



Installation and Records

Framework for underground networks
(and associated HV/LV distribution substations)
in EDF Energy's three Distribution Networks
(EPN, LPN and SPN)

Appendices for ENA/OFGEM Engineering Recommendation G81 Generic Documents:

Part 3:

Installation and Records framework for low voltage housing development underground networks and associated, new, HV/LV distribution substations.

Part 6:

Framework for installation and records of industrial and commercial underground connected loads up to and including 11kV

Originator:	Paul Abreu	Date:	17/12/2004
Approved By:	Keith Hutton	Approved Date:	20/12/2004
Review Date:	31/03/2005		
This document forms part of the Company's Integrated Business System and its requirements are mandatory throughout EDF Energy Networks Branch. If you have any queries about this document please contact the originator of the current issue.			

Version	Date	Details	Originator
1.0	17/12/2004	Three area documents combined and revised	Paul Abreu

Installation and Records Appendix for G81 Documents

CONTENTS	Page
1.0 Introduction	4
1.1 Definitions	4
2.0 Excavation and Cable Laying	5
2.1 Work in the Vicinity of Live Cables, Lines and Plant	6
2.2 Trench Bedding	6
2.3 Cable Ducts	6
2.4 Pulling Cable	7
2.5 Blinding Cables	8
2.6 Cable Protection Covers	8
2.7 HV Single Core Cable	8
2.8 Cable Depths of Cover	8
2.9 Cable Installed in Air	9
2.10 Cable Capping	9
2.11 Service Entries	9
2.12 LV Cable Jointing	9
2.13 HV Cable Jointing	9
2.14 Underground LV Disconnecting Boxes	10
3.0 Cable Trench Drawings	11
4.0 Cable Pulling Tensions & Bending Radii	19
5.0 Overhead Lines	22
6.0 LV Service Termination Layouts	23
6.1 Multi-Occupancy Dwellings	24
6.2 Internal Rising and Lateral Connections	24
6.3 Service Equipment Layout Examples EPN	26
6.4 Service Equipment Layout Examples LPN	27
6.5 Service Equipment Layout Examples SPN	28
7.0 Substation Buildings Plinths and Enclosures	29
7.1 New Substation Buildings	30
7.2 Outdoor Unit Type Distribution Substation Enclosures	30
7.3 Land Requirements for Enclosures and Compact/Pad-Mount Substations	30
7.4 Substation Labels	31
7.5 Approved GRP Substation Enclosures	31
EPN GRP Design Drawing	32
LPN GRP Design Drawing	33
SPN GRP Design Drawing	34
7.6 EPN Substation and Plinth Drawings	35

CONTENTS

Page

7.6	LPN Substation and Plinth Drawings	42
7.7	SPN Substation and Plinth Drawings	43
8.0	Plant, Equipment Tests	44
9.0	Plant, Equipment and Cable Records	45
9.1	Statutory Obligation	46
9.2	33/132kV Cable & Overhead Line Records (including pilot cables)	46
9.2.1	33/132kV Overhead Lines	46
9.2.2	New 33/132kV Cables and Overlays on Existing Cable Routes	46
9.2.3	'As laid' 33/132kV Cable Records	46
9.3	LV & HV (up to & including 11kV) Cable & Overhead Line Records	47
9.3.1	LV/HV Cable laying - General Information	47
9.3.2	LV/HV Overhead lines - General Information	47
9.3.3	Jointing - General Information	47
9.3.4	Site Measurements	47
9.3.5	Acceptable Features	48
9.3.6	Unacceptable Features	48
9.3.7	Information to be Recorded on Site	48
9.3.7.1	Cables (including all services & street furniture)	48
9.3.7.2	Ducts	48
9.3.7.3	Jointing	48
9.3.7.4	Harmonised Cables – Phase Identification	49
9.3.7.5	Harmonised Service cables – Phase Identification	49
9.3.7.6	Harmonised Mains Cables – Phase Identification	49
9.3.7.7	Link Boxes, Pillars and LV Cabinets	49
9.3.7.8	Substation	49
9.3.7.9	Substation Plant Records & Commissioning Information	50
9.3.7.10	Service Record	50
9.3.7.11	Street Furniture	50
9.3.7.12	Overhead Lines	50
9.4	Delivery of Site Information (timing)	51
9.5	Plant Data Form	51

Installation & Records Appendix for G81 Documents

1.0 Introduction

This document describes the installation, construction and asset recording requirements, in the three EDF Energy network areas, EPN, LPN and SPN, for:

- low voltage underground cable networks and associated new HV/LV distribution substations for Greenfield and Brownfield housing estates (G81 Appendix Part 3).
- low voltage and high voltage cable networks and associated HV/LV distribution substation for Commercial and Industrial sites (G81 Appendix Part 6).

The information in this document is subject to some local variations between the three licenced EDF Energy distribution networks, for example, differences in:

- substation specification
- environment and impact on ratings, insulation, corrosion etc
- compatibility with existing equipment.

Where possible any differences in requirements for each of the three EDF Energy distribution areas are clearly specified in this document. However, each project undertaken by an Independent Connection Provider (ICP) will be subject to equipment and design approval and at this stage, if appropriate, EDF Energy may specify any further area-specific requirements that are not covered in this document.

This document should be read in conjunction with the ENA Engineering Recommendation G81 suite of documents, in particular Part 3: Installation and Records and Part 6: Installation and Records Industrial & Commercial.

This document will be updated on a regular basis and you should always check for the latest version before commencing any works. **Where EDF Energy requirements are not specified in this document ICPs should plan to undertake any works in accordance with best industry practice, complying with all appropriate legislation, including those referred to in the ENA G81 suite of documents. ICPs are also required to obtain prior approval for such works from EDF Energy (Connection Services 01293 509356).**

1.1 Definitions

Greenfield – A plot of land that has not been subject to any form of development.

Brownfield – A plot of land previously developed which has received planning consent for redevelopment.

Commercial & Industrial Sites – Areas developed to accommodate companies undertaking processes with high energy consumption requiring large LV/HV electrical connections.

ICP – Independent Connection Provider; a Lloyds Register Approved Contractor that undertakes contestable connections work for adoption by EDF Energy.

Approved Contractor – A contractor approved by Lloyds Register (LR) and listed on the LR National Electricity Registration Scheme (NERS).

2.0 Excavation and Cable Laying

2.1 Work in the Vicinity of Live Cables, Lines and Plant

All EDF Energy cables and apparatus must be treated as live unless instructions from EDF Energy's representative are issued to the ICP confirming they are dead. Works in the vicinity of EDF Energy electricity cables must be carried out by an Approved Contractor and shall only proceed provided that the ICP or his Approved Contractor undertakes to have due regard to the safety of the general public, his and EDF Energy's personnel and the security of the electrical system.

All overhead lines shall be treated as live. Prior to any Works being undertaken in the vicinity of overhead lines (within 15 m) the ICP shall erect all necessary bunting and ground level signs and modify the plant to restrict its operating height in order to maintain safe working clearances.

Mains cable is to be positioned in the footway in accordance with the requirements of NJUG Publication No 7, 'Recommended Positioning of Utilities' Apparatus for New Works on New Developments and in Existing Streets'. The ICP must excavate all trenches and joint holes to the dimensions, appropriate for the type and quantity of apparatus to be installed, as detailed in Section 3.0 'Cable Trench Drawings'. The drawings within this document provide typical cable trench dimensions and should be strictly adhered to unless alternative dimensions have been agreed with EDF Energy.

Where cables are laid direct, care shall be taken that the bottom of the trench is substantially smooth and free of sharp edged stones. The backfill around the cable shall be free of sharp edged stones and rubble.

2.2 Trench Bedding

The ICP must lay 11kV (and below) cables directly onto the bottom of the trench. Where a sand bedding material is required for the base of a trench the ICP shall then excavate the trench depth an additional 75mm and install sand to a finished compacted depth of 75mm.

The ICP must provide and install a 'Selected Sand' bed, to a compacted depth of 75mm, for all 33kV cable installation. The 'Selected Sand' bed shall cover the full width of the trench. The ICP must increase the trench depth by 75mm to accommodate the imported material.

2.3 Cable Ducts

Pipes and ducts shall be proven clear and clean before drawing the cable. Ducts not immediately required shall be sealed using a plug. Similarly all tubing and ducts entering a building, pit or chamber, whether enclosing a cable or not, shall be cut flush to the wall and suitably sealed against gas entry. The installer of the ducts must seal the gap between the outside of the ducts and the building structure and the installer of the cables must seal the annular gaps between the cables and the insides of the ducts where the cables enter the substation or building. The sealant must provide a liquid and gas tight seal and should be suitable mastic or expanding foam or an approved mechanical seal. The Tyco Electronics 'Rayflate' duct sealing system is suitable to prevent the ingress of gas, even if the ducts contain a cable.

Where ducts are installed in concrete, prior agreement must be obtained from EDF Energy and the use of steel pipes will be required. Steel pipes to be medium quality, screwed, complying with BS1387:1985.

Plastic 'Rigi-ducts' shall be laid and connected according to the manufacturer's recommendation. Any concrete surround shall have a minimum thickness of 75mm.

Plastic tubing shall always be buried and never installed in air e.g. under floorboards or along walls for any distance.

Preformed plastic piping for small service cable entries shall comply with the materials specification and the National Joint Utilities Group Publication No.6 – Service Entries for New Dwellings on Residential Estates. EDF Energy requires that ICPs install black low density polythene tube (polyduct) 38mm external, 32mm internal diameter ducts from service termination position to mains jointing position in footpath.

The ICP must only use approved electrical cable ducts. Ducts marked specifically for use by other undertakings e.g. grey plastic ducts marked 'BT'; must never be used for electric distribution or service cables.

Modern cable ducts are black in colour and marked with the legend 'Electric Cable Duct' on two diametrically opposite sides.

The ICP must install and joint all pipes and ducts in accordance with the manufacturers' instructions or recommendations.

For 33kV cable installations the ICP must fill 33kV ducts with a thermally stable re-enterable material. When pipes or ducts are to be filled with a Bentonite Mixture, unless they are installed in a concrete surround, the joints in the pipe or duct run must be effectively sealed to prevent the migration of the Bentonite Mixture and preserve its moisture content under service conditions.

Bentonite Mixture - 100 parts of a 10:1 Bentonite/water mixture to 20 parts sand and 8 parts cement.

2.4 Pulling Cable

The ICP shall handle cables with care and install them correctly. The ICP shall examine and check the cable for damage during and immediately following cable installation. Any damage that occurs, no matter how small, must be rectified immediately. Denso tape repairs to damaged cable sheathing are not acceptable. Any cables damaged during the installation process must be replaced. The ICP shall ensure the cable bending radii used are not less than that specified in Section 4.0.

The ICP should only lay cable when the ambient temperature is above 0°C and has been above this temperature for the previous 24 hours, or approved special precautions have been taken to maintain the cable above this temperature to avoid the risk of damage during handling.

Where the ICP is to use a winch it must have a swivel eye fitted. The swivel eye must be in good working order and freely rotate to prevent the cable twisting. The ICP must only pull cable by winch where there is a serviceable and accurate dynamometer or an adjustable tension limiting switch fitted. The maximum pulling force must not exceed the values shown in Section 4.0.

The ICP shall normally pull LV and 11kV cables by the nose. A cable stocking shall be fully pulled onto the cable to ensure a good grip. More difficult pulls may require the use of an American pulling eye attached to the conductors.

Rollers should always be used when pulling cables. All rollers used must be in serviceable condition moving easily on their spindle and with rolling surfaces free from damage. The rollers should be placed at approximately four-metre intervals. A leading roller shall be placed at the trench side at the pulling end, with slide rollers on bends and hoop rollers along straight sections. Inverted skid plates should be used to prevent the cable or pull wire rising into obstructions. At duct entries a bell mouth shall be attached at each end with rollers positioned to give central access into the bell mouth. Immediately following installation of cables, the ends of each cable should be inspected for damage and secured against the ingress of moisture by fitting heat-shrink caps.

2.5 Blinding Cables

Following installation, all cables 11kV (and below) should be blinded to a compacted depth of 100mm above the cable, or joint, with soil taken from the excavated material. The blinding must be free from materials that may damage the cable. Any accumulated water must be pumped from the excavation before blinding the cable/duct. Imported material for blinding (sand) should only be used for cables 11kV (or below) if all the excavated material is unsuitable. The sand should be installed so as to provide a 100mm radial cover over the cable. Sand filled bags must be used to support cables and joints.

All 33kV cables must be blinded with 'Selected Sand' to a compacted depth of 100mm above the cable. All blinding material over and around the cable and joint bays shall be hand punned.

Selected Sand -The sand must be of a coarse type with a mixture of particle sizes and have good cohesion properties. In situ the thermal resistivity in a dried out state must be not greater than 2.7 Km/W. The composition of the material shall not contain readily visible foreign matter such as pieces of clay or organic detritus or sharp stones or flints. The particle size must not exceed 5 mm.

2.6 Cable Protection Covers

Cables must be protected and/or marked to comply with Regulation 14 of The Electricity Safety, Quality and Continuity Regulations 2002. For direct laid cables the ICP must install marker tile tape/stokboards over the cables as shown in the appropriate trench drawings detailed in Section 3.0. This also includes all single phase service cables with a conductor size of 35mm² or less. This clause will not apply to approved ducts laid by hand. Where the cable is laid in ducts the ducts are to be 125mm Plastic Rigiduct to EATS 12-24. The EDF Energy design will specify whether the cable is to be laid direct or in ducts. The ICP shall cut the tile tape cleanly and install the tape so that it is overlaid at bends to provide continuous cover of the cable route. The ICP shall install stokboards to protect 33kV cables.

