WESTERN POWER DISTRIBUTION

Industrial and commercial installation framework appendix to be read in conjunction with:

ENA Engineering Recommendation G81 Part 6 "Framework for installation and records of industrial and commercial underground connected loads up to and including 11kV. Version agreed at Ofgem ECSG on 12th October 2004

INDUSTRIAL AND COMMERCIAL INSTALLATION FRAMEWORK DLH SPECIFIC APPENDIX

1.0 INTRODUCTION

1.1 Information contained in this Framework Appendix must be read in conjunction with the National Framework Documents, the Adoption Agreement, the other two Western Power Distribution (WPD) Industrial and Commercial Framework Appendices relating to Design and Materials and to the WPD Framework Appendix on cable recording techniques. Please see the WPD Housing Development Installation Framework Document Appendix for full details on supplies to Multi-Occupancy buildings.

1.2 In the event of query please speak to the WPD Planner acting as the focal point of contact for the scheme.

2.0 SERVICE ENTRIES

2.1 LV service entries for whole current metering installations will typically follow the same arrangements as for housing developments as described in WPD Installation Framework Appendix for Housing Developments. For other types of installation, please discuss location, accommodation space and security requirements with the WPD Planner.

2.1.1 The following requirements for Housing Developments are equally valid to equivalent small, single Customer, industrial and commercial whole current LV metered installations

- Cavity service entry is not normally permitted as this de-rates the service cable.
- The air temperature surrounding the cut out must not exceed 30^0 C
- The meter position must not be unduly exposed to accidental damage.
- All meter cabinets must be installed in a way that maintains the manufactured fire resistance values.
- For a Standard Meter Cabinet the installation height should be between 500 mm & 1200mm above ground level to the bottom of the cabinet.
- For a Slim Line Meter Cabinet the installation height should be between 300mm & 1000mm above ground level to the bottom of the cabinet.
- There should not normally be any consumer equipment in an external meter cabinet except for the WPD fitted isolation switch, (whose ownership shall pass from WPD to the property owner upon energisation) and the consumer's outgoing tails to their consumer unit.

- The standard method of service entry into the meter cabinet shall be by means of a white, ultra violet proof PVC preformed tube with an outside diameter of 38 mm and a wall thickness of 2 mm. The tube shall be fixed to the outside wall by a single bracket normally midway between the base of the meter cabinet and ground level.

- Black Alkathene service ducting shall be used. Black is the only colour to be used for electrical service cables, to prevent confusion with other utility services.

- Cut-out arrangements shall be in accordance with WPD Standard Technique SD5D.

- Please see WPD Housing Development Installation Appendix for standard meter cabinet details and installation drawings

For other LV commercial and industrial installations

When the landlord is selling on the electricity to his tenants, there will only be one WPD electricity meter and one Exit Point. These can be placed in a suitable location within the building.

In this situation, it is the landlord's responsibility to install and maintain those cables beyond the Exit Point.

Without charge to WPD, the developer should install suitable 150mm (mains cable) or 38mm (service cable) internal diameter black alkathene ducting from each service position, to a position clear of the building and any concreted area as shown on the Site Plan. A draw cord should be incorporated and uniquely marked along its route for ease of location. There should be a minimum of 450mm cover above the ducting. The minimum bending radius of the 150mm duct will be 900mm.

Alternatively, a service cable may provide a direct service to each customer.. For each incoming service cable a 38mm, internal diameter, black alkathene duct, must be laid from the exterior of the building. The minimum bending radius of the alkathene duct will be 600mm.

For mains cable entry to service termination enclosure ,a straight 150mm duct, coloured black, will be required for each incoming mains cable. The duct must be laid from the exterior of the building to the enclosure with 450mm of cover above the ducting.

A drawpit in the enclosure will be required, with minimum dimensions of depth 700mm, length 1000mm and width 450mm. Again, these details must be agreed with WPD in advance of works.

For HV industrial and commercial installations

Please discuss project specific requirements with WPD Planner.

3.0 CABLE INSTALLATION

3.1 General installation data for Western Power Distribution cables are given in Tables 3.1 and 3.2 below, (which like other requirements has to be read with the National Framework Documents). Cable ratings, including ratings in ducts are provided in the WPD Design Framework DLH Specific Appendix.

