FACTORY ACCEPTANCE TEST PROCEDURE FOR OPTICAL FIBRE (ITU-T G.652D)

APPLICABLE STANDARD EIA/TIA 455

Sl. No.	Test Name	Test Procedure	Acceptance Criteria
1	Attenuation Coefficient	EIA/TIA 455-78A	≤0.35dB/km (1310nm) ≤0.21dB/km (1550nm)
2	Point Discontinuities of Attenuation	EIA/TIA 455-59	≤0.1 dB
3	Attenuation at Water Peak	EIA/TIA-455-78A	≤0.34dB/km at 1383nm
4	Chromatic Dispersion	EIA/TIA 455 -168A/169A /175A	≤18 ps/(nm·km) at 1550nm
			≤3.5 ps/(nm·km) from 1288 nm to 1339nm
			≤5.3 ps/ (nm·km) from 1271nm to 1360nm
			Zero Dispersion wavelength: 1300nm – 1324nm; Zero Dispersion slope: ≤ 0.092 ps/nm^2.km
5	Core - Clad Concentricity Error	EIA/TIA 455- 176	≤0.5 µm
6	Cladding Diameter	EIA/TIA 455-176	125 ± 0.7 µm
7	Fibre Tensile Proof Testing	EIA/TIA 455-31B	≥1.0%, 1 sec. ≥ 0.69 Gpa (100kpsi)

Note: The test report of the above tests for the fibres are to be carried out by the Fibre Manufacturer and used in the Approach cable shall be shown to the inspector during Approach cable FAT and shall be submitted along with the Approach cable FAT reports.

FACTORY ACCEPTANCE TEST PROCEDURE
FOR APPROACH CABLES

Sl. No.	Factory Acceptance Test	Sampling plan
1	Attenuation Coefficient at 1310nm,1550nm	10% of offered FO approach cable drums/lot and 100% of fibers in selected FO approach cable drums.(Minimum 2)
2	Point discontinuities	10% of offered FO approach cable drums/lot and 100% of fibers in selected FO approach cable drums. (Minimum 2)
3	Visual material verification and dimensional checks as per approved DRS & drawings	Quantity verification: 100% of offered material.

Test Location :

Manufacturer :

Test Objective : To measure the optical attenuation at wavelengths 1310 nm and 1550 nm & Point discontinuities at both wavelength of 1310 nm and 1550nm.

Test Set-ups:

Prepare the sample under test as per the figure showing below the test setup. The test bench is connected with Optical Time Domain Reflectometer (OTDR) to measure the value of attenuation coefficient and Point discontinuities

Test Procedure:

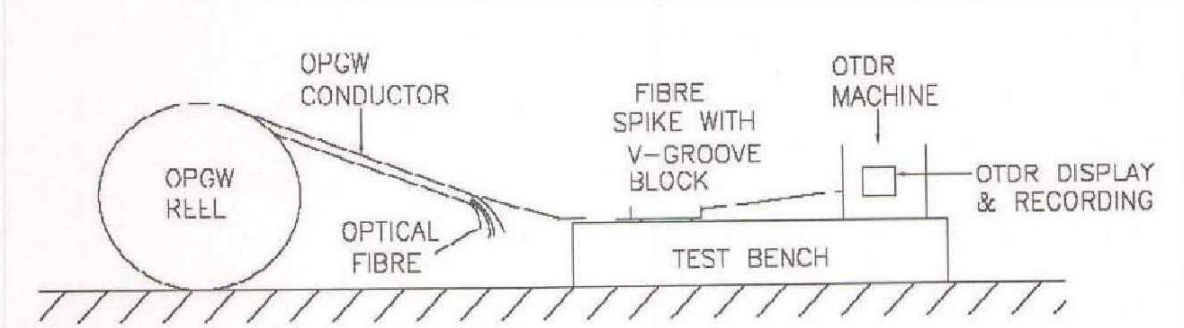
1. Connect the test sample either to the instrument or to one end of end dead-zone fiber (if used). Connect the other end of the dead-zone fiber (if used) to the instrument.
2. If the accurate locations of point defects are to be recorded, the effective group delay index of the test sample is required. If this value is not known, use FOTP-60 (Method A) to determine it. 3. Enter OTDR parameters such as source wavelength, pulse duration, length range, and signal averaging into the instrument, along with the test sample effective group index. The values of some of these parameters may be present in the instrument.
4. Adjust the instrument to display a backscatter signal from the test sample. It may be advantageous to begin with coarse vertical and horizontal scaling to maximize the length displayed. An example is given in Figure.
5. Examine the OTDR signal along the test sample for point defects. If increased resolution is needed, adjust the graphical display, if possible, to expand the section of interest to larger scale (exercising care to assure that proper reading of the true signal can still be distinguished from the noise points).
6. To determine that a point defect (rather than an attenuation non-uniformity situation) exist observe the area in question using two different pulse durations. If the shape of the loss or gain changes with the pulse duration, the anomaly is a point defect. If the shape does not change, the anomaly shall be considered to be attenuation non-uniformity to be measured by FOTP-61. 7. Report any point defect deviations which exceed the values specified in the Detail Specification. Describe the nature of these faults (e.g. apparent loss or gain, reflection, duration, etc.) as required by the Detail Specification.