Where it has been agreed in writing with EDF Energy that cables are laid closer to the surface because of site difficulties then steel plates should be used to provide additional protection and safety.

Where cable markers are removed from existing cables during the course of works or have not been previously installed, they should be replaced or installed as appropriate.

2.7 HV Single Core Cable

Cable to be laid in trefoil format bound together at one-metre intervals with nylon tie tapes as specified in the Materials Specification.

2.8 Cable Depths of Cover

Trench dimensions showing cable depths are detailed in drawings DB/SD10/74/19 to DB/SD10/74/25 within this document.

2.9 Cable Installed in Air

Electricity service cables which run through free space within buildings, in areas such as hallways, basement corridors and garages, must be mechanically protected with the use of appropriately sized steel pipe or capping. The type of mechanical protection is dependant on the cable environment and agreement should be obtained from EDF Energy Connection Services prior to completion of installation.

Cables installed in air within pits or cableways shall be physically separated and, where appropriate, provided with a fire resistant or fire retardant covering. Fibrous coverings shall be removed prior to the application of any fire resistant finish and paint. PVC coverings are generally regarded, as fire retardant, for true fire performance a low smoke and fume (LSF) or low smoke zero halogen (LSOH) should be used.

2.10 Cable Capping

All LV, 11kV and 33kV cables on drums, or installed but not in use, shall be capped using the appropriately sized heat-shrink moulded caps.

2.11 Service Entries

National Joint Utilities Group Publication Number 6 - Service Entries for New Dwellings on Residential Estates (NJUG 6) shall be implemented with one exception:-

Cavity service entry de-rates the service cable and may only be used where allowed for in the design and specifically approved in writing by EDF Energy.

The meter cabinet and installation arrangement shall be one of the types agreed with EDF Energy. These arrangements shall be agreed in advance and documented, with appropriate drawings.

If alternative arrangements are considered the following shall be taken into account that the air temperature surrounding the cut out must not exceed 30°C.

All meter cabinets must be installed in a way that maintains the manufactured fire resistance values. Service cables ducts must be terminated just inside meter cabinet through an appropriately sized entry on the cabinet casing (made with an appropriate circular cutter). Once the service cable has been pulled through ducts it must be sealed both internally and around entry into cabinet.

2.12 LV Cable Jointing

LV joint kits are specified in the Materials Specification. All joints are to be made in accordance with the instructions issued by the joint kit manufacturer. Joints holes should not be back filled until resin/joint filler is fully hardened. Joints must be kept dry until resin/joint filler is fully hardened.

2.13 HV Cable Jointing

Cable Terminations - Termination kits are specified in the Materials Specification. All joints are to be made in accordance with the instructions issued by the joint kit manufacturer.

PILC Joints – Joints are to be protected by compound filled earthenware protection boxes. Jointing materials are specified in the Materials Specification.

PILC HV cable end box terminations in the LPN area must have the lead sheath plumbed onto the brass gland. Solderless sheath earthing systems are not approved for use in the LPN network.

XLPE/EPR Joints - Cable kits are specified in the Materials Specification. All joints are to be made in accordance with the instructions issued by the joint kit manufacturer.

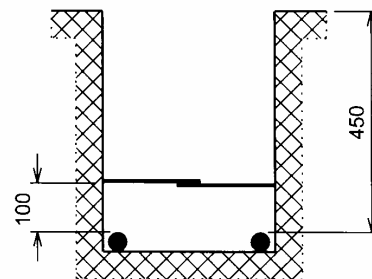
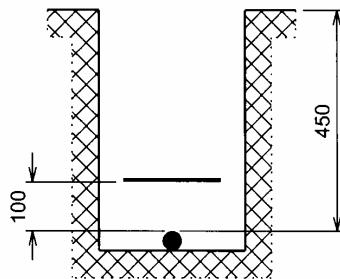
2.14 Underground LV Disconnecting Boxes

Disconnecting Boxes should be installed in the footway and are to be supported on a suitable concrete slab and, after jointing, a brick built (or approved alternative) pit, of a structure appropriate to the imposed loading, shall to be formed around the link box supporting an approved pavement cover. Details of approved covers are also given in Materials Specification. For each low voltage distributor cable connected to disconnecting boxes a suitable engraved destination label shall be attached to the distributor way. In addition it will be necessary to supply a suitable engraved destination label for any off-site location where the installation of new assets has changed existing cable destinations.

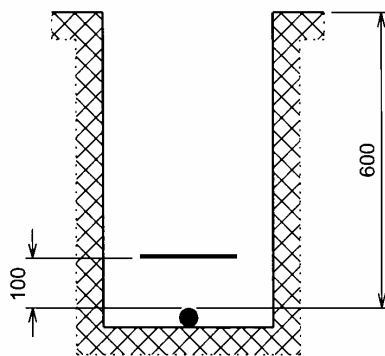
3.0 Cable Trench Drawings

LV Cables

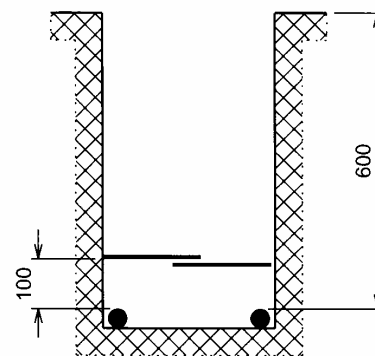
In Footpaths etc.



In Roads



For Ducts Reduce Tape Tile
Distance Above Cable to
50mm



For Ducts Reduce Tape Tile
Distance Above Cable to
50mm

Tape Tiles ———

ARRANGEMENT OF
L.V. CABLE IN TRENCH

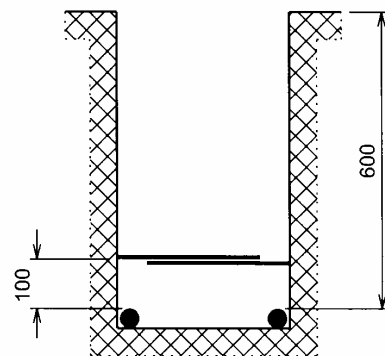
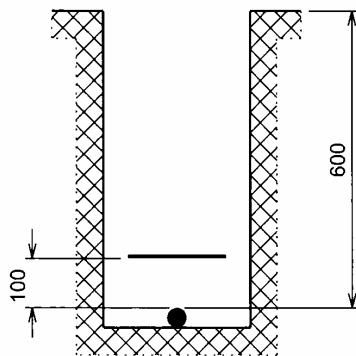
© EDF Energy 2004

DRN.	RDH 28.02.95	DRAWING NUMBER	ISSUE
CKD.	P.W. 18.05.04	DB/SD10/74/19	2
APP.	P.W. 18.05.04		

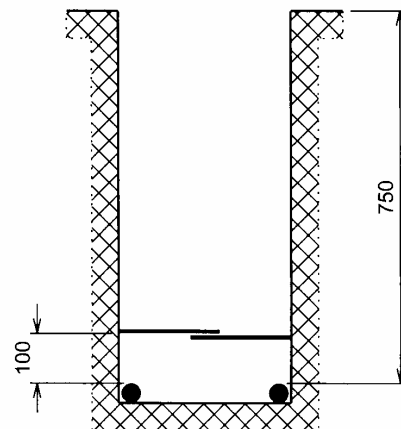
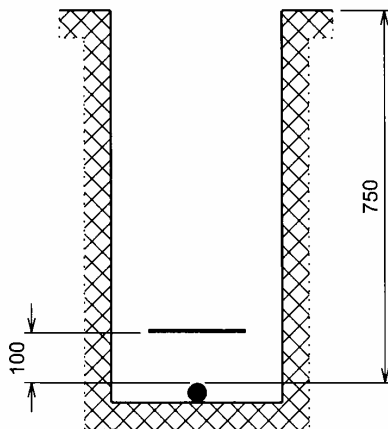
17.05.04

11kV Cables

In Footpaths etc.



In Roads



Tape Tiles ———

ARRANGEMENT OF
11kV CABLE IN TRENCH



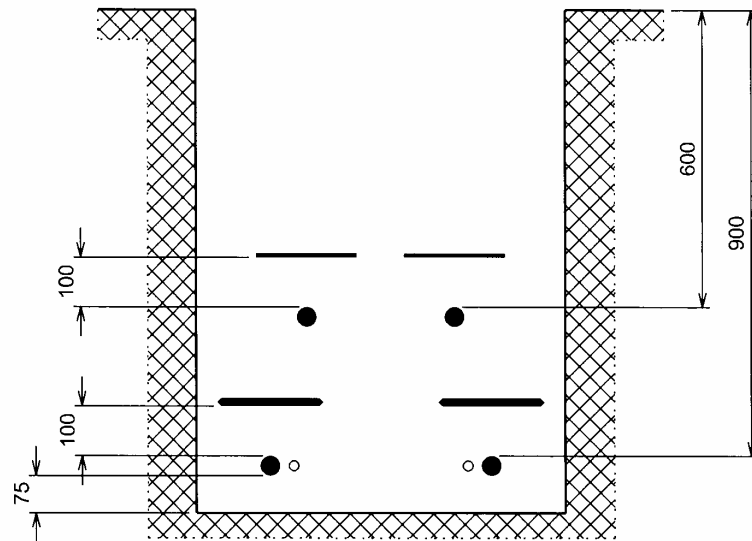
EDF Energy 2004

DRN.	RDH 28.02.95	DRAWING NUMBER	ISSUE
CKD.	P.W. 18.05.04	DB/SD10/74/20	2
APP.	P.W. 18.05.04		

17.05.04

33kV and 11kV Cable

Laid Direct in Footpath etc.



Tape Tiles 

Stok Boards 

ARRANGEMENT OF
33kV & 11kV CABLE IN TRENCH



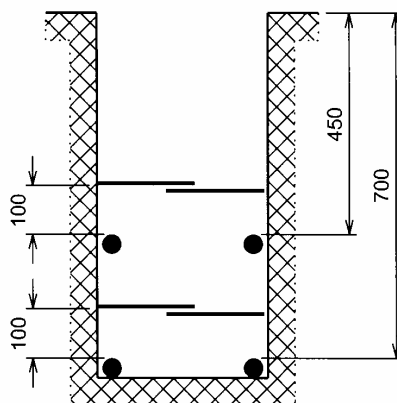
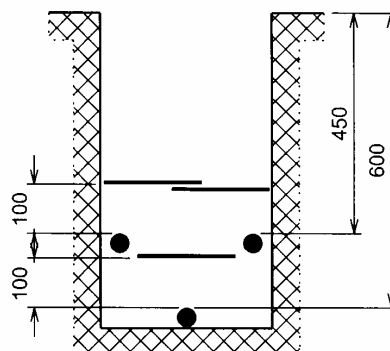
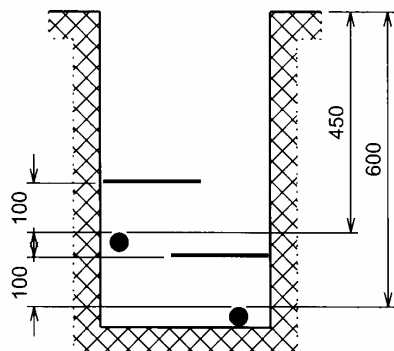
EDF Energy 2004

DRN.	RDH 28.02.95	DRAWING NUMBER	ISSUE
CKD.	P.W. 18.05.04	DB/SD10/74/21	2
APP.	P.W. 18.05.04		

17.05.04

Combined LV and 11kV Cables

In Footpaths etc.



Tape Tiles ———

ARRANGEMENT OF COMBINED
L.V. & 11kV CABLES IN TRENCH

©

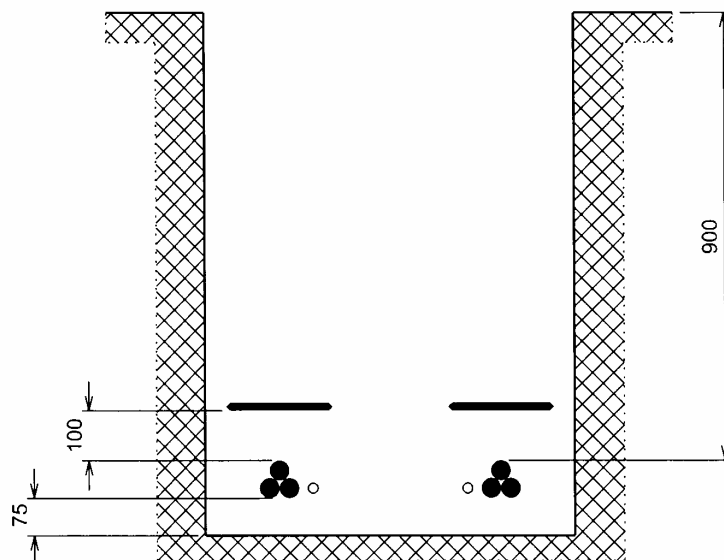
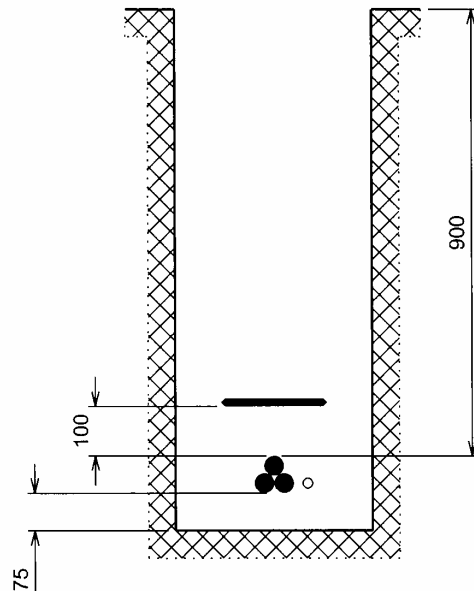
EDF Energy 2004

DRN.	RDH 11.04.95	DRAWING NUMBER	ISSUE
CKD.	P.W. 18.05.04	DB/SD10/74/22	2
APP.	P.W. 18.05.04		

18.05.04

33kV Cables

Road or Footpath



Laid direct. No extra depth for ducts.

