

openreach

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For All Openreach People

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Fibre Quality Standards

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Author

The author of this document may be contacted at:

Quality Standards & Accreditation
Network Performance
CIO Openreach ()
Post Point DL ATE CDarlington ATE
Barnard Street
Darlington
Co Durham
DL3 7DT

Telephone: .
Fax:
Email: qualitystandards.accreditation@bt.com

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1 *Introduction*

This ISIS should be read in conjunction with ISIS EPT/ANS/A024, "Access Network Copper Quality Standards Policy"

Warning: This ISIS is reviewed and updated annually. Between reviews changes are communicated using Access Network Communications (AEC). Users should refer to the current AEC listings for latest information and change to this ISIS. AEC can be found in the -

[Technical Library](#)

Quality Statement

In order to improve the Quality of the Access Network Fibre the following requirements have been set out enabling every person to do the job right first time, every time.

The procedures will establish a common approach across Openreach that will ensure a high degree of management control and a single best practice when work is carried out by both Openreach personnel and contractors in the access network.

2 *Status*

These instructions are mandatory.

3 *Scope*

These instructions cover the actions to be taken by Openreach people and contractors carrying out work in the Openreach Fibre network. The instruction covers the plant item/s worked on associated with the customer's circuit or the work element being undertaken.

The procedures in this document cover all types of optical fibre operations on the Fibre Frames/Racking and in the cable chamber/entry points in the Openreach Fibre network at the exchanges or at the customer/end user site in both the access and (MU/CJ) network.

4 Fibre Frames/Racking Quality Standards

4.1 Cable Management

Provided/newly installed cables must be run into the racks and or cabinets at the correct entry points for the rack or cabinet type.

The provided/newly installed cables must then be routed correctly from the entry point through to the final termination point.

4.1.1 Cable Restraint

Cables provided and/or worked upon within the cabinet/rack must be correctly restrained along the vertical length and restrained at all appropriate anchorage points using straps or the appropriate binding/tie to secure the cables without creating unnecessary pressure and damaging the cables integrity.

Central strength member/s must be cut to the correct length and then be protected and restrained correctly for the position/cabinet/rack type worked upon.

4.2 Bending Diameter of Cables/Fibres

Minimum bending diameter/s for all cables and/or fibres worked upon MUST not be compromised.

- COF 201 12 to 72 fibre cables should have a bend diameter of no less than 200 mm
- COF 201 96 and 144 cables should have a bend diameter of no less than 350 mm

4.3 Ultra Broadband (UBB)

Joints, cabinets, racks, trays, shelves, fibres must be checked for the presence of UBB circuits prior to entering and if UBB circuits present correct procedure MUST be carried out by informing the relevant UBB control of work to be completed prior to and after completion of the work.

4.4 Fibre Management

All fibres provided and/or worked upon must be:-

- Correctly contained within the tray and/or shelf.
- Correctly protected from cable butt to the tray and/or shelf.
- Correctly protected between shelves/trays.

Note: All transport tubing must be correctly connected.

All fibres within trays and/or shelves worked upon must be located and contained as appropriate within the tray and/or shelf type correctly. Fibres must not be allowed to become trapped or exposed to potential damage.

4.4.1 Fibres within the Tray/Shelf

Fibres worked upon must be correctly routed within the tray/shelf type and the appropriate amounts of slack must be left to allow for subsequent re-splicing.

Fibres in external cables must be correctly de-greased prior to introduction to the tray/shelf.

Fibre splices must be correctly located for the tray/shelf type worked upon using the correct splice protector for the tray type.

Fibres must be correctly cleaned prior to cleaving.

4.5 Shelf/Tray/Rack Management

Construction and integrity of the shelf/tray/rack worked upon must be maintained, ensuring security/safety of other circuits. Correct support and restraint of the shelf/tray/rack worked upon must also be maintained at all stages of the work.

Any other plant (shelves/trays/rack fittings) moved to allow access must be correctly re-fitted/re-installed ensuring safety of all fibres contained within/upon is maintained during the complete operation.

Tray/shelf provided/worked upon of correct construction:-

- Shelf correctly mounted within the rack/cabinet.
- Trays correctly mounted within shelf.
- Tray bend managers present and correctly installed
- Tray segregation unit installed correctly.

