1 Scope

This appendix to ENA ER G81 Part 6 covers the construction and records for new low voltage 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 (SP Electricity North West). (This Part 6 of ES281 provides the information, specific to SP 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 comply with SP Electricity North West's requirements for installation and provide SP 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 SP 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 SP 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 4

All plant and equipment installed shall comply with the requirements of ES281 Parts 2 & 5.

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 SP Electricity North West and any other interested parties.

All cables shall be installed in accordance with ES400E4.

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 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. Guidance on LV cable installation requirements is detailed in ES400E4.

Jointing and ducting materials shall comply with SP Electricity North West's specification. For guidance refer to the following sections of ES281 Part 2:

- 3.2 - High Voltage Cable Joints;
- 3.3 - Jointing Accessories and Cable Protection (for details of cold pour resin compound, binding wires, cotton and PVC tape, cable marker tape, cable tiles, plastic ducts and duct seal);
- 4.2 - Low Voltage Cable Joints;
- 4.5 - Low Voltage Underground Service Joints:
- 4.6 - Ducts, Service Pipes & Meter Cabinets.

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 4.

The Applicant shall provide a written record, including for each joint, the location, the name of the jointer and the date the joint was made. These will be kept in the SP 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 SP 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 ES352.

Substation plant and materials shall comply with the requirements of ES281 Parts 2 & 5.

Substation small wiring shall be in accordance with ES397.

Substation housings shall be in accordance with ES301.

Substation earthing design shall be in accordance with CP333.

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

3.4 Service Entries

Service entry policy to properties shall be in accordance with EPD281 (module 7). Nov 2025

3.5 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 SP 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 ES287, which describes the application of ENA ER G87 within the SP Electricity North West network.

4 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 SP 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, SP 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, SP 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 ±100mm, 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 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 SP 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.

