

ES281

COMPANY-SPECIFIC APPENDICES TO ENA ENGINEERING RECOMMENDATION G81

PART 6

Construction and Records for New Underground Connections at Voltages up to 11kV for Industrial and Commercial Customers

1. SCOPE

This appendix to ENA ER G81 Part 6 covers the construction and records for new underground services and mains, and associated high voltage to low voltage substations for the purpose of connecting industrial and commercial customers to the electricity distribution network of Electricity North West Limited (Electricity North West). (This Part 6 of ES281 provides the information, specific to Electricity North West, required by Appendix B of Part 6 of ENA ER G81.)

2. GENERAL

For all new connections work the approved installer (ICP) shall provide Electricity North West with accurate records and test results for all plant and equipment installed that is to be adopted.

The detailed information is required in order for Electricity North West to comply with their statutory and regulatory requirements.

3. INSTALLATION

3.1 General

The installation of all plant and equipment to be adopted by Electricity North West shall meet the requirements of the listed references, all applicable legislation and the details in this section.

It shall be noted that ratings will be influenced by the installation arrangement and reference shall be made to the ES281 Part 1 - Design and planning requirements framework regarding equipment ratings.

All plant and equipment installed shall comply with the requirements of ES281 Part 2 - Materials specification framework.

3.2 Underground Cables

There shall be no material change to routes (to the extent that it affects design criteria) detailed in previously submitted and approved plans unless otherwise agreed in writing with Electricity North West and any other interested parties.

All cables shall be installed in accordance with ES400E4 - Installation, Commissioning & Repair of Solid HV and LV Cables.

Earth conductors and rods shall be laid in accordance with the previously submitted plans. Note should be taken of the requirements of ESQCR 9 (2) (a) and ENA ER G12-3 on the need for earths at the remote end of the main, during each stage of the energisation programme.

The installation of LV cables shall be such as to permit future live working.

Jointing materials shall comply with Electricity North West's specification.

Jointing practice shall be in accordance with CP411 LV or CP411 Part 2.

Cable terminations shall be made with correct phase connections.

Service connections shall be made to the correct phase as shown on the approved design drawings. The numbers of services taken from a single joint shall not exceed the number specified in ES281 Part 1 - Design and planning requirements.

The Applicant shall provide a written record, including for each joint, the location, the name of the joiner and the date the joint was made. These will be kept in the Electricity North West construction file.

3.3 Substations

There shall be no material change to the design or location of any substation to that detailed in previously submitted and approved plans unless otherwise agreed in writing with Electricity North West and any other interested parties. Particular concern shall be made to the legal consents agreed as part of the design approval.

Substation installation shall be in accordance with Electricity North West's specification.

Substation plant and materials shall comply with Electricity North West's specification.

Substation small wiring shall be in accordance with ES397 - Electrical Installation within Distribution Substations.

Substation housings shall be in accordance with ES301 - Distribution Substation Housings.

Substation earthing design shall be in accordance with CP333 - Earthing Design for High Voltage Substations.

A method statement outlining how the applicant will install the substation plant and equipment shall be provided prior to commencement of work.

3.4 Multiple Occupancy Buildings

There shall be no material change to the design for multiple occupancy buildings to that detailed in previously submitted and approved plans unless otherwise agreed in writing with Electricity North West and any other interested parties. Particular attention shall be paid to the legal consents agreed as part of the design approval. The design and installation for multiple occupancy buildings shall be in accordance with EPD212 - Supplies to Multi-Occupied Premises.

4. COMMISSIONING AND RECORDS

4.1 Format and Scales

The preferred format for records of newly laid underground cables is a hand-drawn sketch of the cable route marked on an existing 1:500 paper map of the area concerned. The base map can either be a print from Electricity North West's mapping system or a builder's plan. For congested areas, a map of scale 1:250 or 1:50 is also required.

In general, Electricity North West does not find the use of an intermediate CAD drawing to show the route of the cable route particularly useful. This is because it invariably means that the site recording and CAD drawing processes have been undertaken in two-stages, which can result in some loss of accuracy or clarity during transcription. In addition, re-drawing on CAD frequently introduces a time delay before the records are ready to be handed over.

