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# HES HACILAR ELEKTRİK SANAYİ VE TİC.A.Ş.

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## Technical Specification

Revision/Date:00/10.16	By M. Batmaz	Date : 05 October 2016
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**Cable Type** :Loose Tube, Outdoor F/O Cable

**HES Cable Product Number** :FOZZXXXSLT41DYY

(ZZ: fiber type G652=SD, G657 A1 = A1, G657 A2 = A2, G655 = NZ, 62.5 OM1 = M1, 50/125 OM2 = M2, 50/125 OM3 = M3, 50/125 OM4 = M4, XXX: number of fibers, YY: fiber per tube)

### PHYSICAL DESCRIPTION

- 2-4-6-8-10-12-16-24 fibers armored outdoor fiber optic cable,
- Thixotropic jelly filled loose tube,
- Central loose tube design,
- Swellable glass yarn as strength elements,
- Outer jacket is made of medium density polyethylene,
- Ripcord is inserted for easy jackets removal.

Fiber Type	SM G652 D, G657 A1, G657 A2, G655 MM 62.5 OM1, 50/125 OM2, 50/125 OM3, 50/125 OM4
Tube material	PBT ( Polybutylene Terephthalate)
Color of loose tube	Natural
Color of fibers in per tube	Blue, Orange, Green, Brown, Slate, White, Red, Black, Yellow, Violet, Rose, Aqua, Blue with black tracer, Orange with black tracer, Green with black tracer, Brown with black tracer, Slate with black tracer, White with black tracer, Red with black tracer, Natural, Yellow with black tracer, Violet with black tracer, Rose with black tracer, Aqua with black tracer
Tube filling compound	Thixotropic jelly
Strength elements	Swellable glass yarns
Ripcord	Aramid cord
Identification tape marking	As a customer request
Armor	Corrugated steel tape
Outer jacket	Black MDPE, thickness nominal 1.5±0.1 mm.
Surface marking	As a customer request

Fiber Count	Tube Outer/Inner Diameter (mm)	Cable Diameter (mm)	Cable Weight (kg/km)
2	3.0/2.0*	9.0*	77*
4	3.0/2.0*	9.0*	77*
6	3.0/2.0*	9.0*	77*
8	3.0/2.0*	9.0*	77*
10	3.0/2.0*	9.0*	77*
12	3.0/2.0*	9.0*	77*
16	3.0/2.0*	9.0*	77*
24	3.0/2.0*	9.0*	77*

\*:Tolerance is ±10%



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<b>Mechanical and Environmental Properties</b>		
<b>Physical tests</b>	<b>Value</b>	<b>Standard</b>
Tensile Strength	1000 N	IEC 60794-1-E1
Impact Resistance	10J, 3 impacts	IEC 60794-1-E4
Crush Resistance	220 N/cm	IEC 60794-1-E3
Bend Radius (during installation)	30x cable diameter	IEC 60794-1-E11
Bend Radius (during Service)	15x cable diameter	IEC 60794-1-E11
Operation Temperature	-30 to +70 °C	IEC 60794-1-F1
Reel Marking	As a customer request	
Metal Plate at drum	As a customer request	

<b>STANDARD SM FIBER ITU-T G 652 D</b>	
<b>PROPERTIES</b>	<b>SPECIFIED VALUES</b>
Attenuation (max)	0.40 dB/km (1310 nm) 0.25 dB/km (1550 nm)
MFD	9.2±0.4 μm (1310 nm) 10.4±0.5 μm (1550 nm)
Chromatic Dispersion (max)	3.5 ps/(nmxkm)(1310 nm ) 18 ps/(nmxkm)(1550 nm )
Cladding diameter	125±0.3μm
Core/Clad Concentricity error	≤ 0.5 μm
Zero dispersion wavelength	1300nm≤ ≤1324nm
Cladding non-circularity	≤ 0.7 %
Coating diameter	245±10 μm
Cut Off Wavelength	≤1260nm
Proof Test	≥ 1% (100kpsi or 0.7GPa)

<b>NON-ZERO DISPERSION SHIFTED SM FIBER ITU-T G 655</b>	
<b>PROPERTIES</b>	<b>SPECIFIED VALUES</b>
Attenuation (max)	0.25 dB/km (1550 nm)
MFD	9.6±0.4 μm (1550 nm)
Chromatic Dispersion at 1530-1565 nm	2.0-6.0 ps/(nmxkm)
Chromatic Dispersion at 1565-1625 nm	4.0-12.0 ps/(nmxkm)
Cladding diameter	125±0.7μm
Core/Clad Concentricity error (max)	0.6 μm
Cladding non-circularity (max)	% 0.7
Coating diameter	245±5 μm
Cut Off Wavelength	≤1450nm
Proof Test	≥ 1% (100kpsi or 0.7GPa)



