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Code of Practice 280

Issue 2 April 2024

Distribution System Design – 132kV Network

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Amendment Summary

ISSUE NO. DATE	DESCRIPTION
Issue 2 **April 2024**	Document combined with EPD280 to create a single document for 132kV Network System Design. Design Policy Statement – new section added covering design practice and taken from EPD280 132kV Network Design. Other minor editorial updates made throughout the document, not marked. Prepared by: Peter Twomey Approved by: Policy Approval Panel and signed on its behalf by Paul Turner, PAP Chair

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Contents

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1 Introduction

The general principles contained within this Electricity Policy Document shall be applied to all new work on the 132kV network (Network) of Electricity North West Limited (Electricity North West). The decision as to whether existing Network shall be brought into line with this EPD when reinforcements or material alterations are carried out (including asset replacement work and new connections) will depend on individual circumstances and each case shall be actively considered.

This document is one of the following suites of documents relating to Network Design.

(a) CP280 - Distribution System Design – 132kV Network

(b) CP281 - Distribution System Design – 33kV Network

(c) EPD282 - Distribution System Design – 11/6.6kV Network

(d) EPD283 - Distribution System Design – Low Voltage Network

This document has been formed by an amalgamation of EPD280 and CP280. The contents of EPD280 have been incorporated into this document. EPD280 has now been withdrawn.

NOTE: Electricity North West's common term for 11 & 6.6kV is HV and for 33kV and above is EHV.

2 Scope

This document describes the distribution network design principles at 132kV, which shall be used by the staff of Electricity North West Limited (Electricity North West), acting as service provider, and any third-party connector. It will assist network designers in discharging their responsibilities for compliance with The Electricity Safety, Quality and Continuity Regulations 2002, Electricity Distribution Licence – Condition 5, The Distribution Code and appropriate safety legislation. Information and guidance on design practices is provided in Section 5 to assist staff and contractors employed by Electricity North West in the design and development of the 132kV electricity distribution network. This Network is owned and operated by Electricity North West.

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3 Definitions

For the purpose of this document the following definitions apply:

Approved	Approved by the Company (Electricity North West)
Authorised	Authorised in writing by the Company
BSP	Bulk Supply Point – 132kV or 132/11/6.6kV Substation
CEGB	The former Central Electricity Generating Board
CP	Code of Practice
CVA	Central Volume Allocation
EGIS	Electricity Geographical Information System
EHV	Extra High Voltage. For Electricity North West this is 33kV or 132kV
ENA	Energy Networks Association
EPD	Electricity Policy Document
EREC	Engineering Recommendation (ENA document) NOTE: The legacy acronym for Engineering Recommendation is 'ER'
ES	Engineering Specification
GSP	Grid Supply Point – 400 or 275kV to Lower Voltage Substation
HV	High Voltage. For Electricity North West this is 6.6kV or 11kV
IPSA	Interactive Power Systems Analysis (Network study software tool developed and managed by TNEI)
LV	Low Voltage – a voltage less than 1000V
Network	The Electricity Distribution Network owned and operated by Electricity North West Limited
NG	National Grid
NGET	National Grid Electricity Transmission
TS	Technical Specification (ENA document)

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4 132kV Network Design Policy Statement

4.1 General

Close liaison shall be maintained with NGET on all 132kV development projects in accordance with the Grid Code and the NGET Connection and Use of System Code.

4.2 Network Extension

Extensions to the 132kV Network shall be designed on the feeder-transformer principle with restrictions to be applied in accordance with ENA EREC P18 e.g.

(a) No item of equipment shall have isolating facilities on more than four different sites.

(b) Under normal running arrangements the normal operating procedure for making dead any 132kV circuit shall not require the opening of more than seven circuit-breakers or appropriately rated switches.

(c) Not more than three transformers on any one site shall be banked together on any one 132kV circuit.

4.3 Bulk Supply Points

4.3.1 Civil designs of BSPs shall be agreed with the Design Manager, Electricity North West Limited in accordance with current practice.

4.3.2 New BSPs shall normally be designed to accommodate 132/33kV transformers up to a maximum capacity of 2 × 90MVA, but in exceptional circumstances it is permissible to increase the capacity to a maximum of 3 × 90MVA units.

4.3.3 A new BSP, designed in accordance with Section 4.3.2, may initially be equipped with a single transformer where adequate interconnection is available. See Section 4.5.1.