However, Electricity North West is willing to accept CAD drawings, if this is the preferred medium used by the ICP, provided that the accuracy is guaranteed to be $\pm 100\text{mm}$, and that the handover timescales described below are still met. The scale shall still be either 1:500 or 1:250. The CAD file format may be either Autodesk .dwg or Microstation .dgn. The information specified in Section 4 shall be provided on separate layers (e.g. HV Cables on layer 1, LV Cables on layer 2 etc).

The detailed requirements for information relating to underground cables are given in sub-section 4.5.

4.2 Topography

Where non-Ordnance Survey background topographic data are used as reference sources, appropriate points at the site periphery shall be established and referenced to physical features, which are shown on the existing Ordnance Survey map. For example developers' plans or highway scheme drawings may be used and points along the boundary of the new housing development or industrial site, or along the route of a new road identified as references. This is to enable Electricity North West to update its central record maps so that the new background can be merged into the existing records as accurately as possible.

4.3 Method of Taking Site Measurements

The preferred method for recording assets in Electricity North West is the offset method.

The offset method entails taking two measurements approximately at right angles to each other from fixed points to the asset to accurately locate its position. An example is shown in Figure 1.

The ICP shall not use GPS survey equipment to provide X and Y coordinates (Eastings and Northings) positions of assets in isolation, i.e. without reference to permanent topographic features.