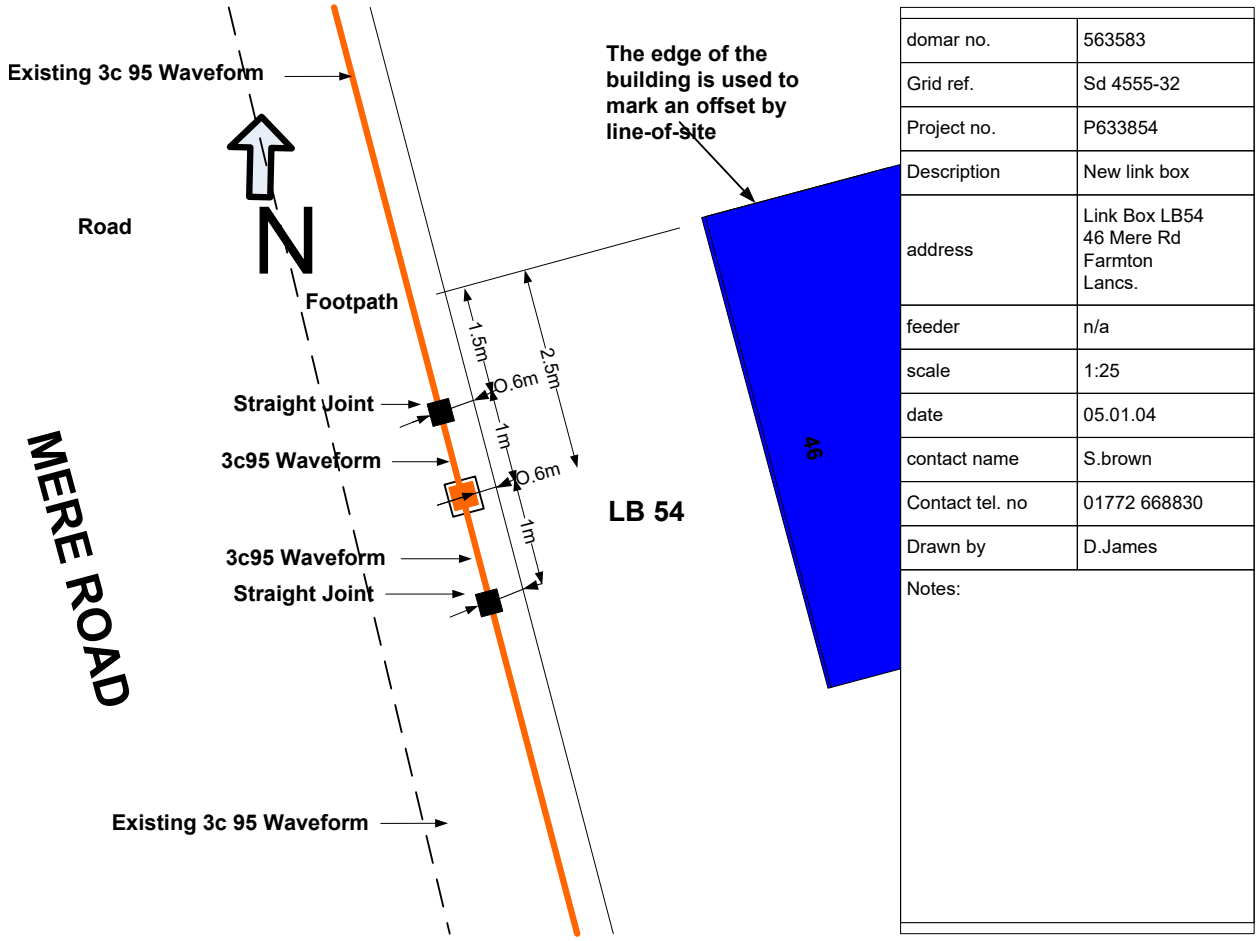
4.3 Method of Taking Site Measurements

The preferred method for recording assets in SP 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 SP 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.

SP Electricity North West requires that the position of any underground apparatus placed, moved or uncovered during works shall be surveyed to an accuracy of ± 0.1m (100mm).

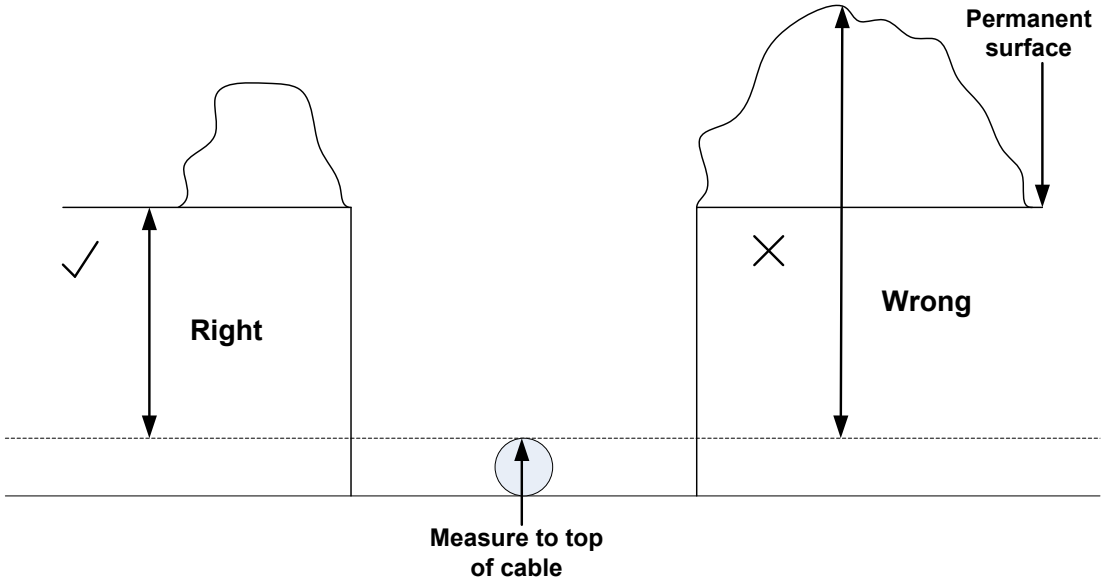
SP Electricity North West reserves the right to reject as-constructed drawings, which do not meet the criteria, set out below:

- 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 ± 0.05m.
- 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 SP Electricity North West Data Management Team on an email addressed to aslaid.drawings@enwl.co.uk.

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 SP Electricity North West's network may be identified from Table 1.

Table 1 – Record Forms

Activity / Form	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 TLF	Y			Y					Y		

Protection Commissioning - Lucy Sabre VRN2A	Y			Y					Y		
Protection Commissioning - Merlin Gerin CE2 CN2	Y			Y					Y		
Protection Commissioning - Schneider RN2c TLF	Y			Y					Y		
Protection Commissioning - Schneider RN2c with VIP relay	Y			Y					Y		
Protection Commissioning - Schneider VIP300	Y			Y					Y		
HV Energisation Request	Y	Y		Y		Y			Y		
LV Energisation Request											Y

Y - Yes; a requirement. Wherever applicable.

Contact SP Electricity North West's Data Management Team on the email address Aslaid.drawings@enwl.co.uk to obtain blank copies of the forms. Completed forms shall be returned to the SP 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 SP Electricity North West's Licence Condition I5 Statement and are given in the Table 2 and are subject to the conditions precedent.

Table 2 – 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 SP 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 SP 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 SP Electricity North West.

SP 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 SP Electricity North West of all necessary non contestable works. SP Electricity North West will specify the works required and associated timescales in the point of connection quotation or in the Agreement to Adopt.