If bedding is not required reduce depth by 75mm.

Stok Boards 

ARRANGEMENT OF 33kV CABLES
IN ROAD OR FOOTPATH

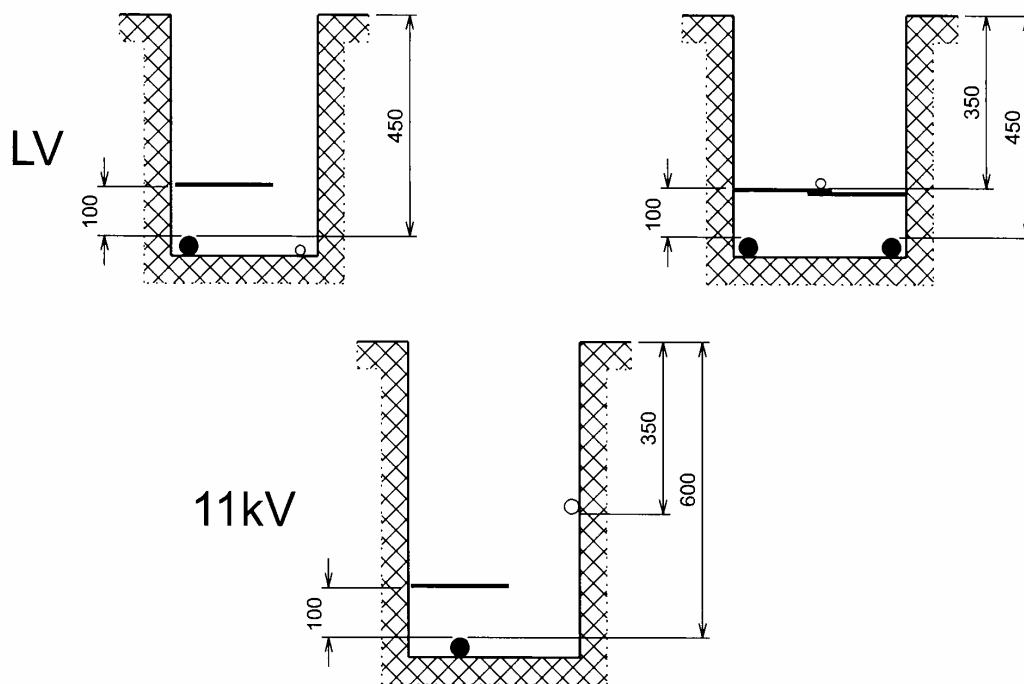
© EDF Energy 2004

DRN.	RDH 11.04.95	DRAWING NUMBER	ISSUE
CKD.	P.W. 18.05.04	DB/SD10/74/23	3
APP.	P.W. 18.05.04		

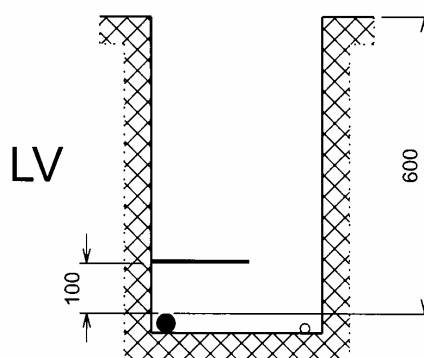
18.05.04

Combined With BT

In Footpaths etc.



In Roads



Similar arrangement to be followed with other trench dimensions.

ARRANGEMENT OF CABLE IN TRENCH
WHEN COMBINED WITH BT



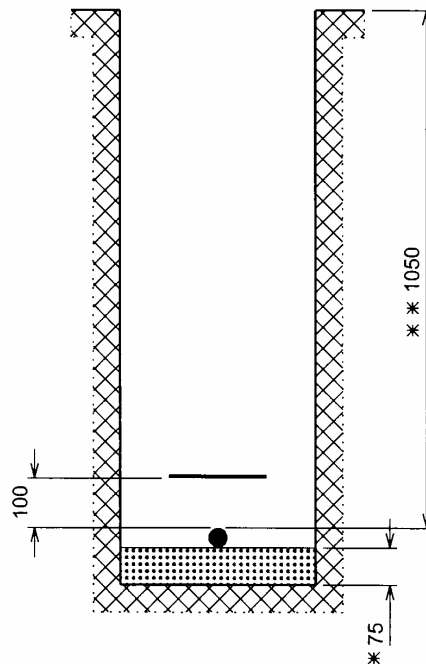
EDF Energy 2004

DRN.	RDH 11.04.95	DRAWING NUMBER	ISSUE
CKD.	P.W. 18.05.04	DB/SD10/74/24	2
APP.	P.W. 18.05.04		

18.05.04

All Cables, 33kV and below

Laid in Agricultural Land



* 75mm sand bed (For 33kV cables only).

** Depth of cover increased to 1200mm if agricultural land is subject to deep plowing.

Tape Tiles ———

ARRANGEMENT OF CABLES IN TRENCH
IN AGRICULTURAL LAND



EDF Energy 2004

DRN.	RDH 28.02.95	DRAWING NUMBER	ISSUE
CKD.	P.W. 18.05.04	DB/SD10/74/25	2
APP.	P.W. 18.05.04		

18.05.04

4.0 Cable Pulling Tensions & Bending Radii

Maximum Cable Pulling Tensions and Minimum Bending Radii for LV and 11KV Cables

Cable Size (mm ²) & Type		Maximum Pulling Tension Newtons (kgf)	Minimum Bending Radius (mm)
LV Mains & Service Cables			
4	1ph copper XLPE/PVC concentric	manual	75
16	1ph Aluminium XLPE/PVC concentric	manual	100
35	1ph Aluminium XLPE/PVC concentric	manual	125
35	3ph Aluminium XLPE/PVC concentric	manual	210
95	3ph Waveform	3000 (306)	550
185	3ph Waveform	7000 (714)	700
300	3ph Waveform	7000 (714)	850
600	Single core aluminium PVC/PVC	manual	350
740	Single core aluminium PVC/PVC	manual	400
11kV Mains Cables			
150	Single Core Aluminium Polylam (EPN)	4400 (450)	600
240	Single Core Aluminium Polylam (EPN)	7000 (720)	670
95	Three Core Aluminium PICAS (SPN)	3950 (403)	600
185	Three Core Aluminium PICAS (SPN)	6400 (652)	750
300	Three Core Aluminium PICAS (SPN)	9800 (999)	900
95	Three Core Aluminium PILCSWA (LPN)	2790 (285)	650
185	Three Core Aluminium PILCSWA (LPN)	5400 (555)	750
240	Three Core Aluminium PILCSWA (LPN)	7000 (720)	800
240	Three Core Copper PILCSWA (LPN)	11750 (1200)	800
300	Three Core Copper PILCSWA (LPN)	14700 (1500)	900
70	Single Core Aluminium XLPE (LPN)	2050 (210)	500
185	Single Core Aluminium XLPE (LPN)	5400 (555)	630
240	Single Core Aluminium XLPE (LPN)	7000 (720)	680
300	Triplex Copper XLPE (LPN)	14700 (1500)	950

Maximum Cable Pulling Tensions and Minimum Bending Radii for 33kV Cables

Cable Size (mm ²) & Type		Maximum Pulling Tension Newtons (kgf)	Minimum Bending Radius (mm)
33kV Mains Cables			
300	Single core Aluminium XLPE	8825 (900)	1000
185	Single core Copper XLPE	9070 (925)	850
300	Single core Copper XLPE	14700 (1500)	950
400	Single core Copper XLPE	19600 (2000)	1050
500	Single core Copper XLPE	19600 (2000)	1100
630	Single core Copper XLPE	19600 (2000)	1200
800	Single core Copper XLPE	19600 (2000)	1300

5.0 Overhead Lines

For the installation of overhead line connection arrangements ICPs are required to obtain the necessary planning consents. As this can often be a long and difficult process ICPs rarely choose the overhead line option for contestable connections installations.

All wood pole overhead lines for network voltages 11kV and 33kV shall conform to Energy Networks Association Technical Specification 43-40 (Specification for Single Circuit Overhead Lines on Wood Poles for use at High Voltage up to and including 33kV) – Issue 2 (2004).

All wood pole overhead lines for low voltages shall generally conform to Energy Networks Association Technical Specification 43-12 (Insulated Aerial Bundled Conductors Erection Requirements for Low Voltage Overhead Distribution Systems).

If you require further information on EDF Energy's overhead line installation requirements for any of the three networks please contact the EDF Energy Connection Services department on 01293 509356.

6.0 LV Service Terminations and Layouts

6.1 Multi-Occupancy Dwellings.

For Maisonette Type Domestic Buildings – Install black low density polythene tube (polyduct) 38mm external, 32mm internal diameter ducts to terminate into fire resistant meter cabinets in external wall of ground floor of building. Cabinets to be sited so that the top of the cabinet is not more than 1.8m from the ground and the bottom of the cabinet is not less than 450mm from the ground. A single phase service and meter to be installed in each cabinet. Each cabinet should be sized to accommodate both a meter and time switch. Minimum space requirement for meter and time switch is 350mm wide by 320 mm high. PME Earth terminal to be provided with each service.

For Multiple Storey Domestic Buildings – A 125mm Rigi-duct to a full height cupboard with full height door in a common access area on the ground floor of the building. A three phase Service to terminate in a multi-way service head or a three phase service head with an approved distribution board. PME Earth terminal to be provided with the service. Internal Rising / Lateral Connection (see below) to each dwelling.

In EPN and SPN areas for larger buildings a central internal rising sub-main to distribution boards on each floor with Lateral connections to each dwelling may be employed.

6.2 Internal Rising and Lateral Connections

Internal Rising and Lateral Connection do not form part of the EDF Energy LPN distribution network and will remain in the ownership of the property owner (LPN will not adopt). In some circumstances and subject to a payment LPN may agree to operate, repair and maintain rising and lateral connections on behalf of the property owner.

In order for Rising and Lateral connection installations to be accepted for connection to any of the three EDF Energy distribution networks, a safe and proper system is required. The notes below provide guidance to EDF Energy's requirements.

- a) The main electrical intake position within the building must be sited so that the incoming underground service cable is terminated as close as possible to its entry point to the building.
- b) The intake position must be in a communal part of the building exclusively set aside for the purpose and NOT in a store or bin area
- c) The electrical intake position must be segregated from the gas intake and water pipes.
- d) The rising and lateral connection system design and installations must be fully compliant with the requirements of both EDF Energy and BS 7671 (the IEE Wiring Regulations).
- e) Rising chases where used should be constructed of non combustible material, have an internal depth of at least 200mm, have removable covers and a fire barrier must be installed between each storey of the building.
- f) Each Customer must be fed from separate fuse. These fuses to be housed in the cut-out of the service termination or in an approved distribution board with fuseways complying with BS 1361. All fuses shall be of HRC type to BS 1361.
- g) Space to be provided for both a meter and a time switch for each customer (minimum space requirement meter & time switch 350mm w x 320mm h).

- h) The maximum height of any meter should be 1.8m from floor / ground level and the minimum height should be 450mm.
- i) Meter tails should be less than 1m in length unless enclosed in galvanised steel trunking, high impact PVC trunking or hard drawn galvanised steel conduit.
- j) Connections between distribution boards and individual domestic dwellings should have a minimum installed rating of 60 amps.
- k) Both service and sub-main cables are to be of Low Smoke and Fume specification.
- l) Cables can be installed in a duct, conduit, trunking or clipped to the surface at high level or in a rising chase or clipped to a cable tray. Mechanical protection is a requirement.
- m) Steel Wire Armoured and MIMS connections cannot be terminated directly into the meter and should terminate in sealable connector blocks immediately adjacent to the meter. 16mm² or 25mm² copper stranded double thermoplastic insulated single core meter tails to be provided for final connection into the meter.
- n) The installation should be designed to be “withdrawable” so as to facilitate repair and replacement at a later date. Cables should not be cast directly into building slab or plastered into wall screed. When cables are clipped to the surface, all clips should be positioned to be accessible at a later date. If cables are to be positioned behind false ceilings they should be accessible through removable panels.
- o) All equipment is only to be installed in communal areas.
- p) The minimum size for service cables is 35mm².
- q) Multi-way service heads are to have individual fuses labelled with each flat number (not plot numbers). A PME label must be fitted to all service cut-outs as appropriate.
- r) In the EDF Energy LPN area Rising and Lateral connections and internal rising sub-mains must be SNE systems. Meters may be grouped at the common access intake position or be installed in a suitable meter cabinet at each dwelling. However, the position of meter may limit the tariffs which can be offered to customers (pre-payment meters must be sited within the dwelling). In the LPN area cables used for unmetered rising and lateral connections must be either:-
 - i. Thermoplastic insulated cables run in hard drawn screwed galvanised steel or high impact PVC conduit,
 - ii. Steel Wire Armoured cables, or
 - iii. MIMS cables.


