



TECHNICAL SUPPORT GUIDE

FIA-TSD-2000-4-4-1

OPTICAL FIBRE CABLING

-

INSTALLATION

-

EXTERNAL:  
BS EN 50174-3 AND UK REGULATIONS

Price: £75 (free to FIA members)

The logo for the Fibreoptic Industry Association (FIA) features the letters 'FIA' in a large, bold, blue, sans-serif font. Below this, the text 'The Fibreoptic Industry Association' is written in a smaller, black, sans-serif font, and the website address 'www.fla-online.co.uk' is displayed in a black, sans-serif font.	<p><b>THE FIBREOPTIC INDUSTRY ASSOCIATION</b> (a Company Limited by Guarantee) Head Office: The Manor House, BUNTINGFORD, Hertfordshire, SG9 9AB Tel: 01763 273039 Fax: 01763 273255 Web: <a href="http://www.fla-online.co.uk">www.fla-online.co.uk</a> ----- e-mail: <a href="mailto:jane@fiasec.demon.co.uk">jane@fiasec.demon.co.uk</a></p>	
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**The Fibreoptic Industry Association**

**FOREWORD**

The past twenty years has seen a vast increase in the use of optical fibre - primarily driven by the need to provide a quality, high-speed transmission media for digital trunk telephony services. The specifications for these systems have typically been produced by large national telecommunications service providers. This has resulted in clear standards and specifications exist to which all suppliers to the WAN telecommunications industry must adhere.

In parallel there has been a significant growth in optical fibre systems being installed in private data, entertainment and telecommunications networks which are separate from the national telephony and data carrier systems. This part of the industry is characterised by having a large number of relatively small company participants albeit supplying large corporate customers with products and services. The use of optical fibres in private, local area data and sensor networks has increased rapidly throughout the 1990's. In order to support this rate of growth, an organizational focus is required for both suppliers and users in the industry in order to ensure the quality and reliability of network design, installation practice and methods of training.

The **Fibreoptic Industry Association** provides such a focus as a Trade Association to which companies, organizations and individuals involved with, or planning an involvement with, fibre optics can subscribe. In addition, by means of seminars, publications, newsletters, press promotion and similar activities, the **Fibreoptic Industry Association** is dedicated to raising the profile of the industry and highlighting its many benefits in order to increase its growth and thus provide direct benefits for members.

Our overall aims can be summarised as follows:

- to promote an awareness of the benefits and applications of fibre optic technology as an adjunct to - or as a replacement for - conventional copper communications technology;
- to promote an awareness of the existence of a professional fibre optics industry fully capable of meeting the needs of users or, so benefiting both suppliers and their customers;
- to promote and adopt standards to which professional participants within the fibre optic industry should be expected to adhere;
- to provide a central source for information on wide ranging aspects of the fibre optic industry;
- to provide a single voice to promote and represent the interests of the industry obtained by consensus and debate amongst FIA members;
- to develop and promote codes of practice within the industry - both operational and ethical - to which members will be expected to adhere and thus offer an assurance that the highest quality of service will be provided.

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**FIA TECHNICAL SUPPORT GUIDES**

This document is one a series of FIA Technical Support Guides. During the year 2000 all the existing FIA documents were re-written or re-published in the format used throughout this document.

More importantly, the way in which these Technical Support Guides is published has also changed.

These documents are now **free to FIA members** via downloads from the FIA web-site ([www.fia-online.co.uk](http://www.fia-online.co.uk)). Non-members are also able to purchase these documents either by contacting the Secretariat (address shown below) or by on-line purchase.

Members and non-members unable to benefit from this service may receive the documents in hard-copy or diskette/CD ROM by contacting the FIA Secretariat (contact details are shown at the bottom of each text page in this document). However, the rapidly changing nature of our technology means that web-based documents can be amended and revised easily and it is the responsibility of the reader to ensure that the latest issue of a document is used.

The FIA web-site will indicate the issue status of each document and will have links to previous issues in order that changes made will be clear to readers.

The complete list of FIA Technical Support Guides is shown in the Table below.

