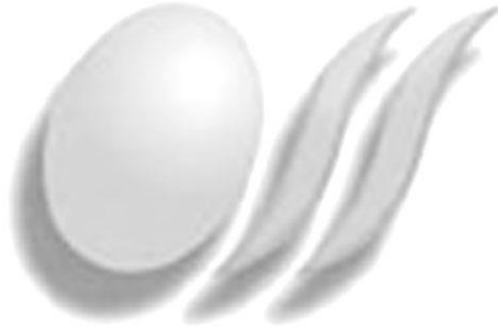


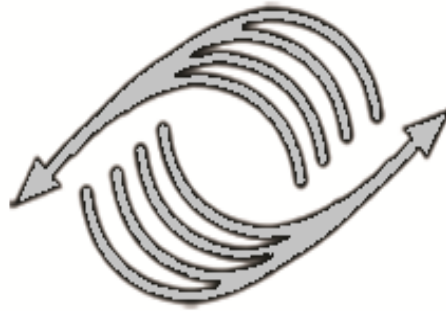
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CODE: 0202-008

**TECHNICAL SPECIFICATION FOR
OPTICAL BURIED UNFILLED CABLE
NON-ZERO DISPERSION SHIFTED FIBER
(OBUC-NZDSF)**



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SPECIFICATION FOR OPTICAL BURIED UNFILLED CABLE

NON-ZERO DISPERSION SHIFTED FIBER

1. GENERAL
2. OPTICAL FIBER
3. CABLE CONSTRUCTION
4. CABLE SIZES AND GENERAL DATAS
5. MECHANICAL AND FUNCTIONAL TESTS

1 - GENERAL

This specification covers in detail the optical, physical and mechanical characteristics of optical cables used in direct buried application.

2 - Optical Fiber

2-1 – Optical Characteristics

The fibers may be standard Non-Zero Dispersion Shifted Fiber (ITU-G655) and have the following table (1)

TABLE (1)

PARAMETERS (Maximum Individual)	UNIT	VALUE
Fiber Attenuation	dB/km	≤ 0.23
Point Discontinuities at 1550nm	dB	≤ 0.1
Attenuation Change vs. Bending 100wraps 37.5 mm Radius	dB	≤ 0.5
Non-Zero Dispersion Region	nm	1530-1565
Zero Dispersion Slope at 1550nm	Ps/nm ² .Km	≤ 0.092
Zero Dispersion Wavelength	nm	< 1507
Chromatic Dispersion Coefficient(Band 1530-1565nm)	Ps/nm.Km	2-6
Nominal Mode Field Diameter at 1550nm	μm	9.6 ± 0.5
Mode Field Concentricity Error at 1550nm	μm	< 0.8
Mode Field Non-Concentricity Error	%	< 6
Cable Fiber Cut-off Wavelength	nm	≤ 1480
Polarization Mode Dispersion at 1550nm	Ps/ $\sqrt{\text{Km}}$	< 0.2
Proof Stress	GPa	≥ 0.7
Proof Strain	%	≥ 1

3-2 - Fiber Dimensions

The fiber dimensions will be as following table (2)

TABLE (2)

PARAMETERS	UNIT	VALUE
Cladding diameter	μm	125±2
Core cladding concentricity error	μm	Max 1
Core non circularity error	%	Max 6
Cladding non circularity error	%	Max 2
Diameter of the coated fiber	μm	250±15
Coating concentricity error	μm	15
Coating non circularity error	%	10

3-3 – Fiber and loose tube identification

Fibers and the loose tubes will be identified with the following table(3).

TABLE (3)

Fiber /Tube No.	Color	Fiber/Tube No.	Color
1	White	7	Brown
2	Red	8	Violet
3	Green	9	Orange
4	Blue	10	Pink
5	Yellow	11	Grey
6	Black	12	Natural

NOTE: For less than 12 core optical cables there should be first colors.



