TECHNICAL SPECIFICATION

1. General

1.1 Scope

Cable type	Application
HelixCore™ Gel Free Single Armor Single Jacket Cable	Duct installation cable

1.2 Reference

The following international specifications were used as reference documents for the cables provided by Navigator:

IEC 60793-1	Optical fiber Part 1: Generic specifications
IEC 60793-2	Optical fiber Part 2: Product specifications
IEC 60794-3-10	Outdoor cables family specification for duct and directly buried optical telecommunication cable
ITU-T G.650	Definition and test methods for the relevant parameters of single-mode fibers
ITU-T G.652	Characteristics of a single-mode optical fiber and cable
ITU-T G.657	Characteristics of a single-mode optical fiber and cable
EIA/TIA 598	Color code of fiber optic cables
ANSI/ICEA S-87-640 and Telcordia® GR-20-CORE	

1.3 QR Guard™

QR Guard™ is a multifunctional online platform that revolutionizes how distributors and network operators keep tabs on the status of Navigator fiber cables, ensuring efficient operations, accurate record-keeping, and valuable insights for future product development. Providing unique features including:

- Distributor exclusive management interface
- Installation record archiving
- Written guidelines and visual demonstrations

QR Guard™ plays a vital role in mitigating the costly consequences of mishandling while enabling efficient network expansion in response to evolving market demands. Scan the QR code in the bottom left corner to find our more.

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2. OPTICAL FIBER

ITU-T G.652.D		
Category	Description	Specifications
Optical Specifications	Attenuation @1310 nm (Max.)	0.34 dB/km
	Attenuation @1550 nm (Typical/Max.)	0.20/0.22 dB/km
	Zero Dispersion Wavelength	1300~1324 nm
	Chromatic dispersion @1310nm @1550nm @1625nm	≤3.5 ps/(nm·km) ≤18 ps/(nm·km) ≤22 ps/(nm·km)
	Zero Dispersion Slope	≤0.092 ps/nm^2·km
	PMD_Q	≤0.04 ps/√km
	PMD individual value	≤0.1ps/√km
	Cable Cutoff Wavelength (λ_{cc})	≤1260 nm
	Macro bending Loss (100 turns; Φ60 mm) @1625 nm	≤ 0.10 dB
	Mode Field Diameter @1310 nm	9.2 ±0.4μm
Dimensional Specifications	Cladding Diameter	125 ±0.7μm
	Coating diameter	245 ±10μm
	Core/clad concentricity error	≤0.5μm
	Cladding Non-Circularity	＜0.7%
Mechanical Specifications	Proof stress	≥0.69Gpa

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ITU-T G.657.A1		
Category	Description	Specifications
Optical Specifications	Attenuation @1310 nm (Max.)	0.34 dB/km
	Attenuation @1550 nm (Typical/Max.)	0.20/0.22 dB/km
	Dispersion coefficient	@1288~1339nm ≤3.5ps/nm·km @1271~1360nm ≤5.3ps/nm·km @1550nm ≤18ps/nm·km @1625nm ≤22ps/nm·km
	Zero Dispersion Wavelength	1300~1324 nm
	Zero Dispersion Slope	≤ 0.092 ps/nm2·km
	PMD Link value (M=20cables Q=0.01%) maximum PMDQ	0.20 ps/√km
	Cable Cutoff Wavelength (λcc)	≤1260 nm
	Macro bending Loss (10 turns; Φ30 mm) @1550 nm (10 turns; Φ30 mm) @1625 nm (1 turns; Φ20 mm) @1550 nm (1 turns; Φ20 mm) @1625 nm	 ≤ 0.25 dB ≤ 1.0 dB ≤ 0.75 dB ≤ 1.5 dB
	Mode Field Diameter @1310 nm	(8.6-9.2) ±0.4μm
Dimensional Specifications	Cladding Diameter	125±0.7μm
	Cladding non circularity	≤1.0%
	Coating diameter	245±10μm
	Coating non circularity	≤6%
	Cladding / coating concentricity error	≤6μm
	Core/clad concentricity error	≤0.5μm
	Cladding Non-Circularity	≤1.0%
Mechanical Specifications	Proof stress	≥0.69Gpa