6.3 Pre-Commissioning Procedures

6.3.1 Pre-Commissioning Form

The pre-commissioning procedures and checks to be undertaken by the ICP are detailed in Section 4.1 of ES220. A record of the activities shall be made by completing the Pre-Commissioning Form (PCF) as shown in Appendix A of ES220.

The substation plant items shall be prepared and, where appropriate, assembled in accordance with the requirements of ES320. A record of the activities shall be made by completing the data forms as shown in the Appendix A of ES320.

6.3.2 Testing

The items listed in Table 3, where installed by the ICP, shall be tested prior to jointing.

Table 3 – Pre-Commissioning Testing

ITEM	TESTS REQUIRED
HV cables	5kV IR test and continuity test (Confirm shorted capped ends fitted)
LV cables	500V IR test and continuity test
Extensible HV switchgear	Pressure test after assembly in accordance with CP319 Ducter test after assembly
Non-extensible HV switchgear	Pressure test in accordance with CP319
Transformers	Pressure test in accordance with CP319
Earthing	Earth resistance
Protection[1]	Wiring checks & Secondary injection
HV Metering CTs & VTs	Tested in accordance with ES501

[1] Procedures for protection testing are given in CP341.

Test result sheets shall be completed by the ICP, as appropriate. Sample sheets are shown in Appendix B of ES320, to cover cable IR tests, earth electrode resistance tests, high voltage tests on switchgear/transformers and protection test results.

Copies of all the forms may be obtained from the SP Electricity North West Virtual Data Room. Completed forms must be returned by the ICP to SP Electricity North West before any further work can be arranged.

6.3.3 Site Risk Assessment

The Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR) require that all substations and overhead lines are assessed to establish the foreseeable risk of danger from interference, vandalism or unauthorised access. Guidance on the assessment and classification of sites is provided in Appendix A of EPD301. A Background Risk Classification for the new site shall be determined by the ICP and recorded on the appropriate Data Form.

7 Overhead Circuits

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 SP Electricity North West and any other interested parties. Particular attention shall be paid to the legal consents agreed as part of the design approval.

Equipment for overhead circuits shall be acquired in accordance with ES281 Part 2, otherwise the approved installer shall gain approval from SP Electricity North West's Circuit Policy Manager for suggested equipment, prior to purchasing the equipment.

For low voltage overhead networks and services connections, Aerial Bundled Conductor (ABC) shall be the preferred overhead line construction method. Open wire lines shall be used only with the approval of SP Electricity North West. For guidance on installation practice refer to ES400O2, ES400O3 and ES400O4, as appropriate.

8 Documents Referenced

DOCUMENTS REFERENCED	
Regulations	
ESQCR	The Electricity Safety, Quality & Continuity Regulations 2002
Energy Networks Association engineering documents	
ENA ER G12	Requirements for the Application of Protective Multiple Earthing to Low Voltage Networks
ENA ER G81 Part 6	Framework for new low voltage housing development installations - Part 6 Installation and records
ENA ER G87	Guidelines for the Provision of Low Voltage Connections to Multiple Occupancy Buildings

NOTE: SP Electricity North West is unable to supply copies of the above document, but copies may be obtained from the Energy Networks Association.	
SP Electricity North West documents	
EPD301	Inspection and Maintenance of Electrical Plant and Substation Security
EPD283	LV Design Manual
ES220	Pre-commissioning Requirements for ICPs Requiring New Assets to be Connected to the 11/6.6kV Network
ES281 Part 4	Design and Planning Specification for New Underground Connections at Voltages up to 11kV for Industrial and Commercial Customers
ES281 Parts 2 & 5	Part 2 – Materials Specification for New Low Voltage Installations For Housing Developments Part 5 – Materials Specification for New Underground Connections at Voltages up to 11kV for Industrial and Commercial Customers
ES287	Connections to Multiple Occupancy Buildings
ES301	Distribution Substation Housings, Replacement Roofs and Doors
ES320	Preparation and Assembly of Substation Plant (11/6.6kV and LV)
ES352	Design of Distribution Substations
ES397	Electrical Installation within Distribution Substations
ES400E4	Installation, Commissioning and Repair of Solid HV and LV Cables
ES400O2	Overhead-Lines of Compact-Covered-Construction for 6.6, 11 & 33 kV
ES400O3	Bare-Wire Overhead-Lines on Wood Poles for 11/6.6 and 33 kV
ES400O4	LV ABC Overhead Lines and Services

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CP319	Applied High Voltage Tests
CP333	Earthing Design for High Voltage Substations
CP342	Commissioning and Maintenance of Electrical Protection Systems
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 Including132kV - 6.6/11kV Cable Jointing
Booklet	Guide for the recording of underground assets