4.6 Marking and Labelling

4.6.1 Cable(s)

Provided/installed cables correctly marked/labelled close to cable butt/s.

4.6.2 Trays/shelves

Tray identity must be provided and labelled/marked clearly and concisely. Local records up-dated correctly (cabinet door or local records sheet). All safety labels must be fitted correctly (e.g. star burst laser label etc). UBB markings provided on trays/cabinets where applicable.

Note: In bottom of each rack a certain amount of blank labels, UBB labels, Red spots for UBB and other labelling items must be held to ensure correct labelling is completed at all times.

4.6.3 Circuits

Circuit details recorded correctly on tray. If circuit is live it must be correctly identified prior to any work commencing. If any UBB circuits are present notify the UBB control prior to and after work completion.

4.6.4 Jumpers

All jumpers and/or tails provided/worked upon must be correctly marked and/or labelled.

4.7 Jumper Management

Jumper(s) must enter rack/cabinet at correct point of entry and be correctly routed from access point to termination point. They must always be managed onto the tray via a bend manager. With Pre-otian bend managers the slack must be formed over the "Hedgehog".

Jumper slack must be correctly formed around the mandrel and correctly managed between racks/cabinets.

4.7.1 Correct Jumper Type Provided

The correct Jumper type must be used for the situation (fire resistant type/non fire resistant type as appropriate).

4.7.2 Jumper(s) Provided in Continuous Length

All new jumpers must be provided in a continuous length and must be run within the constraints of the jumper raceway. Where existing jumpers have splices and are not/cannot be housed within a tray (i.e. splices in vertical rises of rack already installed) then an inline splice kit must be fitted and managed correctly.

4.7.3 Restraint of Fibre Jumpers/Tails Provided

All jumper(s)/tails must be restrained within cabinet/rack/tray.

Jumper strength member must be restrained using correct method for termination type.

Aramid restraint fixing must be installed when required.

4.7.4 Replaced Jumpers Recovered where Appropriate

The following applies to jumpers being replaced or removed from trays to allow for new or additional jumpers to be installed.

If jumper cannot be safely recovered then the cut jumper end must be correctly protected.

4.8 Test/Verification of Equipment

All equipment used must be within test date and be fit for purpose.

4.9 Routing Verification

All routing changes must be formally recorded within the job details and with the relevant control.

4.10 Waste Materials

Scrap cable/fibre removed and disposed of safely and correctly.

4.11 Product Installation Guides

All products (cable, jumpers, racking, shelving and fibre installation etc) must be installed in accordance with the product guides/instructions supplied with the equipment.

5 *Cable Chamber Fibre Standards*

5.1 Cable/BFT Management

Provided/newly installed cables must be run and supported within the cable chamber correctly using the relevant ironwork/planned route

All blown fibre tube provided as part of FTTP will be provided in accordance with current BFT specifications.

All newly installed Fibre cables/Blown Fibre tubing must be correctly routed through the structure, utilising all racking and support as appropriate and as required. Brackets, bearers and support bars must be fitted and used through the whole route. All structural support/racking used must be in service-able condition. If new racking provided it must be constructed correctly.

Cables/BFT provided correctly supported and restrained

Other cables moved to allow access to cable/joint being worked on, must be replaced/ re-restrained correctly.

Note: If defective support racking observed, then report to A1024 duty.

Note: Sub duct mono bore must not enter/be taken into cable chambers and must always be terminated at an external point to all buildings.

At no time must a cable/tubing be situated in a manner which compromises the cable chamber access/exit points.

5.1.1 Cable Restraint

Cable(s)/BFT provided and/or worked upon within the cable chamber must be correctly restrained at all appropriate anchorage points.

5.2 Bending Diameter of Cables/Fibres

See Section 4.2

5.3 Ultra Broadband (UBB)

See Section 4.3

5.4 Cables/BFT Provided/Worked upon Correctly Sealed

All cables/BFT provided and/or worked upon must have correct method of seal applied correctly.

5.5 Only Correct/Approved Types of Cable Incorporated within joint worked upon

No non standard or non approved cable types may be incorporated within the joint worked on.

If incorrect (non standard or non approved) cable/fibre type has been planned refer work back to the planner.