6.3 Service Equipment Layout Examples EPN

This information is being prepared for formal publication.

If you require information on EDF Energy's Service Equipment Layout requirements for the EPN network please contact the EDF Energy Connection Services department on 01293 509356.

6.4 Service Equipment Layout Examples LPN

Comprehensive information on service termination layouts for the LPN area is contained in EDF Energy document EI 08-0107 'Central Area Service Drawings'. This document will be provided by EDF Energy Connection Services, on request.



Document Number: EI 08-0107
Version: 01
Date: 19/11/2004

ENGINEERING INSTRUCTION

EI 08-0107

CENTRAL AREA SERVICE DRAWINGS

Network(s): LPN

Summary: This engineering instruction contains the service drawings applicable to the LPN network.

Originator: Dave Collis

Date: 19/11/2004

Approved By: Paul Elliott

Approved Date: 30/11/2004

Review Date: 30/11/2009

This document forms part of the Company's Integrated Business System and its requirements are mandatory throughout EDF Energy Networks Branch. Departure from these requirements may only be taken with the written approval of the Director of Asset Management. If you have any queries about this document please contact the originator of the current issue.

Document History

(This document history notes below are intended as a guide only and may not cover all of the changes. If you wish to make use of this document it should be read in full.)

Version	Date	Details	Originator
01	19/11/2004	Original	Dave Collis

1 of 43

THIS IS AN UNCONTROLLED DOCUMENT, THE READER MUST CONFIRM ITS VALIDITY BEFORE USE

6.5 Service Equipment Layout Examples SPN

This information is being prepared for formal publication.

If you require information on EDF Energy's Service Equipment Layout requirements for the SPN network please contact the EDF Energy Connection Services department on 01293 509356.

7.0 Substation Buildings, Plinths and Enclosures

7.1 New Substation Buildings

EDF Energy will specify civil works requirements for each substation and will inspect each substation for compliance as part of the adoption process. Due to the complex nature of the majority of substation environments within the LPN area the majority of substation buildings are one-off designs. EDF Energy has a dedicated LPN Substation Design Team that can provide building design information at the design stage of developments. The contact details for this department are normally provided during the quotation process for a new connection.

7.2 Outdoor Unit Type Distribution Substation Enclosures

Unit type distribution substations which are not incorporated within a building shall, whenever possible be totally enclosed by an appropriate GRP enclosure as detailed in the Materials Specification appendix. If a GRP enclosure is not acceptable for a particular site ICPs will be required to provide an alternative proposal for approval by EDF Energy.

The standard concrete bases for use with GRP enclosures with unit type substations and compact/pad-mount substations are detailed in the plinth design drawings provided by EDF Energy Connection Services (01293 509356).

For brick enclosures the standard 315kVA - 1000kVA unit transformer plinth must be positioned to the rear of the enclosure with a minimum of 850mm clearance between the edge of the plinth and the walls. For brick substations in EPN and SPN the ICP/developer must provide GRP ventilation louvers and GRP substation doors (with galvanised steel frames) provided by an approved supplier as listed in the Materials Specification. For all areas, local planning restrictions may require alternative door arrangements. These alternative arrangements must be agreed with EDF Energy before being implemented. Timber doors are not acceptable.

In all cases the ICP/developer will be required to provide the concrete base and where necessary the surfaced access strip and fence panels detailed below.

7.3 Land Requirement for Enclosures and Compact/Pad-Mount Substations (SPN and EPN)

In addition to an area of land the size of the plinth, a strip of land at least 500mm wide will be required at the sides and rear for ventilation and maintenance purposes. This strip shall be surfaced by the developer using either concrete, grey paving slabs set on concrete or tarmacadam.

In situations where the strip forms a corridor at the sides and rear between the site and other boundaries, unauthorised access around the substation shall be prevented by means of a barrier such as a close boarded or palisade fence on either side at the front of the enclosure. In these situations consideration must be given to ensuring that these barriers or the neighbouring boundary fences do not provide a climbing unauthorised access onto the roof of the substation.

To comply with Regulation 3(4) of The Electricity Safety, Quality and Continuity Regulations 2002, all cable entries into substations must be sealed. The installer of the ducts must seal the gap between the outside of the ducts and the building structure and the installer of the cables must seal the annular gaps between the cables and the insides of the ducts where the cables enter the substation and where cables enter the ducts outside in the roadway/footpath. The sealant must provide a liquid and gas tight seal and should be a suitable mastic or expanding foam or an approved mechanical seal. All ducts entering substations must be cut flush with to inside wall.

Electricity cables which run through free space within buildings, in areas such as hallways, basement corridors, basement car parks and garages, must be mechanically protected with the

use of appropriately sized steel pipes. Alternative arrangements may be possible but these must be discussed and agreed with EDF Energy Design staff.

It is recommended that no electrical installation work is commenced within any substation building until the EDF Energy civil works inspection has taken place and acceptance of the substation building structure confirmed in writing. Failure to do this may mean that installed plant may need to be removed to allow corrective works to the substation structure to take place.

7.4 Substation Labels

For sub-station enclosures a suitable engraved substation name and reference number label shall be fitted at eye level to both the exterior (EPN/SPN) and the interior of the sub-station door in a conspicuous position. A standard "Danger of Death" label with telephone number of the EDF Energy permanently manned control centre shall also be fitted. This item is supplied by EDF Energy but the ICP is responsible for providing all other permanent labels for the substation including destination labels for LV pillar and RMU, also SF₆ label for substation door. It may be necessary to fit additional signs around the substation to give warning of danger should the location or its surroundings warrant additional measures. Other appropriate warning labels, e.g. SF₆ warning label, shall also be fixed to the exterior of the sub-station doors. All exterior labels shall be securely fitted with appropriate non-ferrous fixings.

7.5 Approved GRP Substation Enclosures

EDF Energy Approved Supplier

Envico Engineering Ltd.
Nantyffin Road (South)
Lansamlet Industrial Estate
Lansamlet
Swansea SA6 9RG

Tel: 01792 794619
Fax: 01792 793532
Email: envico@compuserve.com
Web: www.envicoengineering.com

There are currently three GRP designs (one for each of the three EDF Energy networks) available from the above supplier and shown on the following pages.

A common GRP design which is suitable for all three areas will be available in 2005. Full details will be provided in later updates of this document.

ROOF OVERHUNG
FRONT AND REAR
ONLY, GIVING
AN OUTLET
VENTILATION
OF 0.48 M.SQ
NETT TOTAL.
GALV'D STEEL
MESH UNDER
OVERHANG.

ROOF FORMED OF DOUBLE
SKIN CONSTRUCTION WITH
12mm CHIPBOARD.

SAINLESS STEEL
BUTT HINGES
TAPPED INTO
STEEL FRAME
IN DOOR AND
FRONT FRAME.

2.OFF BLANKING
PANELS, ONE IN
EACH SIDE.
(ALTERNATIVE
VENT POSITION.)

6.OFF GROUND FIXING FEET
GALV'D STEEL, SLOTTED FOR
ENTRAPMENT OR BOLTING.

90 DOOR STAYS.

HASP &
STAPLE
(HASP
FITTED
ON L.H.
DOOR.)

SHOOT BOLTS FITTED
TOP AND BOTTOM ON
R. H. DOOR.

2.OFF LOUVRE BLOCKS, EACH
PROVIDING 0.24 M.SQ OF NETT
VENTILATION, WITH INTERNAL
GALV STEEL MESH.

FRONT FRAME LIFTING.
TWO HOLES TAPPED INTO
TOP OF FRONT FRAME
INTERNALLY TO RECEIVE
LIFTING EYES.

TOTAL AREA = 32.35 SQUARE METRES

DRG NO :- EE.697

DATE :- 14.7.94

DRN :- D.M.

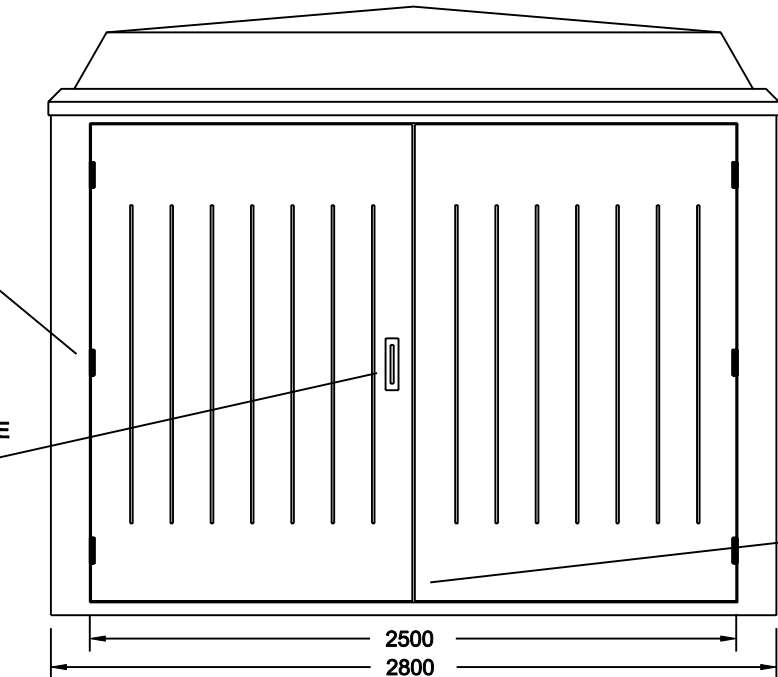
CUSTOMER :- EASTERN ELECTRICITY

ENVICO ENGINEERING LTD.
NANTYFFIN RD (SOUTH).
LLANSAMLET IND ESTATE.
LLANSAMLET.
SWANSEA, SA7 9RG.

BOTH DOORS
FITTED WITH
1010 TYPE
DOOR STOPS.

3 PAIRS OF
BRASS BUTT
HINGES.

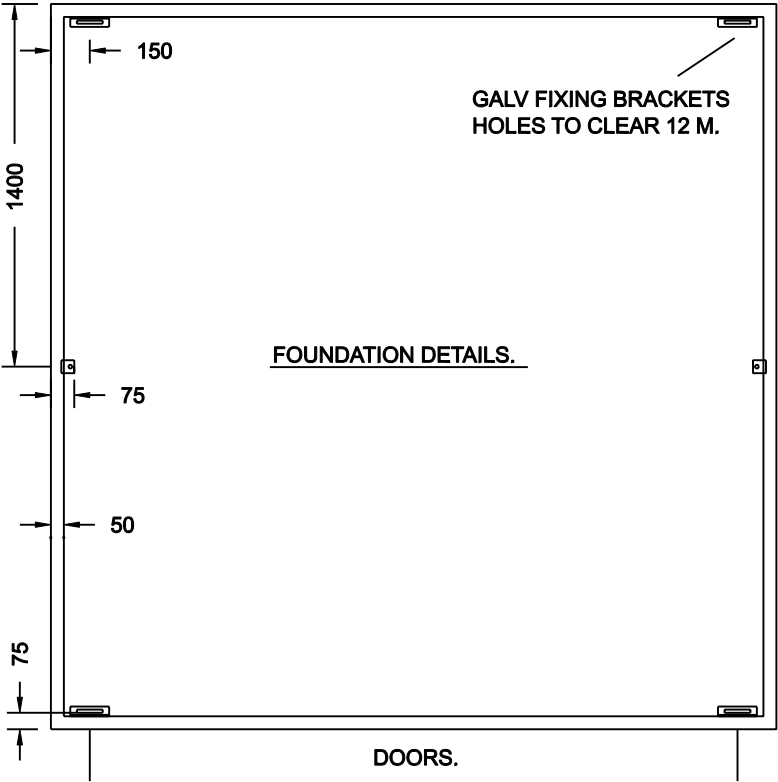
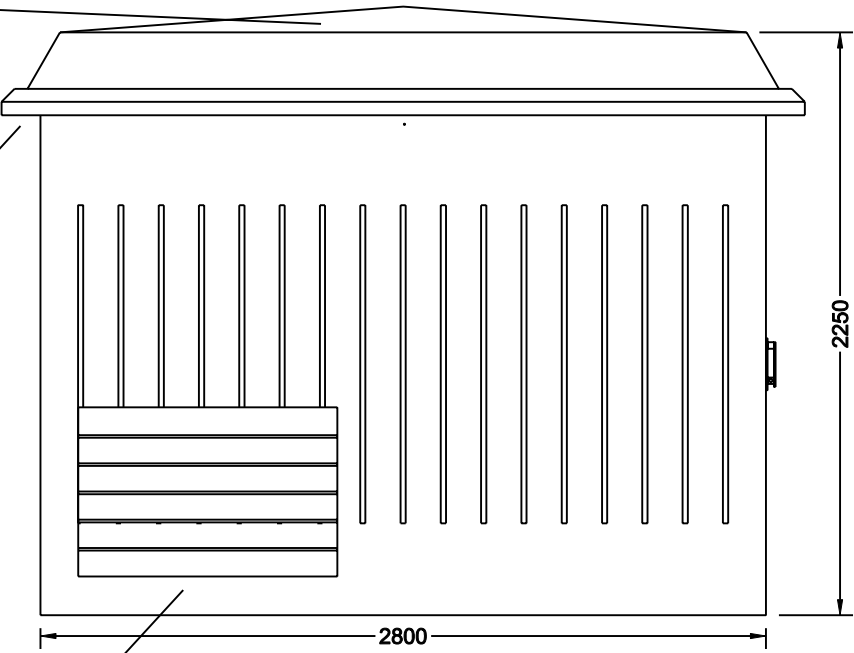
GALVANISED
ESPAGNOLETTE
LATCH.