<b>STANDARD SM FIBER ITU-T G 657 A</b>	
<b>PROPERTIES</b>	<b>SPECIFIED VALUES</b>
Attenuation (max)	0.40 dB/km (1310 nm) 0.25 dB/km (1550 nm)
MFD	9.0±0.4 µm (1310 nm) 10.1±0.5 µm (1550 nm)
Cladding diameter	125±0.7µm
Core/Clad Concentricity error (max)	0.5 µm
Zero dispersion wavelength	1300nm≤ ≤1324nm
Cladding non-circularity (max)	% 0.7
Coating diameter	242±7 µm
Cut Off Wavelength	≤1260nm
Proof Tensile Test	≥ 1% (100kpsi or 0.7GPa)
Macro bending Attenuation : (10 turn on a 15 mm radius mandrel)	≤ 0.25 dB @1550 nm
<b>SM FIBER ITU-T G 657 A2 Bend İnsensitive</b>	
<b>PROPERTIES</b>	<b>SPECIFIED VALUES</b>
Attenuation (max)	0.35 dB/km (1310 nm) 0.22 dB/km (1550 nm)
MFD	8.6±0.4 µm (1310 nm)
Cladding diameter	125±0.7µm
Core/Clad Concentricity error (max)	0.5 µm
Zero dispersion wavelength	1302nm≤ ≤1322nm
Cladding non-circularity (max)	% 1
Coating diameter	240±5 µm
Cut Off Wavelength	≤1260nm
Proof Tensile Test	≥ 1% (100kpsi or 0.7GPa)
Macro bending Attenuation : (1 turn on a 7.5 mm radius mandrel)	≤ 0.5 dB @1550 nm
<b>62.5/125 µm MM OM1 OPTICAL FIBER</b>	
<b>PROPERTIES</b>	<b>SPECIFIED VALUES</b>
Attenuations (max)	3.5 dB/km (850 nm) 1.5 dB/km (1300 nm)
Bandwidth (min)	200 MHz.km(850 nm) 600 MHz.km(1300 nm)
Numerical Aparature	0.275±0.015
Core Diameter	62.5 ±2 µm
Cladding Diameter	125 ±1µm
Core/Clad Concentricity error	≤ 1 µm
Cladding non-circularity	≤ 0.7 %
Coating Diameter	242 ±5 µm
Proof Test	≥ 100kpsi or 0.7GPa



<b>50/125 µm MM OM2 OPTICAL FIBER</b>	
PROPERTIES	SPECIFIED VALUES
Attenuations (max)	3.5 dB/km (850 nm) 1.5 dB/km (1300 nm)
Bandwidth (min)	700 MHz.km(850 nm) 500 MHz.km(1300 nm)
Numerical Aparature	0.200±0.015
Core Diameter	50±2 µm
Cladding Diameter	125±1µm
Core/Clad Concentricity error	≤ 1 µm
Cladding non-circularity	≤ 0.7 %
Coating Diameter	242 ±5 µm
Proof Test	≥ 100kpsi or 0.7GPa

<b>50/125 µm MM OM3 OPTICAL FIBER</b>	
PROPERTIES	SPECIFIED VALUES
Attenuations (max)	3.5 dB/km (850 nm) 1.5 dB/km (1300 nm)
Bandwidth (Laser EMB)	2000 MHz.km(850 nm) 500 MHz.km(1300 nm)
Bandwidth (Overfilled)	1500 MHz.km(850 nm) 500 MHz.km(1300 nm)
Numerical Aparature	0.200±0.015
Core Diameter	50±2 µm
Cladding Diameter	125±1µm
Core/Clad Concentricity error	≤ 1 µm
Cladding non-circularity	≤ 0.7 %
Coating Diameter	242 ±5 µm
Proof Test	≥ 100kpsi or 0.7GPa

<b>50/125 µm MM OM4 OPTICAL FIBER</b>	
PROPERTIES	SPECIFIED VALUES
Attenuations (max)	3.0 dB/km 1.0 dB/km
Bandwidth (Laser EMB)	4700 MHz.km(850 nm) 500 MHz.km(1300 nm)
Bandwidth (Overfilled)	3500 MHz.km(850 nm) 500 MHz.km(1300 nm)
Numerical Aparature	0.2±0.015
Core Diameter	50±3 µm
Cladding Diameter	125±3µm
Core/Clad Concentricity error	≤ 1 µm
Cladding non-circularity	≤ 0.7 %
Coating Diameter	242 ±5 µm
Proof Test	≥ 100kpsi or 0.7GPa

