

Technical Manual For Physical Co-location Service

as defined in the
open eir¹ Access Reference Offer
Service Schedule 101

¹ open eir is a trading name of eircom limited, Registered as a Branch in Ireland Number 907674, Incorporated in Jersey Number 116389, Branch Address : 1 Heuston South Quarter, St. John's Road, Dublin 8

Version Control

Version	Status	Update	Effective Date
2.34		Re Branding	30/09/15
V3.0	Final	This document is based on V2.34 Implementation of Standardised Change Control.	16/06/2017

This document follows change control procedure:

Proposed is defined as a document status when the approved document is uploaded to Proposals Section of open eir Website.

Final is defined as a document status when the approved document is uploaded to the relevant section of the open eir Website following the publication period.

For information:

- Historical Document History Table located at end of Document.
- Publish means the action of uploading a document to the website regardless of status or location.
- **If there are changes to the document between 'Proposed' and 'Final', change control operates.**

Table of Contents

1. INTRODUCTION	5
1.1 THE ROLE OF COMREG	5
1.2 SCOPE.....	5
1.3 DEFINITIONS.....	5
1.4 DESCRIPTION OF PHYSICAL COLOCATION SERVICE.....	5
1.5 STANDARDS	5
1.6 DOCUMENT STATUS.....	6
1.7 CHANGE MANAGEMENT	6
2. PHYSICAL COLOCATION ENVIRONMENT.....	6
2.....	6
2.1 PHYSICAL ELEMENTS	6
2.2 OPERATOR FOOTPRINT (OPERATOR FP)	8
2.3 OPERATOR ODF	8
2.4 SERVICE IMPLEMENTATION ACTIVITIES.....	8
3. SITE PREPARATION BY THE ACCESS PROVIDER	8
3.....	9
3.1 SITE SURVEY.....	9
3.2 RUNNING OF OPERATOR FIBRE(S) FROM EXTERNAL MANHOLE TO OPERATOR ODF.....	9
3.3 MAINTENANCE OF OPERATORS OPTIC FIBRE CABLE	10
3.4 PROVISION AND MANAGEMENT OF EXCHANGE OPES	10
3.5 PROVISION OF CABLE MANAGEMENT (CABLE TRAYS)	11
3.6 PROVISION OF DC POWER DISTRIBUTION.....	11
3.7 PROVISION OF EARTH WINDOW.....	11
3.8 ALLOCATION OF MDF BLOCKS AND JUMPERING	11
3.9 PROVISION OF TELEPHONE LINE FOR OPERATOR USE	14
4. OPERATOR ACTIVITIES IN THE ACCESS PROVIDER EXCHANGE FACILITY	14
4.....	14
4.1 BASIC PRINCIPLES	14
4.2 INSPECTION BY OPERATOR	16
4.3 ARRANGE PLANNED ACCESS	16
4.4 DELIVERY	16
4.5 UNPACKING BY THE OPERATOR AND SAFETY DEMANDS	16
4.6 VERIFICATIONS OF ITEMS BY THE ACCESS PROVIDER	16
4.7 DELIVERY OF EQUIPMENT TO OPERATOR FP	17
4.8 INSTALLATION OF HARDWARE BY THE OPERATOR.....	17
4.9 CONNECTION TO SERVICES BY OPERATOR.....	17
4.10 TERMINATION OF OPERATOR FIBRE	17
4.11 TERMINATION OF FIBRE ON OPERATOR ODF	18
4.12 SPECIFICATION OF OPERATOR SUB-DUCT	18
4.13 SPECIFICATION OF TIE-CABLES.....	18
4.14 CONNECTION TO 48 VOLT DC DISTRIBUTION POINT	18
4.15 CONNECTION TO EXCHANGE EARTHING SYSTEM	18
4.16 SEALING OF EXCHANGE OPES BY OPERATOR.....	19
4.17 TESTING OF SERVICES BY OPERATOR	19
4.18 LOCALISE AND RESOLVE FAULT(S)	19
4.19 VERIFICATION OF WORK BY THE ACCESS PROVIDER	19
5. REFERENCES	20



APPENDIX 1 - INDICATIVE SPECIFICATION OF OPERATOR FIBRE CABLE.....	21
APPENDIX 2 - INDICATIVE SPECIFICATION OF OPERATOR SUB-DUCT	24
APPENDIX 3 - INDICATIVE SPECIFICATION OF OPERATOR TIE CABLES.....	27
APPENDIX 4 - OPEN EIR'S COMMITTED RESPONSE TIMES ON OPERATOR'S FIBRE CABLE BREAKS	30
APPENDIX 5- SEALING OF EXCHANGE OPES	31
VERSION CONTROL HISTORY	32

Table of Figures

FIGURE 1: ACCESS PROVIDER EXCHANGE FACILITY.....	7
FIGURE 2: OUTLINE OF ACTIVITIES BY OPERATOR.....	15

List of Tables

TABLE 1: CHARACTERISTICS OF JUMPER WIRE	14
TABLE 2: CONDUCTOR DIMENSIONS AND RESISTANCE.....	27
TABLE 3: MAKE-UP AND DIMENSIONS OF CABLE-LAYER (PAIR)	28
TABLE 4: MAKE-UP AND DIMENSIONS OF CABLE-UNIT.....	28
TABLE 5: MAKE-UP AND UNIT IDENTIFICATION COLOURS – 20 PR UNIT	29
TABLE 6: MINIMUM INSULATION RESISTANCE OF COMPLETED CABLE	29

Any use of gender-specific language in this document has no particular relevance
--

1. Introduction

This Technical Manual contains a set of ‘best practice’ technical procedures to be followed by the Telecommunication Industry. These procedures relate to the implementation of Physical Collocation Services in Access Provider exchange facilities in connection with Local Loop Unbundling in accordance with the Local Loop Unbundling regulations currently in force.

1.1 The role of ComReg

At the request of the telecommunications industry in Ireland ComReg has led an industry initiative to develop the operational processes required to support Local Loop Unbundling. This Technical Manual is part of that initiative.

1.2 Scope

This Technical Manual and the techniques described herein apply to the Physical Collocation Service, as defined by Open eir in its Access Agreement.

The scope of this document is limited to statements of best practices to be followed in relation to implementation techniques by Operators within Access Provider exchanges and specifically excludes areas such as :

- technical standards relating to Copper Loop Frequency Management Plan
- pricing of Local Loop Unbundling services offered by Open eir.

It also includes statements on the site preparation activities to be followed by Access Providers.

1.3 Definitions

Operator	referred to as Licensee upon signature of a Physical Collocation Licence Agreement
Access Provider	referred to as Licensor upon signature of a Physical Collocation Licence Agreement
Operator Staff	means any employee, agent or contractor of the Operator

All other terms shall have the meaning conferred on them by the Licence Agreement.

1.4 Description of Physical Collocation Service

A full description of the Physical Collocation Service is available in the Access Agreement.

1.5 Standards

All equipment and plant deployed as part of the implementation of the service shall comply with the relevant national and international standards, as appropriate.

1.6 Document Status

This Technical Manual has been produced by the LLU Industry Forum after an initial industry consultation on the best practices to be applied in the delivery of the service to Operators. It takes account, where relevant, of the operational processes described in the associated document – Process Manual for Open eir Physical Collocation Service [2].

Changes in the provisions of the base documents (Refs. and [2].) in the future will result in a review of this Manual and possible consequential revision.

1.7 Change Management

This document is part of an interlinked set of documents, namely:

- ✔ Inter Operator Process Manual for Physical Co-location
- ✔ Inter Operator Process Manual for the Open eir services Unbundled Local Metallic Path and Line Sharing
- ✔ *Open eir's* Access Agreement.
- ✔ Physical Collocation Licence Agreement

The development of this document may necessarily lead to changes in the other related documents. Therefore, where such changes are identified, they will be annotated in this document and actions placed on the other documents for consideration of the issues and changes.

Prior to the publication of this document, the working group of the industry forum shall submit it to the full industry forum for approval.

The document set shall be reviewed as and when appropriate but at least at three monthly intervals, so that lessons learned from the practical implementation of the products and processes can be rapidly used to inform and shape the product descriptions and the working relationships between the parties.

Change management will list the changes made, the source of those changes, and the underlying reasons for the change.

2. Physical Colocation Environment

2.1 Physical Elements

A number of discrete elements combine to deliver the Service. These components are provided by the Operator or by the Access Provider (AP), as appropriate. Exceptionally in the case of the Operator fibre(s) providing connectivity to their network, while it is the property of the Operator, it is run into the exchange facility by the Access Provider from the external manhole to the Operator Optical Distribution Frame (Operator ODF).

These elements and their relationships are shown diagrammatically in Figure 1.

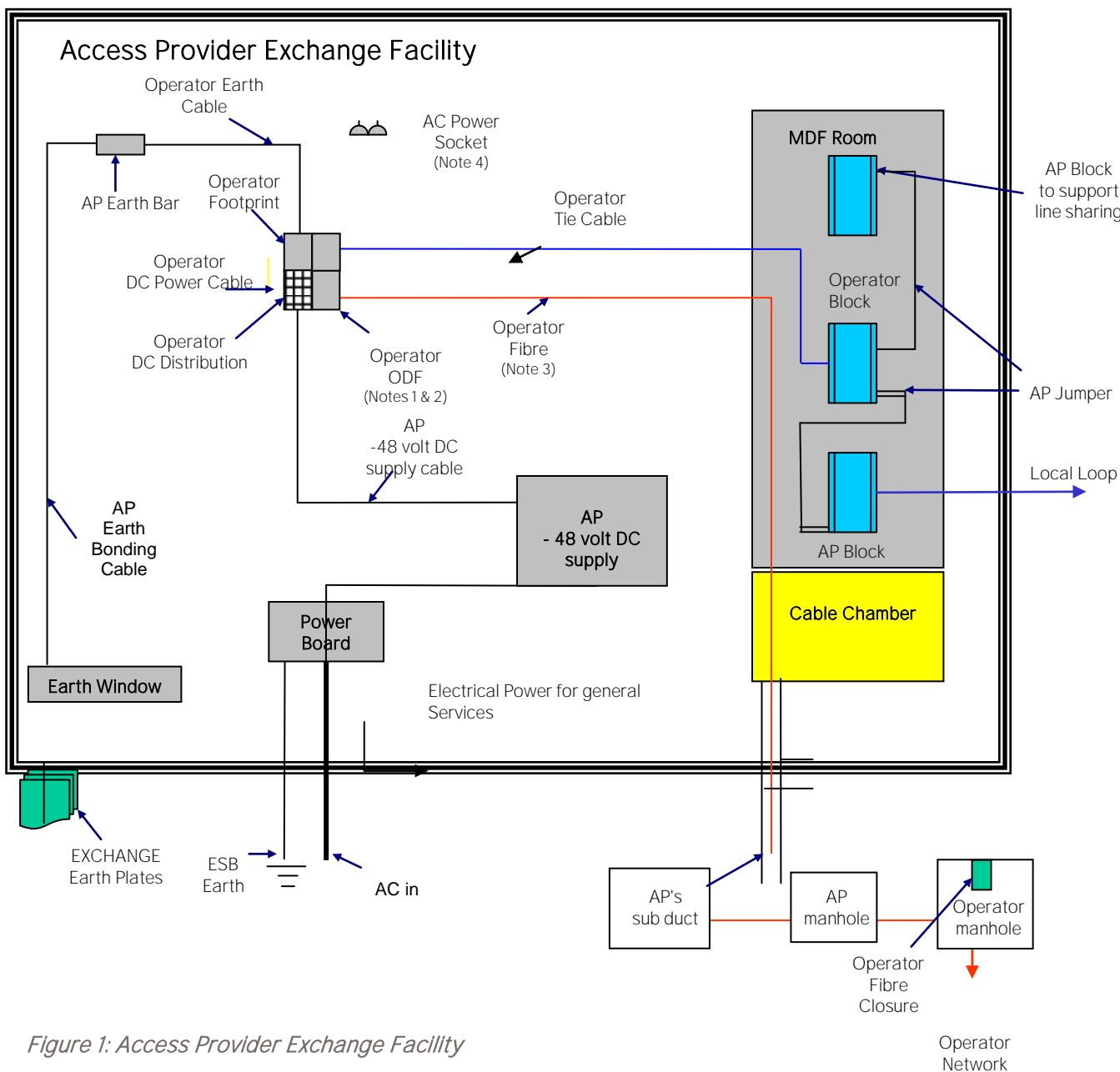


Figure 1: Access Provider Exchange Facility

- Note 1: Operator ODF may be physically located in Operator Rack on FP
- Note 2: This will be a fibre patch cord within the Operator Rack when the Operator ODF is in the Rack.
- Note 3: While this fibre optic cable belongs to the Operator =, it will be run by the Access Provider from the Access Provider manhole to the Operator ODF.
- Note 4: General-purpose 13A Twin Socket switched outlets (BS1363)

2.2 Operator Footprint (Operator FP)

While Figure 1 shows a single Operator FP, it must be recognised that the following configurations may exist:

- a) A single Operator FP may exist in any one aisle;
- b) There may be several Operator FPs from a variety of Operators in any one aisle;
- c) Operator FPs may be mixed together in any one aisle
- d) Footprints may be positioned back-to-back or side-to-side

Accordingly, the techniques described in this Technical Manual shall also provide for any necessary inter-connection between Operator FPs either in the same aisle or between aisles. Equipment interconnection between Operator FPs shall use the dedicated cable management infrastructure in all cases.

2.3 Operator ODF

The Operator ODF, if any, will be on the Operator footprint.

2.4 Service Implementation Activities

After a site offer has been agreed between the Access Provider and Operator, the implementation of the service consists of two primary activities, namely:

- a) Site preparation by the Access Provider, and
- b) Operator activity within the Access Provider exchange facility

These are described in the sections 3 and 4 below.

3. Site Preparation by the Access Provider

Further to the elements identified in Figure 1, the Access Provider will carry out a number of preparatory works on the site following execution of a Licence Agreement. The following non-restrictive list indicates these general activities:

- a) Installation of the Operator subduct between the Operator manhole and the AP cable chamber;
- b) Installation of the Operator optical fibre cable within the Operator subduct between the Operator manhole and the Operator footprint with the telephone exchange;
- c) Installation of the Operator Block on the MDF;
- d) Installation of AP Earth cable from earth window to AP earth bar and associated AP cable trays;
- e) Installation of AP Earth Bar;
- f) Installation of AP cable tray to support licensee's dc cable from footprint to dc distribution;
- g) Installation of AP cable tray to support licensee's earth cable from Earth Bar to Licensee footprint;

-
- h) AP DC Distribution;
 - i) AP DC power equipment and associated cabling and cable trays (including trays for power) where required,
 - j) AP cable trays to support cable run for licensee's tie cable and fibre where required,
 - k) Provisioning of new OPES and sealing of changes where required
 - l) Compression or extension of the AP MDF to support Operator Block* where required;
 - m) Clearance of space if required (eg removal of redundant equipment);
 - n) Construction Work;
 - o) Installation of AP raised floor (where applicable);
 - p) Provision of AC Power supply to AP DC Rectifiers feeding Operator Equipment;
 - q) Upgrading of utility electrical supply to support increase load directly attributable to Equipment;
 - r) Upgrading of AP electrical main board to support increase load directly attributable to Operator equipment;
 - s) Provision of additional AP lighting, AP fire detection specifically for the Equipment;
 - t) Provision of the AP Air-Conditioning/ventilation to cater for any additional cooling load directly attributable to Operator equipment.
 - u) Confirmation of a route from the unpacking area to the footprint

This work will be undertaken as part of the overall provision of a serviced footprint to the Operator(s) in accordance with the provisions of Reference [2]. Section 3.

3.1 Site Survey

The Access Provider will survey the exchange location in accordance with the provisions of Reference [2]., section 3.

3.2 Running of Operator fibre(s) from external manhole to Operator ODF

The following procedure is proposed for the running of the Operator fibre from the Operator manhole to the Operator ODF. All works carried out in the installation of the Operators fibre must comply with Open eir standard practice, which will be provided to the Operator after signing a Licence Agreement. Materials provided by Operator to the Access Provider must be of Open eir standard and specification.

The Access Provider will nominate one or more manholes, which provides a route for the installation of the Operator's fibre to the exchange cable chamber. **This manhole will be located local to the specified exchange but not within the exchange campus.** Where possible the Access Provider will nominate two manholes on either side of the exchange to facilitate Operator diverse access. The agreed manholes will, where possible, be common to those for the provision of the In-Span Interconnect Service.

The Operator will construct its manhole within 10 metres of the Access Providers manhole(s) provided that there are no restrictions within the 10 metres. Where the distance exceeds 10 metres, this will be subject to agreement. The Operator will be responsible for laying a single duct from **Operators manhole to Access Provider's manhole.** The point of entry for the Operators duct, into the Access Providers manhole wall will be nominated by the Access Provider. All work entailed in

breaking into the Access Providers manholes for the installation of this duct will be supervised by the Access Providers personnel.

The Operator to supply Access Provider with 25mm sub-duct unbroken (sub-duct to be of standard as indicated in Appendix 2 Indicative Specification of Operator Sub-Duct), of a length sufficient to cover distance from Operators manhole to exchange chamber. Access Provider or Access Providers contractor to pull in 25mm sub-duct from Operators Manhole to exchange cable chamber.

At all sites duct space will be maintained to allow for the pulling in of a cable of size equal to the largest cable existing. Sub duct will be used for the installation of Operator fibre at all Colocation sites. Exceptionally where congestion of ducts does not allow for the utilisation of sub duct Operator optic fibre cable may be pulled in independently. In these exceptional instances the Operator will be notified. Liability in terms these cables will rest with the Operator. The AP will endeavour to ensure all due care is taken if such circumstances arise.

Operator to provide Access Provider with Operators unbroken internal/external fibre optic cable in accordance with specification in Appendix 1 (Indicative Specification of Operator Fibre Cable, internal/external cable). This cable to be of a length sufficient to cover distance from Operators manhole to Operators ODF located within allocated footprint. Additional cable length to be provided for jointing purposes at Operators manhole and termination at Operators ODF. The Access Provider or Access Providers contractor will pull in the Operators fibre optic cable within the 25mm sub-duct provided. The Access Provider will route Operators optic fibre cable from cable chamber to allocated footprint.

Pre-commissioning acceptance test will be carried out by the Operator on the Operator's optic fibre cable prior to jointing or termination of optic fibre cable. All jointing of fibre optic cables to be carried out by Operator in Operators manhole or elsewhere within the Operators network.. Operator will carry out termination of Operators fibre optic cable at Operators ODF within allocated footprint. Where visible in Access Providers duct network or boxes Operators optic fibre to be clearly identified with appropriate marker or label supplied by Operator. The marker to be of a standard to provide an environmental seal to a pre-printed or hand-written label identifying the cable. Coding convention for Operators fibre optic cable to be determined by Access Provider.

3.3 Maintenance of Operators Optic Fibre Cable

It is the responsibility of the Operator to test and localise faults in the Operators fibre optic cable. As far as possible, localisation of fault should be carried out remotely. If this is unsuccessful localisation of fault should be carried out at Operators ODF and or fibre optic joint located in Operators manhole.

If a service affecting fault is localised into the optic fibre cable routed from Operators manhole to Operators footprint and the recommendation is that the cable is to be replaced. The cable must be replaced without the inclusion of extra joints. Pulling in of a replacement optic fibre cable from Operators Manhole to Operators ODF will be carried out by the Access Provider see attached **Appendix 4 "Open eir's committed response times on Operators Optic Fibre cable Breaks"**. When completed redundant optical fibre cable to be recovered. All Costs to be borne by Operator.

The replacement of fibre in the event of non-service affecting faults will be scheduled between the Access Provider and Operator.

3.4 Provision and Management of Exchange Opes

The Access Provider will survey the exchange in question and identify the exchange opes available. In the event that there is insufficient capacity available the Access Provider will estimate the opes required having regard to the locations of the Operator FP and the MDF. The Access Provider will then arrange for their provision. Opes will be re-sealed by the Access Seeker, where the original

seal has been broken by the Operator. In the event of the exchange opes being in an unsealed state, prior to commencement of work, this should be noted to the Open eir representative prior to commencing any work. The Operator will then log this in the "Installation Equipment Safety Certificate" as detailed in Appendix N of the Inter Operator Process Manual. Training will be provided to the Operator in implementation of Open eir guidelines. Guidelines on exchange opes seals can be found in appendix 5.

3.5 Provision of Cable Management (Cable Trays)

Cable management systems (cable trays) will be provided (if not already available) by the Access Provider to facilitate the running of cables by the Operator from the FP to the MDF, the DC power distribution cabinet, and the earth system.

3.6 Provision of DC Power Distribution

The provision of -48 volt DC power to each Operator requesting Physical Co-location will be carried out as follows by the Access Provider:

1. Each Operator will be provided with access to a dual-fed -48 volt DC distribution point.
2. The Access Provider will arrange installation and commissioning of each distribution point subject to all information requested on the order form being supplied;
3. The Access Provider will be responsible for monitoring and maintenance of the DC power supply to, but not including, the distribution unit (Clarity required on definition of distribution unit)
4. The Operator will be responsible for the provision, installation, and maintenance of all power cabling from the distribution point to their equipment;
5. The Operator will be responsible for the provision, installation, and maintenance of earth cables to their equipment.

Note: Distribution point refers to 'best fit' MCCB or Fuse position as appropriate to the site at the Access Providers discretion.

In the case of a higher DC power consumption being required at a future date by an Operator (e.g. due to customer growth) the Operator will request additional DC power from Open eir. Open eir will revert with a price and timescale for the provision of this additional power.

3.7 Provision of Earth Window

The Access Provider will carry out all tasks in respect of the provision of a point of connection for Operators to the exchange earth window. A full site survey will identify the earth window in the cable chamber or MDF area and survey the earth cable run to the Operator FP. The Access Provider will provide an earth bar with suitable connection points in the general area of the Operator FP and shall bond this earth bar to the exchange earth window using a properly-dimensioned unbroken earth cable. This work may include any earth cable, cable tray and ope build required to provide this Earth Connection Point to Operators footprint.

3.8 Allocation of MDF blocks and Jumpering

As part of the Site Offer, OLO block termination positions will be identified on the MDF. The MDF blocks will be supplied by the Operator and installed by the Access Provider. Where QM frames and multiple frames are present within the Open eir exchange, the provision of the Operator block will be dealt with on a case by case basis as follows:

QM Frames

To facilitate the availability of Operator terminations it is necessary to terminate blocks at optimum zones throughout the MDF. Regardless of the quantity of terminations required a block must be fitted in these optimum positions to allow for an equal distribution of service to customers. In view of the difficulties encountered in dealing with QM frames no rules or policy can apply in determining number of termination blocks, or position of these blocks. The number of Operator termination blocks required on QM frames will be determined by the Access Provider.

From a frame management perspective where there is a request for terminations on QM frames each QM frame must be assessed on an individual basis.

Multiple MDF's

Where multiple MDF's exist within an exchange, Operator termination blocks are installed on each frame. Operator to split tie cable to facilitate termination of allotment on these blocks. This allows for distribution of Operator terminations to each frame. In no circumstances will Open eir tie cables be used to provide path for Operator circuits from one MDF to the other. If more Operator terminations are required on either MDF, a new Operator tie cable will have to be run and another termination block installed.

On multiple frames where it is found that there is only space available to site the Operator termination block on one MDF, the AP will rationalise (cable compression) cables on the second or other MDF's so as to allow for the siting of Operator termination block.

