs, maintains and operates their installation but that the open neutral detection and earth disconnection device is suitable for its purpose in protecting members of the public from the risks associated with the rise of voltage on the Street Electrical Fixture in the event of an open neutral condition.

Details of all technical, general and editorial amendments are available on request from the Innovation and Electricity Systems Directorate of ENA.

A copy of the draft EREC G12 Issue 4 Ammendment 2 and comment proforma are included in this report to authority.

3. Impacts and Other Considerations

Impacts on Users of The Distribution Code

By providing clarity around the earthing of Class 1 Electric Vehicle Charging Points (EVCP) which are either themselves street electrical fixtures, are connected to street electrical fixtures or electrical fixtures not located on a street / highway.

Impacts on Total System and the DNOs System

There is no impact on the Total System and DNOs Systems as a result of the proposed changes.

Environmental Impact Assessment

As this amendment will assist installers on the requirement to provide earthing to EVCPs which are either themselves street electrical fixtures or are connected to street electrical fixtures, it is not possible to ascribe a direct environmental impact.

4. Impact on other Industry documents

There are no impacts on other industry documents.

5. Assessment against Distribution Code Objectives

The proposed amendments better facilitate the Distribution Code objective (i):

(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the distribution of electricity.

The proposal has a positive impact on this objective. This is achieved by providing clarity on the use of open neutral detection and earth *disconnection devices used in the connection of EVCPs connected to the distribution network at street electrical fixtures.*

(ii) to facilitate competition in the generation and supply of electricity

The proposal has a neutral impact on this objective.

(iii) to efficiently discharge the obligations imposed upon distribution licensees by the distribution licences and comply with the Regulation and any relevant legally binding decision of the European Commission and/or the Agency for the Co-operation of Energy Regulators; and

The proposal has a neutral impact on this objective.

(iv) to promote efficiency in the implementation and administration of the Distribution Code.

The proposal has a positive impact on this objective, by providing guidance to the reader on the use of open neutral detection and earth disconnection devices at electric vehicle charge points connected to street electrical fixtures.

6. Workgroup Recommendations

In March 2021 the ENA EV Charge Point Earthing Project Team who have been overseeing the work to revise the document agreed on a final draft EREC G12 Issue 4 Amendment 2 which was reviewed by the DCRP on 1st April and approved for a public consultation.

The DCRP requested comments from industry stakeholders through a public consultation from 9th April 2021 to 7th May 2021.

ENA EV Charge Point Earthing Project Team formally approved the proposed draft of EREC G12 Issue 4 Amendment 2 to be recommended to the DCRP to proceed to a Report to Authority.

The ENA EV Charge Point Earthing Project Team agreed to allow drafters to make any other editorial corrections identified as the document is finalised for publication.

Following presentation to Authority some modifications have been made to the new Section 6.2.16 to address comments made at public consultation, these are incorporated in Engineering Recommendation G12 Issue 4 Amendment 2 November 2021 and summarised below.

Section 6.2.15 provides guidance on supplies to Street Electrical Fixtures with load above 500W. Since publication of Engineering Recommendation G12 Issue 4 + Amendment 1 2015 open neutral detection and earth disconnection devices have been developed, G12 has been updated to provide guidance on the use of these devices.

Words have been added in 6.2.16 to clarify that the main area of concern is Street Electrical Fixtures of class 1 construction as defined in BS7671 (where the exposed-conductive-parts are connected to the Distributor's earth terminal).

Words have been added in 6.2.16.1 to give examples of where it may not be reasonably practical to install a TT system earthing arrangement. It is worth noting that in a TT system earthing arrangement there is segregation between the earthed metalwork of the TT system and any metalwork associated with the PME system Distributor's earth terminal which removes the risks associated with an open neutral on the 3-phase mains cable servicing a Street Electrical Fixture as well as an open neutral on a single phase service cable to the Street Electrical Fixtures; an open neutral detection and earth disconnection device only removes the risks associated with an open neutral on a single phase service cable to the Street Electrical Fixture.