4.3.4 BSPs designed for 132/11kV transformers shall normally have their capacity restricted to 2 × 30MVA units.

4.3.5 All 132kV transformers shall have local 132kV isolating and earthing facilities.

4.3.6 Due consideration shall be given to transformer duty (viz step-up, step-down, power flows etc), impedance (based on ENA EREC P 1/3) and tapping rang.

4.4 Voltage Step Change and Voltage Collapse

The Network shall be designed to limit voltage step changes and to avoid voltage collapse. Reference shall be made to EPD279, Section 4.6.

4.5 Interconnection

4.5.1 BSPs shall normally operate independently but consideration shall be given to operating supply points in parallel through the lower voltage Network via transformers located at independent sites. There shall normally be a maximum of three transformers supplying an independent load group, each transformer fed from the same GSP.

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4.5.2 The 132kV distribution Network shall not be designed to permit the permanent interconnection of GSP sites.

4.5.3 Lower voltage transfer capacity between BSPs, preferably available within 15 minutes by automatic or supervisory switching, shall be taken into account when determining the need for reinforcement.

4.6 Security of Demand

The demand to be met, after a first circuit outage affecting the capacity of the Network at a BSP busbar, shall be designed to be 100% of the normal maximum demand on that busbar. This demand may be met, either continuously (no break), or using transfer capacity between BSPs (typically at 33kV), restoration being normally achievable within 60s, i.e. by automatic switching.

Only in a case where the group maximum demand exceeds 100MW, is there a requirement to meet demand after a second circuit outage. In such a case, for a two-transformer BSP, the demand to be restored (within 3 hours) will not be expected to exceed the BSP maximum demand minus 100MW. (See ENA EREC P2/8.)

4.7 Protection

Protection of the 132kV Network shall comply with EPD350 Protection for 132kV, 33kV and 11kV Systems, current practice and, as reference material, CEGB and NG plant standards and protection memoranda. Any deviation shall be referred to the Protection Policy Manager.

Design of inter-tripping facilities shall be in accordance with EPD350.

New 132kV underground cables shall have pilot circuits laid with them or provision (e.g., ducts and pits) made for the future installation of pilot cables. New and refurbished 132kV overhead lines shall have pilot circuits installed with them. The specifications for such pilot circuits shall be agreed, for each individual cable or overhead line, with the Protection Policy Manager.

5 132kV Network Design Practice

In implementing the design policy, staff and others working directly for Electricity North West on Network design shall adhere to the guidance as follows:

5.1 Civil Design of Bulk Supply Points

Civil designs of Bulk Supply Points shall be in accordance with CP355 – Civil Design Aspects of 132kV Substations.

5.2 Network Design Studies

All proposals for Network alterations shall be subject to design studies, to examine load flow, fault level, power swing and stability, and voltage, including voltage step change. Studies shall be carried out by adequately trained users of IPSA, a proprietary software package. Studies shall be based on Electricity North West's IPSA Network Model, as described in EPD241. Source data for this model is taken from MAMS and EGIS, as described in CP2–1 - IPSA Network Mod–l - Management.

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5.3 Protection

Protection schemes shall be designed in accordance with CP338 – 132kV Protection, using the same sources of data as the IPSA Network Model.

5.4 Metering

Modifications to the 132kV Network shall take account of their impact on the CVA Metering Scheme in accordance with CP5–1 - CVA Metering.

6 Documents Referenced

DOCUMENTS REFERENCED	
Non-Electricity North West Documents The following documents, legislation, national standards and ENA publications, cannot be supplied by Electricity North West Limited to persons outside those companies:	
Electricity Safety, Quality and Continuity Regulations 2002	
Grid Code	
The NGET Connection and Use of System Code	
ENA EREC P1/3	275/33kV, 132/33kV and 132/11kV Supply Point Transformers
ENA EREC P2/8	Security of Supply
ENA EREC P18	Complexity of 132kV Circuits
Electricity North West Limited Published Documents The following documents are available from Electricity North West Limited:	
The Distribution Code	
Electricity Distribution Licence	
CP279	Distribution System Design – General Requirements
CP281	Distribution System Design – 33kV Network
EPD282	Distribution System Design – 11/6.6kV Network
EPD283	Distribution System Design – Low Voltage Network

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EPD350	Protection for 132kV, 33kV and 11kV Systems
The following documents are available to Electricity North West Limited staff:	
CP241	IPSA Network Model - Management
CP338	132kV Protection
CP355	Civil Design Aspects of 132kV Substations
CP501	CVA Metering
EPD241	IPSA Network Model

7 Keywords

132kV; BSP; Design; Network; Planning; Policy; Security; System.

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