TOPIC	FIA-TSD-	TITLE
DESIGN	2000-1-1	OPTICAL FIBRE CABLING: LAN APPLICATION SUPPORT GUIDE
COMPONENT SELECTION	2000-2-1 2000-2-2	OPTICAL FIBRE CABLING: CABLE SELECTION GUIDE OPTICAL FIBRE CABLING: CONNECTING HARDWARE SELECTION GUIDE
OPERATION	2000-3-3	OPTICAL FIBRE CABLING: POLARITY MAINTENANCE
INSTALLATION	2000-4-1-1 2000-4-2-1 2000-4-2-2 2000-4-2-3 2000-4-4-X	OPTICAL FIBRE CABLING: INSTALLATION PRACTICE: SPLICING OPTICAL FIBRE CABLING: TESTING Installed cabling using LSPM equipment OPTICAL FIBRE CABLING: TESTING Installed cabling using OTDR equipment OPTICAL FIBRE CABLING: TESTING: Test cords OPTICAL FIBRE CABLING: INSTALLATION: EXTERNAL: BS EN 50174-3 AND UK REGULATIONS
SAFETY	2000-5-1 2000-5-2 2000-5-3	OPTICAL POWER: SAFETY LEVELS OPTICAL FIBRE: HANDLING OF PROCESSING CHEMICALS OPTICAL FIBRE: DISPOSAL OF WASTE

1 **FOREWORD AND EXECUTIVE SUMMARY**

2 Installation between buildings covers a wide range of possible contractual and regulatory environments - from providing a  
3 connection between two buildings on private land, working in public spaces in agricultural land, footways and carriageways and  
4 alongside of across motorways and railways.

5  
6 This Technical Support Document provides key information in relation to the application of standards and regulations in this  
7 area and is supported by four Shortform Guidance Notes produced in support of external installations. These address:

- 8 • specification of pathways, spaces and structures (i.e. ducts, chambers, cabinets and splice closures);  
9 • the comparative costs of digging and reinstatement;  
0 • understanding licences and wayleaves (costs, timescales, documentation and responsibilities);  
1 • the interpretation of standards and regulations.

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5

By Paul Bateson, Chairman of the FIA

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## INTRODUCTION

In common with the requirements for the specification, planning and implementation of installations of telecommunications cabling inside buildings, the primary United Kingdom standard for cabling external to buildings is BS 6701 - which refers to and requires the application of the BS EN 50174 series - specifically BS EN 50174-1 and BS EN 50174-3.

The requirements are independent of the type and purpose of the telecommunications cabling and are applicable to all metallic (e.g. balanced copper, coaxial) and optical media (all-silica, silica-based and plastic optical fibres).

In addition, and to provide a comprehensive approach, BS 7671 (better known as the Wiring Regulations) also requires the application of BS 6701 and BS EN 50174 standards in relation to low voltage cabling (a category that applies to all telecommunications cabling capable of carrying a voltage between 0 V and 1000 VAC/1500 VDC - but excludes all-dielectric cables).

However, BS EN 50174-3 contains a Conformance clause which details exactly which parts of the standard are required for a claim of conformance. Within that clause there is a requirement that "local regulations, including safety, shall be met". The purpose of this Technical Support Document is to detail the relevant local regulations that apply in the United Kingdom and which, therefore, supersede specific requirements in BS EN 50174-3 and to explain how those regulations affect the implementation of installation of telecommunications cabling outside buildings.

The specific aspects of BS EN 50174-3 which are subject to these regulations are the depths of telecommunications cabling infrastructures, their separation from other utility infrastructures, their identification and marking.

## 1 SCOPE

The purpose of this Technical Support Document is to detail the relevant local regulations that apply in the United Kingdom and which, therefore, supersede specific requirements in BS EN 50174-3 and to explain how those regulations affect the implementation of installation of telecommunications cabling outside buildings - by separately addressing carriageways, footways and other spaces associated with carriageways and, finally, open land.

The specific aspects of BS EN 50174-3 which are subject to these regulations are the depths of telecommunications cabling infrastructures, their separation from other utility infrastructures, their identification and marking.