7.1 Determine the defect location, if required, by placing a cursor at the beginning (or at another point specified by the OTDR manufacturer) of a power rise or drop, this may be difficult to do at a drop. Obtain the distance coordinate via the alphanumeric display. 7.2 Obtain the apparent loss or gain of the defect, if required, by the method described by the OTDR manufacturer .Some instruments required placement of a pair of cursors on each side of the defect. The two best-fit straight lines (from a two-point or least-squares fit for each) are extrapolated to the defect location .If available, the linear fit method should be

chosen. The vertical separation of the lines gives the apparent loss or gain .Note any reflection peak.

7.3 When possible, repeat the test for a single launched into the test sample in the opposite direction. A more accurate loss estimate (and the elimination of apparent gain) is made by averaging readings taken directionally at the same wavelength .This eliminates the effect of any backscatter different for the fiber sections on both side of the defect.

7.4 Repeat the test at another wavelength.



Test Set-up for Attenuation Coefficient & Point Discontinuity of Attenuation Test and Attenuation at Water Peak

Acceptance Criteria:

For Attenuation

Wavelength	Attenuation
1310 nm	< 0.35 dB/Km
1550 nm	<0.21 dB/Km

For Point Discontinuity: Attenuation of fiber shall be uniform throughout its length such that there are no point discontinuity in excess of 0.1dB.

ATTENUATION AND POINT DISCONTINUITY

Ring Mark	Fiber id	At 1310 nm					At 1550 nm			
		Optical Attenuation	Point Discontinuity	Pass or Fail	Remarks	Ring Mark	Optical Attenuation	Point Discontinuity	Pass or Fail	Remarks

Observations, if any:

Test Results:

The attenuation and point discontinuity measured have met/not met the acceptance criteria.

Tested by:
(Sign with date)

Witnessed by:
(Sign with date)

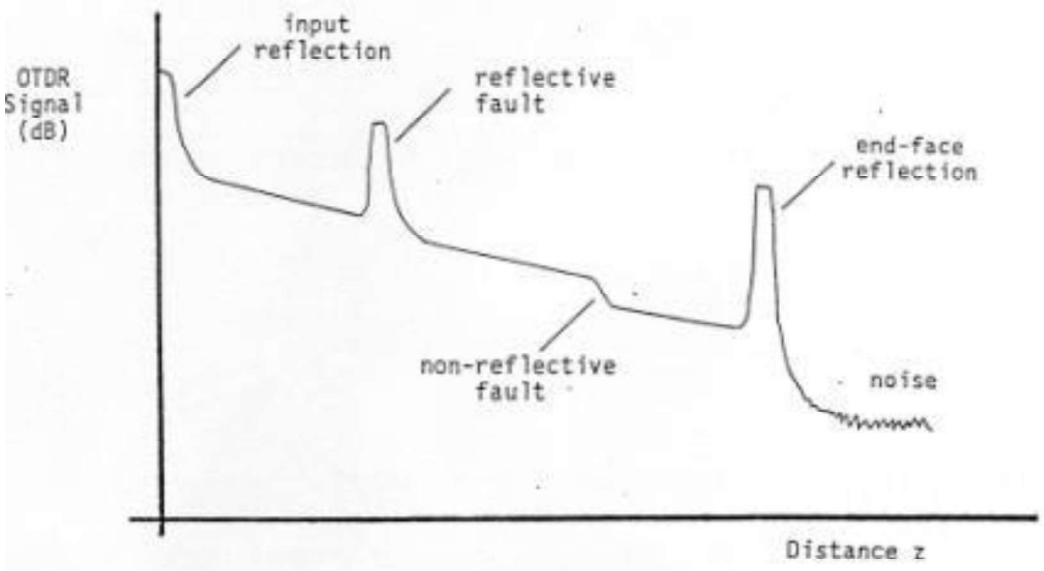


Figure 1. Schematic of an OTDR Trace. Point defects with apparent loss are shown, one reflective and one non-reflective.

