IEC 60794-5-1 Tests for Microducts of Optical Fiber Cables

Description

IEC 60794-5-1 Optical fibre cables –

Family specification – Outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing

6 Microduct

6.1 Tests applicable

Tests shall be selected from Table 3, in accordance with the relevant product specification. If the microduct is only to be used in a protected microduct, some tests may not be relevant.

Table 3 – Tests applicable for mechanical and environmental performance of a microduct

Characteristics	Family requirements	Test methods	Remarks
Tensile performance	6.2	Under consideration, IEC 60794-1-21 Method E1	
Crush	6.3	IEC 60794-1-21 Method E3A	
Impact	6.4	Under consideration, IEC 60794-1-21 Method E4	
Repeated bending	6.5	IEC 60794-1-21 Method E6	
Torsion	6.6	IEC 60794-1-21 Method E7	
Kink	6.7	IEC 60794-1-21 Method E10	
Bend	6.8	IEC 60794-1-21 Method E11B	
Microduct route verification test	6.9	IEC 60794-1-21, Method E23	
Microduct pressure withstand	6.10	IEC 60794-1-22, Method F13	
Ageing	6.11	Under consideration	

6.2 Tensile performance

a) Family requirements
Under visual examination without magnification there shall be no damage after the test and the microduct shall pass the inner clearance test (Annex E).

b) Test conditions
Method: Generally IEC 60794-1-21, Method E1

NOTE Use of IEC 60811-501 is under consideration.

Microduct length under tension:>1 m
Tensile load on microduct:1 × W
Duration of load:10 min

Tensile Tester According to IEC 60794-1-21 Method E1

This measuring method applies to optical fiber cables which are tested at a particular tensile strength to examine the behavior of the attenuation and/or the fiber elongation strain as a function of the load on a cable which may occur during installation. This method is intended to be nondestructive (the tension applied shall be within the operational values).

- According to IEC 60794-1-21 Method E1
- Load capacity: 100 kN
- Accuracy class: ±0.5%
- Measuring range: 0.4%-100%
- Loading speed: 0.2~250 mm/min
- Deformation measuring accuracy: ±0.5%
- Displacement measuring accuracy: ±0.3%
- Elongation measurement
- gauge length: 1000mm
- Measuring resolution is better than 10?m
- Accuracy is better than ±0.5%.
- Crosshead travel: 800
- Report in MS EXCEL
- Data communication port is USB

6.3 Crush

a) Family requirements
Under visual examination, without magnification, there shall be no damage to the microduct. After the recovery time, the microduct shall pass the inner clearance test (Annex E) and there shall be no splitting or permanent damage. The imprint of the plate is not considered as mechanical damage.
b) Test conditions
Method: IEC 60794-1-21, Method E3A
Sample length: 250 mm
Load (plate/plate):500 N
Duration time:1 min
Recovery time:1 h

Crush Tester as per IEC-60794-1-21 Method E3

AHP's Optical Fiber Cable Crush Testing Machine complies with employs an IEC-60794-1-2 Method E3to perform Crush test on optical cables.
Cable is laid under compression and then the attenuation of fiber optics is measured.
It employs servo-controlled system to apply compressive force on the cable in constant speed and maintains the compression force in specified period.

- Force capacity: 10KN
- Travel: 200mm
- Loading speed : up to 250mm/min
- Accuracy class: ±0.5%
- Computer is up to the customer
- Reporting in MS EXCEL

6.4 Impact

a) Family requirements

Under visual examination without magnification there shall be no damage to the microducts. The microduct shall pass the inner clearance test (Annex E) and there shall be no splitting or permanent damage. The imprint of the striking surface on the microduct is not considered mechanical damage.

b) Test conditions
Method: IEC 60794-1-21, Method E4
Striking surface radius: 300 mm
Impact energy: 1 J
Recovery time:1 h
Number of impacts: One in 3 different places spread not less than 500 mm apart

Optical Fiber Impact Tester According to IEC-60794-1-21 Method E4

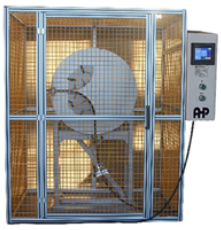
Optical Fiber Cable Impact Testing Machine is used to determine the ability of optical fiber cable withstand impact in compliance with IEC-60794-1-2-E4.