## 2 REFERENCES

BS 6701:2010	Telecommunications equipment and telecommunications cabling – Specification for installation, operation and maintenance
BS 7671:2008 + A3:2015	Requirements for Electrical Installations. IET Wiring Regulations
BS EN 50174-1:2009 +A2:2014	Information technology - Cabling installation - Part 1: Installation specification and quality assurance
BS EN 50174-3(2013)	Information technology - Cabling installation - Part 3: Installation planning and practices outside buildings
DCLG	Data Ducting Infrastructure for New Homes: Guidance Note
BT Openreach	Developers Guide To Telecommunications Infrastructure and Installation
NJUG Volume 1:Issue 5:2018	Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus
NJUG Volume 2	Guidelines on the Positioning of Underground Apparatus for New Development Sites
NJUG Volume 3	Guidelines on the Management of Third Party Cable Ducting
NJUG Volume 4	Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees
NJUG Volume 5	On-Site Environmental Good Practice Guidelines
NJUG Volume 6	Guidelines on Co-ordination, Co-operation & Communication
	Specification for the Reinstatement of Openings in Highways

### 3 DEFINITIONS AND ABBREVIATIONS

#### 3.1 Definitions

For the purpose of this Technical Support Guide the following definitions apply:

Apparatus	Equipment such as valves, stopcocks, chambers, cabinets, transformer chambers etc and includes any structure for the lodging of apparatus.
Carriageway	A way constituting or comprised in a highway, being a way (other than a cycle track) over which the public have a right of way for the passage of vehicles.
Cycle track	A way constituting or comprised in a highway over which the public have a right of way on pedal cycles with or without a right of way on foot.
District heating	District heating utilizes a centralized boiler installation to provide heat for a number of buildings such as individual houses, blocks of social housing, local council offices, schools etc.
Duct / ducting	Structure (usually cylindrical) used to convey and protect apparatus
Fibre optic	The use of very thin glass or plastic fibres through which light can be transmitted to carry information from a source to a receiver, especially for telecommunication, television and information technology systems.
Footpath	A highway over which the public have a right of way on foot only, not being a footway.
Footway	A way comprised in a highway which also comprises a carriageway, being a way over which the public have a right of way on foot only.
High Voltage	Electricity cables over 1000 volts (>1kV)
Low Voltage	Electricity cables up to and including 1000 volts (1kV)
Main	Structure (usually cylindrical) used to convey water or gas or oil generally greater than 50mm diameter.
Pipe	Longitudinal structure (usually cylindrical) used to convey water, gas or oil.
Service strip	A strip of designated land alongside a carriageway or footway used to convey services.
Sub-duct	Longitudinal structure (usually cylindrical) laid inside ducts used to carry smaller diameter cables such as fibre optic.
Tiles	Impact resistant cover constructed of earthenware, concrete or polyethylene for protecting underground cables
Utility	An undertaker by statute that has a legal right to provide customer services (e.g. communications, electricity, gas, water)
Verge	A strip of land which may form part of the public highway alongside a carriageway or footway, which may contain services.

#### 3.2 Abbreviations

For the purpose of this Technical Support Guide the following definitions apply:

GRP	Glass Reinforced Plastic
NJUG	National Joint Utilities Group
SROH	Specification for the Reinstatement of Openings in Highways

## 4 REGULATIONS

### 4.1 General

The term "local regulation" in the context of a EuroNorm is quite wide in its application. It can mean "national regulations" which apply on a countrywide basis, "regional regulations" which may amend replace national regulations in specific areas (e.g. local councils) or truly "local regulations" which could apply on a particular site (e.g. petrochemical sites).

### 4.2 National regulations

The relevant "national regulations" are those produced by National Joint Utilities Group (NJUG) which are specified for different types of "land" where there is a possibility of the infrastructures of multiple utilities being installed. While there is an argument that the NJUG guidance for depths of telecommunications cabling infrastructures, their separation from other utility infrastructures, identification and marking may be irrelevant where no other utility is to be installed, it is a brave person that would ignore them.

Clause 2 of this Technical Support Document contains references to a large number of NJUG publications which address different of underground infrastructure installation. The majority of the content of the main body of this Technical Support Document refers to NJUG Volumes 1 and 2 but it recommended that readers become familiar with the complete set. This is because the package of documents contains information that is used or relied upon by multiple utility providers.

Telecommunications providers such as BT Openreach "*Developers Guide to Telecommunications Infrastructure and Installation*" and similar information from Virgin Media define many of their requirements for new infrastructure installation of pathways and spaces (e.g. chambers and street cabinets) to map to those of NJUG documents. The DCLG published a Guidance Note entitled "*Data Ducting Infrastructure for New Homes*" which also maps to the NJUG information (except for the colour of duct).

