SCS

TRANSNET

freight rail

STANDARD TEST PROCEDURE

POST-INSTALLATION TESTS OF OPTIC FIBRE CABLE

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TABLE OF CONTENTS

I DOCUMENT AUTHORISATION

FUNCTION	NAME	TITLE & DIVISION	SIGNATURE	DATE
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II DISTRIBUTION

Once updated, a copy of the latest revision will be published in the document management system in use. E-mail to this effect will be sent to the relevant personnel or heads of department.

III DOCUMENT CHANGE HISTORY

ISSUE NO.	DATE ISSUED	ISSUED BY	HISTORY DESCRIPTION
1.00	September 2001	Transmission	New document
2.00	January 2008	Transmission	Converted to ISO standard

IV CHANGES SINCE LAST REVISION

CLAUSE	DESCRIPTION
All	Converted to ISO standard

V ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABBREVIATIONS AND ACRONYMS	DESCRIPTION
CD	Compact Disk
OTDR	Optical Time Domain Reflectometer
QAD	Quality Assurance Department
ODF	Optical distribution Frame

DEFINITIONS	DESCRIPTION
None	

VI RELEVANT DOCUMENTATION

APPLICABLE

DOCUMENT NO.	DESCRIPTION	LOCATION
None		

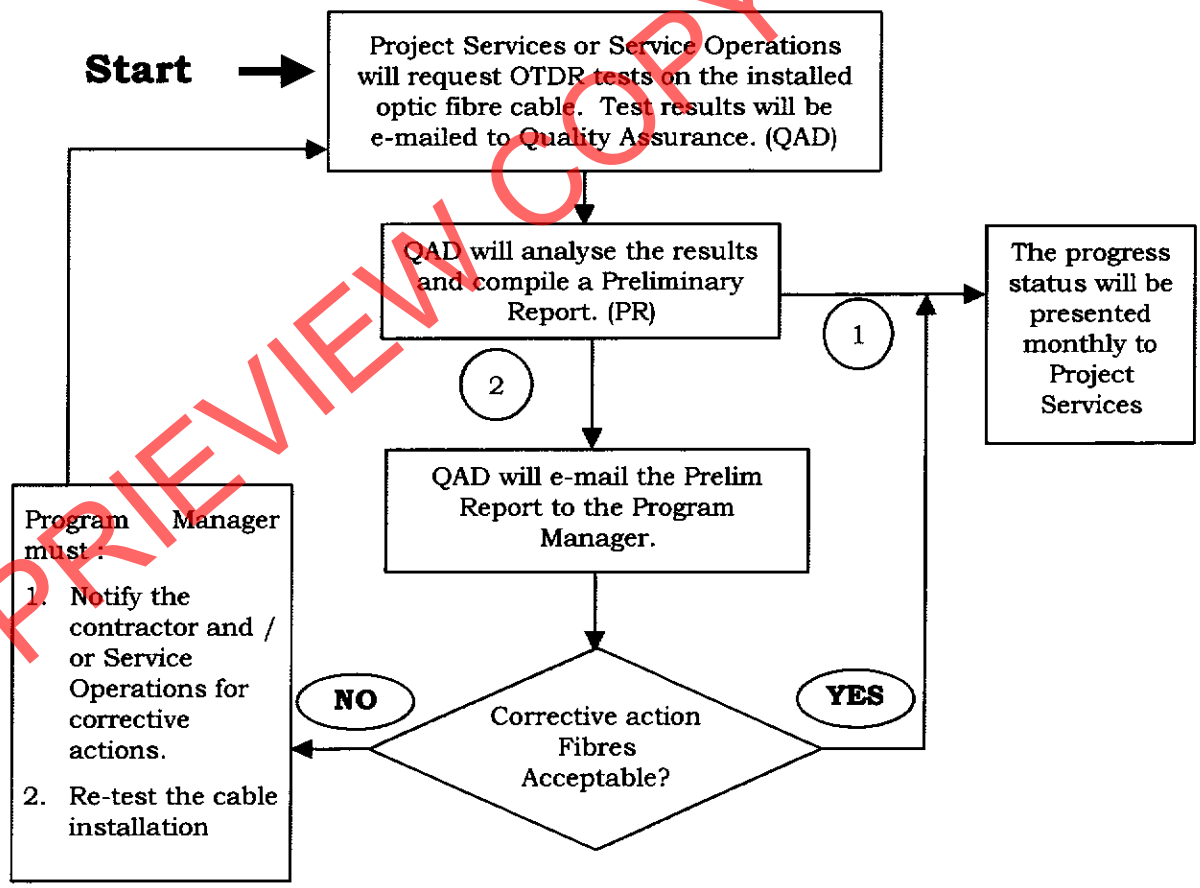
RELEVANT

DOCUMENT NO.	DESCRIPTION	LOCATION
None		

1. OFC OTDR TEST SEQUENCE

SEQUENCE	TESTING OFFICER	OTDR TEST RESULTS
1) Factory Testing	Supplier	a) Hardcopy with drums b) E-mail to Project Manager c) E-mail to QAD
2) Pre-testing Drum's Standard Test Procedure	Project Services or Service Operations	E-mail to QAD
3) Post-installation Standard Test Procedure	Project Services or Service Operations	E-mail to QAD

2. PROCESS FOR PRE-TESTING



3. GENERAL

3.1 Background

3.1.1 Optical quality tests on the installed Optical Fibre Cable must be conducted after splicing of the first joint of the cable installation and with the OFC terminated at the ODF.

3.1.2 OTDR-trace files shall be stored in NATIVE format.

3.1.3 These tests will be conducted on request of the specific Project Manager or on request of the Head of Quality Assurance Transmission. If there are any abnormal indicators in the results of such tests the contractor will not be allowed to continue with splicing and installation of the cable until the reasons for the poor splices have been established.

3.2 Submission of OTDR profiles of first spliced joint within forty-eight (48) hours

3.2.1 The results of the tests must be submitted to the Head of the "Quality Assurance Transmission" in a report format. This submission must occur within forty-eight (48) hours of the first joint having been spliced.

3.3 Personnel

3.3.1 Personnel responsible for the execution of the tests will be fully trained in Optical Fibre Cable installation.

3.3.2 Personnel under going training and non-permanent staff members can only conduct tests under the supervision of trained personnel.

3.3.3 Transtel personnel must be in possession of all specifications concerning Optical Fibre Cable.

3.4 Equipment Requirements

3.4.1 Fusion Splicer.

3.4.2 Cleaning kit.

3.4.3 Optical Time Domain Reflectometer (OTDR).

3.4.4 Pigtail with E2000connector to fit OTDR.

3.4.5 Contract documentation.

3.4.6 Power source and Power meter.

3.5 **Tests to be done**

3.5.1 With reference to Transnet Freight Rail's specifications SPC-00571 and SPC-00573 the following tests must be done :

3.5.1.1 On single mode fibres, take OTDR profiles (traces) at 1550 nm in both directions.

3.5.1.2 Measure the loss of each splice (events).

3.5.1.3 Record the link loss at 1550 nm with a power source and power meter. This measurement must be done in both directions.

3.5.1.4 On multimode fibres, testing cable lengths of greater than 1000 m may be done with a power source and power meter at 850 nm .

3.6 **Fibre profiles**

3.6.1 Use the OTDR to obtain profiles of the fibres.

3.6.2 Ensure that the reflectance value (launch level reflectance) at the insertion point of the OTDR into the cable comply with the value stated in the guidelines.

3.6.3 Save all profiles on a storage diskette in the OTDR.

3.6.4 Use the Section station's name for the file name.

3.6.5 Use the attached spreadsheet (Annexure B) to capture the power source and power meter link loss measurements. The spreadsheet must be e-mailed to the Quality Assurance Department at Transnet Freight Rail's Head Office (QAD).

3.7 **Recording splice losses (Distribution graph of splice losses)**

3.7.1 Use the OTDR to measure each splice loss.

3.7.2 Compare the loss measured in both directions on each splice to confirm any fibre core deviations.

4. GUIDELINES FOR TESTING OPTICAL FIBRE CABLE (OFC) INSTALLATIONS

4.1 **OTDR Settings**

4.1.1 Range setting : The shortest-range setting must be used, i.e. do not set the OTDR to an 80 km range when measuring 20 km OFC section.

4.1.2 Pulse width : Switch the OTDR to measure the shortest pulse width for the distance under test. (Analysing the end of the OFC-trace must be possible.)

4.1.3 Time duration : For the best results the maximum average time must be set. This can only be achieved by testing the OFC for a lengthy period. Readings should not be less than sixty (60) seconds on short OFC sections.

4.1.4 Launching level (Reflection level) : Clean the connector at the OTDR and the test cord to comply with the levels stated in Annexure A (acceptance criteria).

4.2 Presenting Results Using Toolbox or Target 1 Software

4.2.1 OTDR-trace file name.

Make use of the following format when naming the OTDR-trace file.

Fibre ID	=	Type in number of each fibre (e.g. Fibre number 6 = 06)
File	=	GMR—ISO - 06
GMR	=	Germiston
→	=	Direction test was conducted (GMR to ISO)
ISO	=	Isando

4.2.2 Abbreviations, station names and number of splices (Extra Text or Word file).

4.2.2.1 List the station names and abbreviations in a separate Text or Word file.

4.2.2.2 Log the OTDR distance of the link.

4.2.2.3 Log the number of splice joints within in the link.

4.2.2.4 Send this information with all OTDR-traces to QAD.

4.3 E-mail the OTDR Profiles or Send the Storage CD to QAD

4.4 Labelling the CD

The following information must be used to label the CD, containing the above OTDR traces :

1) CD NAME	:	OTDR-Traces.
2) SECTION	:	First and last station name for the section tested, (e.g. Germiston — Isando).
3) CONTACT PERSON	:	Name and telephone number of person who has performed the test.
4) CD NO.	:	1 of 3 (label and number of diskettes).
5) DATE	:	Use the following format (dd-mm-yyyy).

ANNEXURE A : ACCEPTANCE CRITERIA

A1. **Splice Loss**

A1.1 The average splice loss of 0,08 dB at 1550 nm must be achieved for at least 70% of the splices.

A1.2 The average splice loss of 30% must be 0,0 dB this includes "gainers".

A1.3 Any single splice loss should not exceed a value of 0,3 dB .

A2. **Launching (Injection) Levels**

Using an OTDR, the launch level must be better than -50 dB (-50 to –75 dB).

A3. **Link Loss**

A3.1 The budgetary link loss measured between fibre cable termination points will be calculated as follows :

A3.1.1 Splice loss at 1550 nm = 0,08 dB for 70% of all splices.

A3.1.2 Splice loss at 1550 nm = 0,0 dB, and including "gainers" for 30% of all splices.

A3.1.3 Fibre loss at 1550 nm = 0,195 dB/km .

A3.1.4 Connector loss at 1550 nm = 0,15 dB .

ANNEXURE B :

See Excel file herewith

END OF DOCUMENT