

Distribution Code Consultation DCRP/20/03/PC

Engineering Recommendation (EREC) P24 Issue 2 (2020)

AC supplies to railway systems

Target Audience:

The guidance in Engineering Recommendation (EREC) P24 Issue 2 is intended primarily for those tasked with planning, design and construction of new connections for 25kV a.c. supplies of railway traction loads to be connected to licensed transmission and distribution networks. These requirements might also be useful information for Transmission and Distribution Network operational personnel. This consultation will be of interest to Distribution Network Operators, Distribution System Planners, Customers, Demand Side Response providers, Distribution Energy Resource providers, and all other Interested Distribution Code Stakeholders.

Date Published: 16 March 2020

Deadline for responses: 17:00 13 April 2020

Summary:

ENA Engineering Recommendation (ER) P24 Issue 1, AC Traction Supplies to British Rail, provides guidance and recommended practice for provision of 25 kV AC rail supplies and covers a range of topics from the characteristics of traction load and estimation of electrical disturbance (e.g. voltage fluctuations, voltage imbalances and harmonics) to supply arrangements, equipment and earthing. This Distribution Code public consultation is seeking the views from industry stakeholders on the proposed modification to Engineering Recommendation (ER) P24. If approved, the current guidance would be superseded by the modified guidance in Engineering Recommendation (EREC) P24 Issue 2 (2020).

ER P24 is an Annex 1 qualifying standard to the GB Distribution Code and governed by the Distribution Code Review Panel (DCRP). The DCRP establish and maintain governance arrangements for Qualifying Standards that have a material effect on Users of the Distribution System. P24 is also referenced in Grid Code of Great Britain and is also subject to Grid Code governance processes.

1. Introduction

Network Operators are reliant on P24 as a guide when planning new traction supplies. Recent proposals and plans associated with new traction supplies (for example, HS2 and the electrification of the Great Western Line) highlighted the importance and need for P24 to be revised or updated. In addition, Network Rail (NR) and National Grid (NG) also fully supported the need to revise P24 as both parties had developed traction supply arrangements at 275/400 kV which are not fully addressed in P24.

ER P24 Issue 1 is to a large degree out of date and much of the technical content has been surpassed. Over the last 30 years, developments in traction drive technology, the publishing

of numerous national Standards, developments in phase balancing and the advent of powerful network modelling and simulation software have shifted many of the technical considerations associated with traction supplies. Indeed, all the current references in P24 are either out of date, superseded or replaced.

A revision project for P24 was initiated by Energy Networks Association (ENA) in 2015 to update the guidance in ER P24 Issue 1. The scope of the intended revision is detailed in Appendix 1. The DCRP EREC P24 Working Group, who have been overseeing the work to revise the document, have now agreed on a final draft EREC P24 Issue 2 which seek to address the revision items.

2. Proposal

The DCRP ECERC P24 Working Group are now requesting comments from industry stakeholders on the contents of the draft EREC P24 Issue 2. The major technical revision elements included in P24 Issue 2 encompass the following changes:

- Update and align the document in respect of the latest a.c. traction technology.
- Reference to '132 kV' connections throughout the document has been changed to 'EHV', thus encompassing 275 kV and 400 kV connections and widening the scope of connections described in P24 (33 kV, 132kV and 275/400 kV).
- Clause 5: Major update and inclusion of the latest guidance for the two connection arrangements most widely used for traction loads: EHV/25 kV transformer (1 x 25 kV) and EHV/25/25 kV transformer (2 x 25 kV).
- Clause 6: Complete re-write of the guidance on estimating traction loads
- Clause 7: Minor amendments to the requirements for security.
- Clause 8: Nature of traction current: The content from the previous issue has largely been deleted. The new content now reflects modern traction pulse-width modulated (PWM) drives.
- Clause 9: Major amendments to update and clarify guidance on disturbance limits, taking account of changes to ENA ER P28, ENA ER G5 and changes to grid voltage unbalance limits.
- Clause 10: Major amendments to the guidance on disturbance estimation (unbalance and harmonics). Reference to legacy software no longer in use has been removed.
- Clause 12: Complete re-write of guidance on specification of equipment for traction supplies.
- Clause 13: Complete re-write of the guidance on earthing design and equipment specification for traction supplies.
- Clause 14: Major amendments to guidance on protection design for traction supplies. Previous diagrams from P24 Issue 1 and ENA TS 41-15 Part 9 have been captured in new simplified, indicative diagrams.
- Clause 15: major amendments to guidance on requirements for system monitoring and controls.
- Clause 16: Previous content on operational aspects largely deleted and replaced with reference to ENA ER G38.
- Clause 17: New clause added covering non-traction power supplies.

- Annex A: New annex added to describe options for the use of Scott transformer. Previous descriptions (P24 Issue 1, Clause 9.1 and Appendix C) of power electronics which could be used with transformer supplies have been retained in this annex.
- Annex B: New annex added to describe the option of employing a static frequency converter (SFC).
- Previous appendices (P24 Issue 1, Appendix A and B), describing use of legacy software (HARP) have been removed.

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 ER 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.

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

A copy of the draft EREC P24 Issue 2 and comment proforma are included in the consultation pack.

3. Applicable Distribution Code Objectives

The Applicable Distribution Code Objectives are to:

- a) permit the development, maintenance, and operation of an efficient, co-ordinated, and economical system for the distribution of electricity; and
- b) facilitate competition in the generation and supply of electricity; and
- c) 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
- d) promote efficiency in the implementation and administration of the Distribution Code.

4. Consultation Questions

- Do you agree that the proposed amendments to EREC P24 achieve the Distribution Code Objectives?
- Do you agree with the proposed text contained in EREC P24 Issue 2, or do you have any alternatives to propose?

5. Next Steps

Responses to this consultation should be sent to the Distribution Code Review Panel Secretary at dcode@energynetworks.org by **17:00 13 April 2020** on the pro-forma provided expressly for the purpose, or via any other convenient means. The pro-forma can be found in the consultation pack. Responses after this date may not be considered.

6. Consultation Pack

The DCRP/20/03/PC Consultation pack can be found here - <http://www.dcode.org.uk/consultations/open-consultations/>

The consultation pack includes:

- This consultation paper
- P24 Revision Report
- Draft EREC P24 Issue 2 (clean)
- Proforma comment form

For more information, please contact:

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