**NOTE (If any):**

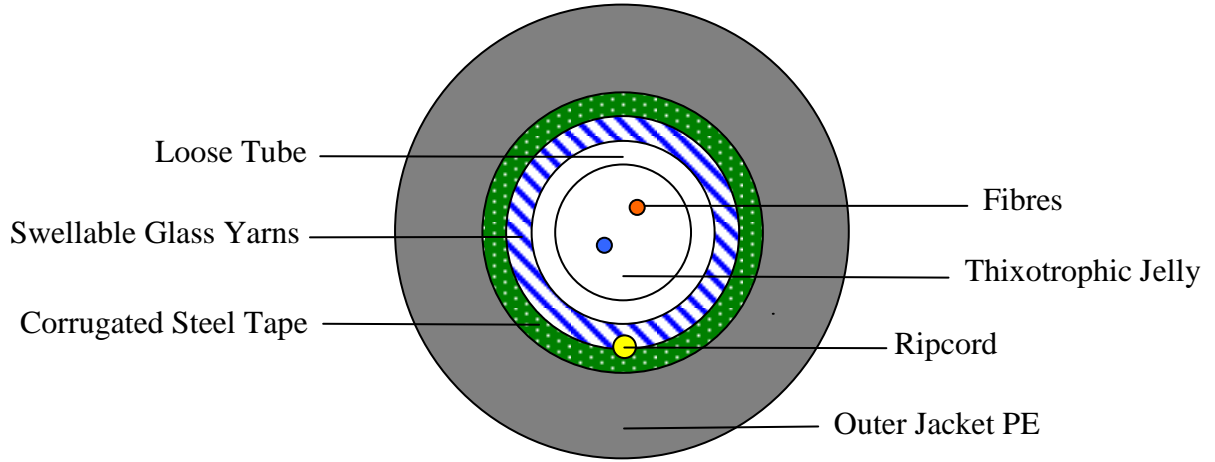


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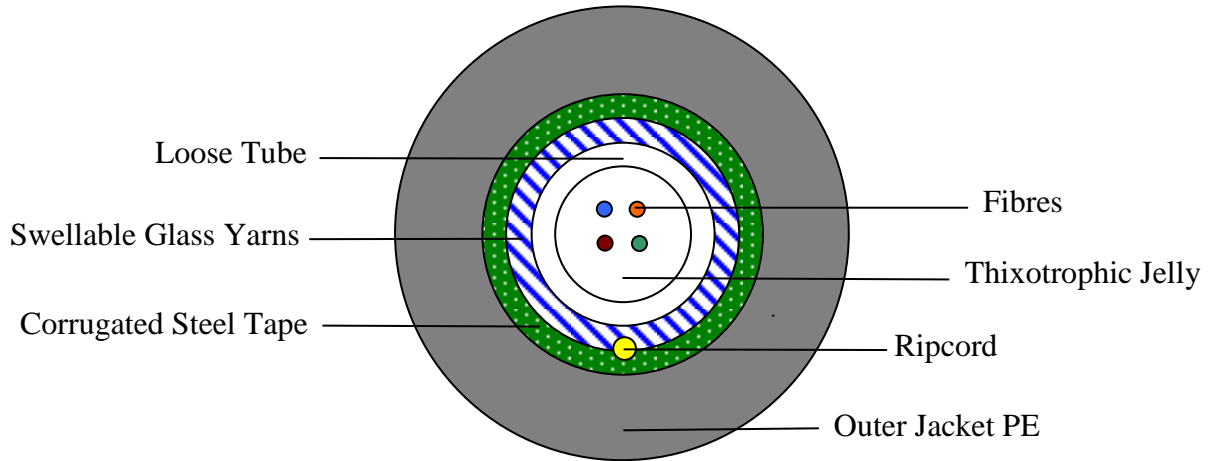
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*2 fibers Cable Cross Section*



*4 fibers Cable Cross Section*



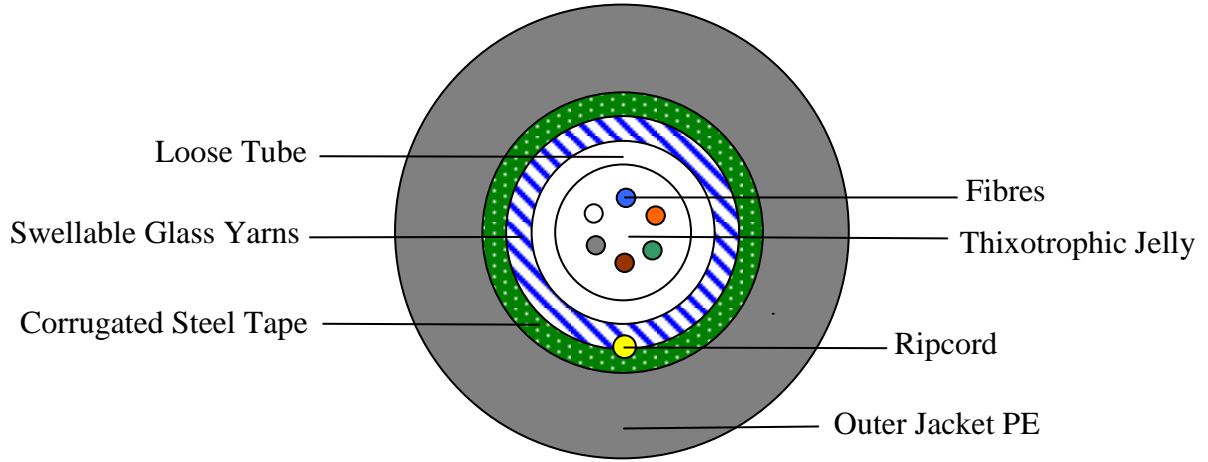


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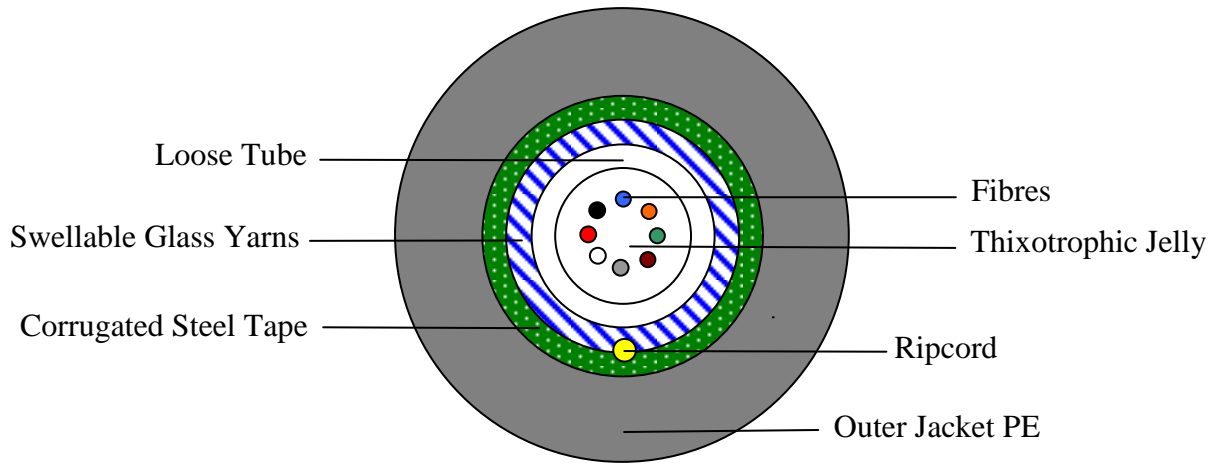
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*6 fibers Cable Cross Section*