- Maximum drop height: 1000mm
- Impact cycles: 1-9999 cycles
- Test Frequency: 10 cycles/min
- Hammer diameter: 20mm
- Striking surface curvature: 300mm
- Mass of striker: 0.45kg
- Mass of weights: 5 pcs of 0.5kg

6.5 Repeated bending

a) Family requirements
Under visual examination without magnification there shall be no damage to the microducts. The microduct shall pass the inner clearance test (Annex E) and there shall be no splitting or permanent damage.

b) Test conditions
Method:IEC 60794-1-21, Method E6
Bending diameter:40 × OD
Load:Adequate to assure uniform contact with the mandrel
Number of cycles:25



Repeated Bending Tester According to IEC-60794-1-21 Method E6

Optical Fiber Cable Repeated Bending Testing Machine is used to determine the ability of a fiber optic cable to withstand repeated bending.

- Touch screen 7”
- Bending Angle: 90 degrees
- Bending cycles: up to 9999
- Bending radius: 75,200,300mm
- Frequency of loading: 10-30 cycles/min
- Mass of weights: 1-10kg
- Safety cover included

6.6 Torsion

a) Family requirements
Under visual examination without magnification there shall be no damage to the microducts. The microduct shall pass the inner clearance test (Annex E) and there shall be no splitting or permanent damage.

b) Test conditions
Method: IEC 60794-1-2, Method E7
Maximum gauge length: 2 m

Torsion Tester According to IEC-60794-1-21 Method E7

Optical Fiber Cable Torsion Testing Machine is used to determine the ability of optical fiber cable to withstand mechanical twisting.

- Touch screen 7”
- Max distance between grips: 1000mm
- Torsion angle: 90, 180, 360 degrees
- Twisting cycles: up to 9999
- Frequency of loading: 50-30 cycles per minute
- Mass of weights: 1-10kg

6.7 Kink

a) Family requirements
Under visual examination, without magnification, there shall be no damage to the microducts after the test and shall pass the inner clearance test (Annex E). The microduct shall attain the required minimum diameter without kinking.
b) Test conditions
Method: IEC 60794-1-21, Method E10
Minimum diameter: 20 × OD

Kink Tester According to IEC 60794-1-21 Method E10
Optical Fiber Cable Kink Testing Machine is used to determine the loop diameter at the onset of the kinking of an optical fiber cable in accordance with IEC-60794-1-2-E10.

- Pulling head stroke: 50-500 mm
- Pulling speed: 0 – 100 mm/s
- Transparent cover: 1000 x 700 mm
- Display: 7inch touch screen
- Save test results to internal memory

6.8 Bend

a) Family requirements
The outer and inner diameter of the microducts shall show, under visual examination without magnification, no damage and after the test and shall pass the inner clearance test (Annex E).
b) Test conditions
Method: IEC 60794-1-21, Method E11B
Diameter of mandrel: 40 × OD
Number of cycles: 3

6.9 Microduct route verification test

a) Family requirements
Objects of the required size can be passed through the microduct.
b) Test conditions
Method:IEC 60794-1-21, Method E23

6.10 Microduct pressure withstand

a) Family requirements
Under visual examination, without magnification, there shall be no damage to the microducts.
b) Test conditions
Method:IEC 60794-1-22, Method F13
All microducts shall resist an air pressure of at least 2,5 × the installation pressure at a temperature of 20 °C for a period of 0,5 h.
All microducts shall resist a proof test pressure of at least 1,3 × the installation pressure at a temperature of 40 °C for a period of 24 h.

6.11 Ageing

a) Family requirements
Tests to be performed after the aging period should be agreed between the customer and supplier and may include dimensions, inner clearance test, shrinkage, changes to surface finish, pressurization or installation test of the microduct cable.
b) Test conditions
Method: Under consideration
Ageing condition: Under consideration (+60 °C for 3 months; 7 days at 70 °C; 7 days at 85 °C)

Category

1. Standards