TABLE 3.1 LOW VOLTAGE CABLES – General Installation Data

TYPE AND SIZE OF CABLE	OVERALL DIAMETER (mm)	MINIMUM BENDING RADIUS (mm)		MAX PULLING TENSION (N)
16mm 1ph Split Cu Concentric	15.0	300		
25mm 1ph Split Cu Concentric	18.3	366		
16mm 3ph Split Cu Concentric	19.6	392		
25mm 3ph Split Cu Concentric	26.2	524		
		NORMAL	ADJ TO JOINTS	
95mm Wavecon 3 core	34.4	650	510	3675
185mm Wavecon 3 core	45.9	850	680	6348
300mm Wavecon 3 core	55.2	950	820	9075

TABLE 3.2 HIGH VOLTAGE CABLES – General Installation Data

TYPE AND SIZE OF CABLE	OVERALL DIAMETER (mm)	MINIMUM BENDING RADIUS (mm)		MAX PULLING TENSION (N)
		NORMAL	ADJ TO JOINTS	
95mm sac	27.4	600	425	
95mm Triplex	59.0 (27.4 single core)			2352
185mm Triplex	70.0 (32.5 single core)			3267
300mm Triplex	80.2 (37.2 single core)			4107
300mm Cu Triplex	80.4 (37.4 single core)	800	600	

4.0 TESTS AND RECORDS

4.1 The details of records and tests required, together with test record sheets are shown below.

4.2 Further WPD requirements covering underground assets recording techniques, procedures and records are detailed in WPD's Framework Document Appendix on Cable Recording Techniques; it is an extract from a handbook issued to WPD Contractors. *(separated out to reduce individual files sizes when downloading this document from the Internet).

4.3 Other data to be recorded on site

Site location / address
Recorded by (name and contractor) and when.
Cable sizes
Depth of plant below final ground level
Size, type and manufacturer of jointing chambers
Cable drum number and manufacturer
Cable length
Duct and sub duct sizes. (Sections to be shown where multiple ducts are laid)
Cable laid by and when.
Map number or reference and scale
– minimum scale 1/500 for underground cable recording
LV Link box maker, type, rating and (if present) serial number
LV Fuse cabinet / board / pillar make, type, serial number, number of outgoing ways
HV/LV transformer, type (eg unit), make, rating, serial number, tapping range, fixed and variable losses (from test certificate)
HV ring main unit / tee circuit breaker – make, type, ratings normal and short circuit current and serial number
Make and type of substation housing with serial number (if present)

4.4 Test records required

Test sheets, for completion by the third party, including some aide-memoire checks follow. It should be noted that in listing only *some* checks this is no way removes any of the requirements stated elsewhere.

SERVICES TEST / CHECK SHEET				
SITE LOCATION -				
House / plot number	**Polarity / Phase rotation (3ph) tested and correct? Y/N**	**Insulation resistance Value 0.5 / 1kV M Ohms**	**Earth loop Impedence Value Ohms**	**Meter box installed correctly, incl. gas seals ? Y/N**

I confirm the above tests / checks and that the installation is compliant with requirements of National Framework Documents and WPD Framework Appendices

Signed…….

Company……

Date…….

MAINS CABLE TEST / CHECK SHEET			
SITE LOCATION –			
Item	**Which section / Location?**	**Which section / Location?**	**Which section / Location?**
Insert location details			
Insulation Resistances ph-ph & ph-earth 0.5 / 1kV M Ohms			
Continuity checked and OK? Y/N			
Trench depth checked and OK? Y/N			
Cable marker tape laid throughout length? Y/N			
Where applicable, reinstatement is compliant with NRSWA spec? Y/N			

I confirm the above tests / checks and that the installation is compliant with requirements of National Framework Documents and WPD Framework Appendices

Signed…….

Company……

Date…….

PME ELECTRODE TEST / RECORD SHEET	
SITE LOCATION –	
Describe location of electrode	**Earth resistance value - Ohms**

I confirm the above tests / checks and that the installation is compliant with requirements of National Framework Documents and WPD Framework Appendices

Signed…….

Company……

Date…….

HV / LV SUBSTATION TEST / CHECK SHEET		
SITE LOCATION –		
Item	**Test / check**	**Result value or Y/N**
Earthing resistance at substation	Overall value measured at substation Ohms	
	At HV/LV substation – combined HV/LV / not combined and overlap (depends on achieving < 1 Ohm)	
	HV Value Ohms	
	LV Value Ohms	
	Overlap value Ohms	
	HV earth link position in or out?	
LV fuse cabinet	Insulation resistance 500/1000V M Ohms	
	All fuseway carriers in place? Y/N	
	Ratings of fuses installed – A, by fuseway	
HV/LV transformer	Insulation resistances HV-LV winding / earth 5kV HV G Ohms	
	Pressure test, value and duration kV, time	
	Voltage and phasing checks OK? Y/N	
	Tap setting check +/- % (Value)	
	Oil moisture content ppm	
	Oil electric breakdown strength kV / gap	
	Confirmation from oil supplier that PCB content <5ppm Y/N	
HV Switchgear	Insulation resistance 5kV G Ohms	
	Pressure test value and duration kV, time	
	Protection test, secondary injection or dummy HV fuse tester (e.g. B&S device) OK? Y/N	
	Functional test of interlocks and operation OK? Y/N	
	Insulation test of any loose test devices G Ohms	
	Gas pressure indication satisfactory? Y/N	
	Busbar resistance if work includes connections of busbars, new to new or new to existing. Micro Ohms	