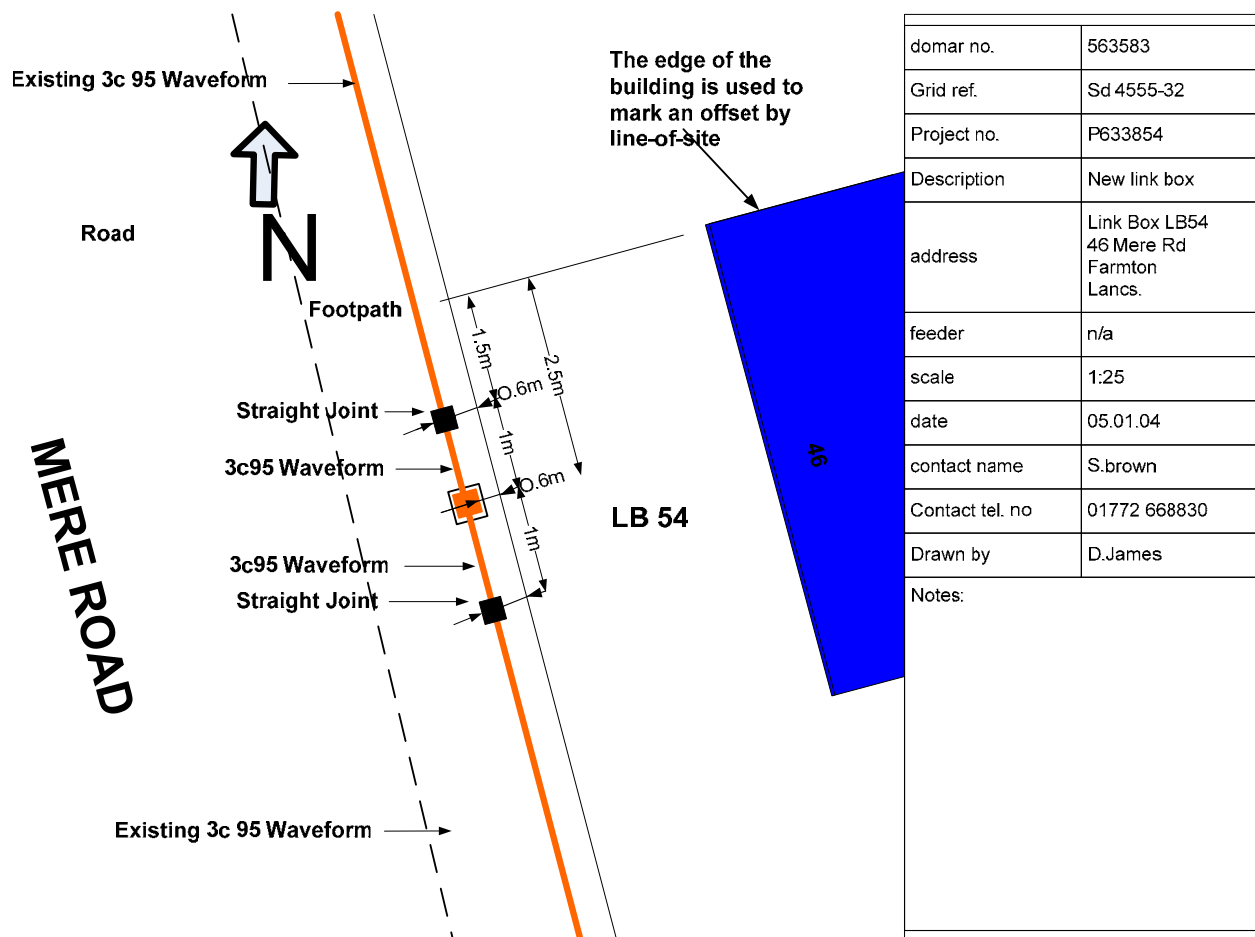


Figure 1: Offset Method

4.4 Connectivity

Connectivity shall be recorded on the as-constructed record, such that the complete route of a cable or series of connected cables (feeder circuit) can be traced from the start connection point to the end point or points. This requirement shall be read in conjunction with that for the as-constructed record to include accuracy of positions of cables relative to each other, where multiple cables share any part or all of a feeder route.

4.5 Detailed Requirements

To enable Electricity North West's Asset Data Records to be accurate, the following shall always be taken into account when producing as-constructed drawings returned from site.

Electricity North West requires that the position of any underground apparatus placed, moved or uncovered during works shall be surveyed to an accuracy of $\pm 0.1\text{m}$ (100mm).

Electricity North West reserves the right to reject as-constructed drawings, which do not meet the criteria, set out below:

- All drawings shall be legible.

- All drawings shall include the exact location of work, grid reference, title, type of job, and dates of actual work. Streets shall be named and house numbers or plot numbers shown.
- Measurements shall always be taken from permanent features, which are, or would be shown on an Ordnance Survey map, such as buildings (gable ends) kerb lines, walls, bridges etc.
- Dimensions SHALL NOT be measured from trees, gate posts, sheds, bay windows, letter boxes, lamp posts, manhole covers, gullies etc.
- The phase connection of each single-phase service shall be indicated.
- All drawings shall be to a suitable scale (1:250 & 1:500).
- All drawings shall show a north point.
- All details of any non-standard work undertaken shall be provided.
- All measurements shall be in metre or millimetre as appropriate.
- The type of each joint shall be indicated: cable cross-sectional area, conductor material, insulating material, cable type, operating voltage, number of cores, number of phases and where less than 3 phases are being used the core colours in use.
- Earth cables and earth mats shall be recorded when they are installed. The position and cross sectional area of the cable shall be included.
- Each joint shall be located with two dimensions at right angles, from at least 2 permanent features e.g. from the kerb and from the end wall of a building.
- The type and manufacturer of all link boxes shall be recorded, including the number of ways and, where known, the normal open points.
- The position of link boxes shall be recorded with measurements, from at least 2 permanent features.
- Sufficient measurements shall be made to show the route of each cable accurately, including additional measurements as necessary to show deviation from straight lines. Measurements shall be taken at intervals not exceeding 20m and at all points where the cable changes direction, size or type.
- The size and type of all ducting installed shall be indicated, showing which ducts are in use. The positions of the ends of ducting, including any breaks in the run of ducting, shall be shown with measurements, from at least 2 permanent features. Where more than one duct has been laid in the same trench, a vertical cross section drawing shall be included.
- Where cable tiles are used above a cable this shall be recorded: the depth of the tiles, the clearance of the tiles above the cable and the length of cable covered by tiles identified.
- Depths of LV cables shall be recorded, if less than 0.45m or more than 0.50m and of HV cables, if less than 0.60m or more than 0.65m.
- Depths shall be recorded to an accuracy of $\pm 0.05\text{m}$.