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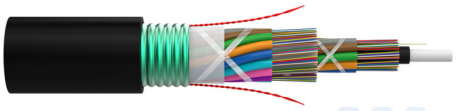
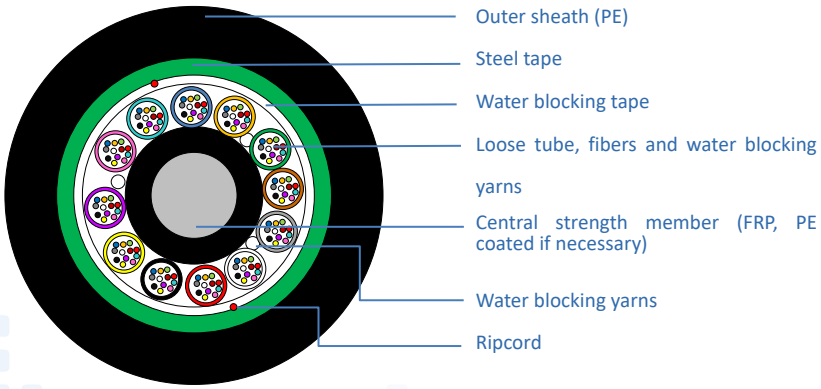
ITU-T G.657.A2		
Category	Description	Specifications
Optical Specifications	Attenuation @1310 nm (Max.)	0.34 dB/km
	Attenuation @1550 nm (Typical/Max.)	0.20/0.22 dB/km
	Dispersion coefficient	@1288~1339nm ≤3.5ps/nm·km @1271~1360nm ≤5.3ps/nm·km @1550nm ≤18ps/nm·km @1625nm ≤22ps/nm·km
	Zero Dispersion Wavelength	1300~1324 nm
	Zero Dispersion Slope	≤ 0.092 ps/nm2·km
	PMD Link value (M=20cables Q=0.01%) maximum PMDQ	0.20 ps/√km
	Cable Cutoff Wavelength (λcc)	≤1260 nm
	Macro bending Loss (10 turns; Φ30 mm) @1550 nm (10 turns; Φ30 mm) @1625 nm (1 turns; Φ20 mm) @1550 nm (1 turns; Φ20 mm) @1625 nm (1 turns; Φ15 mm) @1550 nm (1 turns; Φ15 mm) @1625 nm	 ≤ 0.03 dB ≤ 0.1 dB ≤ 0.1 dB ≤ 0.2 dB ≤ 0.5 dB ≤ 1.0 dB
	Mode Field Diameter @1310 nm	(8.6-9.2)±0.4μm
Dimensional Specifications	Cladding Diameter	125±0.7μm
	Cladding non circularity	≤1.0%
	Coating diameter	245±10μm
	Coating non circularity	≤6%
	Cladding / coating concentricity error	≤6μm
	Core/clad concentricity error	≤0.5μm
	Cladding Non-Circularity	≤1.0%
	Peak Coating Strip Force	1.3~8.9N

3. CABLE STRUCTURE

3.1 Cable type

HelixCore™ Gel Free Single Armor Single Jacket Cable





Features & Application

- Excellent excess length control technology guarantees superb mechanical and environmental performances
- Multiple water blocking material filling provides dual water blocking function
- Provides good crush resistance
- Anti-rodent

Technical Specifications

General Specifications	Fiber type	ITU-T G.652.D or ITU-T G.657.A1 or ITU-T G.657.A2				
	Fiber count	**2-72**	**74-96**	**98-120**	**122-144**	
	No. of fibers per tube	12	12	12	12	
	Stranding no.	6	8	8	10	
	Cable D – mm(in)	11.1(0.44)	12.2(0.48)	13.9(0.55)	14.9(0.59)	
	Cable weight – kg/km(lb/1000ft)	119(80)	137(92)	145(97)	206(138)	
	Fiber type	ITU-T G.652.D or ITU-T G.657.A1 or ITU-T G.657.A2				
	Fiber count	**146-216**	**218-288**	**432**	**576**	**864**
	No. of fibers per tube	12	12	12	24	24
	Stranding no.	12	6/12	9/15	6/12/18	6/12/18
	Cable D – mm(in)	15.6(0.61)	17.3(0.68)	20.6(0.81)	20.0(0.79)	25.3(1.00)
	Cable weight – kg/km(lb/1000ft)	218(146)	272(183)	367(247)	346(233)	564(379)
Environmental	Operation	-40°C to + 70 °C (-40 ° F to 158 ° F)				