I confirm the above tests / checks and that the installation is compliant with requirements of National Framework Documents and WPD Framework Appendices

Signed…….
Company……
Date…….

HV CABLE TEST / CHECK SHEET			
SITE LOCATION –			
Item	**Which section / Location?**	**Which section / Location?**	**Which section / Location?**
Insert location details			
Insulation Resistances ph-ph & ph-earth 5kV G Ohms *			
Continuity checked and OK? Y/N			
Trench depth checked and OK? Y/N			
Cable marker tape laid throughout length? Y/N			
Where applicable, reinstatement is compliant with NRSWA spec? Y/N			

* NOTE – Following HV "closing" jointing by WPD to connect into WPD network, WPD undertake insulation and pressure tests of the circuit prior to energisation.

I confirm the above tests / checks and that the installation is compliant with requirements of National Framework Documents and WPD Framework Appendices

Signed…….

Company……

Date…….

AC VLF FOR 11kV POLYMERIC CIRCUITS (XLPE or EPR)			
SITE LOCATION-			
Test Voltage	**Test Points**	**Time**	**Result**
2.5 Uo	**All Phases to Earth**	**30 min**	
2.5 Uo	**Phase 1 to Phase 2**	**30 min**	
2.5 Uo	**Phase 1 to Phase 3**	**30 min**	
2.5 Uo	**Phase 2 to Phase 3**	**30 min**	
Where Uo = the power frequency voltage between phase and earth			

Note:- Where the cable is to be connected to an existing Western Power Distribution cable, the above test shall be carried out by an authorised member of Western Power Distribution.

I confirm the above tests/checks and that the installation is compliant with requirements of National Framework Documents and WPD Framework Appendices

Signed……

Company……

Date……

AC PRESSURE TEST FOR 11 kV SWITCHGEAR (NOT CONNECTED)			
SITE LOCATION-			
Manufacture			
Type			
Serial Number			
Switch 1			
Test Voltage	**Test Points**	**Time**	**Result**
24kV	**All Phases to Earth**	**1 min**	
24kV	**Phase 1 to Phase 2**	**1 min**	
24kV	**Phase 1 to Phase 3**	**1 min**	
24kV	**Phase 2 to Phase 3**	**1 min**	
24kV	**All Phases Across open switch**	**1 min**	
Switch 2			
Test Voltage	**Test Points**	**Time**	**Result**
24kV	**All Phases to Earth**	**1 min**	
24kV	**Phase 1 to Phase 2**	**1 min**	
24kV	**Phase 1 to Phase 3**	**1 min**	
24kV	**Phase 2 to Phase 3**	**1 min**	
24kV	**All Phases Across open switch**	**1 min**	
Switch 3			
Test Voltage	**Test Points**	**Time**	**Result**
24kV	**All Phases to Earth**	**1 min**	
24kV	**Phase 1 to Phase 2**	**1 min**	
24kV	**Phase 2 to Phase 3**	**1 min**	
24kV	**Phase 1 to Phase 3**	**1 min**	
24kV	**All Phases Across open switch**	**1 min**	

Note:- These tests must be carried out prior to any cable being connected to the switch.

Where the switch is mounted directly on to a transformer the 11kV windings of the transformer shall disconnected from the switch prior to the test commencing.

I confirm the above tests/checks and that the installation is compliant with requirements of National Framework Documents and WPD Framework Appendices

Signed……

Company……

Date……

11kV/415V TRANSFORMER TESTS			
SITE LOCATION-			
Manufacture			
Size KVA			
Serial Number			
Tap Setting			
HV WINDING DC PRESSURE TEST			
Test Voltage	**Test Points**	**Time**	**Result**
18kV	**Winding to Earth**	**15 min**	
LV WINDINGS			
1000V	**Winding to Earth**	**1 min**	

I confirm the above tests/checks and that the installation is compliant with requirements of National Framework Documents and WPD Framework Appendices

Signed……

Company……

Date……