- If a permanent surface does exist, such as on a new housing estate, the final finished depth shall be measured from the kerb line or back footpath line. See Figure 2.
- Depths shall be marked on maps at the points at which they were measured.
- For a small excavation or opening, the depth of the apparatus uncovered at that point shall be recorded.
- Measurements shall be taken from the permanent surface level to the top of the cable where possible, as shown in Figure 2.
- The dates, when the depths are measured, shall be recorded.

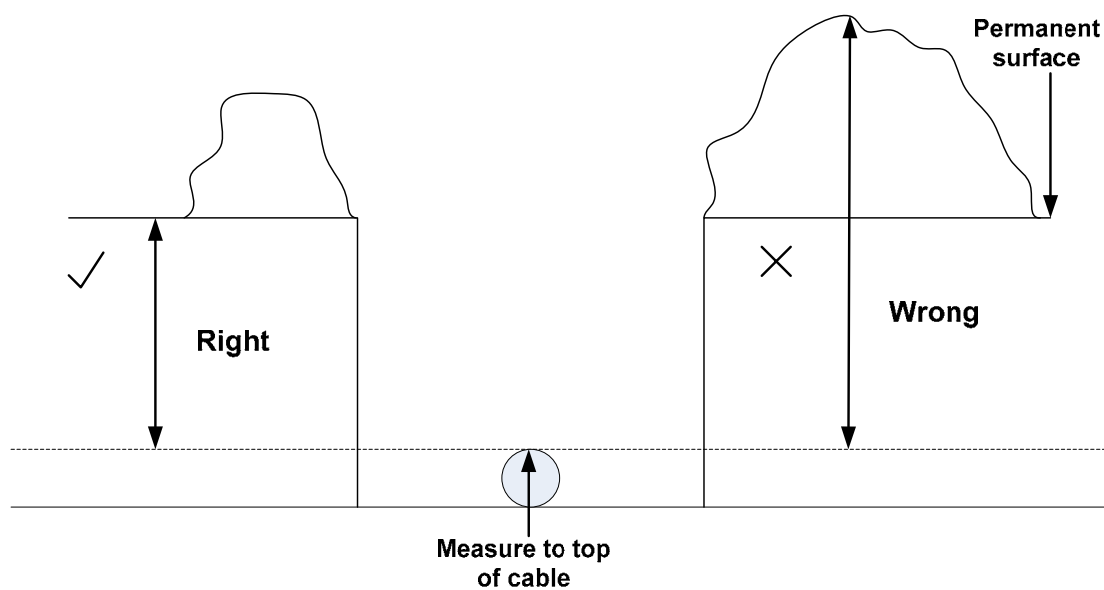


Figure 2: Guide to Measuring Depths of Cables

If further guidance or copies of the booklet “Guide for recording underground assets” are required, requests should be made to Electricity North West Asset Data Records, ‘phone: 0161-247 0656.

5. PLANT RECORDS

5.1 Fixed Plant - Format

The preferred format for records of newly commissioned fixed plant, transformers and switchgear, is a form based on a number of templates. In order to help avoid transcription errors a version that has been filled in on site by the engineer is preferred. This can be done either with a laptop on site, or alternatively a hand-completed form is acceptable. At the time of handover, if electronic copies are being provided, printed versions are also required, so that they can be rapidly assessed.

5.2 Detailed Requirements

The forms required for any particular extension or alteration to Electricity North West's network may be identified from the following table:

Form \ Activity	Substation Commissioning	GMT/PMT Commissioning	GMT/PMT De-commissioning	Plant changes	Changes to Operational Status	Changes to circuits and X-jointing	Addition/Removal of Loads	Addition/Removal of Ops Notes	Addition/Removal of Generation	Diagram Correction only	LV Energisation
System Amendment Request Distribution - Front Sheet	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Doc 1 - Diagram Amendment	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
PCF - Pre-Commissioning Form	Y	Y									
Doc 2 - Site Substation Details	Y	Y				Y			Y		
Doc 3 - Extensible or pole mounted switchgear	Y			Y					Y		
Doc 4 - Non Extensible switchgear	Y			Y					Y		
Doc 5 - Transformer Details	Y	Y		Y					Y		
Doc 6 - LV Equipment Details	Y	Y		Y					Y		
Doc 7 - De-commissioning			Y	Y					Y		
Doc 8 & 9 - OHL and Pole data		Y				Y					
Doc 10 - Battery and Charger Details	Y										
Protection Commissioning - Lucy Sabre VRN2A	Y			Y					Y		
Protection Commissioning - Merlin Gerin CE2 CN2	Y			Y					Y		
Protection Commissioning - Schneider RN2C	Y			Y					Y		
Protection Commissioning - Schneider RN2C with VIP relay	Y			Y					Y		
HV Energisation Request	Y	Y		Y		Y			Y		
LV Energisation Request											Y

Y - Yes; a requirement. wherever applicable.