Specifications	temperature range	
	Installation temperature range	-30 °C to + 60 °C (-22 ° F to 140 ° F)
	Transport and storage temperature range	-40 °C to + 70 °C (-40 ° F to 158 ° F)
Mechanical Specifications	Max. tensile load (MAT) – N(lb)	2700(607)
	Crush resistance – N/10cm(lb/in)	3000(171)
	Minimal installation bending radius	25*D
	Minimal operation bending radius	12.5*D

***Note:** D =cable diameter;

4. TEST REQUIREMENTS

Fiber test standard

Mode field diameter	IEC 60793-1-45
Mode field Core/clad concentricity	IEC 60793-1-20
Cladding diameter	IEC 60793-1-20
Cladding non-circularity	IEC 60793-1-20
Attenuation coefficient	IEC 60793-1-40
Chromatic dispersion	IEC 60793-1-42
Cable cut-off wavelength	IEC 60793-1-44

Performance testing list

4.1 Tensile strength test

Reference standards	**Telcordia® GR-20-CORE 6.5.6 OR IEC 60794-1-21 E1**
Sample length	No less than 50 meters
Load	MAT
Duration time	5 minutes
Test results	Additional attenuation≤0.10dB
	No damage to outer jacket and inner elements

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4.2 Compressive strength test

Reference standards	**Telcordia® GR-20-CORE 6.5.5 OR IEC 60794-1-21 E3**
Load	Crush resistance
Duration time	1minute
Test results	Additional attenuation ≤0.10dB
	No damage to outer jacket and inner elements

4.3 Impact resistance test

Reference standards	**Telcordia® GR-20-CORE 6.5.4 OR IEC 60794-1-21 E4**
Impact energy	4.5J
Radius	10mm
Impact points	3
Impact number	1
Test result	Additional attenuation ≤0.10dB
	No damage to outer jacket and inner elements

4.4 Cyclic flexing test

Reference standards	**Telcordia® GR-20-CORE 6.5.8 OR IEC 60794-1-21 E6**
Bending radius	25*D
Cycles	25 cycles
Load	250N
Test result	Additional attenuation ≤0.10dB
	No damage to cable elements

4.5 Bend test

Reference standards	**Telcordia® GR-20-CORE 6.5.3 OR IEC 60794-1-21 E11**
Mandrel diameter	25*D
Turn number	3
Cycles	4
Test result	Additional attenuation ≤0.10dB
	No damage to outer jacket and inner elements

4.6 Twist test

Reference standards	**Telcordia® GR-20-CORE 6.5.7 OR IEC 60794-1-21 E7**
Sample length	1m
Angles	±90 degree

Load	150N
Cycles	10
Test result	Additional attenuation ≤0.10dB
	No damage to cable elements

4.7 Abrasion test

Reference standards	**Telcordia® GR-20-CORE 6.6.6 OR IEC 60794-1-21 E2B**
Experiment method	The wool felt should be thoroughly impregnated with water
Frequency	6-12cycles/min
Load	20N
Cycles	10
Test result	The marking should be legible after test

4.8 Water penetration test

Reference standards	**Telcordia® GR-20-CORE 6.6.7 OR IEC 60794-1-22 F5**
Height of water column	1m
Sample length	3m
Test time	24 hours
Test result	No water seepage from the opposite end of the sample

4.9 Temperature cycling test

Reference standards	**Telcordia® GR-20-CORE 6.6.3 OR IEC 60794-1-22 F1**
Temperature step	+20 ^{O}C→-40 ^{O}C →+70 ^{O}C→+20 ^{O}C
Time per each step	12 hours
Cycles	2
Test result	Attenuation variation for reference value (the attenuation to be measured before test at +20±3 ^{O}C) ≤0.15dB/km

4.10Environmental performance

Test Standard	**RoHS**
Test result	Pass the test.

Remark: The test wavelength is 1550 nm.

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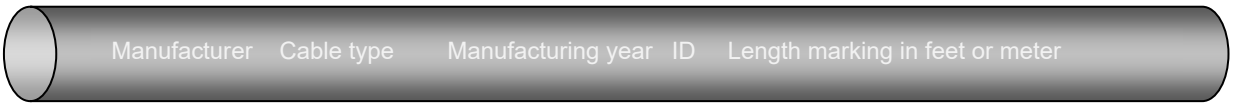
5. COLOR CODE SCHEME

Fiber color	blue	orange	green	brown	slate	white	red	black	yellow	violet	pink	aqua
Tube color	blue	orange	green	brown	slate	white	red	black	yellow	violet	pink	aqua

Note: Stripes will be used after more than 12 colors of loose tubes.

6. SHEATH MARKING



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