From a frame management perspective where there is a request for terminations in exchanges where multiple frames are sited each multiple frame must be assessed on an individual basis.

Note : The following information relates to MDF blocks in Open eir exchanges. Other Access Providers may use different standards and these will be described, as necessary, in future editions of this Technical Manual.

The following two standards are used by Open eir in the provision of Operator Blocks on the MDF :

QUANTE Blocks

Quante blocks, protection cassettes & wiring tool (manufacturer's code in brackets):

5532932	Q. ID3 BLOCK 512PR - 8PR MODULE	(15-512-00000)
5532933	Q. ID3 BLOCK 128PR - 8PR MODULE	(15-628-00000)
5532934	Q. ID3 BLOCK 104PR - 8PR MODULE RIGHT	(15-604-00000)
5532936	Q. ID3 BLOCK 100PR - 10PR MODULE RIGHT	(15-600-00000)
5532938	Q. OVERVOLTAGE PROTECTION 10PR RIGHT	(62126-504 00)
5532940	Q. OVERVOLTAGE PROTECTION 8PR RIGHT MAG	(62126-505 00)
5532942	Q. WIRING TOOL FOR ID3000	(62397-513 00)

Siemens Blocks

Siemens Series 2000 blocks, protection cassettes & wiring tool (manufacturer's code in brackets):

5592170	S2000 TERMINATING BLOCK 128PR	(S30264-C39104-A113-D12)
5591977	S2000 TERMINATING BLOCK (LH) 104PR	(C39104-A110-D101)
5591976	S2000 TERMINATING BLOCK (RH) 104PR	(C39104-A110-D1)
5532334	PROTECTOR CARD 8D (8X2) LEFT	n/a
5532999	PROTECTOR CARD 8D (8X2) RIGHT	n/a
5592177	S2000 PROT. CASS.LH (OBSOL. USE 5532334)	(S30264-D1008-S5)
5592176	S2000 PROT. CASS.RH (OBSOL. USE 5532999)	(S30264-D1008-S51)
5599900	S2000 BLOCK WIRING TOOL	(C39407-A175-A3)

Any deviations from the above MDF Block specification will be flagged in the Site Offer in which case the Operator may have to adjust his method of terminating the Tie Cable on the MDF Block, or the capacity of the tie cable itself (see section 4.13 below), or both.

Accessories such as labels, test cords etc. are also available for the above blocks.

Blocks are available, as above, in 104 pairs (for Cable / line / UG side) with only 100 pairs used, or 128 pair/512 pair for exchange side.

Contacts are IDC (Insulation Displacement Contact), wires to be used are SOLID, with diameter 0.32 to 0.63 mm.

The Operator MDF block must support gas-discharge tubes for lightning protection.

Cables currently used by Open eir are:

All standard *Open eir* external cables (excluding Drop Wire, paper-insulated or 0.9 conductor),
All standard Open eir internal cable equipment,
Category 5 cable (4-pair or 25 pair solid wires),
Suitable cables as supplied by Ericsson / Alcatel etc for exchange side wiring.
Insulation on the wires can be solid or cellular for use in these blocks (if an air-block is to be employed, insulation on the wires MUST be solid)

As well as installing the Operator Block(s) on the MDF, the Access Provider will also be responsible for all jumpering on the MDF using jumper wire conforming to the specification below.

Special Note: The following data is provided for information purposes only and relates to current Open eir practice in respect of MDF jumpering practices.

Jumper Wires to be used are:

5522151 Wire Jumper 1pr 0.5/0.9mm (Black/Yellow)
5522981 Wire Jumper 1pr 0.5mm Green/Red SPECIAL

Both types of Jumper Wire have SOLID 0.5mm conductor, with insulation giving overall diameter of 0.9 to 1.0 mm. Standard insulation colour is Black/Yellow.

For High Voltage (eg ISDN) or special circuits, insulation colour is Green/Red.

NOTE: coloured markers are available for both types of blocks which can be used to highlight particular circuits.

Open eir uses single pair insulated wire for jumpering at the MDF and cabinets (conductor diameter = 0.5mm). The overall diameter is 0.9mm to cater for high-density MDF termination blocks. The PVC insulation is thus cross-linked for added strength.

Conductors

Each conductor consist of a solid wire of standard annealed copper, smoothly drawn, circular in cross section, uniform in quality, free from defects and uniformly coated with pure tin. The tinned wire passes the tinning test in BS No.3360. The diameter and resistance of the conductor are in accordance with **Error! Reference source not found.**below. All measurements are nominal and have a spread of $\pm 5\%$.

Jumper	Conductor		Insulation	% Elongation after removal from Completed Wire
Type	Diameter (mm)	Resistance (Ω) per 1000m at 20°C	Radial Thickness mm	
1	0.5 mm	90 Ω	0.2 mm	15%

Table 1: Characteristics of Jumper Wire

The conductor shall be uniformly covered with insulation comprising of cross-linked PVC and fire resistance in accordance with either BS 4066 Part C or BS2011 Part 2 Test PZ.

The jumper wire will have undergone insulation tests, breakdown tests and Spark tests.

3.9 Provision of Telephone Line for Operator use

The Access Provider will make a PSTN telephone line available for use by the Operator where requested as per the ordering process in the Inter Operator Process Manual. This line will be provided within the Operator footprint for the purpose of voice calls, remote diagnostics and fault finding. The Operator will be invoiced for this line as a retail customer, whereby all associated rental and traffic charges will be paid by the Operator without recourse to the disputed payments procedure in the ARO. The security and use of the line is the sole responsibility of the Operator. The NTU will be provided by the Access Provider.

4. Operator Activities in the Access Provider Exchange Facility

4.1 Basic Principles

As a general principle, the person or entity representing the Operator in the implementation of the Service should be notified to the Access Provider within a reasonable period prior to his arrival on site to carry out the activities that follow below.

Excluding the necessary order processing activities associated with the Service and which are described in Ref. [2]., a number of activities need to be followed by Operator(s) and Access Provider(s) in order to physically deploy the components necessary to implement the Service. These are shown sequentially in Figure 2 and show the activities carried out from when the Operator first arrives at the Access Provider exchange facility.

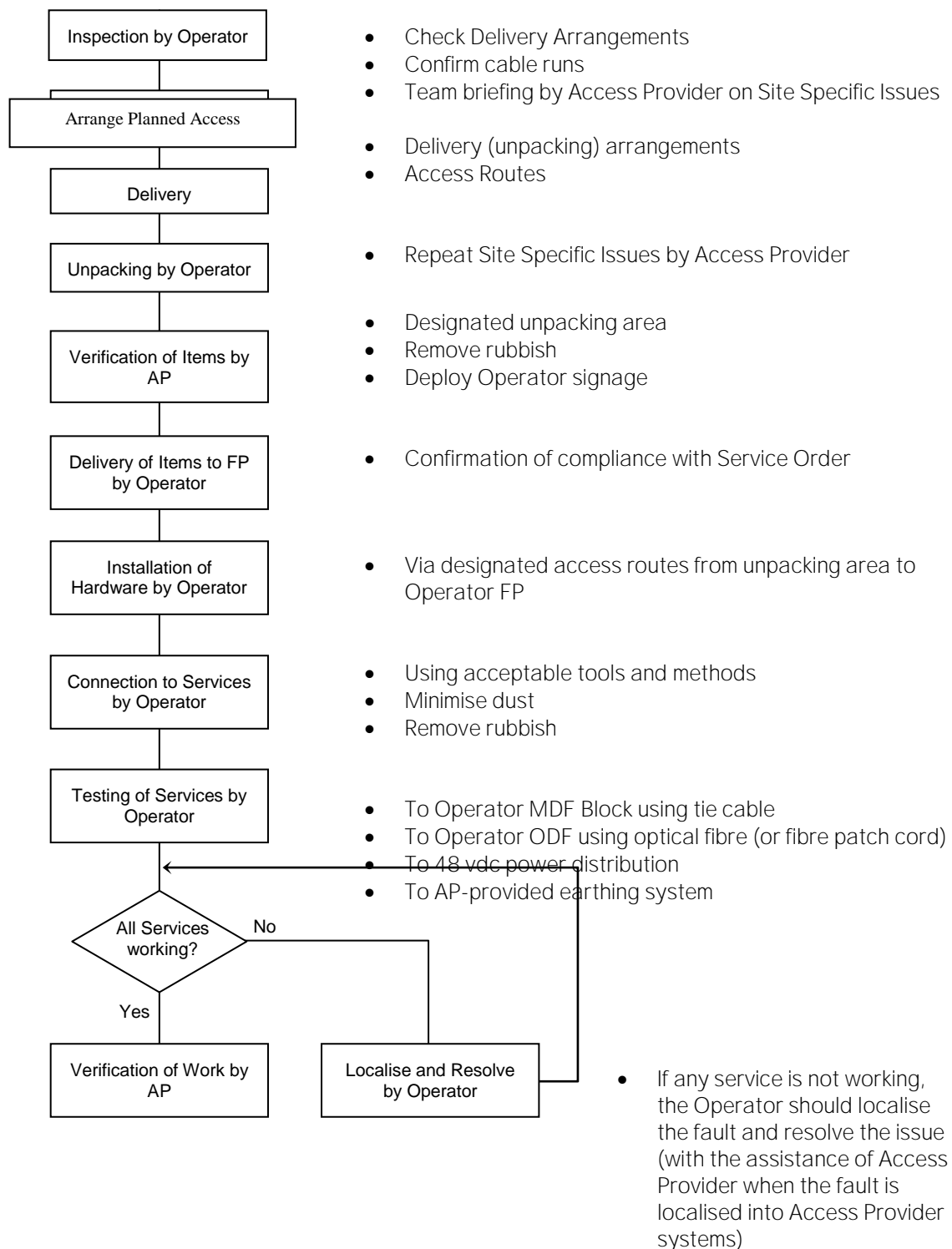


Figure 2: Outline of Activities by Operator

4.2 Inspection by Operator

In association with the local Access Provider representative, the initial inspection of the site will be used by the Operator to complete the following tasks:

- a) General inspection and familiarisation with the site layout and features, as advised by the Access Provider;
- b) Identification of delivery and unpacking locations;
- c) Confirmation of cable runs and any special features (for example, any bending radius constraints for optical fibre cable);
- d) A full briefing by the Access Provider on all site-specific features.

This inspection may take place on the occasion of the handover of the FP to the Operator.

4.3 Arrange Planned Access

At the initial inspection, and having identified the effort needed to complete his work, the Operator should book the required Access Provider resources as per the Inter Operator Process Manual in order to ensure their availability on the selected date, for example:

- a) Reserve an escort
- b) Reserve an unpacking area;
- c) Reserve an access route from unpacking area to Operator FP;
- d) Agree how any rubbish will be removed from the site.

4.4 Delivery

The Operator must be present to take delivery of his equipment. Delivery of the Operators equipment and plant will be done on the agreed date to the designated delivery area in the Access Provider exchange facility. As some time may have elapsed since the initial briefing, the Access Provider will repeat the briefing on all site-specific features.

No equipment should be delivered to site unless the installation team are available to unpack and deliver the equipment to the footprint.

4.5 Unpacking by the Operator and Safety Demands

The Operator shall deploy the necessary safety signs and signals prior to commencing his work. See also section 4.8. This activity is additional to any obligation on the Operator to comply with the statutory Health and Safety legislation.

On the day of delivery, the Operator will unpack his equipment in the designated unpacking area² prior to moving it to the Operator FP. Unpacking activities must not be carried out in any area other than the designated unpacking area.

All rubbish must be removed on the same day and will not be allowed to accumulate.

4.6 Verifications of Items by the Access Provider

Immediately following the unpacking of the equipment by the Operator and prior to its removal to the Operator FP, the Access Provider will have the opportunity to verify that the items delivered are in conformity with the Collocation Equipment Register as described in the Inter Operator Process Manual. Should the Access Provider not be available, such verification will not take place and the equipment will be moved to the Operator FP.

² Storage of equipment on the Access Provider site is not permitted.

4.7 Delivery of Equipment to Operator FP

Following unpacking and any verification, the Operator should then move his equipment and/or plant from the unpacking area to the Operator FP. The designated and reserved access route must be used in all cases. The wheeling in of racks with pre-installed equipment is permitted, and should be flagged to the Access Provider in the relevant Methods Statement.

4.8 Installation of Hardware by the Operator

Once the equipment is delivered to the Operator FP, installation may commence. All installation work shall be carried out using agreed methods and to agreed standards (as described in this Manual) and using tools that are fit for purpose. All work equipment and other items required to complete the job shall be provided by the Operator from his own resources.

The Operator shall take all necessary precautions to prevent dust and any physical or electrical interference to adjacent equipment and systems.

Electrically-operated tools and test equipment will be powered from the designated mains power outlets which the Access Provider will provide adjacent to the Operator FP.

During the installation period, and at all other times when there is on-site Operator activity, the Operator shall deploy appropriate signage, containing his official logo, in all locations of activity to indicate his presence.

The Operator will fix his rack(s) to the floor using a method appropriate to whether it is being fixed to a concrete or a false floor. Overhead fixing to the cable management system (cable tray) shall use proper bolting mechanisms of suitable dimensions with all bolts and fixings de-burred.

All rubbish and spoil must be removed on a daily basis.

4.9 Connection to Services by Operator

Having installed his equipment, the Operator may then connect this equipment to the necessary services provided by Open eir, as follows:

- a) To earthing system;
- b) To Operator ODF;
- c) To Operator MDF block using tie cable run in designated cable runways;
- d) To 48 volt DC power distribution board.

4.10 Termination of Operator Fibre

The Operator will terminate his fibre(s) on the Operator ODF. This fibre will have been run by Access Provider from the Access Provider manhole to the Operator ODF and left un-terminated (see section 3.2 above). The running of this fibre by the Access Provider and the route taken must comply with any constraints imposed by the minimum bending-radius of the cable. Project planning by the Access Provider may see this fibre cable pulled through before the Footprint is in place and fully serviced.

This fibre optic cable must be internal/external cable and should emulate the indicative specification contained in Appendix 1³. The fibre will be pulled from the Operator manhole to the Operator footprint without the inclusion of any joints. The fibre may be blown or pulled into the sub-duct by the Access

³ The fibre count is at the discretion of the Operator within the constraints imposed by the sub-duct.

Provider and the maximum pulling force should comply with Appendix 1. External coating shall also comply with or exceed the requirements of Appendix 1 regarding flame-retardant low-halogen materials.

4.11 Termination of Fibre on Operator ODF

The Operator will terminate his fibre on the Operator ODF in accordance with his normal practices.

4.12 Specification of Operator Sub-Duct

Sub-duct will be provided by the Operator in accordance with section 3.2 above. This sub-duct should emulate the indicative specification contained in Appendix 2. While an Operator may choose to use a different specification, the sub-duct shall, as a minimum, comply with or exceed the physical, mechanical, and chemical characteristics listed in Appendix 2. The Operator should advise the Access Provider of the safe pull strength for the sub-duct to be used. In principle, the Operator fibre cable and sub-duct must be compatible with each other at all times regarding ease of installation.

4.13 Specification of Tie-Cables

All Tie-Cables used by the Operator between the MDF and the Operator FP shall emulate the specification contained in Appendix 3. This specification details cable with tinned copper conductors, PVC insulated to a special colour code, and PVC sheath. The preference is to use 100-pair cables or multiples thereof, compatible with the capacity of the Operator MDF block.

The cable is intended to be terminated in Insulation Displacement Connectors (IDC) but may be soldered or wrapped.

Tie cables must be run in the designated cable run.

4.14 Connection to 48 volt DC Distribution Point

The Operator will be responsible for the provision of all power cabling from his distribution point to his equipment. The Operator shall connect his equipment to the 48 volt DC distribution point using power cabling which conforms to BS6007 and to the relevant ETCI National Rules for Electrical Installations, and ETSI standards for telecommunications installations. Cabling dimensioning will be determined by the Operator and communicated to the AP on the order form. The AP will not permit any cable to be installed which poses a risk to its buildings or occupants.

DC power cabling shall be run in the supplied labelled power cable trays by the Operator in a secure and tidy manner. Cables should be tied at 2 metre intervals for tidiness. The Operator may place an identification tag or label on his cables.

All DC power work must be carried out by competent personnel representing the Operator.

4.15 Connection to Exchange Earthing System

The Operator will be responsible for the earthing of their equipment. The Operator must connect his equipment and rack to the earthing connection point provided by the Access Provider in the general area of the Operator FP (see section 3.7 above). It must be recognised that this is not the mains earth.

The earthing cable from the Operator FP to the exchange earth window shall be at least of the same current carrying capacity as the earthing cable from the Operator DC distribution point to the earth window, typically 70mm². This cable should be insulated throughout its length and should be

terminated on the earth window bar at a position indicated by the Access Provider. This position should be suitably labelled by the Access Provider to indicate the Operator using it. All connections should be made to ensure a good electrical bond between the terminating cable and the brass material of the earth window with the appropriate cable terminating lug.

The earthing cable from the Operator FP should follow the designated cable run from the Operator FP to the earthing connection point. The cable should be run as straight as possible, keeping the bending radius not less than 2.5 times the Cross Sectional Area of the cable.

The utilisation of the earth connection point by the Operator should be entered by the Access Provider on a Display Notice adjacent to the facility. Additionally, a second notice should also be displayed by the Access Provider warning against unapproved disconnection of any cable from this earth connection point.

All earthing work must be carried out by competent personnel representing the Operator.

4.16 Sealing of Exchange Opes by Operator

When installing cables between the Operator FP and the MDF room (which also includes the earth window), the Operator will have to break fire-seals around exchange opes. These must be resealed on the same day as they were opened. Where the Operator has to return the following day to continue or complete the job, a temporary fire seal may be used overnight using an appropriate material. When the job is completed, the Operator must provide a permanent seal. In the event of the exchange opes being in an unsealed state, prior to commencement of work. The Operator will log this in the "Installation Equipment Safety Certificate" as detailed in Appendix N of the Inter Operator Process Manual. Responsibility will then revert to the AP to provide a permanent seal.

The purpose of fire stopping (sealing) cable opes is to:

- a) Prevent the passage of combustion products from one compartment or room to another;
- b) Prevent smoke interfering with the integrity of escape routes;
- c) Minimise possible damage to telecommunication equipment by corrosive by-products of combustion.

The quality and properties of the seal must ensure that all cable and service opes through walls and floors are adequately sealed against the passage of fire, smoke, and gases.

Appendix 5 lists of the products that may be used to seal OPES:

4.17 Testing of Services by Operator

The Operator may then verify that all services are functioning correctly using appropriate non-invasive methods.

4.18 Localise and Resolve Fault(s)

If any service is not working, the Operator should localise the fault and resolve the issue. In the event that the fault is localised into Access Provider systems, the Access Provider will resolve in accordance with the provisions of the Inter Operator Process Manual.

4.19 Verification of Work by the Access Provider

On the conclusion of the work by the Operator, the Access Provider will verify that the installed equipment is compliant with the project plan. Failure to comply with the project plan should be referred to the Operator Project Manager in the first place for resolution, or, depending on the issue, the person nominated at the first project meeting or identified from time to time by the Operator.

This examination will also ensure that the correct fixing techniques and practices have been used throughout the installation.

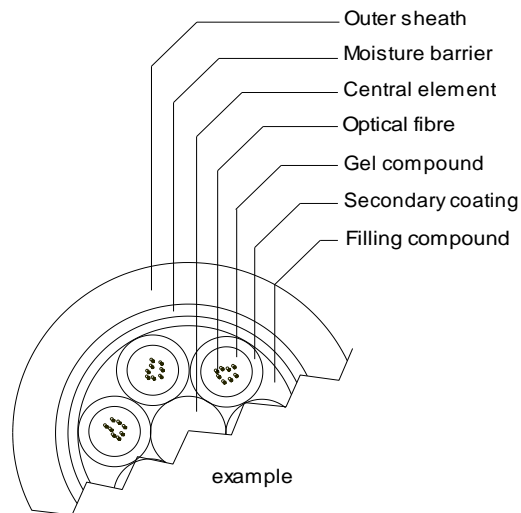
The Access Provider will also ensure that the site has been left in a clean and safe condition.

5. References

Open eir's Access Reference Offer, version 2.0, 11/06/2012[2].

Process Manual for Open eir Physical Collocation Service, version 15.5, 16/02/2012

Appendix 1 - Indicative Specification of Operator Fibre Cable



APPLICATION

Duct installation.

FEATURES

- Duct installation by pulling or blow-in techniques
- Fully watertight construction
- Moisture barrier
- Small size
- Light weight
- Low cost

CONSTRUCTION

Optical fibre	: For fibre specification see optical characteristics.
Secondary coating	: The fibres are, uniquely identified by a different colour, placed inside 'loose tubes' made of thermoplastic polyester.
Gel compound	: The tubes are fully filled with a non-toxic and dermatologically safe gel compound.
Conductor	: Each conductor consists of a solid wire of commercially pure annealed copper.
Insulation	: Each conductor is uniformly insulated with solid polyethylene compound.
Fault location	: The cable is provided with a fault location conductor (red). At regular intervals the insulation is perforated.
Pair	: Two insulated conductors are uniformly twisted together to form a pair.
Central element	: The central element consists of steel if applicable sheathed up to fit into the centre of the cable core.
Cable core	: The required number of tubes and pair are stranded around the central element.
Filling compound	: At regular intervals watertight plugs of a filling compound are applied.
Moisture barrier	: The cable is completely covered with an aluminium foil applied longitudinally with an overlap. The aluminium foil is bonded to the sheath.

All values in this product data sheet are nominal unless otherwise stated.

Fibre distribution					Dimensions		Mechanical	
Number of fibres	Tube size in- / outside [mm]	Number of tubes [-]	Number of fibres/tube [-]	Number of fillers/pairs [-]	Diameter over cable core [mm]	Diameter over outer sheath [mm]	Cable weight kg.km ⁻¹	Pulling force [N]
48*	1.7 / 2.4	6	8	- / 1	8.3	11.8	135	2800

* example

Fibre colouring

Fibre No.	1	2	3	4	5	6
Fibre colour	Red	Nat. / White	Yellow	Blue	Green	Violet

Fibre No.	7	8
Fibre colour	Brown	Black

Customised colouring upon request

Tube colouring

Tube No.	1	2	3	4	5	6
Tube colour	Red	Nat. / White	Yellow	Nat. / White	Yellow	Nat. / White

Tube No.	7	8	9	10	11	12
Tube colour	Yellow	Nat. / White	Yellow	Nat. / White	Yellow	Blue

Customised colouring upon request

Nat. = natural

Pair colouring

Pair no	1
Pair colour	Red / Blue

Customised colouring upon request

Sheath marking

NKF year of manufacture OPTICAL CABLE fibre count x fibre type length marking

Buyer specific printing upon request

Electrical characteristics

Summary (at 20°C):			
Conductor resistance	Max. 70	Ohms/km	
Insulation resistance			
- blue insulated conductor	Min. 5000	Mohms.km	(500 Vdc, 60 sec)
- red fault location conductor	Min. 1000	Mohms.km	(500 Vdc, 60 sec)
Dielectric strength	Min. 1000	V / 50 Hz	



Mechanical characteristics

Temperature range	- Transport, storage, operation - Installation	- 30 to +70 - 10 to +50	°C °C
Bending radius	- Repeated bending - Cable bend	min. 15 x D min. 10 x D	

D = outer diameter of cable

Optical characteristics (cabled max. values)

Fibre type	Single mode 9/125 μm			
Acc. to specification	ITU-T G.652			
Mode field diameter	9.2 ± 0.6			μm
Cladding diameter	125 ± 1			μm
Coating diameter	245 ± 10			μm
Wavelength	1310	1285-1330	1550	nm
Attenuation coefficient	0.38	0.40	0.25	dB/km
Dispersion	-	3.5	18.0	ps/nm.km
PMD	0.5			ps.km ^{-1/2}

Testing and inspection

Testing will comprise the following:	
- Optical characteristics	Attenuation (Single mode at 1310 / 1550 nm)
- Mechanical characteristics	Thickness of sheaths Diameter of cable
- Electrical characteristics	Insulation resistance Conductor resistance
- Visual inspection of cable	Colouring of fibres/tubes Colour of sheaths Identification
The mechanical characteristics and visual inspection shall be carried out with a frequency of 1 out of 10 drums, starting with the first drum. The first drum shall always be checked when the quantity is less than 10 drums.	
Certified test results are provided upon request.	
If testing and inspection is required to be carried out by third parties, such parties will be nominated and paid by the Purchaser.	

Packing

Standard length	4000	m
Length tolerance	± 100	m
Sealing of cable ends	To prevent ingress of moisture the cable ends are sealed with heat shrinkable end caps.	

Appendix 2 - Indicative Specification of Operator Sub-Duct

1. Product

This specification establishes the minimum material and performance requirements for sub-ducts. A number of sub-ducts can be blown into an outer duct. The individual Sub-duct then provides a dedicated path for a single cable.

2. Quality

Sub-ducts should be manufactured under the control of ISO 9000 with full quality record and tractability.

3. Product Design

The supplied sub-duct should be designed to be flexible, lightweight, durable and easy to install and are available in the following configurations:

- Ribbed outside and ribbed inside
- Smooth outside and ribbed inside
- Smooth outside and smooth inside

3.1 SILICORE™ - the permanent lubrication layer

An optional solid, permanent and integral layer of uniform thickness, containing active or polymeric materials which are formulated to provide a permanent, low friction boundary layer between the Sub-duct and cable for the anticipated service life of the sub-duct.

3.2 Product Life

The quality of sub-ducts shall allow blowing and replacements of cables over a life of at least 15 years after the installation.

3.3 Workmanship

The Sub-duct shall be free from holes, blisters, inclusions, cracks, or other imperfections, which would affect the performance or serviceability. The Sub-duct shall be homogenous throughout and the bores free from dimensional non-conformities as far as possible within the manufacturing process.

4. Material Requirements

4.1 Material

The Sub-duct shall be constructed of polymeric materials, which are lightweight, flexible, corrosion resistant and nonconductive. The base material shall be clean, virgin grade high density polyethylene (HDPE) which conforms to ASTM D3350-98a, Type III, Category 5, Class B or C and Grade P-34 per ASTM D1248-84 or equivalent.

4.2 Material Mechanical Properties

The base HDPE shall conform to the minimum mechanical properties listed below.

Melt Index (E)	D 1238	0.10 - 0.35 g/ 10 minute
ESCR	D 1693	192.0 hrs (per ASTM D3350)
Tensile @ Yield (min)	D 638	2500 psi to 3200 psi
% Elongation	D 638	300%
Flexural Modulus(min)	D 790	115,000 psi
Hardness	D 2240	60 Shore D
VICAT Softening Pt	D 1525	248 ° F (120 ° C)
Brittleness Temp.	D 746	-94 ° F (-70 ° C)

4.3 Colour / UV Protection Additive

Standard available colours shall be black, terracotta, red, orange, yellow, green, blue, brown and white or as specified by the customer. Colours shall be protected from ultra-violet (UV) degradation by the incorporation of Hindered Amine Light Stabilizers (HALS). This will allow for two (2) years of outside storage UV protection. The duct material shall be compounded with antioxidant additives to prevent thermal degradation.

5. Dimensions and Tolerances

The sub-duct should be circular in form of nominal 25mm or 37mm diameter and wall thickness of 3mm. Wall thickness should have a tolerance of $1 +0.0/-0.1$ mm.

The outside diameter and wall thickness does not include the rib heights.

6. Performance Requirements and Test

The sub-duct should be capable of being blown inside an outer duct. The cable can be installed inside the sub-duct by a blowing operation. The sub-duct should possess the following characteristics:

6.1 Coefficient of Friction

The Table below lists typical values of sliding coefficient of friction to be demonstrated by sub-duct with Polyethylene jacket.

TABLE

COEFFICIENT OF FRICTION (m)

DESCRIPTION	m
Smooth walled ducts with SILICORE	0.11
Smooth walled ducts without SILICORE	0.20
Ribbed ducts with SILICORE	0.10
Ribbed ducts without SILICORE	0.20

6.2 Pull Strength

The pull strength for a sub-duct is the maximum tensile force that can be used to pull it during installation. The following are typical safe pull strength for sub-ducts used in the industry:

Size (OD x ID)	mm	12 x 10	10 x 8	7 x 5.5	5 x 3.5
Safe Pull Strength (lbs)		131	107	55	38
Safe Pull Strength (Newtons)		583	476	245	169

6.3 Crush Strength

The sub-duct used should recover its circular shape on removal of any transverse compression load. For example, a sub-duct of 250 mm in length when placed between two flat plates 100mm x 100 mm and loaded with 1000 N (100 kg) of compression force for 60 seconds should show a deformation not greater than 15 % (of original OD) with no splitting or permanent damage. This test complies to IEC 60794-1-2, method E3.

6.4 Pressure

The Burst (corresponding to a break in the duct with loss of air and no pressure retaining capability) and Sustain (corresponding to holding the air under pressure for 1000 hours)

Pressure rating for the proposed sub-duct should be in accordance with ASTM D3035 Section 7.7 and calculations per tables 3 and 4 at a temperature of 73° F (23° C).

6.5 Sub-Duct Flexibility (Bend Test)

The proposed sub-duct should be capable of being bent at least 180 degrees over a mandrel (the mandrel diameter being equal to or less than 20 times the diameter of the sub-duct) and then straightened. There should be no cracking, splitting, breaking, or permanent reduction in the diameter of the sub-duct.

6.6 Environmental Stress Crack Resistance (ESCR)

The installation of the sub-duct imposes stresses on the structure of the sub-duct. The sub-duct may also be subjected to chemical attack from the environment. Accordingly, the sub-duct should be manufactured from high quality polymer to reduce the risk of cracking. In the ESCR test the sub-duct should be pre-stressed and exposed to chemical solution at an elevated temperature for a given time. The proposed sub-duct should be capable of producing zero (0) failures in at least 192 hours of exposure to this environment.

7. Packaging Requirements for Sub-Duct

For ease of installation, the sub-duct should be provided on wooden reels or coils with a minimum diameter of 300 mm. The ends should be sealed to prevent ingress of moisture or dirt.

Appendix 3 - Indicative Specification of Operator Tie Cables

1. Conductors

Material

Each conductor shall consist of annealed copper, circular in cross-section, uniform in quality and free from defects. The properties of the copper shall be in accordance with IEC Publication 28, International Standard of Resistance for Copper.

Coating

The conductor shall be uniformly coated with pure tin except for the 1.38mm diameter insulated earth conductor which shall be plain.

Dimension

The diameter of the conductor shall be in accordance with **Error! Reference source not found.**

2. Electrical Requirements

The resistance of the conductor shall be in accordance with **Error! Reference source not found.**

Conductor		Insulation	Insulated Conductor
Diameter	Resistance per 1000m at 20°C (maximum)	Radial Thickness (minimum)	Overall Diameter (maximum)
mm	Ohms	mm	mm
0.5 +/- 0.02	97.8	0.15	0.95
1.38 nom	12.4	0.55	3.50

Table 2: Conductor Dimensions and Resistance

Note to **Error! Reference source not found.** : The resistance value is in accordance with IEC Publication 344 for tinned copper conductors with twisting and cabling lay factors greater than 16 for the 0.5mm diameter conductors and for plain copper conductor for the 1.38mm diameter insulated earth conductor. To permit various methods of providing this latter conductor the resistance value allows twisting and cabling factors greater than 16.

3. Additional Cable Characteristics

*Additional cable characteristics are provided in **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**, and **Error! Reference source not found.** below.*

No. of Pairs	Cabling Element	Sheath Radial Thickness Minimum mm	Cable Overall Diameter Maximum mm

2	1 - 2	0.65	4.5
3	1 - 3	0.65	4.8*
4	1 - 4	0.65	5.8
6	1 - 6	0.6	6.8
10	1 - 10	0.6	8.3
12	1 - 12	0.7	9.1
15	1 - 15	0.7	9.8
20	1 - 20	0.8	10.7
25	1 - 25	0.8	11.4
30	1 - 30	0.9	12.2

Table 3: Make-Up and Dimensions of Cable-Layer (Pair)

The value for the maximum permitted overall diameter is dictated by installation practice.

No. of Pairs	Size of Unit	Sheath Radial Thickness Minimum mm	Cable Overall Diameter Maximum mm
10	1 x (1/2 x 20)	0.6	8.6
20	1 x 20	0.7	12.0
30	3 x (1/2 x 20)	0.8	14.0
40	4 x (1/2 x 20)	0.9	15.0
50	5 x (1/2 x 20)	1.0	17.0
80	4 x 20	1.2	22.5
100	5 x 20	1.5	27.0
160	8 x 20	1.7	30.3
320	16 x 20	2.2	39.5

Table 4: Make-Up and Dimensions of Cable-Unit

Pair Size	10 Pr	20 Pr	30 Pr	40 Pr	<u>50 Pr</u>	80 Pr	<u>100 Pr</u>	160 Pr
Number of Units								
Centre 1 st Layer	1/2	1	3 x 1/2	4 x 1/2	<u>5 x 1/2</u>	1 6 x 1/2*	1 <u>8 x 1/2*</u>	4 x 1/2 6
Unit No.	Colours of Unit Lappings							
1	Orange	Orange	Orange Green#	Orange Green	<u>Orange</u> <u>Natural</u> <u>Green#</u>	Orange Orange Natural Green	<u>Orange</u> <u>Orange</u> <u>Natural</u> <u>Natural</u> <u>Green</u>	Orange Green Orange Natural Natural Natural Natural Green
2								
3								
4								
5								
6								
7								
8								

Table 5: Make-Up and Unit Identification Colours – 20 pr Unit

Notes:

- 1/2 refers to sub-units of 10 pairs.
- Each of these cables include the single 1.38mm diameter insulated earth conductor.
- At the manufacturer's discretion the first layer may be made up of sub-units of 10 pairs, or units of 20 pairs.
The Green colour lapping shall be applied to the last 1/2 unit.

Temperature at which Insulation Resistance is measured (°C)	Minimum Insulation Resistance for 1000 metres of cable (M Ohms)
10	500
11	400
12	310
13	240
14	190
15	150
16	120
17	110
18	79
19	62
20	50
21	41
22	32
23	28
24	23
25	19
26	16
27	13
28	11
29	9
30	8

Table 6: Minimum Insulation Resistance of Completed Cable

Appendix 4 - Open eir's committed response times on Operator's fibre Cable Breaks

The Open eir response from initial call to NMC confirming cable and sub-duct delivered to site, to an Open eir on site presence will be 2 Hours. The time to replace the existing fibre with a replacement fibre depends on the length of fibre to be replaced and the availability of spare duct space at the particular exchange. **(All emergency roadwork's notification and approvals from local authorities will be the responsibility of the Operator. Restoration times indicated below are assuming all appropriate approvals have been granted)**

The replacement of the Operator Fibre will include the following activities

- Identification of Operator fibre in Open eir nominated manhole and Cable Chamber
- Identification of Operator Fibre within exchange racking and into Operator footprint
- Identification of spare duct from Open eir nominated manhole to cable chamber
- Survey route from cable chamber to Operator footprint for replacement fibre
- The breaking of out fire seals and duct seals to allow for installation of replacement fibre
- Rod and Rope new duct line from Open eir nominated manhole to cable chamber
- Draw in sub-duct and fibre from Open eir nominated manhole to cable chamber
- Pull out existing fibre and sub-duct
- On completion all ducts sealed and all fire breaks to be resealed

Fibre provided by Operator should be inclusive of length required for jointing at Operator manhole and for terminating at Operator ODF. The fibre will also be inclusive of a 15-20Mts loop that will be resistant in the cable chamber. Open eir committed times are as follows.

Length(Mts.)	Scheduling & Travelling Time to site (Hrs) from call	Restoration time for new fibre install into spare duct (Hrs) from call	Recovery time of old fibre (Hrs)
50	2	5	1
100	2	8	2
150	2	11	2.5
200	2	14	3.5
250	2	17	4

If no additional duct space is available the in-situ fibre will have to be pulled out before replacement fibre is installed with the following committed times.

Length(Mts.)	Scheduling & Travelling Time to site from call	Restoration time for new fibre install into existing duct from call
50	2	6
100	2	10
150	2	13
200	2	17
250	2	21

The Operator will be liable for all costs incurred. This will include overtime rates for work outside normal hours.

Appendix 5- Sealing of Exchange Opes

Listed below is a suggest list of materials that Open air uses in complying with the Health and Safety Policy, in regard to Sealing of Exchange Opes. However, other products that comply with B.S. 476 Part 8 and that give a minimum of 1-hour fire resistance will also satisfy this requirement.

Material	Supplier
Dufaylite Mineral Fibre Board	Seal Systems Irl. Ltd.
Pyrobatt 120 Mineral Fibre Board	Pan Protection Systems Ltd
Nelson CPS Composite Sheet	Seal Systems Irl. Ltd.
Nelson FSP Firestop putty	Seal Systems Irl. Ltd
Intumescent Putty	Pan Protection Systems Ltd
Bromastic Intumescent Sealant (tube)	Pan Protection Systems Ltd
Soudal Fire Silicone B1 FR (tube)	Seal Systems Irl. Ltd
Soudal Firecryl (tube)	Seal Systems Irl. Ltd
Nelson PLW Firestop Pillows (2 sizes)	Seal Systems Irl. Ltd
Envirograt Firestop Pillow	Pan Protection Systems Ltd.
Nelson FSC3 Firestop Coating (3.9 Ltr drum)	Seal Systems Irl. Ltd.

Training can be provided on a one of bases on the use and application of the above. Request for this should be made through your account manager.

Version Control History

Version	Status	Update	Effective Date
1		First draft based on initial view of author on main chapter headings. Basis of kick-off meeting on 20 April. Document seen by Access Provider and Operators.	20.04.01
1.1		Description of high-level tasks plus output of meeting with industry on 20 April, including input proposals from industry arising therefrom.	27.04.01
1.2		<ol style="list-style-type: none"> 1. Review of v1.1 at Meeting 2 of 27.4.01. 2. Editorial corrections and re-structuring (use terms Access Provider and Access Seeker throughout instead of OLO and eircom). 3. Output tasks from Meeting 2 of 27.4.01. 4. Alignment with Process Manual. 	03.05.01
1.3		<ol style="list-style-type: none"> 1. Review of v1.2 at Meeting 3 of 03.05.01. 2. Output tasks from Meeting 3 of 03.05.01. 3. Reference in section 4 to Specifications in Appendices being 'indicative' 4. Editorials 	10.05.01
2.0		Clarification of method of running Operator fibre to Operator ODF	15.05.01
2.1		Inclusion of comments from ESB fibreco	21.05.01
2.2		Amended to correlate with the Licence Agreement for Physical Co-location	11.09.01
2.32		Amended as part of overall IPN / TM industry review	01.02.02
2.33		Amended as part of an overall review with industry.	03/04/032
2.34		Updated section	22/04/08
2.34		Re Branding	30/09/15
V3.0	Final	This document is based on V2.34 Implementation of Standardised Change Control.	16/06/2017