*8 fibers Cable Cross Section*



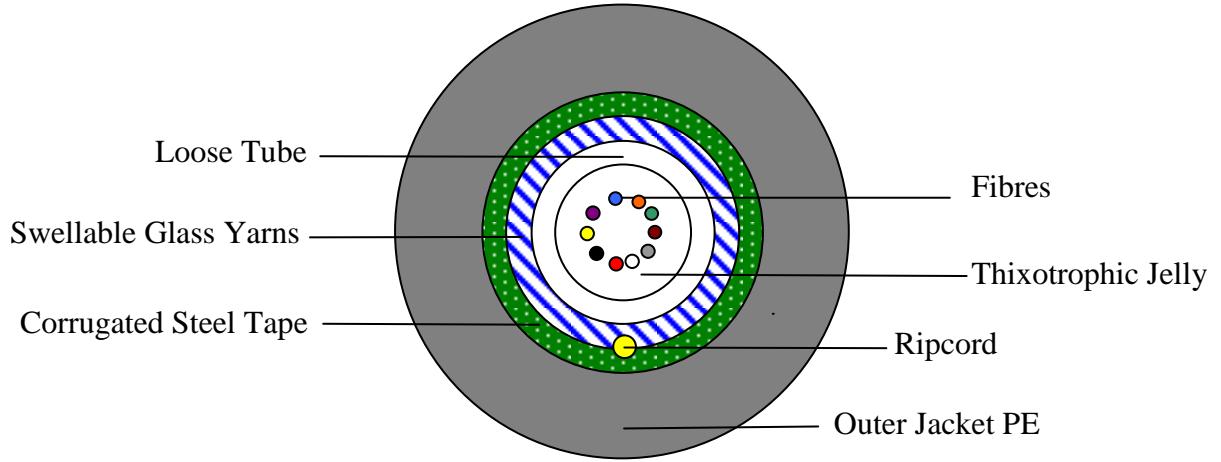


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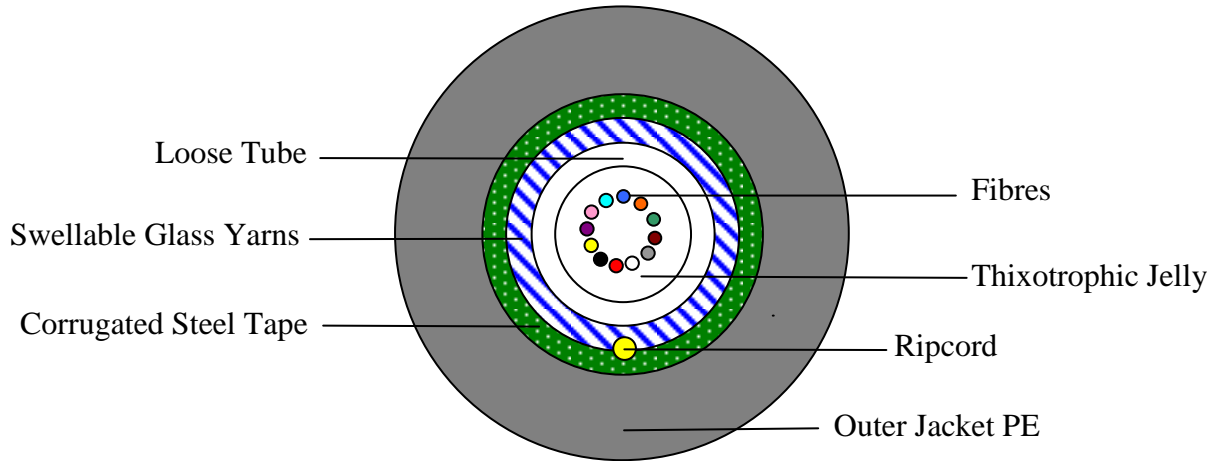
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*10 fibers Cable Cross Section*



*12 fibers Cable Cross Section*



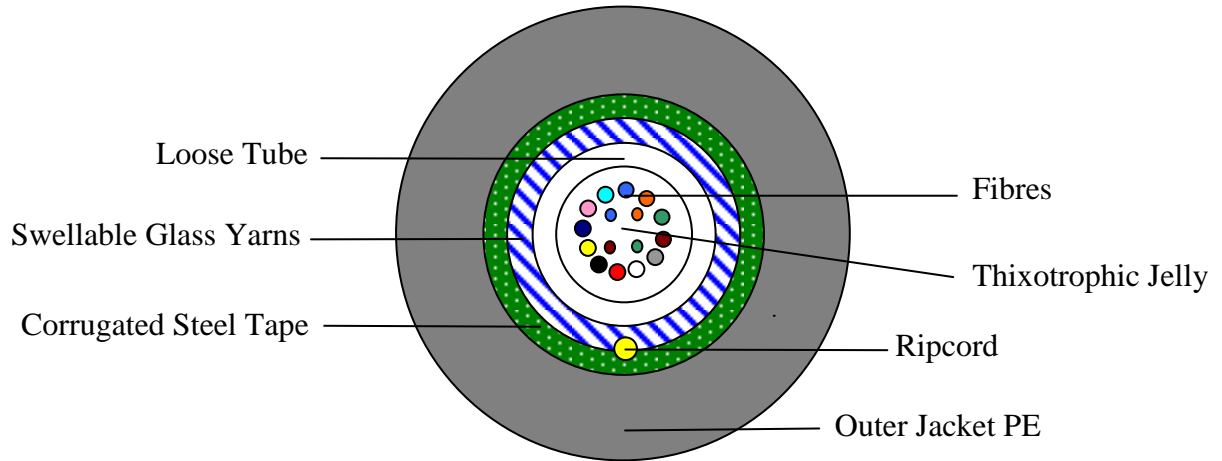


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*16 fibers Cable Cross Section*



*24 fibers Cable Cross Section*