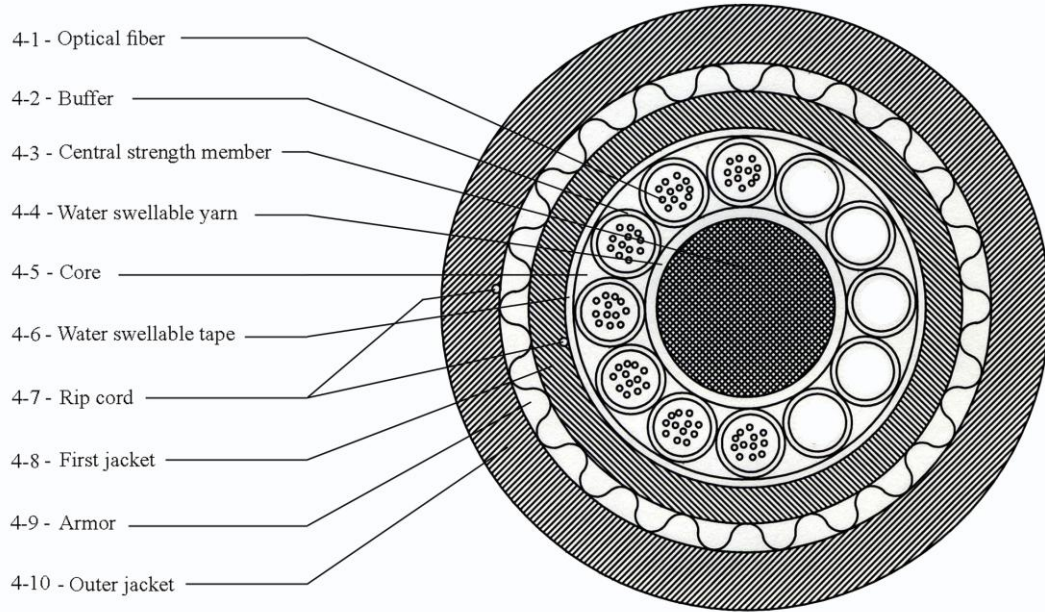
3 - CABLE CONSTRUCTION

Cable constructions are in accordance with the following table (4) and FIG. (1)

TABLE (4)

Subject	Description
3-1- Optical fiber	Single mode fiber as ITU G.652B. The fibers are color coded and properly operate at a wide range of temperature from -40 °C up to +80 °C.
3-2- Buffer	Loose tubes of PBT materials, color coded, contains up to 12 optical fibers, filled with thixotropic jelly. The jelly is free from dirt, metallic particles and would be non toxic and present no any dermal hazards.
3-3- Central strength member	Non-metal central strength member (FRP) with minimum diameter 2.5mm.
3-4- Water swell able yarn	The water swellable yarn will be wound helically around the Strength member.
3-5- Core	Loose tubes will be stranded around central strength member by SZ stranding method. For adapting the loose tubes to central element the fillers of PP or HDPE may be used in cable construction.
3-6- Water swellable tape	A layer of water swellable tape with a sufficient thickness applied longitudinally over loose tubes. The overlap shall not be less than 3 mm.
3-7- Rip cord	2 Diametrically opposed rip cords will be placed over the swellable tape under the inner jacket and 2 rip cords over the steal tape under the outer jacket. The rip cord must be strong and flexible enough to be able to strip or the jackets easily.
3-8- First jacket	A black LDPE jacket in accordance to ASTM D-1248. The nominal thickness of the jacket is 1.5 mm.
3-9- Armor	A corrugated steel tape will be applied on inner jacket. This layer act as anti rodent. The overlap shall not be less than 3mm.
3-10- Outer jacket	A black HDPE jacket in according to ASTM-D1248 will be applied on corrugated steel tape. The nominal jacket thickness is 2mm.

FIG. (1)



4 - CABLE SIZES AND GENERAL DATAS

Cables size and general data are in accordance with the following table (5).

TABLE (5)

PARAMETERS	N1x4	N2x4	N2x6	N4x6	N8x6	N12x6
Number of tubes	1	4	2	4	8	12
Fiber per tubes	4	4	6	6	6	6
Number of fibers	4	8	12	24	48	72
Central Strength Member(mm)	2.5	2.5	2.5	2.5	2.5	3
Pulling tension (N)*	2800	2800	2800	2800	3000	3500
Overall diameter (mm)	17	17	17	17	19	22
Weight (Kg/km)	260	260	260	265	318	427

* Note: The pulling tension may be increased as an option by using the messenger with higher diameter .

5 - Mechanical and Functional tests

Mechanical and functional tests are in accordance with the following table(6).

TABLE (6)

ITEM	CONDITIOND	REFERENCE
WATER PENETRATION	1 m Length / 1 m height / 1 hours no drop	FOTP-82
COMPRESSION	220 N / on 10 mm section of cable	EIA/TIA 455-41
FLEXING	25 mechanical flexing / heave diameter 20 times the cable diameter	EIA/TIA 455-104
IMPACT	660 g weight / 1 m height / In 2 at 3 locations along cable	EIA/TIA 455-25
TENSILE & BENDING	Pulling force 3000 N (As technical spec)	EIA/TIA 455-33
TWIST	2 m length / 10 cycles of mechanical twisting	EIA/TIA 455-85
LOW OR HIGH TEMPRATURE BEND	sheave diameter 20 times the cable diameter / 4 full turns / 4 hours / at temperatures -30°C & +60°C	EIA/TIA 455-37
KNOT	10 kg weight / in cross sectional diameter of the knot	EIA/TIA 455-87
TEMPRATURE CYCLING	2 hours from 0°C to -40°C / 8 hours in -40°C / 4 hours from -40°C to +85°C / 8 hours in +85°C / 2 hours from +85°C to 0°C / 5 cycles	IEC 794-1-F1

Note:

The change in attenuation will not exceed 0.05 dB at 1550 nm.