As a result the Fibreoptic Industry Association recommends the applicable of NJUG guidance expect in cases where particular site-specific regulations are applicable.

### 4.3 Local regulations

"Local regulations" may amend the national regulations described in this document but may also relate to the controls exercised by local authorities such as parish, town, borough or city councils.

This document does not address such issues but ShortForm Guidance documents produced by the Fibreoptic Industry Association provide further information in specific areas.

## 5 DEPTHS OF LAY - BS EN 50174-3 AND NJUG VOLUME 1

### 5.1 Underground pathways

BS EN 50174-3 contains a Table 3 which contains requirements and recommendations for the pathway depths below finished surface in the following conditions:

- footpath;
- agricultural land;
- uncultivated or landscaped land;
- road - including parking areas;
- motorway;
- railway.

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When Issue 1.0 of this document was written, NJUG Volume 1 "Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus" provides guidance for the following circumstances

- footpath (described as footways, footpaths, cycle tracks, verges, service strips);
- road - including parking areas (described as carriageways);
- agricultural land;
- uncultivated or landscaped land.

The parts relating to agricultural, uncultivated and landscaped land have been removed in the NJUG Volume 1, Issue 5:2018 and anyone wishing to find out what has been removed should read Issue 1.0 of this document.

Motorways and railways are outside the scope of NJUG but are addressed in 5.4 and 5.5 of this document. It should be noted that NJUG Volume 1, Issue 5:2018 suggests that it covers railways and tramways but the content is minimal and does not address depths of lay.

## 5.2 Carriageways and footways

The depths indicated are additional to the diameters of the cable(s) such that the top of the installed cable(s) or pathway systems shall meet the requirements of Table 1. This definition of depth is consistent between BS EN 50174-3 and NJUG Volume 1.

In essence the BS requires greater depths than the NJUG Volume 1 - which on initial reading provides greater security for the telecommunications cabling. Furthermore the BS states that pathways that do not meet the requirements of planned depths of Table 1 without effective mitigation are considered to be sacrificial. However, the NJUG Volume 1 considers a multi-utility infrastructure approach which is not included in the BS.

Table 1 - Comparison for BS EN 50174-3 and NJUG Volume 1 for telecommunications cabling

BS EN 50174-3		NJUG Volume 1	
Footpath	0,5 m min	0,25 - 0,35 m	Footway, verge
Road - including parking areas	0,6 m min	0,45 - 0,6 m	Carriageway

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Table 2 shows the recommendations of NJUG Volume 1 for depths of different utilities in a carriageway (this excludes motorways) and Table 3 shows the same information for footways and verges. NJUG Volume 1 provides recommendations for the lateral separation of different utilities in footways. The BT Openreach “*Developers Guide To Telecommunications Infrastructure and Installation*” and similar documents produced by Virgin Media adopt these recommendations.

Figure 1 and Figure 2 show this information in schematic form and demonstrate that:

- within carriageways, the BS EN 50174-3 requirements do not automatically indicate a conflict with NJUG putting telecommunications ducts and cables at the same depth as other utilities but the “minimum” nature of the BS EN 50174-3 requirements suggests that greater depths could place ducts or cables at greater depths consistent with those used by water electricity and gas;
- Within footways and verges the BS EN 50174-3 requirements do indicate a conflict with NJUG putting telecommunications ducts and cables at depths consistent with those used by water electricity and gas.

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Table 2 - NJUG Volume 1 utility depths in carriageway

Utility	Depth	Duct-pipe-cable colour
Sewerage	Variable	Duct - Black Pipe - No colour specified
Telecommunications	0,45 - 0,6 m	Duct - Grey, white, green <sup>1</sup> , black Cable - Black or light grey
Water (non-potable, grey)	0,6 - 0,75 m	Pipe - black with green stripes
Water (fire-fighting)	0,6 - 0,75 m	Pipe - black with red stripes/bands
Gas	0,75 m	Pipe - Yellow (see Note)
Electricity LV	0,75 m	Duct - Red (on tile) Cable - Black or red (on tile)
Water (other than described above)	0,75 m min	Duct - Blue or grey Pipe - Blue (may have stripes)
Electricity HV	0,75 - 1,2 m	Red (on tile) Cable - Red or black (on tile)
Oil/fuel pipelines	0,9 m (with 3 m lateral separation)	Pipe - Black