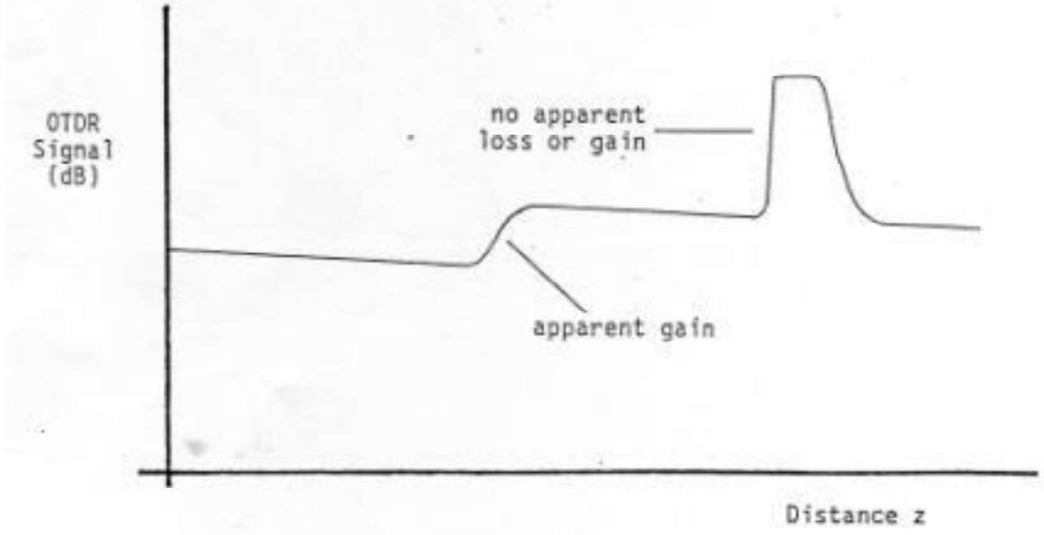


Figure 2. Schematic of an expanded OTDR trace. Two point defects are shown, one with apparent gain, and another with no apparent loss or gain.

2. VISUAL MATERIAL VERIFICATION, CABLE CONSTRUCTION AND DIMENSIONAL CHECKS

Test Standard: IEC 60793 & 60794, EIA/TIA-598

Test Location:

Manufacturer:

Cable Type: Approach Cable.

Reference Doc: Approved DRS & Drawings of Fiber Optical Approach Cable.

Objective: To measure the Visual material verification, Cable construction and dimensional checks for Fiber Optical Approach Cable.

Test Procedure:

The physical/dimensional measurements of the individual parts of the cable shall be taken with suitable measuring device and verified against the approved DRS/Drawings

Drum Checks:

Physical Verification for the 100% offered quantity of the offered reels/drums shall be carried out. 1.

2. 100% physical verification of sealing of cable ends with end caps, check for provision of spare cable caps for each drum.

3. 100% verification of Sealing/Pasting the drum details over the end cap with transparent tape.

4. Verification of drum details properly printed and pasted on each drum suitably as per approved document **Checks on Approach cable:** The below to be verified as per approved DRS/Drawings for both Fiber Optical Approach Cable.

S.NO.	Description	Acceptance Criteria
1.	No. of Fiber	AS per approved DRS& drawings
2.	Buffer Tube Quantity(Nos.)/Diameter	AS per approved DRS& drawings
3.	No. of Fibers per tube(Nos.)	AS per approved DRS& drawings
4.	Filling Material	AS per approved DRS& drawings
5.	Strengthening Member	AS per approved DRS& drawings
6.	Outside Jacket Coating	AS per approved DRS& drawings
7.	Outside Jacket Thickness	AS per approved DRS& drawings
8.	Armoring Tape provided	AS per approved DRS& drawings
9.	Weight(kg/km)	AS per approved DRS& drawings
10.	Overall Diameter	AS per approved DRS& drawings
11.	Identification of colors of fibers/tube	AS per approved DRS& drawings
12.	Other physical/Technical parameters	AS per approved DRS& drawings

Acceptance Criteria: Visual material verification, Cable construction and dimensional checks shall be as per approved DRS /drawings.

Observations, if any:

Test Results: The Fiber Optic Approach cables as teats met tested met the requirement as approved DRS & Drawings.

Test by: **Witnessed by:**

(sign with date) **(sign with date)**