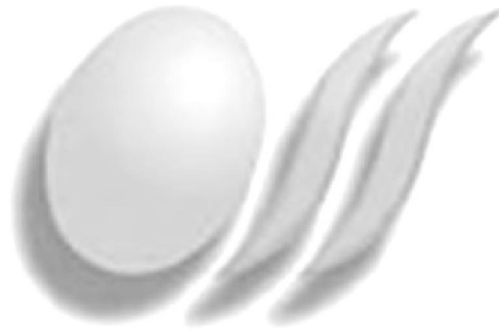


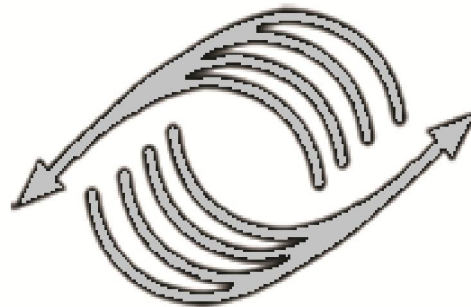
SHAHID GHANDI COMMUNICATION CABLE CO.

CODE: 0204-006

**TECHNICAL SPECIFICATION FOR
OPTICAL CONDUIT UNFILLED CABLE
(OCUC - NZDSF)**



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SPECIFICATION FOR OPTICAL CONDUIT UNFILLED CABLE

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 dry optical fiber cables used in conduit applications.

2 - OPTICAL FIBER

2-1 – Optical Characteristics

The fibers may be standard single mode 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

2-2 - Fiber Dimensions



The fiber dimensions will be as following table (2)

TABLE (2)

PARAMETERS	UNIT	VALUE
Cladding diameter	μm	125 \pm 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 \pm 15
Coating concentricity error	μm	15
Coating non circularity error	%	10

2-3 – Fiber and loose tube identification

Fibers in each loose tube and the 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.



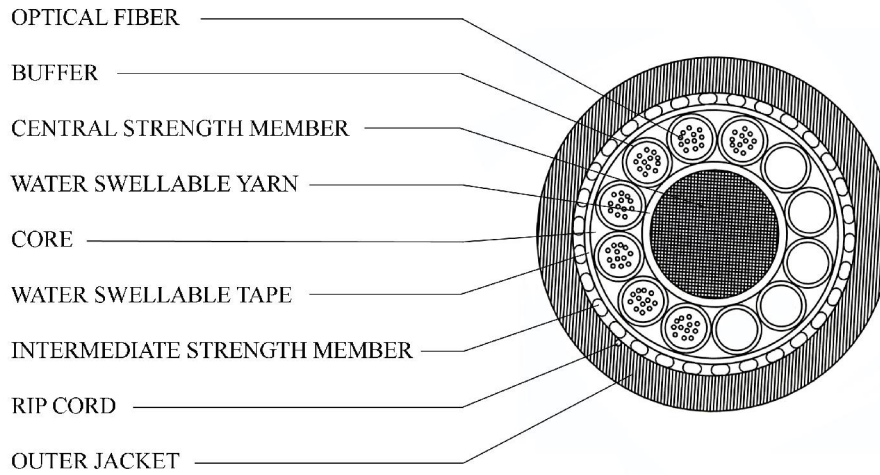
3 - CABLE CONSTRUCTION

Cable construction is in accordance with the following table (4) and FIG (1)

TABLE (4)

Subject	Description
3-1- Optical fiber	Single mode fiber as ITU-T G.655. 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 thixo tropic 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 nominal diameter 2.5mm.
3-4- Water swell able yarn	The water swell able 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 swell able tape	A layer of water swell able tape with a sufficient thickness applied longitudinally over loose tubes. The overlap shall not be less than 3mm.
3-7- Intermediate Strength Member	A layer of Aramid yarn will be applied over the swell able tape for additional pulling force.
3-8- Rip cord	2 Diametrically opposed rip cords will be placed over the swell able tape under the outer jacket. The rip cord must be strong and flexible enough to be able to strip or the jackets easily.
3-9- Outer jacket	A black HDPE jacket in according to ASTM-D1248 will be applied on aramid yarn. The nominal jacket thickness is 2mm.

FIG. (1)



4 - CABLE SIZES AND GENERAL DATAS

4-1 - CABLE SIZES AND GENERAL DATA

Cables size and general data are in accordance with the following TABLE (5):

Table (5)

PARAMETERS	N 1x 6	N 2x 6	N 2x 6+1×4	N 4x 6	N 8x 6
Number of tubes	1	2	3	4	8
Fiber per tubes	6	6	6, 4	6	6
Number of fibers	6	12	16	24	48
Central Strength Member(mm)	2.5	2.5	2.5	2.5	2.5
Pulling tension (N)*	3000	3000	3000	3000	3000
Overall diameter (mm)	13	13	13	13	15
Weight (Kg/km)	109	109	112	112	146

PARAMETERS	N 12x 6	N8x12	N10x12	N12x12
Number of tubes	12	8	10	12
Fiber per tubes	6	12	12	12
Number of fibers	72	96	120	144
Central Strength Member(mm)	3	3	4	4
Pulling tension (N)*	3000	3000	3000	3000
Overall diameter (mm)	18	17	18	20
Weight (Kg/km)	217	177	223	271

* Note: The pulling tension may be increased as an option by increasing the amount of aramid yarn.



4-2 – IDENTIFICATION MARKING

Each length of the cable shall be permanently identified as to the manufacturer, year of manufacture, number of tubes, fiber per tubes and cable type. The marking will be printed on the outer jacket.

NOTE: Other method as request

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	22 kg compress / on 10 mm section of cable	EIA/TIA 455-41
FLEXING	25 cycles / 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	Up to amount of pulling force / 560 mm sheave diameter / 1 hours	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
TEMPERATURE 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 shall not exceed 0.05 dB at 1550 nm.