<sup>1</sup> Virgin Media specify green duct and DCLG specify "cyan" duct

NOTE: these may be PE or other materials but are designated with yellow markings (except for asbestos and cast iron which have no defined colour)

Table 3 - NJUG Volume 1 utility depths in footways and verges

Utility	Depth	Duct-pipe-cable colour
Sewerage	Variable	Duct - Black Pipe - No colour specified
Telecommunications	0,25 - 0,35 m	Duct - Grey, white, green <sup>1</sup> , black Cable - Black or light grey
Water (non-potable, grey)	0,6 - 0,75 m	Pipe - black with green stripes
Water (fire-fighting)	0,6 - 0,75 m	Pipe - black with red stripes/bands
Gas	0,6 m (footway) 0,75 m (verge)	Pipe - Yellow (see Note)
Electricity LV	0,45 m	Duct - Red (on tile) Cable - Black or red (on tile)
Water (other than described above)	0,75 m	Duct - Blue or grey Pipe - Blue (may have stripes)
Electricity HV	0,45 - 1,2 m	Red (on tile) Cable - Red or black (on tile)
Oil/fuel pipelines	0,9 m (with 3 m lateral separation)	Pipe - Black

<sup>1</sup> Virgin Media specify green duct and DCLG specify "cyan" duct

NOTE: these may be PE or other materials but are designated with yellow markings (except for asbestos and cast iron which have no defined colour)

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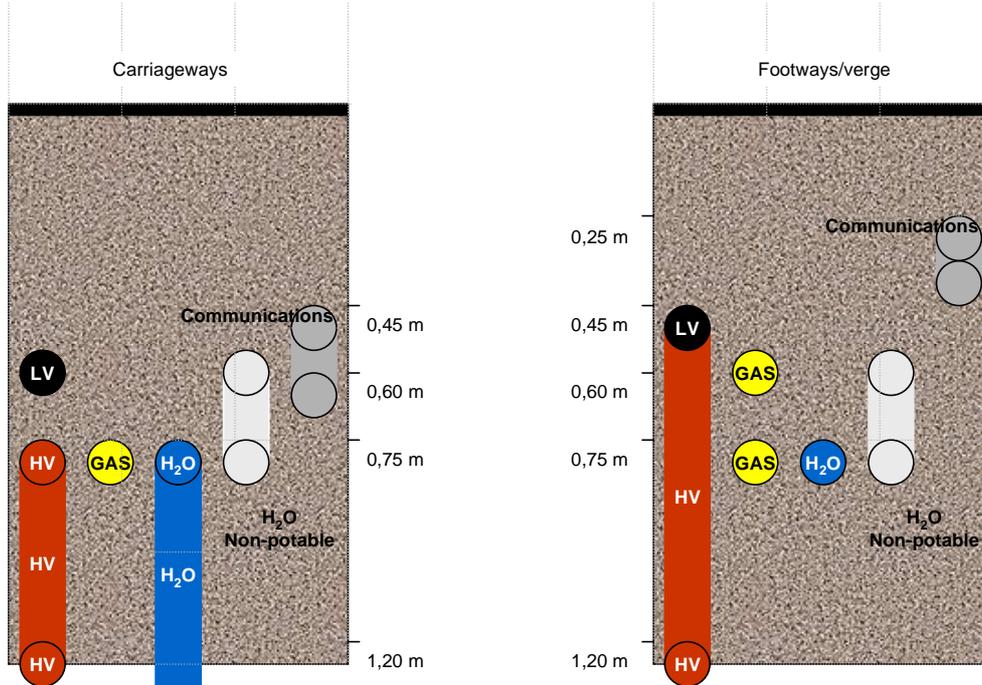