ROOF DOUBLE SKINNED
WITH 12 mm CHIP BOARD
INFILL.

ROOF WILL OVERHANG
BACK & FRONT
PANELS BY 150 mm
WITH VENTS UNDER.

RIGHT HAND DOOR
FITTED WITH TWO
GALV SHOOT BOLTS.



GALV FIXING BRACKETS
HOLES TO CLEAR 12 M.

FOUNDATION DETAILS.

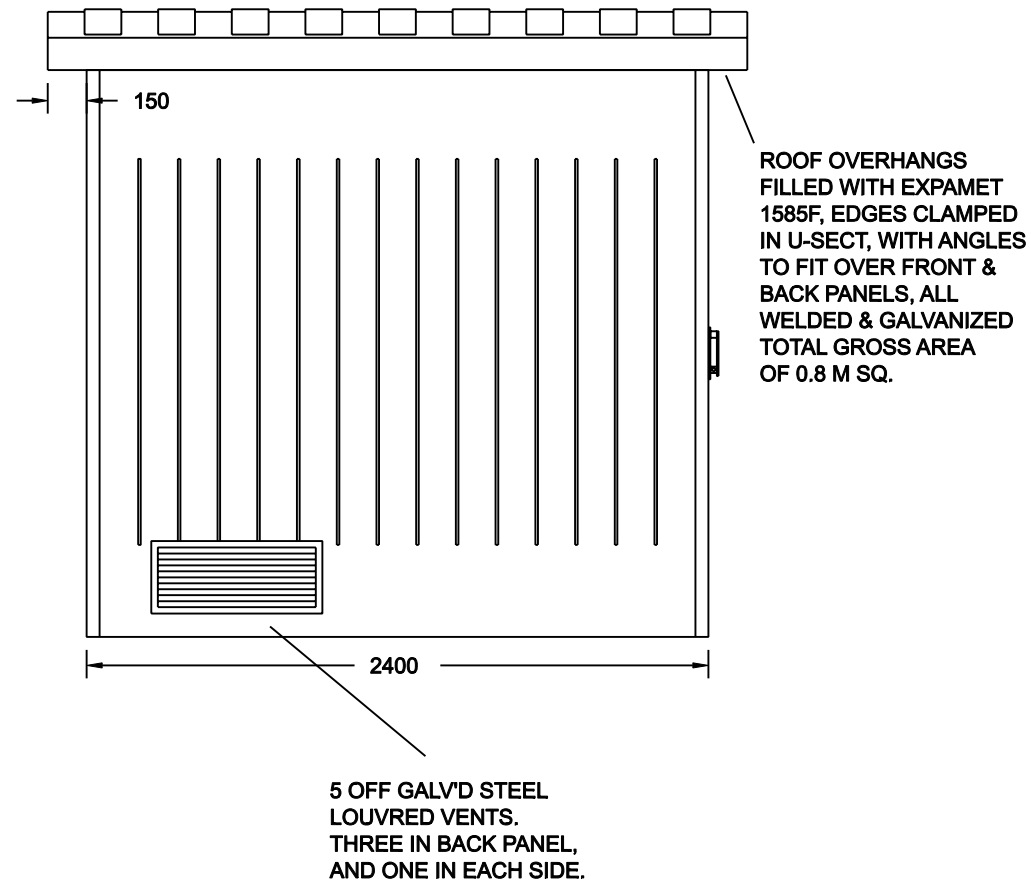
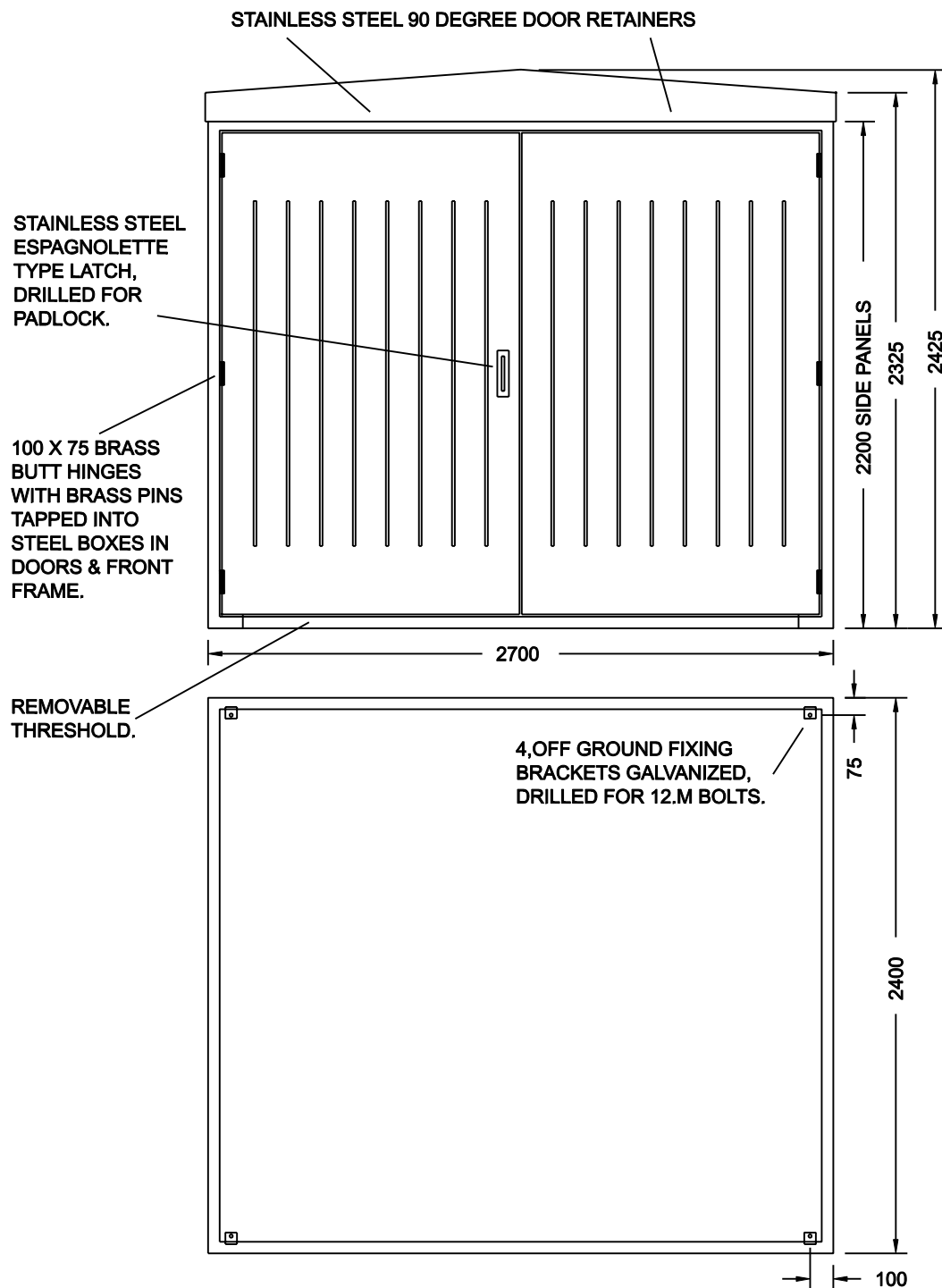
4 LOUVRE BLOCKS PROVIDED
EACH 1035 X 616, ONE IN
EACH SIDE AT LOW LEVEL,
ONE AT LOW LEVEL IN BACK
AND ONE AT HIGH LEVEL.
EACH BLOCK PROVIDES 3.1
FT SQ NETT VENTILATION.

G.R.P CONSTRUCTION.

LAYER 1. GEL COAT, COLOURED.
LAYER 2. 450 GRM/M.SQ GLASS & RESIN.
LAYER 3. 450 GRM/M.SQ GLASS & RESIN.
LAYER 4. 450 GRM/M.SQ GLASS & RESIN.
DOORS WITH ADDITIONAL INSIDE GEL.
ALL RESIN TO CLASS II FIRE RETARDANT GRADE.

DRG NO :-	EE 615/A
DATE :-	02/09/02
DRN :-	D.M.
ENVICO ENGINEERING LTD. NANTYFFIN RD (SOUTH). LLANSAMLET IND ESTATE. LLANSAMLET. SWANSEA, SA7 9RG.	

CUSTOMER:- LONDON ELECTRICITY PLC.



DRG NO :- EE 712

DATE :- 29.11.94

DRN :- D.M.

ENVICO ENGINEERING LTD.
NANTYFFIN RD (SOUTH).
LLANSAMLET IND ESTATE.
LLANSAMLET.
SWANSEA, SA7 9RG.

CUSTOMER - SEEBOARD PLC

7.6 EPN Substation and Plinth Drawings

1 Introduction

This document lists the current standard drawings that must be used for the construction of switchgear and transformer plinths in GRP housings and free standing brick structures within the EDF Energy EPN network. Modified shapes may be proposed to suit local conditions but are subject to EDF Energy approval.

2 Scope

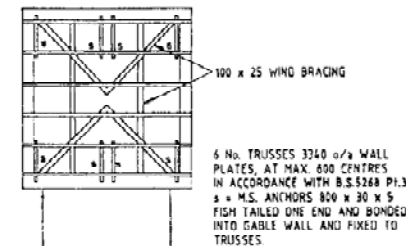
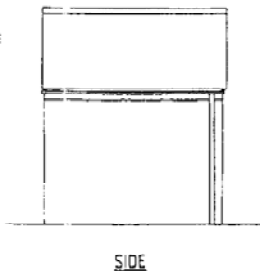
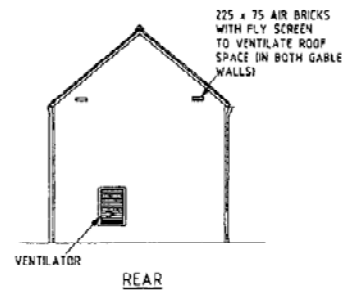
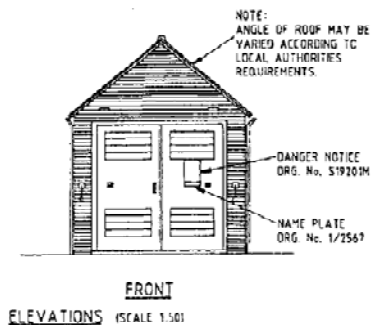
Standard plinth and substation designs for ground mounted distribution substations, metering and switching sites.

3 Current New-build Plinth Design

These designs should be used for all new-build distribution substations.

3.1 Plinth drawings

Equipment	Drawing No
Distribution Substation Indoor Building (Pitched Roof) For Package Substation Equipment	HQ/STD/5212A
Distribution Substation Package Substation Base For Brick Built Buildings	HQ/STD/5212B
H.V. Metering Units And Free Standing R.M.U. Base For Brick Built Buildings	HQ/STD/5212C
GRP Distribution Substation Package Substation Base	HQ/STD/5313A
H.V. Metering Units And Free Standing R.M.U. Base For GRP Housings	HQ/STD/5313B