If non standard/non approved cable type exists within the closure either remedy if possible while onsite, or refer the situation to the Fibre Repair Analysis Centre (FRAC) for a solution/estimate to correct the situation. If it is agreed with the FRAC that an onsite remedy is not possible then report the relevant defects to the FRAC for future corrective action.

5.6 All Joint Closures Observed or worked upon

All joint closures whether observed or worked upon must be dealt with in accordance with the Quality Standards detailed in Section 6.

5.7 Waste Materials

Scrap cable/fibre removed and disposed of safely and correctly.

5.8 Observed Fibre Defects

Observed unprotected fibres (those not worked upon) reported to the FRAC.

Other observed fibre/s in tray/shelf worked on reported to FRAC or remedied where observed as being routed incorrectly and presenting potential fault liability.

All observed fibre defects/damage identified on-site reported to FRAC.

6 *External Network Fibre standards*

6.1 Initial Worksite/Joint Inspection

After initial site set up the optical fibre joint to be worked upon must be inspected prior to starting work to determine whether it is in a safe and stable condition to ensure that optic system/fibre damage is not caused by carrying out the provision/repair work.

Before starting work the engineer must identify whether it is possible to re-close the existing joint closure correctly upon work completion this work may fall into 3 categories being:

1) Minor Repair works required - non-customer service/provision affecting basic node/closure repair work such as replace clamps, seals, repair port shrinkdowns etc. With the availability of replacement parts it may enable the joint to be closed correctly without causing service affecting faults. Other minor repairs would be to ensure tubing connectors, strength member anchors and splice protectors plus fibre are fixed and stored correctly to enable the joint to be closed and secured. This work to be completed on site at time of provision/repair as part of the normal planned/repair activity.

2) Medium Remedial works required - Non-customer service/provision affecting node/closure repair work that is more involved than 1 above, but may include some of the work identified in 1 above. This would include extension of Node closure with higher tray stack fitting larger dome to accommodate any additional trays added, along with re-organisation of spare fibres into the new trays. This type of work is not a planned exercise, but may form part of the circuit repair/provision and will require the originating planner's agreement with a DFE for the additional products and material. This work could extend to an overhaul of the closure, check and restore integral component parts without the need to disrupt customer circuits by powering down.

3) Medium Remedial Works Plus KJCR1A - This is where a fibre joint cannot be stabilised by general remedial works only, the use of the Kit Joint Closure Repair 1A may be a solution. The KJCR1A is intended as a re-enterable non-pressurised closure system for uplifting a KJC11D. The use of this closure must be co-ordinated with the FRAC and is considered as a planned works activity. The repair process to use the KJCR1A is as follows:-

- The faulty KJC11D **MUST** be reported to the FRAC.
 - A FRAC survey report will be completed in the FRAC, in conjunction with the engineer giving the necessary information when reporting the defect.
 - Repair decision is based on the FRAC survey report.
 - Authorisation from the FRAC to complete the work.
 - Note: The FRAC survey report & the planning process decision can be made on the day.
-
- **If the engineer identifies the worksite as either 2 or 3** above then he/she must:
 - Contact the planner to highlight the practical problem and the planner must identify/issue a planning solution to give service and correct the problem (e.g. DFE to re-build/up-grade existing node etc)
 - Report the defective closure/node using standard FRAC procedures

4) Planned Major works required - Does not fall within the scope of 1 to 3 above. Customer service/provision affecting, where to work on the node/closure would create more faults, or it is not possible to give service due to the closure entry ports being already full, and/or it will not be possible to safely close the node closure without disrupting customer service etc. This would require direct contact and involvement with both the planner/s and the FRAC and further decisions made as to how to give service and repair/report the situation. Usually in this situation until the full planned work to correct/repair/uplift/replace the node has been issued the engineer will have to leave site registering that no work could be completed against his/her job due to unsafe/fragile node fibre condition. Also the engineer must annotate on the job pack that the problem node has been registered with the FRAC (attach ref number) and the planner who is dealing with the issue (name of planner, OUC and contact number).

6.1.1 Definition of "Safe & stable"

The joint is either, correctly closed and dry, or, is in a defective but repairable state (e.g. broken clamps, missing dome, broken/open port) and to complete the repair would not cause fibre damage.