The blank templates may be found annexed to this Part 3 of ES281. Completed forms shall be returned to the Electricity North West engineer, who is to carry out the commissioning. Unless the necessary forms are completed satisfactorily and handed over sufficiently in advance, the commissioning will not be permitted to proceed.

6. COMMISSIONING AND HANDOVER

6.1 Handover & Energisation Timescales

The timescales for the handover of information and energisation of assets are those stipulated in Electricity North West's Licence Condition 4F and are given in the Table 1 and are subject to the conditions precedent.

Table 1: Energisation Timescales

Activity	Type of Connection		
	Low Voltage (400/230V)	High Voltage (6.6kV or 11kV)	Extra High Voltage (33kV)
Requirement on licensee for final works	Complete final works within 10 working days of receipt of request	Complete final works within 20 working days of receipt of request	Issue dates for final works within 20 working days of receipt of request and complete works as soon as reasonably practicable.
Requirement on licensee for completion of phased energisation	5 working days from receipt of request	10 working days from receipt of request	To be agreed within the final connection process
Reasonable cancellation period for applicant	5 working days prior to planned final connection date	10 working days prior to planned final connection date	To be agreed within the final connection process

6.2 Conditions Precedent

Where Electricity North West, on behalf of Electricity North West, has agreed to adopt the assets being installed by a suitable accredited connections provider, the conditions precedent set out below require the applicant to ensure that the following occur prior to the date of final works or phased energisation:

- legal requirements are completed to Electricity North West normally accepted status, including relevant adoption obligations, third party consents and the requirements for notices under the New Roads & Street Works Act; and
- all relevant and substantive contestable works are completed prior to the connection date, including pre-commissioning, any required witnessing, the provision of all test documents and as installed information specified by Electricity North West

Electricity North West may choose to withdraw the proposed date for final works or phased energisation 5 working days before the scheduled date for connection if the conditions precedent have or will not be met by the applicant.

All requests for final works and phased energisation are subject to the completion by Electricity North West of all necessary non contestable works. Electricity North West will specify the works required and associated timescales in the point of connection quotation or in the Agreement to Adopt.

7. DOCUMENTS REFERENCED

Regulation

ESQCR	The Electricity Safety, Quality & Continuity Regulations 2002
LC4F	Ofgem Standard Licence Condition 4F Guidance Document- Version 1

Energy Networks Association

ER G12-3	Requirements for the Application of Protective Multiple Earthing to Low Voltage Networks
----------	--

Note: Electricity North West is not able to supply copies of the above document, but copies may be obtained from the Energy Networks Association.

Electricity North West

EPD212	Supplies to Multi-Occupied Premises
ES220	Pre-commissioning Requirements for ICPs Requiring New Assets to be Connected to the 11/6.6kV Network.”
ES281-Part1	Design and Planning Specification for New Low Voltage Installations for Housing Developments
ES281-Part2	Materials Specification for New Low Voltage Installations for Housing Developments
ES301	Distribution Substation Housings, Replacement Roofs and Doors
ES320	Preparation and Assembly of Substation Plant (11/6.6kV and LV)
ES397	Electrical Installation within Distribution Substations
ES400E4	Installation, Commissioning and Repair of Solid HV and LV Cables
CP333	Earthing Design for High Voltage Substations
CP411 LV	Mains Practice up to and Including 132kV - Cable Jointing up to and Including 1000 Volts
CP411 Part 2	Mains Practice up to and Including 132kV - 6.6/11kV Cable Jointing Guide for the recording of underground assets

8. KEYWORDS

Commercial; commissioning; connection; ICP; industrial; record.