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Methods and Procedures for Underground Duct Laying and Associated Works

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METHOD AND PROCEDURES FOR UNDERGROUND DUCT LAYING AND ASSOCIATED WORKS

FOREWORD

The National Grid Company (NGC) is responsible for the operation and maintenance of the 400 kV and 275 kV Electricity Transmission Network in England and Wales. A number of power transmission routes have optical fibre cables attached to or embedded in the earthwires to provide a nationwide telecommunications network and to provide signalling between substations.

Fibre optic cables installed in underground ducts systems are required to extend the telecommunications network, from the NGC routes or regional electricity company routes to the end users.

1 SCOPE

This specification provides general guidelines for new construction of underground ducts and associated jointing boxes in carriageways, footways, grass verges and open country. The modification of any existing ducts of jointing chambers will be covered by other documentation issued by the NGC, Telecom Electric or the relevant Regional Electricity Company.

2 REFERENCES

This document makes reference to, or should be read in conjunction with the following documents.

2.1 British Standards (BS)

- BS 1881 Methods of sampling and testing concrete. Parts 108, 111, 116 and 120.
- BS 5328 Specifying, mixing, transporting, sampling and testing concrete. Parts 1 to 4.

2.2 National Grid Company

- NGTS 1 National Grid System
- NGTS 2.8 Telecommunications
- NGTS 2.16 Quality Assurance including Production Inspection and Testing, Verification Monitoring and Reporting of progress and Stage Payment Claims.
- NGTS 3.8.20 Non Metallic Optical cables for use in Ducts
- NGTS 3.8.21 Steel Reinforced Optical Cable for use in Ducts
- NGTS 3.8.23 Fibre Optic Splice Closures for Endlinks
- TGN(T)43 General Requirements for the installation of Optical cable in Protective Ducts.

3 GENERAL REQUIREMENTS

3.1 General

It is the purpose of this document to provide sufficient general information for approved contractors to plan construction work and carry out the work to the satisfaction of the National Grid Company or Telecom Electric or any Regional Electricity Company or their appointed agent.

The details for the construction of each duct route will be supplied with specific contracts. In some instances contractors may be involved in the planning phases with the relevant local authorities.

The details for the route will include the number of duct ways, the type of joint chambers and their required positions.

Sub-duct installation is covered in the Guidelines for Installation of Optical Cable in Protective Ducts. TGN(T)43.

The preferred type of subduct to be used is defined in this document as well as the details of duct, connectors, splice boxes, frames and covers etc. See Section 10.

3.2 Approvals

Contractors will be approved by the National Grid Company or Telecom Electric or a relevant Regional Electricity Company.

Contractors shall preferably be BS5750 part 2 accredited and shall have acceptable fully documented and implemented codes of practice for construction and safety procedures for:

Excavation, duct laying, the construction of jointing chambers and accessories, reinstatement and in particular the provision for safeguarding vehicular traffic and pedestrian safety taking into account Local Authority and Highway Authority regulations and requirements.

The codes of practice will be approved by the National Grid Company, Telecom Electric or the Regional Electricity Company concerned.

3.3 Safety

At all times the required road guarding items, warning signs, cones, protection barriers and lighting shall be constructed or be in place - before work commenced and throughout the time work is taking place.

The contractor, through the appointed Supervising Officer, shall ensure that all operators have been trained and are competent to operate plant and equipment, before the equipment is used. All safety procedures associated with the item of equipment or methods of work shall be complied with to the full.

4 EXCAVATION

4.1 General

Unless otherwise directed by the Supervising Officer the guidelines in all the following sections shall be used.

The contractor shall excavate in the Carriageway or Footway or Verges as directed by the Supervising Officer. The foundation and the surface material shall be segregated so they may be replaced in their original order.

4.2 Subsoil

Excavated subsoil shall be protected from weathering action which could increase or decrease the natural moisture content of the soil which may lead to the voids or settlement after backfilling.

The amount of excavated subsoil left above ground overnight shall be kept to a minimum.

Subsoil which is damaged shall be removed from the site and taken to the local tip. The quantity of subsoil removed should normally be equal to the volume of the duct being laid. If greater amounts of subsoil are removed, make up subsoil quantities shall be brought from a fresh excavation length or imported.

4.3 Weather Protection

4.3.1 Wet Weather

Excavated material shall be stacked in a heaped ridge and protected by the use of waterproof sheeting to prevent excessive water uptake.

Water channels shall not be blocked by excavated materials. Boards, ducting or other means shall be used beneath the excavated material to maintain the normal water channel. Excavated materials or other means shall be used to divert water away from open excavations.

4.3.2 Dry Weather

Excavated subsoil that is replaced as backfill in the same day needs no special protection. Subsoil that is left above ground overnight for longer periods shall be protected using waterproof sheeting to maintain water content.

4.4 Shoring and Supports

The contractor shall include in excavation, all the necessary timbering, sheet piling and shoring necessary to maintain the stability of the excavation.

Supports placed in an excavation shall prevent loss of ground from beneath adjacent paved surfaces. In general supports shall be removed when backfilling, to allow complete consolidation of the space occupied by the supports. Leaving supports in the ground for whatever reason shall only be with prior agreement with the Supervising Officer and recorded with the reasons in the Works Diary.

Existing mains and services shall be adequately supported by temporary means (slinging, strutting and where necessary by brick or concrete piers) as directed by the Supervising Officer. Where the compaction of back filling is considered difficult beneath existing mains and services the backfill used shall be stabilised with 10 parts soil to 1 part of cement.

4.5 Objections

The contractor shall make any objection in writing where he believes a selected position for excavation may cause damage to adjoining property. The Supervising Officer shall give modified directions that shall remove the objection or refer the matter to the Engineer. If the Engineer deems the objection to be reasonable the Contractor shall be relieved of liability for damage that may result from due and proper execution of the work in the position objected to. In this event the Engineer and the Supervising Officer shall specify the precautions the Contractor shall take to safeguard the property which gave rise to the objection.

4.6 Mechanical Equipment

The use of mechanical excavators shall take into account, and be used in such a manner to satisfy the requirements for, segregated materials and width of the trench compared with manual excavation.

Compressors and other power driven machines shall be maintained and kept in an efficient condition and operated to avoid the generation of undue noise.

All powered equipment, including equipment such as pneumatic drills shall be fitted with efficient silencing devices.

Contractors shall also comply with other noise reduction precautions, such as the provision of enclosures and noise reduction screens when required by the Supervising Officer.

The contractor shall take all reasonable care to prevent plant and equipment from damaging paving or allowing oil or fuel from the equipment to contaminate paving.

4.7 Pilot Holes and Side Shafts etc

The contractor shall undertake trial excavations and pilot holes as directed by the Supervising Officer to establish the position of other plant or conditions beneath the surface. In addition, where deemed necessary by the Supervising Officer the Contractor shall excavate Side Shafts alongside the existing trench in order to negotiate obstructions.

4.8 Width of Trench

The trench shall not be wider than reasonable necessary for execution of the work. In grass verges the excavation can be wider if the Contractor wishes to use an excavator providing, the trench width will not cause detriment to property or carriageway haunches. Such a deviation shall be agreed with the Supervising Officer and the new agreed width entered in the Works Diary.

4.9 Depths of Trench

All trenches shall be the required depth and free from stones and rock at the base of the excavation.

Types of Duct	Depth of Cover*	
	Footway & Grass Verge	Carriageway
	mm	mm
TED 100/PVC (1 & 2 ways)	350	600
TED 100/PVC (3 to 9 ways)	450	600
TED 56/PVC (1 to 4 ways)	350	600
TED 25/PE (1 to 8 ways)	350	600
TED 102/ST (1 & 2 ways)	350	600

* Standard depth of cover to top of uppermost barrel or for ducts laid on concrete, to top of concrete surround.

4.10 Change of Level

Where it is required that ducting changes level, such as changing from footway to carriageway and vice versa, the trenching shall be excavated with gradual rise and fall as directed by the Supervising Officer.