Figure 1 - NJUG recommendations in relation to depth of utility dig

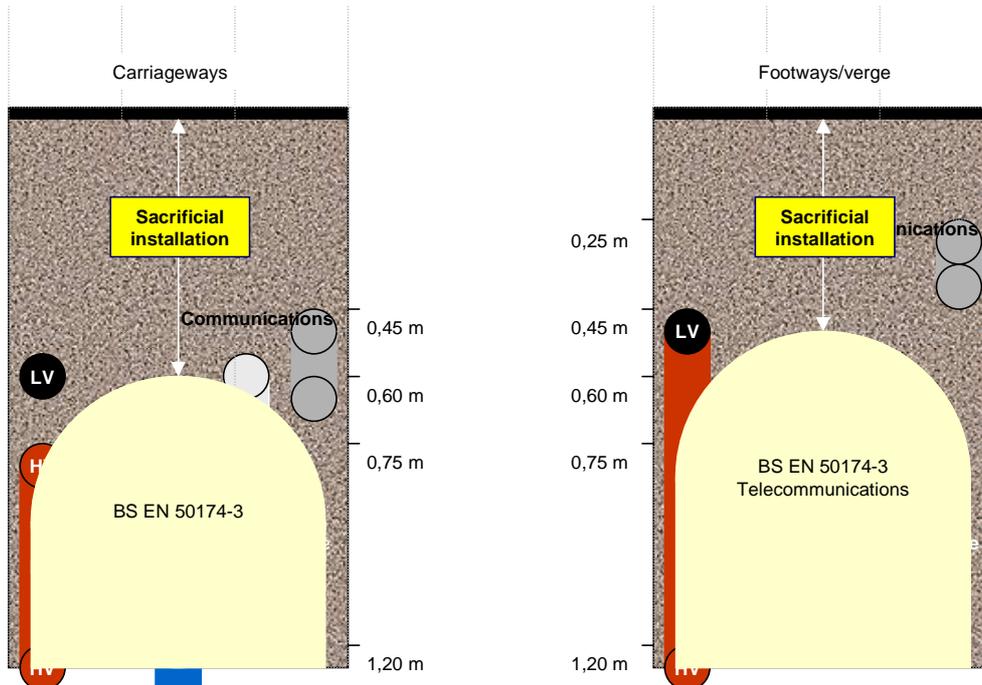


Figure 2 - EN 50174-3 requirements overlaid on NJUG recommendations in relation to depth of utility dig

With regard to colour, it is highlighted that:

- older services or other pipelines may not conform to these recommendations;
- colours may look different under poor or artificial lighting;
- older pipes or ducts may contain apparatus not specifically indicated by its colour coding;
- aggressive soils may discolour pigments in duct, pipe and cable colourings over time.

### 5.3 Highways services pathways

NJUG Volume 1 indicates a range of highways services which, in many cases, have minimum recommended depths of 0,45 m in both carriageways and footways. These include street lighting, street furniture, traffic control, communications and CCTV. Compliance with either BS EN 50174-3 or the NJUG Volume 1 within footways and verges should avoid conflict since the former requires deeper lay and the latter suggests more shallow installation. In carriageways, the implementation of BS EN 50174-3 depths risks a conflict in certain cases.

### 5.4 Motorways

NJUG Volume 1 states that motorways are protected streets laying apparatus under them should be avoided unless the apparatus is directly associated with the motorway itself (e.g. lighting, communication and signal cables, etc.). Where apparatus does have to be laid under a motorway this is usually accomplished by means of a duct or service tunnel.

### 5.5 Railways

NJUG Volume 1 provides no information regarding railways. BS EN 50174-3 requires a minimum depth of lay of 1,0 m and suggest that Increased depths may be required in accordance with agreements between the planner and the owners/operators of the land.

With regard to colour, it is highlighted that:

- older services or other pipelines may not conform to these recommendations;
- colours may look different under poor or artificial lighting;
- older pipes or ducts may contain apparatus not specifically indicated by its colour coding;
- aggressive soils may discolour pigments in duct, pipe and cable colourings over time.

### 5.6 Other land

The depths indicated are additional to the diameters of the cable(s) such that the top of the installed cable(s) or pathway systems shall meet the requirements of Table 4.

Table 4 - Comparison for BS EN 50174-3 and NJUG Volume 1 for telecommunications cabling in other land

BS EN 50174-3	
Agricultural land	0,9 m
Uncultivated or landscaped land	0,5 m

The BS states that pathways that do not meet the requirements of planned depths of Table 4 without effective mitigation are considered to be sacrificial.

BS EN 50174-3 places telecommunications cabling at a depth where the other utilities of **Error! Reference source not found.** are to be found. However, **Error! Reference source not found.** also indicates that anyone subsequently installing other utilities in accordance with NJUG Volume 1 would risk excavating telecommunications cables.

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## 5.7 Marker tapes

BS EN 50174-3 states that requirements and recommendations for marker tapes or equivalent products shall comply with national or local regulations.