6.2 Joint up-grade

Where any of the following conditions (6.2.1) are encountered in joints being worked on, the joints defects must be corrected as necessary and closed with a standard approved closure.

Note: A joint is a physical connection between fibres it does NOT refer to a joint Closure (KJC11D or otian closure).

6.2.1 Conditions

Wet joints

Fibres with micro-bends, damaged or trapped.

Broken or damaged trays that cause problems to the containment or support of the fibres.

Unsupported fibres between trays and joint entry position that (free float) could be easily damaged when re-closing the joint closure.

6.2.2 The Standard

The agreed standard for dealing with joint up-grades is as follows:-

For joint up-grades any fibre number, release of the fibres affected (off-load etc) and agreement must be obtained from the control/customers before proceeding with the work. If permission is denied then the FRAC (A1024 for fibre system) procedure must be followed, the joint must be made watertight with a permanent approved closure or if this is not possible with a temporary closure.

6.3 Joint Closures

All joints and or cables that are connected to the plant being worked on in the same worksite, that are not watertight must be brought up to the standard and

closed. Either by repairing/closing the existing closure, or using a new approved closure, if not possible to repair/close the existing closure or fit a modern approved closure then they must be made safe and reported to the FRAC.

6.3.1 Obsolete or Non Approved Closures

When being worked upon, obsolete closures should be closed correctly; non approved closures should be replaced with a modern approved closure. If it is not possible to do so, they **MUST** be made safe and reported using standard FRAC procedures.

When being worked upon the closures below should be removed and closed with a standard modern approved closure every time.

- Plastic Bags
- Any incorrectly fitted or damaged joint closure

6.3.2 Otian Closures

Otian closures must be closed correctly as per the current instructions for the product type encountered.

6.3.3 In-line Track Closures

The closure 11D, E or F range can either be corrected by:-

- Re-fitting the necessary clamps to close the joint.
- Sealed by fitting a Kit Repair 11 of the appropriate size heatshrink closure over the body of the old closure.
- Sealed by fitting a WIDGETX over the whole closure encapsulating the entire fibre node.
- None of this work can be carried out to correct the open/defective closure until a full inspection of the fibres and interior of the old closure has been made to ensure that no damage will occur to any of the working fibres within the old closure.

6.3.4 Approved Joint Closures

Only joint closures approved by Engineering Solutions can be used in the Fibre Optic network.

6.3.5 Provision / Build or Repair - Temporary Closures - Overnight or Suspension of Work

Where work is suspended and will recommence the following day or within a reasonable planned time span the joint or joints must be closed using Sheet Rubber Adhesive as a temporary closure. When all jointing work has been completed the joint should always be closed with a permanent closure.

There is no requirement for A1024 or any other action under these circumstances.

6.3.6 Pressurised Joints or Blown Fibre Joints

All pressurised optical fibre joints, joints containing blown fibre tubing or blown fibre tube joints MUST have either a manufacturer provided pressure relief valve within the body of the node/joint or a pressure relief valves fitted (currently Kit 817 A/B). If NO pressure relief valve has been fitted then the engineer MUST fit a pressure relief valve if possible to do so, before closing the joint. If not possible to fit a pressure relief valve (e.g. due to no spare ports etc) then the engineer MUST report the problem to the FRAC and fit necessary report labels to the joint/closure identifying the issue reported.

6.4 Observed Obviously Open Joints in Worksite

6.4.1 D or E side Copper Joints

Observed open joints are those not being worked on, but are present in the same worksite as the jointing repair/provision work in hand, they should be closed on the day or reported using an A1024 with the relevant defect code. These can only be seen by a visual (hands free) check within the worksite from the current working position.

6.4.2 Optical Fibre Joints

Observed open joints are those not being worked on, but are present in the same worksite as the jointing repair/provision work in hand, they should be closed on the day or reported to the FRAC. These can only be seen by a visual (hands free) check within the worksite from the current working position.