FOR FOUNDATION DETAILS
AN
SECTIONS A - A AND F - F

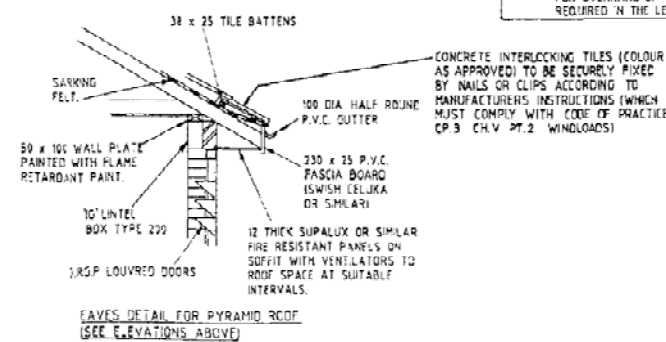
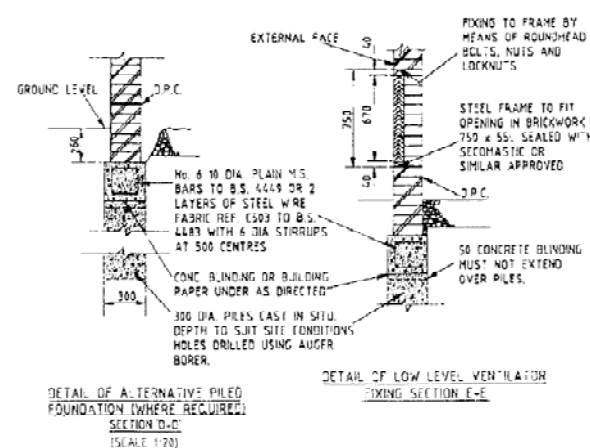
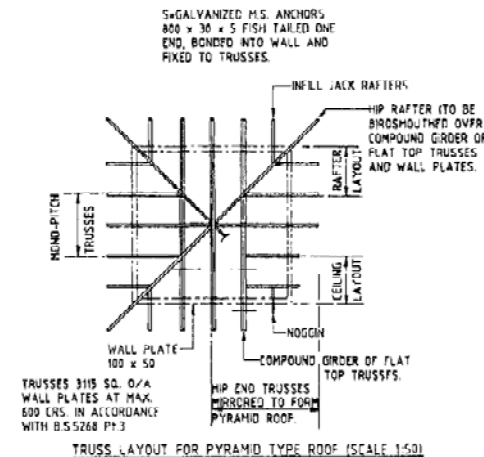
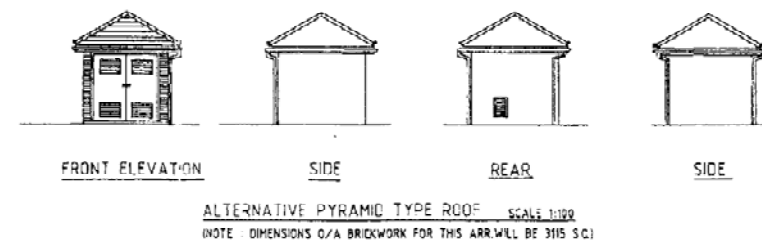
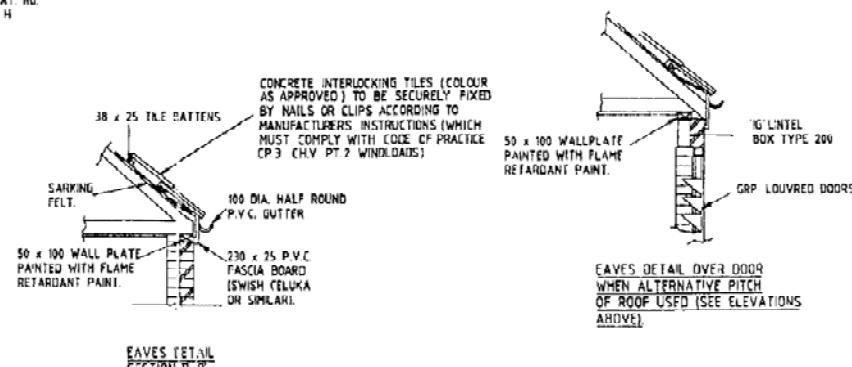
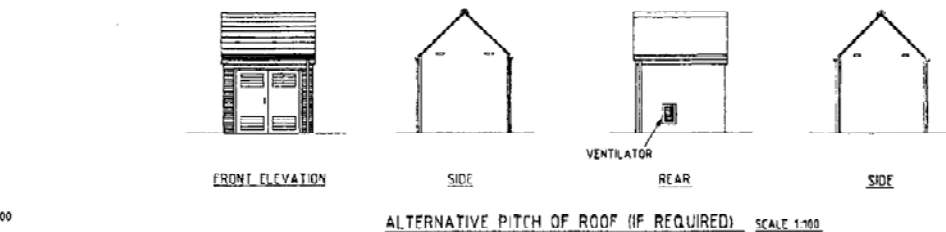
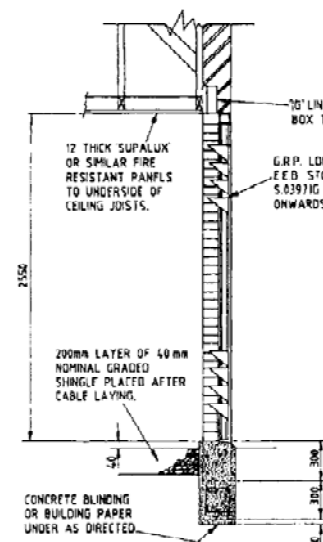
SEE

DRAWING No: HQ/STD/B5212B
FOR
PACKAGE SUBSTATION'S

SEE

DRAWING No: HQ/STD/B5212C
FOR
HV METERING AND FREE STANDING RMU'S

FOR ALL OTHER BUILDING
DIMENSIONS REFER TO THIS DRAWING



NOTE: WHEN USING THE PYRAMID TYPE ROOF ON A STANDARD 3.6m x 3.6m SITE RIGHTS FOR OVERHANG OF THE ROOF WILL BE REQUIRED IN THE LEGAL DOCUMENTS.

Notes:

1. Before any civil engineering work is commenced the contractor is to ascertain from EDF Energy the location of all existing cables within and close to the site.

2. Use the foundations as directed, any other type of foundations are subject to the approval of EDF Energy. Where unreinforced foundations are used, suitable cable entries in the specified locations shall be provided.

Materials

3. Concrete to be 30N/mm² with 40 mm aggregate, using Sulphate resisting cement in accordance with BS4027

4. Reinforcement: Steel wire fabric Ref: A98 and REF: C503 to BS 4483: 1998

5. Oil drainage:

When the substation is located in a high fire risk area a precast concrete oil interceptor tank of minimum 230 Gallons (1045 LTRS) capacity, is to be installed in a suitable position away from the building.

6. Doors and ventilators

Where the substation building is built by the developer GRP doors and ventilators can be supplied by EDF Energy at cost on an official order placed by the developer. Glass Reinforced plastic doors with metal frame.

7. All exposed woodwork to be painted with flame retardant paint.

8. Cable entries shall be sealed as detailed in EDM V9/S10/1

9. Maximum aggregate size shall be 40mm with all aggregates complying with the requirements of BS EN 12620 Aggregates for concrete. No marine aggregates are to be used under any circumstances

10. Formwork required to be fair faced for top 300mm of foundation

11. Top of foundation to have a steel trowel finish

12. All workmanship shall comply with the requirements of the National Structural Concrete Specification published by Construction House, Telford Ave., Crowthorne, Berkshire RG45 6YS

EDF Energy

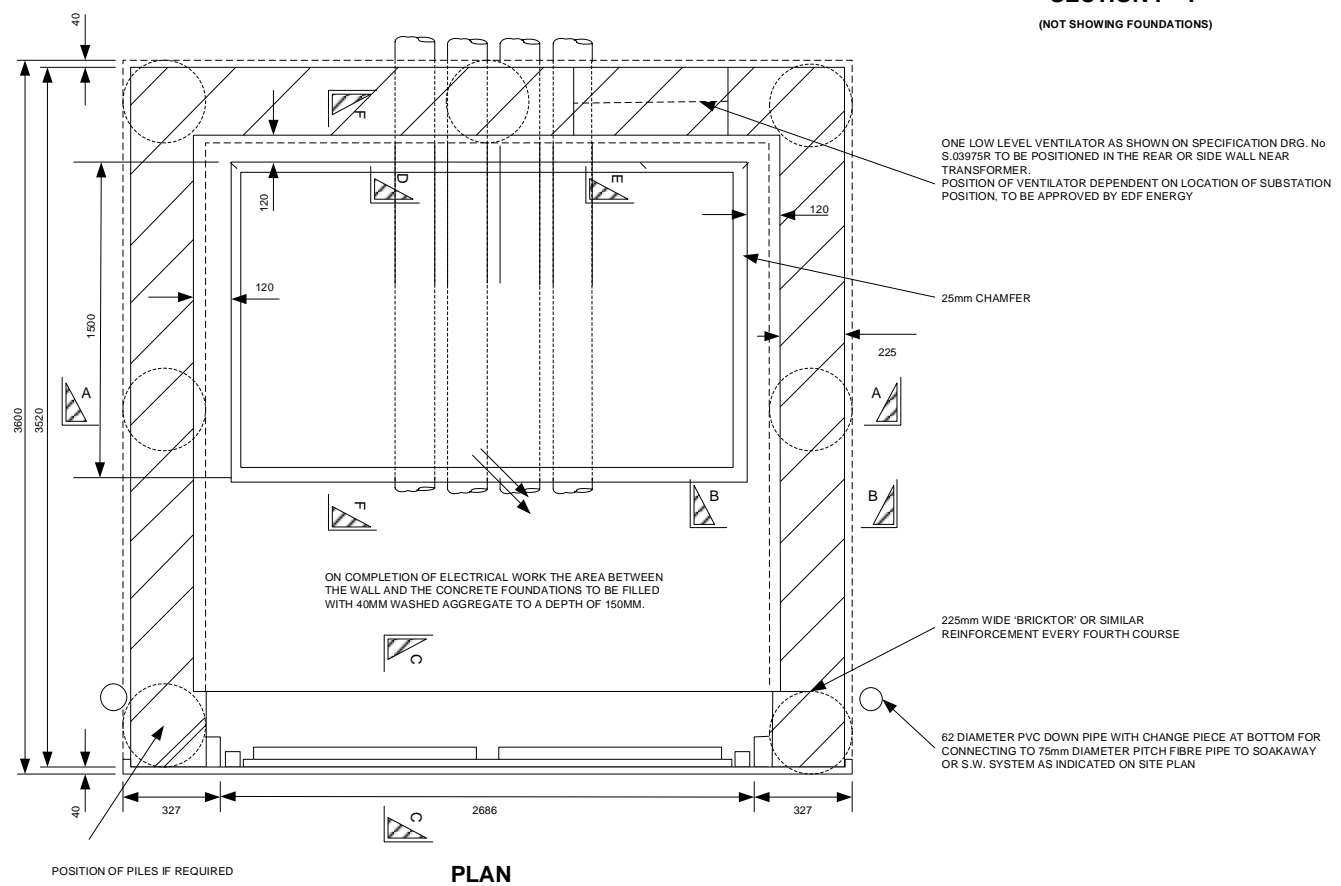
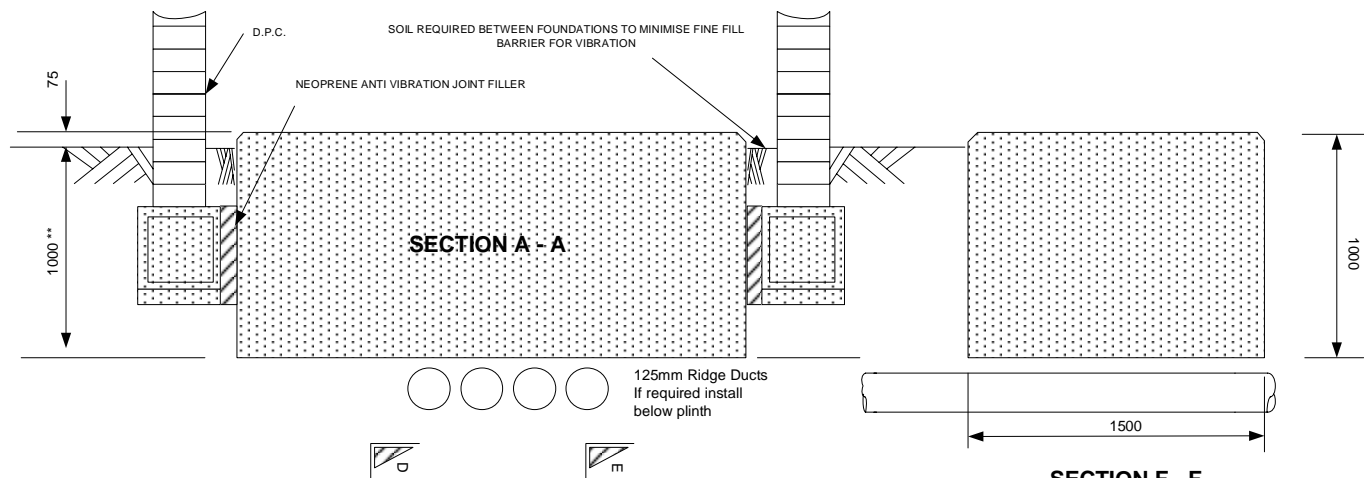
DISTRIBUTION
SUBSTATION INDOOR
BUILDING (PITCHED
ROOF) FOR PACKAGE
SUBSTATION
EQUIPMENT
for use on
EPN NETWORK ONLY