The wording has been modified to clarify that section 6.2.16 is not attempting to dictate how a consumer designs, installs, maintains and operates their installation but that the open neutral detection and earth disconnection device is suitable for its purpose in protecting members of the public from the risks associated with the rise of voltage on the Street Electrical Fixture in the event of an open neutral condition. ESQCR 24(4) and ESQCR 25(2) (a) places duties on the Distributor which are discharged by the caveats within section 6.2.16 and whilst some manufacturers are claiming compliance with BS7671 this does not satisfy the obligations on the Distributor as BS7671 is an installation standard not a product standard.

7. Implementation

The DCRP agreed to an immediate implementation from the date of publication.

8. Consultation

On 9th April 2021 the DCRP formally published a public consultation (DCRP/21/04/PC) on the proposed draft of EREC G12 Issue 4 Amendment 2. The deadline for responses was 7th May 2021. The consultation material is presented in this RTA.

The following 12 respondents sent in their feedback which have been summarised below, copies of the responses received, and a detailed breakdown of the assessed responses have been provided in the spreadsheet within Appendix 3.

8.1. Siemens Rail Electrification/Mobility

Siemens Rail Electrification/Mobility agreed with the recommendations in the new Section 6.2.16 of EREC G12 Issue 4 and had no further comments.

8.2. City EV Limited

City EV Limited agreed with the recommendations in the new Section 6.2.16 to EREC G12 Issue 4 and had detailed in the spreadsheet provided in Appendix 3. System designers / installers should be free to choose between PEN fault detection devices (generally) and TT; the document as proposed accommodates this, however, has an

undue bias toward TT as ‘preferred’. The stated text refers to ‘alternative’ in respect of PEN fault detection and the text should be amended to remove preference in favour of competent discretion.

The technical content of the document should not detract from the wider social, environmental and policy objectives in respect of EV implementation and allow maximum competent flexibility, with due regard to standards.

It is considered that the text could be simplified, whilst meeting the objectives; there is little need delve into technical standards as there are addressed in BS7671 and IET documents. This amendment to EREC G12 should equally encompass TT and PEN fault detection in principle, with the mentioned conditions but without the need to refer to technical content which is covered elsewhere.

8.3. FM Conway Ltd

FM Conway Ltd agreed with the recommendations in the new Section 6.2.16 to EREC G12 Issue 4 and had the following further comments:

There is no mention of the use of PME supplies with additional protection in the form of these broken neutral detection devices being permitted here. These devices have other applications other than EV charging and EREC G12 Issue 4 should not be limiting these applications but aligning itself with BS 7671.

“Where it is not reasonably practicable to install a TT system earthing arrangement at on-street locations, an additional form of protection should be installed.” This statement still implies TT is the preferred earthing arrangement on-street, it should be up to the designer to decide on their approach.

8.4. Electrical Contractors' Association (ECA)

ECA agreed with the recommendations in the new Section 6.2.16 to EREC G12 Issue 4 and had the following further comments:

Clarification is required regarding the instances of broken PENs and how they equate to injuries/deaths as a result of the phenomenon to justify alternative or additional protection to PME.

The ECA also suggested some doubt as to the suitability of some devices on the market.

8.5. Certsure LLP

Certsure LLP agreed with the recommendations in the new Section 6.2.16 to EREC G12 Issue 4 and had the following further comments:

The proposal for the inclusion of open-PEN devices will financially impact installations, network and in turn, the end user. As such has a cost (and energy) benefit analysis been undertaken to justify such a proposal. (It has been cited that these devices consume between 70-90 W in continuous operation, thereby adding significant parasitic load to the network).

The IET have agreed to organize a second HSL report into the actual degree of risk posed to those interacting with EVs under open-PEN fault conditions. The conclusions of this

research will be taken into account by JPEL/64 when updating the requirements for EV charging installations given in section 722. Certsure LLP recommends that EREC G12 Issue 4 should not include recommendations pertaining to the use of open-PEN devices until after the findings of this new research is published.

8.6. Power Data Associates Ltd (PDA)

PDA are of the opinion that the scope of G12 needs to be clear that it only covers the provision of a PME connection made available to customer for connection to the customers installation. PDA suggested that the customer is and should always be responsible for the design, operation and maintenance of their installation. In many ways G12 section 6 goes into too much detail in describing the customers installation which are actually decisions for the customer in their design.

8.7. Siemens Mobility (Soon to be re-named "Yunex")

Siemens Mobility agreed with the recommendations in the new Section 6.2.16 to EREC G12 Issue 4. They also suggested that EREC G12/4 should be developed further to specify separation distances between the EVCP TT earth rod/mat and underground metallic services. The suggested that it would be sensible to suggest a practical minimum separation (e.g. 0.5m) that allows TT earth rods to be easily installed but without risking direct metallic contact between the two earth domains.

8.8. WSP

WSP agreed with the recommendations in the new Section 6.2.16 to EREC G12 Issue 4 and only sough clarification on whether this amendment of G12 would also consider the use of PEN fault detection devices at EVCP as covered in sections 6.2.15.

8.9. Network Rail

Network Rail agreed with the recommendations in the new Section 6.2.16 of EREC G12 Issue 4 and had no further comments.

8.10. Westminster City Council

The Westminster City Council agreed with the recommendations in the new Section 6.2.16 of EREC G12 Issue 4 and also sought to find out if EREC G12 would give the option of PME with additional forms of protection since it currently only considers the use of PEN fault detection devices at EVCP as covered in 6.2.16.

They also queried how a highway authority can always know the associated vehicle is of class II construction as indicated in section 6.2.16.1 of Amendment 2 f EREC G12 Issue 4.

8.11. Transport for London (TfL)

TfL agreed with the recommendations in the new Section 6.2.16 of EREC G12 Issue 4 and had no further comments.

8.12. Chartered Institution of Building Services Engineers (CIBSE)

CIBSE agreed with the recommendations in the new Section 6.2.16 of EREC G12 Issue 4 and sought further clarification on the "wet conditions" described in the text:

"As EVCPs will be used in all weather conditions, the contact scenario should be assumed to be in wet conditions."

Overall the responses were supportive of the proposed changes with mainly editorial and minor technical recommendations to be made to the draft EREC G12 Issue 4 to add clarity to users. A number of responses received included items currently outside the scope of the proposed iteration of EREC G12, the issues raised within these responses have been logged and will be discussed as part of the planned 2022 modification proposal.

Further detail of this public consultation can be found on the DCode website under DCRP/21/04/PC.

9. Legal Text

Legal text for the changes proposed to the Distribution Code (Appendix 11) and the final draft of EREC G12 Issue 4 amendment 2 has been provided as appendices (Appendix 3 – since DCRP/21/04/PC Public Consultation) to this Modification Proposal. The version of the Distribution Code provided incorporates the legal text changes required for the implementation of EREC G12 Issue 4 Amendment 2.

The current version of the Distribution Code refers to Engineering Recommendation G12 in the main body of the text in 3 instances:

DPC4.3.2

DPC4.4.2(c)

Annex 2 Qualifying Standards

10. Distribution Code Review Panel Discussion

The Final Modification Report was circulated to DCRP for approval via email on 23rd June 2021. At the meeting of the Distribution Code Review Panel (the Panel) held on 3rd June 2021, the Panel agreed that the Final Modification Report would be circulated for review before the August DCRP and approved by members before final submission of the Report to Authority for approval.

A revised version of this document has been prepared and was circulated to the panel on 8th November via email with a period of seven days for any panel member to return their views. Once this revised version was approved a copy, along with the revised EREC document was submitted to the authority for approval.

11. Recommendation

The Distribution Code Review Panel and Licenced Distribution Network Operators recommend that this modification report should:

- be submitted to the Authority for approval; and
- subject to the agreement of the Authority the modification should be implemented from the date the revised Distribution Code is published.

12. Appendices

Appendix 1 – EV Charging Point Project Group Members

Appendix 2 – DCRP/21/04/PC – EREC G12 Issue 4 Amendment 2 Public Consultation Responses Package

Appendix 3 – Proposed ENA Engineering Recommendation EREC G12 Issue 4 Amendment 2 – Revised version