6.4.3 Definition of - Optical Fibre Open Joint is, where it can be seen that:-

- Wires/conductors/fibres are visible.
- Plastic bag or other unapproved method has been used as a closure.
- Track joint (e.g. KJC11D) series closure that has missing clamps, broken clamps or unsealed entry ports.
- Non-standard mechanical closure that has missing bolts, closure faces that do not meet as per instructions, or unsealed entry ports.
- Any non-standard strap between joints, e.g. fibres, cable, jumper wire, dropwire or internal cable.
- Closures with damage to the external fabric that will allow the ingress of moisture.
- Sheet Rubber Adhesive closures not part of an ongoing overnight or suspension of work job.
- Sheet Rubber Adhesive which is open allowing ingress of moisture.
- Stumped cable ends that have not been sealed using the correct caps sealing.

6.5 Marking of Joints / Cables

6.5.1 Optical Cabling / Blown Fibre Tubing / Jointing Activities

All optical fibre cables/blown fibre tubing within a worksite must be marked with appropriate amounts of yellow tape to highlight the fragility of the optical cables.

Yellow tape will not be required to be applied if the fibre cable, BFT or sub duct has been manufactured with longitudinal yellow stripes identifying it as fibre plant.

6.5.2 Cabling Activities

All newly provided cables/blown fibre tubing must be marked/labelled according to current instructions giving the minimum details of:-

- Cable number
- Cable section or estimate number
- Fibre count
- CSS/Engineering/Contractor ID
- Date

Note: If known it would also be useful to show the route ident number.

6.5.3 Jointing Activities

Upon fitting a new or replacement joint closure (including re-closure bands) the following is a mandatory requirement.

6.5.3.1 All Closures

Node joints must have the T code written on the dome of the closure and it should be visible when the closure is fitted in the jointing chamber. All other information must be written on the collet/label and fixed to the cable/s.

Either label the cables entering the closure or print on the body of the closure (with a Pen Marker Number 2) the following:-

- The engineering CSS ID/Contractor ID.
- The date.
- The Job/Fault number.
- If fitted by a BT contractor then also print the name of the contract company.
- "T" code number if joint serves as a Node.

Note: All information recorded on the joint must be completed in BLOCK CAPITALS.

6.5.3.2 Cable / Blown Fibre Tubing Marking

All newly provided cables/blown fibre tubing (BFT) entering joints should be marked according to current instructions. The joiner must add to the label fitted by the cablers the Cable code/node details as applicable.

6.6 Support and Restraint of Joints and Cables

When the job is completed all optic fibre joints and cables within the worksite must be correctly supported and restrained ensuring minimum bend radii are not exceeded.

An exception to this exists on greenfield/brownfield developments where it is the responsibility of the developer to provide fixings. These may not be present at the time of the jointing/cabling work being undertaken. In this situation there is no need to submit an A1024 as the DLO responsible for the site will ensure all restraints are provided.

6.7 Support of Cables on Pole and / or Wall

Such cables must be adequately supported and restrained.

6.8 Optical Fibres

6.8.1 Jointing to Old Fibres

Optical cables manufactured and installed from the mid 1980's to early 1990's whether air spaced or not were manufactured with a primary coating (the protective layer over the glass fibre) made of a single hard layer of acrylate. Experience has shown that over time these primary coatings (not the fibre) age harden and can become brittle. The primary coating will be more prone to becoming brittle if it has been immersed in water/suffered from damp/moisture.

These fibres are found to be difficult to strip in preparation for the splicing operation as they "stick" to the underlying fibre. This gives the impression that the fibre is brittle as well as the primary coating as breakages occur.

The recommended practise to overcome this problem is to use the current primary coating stripping tool (Stripper Fibre 10A) but remove smaller sections of primary coating (approx 5 to 10mm) as compared to the normal amounts of coating on today's modern fibres.

Later Optic fibre cables manufactured from the early 1990's used a dual layer primary coating method. The dual coatings have a soft inner layer with a hard protective outer layer which offers resistance to age hardening and make the stripping of the coatings easier.

6.9 Splitter Node External/Internal Locations

Splitter nodes can be fitted either externally serving several or multiple premises or internal within the riser/serving duct/trench in a multiple block of flats serving just the one building.

7 *References*

A wider range of information on Access Network, Quality of Personal Workmanship can be found in the

[Technical Library](#)

All craft practises are contained in the appropriate ISIS documents that are available from your Manager or BT representative.

8 *Enquiries*

Enquiries and document change request should be made with, or sent to the author of this document. Details on page 2.

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