For directly buried cables, BS EN 50174-3 requires that either

- a marker tape/wire in accordance with EN 12613 shall be laid between 0,1 m and 0,2 m above any cable to be installed which allows the position of the cable to be detected using an appropriate cable locator equipment;
- or
- the location of cables shall be documented on a site plan.

For cables in duct/conduit, BS EN 50174-3 recommends that a marker tape in accordance with EN 12613 should be laid between 0,1 m and 0,2 m above each conduits or group of conduits.

NJUG Volume 1 contains marker system information as shown in Table 5 warns that whilst marker systems may have value in warning an operator of the presence of buried plant, they are of strictly limited value as a means of identification. Marker systems should not be taken as an accurate indication of buried plant.

NJUG Volume 1 recommends that:

- when installing new apparatus - appropriate marker systems are laid some distance above the plant  
*Insulated wire or tapes incorporating a metal strip or passive electronic marker systems may be laid as an aid to the location of non-metallic pipes and ducts. Protection tapes or tiles made out of concrete, clay or plastic may be used and provide an additional means of identification.*
- when exposing existing marker systems care should be taken that they are not disturbed, damaged or removed and any displaced marker system should be replaced.

Table 5 - NJUG Volume 1 marker systems

Utility	Marker system
Sewerage	Not applicable
Telecommunications	Various
Water (non-potable, grey)	Not applicable
Water (fire-fighting)	Not applicable
Gas	Black legend on pipes (1 m intervals)
Electricity LV	Yellow with black legend
Water (other than described above)	Blue or blue/black
Electricity HV	Yellow with black and red legend or concrete tiles
Oil/fuel pipelines	Various surface markers Marker tapes or tiles above red concrete
Highways systems (see 5.3)	Yellow with black legend

## **6 LATERAL SEPARATION - BS EN 50174-3 AND NJUG VOLUME 1**

### **6.1 General**

Clearly, the idea of simply defining utilities by a depth regime would result in chaos if a contractor was trying to access the lowest utility infrastructure.

BS EN 50174-3 discusses separation and isolation (segregation) in relation to electromagnetic interference between power supply and telecommunications cabling. However, it makes few statements regarding other utilities and we have to rely on local regulations.

### **6.2 Carriageways**

NJUG Volume 1 gives no guidance on lateral separation for utilities when they are installed along carriageways except by reference to the Specification for the Reinstatement of Openings in Highways.

However, ducts are recommended when crossing carriageways.

With regard to BS EN 50174-3, the terms for a duct of circular cross-section is a "conduit" and all conduits shall be selected to

- withstand the predicted mechanical loading;
  - avoid colours of cable management systems which are used exclusively by other services e.g. power, gas, water;
  - allow the installation and replacement of sub-conduits, cables or cable elements (as applicable);
- and
- where appropriate, the conduits, sub-conduits and accessories shall be able to support the air pressure required to blow the cables or cable element.

The BT Openreach "*Developers Guide To Telecommunications Infrastructure and Installation*" requires a minimum separation of its ducts by 0,6 mm from all other utilities.

### **6.3 Footways**

NJUG Volume 1 provides recommendations for the lateral separation of different utilities in footways of 2 m width, which is the minimum width required to accommodate the full range of utility services. Due to the complexity of layout and size of utility and other apparatus only guidance can be given on their actual positioning. However, utilities and others are expected to endeavour to comply with the recommended positioning of their apparatus.

This sequences installations from the boundary with the carriageway as follows:

- telecommunications (centred at 0,43 m from paving edge/carriageway)
- water (centred at 0,69 m from paving edge/carriageway)
- gas (centred at 0,96 m from paving edge/carriageway)
- cable TV/communications (centred at 1,255 m from paving edge/carriageway)
- electricity HV and LV (centred at 1,550 m from paving edge/carriageway)

These lateral separations may also be applied in other conditions where there is no footway and, subject to agreement, where the property boundary is closer to the carriageway.

Figure 3 shows the lateral and vertical separation in a footway in schematic form.

### **6.4 Exclusions**

NJUG Volume 1 does make allowances in situations where technical, engineering or legal constraints prevent the recommendations being followed.