HQ/STD/5212A

Issue

A

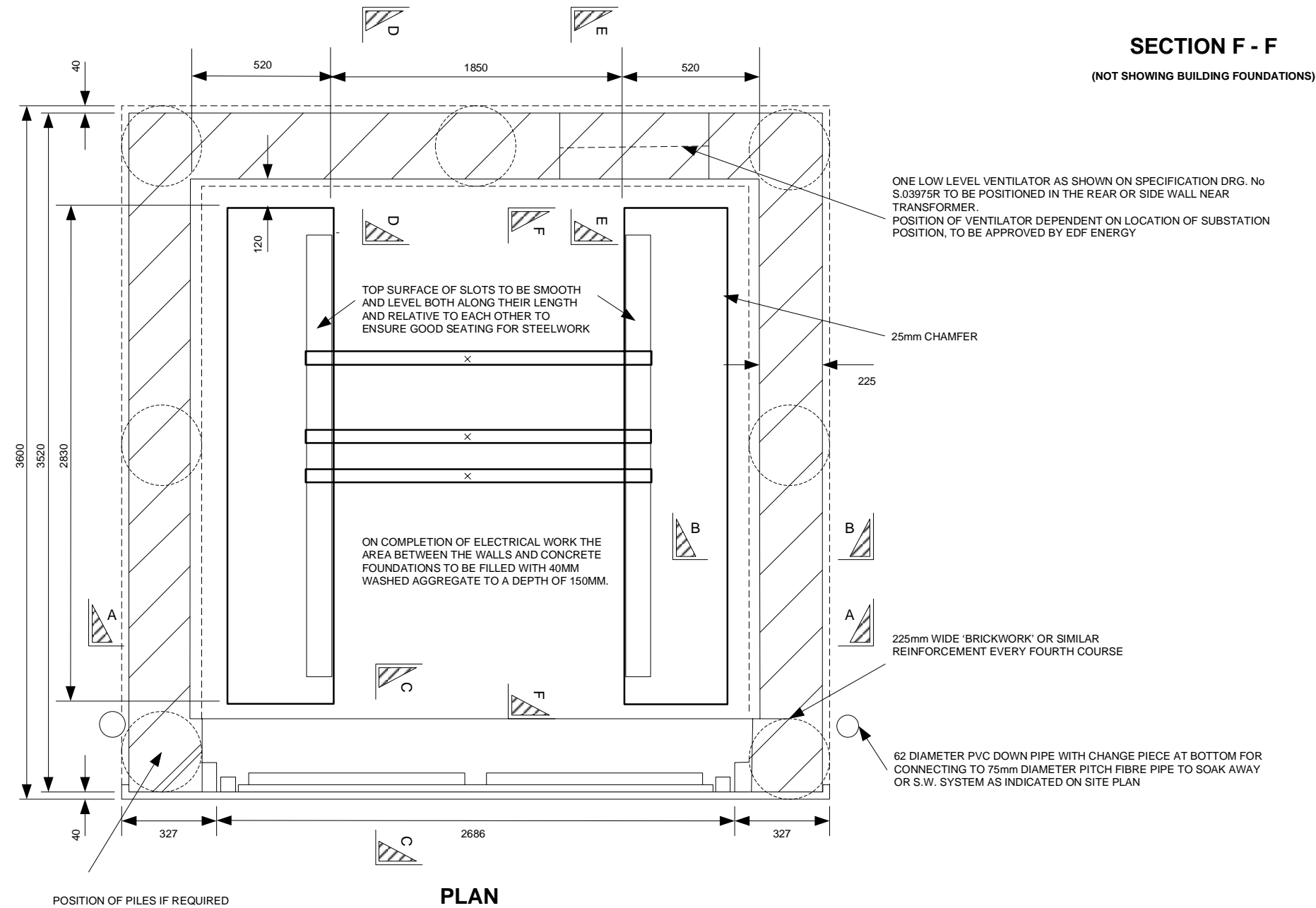
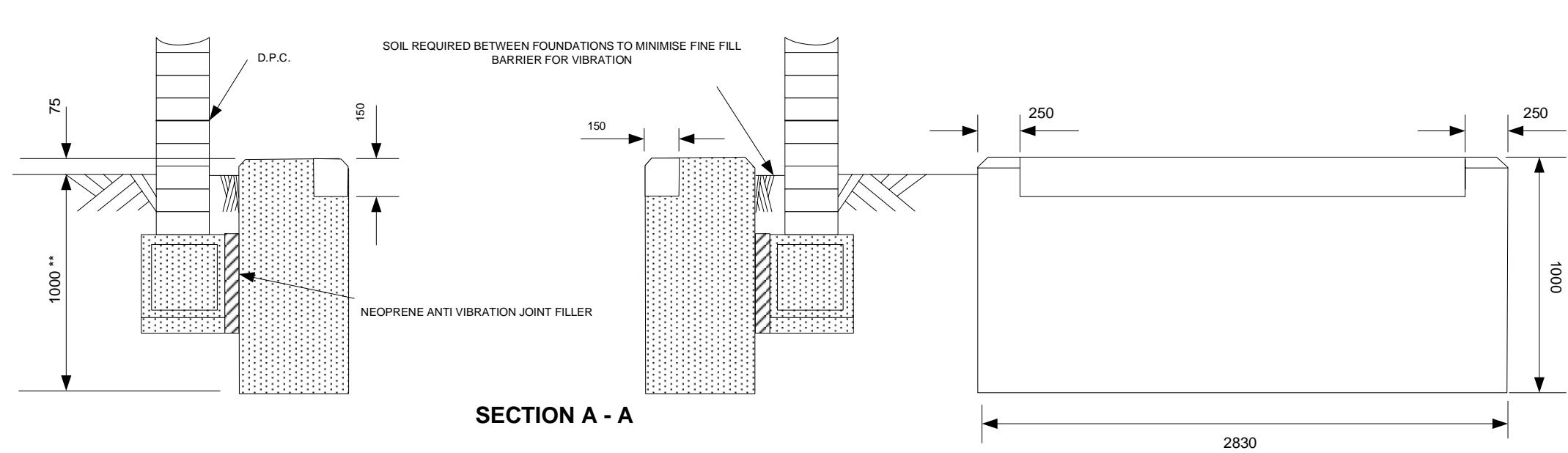
STANDARD DRAWING



**For Building Structure
and for
Sections
B - B
C - C
D - D
E - E
SEE DRAWING
No: HQ/STD/B5212A**

- Notes:**
1. Concrete to be 30N/mm² with 20 mm aggregate, using Sulphate resisting cement in accordance with BS4027
 2. Maximum aggregate size shall be 20mm with all aggregates complying with the requirements of BS EN 12620 Aggregates for concrete. No marine aggregates are to be used under any circumstances
 3. Formwork required to be fair faced for top 300mm of foundation
 4. Top of foundation to have a steel trowel finish
 5. All workmanship shall comply with the requirements of the National Structural Concrete Specification published by Construction House, Telford Ave., Crowthorne, Berkshire RG45 6YS

EDF Energy	
DISTRIBUTION SUBSTATION PACKAGE SUBSTATION BASE FOR BRICK BUILT BUILDINGS for use on EPN NETWORK ONLY	
HQ/STD/5212B	Issue A
STANDARD DRAWING	



For Building Structure
and for
Sections
B - B
C - C
D - D
E - E
SEE DRAWING
No: HQ/STD/B5212A

- Notes:**
1. Concrete to be 30N/mm2 with 20 mm aggregate, using Sulphate resisting cement in accordance with BS4027
 2. Maximum aggregate size shall be 20mm with all aggregates complying with the requirements of BS EN 12620 Aggregates for concrete. No marine aggregates are to be used under any circumstances
 3. Formwork required to be fair faced for top 300mm of foundation
 4. Top of foundation to have a steel trowel finish
 5. All workmanship shall comply with the requirements of the National Structural Concrete Specification Specification published by Construction House, Telford Ave., Crowthorne, Berkshire RG45 6YS

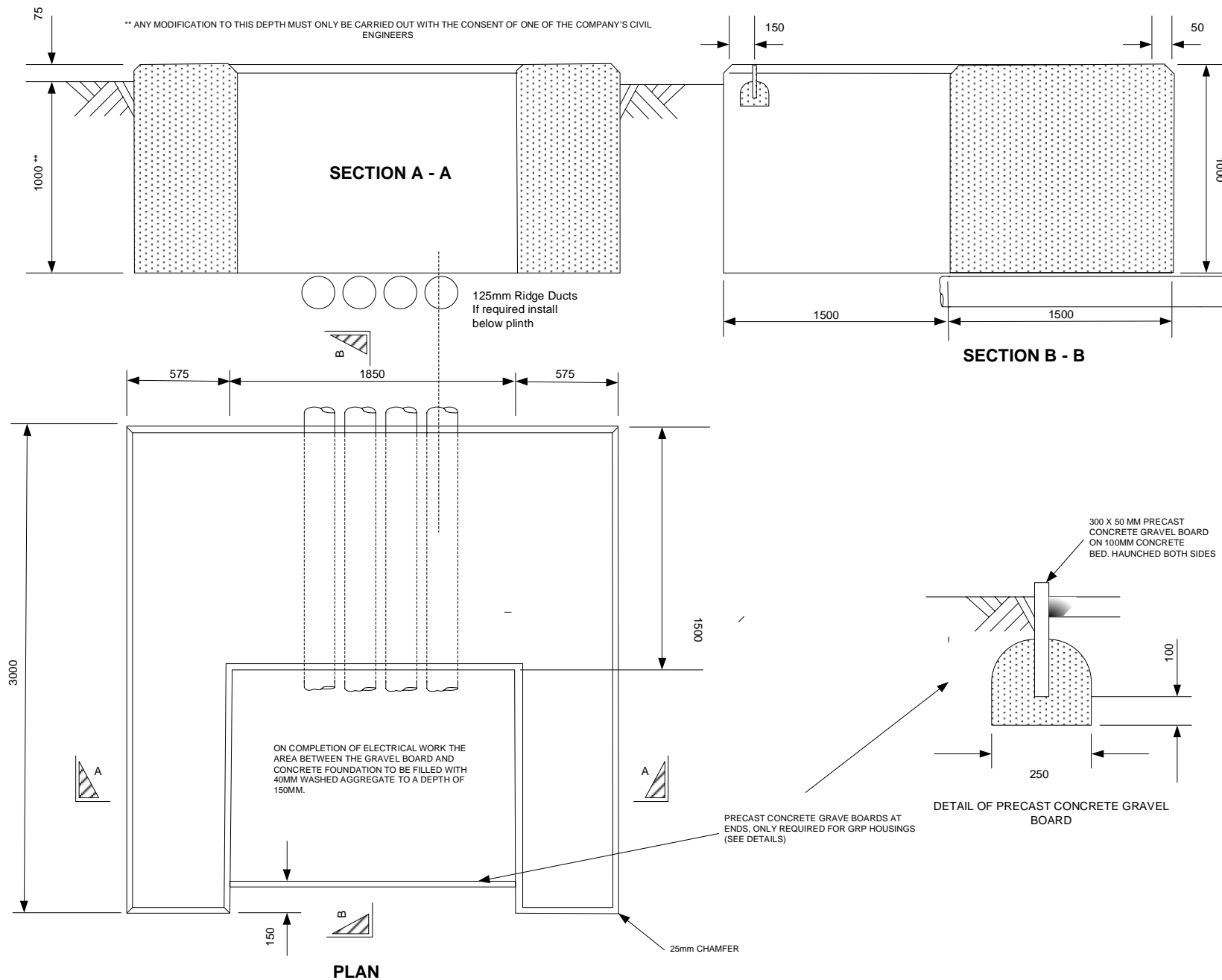
EDF Energy

H.V. METERING UNITS AND FREE
STANDING R.M.U. BASE FOR
BRICK BUILT BUILDINGS
for use on
EPN NETWORK ONLY

HQ/STD/5212C

Issue
A

STANDARD DRAWING



- Notes:**
1. Concrete to be 30N/mm² with 20 mm aggregate, using Sulphate resisting cement in accordance with BS4027
 2. Maximum aggregate size shall be 20mm with all aggregates complying with the requirements of BS EN 12620 Aggregates for concrete. No marine aggregates are to be used under any circumstances
 3. Formwork required to be fair faced for top 300mm of foundation
 4. Top of foundation to have a steel trowel finish
 5. All workmanship shall comply with the requirements of the National Structural Concrete Specification published by Construction House, Telford Ave., Crowthorne, Berkshire RG45 6YS

EDF Energy

**GRP DISTRIBUTION
SUBSTATION PACKAGE
SUBSTATION BASE
for use on
EPN NETWORK ONLY**

HQ/STD/5313A

Issue
A

STANDARD DRAWING

7.6 LPN Substation and Plinth Drawings

Due to the complex nature of the majority of substation environments within the LPN area many substation buildings are one-off designs. EDF Energy has a dedicated Substation Design Team that can provide building design information at the design stage of developments. The contact details for this department are normally provided during the quotation process for a new connection.

7.7 SPN Substation and Plinth Drawings

Comprehensive information on switchgear and transformer plinths for the SPN area is contained in EDF Energy document EI 07-0100 'Switchgear and Transformer Plinths for Distribution Substations on the SPN Network'. This document will be provided by EDF Energy Connection Services (01293 509356), on request.


EDF ENERGY

Document Number: EI 07-0100
Version : 02
Date: 08/10/2004

ENGINEERING INSTRUCTION

EI 07-0100

**SWITCHGEAR AND TRANSFORMER PLINTHS FOR
DISTRIBUTION SUBSTATIONS ON THE SPN NETWORK**

Network(s): SPN

Summary: This engineering instruction details the current and previously used foundations used for the installation of electrical distribution equipment on the SPN network.

Originator: David J Collis

Date: 08/10/2004

Approved By: Paul Elliott

Approved Date: 12/10/2004

Review Date: 12/10/2009

This document forms part of the Company's Integrated Business System and its requirements are mandatory throughout EDF Energy Networks Great Britain. Deviations from these requirements may only be taken with the written approval of the Director of Asset Management. If you have any queries about this document please contact the originator of the current issue.

Document History
(The document history notes below are intended as a guide only and may not cover all of the changes. If you wish to make use of this document it should be read in full.)