Examples include:

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- width restrictions;
- depth restrictions;
- environmental reasons e.g. trees and planted areas (see NJUG Volume 4);
- restrictions imposed by legislation;
- safe access to apparatus e.g. heavily trafficked roads;
- clustering of utilities' apparatus typically caused by:
  - jointing chambers or valve installations in footways which may reduce the available space for additional apparatus;
  - apparatus exiting from or entering buildings or chambers e.g. electricity substations and telephone exchanges;
  - surface apparatus e.g. kiosks, street lighting columns and cabinets.

In such circumstances apparatus may be forced to encroach into adjacent private property providing the necessary permissions have been obtained.

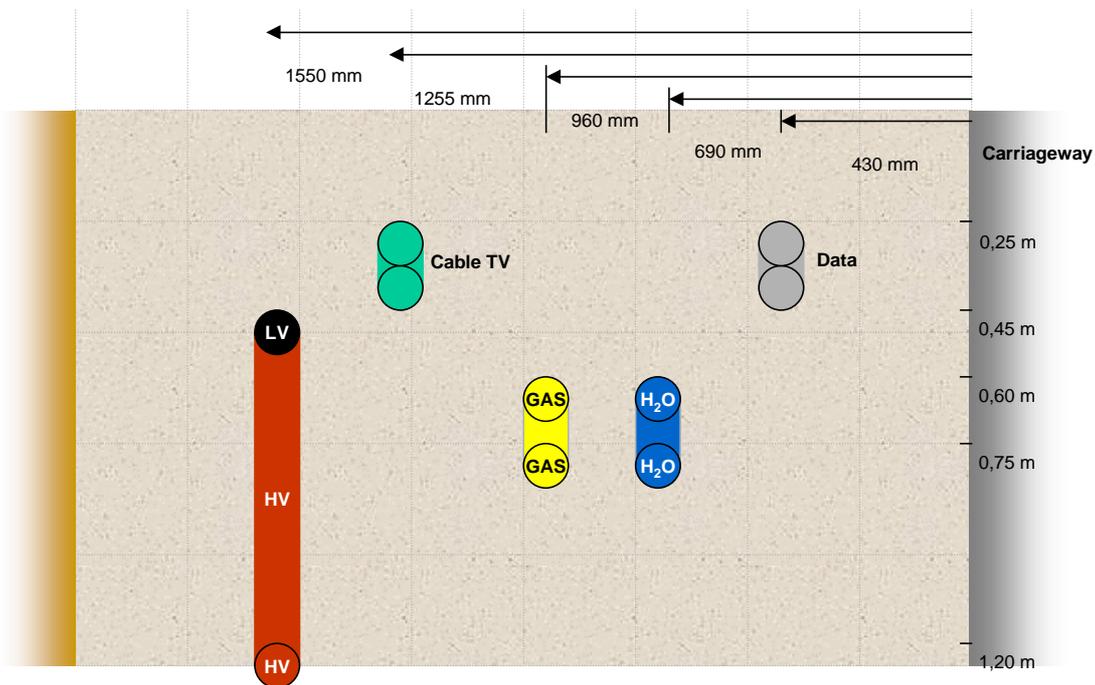


Figure 3 - Schematic of lateral and vertical separations in NJUG Volume 1

## 7 NEW DEVELOPMENT SITES

NJUG Volume 1 applies to all circumstances. However, new development sites are covered in a number of documents:

- NJUG Volume 2 focuses on constructing the environment that allows the "requirements" of NJUG Volume 1 to be met;
- DCLG Guidance Note document "Data Ducting Infrastructure for New Homes";
- BT Openreach "Developers Guide To Telecommunications Infrastructure and Installation" and equivalent documents for Virgin Media.

On new development sites where utility apparatus is installed by the Developer or a third party, the guidelines contained in NJUG Volume 1 in relation to positioning and colour coding of underground apparatus should be followed. Any deviation from these guidelines should only be conducted with the agreement of the prospective asset owner. Any variation to depth of cover must permit access to all utility apparatus.

## 8 REINSTATEMENT

The New Roads and Street Works Act 1991 Specification for the Reinstatement of Openings in Highways should be consulted.

This Specification is a Code of Practice outlining a national standard applicable to all Undertakers when carrying out reinstatement as a part of executing street works. Broadly, the Specification and its appendices prescribe materials that may be used, the expected standards of workmanship and performance standards to be complied with at both interim and permanent reinstatement stages for the duration of the Guarantee Period (which is normally two years).