Version	Date	Details	Originator
1	21-06-2004	Original Version, replaces SPN document EI 6/4/6. Drawings db/SD10/17/17 and 22 have been updated	D.J Collis
2	08-11-2004	Addition of steel channel frame equipment support drawings	D.J Collis & Darren Sandle

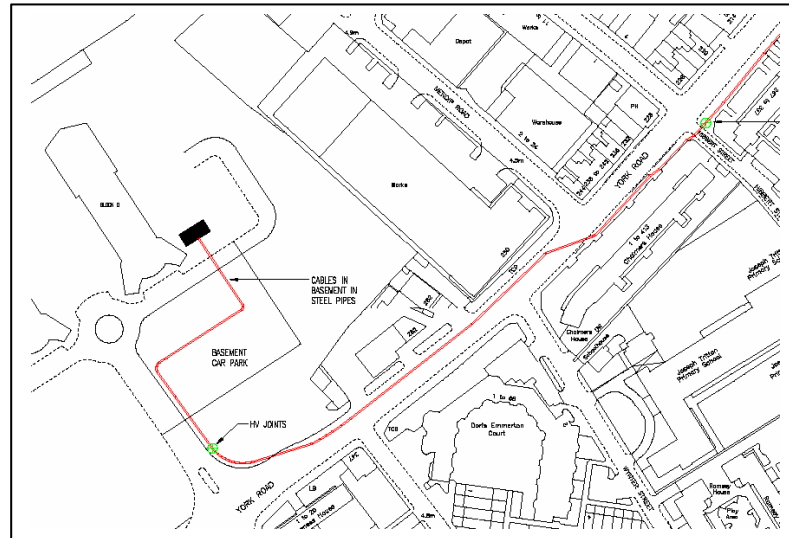
1 of 5

THIS IS AN UNCONTROLLED DOCUMENT, THE READER MUST CONFIRM ITS VALIDITY BEFORE USE

8.0 Plant, Equipment Tests

Each service	<ul style="list-style-type: none">• polarity / phase rotation (3ph)• insulation resistance 500/1000V• earth loop impedance
Each new section of main	<ul style="list-style-type: none">• insulation resistance ph-ph and ph-n/earth 500/1000V• continuity.
Each p.m.e. electrode	<ul style="list-style-type: none">• earth resistance
Earthing resistance	<ul style="list-style-type: none">• overall value measured at substation• at HV/LV substation – combined HV/LV / not combined and overlap (depends on achieving < 1 Ohm)
LV fuse cabinet	<ul style="list-style-type: none">• insulation resistance 500/1000V
HV/LV transformer	<ul style="list-style-type: none">• insulation resistances HV- LV winding/earth• pressure test• voltage and phasing checks• tap setting check• oil moisture content• oil electric breakdown strength• statement on PCB content < 2ppm new oil
HV Switchgear	<ul style="list-style-type: none">• insulation resistance 5kV• pressure test• protection test, secondary injection or dummy HV fuse tester (e.g. B&S device)• functional test of interlocks and operation• insulation test any loose test devices• busbar resistance if work includes connection of busbars, new to new or new to existing• gas pressure if gas filled
HV Cables	<ul style="list-style-type: none">• insulation resistance 5kV• pressure test RYB-E, RY-B, BR-Y• continuity

9.0 Plant, Equipment and Cable Records



9.0 Plant, Equipment and Cable Records

9.1 Statutory Obligation

EDF Energy has a statutory obligation to record the cable route, cable depth, cable types and sizes, ducts routes and sizes, joint locations, joint and service phasing, earth rod locations, link boxes, pillars and all other plant and equipment. It is important that all relevant information is accurately gathered on site as work proceeds to enable that obligation to be met.

Licence condition 49 refers to Information and Incentives Project (IIP), this states that EDF Energy must be able to measure, record and produce specified information. This includes a level of accuracy on Network Connectivity. Therefore ICPs must not only record network changes but also make every reasonable effort to clarify LV connectivity.

9.2 33/132kV Cable & Overhead Line Records (including pilot cables)

Records for 33kV and 132kV cables and any associated pilot cables are to be drawn in accordance with Electricity Networks Association (ENA) Technical Specification 09-2 Issue 4. EDF Energy will accept cable records drawn to A3 (landscape) format in addition to the standard sizes shown in the EA specification. 33/132kV records may also be presented in electronic format [AutoCAD 2002]).

9.2.1 33/132kV Overhead Lines

EDF Energy Network Records requires an 'As Constructed Plan' (1/2500 preferred) showing new overhead lines and modifications to existing overhead lines. All pole and tower numbers must be clearly indicated on the plan.

9.2.2 New 33/132kV Cables and Overlays on Existing Cable Routes

Prior to site work commencing, EDF Energy Connection Services must be supplied with a route plan showing proposed cable route and details of work being carried out. As work proceeds, EDF Energy Connection Services is to be provided with weekly updates of work carried out. The ICP will be responsible for all NRSWA enquiries relating to their work.

9.2.3 'As laid' 33/132kV Cable Records

'As laid' records, (as specified in ENA 09-2) are to be submitted to EDF Energy's Network Records section by Connection Services section well in advance of any energisation work being carried out on site in order to comply with EDF Energy's Information and Incentives Project (IIP) obligations. Independent Connection Providers (ICPs) are therefore required to provide EDF Energy's Connection Services section with 'as laid' drawings **ten working days** prior to any energisation works on site in order for these to be checked and forwarded to the Network Records section within the IIP timescales.

9.3 LV & HV (Up to & including 11kV) Cable & Overhead Line Records

9.3.1 LV/HV Cable laying - General Information

As cables are laid, their position must be plotted to an accuracy of no less than ± 0.1 metres onto either a copy of EDF Energy's 1/500 scale cable record, or an appropriate architect's plan of the same scale. New work is to be added in red so that the new cables and associated measurements stand out from the background.

The cables being laid, or worked on, are to be shown accurately in relation to all existing cables exposed during the course of excavation. Where necessary, cross sections of the cable trench are to be produced to clearly identify the position of new cables in relation to existing EDF Energy plant and equipment. Cross sections are required when several cables are laid together in the same trench. See 3.7 for further information.

For clarity, complex areas of work must be detailed in enlargements associated to the "as laid" cable record.

9.3.2 LV/HV Overhead lines - General information

EDF Energy requires an 'As Constructed Plan' (1/2500 preferred) showing new overhead lines and modifications to existing overhead lines. All pole and tower numbers must be clearly indicated on the plan. See 3.7 for further information.

Overhead line work carried out in conjunction with underground cable work must be shown on the underground cable record – refer to 3.1. New work is to be added in red.

Overhead lines must be plotted accurately in relation to existing EDF Energy equipment and Ordnance Survey features.

9.3.3 Jointing - General Information

Contractors responsible for cable jointing must ensure that a record of ALL jointing is marked on either a print of EDF Energy's 1/500 cable record or architect's plan. Information as to the cable size, construction, source substation, open points and termination of the cable being worked are required to enable EDF Energy to identify the correct cable when updating cable records. See 3.7 for further information. It is very important that open points are accurately recorded; all open points seen or changed during the work must be recorded.

9.3.4 Site Measurements

Sufficient measurements, to an accuracy of no less than ± 0.1 metres, must be taken on site to record deviations of route and depth, duct runs, cable ends, joint positions, link boxes, substations and any other plant and equipment involved with the work to be carried out. EDF Energy cable and overhead line records are based on Ordnance Survey maps. Only use features shown on Ordnance Survey maps when taking site measurements. Each record shall clearly show the work location, road name, house number/name, parish etc. Missing map features, essential to the record, must be measured on site, and added to the plan prior to submission to EDF Energy.

9.3.5 Acceptable Features

- Flank walls of building;
- Boundary lines - fences, walls and hedges (dimension from centre-line of hedge);
- Front edge of kerb;
- Back edge of footpath.

9.3.6 Unacceptable features

The following are some of the features NOT shown on Ordnance Survey maps and are UNACCEPTABLE for taking site measurements from:

- Trees - (these are indicated on maps but not accurately plotted);
- Garden footpaths, gates and driveways;
- Lamp columns and other street furniture, including phone boxes and bus shelters;
- Road gullies and inspection covers;
- EDF Energy/Telephone poles and equipment - (other than substation boundaries).

9.3.7 Information to be Recorded on Site

Network Connectivity Information - In order to comply with EDF Energy IIP requirements, details of the supplying substation and all existing and new open points must be recorded where work affects the supply arrangement to LV customers.

9.3.7.1 Cables (including all services & street furniture cables)

- Size/number of cores/construction;
- Cable route & depth;
- Cable covers;
- Who laid it, date laid and their company name;
- Cross sections showing formation (multiple cable runs).

9.3.7.2 Ducts

Details of all duct runs are to be shown in 'cross section' sketches and must include the following:

- Internal diameter;
- Construction material ;
- Covers;
- Depth to top of ducts/covers;
- Formation;
- Installed cables (include cable size to aid identification).

9.3.7.3 Jointing

- Details of phase colours/core numbers at joint positions. This is to include details of three phase to two phase/single-phase mains jointing (which cores are stumped, bunched or crossed);

- Phase colour(s) of service connections;
- Details of other non-standard jointing work;
- Jointers name, date jointed and their company name;
- Location of earth wires and pins.

9.3.7.4 Harmonised Cables – Phase Identification

Following the introduction of the new “harmonised” phase identification system, cable records held within the companies mapping systems will use one convention to identify new cable phase colours.

To avoid confusion, the new “harmonised” colours will NOT be used when identifying connected phases. Phase colours will be identified as **L1** = Brown (Red) / **L2** = Black (Yellow) / **L3** = Grey (Blue).

9.3.7.5 Harmonised Service cables – Phase Identification

The connected phases for new colour convention services will be shown on the mapping systems as follows:

- New colour convention single phase service cables jointed to old colour convention mains/service cable – The connected phase is to be shown as L1 or L2 or L3 as appropriate.
- New colour convention single phase service cables jointed to new colour convention mains cable – The connected phase is to be shown as L1 or L2 or L3 as appropriate.
- New colour convention three phase service cables jointed to old colour convention single phase / two phase mains cable – The connected phases are to be shown. Example: L1 / L2 or L1 / L3 or as appropriate.
- New colour convention three phase service cables jointed to old colour convention three phase mains cable – to be shown as Three phase.
- New colour convention three phase service cables jointed to new colour convention mains cable – to be shown as Three phase.

9.3.7.6 Harmonised Mains Cables – Phase Identification

For new colour convention mains, the connected phases will be shown as L1, L2, L3 where **L1** = Brown (Red) / **L2** = Black (Yellow) / **L3** = Grey (Blue).

9.3.7.7 Link Boxes, Pillars and LV Cabinets

- Location;
- Cable configuration (note which links are in/out);

9.3.7.8 Substation

- Position of substation in relationship to existing Ordnance Survey features;
- Routes of cables within site including connection to apparatus;
- Terminations – Jointers name, date and their company name.

9.3.7.9 Substation Plant Records & Commissioning Information

The ICP will provide nameplate data for all equipment installed in the substation using the standard EDF Energy Plant Data Form included with this document. The

information must be provided to EDF Energy (Connection Services) ten working days prior to the substation being energised.

Pre-commissioning test sheets must also be provided for all plant items to record the test and checks completed. These shall be signed and dated by the person who completed the tests.

9.3.7.10 Service Record

A record in the form of the information and sketch as detailed below is to be provided for each service installed. Dimensions are to be given in metres to the nearest 100mm. The full postal address must be provided.

Address	24 High Street KT4 7AF		
Supply to	Single Property		
MPAN No.			
Service Cable size/Type	35mm 1c CNE	Fuse Size	60A
Service Cable Length	10m	Cutout Type	SP&N
Joint Box Type	Crutch Joint	Phase	Yellow
Main Cable Size/Type	240mm WV	Voltage	230V
Service Duct Size	38mm	Joiners Name	Bill Smith
Service Duct Matl	Plastic	Company	24seven
Cutout	100A	Date Installed	12/06/99

9.3.7.11 Street Furniture

- Geographic position of street furniture in relation to existing Ordnance Survey features;
- Type of equipment (lamp columns, bus shelter, kiosk etc.).

9.3.7.12 Overhead Lines

- Size/Number of wires/Construction;
- Who constructed it, date and their company;
- Pole positions (also detail on the plan any poles/lines removed);
- Line switches - note where jumpers are broken to form Section Points on LV.

9.4 Delivery of Site Information (timing)

Independent Connection Providers (ICPs) are required to provide EDF Energy's Connection Services section with updated 'as laid' drawings **ten working days** prior to each energisation event on site.

9.5 Plant Data Form

The following page contains the EDF Energy plant data form which must be completed by the ICP for each substation completed. The information must be provided to Connection Services **ten working days** prior to energisation.

TRANSFORMERS	
TFR Designation (eg TI)	
Make	
Year Made	
Year Commissioned	
Rating (KVA)	
Type	
Serial No.	
Vector Group	
Nom Voltage (Prim/Sec)	
Tap Range % (-)	
Tap Range % (+)	
Tap Range % Step	
Impedance	
Oil Quantity (Litres)	
Breather	
Conservator	
Weight (Tonnes)	

L.V. BOARDS	
Make	
Year	
Type	
Rating (Amperes)	
Number of ways	

RTU	
Make	
Year Commissioned	
Serial No.	
Actuator SW1	Yes / No
Actuator SW2	Yes / No
Radio / BT	

EARTH FAULT PASSAGE INDICATORS	
Make	
Type	
Serial No.	
Year of Commission	
How many fitted	
Circuit/ Feeder fitted to	
Battery Date	

RMU/CB/Switch	No 1	No 2	No 3	No 4	No 5
Make					
Year Made					
Year Commissioned					
Type					
Serial No.					
Rating (KV)					
Rating (MVA)					
Rating (Amperes)					
Prot'n C.T. Ratio (/5A)					
Operating Mech					
Duty					

AIR CIRCUIT BREAKERS	
Make	
Year Made	
Year Commissioned	
Type	
Serial No.	
Rating (Amperes)	
Min Trip Volts	
O/C C.T. Ratio (/5A)	
RPR C.T. Ratio (/5A)	
Actuator	Yes / No

Comments: