








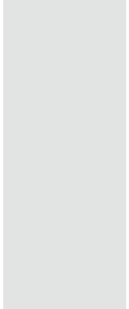


# Fiber Optic Cables

Product Catalog 2022

03066681



	<b>Overview CPR Classified Products</b>	<b>4</b>
	<b>Indoor Cables for Connector Termination</b>	<b>6</b>
	<b>Gel-free Loose Tube Installation Cables</b>	<b>18</b>
	<b>Standard Duct Cables</b>	<b>30</b>
	<b>Intensified Duct Cables</b>	<b>44</b>
	<b>Corrugated Steel Tape Armored Cables</b>	<b>60</b>
	<b>Aerial Drop &amp; Façade Cables</b>	<b>84</b>
	<b>Micro Cables for blowing-in</b>	<b>98</b>
	<b>Fire Resistant Cables</b>	<b>108</b>
	<b>Explanations</b>	<b>120</b>
	Singlemode Fiber Specification	122
	Multimode Fiber Specification	124
	Cable Family Code	126
	DIN VDE 0888 Cable Code	127
	Sheat Materials Installation Cables	128
	Color Codes Installation Cables	129
	CPR Installation Cables	130





## CPR Classification – B2ca

Product Description	Cable Type	Product Name	Fiber Count	CPR Classification	DoP No°	Page
Gel-free Indoor Cable	CLT	IFEF FiRis	4 - 24	B2ca-s1a,d0,a1	D9082	22
Gel-free Intensified Rodent Protected Universal Cable	SLT	UTd6x2,3GF FiRis 04.12	48	B2ca-s1a,d0,a1	D9093	28
Steel Tape Armored Double Sheathed Cable	CLT	UX1EFCF FiRis	4 - 24	B2ca-s1a,d0,a1	D9033	66
Fire Resistant - Steel Tape Armored Double Sheathed Cable	CLT	QX1EFCF FiRis	4 - 24	B2ca-s1,d0,a1	D9045	116

## CPR Classification – Cca

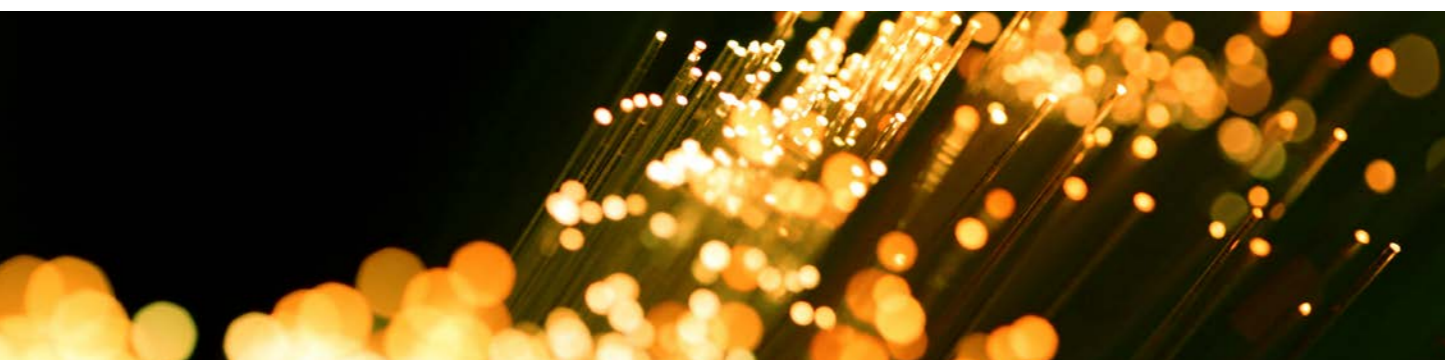
Product Description	Cable Type	Product Name	Fiber Count	CPR Classification	DoP No°	Page
Gel-free Intensified Rodent Protected Universal Cable	CLT	UTd1GF FiRis	4 - 12	Cca-s1a,d0,a1	D9088	24
Gel-free Intensified Rodent Protected Universal Cable	SLT	UTd6x2,3GF FiRis	12 - 72	Cca-s2,d1,a1	D9089	28
Gel-free Intensified Rodent Protected Universal Cable	SLT	UTd8x2,3GF FiRis	84 - 96	Cca-s2,d1,a1	D9090	28
Gel-free Intensified Rodent Protected Universal Cable	SLT	UTd3x2,3GF FiRis	108 - 144	Cca-s2,d1,a1	D9091	28
Fire Resistant - Steel Tape Armored Single Sheathed Cable	CLT	QX1ECF FiRis	4 - 24	Cca-s1,d0,a1	D9044	114
Aerial drop & Façade Cables	MiniCore	UAF250FiRis	02 - 12	Cca-s2,d0,a1	D9084	86
Aerial drop & Façade Cables	MiniCore	UAF1000FiRis	02 - 12	Cca-s2,d0,a1	D9085	88

## CPR Classification – Dca






Product Description	Cable Type	Product Name	Fiber Count	CPR Classification	DoP No°	Page
Universal Cable	CLT	UT1EF	4 - 12	Dca-s2,d1,a1	D9012	32
Universal Cable	CLT	UX1EF	12 - 24	Dca-s2,d1,a1	D9027	32
Intensified Rodent Protected Universal Cable	CLT	UT1GF	4 - 12	Dca-s2,d1,a1	D9013	46
Intensified Rodent Protected Universal Cable	CLT	UX1GF	12 - 24	Dca-s2,d1,a1	D9031	46
Steel Tape Armored Universal Cable	CLT	UX1ECF	4 - 24	Dca-s2,d2,a1	D9026	64
Fire Resistant - Non Armored, Intensified Rodent Protected Cable	CLT	QT1GF	4 - 12	Dca-s1,d1,a1	D9004	110
Fire Resistant - Non Armored, Intensified Rodent Protected Cable	CLT	QX1GF	12 - 24	Dca-s2,d1,a1	D9008	110
Gel-free FTTH Mini Loose Tube Indoor Drop Cable	CLT	IFAF	02 - 04	Dca-s2,d0,a1	D9087	20

## CPR Classification – Eca

Product Description	Cable Type	Product Name	Fiber Count	CPR Classification	DoP No°	Page
Universal Cable	SLT	UT6x1,7F	24 - 72	Eca	D9020	34
Universal Cable	SLT	UT8x1,7F	84 - 96	Eca	D9024	34
Universal Cable	SLT	UT3x1,7F	108 - 144	Eca	D9014	34
Universal Cable	SLT	UT9x1,7F	156 - 216	Eca	D9051	34
Universal Cable	SLT	UX3x2,3EF	12 x 24f = 288	Eca	D9077	36
Universal Cable	SLT	UX9x2,3EF	18 x 24f = 432	Eca	D9078	36
Intensified Rodent Protected Universal Cable	SLT	UT6x1,7GF	24 - 72	Eca	D9021	48
Intensified Rodent Protected Universal Cable	SLT	UT8x1,7GF	84 - 96	Eca	D9025	48
Intensified Rodent Protected Universal Cable	SLT	UT3x1,7GF	108 - 144	Eca	D9015	48
Intensified Rodent Protected Universal Cable	SLT	UT9x1,7GF	156 - 216	Eca	D9052	48
Intensified Rodent Protected Universal Cable	SLT	UX3x2,3GF	12 x 24f = 288	Eca	D9079	50
Intensified Rodent Protected Universal Cable	SLT	UX9x2,3GF	18 x 24f = 432	Eca	D9080	50
Corrugated Steel Tape Armored Cable	SLT	UT6x1,7EFCF	24 - 72	Eca	D9019	70
Corrugated Steel Tape Armored Cable	SLT	UT8x1,7EFCF	84 - 96	Eca	D9023	70
Corrugated Steel Tape Armored Cable	SLT	UT3x1,7EFCF	108 - 144	Eca	D9049	70
Corrugated Steel Tape Armored Cable	SLT	UT9x1,7EFCF	156 - 216	Eca	D9050	70





Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Buffer Ø [µm]	Simpex Cord Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperatur Range in Operation	CPR Classification	DoP Number	Warranty Classification
 030.6817_M <b>Semi-tight buffered tube Ø 0.9 mm</b>	IB9e	8	indoor	FRLSZH	1	900		1.0		50	50	-10°C ÷ +60°C	n.a.	n.a.	product warranty
 030.6830_E <b>Tight buffered tube Ø 0.9 mm</b>	IB9t	10	indoor	FRLSZH	1	900		1.0		50	50	-25°C ÷ +70°C	n.a.	n.a.	product warranty
 030.6839_C <b>Simplex Cord</b>	IB9t1AF2,0	12	indoor	FRLSZH	1	900		2.0	4.0	200	500	-25°C ÷ +70°C	n.a.	n.a.	product warranty
	IB9t1AF3,0	12	indoor	FRLSZH	1	900		3.0	9.0	400	500	-25°C ÷ +70°C			product warranty
 030.6800_D <b>Duplex fig.8 Cord</b>	IB9t2AF2x2,0	14	indoor	FRLSZH	2	900	2.0	4.2	9.0	2x 200	1000	-25°C ÷ +70°C	n.a.	n.a.	product warranty
	IB9t2AF2x2,7	14	indoor	FRLSZH	2	900	2.7	5.6	15.0	2x 300	1000	-25°C ÷ +70°C	n.a.	n.a.	product warranty
 030.6414.B <b>MiniCore Multifiber Harness Cable</b>	IAF250 FiRis	16	indoor	FRLSZH	12			3.0	8.0	250	500	-10°C ÷ +60°C	Cca-s2,d0,a1	D9075	product warranty
	IAF400 FiRis	16	indoor	FRLSZH	24			3.6	10.0	400	500	-10°C ÷ +60°C	Cca-s2,d0,a1	D9076	product warranty



- 1. Colored fiber
- 2. Colored semi-tight buffer

030.6817\_M / similar product

## General Description

Semi-tight buffered fiber for direct connector termination to be used as Pigtail assembly for fusion or mechanical splicing. The buffered tube can be stripped off more than 150 cm in one piece. The buffer and the fiber coating are kept in the same color for easy identification even though the buffer is stripped off on longer length.

## Construction and Dimension

Cable family code	<b>IB9e</b>
Cable outer diameter	900 µm
Cable weight	0.96 kg / km
Outer sheath material	FRLSZH
DIN / VDE Code	J-VH
Standard put-up length *	2100m ± 5%

\* other put-up length available on special request

## Order Information

Buffer Color	OM1	OM2	OM3	OM4	OM5	G.657.A1 *
Red			R861315	R864937	R866470	R865594
Green			R861316	R864938	R866471	R865595
Blue	R866482		R861317	R864939	R866472	R865596
Yellow			R861318	R864940	R866473	R865597
White			R861319	R864941	R866474	R865598
Gray			R861320	R864942	R866475	R865599
Violet			R861321	R864943	R866476	R865600
Brown			R861322	R864944	R866477	R865601
Orange		R866483	R861323	R864945	R866478	R865602
Black			R861324	R865591	R866479	R865603
Turquoise			R861325	R865592	R866480	R865604
Pink			R864936	R865593	R866481	R865605

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance	IEC 60794-1-21:E1	50N (short term)	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - short term	IEC 60794-1-21:E3A	150N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Kink resistance	IEC 60794-1-21:E10	d=30 x buffer diameter	no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=10mm, 6 turns, 10 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage

## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F12	- 10°C ÷ + 60°C	$\Delta\alpha \leq 0,05$ dB @ 1550nm
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	0.02 MJ / m	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



030.6830\_E / similar product

## General Description

Tight buffered fiber for direct connector termination to be used as Pigtail assembly for fusion or mechanical splicing. The buffer is kept in color, whereas the fiber respectively its cladding is natural. The buffered tube can be stripped up to 50 mm in one piece.

## Construction and Dimension

Cable family code	<b>IB9t</b>
Cable outer diameter	900 µm
Cable weight	0.96 kg / km
Outer sheath material	FRLSZH
DIN / VDE Code	J-VH
Standard put-up length *	2100m ± 5%

\* other put-up length available on special request

## Order Information

Buffer Color	OM1	OM2	OM3	OM4	OM5	G.657.A1*	G.657.A2**
Blue	R866520						
Orange		R866521					
Turquoise			R866522				
Heather Violet				R866523			
Lime Green					R866525		
Yellow						R865610	R866526

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance	IEC 60794-1-21:E1	50N (short term)	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - short term	IEC 60794-1-21:E3A	150N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Kink resistance	IEC 60794-1-21:E10	d=30 x buffer diameter	no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=10mm, 6 turns, 10 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage

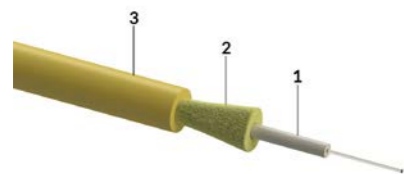
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F12	- 25°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB @ 1550nm
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	0,02 MJ / m	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Uncolored tight buffered fiber
2. Aramid yarn
3. FRLSZH outer sheath

030.6839\_C / similar product

## General Description

Non-metallic Simplex cable for direct connector assembly featuring high flexibility and tight bending radii. Tight buffered fiber design with a standard strippability up to 50mm in one piece. Suitable for any indoor application such as Patch Cord Cable for data centers, drop cable installations or data cable in distribution centers.

## Construction and Dimension

Cable family code	IB9t1AF2,0	IB9t1AF3,0			
Cable outer diameter	2.0mm	3.0mm			
Cable weight	4 kg / km	9 kg / km			
Outer sheath material	FRLSZH				
Sheath color	OM2 orange	OM3 turquoise	OM4 heather-violet	OM5 lime-green	Singlemode yellow
Sheath marking method, color	Ink-Jet, black				
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, G.657.A2, OM3, OM4, OM5)				
DIN / VDE Code	J-V(ZN)H				
Standard put-up length *	2100m ± 5%				

\* other put-up length available on special request

## Order Information

Cord Type	OM3	OM4	OM5	G.657.A1*	G.657.A2**
Ø 2.0mm - IB9t1AF2,0	866484	866485	866486	866487	866488
Ø 3.0mm - IB9t1AF3,0	866494	866495	866496	866497	866498

other fiber types available on request

## Mechanical Data

Test	Test Method	IB9t1AF2,0	IB9t1AF3,0	Acceptance Criteria*
Tensile performance – during installation	IEC 60794-1-21:E1	200N	400N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - short term	IEC 60794-1-21:E3A	500N / 100mm		$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	1 Nm, 3 impacts, d=20mm, R=12,5mm		$\Delta\alpha \leq 0,05$ dB after test, no damage
Kink resistance	IEC 60794-1-21:E10	d=20 x cable diameter		no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=60mm, 6 turns, 10 cycles		$\Delta\alpha \leq 0,05$ dB after test, no damage

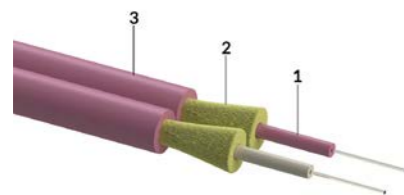
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F12	- 25°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	IB9t1AF2,0	IB9t1AF3,0	Test Method
Thermal load	0.12 MJ / m	0.19 MJ / m	
Flammability - vertical single cable	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	IEC 60332-3-25
Smoke density	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



1. Tight buffered fiber
2. Aramid yarn
3. FRLSZH outer sheath

030.6800\_D / similar product

## General Description

Non-metallic Duplex cable in a figure 8 design also known as Zip Cord made for direct connector assembly featuring high flexibility and tight bending radii. Tight buffered fiber design with a standard strippability up to 50mm in one piece. Suitable for any indoor application such as Patch Cord Cable for data centers, drop cable installations or data cable in distribution centers.

## Construction and Dimension

Cable family code	IB9t2AF2x2,0	IB9t2AF2x2,7			
Cable outer diameter	2.0 x 4.2mm	2.7 x 5.6mm			
Cable weight	9 kg / km	15 kg / km			
Outer sheath material	FRLSZH				
Sheath color	OM2 orange	OM3 turquoise	OM4 heather-violet	OM5 lime-green	Singlemode yellow
Sheath marking method, color	Ink-Jet, black				
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, G.657.A2, OM3, OM4, OM5)				
DIN / VDE Code	J-V(ZN)H				
Standard put-up length *	2100m ± 5%				

\* other put-up length available on special request

## Order Information

Cord Type	OM3	OM4	OM5	G.657.A1*	G.657.A2**
Ø 2 x 2.0 mm - IB9t2AF2x2,0	866499	866500	866501	866502	866503
Ø 2 x 2.7 mm - IB9t2AF2x2,7	866504	866505	866506	866507	866508

other fiber types available on request

## Mechanical Data

Test	Test Method	IB9t2AF2x2,0	IB9t2AF2x2,7	Acceptance Criteria*
Tensile performance - during installation	IEC 60794-1-21:E1	2 x 200N	2 x 300N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - short term	IEC 60794-1-21:E3A	1000 N / 100mm		$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	1 Nm, 3 impacts, d=20mm, R=12,5mm		$\Delta\alpha \leq 0,05$ dB after test, no damage
Kink resistance	IEC 60794-1-21:E10	d=20 x single cord diameter		no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=60mm, 6 turns, 10 cycles		$\Delta\alpha \leq 0,05$ dB after test, no damage

## Climatic Data

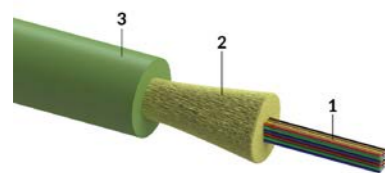
Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F12	- 25°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	IB9t2AF2x2,0	IB9t2AF2x2,7	Test Method
Thermal load	0.23MJ / m	0.37MJ / m	
Flammability - vertical single cable	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	IEC 60332-3-25
Smoke density	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		





1. Optical fibers
2. Aramid yarn
3. FRLSZH UV stable outer jacket

030.6414.B / similar product

## General Description

MiniCore cables are non-metallic multifiber harness cables and are designed for direct assembly of MPO / MTP® connectors or on dividers to fan-out to standard simplex or duplex connectors. The cable includes strain relief made from aramid yarn and a maximum of 12 fibers (IAF250 FiRis), respectively 24 fibers (IAF400 FiRis) and its outer sheath is constructed for indoor installations.

## Construction and Dimension

Cable family code	IAF250 FiRis		IAF400 FiRis		
Fiber count	12		24		
Outer sheath thickness	0.55 mm		0.55 mm		
Cable outer diameter	3.0 mm		3.6 mm		
Cable weight	8 kg / km		10 kg / km		
Outer sheath material	FRLSZH				
Sheath color	OM2 orange	OM3 turquoise	OM4 heather-violet	OM5 lime-green	Singlemode yellow
Sheath marking method, color	Ink-Jet, black				
Fiber types available	Bend optimized single- and multi-mode (G.657.A1, OM3, OM4, OM5) and OM2 fibers				
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)				
DIN / VDE Code	J-(ZN)H				
Standard put-up length *	2100 m ± 5%				

\* other put-up length available on special request

## Order Information

Cord Type	OM3	OM4	OM5	G.657.A2*
12 fiber cable - IAF250 FiRis	866567	866568	866569	866570
24 fiber cable - IAF400 FiRis	866571	866572	866573	866574

other fiber types available on request

## Mechanical Data

Test	Test Method	IAF250 FiRis	IAF400 FiRis	Acceptance Criteria *
Tensile performance - during installation	IEC 60794-1-21:E1	250 N	400 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	300 N / 100 mm		$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	500 N / 100 mm		$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	1 Nm, 3 impacts, d=20 mm, R=12,5 mm		$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles, F= 20 N		no damage
Kink resistance	IEC 60794-1-21:E10	d=20 x cable diameter		no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=15 x cable diameter, 4 turns, 3 cycles		$\Delta\alpha \leq 0,05$ dB after test, no damage

## Climatic Data






Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F12	- 20°C ÷ + 60°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 60°C - 25°C ÷ + 70°C	during installation in service in storage & transport
Expected lifetime		minimum 30 years	

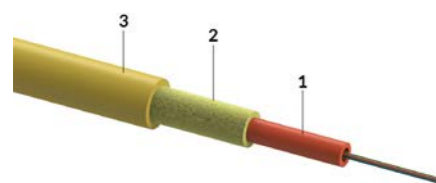
\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	IAF250 FiRis	IAF400 FiRis	Test Method
Thermal load	0.25 MJ / m	0.28 MJ / m	
Euro classification to CPR	Cca-s2,d0,a1	Cca-s2,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9075	D9076	
Flammability - vertical single cable	Pass	Pass	IEC 60332-1-2
Smoke density	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Loose Tube Count	Loose Tube Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperatur Range in Operation	CPR Classification	DoP Number	Warranty Classification
<b>FTTH Mini Loose Tube Indoor Drop Cable</b>  030.7257.C	IFAF	20	indoor	FRLSZH	4	1	1.2	2.3	5.5	200	400	-10°C ÷ +60°C	Dca-s2,d0,a1	D9087	R&Mfreenet
<b>Central Loose Tube – Indoor Cable – B2ca graded</b>  030.6309.D	IFEF FiRis	22	indoor	FRLSZH	24	1	2.4	5.4	32.0	1000	1000	-20°C ÷ +60°C	B2ca-s1a,d0,a1	D9082	R&Mfreenet
<b>Central Loose Tube – Universal Cable – Cca graded</b>  030.7220.C	UTd1GF FiRis	24	universal	FRLSZH – UV stable	12	1	2.8	6.8	32.0	2000	4000	-25°C ÷ +70°C	Cca-s1a,d0,a1	D9088	R&Mfreenet
<b>Stranded Loose Tube – Universal Cable – B2ca graded</b>  030.7270.E	UTd6x2,3GF FiRis 04.12	26	universal	FRLSZH – UV stable	48	4	2.3	10.6	120.0	4000	4000	-40°C ÷ +70°C	B2ca-s1a,d0,a1	D9093	R&Mfreenet
<b>Stranded Loose Tube – Universal Cable – Cca graded</b>  030.7270.G	UTd6x2,3GF FiRis	28	universal	FRLSZH – UV stable	72	6	2.3	10.6	120.0	4000	4000	-40°C to +70°C	Cca-s2,d1,a1	D9089	R&Mfreenet
	UTd8x2,3GF FiRis	28	universal	FRLSZH – UV stable	96	8	2.3	12.5	155.0	5000	4000	-40°C to +70°C	Cca-s2,d1,a1	D9090	R&Mfreenet
	UTd3x2,3GF FiRis	28	universal	FRLSZH – UV stable	144	12	2.3	15.3	240.0	6000	4000	-40°C to +70°C	Cca-s2,d1,a1	D9091	R&Mfreenet



1. Gel free (dry) loose tube with optical fibers
2. Aramid yarn
3. FRLSZH outer sheath

030.7257.C / similar product

## General Description

FTTH mini loose tube cable for up to a maximum of 4 fibers with an outer diameter of only 2.3mm. Non-metallic, gel-free (dry) and suitable for any indoor installation in ducts or direct surface mounting.

## Construction and Dimension

Cable family code	IFAF
Loose tube diameter	1.15 mm
Fiber count per tube	4
Outer sheath thickness	0.35 mm
Cable outer diameter	2.3 mm
Cable weight	5.5 kg / km
Outer sheath material	FRLSZH
Sheath marking method, color	Ink-Jet, black
Fiber types available	Bend insensitive singlemode fiber G.657.A2
Fiber color coding (IEC 60304)	1.-4.: red, green, blue, yellow
DIN / VDE Code	J-B(ZN)H
Standard put-up length *	2100 m ± 5 %

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A2*
IFAF	2	873755
	4	873756

other fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – during installation	IEC 60794-1-21:E1	200N (5 min)	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	400N / 100mm (15 min)	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	3 Nm, 3 impacts, d=20mm, R=12.5 mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Kink resistance	IEC 60794-1-21:E10	d=4 x cable diameter	no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		35 mm	
Minimum bend radius – during installation		45 mm	

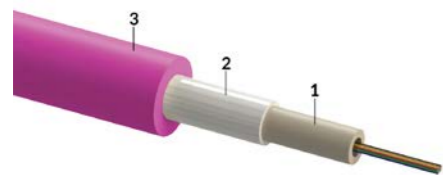
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 60°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 60°C - 20°C ÷ + 60°C	during installation in service in storage & transport
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	0.11 MJ / m	
Euro classification to CPR	Dca-s2,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9187	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	IEC 60332-3-25
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Dry tube with optical fibers
2. Water-blocking e-glass yarn
3. FRLSZH outer sheath

030.6309.D / similar product

## General Description

Rodent protected, non-metallic and dry central loose tube cable for up to a maximum of 24 fibers for indoor duct installation.

## Construction and Dimension

Cable family code	IFEF FiRis				
Loose tube diameter	2.4 mm				
Fiber count per tube	24				
Outer sheath thickness	0.9 mm				
Cable outer diameter	5.4 mm				
Cable weight	32 kg / km				
Outer sheath material	FRLSZH				
Sheath color	OM2 orange	OM3 turquoise	OM4 heather-violet	OM5 lime-green	Singlemode yellow
Sheath marking method, color	Ink-Jet, black				
Fiber types available	Bend optimized single- and multi-mode G.657.A1, OM2, OM3, OM4 and OM5 fibers				
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)				
DIN / VDE Code	J-B(ZN)H wbg				
Standard put-up length *	2100 m ± 5 %				

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM2	OM3	OM4	OM5	G.657.A1 *
IFEF FiRis	4	857768	857774	857780	857786	857792
	6	857769	857775	857781	857787	857793
	8	857770	857776	857782	857788	857794
	12	857771	857777	857783	857789	857795
	16	857772	857778	857784	857790	857796
	24	857773	857779	857785	857791	857797

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – during installation	IEC 60794-1-21:E1	1000 N (5 min.)	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	500 N / 100 mm (15 min)	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	1000 N / 100 mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	5 Nm, 3 impacts, d=20mm, R=12,5 mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles, F= 20 N	no damage
Kink resistance	IEC 60794-1-21:E10	d=20 x cable diameter	no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	R=20 x cable diameter, 6 turns, 10 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=10 x cable diameter, 25 cycles, m = 4 kg	no damage
Minimum bend radius – in service		85 mm	
Minimum bend radius – during installation		110 mm	

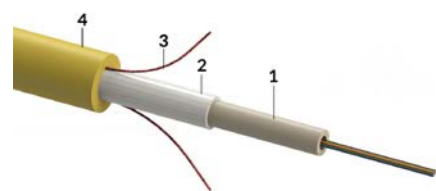
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 60°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 60°C - 25°C ÷ + 60°C	during installation in service in storage & transport
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	0.48 MJ / m	
Euro classification to CPR	B2ca-s1a,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9082	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Gel free (dry) PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. Rip-cords (diametral positioned)
4. UV-stable FRLSZH outer sheath

030.7220.C / similar product

## General Description

Central loose tube cable (CLT) for up to a maximum of 12 fibers. Non-metallic, "intensified" rodent protected (IRP), gel-free (dry) and longitudinal water tight for indoor or outdoor duct installation (universal-use).

## Construction and Dimension

Cable family code	UTd1GF FiRis			
Loose tube diameter	2.8mm			
Fiber count per tube	12			
Outer sheath thickness	1.2mm			
Cable outer diameter	6.8mm			
Cable weight	32kg / km			
Outer sheath material	UV stable FRLSZH			
Sheath color	OM3 turquoise	OM4 heather-violet	OM5 lime-green	Singlemode yellow
Sheath marking method, color	Ink-Jet, black			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4, OM5)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
DIN / VDE Code	U-BQ(BN)H wbg			
Standard put-up length *	2100m ± 5%			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	OM5	G.657.A1 *
UTd1GF FiRis	4	870412	870416	870420	870424
	6	870413	870417	870421	870425
	8	870414	870418	870422	870426
	12	870415	870419	870423	870427

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1000 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	4000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=10 x cable diameter, 25 cycles, m = 4 kg	no damage
Minimum bend radius – in service		100mm	
Minimum bend radius – during installation		140mm	

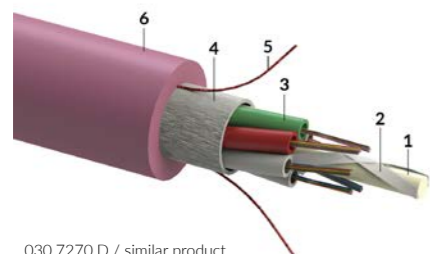
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 70°C - 25°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	0.63MJ / m	
Euro classification to CPR	Cca-s1a,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9088	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	IEC 60332-3-22
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. FRP central strength member
2. Water-blocking yarn
3. Gel free (dry) PBT loose tube with optical fibers
4. Water-blocking e-glass yarn
5. Rip-cords (diametral positioned)
6. UV stable FRLSZH outer sheath

030.7270.D / similar product

## General Description

6-way stranded loose tube cable (SLT) equipped with 48 fibers. Non-metallic, improved rodent protected (IRP), gel-free (dry) and longitudinal water tight for indoor or outdoor duct installation (universal-use). The cable construction is specifically designed to meet the CPR fire rating of B2ca.

## Construction and Dimension

Cable family code	<b>UTd6x2,3GF FiRis 04.12</b>			
Loose tube diameter	2.3mm			
Fiber count per tube	12			
Outer sheath thickness	1.4mm			
Cable outer diameter	10.6mm			
Cable weight	120kg / km			
Outer sheath material	UV stable FRLSZH			
Sheath color	OM3 turquoise	OM4 heather-violet	OM5 lime-green	Singlemode yellow
Sheath marking method, color	Ink-Jet, black			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4, OM5)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers black			
DIN / VDE Code	U-BQ(BN)H wbg 4x2,3			
Standard put-up length *	2100m ± 5%			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
UTd6x2,3GF FiRis 04.12	4 x 12 (48)	870468	873700

other fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	2200 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	4000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	4000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		160mm	
Minimum bend radius – during installation		215mm	

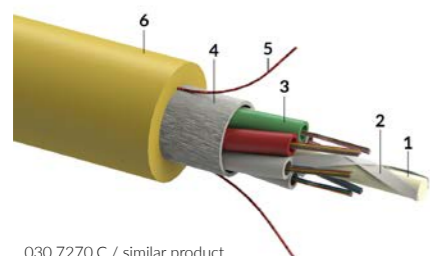
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, 1 m water height, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	1.8MJ / m	
Euro classification to CPR	B2ca-s1a,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9093	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	IEC 60332-3-22
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. FRP central strength member
2. Water-blocking yarn
3. Gel free (dry) PBT loose tube with optical fibers
4. Water-blocking e-glass yarn
5. Rip-cords (diametral positioned)
6. UV stable FRLSZH outer sheath

030.7270.C / similar product

## General Description

Stranded loose tube cable (SLT) for up to a maximum of 144 fibers. Non-metallic, "improved" rodent protected (IRP), gel-free (dry) and longitudinal water tight for indoor or outdoor duct installation (universal-use).

## Construction and Dimension

Cable family code	UTd6x2,3GF FiRis	UTd8x2,3GF FiRis	UTd3x2,3GF FiRis	
Maximum fiber count	72	96	144	
Maximum fiber count per tube	12	12	12	
Maximum loose tube count	6	8	12	
Loose tube diameter	2.3mm	2.3mm	2.3mm	
Outer sheath thickness	1.4mm	1.4mm	1.4mm	
Cable outer diameter	10.6mm	12.5mm	15.3mm	
Cable weight	120kg / km	155kg / km	240kg / km	
Outer sheath material	UV stable FRLSZH			
Sheath color	OM3 turquoise	OM4 heather-violet	OM5 lime-green	Singlemode yellow
Sheath marking method, color	Ink-Jet, black			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4, OM5)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers black			
DIN / VDE Code	U-BQ(BN)H wbg nx2,3			
Standard put-up length *	2100m ± 5%			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	OM5	G.657.A1 *
UTd6x2,3GF FiRis	2 x 12 (24)	873735	870469	873739	873701
	4 x 12 (48)	873736	870470	873740	873732
	6 x 12 (72)	873737	873698	873741	873733
UTd8x2,3GF FiRis	8 x 12 (96)				878469
UTd3x2,3GF FiRis	12 x 12 (144)	873738	873699	873742	873734

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	UTd6x2,3GF FiRis	UTd8x2,3GF FiRis	UTd3x2,3GF FiRis	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	2200 N	2500 N	3000 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	4000 N	5000 N	6000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	2000 N / 100mm			$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	4000 N / 100mm			$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm			$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles			no damage
Cable bend – no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles			$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles			no damage
Minimum bend radius – in service		230mm			
Minimum bend radius – during installation		310mm			

## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, 1m water height, 24h	no water leakage
Expected lifetime		minimum 30 years	

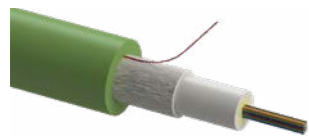
\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UTd6x2,3GF FiRis	UTd8x2,3GF FiRis	UTd3x2,3GF FiRis	Test Method
Thermal load	2.0MJ / m	2.2MJ / m	3.5MJ / m	
Euro classification to CPR	Cca-s2,d1,a1	Cca-s2,d1,a1	Cca-s2,d1,a1	EN 50575, EN 13501-6
Declaration of performance number	D9089	D9090	D9091	
Flammability – vertical single cable	Pass	Pass	Pass	IEC 60332-1-2
Flammability – vertical cable bundle	Pass	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	Pass	IEC 60754-2
2015 / 863 / EU – RoHS 3	conform			
1907 / 2006 / EU – REACH	conform			

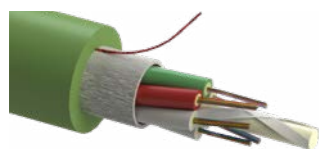


Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Loose Tube Count	Loose Tube Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperature Range in Operation	CPR Classification	DoP Number	Warranty Classification
<b>Central Loose Tube - Universal Cable</b>	UT1EF	32	universal	FRLSZH - UV stable	12	1	2.3	5.2	33.0	1000	2000	-30°C ÷ +70°C	Dca-s2,d1,a1	D9012	R&Mfreenet
	UX1EF	32	universal	FRLSZH - UV stable	24	1	3.0	5.8	41.0	1000	2000	-30°C ÷ +70°C	Dca-s2,d1,a1	D9027	R&Mfreenet



030.6308.B

<b>Stranded Loose Tube - Universal Cable</b>	UT6x1,7F	34	universal	FRLSZH - UV stable	72	6	1.7	7.8	70.0	2000	2000	-40°C to +70°C	Eca	D9020	R&Mfreenet
	UT8x1,7F	34	universal	FRLSZH - UV stable	96	8	1.7	9.5	90.0	2000	2000	-40°C to +70°C	Eca	D9024	R&Mfreenet
	UT3x1,7F	34	universal	FRLSZH - UV stable	144	12	1.7	11.7	130.0	2000	2000	-40°C to +70°C	Eca	D9014	R&Mfreenet
	UT9x1,7F	34	universal	FRLSZH - UV stable	216	18	1.7	11.8	135.0	2000	2000	-40°C to +70°C	Eca	D9051	R&Mfreenet



030.6399.B

<b>Stranded Loose Tube - 24 Fiber Tubed Universal Cable</b>	UX3x2,3EF	36	universal	FRLSZH - UV stable	288	12	2.3	14.2	190.0	3000	2000	-40°C ÷ +70°C	Eca	D9077	R&Mfreenet
	UX9x2,3EF	36	universal	FRLSZH - UV stable	432	18	2.3	14.6	195.0	3000	2000	-40°C ÷ +70°C	Eca	D9078	R&Mfreenet



030.6410.B

<b>Central Loose Tube - Outdoor Cable</b>	OT1EL	38	outdoor	LDPE - UV stable	12	1	2.8	5.8	29.0	1000	2000	-20°C ÷ +70°C	Fca	D9905	R&Mfreenet
	OX1EL	38	outdoor	LDPE - UV stable	24	1	3.5	6.5	37.0	1000	2000	-20°C ÷ +70°C	Fca	D9906	R&Mfreenet



030.6308.A

<b>Stranded Loose Tube - Outdoor Cable</b>	OT6x1,7H	40	outdoor	HDPE - UV stable	72	6	1.7	7.8	55.0	2000	2000	-40°C to +70°C	Fca	D9925	R&Mfreenet
	OT8x1,7H	40	outdoor	HDPE - UV stable	96	8	1.7	9.5	70.0	2000	2000	-40°C to +70°C	Fca	D9926	R&Mfreenet
	OT3x1,7H	40	outdoor	HDPE - UV stable	144	12	1.7	11.7	105.0	2000	2000	-40°C to +70°C	Fca	D9927	R&Mfreenet
	OT9x1,7H	40	outdoor	HDPE - UV stable	216	18	1.7	11.8	110.0	2000	2000	-40°C to +70°C	Fca	D9928	R&Mfreenet



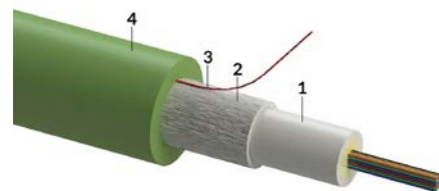
030.7270.G

<b>Stranded Loose Tube - 24 Fiber Tubed Outdoor Cable</b>	OX3x2,3EH	42	outdoor	HDPE - UV stable	288	12	2.3	14.2	170.0	3000	2000	-40°C to +70°C	Fca	D9933	R&Mfreenet
	OX9x2,3EH	42	outdoor	HDPE - UV stable	432	18	2.3	14.6	175.0	3000	2000	-40°C to +70°C	Fca	D9934	R&Mfreenet



030.6410.A





1. Gel filled PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. Rip-cord
4. UV-stable FRLSZH outer sheath

030.6308.B / similar product

## General Description

Rodent protected, non-metallic central loose tube cable for up to a maximum of 24 fibers for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	UT1EF	UX1EF
Loose tube diameter	2.3mm	3.0mm
Fiber count per tube	12	24
Outer sheath thickness	1.0mm	1.1mm
Cable outer diameter	5.2mm	5.8mm
Cable weight	33kg / km	41kg / km
Outer sheath material	UV stable FRLSZH	
Sheath color	green	
Sheath marking method, color	Ink-Jet, black	
Fiber types available	Bend optimized single- and multi-mode (G.657.A1, OM3, OM4) and OM1 and OM2 fibers	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)	
DIN / VDE Code	U-DQ(ZN)H wbg	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM1	OM2	OM3	OM4	G.657.A1 *
UT1EF	4	855523	855531	855539	855545	855558
	6	855524	855532	855540	855546	855559
	8	855525	855533	855541	852312	855560
	12	855526	855534	853221	852313	855561
UX1EF	24	855563	855565	855566	855567	852308

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	300N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	1000N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		90mm	
Minimum bend radius – during installation		130mm	

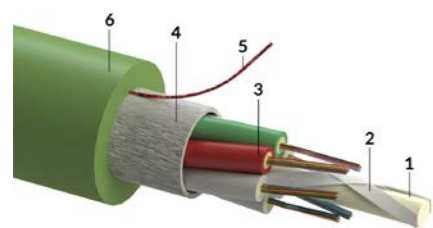
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 30°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C	during installation
		- 30°C ÷ + 70°C	in service
		- 35°C ÷ + 70°C	in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, 1m water height, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UT1EF	UX1EF	Test Method
Thermal load	0.48MJ / m	0.66MJ / m	
Euro classification to CPR	Dca-s2,d1,a1	Dca-s2,d1,a1	EN 50575, EN 13501-6
Declaration of performance number	D9012	D9027	
Flammability - vertical single cable	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking tape or e-glass yarn
5. Rip-cord
6. UV stable FRLSZH outer sheath

030.6399.B / similar product

## General Description

Rodent-protected, non-metallic stranded loose tube cable with up to 216 fibers in a 18-strand stranding, for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	UT6x1,7F	UT8x1,7F	UT3x1,7F	UT9x1,7F
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.7 mm	1.7 mm	1.7 mm	1.7 mm
Outer sheath thickness	1.2 mm	1.2 mm	1.2 mm	1.2 mm
Cable outer diameter	7.8 mm	9.5 mm	11.7 mm	11.8 mm
Cable weight	70 kg / km	90 kg / km	130 kg / km	135 kg / km
Outer sheath material	UV stable FRLSZH			
Sheath color	green			
Sheath marking method, color	Ink-Jet, black			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	U-DQ(ZN)H nx1,7			
Standard put-up length *	2100 m ± 5 %			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UT6x1,7F	2 x 12 (24)	856271	856303	856365
	4 x 12 (48)	856273	856305	856367
	6 x 12 (72)	856275	856307	856369
UT8x1,7F	8 x 12 (96)	856276	856308	856370
UT3x1,7F	12 x 12 (144)	856277	856309	856371
UT9x1,7F	18 x 12 (216)	856279	856311	856373

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	UT6x1,7F	UT8x1,7F	UT3x1,7F	UT9x1,7F	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	800 N	800 N	800 N	800 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2000 N	2000 N	2000 N	2000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles				no damage
Minimum bend radius – in service		180 mm				
Minimum bend radius – during installation		240 mm				

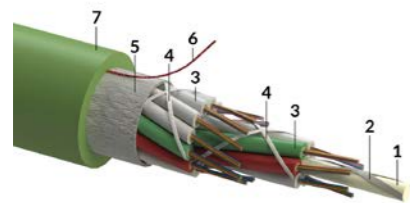
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, 1 m water height, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UT6x1,7F	UT8x1,7F	UT3x1,7F	UT9x1,7F	Test Method
Thermal load	1.1 MJ / m	1.45 MJ / m	2.5 MJ / m	2.47 MJ / m	
Euro classification to CPR	Eca	Eca	Eca	Eca	EN 50575, EN 13501-6
Declaration of performance number	D9020	D9024	D9014	D9051	
Flammability - vertical single cable	Pass	Pass	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform				
1907 / 2006 / EU - REACH	conform				



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Fixation yarn
5. Water-blocking e-glass yarn
6. Rip-cord
7. UV stable FRLSZH outer sheath

030.6410.B / similar product

## General Description

Rodent-protected, non-metallic stranded loose tube cable with up to 432 fibers in a 18-strand stranding, for indoor or outdoor duct installation. Individual loose tubes are equipped with 24 fibers.

## Construction and Dimension

Cable family code	UX3x2,3EF	UX9x2,3EF
Maximum fiber count	288	432
Maximum fiber count per tube	24	24
Maximum loose tube count	12	18
Loose tube diameter	2.3mm	2.3mm
Outer sheath thickness	1.2mm	1.2mm
Cable outer diameter	14.2mm	14.6mm
Cable weight	190kg / km	195kg / km
Outer sheath material	UV stable FRLSZH	
Sheath color	green	
Sheath marking method, color	Ink-Jet, black	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)	
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black	
DIN / VDE Code	U-DQ(ZN)H wbg nx2,3	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UX3x2,3EF	12 x 24 (288)	856586	856590	856598
UX9x2,3EF	18 x 24 (432)	856587	856591	856599

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1000 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	3000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		220mm	
Minimum bend radius – during installation		295mm	

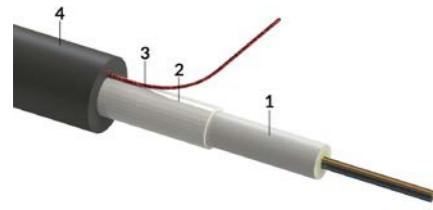
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, 1m water height, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UX3x2,3EF	UX9x2,3EF	Test Method
Thermal load	4.09 MJ / m	3.98 MJ / m	
Euro classification to CPR	Eca	Eca	EN 50575, EN 13501-6
Declaration of performance number	D9077	D9078	
Flammability - vertical single cable	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



1. Gel filled PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. Rip-cord
4. UV stable LDPE outer sheath

030.6308.A / similar product

## General Description

Rodent protected, non-metallic central loose tube cable for up to a maximum of 24 fibers for outdoor duct installation.

## Construction and Dimension

Cable family code	OT1EL	OX1EL
Loose tube diameter	2.8mm	3.5mm
Fiber count per tube	12	24
Outer sheath thickness	1.0mm	1.1mm
Cable outer diameter	5.8mm	6.5mm
Cable weight	29 kg / km	37 kg / km
Outer sheath material	UV stable LDPE	
Sheath color	black	
Sheath marking method, color	Ink-Jet, white	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink	
DIN / VDE Code	A-DQ(ZN)2Y wbg	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OT1EL	4	855505	855512
	6	855506	855513
	8	855507	855514
	12	855508	855515
OX1EL	24	855517	855518

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	300N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	1000N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	1000N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	2000N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		90mm	
Minimum bend radius – during installation		130mm	

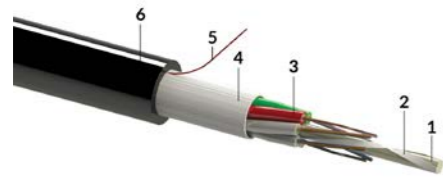
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 70°C - 25°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, 1m water height, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OT1EL	OX1EL	Test Method
Euro classification to CPR	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9905	D9906	
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking tape or e-glass yarn
5. Rip-cord
6. UV stable HDPE outer sheath

030.6399.A / similar product

## General Description

Rodent-protected, non-metallic stranded loose tube cable with up to 216 fibers in a 18-strand stranding, for outdoor duct installation.

## Construction and Dimension

Cable family code	OT6x1,7H	OT8x1,7H	OT3x1,7H	OT9x1,7H
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.7 mm	1.7 mm	1.7 mm	1.7 mm
Outer sheath thickness	1.2 mm	1.2 mm	1.2 mm	1.2 mm
Cable outer diameter	7.8 mm	9.5 mm	11.7 mm	11.8 mm
Cable weight	55 kg / km	70 kg / km	105 kg / km	110 kg / km
Outer sheath material	UV stable HDPE			
Sheath color	black			
Sheath marking method, color	Ink-Jet, white			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	A-DQ(ZN)2Y nx1,7			
Standard put-up length *	2100m ± 5 %			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OT6x1,7H	2 x 12 (24)	856177	856207
	4 x 12 (48)	856179	856209
	6 x 12 (72)	856181	856211
OT8x1,7H	8 x 12 (96)	856182	856212
OT3x1,7H	12 x 12 (144)	856183	856213
OT9x1,7H	18 x 12 (216)	856185	856215

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	OT6x1,7H	OT8x1,7H	OT3x1,7H	OT9x1,7H	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	800 N	800 N	800 N	800 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2000 N	2000 N	2000 N	2000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles				no damage
Minimum bend radius – in service		175 mm				
Minimum bend radius – during installation		240 mm				

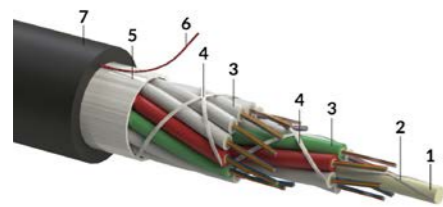
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OT6x1,7H	OT8x1,7H	OT3x1,7H	OT9x1,7H	Test Method
Euro classification to CPR	Fca	Fca	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9925	D9926	D9927	D9928	
2015 / 863 / EU - RoHS 3	conform				
1907 / 2006 / EU - REACH	conform				



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Fixation yarn
5. Water-blocking e-glass yarn
6. Rip-cord
7. UV stable HDPE outer sheath

030.6410.A / similar product

## General Description

Rodent-protected, non-metallic stranded loose tube cable with up to 432 fibres in a 18-strand stranding, for outdoor duct installation. Individual loose tubes are equipped with 24 fibers.

## Construction and Dimension

Cable family code	OX3x2,3EH	OX9x2,3EH
Maximum fiber count	288	432
Maximum fiber count per tube	24	24
Maximum loose tube count	12	18
Loose tube diameter	2.3mm	2.3mm
Outer sheath thickness	1.2mm	1.2mm
Cable outer diameter	14.2mm	14.6mm
Cable weight	170kg / km	175kg / km
Outer sheath material	UV stable HDPE	
Sheath color	black	
Sheath marking method, color	Ink-Jet, white	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)	
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black	
DIN / VDE Code	A-DQ(ZN)2Y wbg nx2,3	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OX3x2,3EH	12 x 24 (288)	856453	856457
OX9x2,3EH	18 x 24 (432)	856454	856458

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1000 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	3000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		220mm	
Minimum bend radius – during installation		295mm	

## Climatic Data


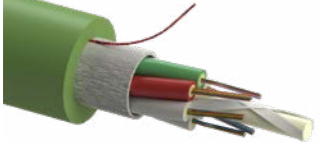





Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, 1h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

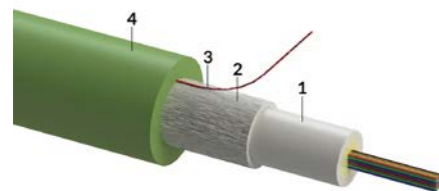
\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OX3x2,3EH	OX9x2,3EH	Test Method
Euro classification to CPR	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9933	D9934	
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Loose Tube Count	Loose Tube Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperature Range in Operation	CPR Classification	DoP Number	Warranty Classification
<b>Central Loose Tube - Universal Cable</b> 	UT1GF	46	universal	FRLSZH - UV stable	12	1	2.3	6.2	45.0	1800	2000	-30°C ÷ +70°C	Dca-s2,d1,a1	D9013	R&Mfreenet
	UX1GF	46	universal	FRLSZH - UV stable	24	1	3.0	7.2	58.0	2000	2000	-30°C ÷ +70°C	Dca-s2,d1,a1	D9031	R&Mfreenet
030.6308.B															
<b>Stranded Loose Tube - Universal Cable</b> 	UT6x1,7GF	48	universal	FRLSZH - UV stable	72	6	1.7	9.0	90.0	2700	2000	-40°C ÷ +70°C	Eca	D9021	R&Mfreenet
	UT8x1,7GF	48	universal	FRLSZH - UV stable	96	8	1.7	10.0	115.0	4000	2000	-40°C ÷ +70°C	Eca	D9025	R&Mfreenet
	UT3x1,7GF	48	universal	FRLSZH - UV stable	144	12	1.7	12.2	155.0	4500	2000	-40°C ÷ +70°C	Eca	D9015	R&Mfreenet
	UT9x1,7GF	48	universal	FRLSZH - UV stable	216	18	1.7	12.7	160.0	4500	2000	-40°C ÷ +70°C	Eca	D9052	R&Mfreenet
030.6399.B															
<b>Stranded Loose Tube - 24 Fiber Tubed Universal Cable</b> 	UX3x2,3GF	50	universal	FRLSZH - UV stable	288	12	2.3	15.3	220.0	5000	2000	-40°C ÷ +70°C	Eca	D9079	R&Mfreenet
	UX9x2,3GF	50	universal	FRLSZH - UV stable	432	18	2.3	15.7	230.0	5000	2000	-40°C ÷ +70°C	Eca	D9080	R&Mfreenet
030.6410.B															
<b>Central Loose Tube - Outdoor Cable</b> 	OT1GL	52	outdoor	LDPE - UV stable	12	1	2.8	6.5	37.0	1800	2000	-20°C ÷ +70°C	Fca	D9907	R&Mfreenet
	OX1GL	52	outdoor	LDPE - UV stable	24	1	3.5	7.4	50.0	2000	2000	-20°C ÷ +70°C	Fca	D9908	R&Mfreenet
030.6308.A															
<b>Stranded Loose Tube - Outdoor Cable</b> 	OT6x1,7GH	54	outdoor	HDPE - UV stable	72	6	1.7	9.0	70.0	2700	2000	-40°C ÷ +70°C	Fca	D9935	R&Mfreenet
	OT8x1,7GH	54	outdoor	HDPE - UV stable	96	8	1.7	10.0	90.0	4000	2000	-40°C ÷ +70°C	Fca	D9936	R&Mfreenet
	OT3x1,7GH	54	outdoor	HDPE - UV stable	144	12	1.7	12.2	130.0	4500	2000	-40°C ÷ +70°C	Fca	D9937	R&Mfreenet
	OT9x1,7GH	54	outdoor	HDPE - UV stable	216	18	1.7	12.7	135.0	4500	2000	-40°C ÷ +70°C	Fca	D9938	R&Mfreenet
030.6399.A															
<b>Stranded Loose Tube - 24 Fiber Tubed Outdoor Cable</b> 	OX3x2,3GH	56	outdoor	HDPE - UV stable	288	12	2.3	15.3	190.0	5000	2000	-40°C to +70°C	Fca	D9947	R&Mfreenet
	OX9x2,3GH	56	outdoor	HDPE - UV stable	432	18	2.3	15.7	195.0	5000	2000	-40°C to +70°C	Fca	D9948	R&Mfreenet
030.6410.A															
<b>Stranded Loose Tube - Double Sheathed Outdoor Cable</b> 	OT6x1,7LGH	58	outdoor	HDPE - UV stable	72	6	1.7	12.0	115.0	4000	3000	-40°C to +70°C	Fca	D9939	product warranty
	OT8x1,7LGH	58	outdoor	HDPE - UV stable	96	8	1.7	13.0	140.0	5000	3000	-40°C to +70°C	Fca	D9940	product warranty
	OT3x1,7LGH	58	outdoor	HDPE - UV stable	144	12	1.7	15.3	180.0	5000	3000	-40°C to +70°C	Fca	D9941	product warranty
030.7628.A															



1. Gel filled PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. Rip-cord
4. UV-stable FRLSZH outer sheath

030.6308.B / similar product

## General Description

Non-metallic central loose tube cable with improved rodent protection. With up to 24 fibers maximum, suitable for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	UT1GF	UX1GF
Loose tube diameter	2.3mm	3.0mm
Fiber count per tube	12	24
Outer sheath thickness	1.1 mm	1.2 mm
Cable outer diameter	6.2mm	7.2mm
Cable weight	45 kg / km	58 kg / km
Outer sheath material	UV stable FRLSZH	
Sheath color	green	
Sheath marking method, color	Ink-Jet, black	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)	
DIN / VDE Code	U-DQ(BN)H wbg	
Standard put-up length *	2100m ± 5 %	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UT1GF	4	855616	855622	855637
	6	855617	855623	855638
	8	855618	855624	855639
	12	855619	855625	855640
UX1GF	24	855646	855648	855651

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	UT1GF	UX1GF	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	600N	800N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	1800N	2000N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100mm		$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100mm		$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm		$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles		no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles		$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles		no damage
Minimum bend radius – in service		110mm		
Minimum bend radius – during installation		150mm		

## Climatic Data

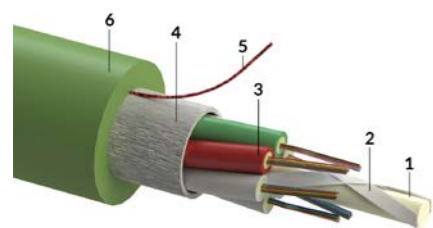
Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 30°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 30°C ÷ + 70°C - 35°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UT1GF	UX1GF	Test Method
Thermal load	0.59 MJ / m	0.81 MJ / m	
Euro classification to CPR	Dca-s2,d1,a1	Dca-s2,d1,a1	EN 50575, EN 13501-6
Declaration of performance number	D9013	D9031	
Flammability - vertical single cable	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		





1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking e-glass yarn
5. Rip-cord
6. UV stable FRLSZH outer sheath

030.6402.B / similar product

## General Description

Improved rodent-protected, non-metallic stranded loose tube cable with up to 216 fibers in a 18-strand stranding, for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	UT6x1,7GF	UT8x1,7GF	UT3x1,7GF	UT9x1,7GF
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.7 mm	1.7 mm	1.7 mm	1.7 mm
Outer sheath thickness	1.4 mm	1.4 mm	1.4 mm	1.4 mm
Cable outer diameter	9.0 mm	10.0 mm	12.2 mm	12.7 mm
Cable weight	90 kg / km	115 kg / km	155 kg / km	160 kg / km
Outer sheath material	UV stable FRLSZH			
Sheath color	green			
Sheath marking method, color	Ink-Jet, black			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	U-DQ(BN)H wbg nx1,7			
Standard put-up length *	2100 m ± 5 %			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UT6x1,7GF	2 x 12 (24)	856718	856750	856813
	4 x 12 (48)	856720	856752	856815
	6 x 12 (72)	856722	856754	856817
UT8x1,7GF	8 x 12 (96)	856723	856755	856818
UT3x1,7GF	12 x 12 (144)	856724	856756	856819
UT9x1,7GF	18 x 12 (216)	856726	856758	856821

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	UT6x1,7GF	UT8x1,7GF	UT3x1,7GF	UT9x1,7GF	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	900 N	1200 N	1400 N	1400 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2700 N	4000 N	4500 N	4500 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20 mm, R=300 mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles				no damage
Minimum bend radius – in service		190 mm				
Minimum bend radius – during installation		255 mm				

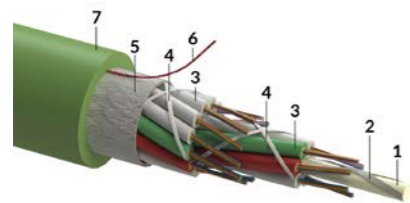
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UT6x1,7GF	UT8x1,7GF	UT3x1,7GF	UT9x1,7GF	Test Method
Thermal load	1.35 MJ / m	1.65 MJ / m	2.73 MJ / m	2.72 MJ / m	
Euro classification to CPR	Eca	Eca	Eca	Eca	EN 50575, EN 13501-6
Declaration of performance number	D9021	D9025	D9015	D9052	
Flammability - vertical single cable	Pass	Pass	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform				
1907 / 2006 / EU - REACH	conform				



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Fixation yarn
5. Water-blocking e-glass yarn
6. Rip-cord
7. UV stable FRLSZH outer sheath

030.6410.B / similar product

## General Description

Improved rodent-protected, non-metallic stranded loose tube cable with up to 432 fibers in a 18-strand stranding, for indoor or outdoor duct installation. Individual loose tubes are equipped with 24 fibers.

## Construction and Dimension

Cable family code	UX3x2,3GF	UX9x2,3GF
Maximum fiber count	288	432
Maximum fiber count per tube	24	12
Maximum loose tube count	12	18
Loose tube diameter	2.3mm	2.3mm
Outer sheath thickness	1.4mm	1.4mm
Cable outer diameter	15.3mm	15.7mm
Cable weight	220kg / km	230kg / km
Outer sheath material	UV stable FRLSZH	
Sheath color	green	
Sheath marking method, color	Ink-Jet, black	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)	
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black	
DIN / VDE Code	U-DQ(BN)H wbg nx2,3	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UX3x2,3GF	12 x 24 (288)	857038	857042	857050
UX9x2,3GF	18 x 24 (432)	857039	857043	857051

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	1500 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	5000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		235mm	
Minimum bend radius – during installation		315mm	

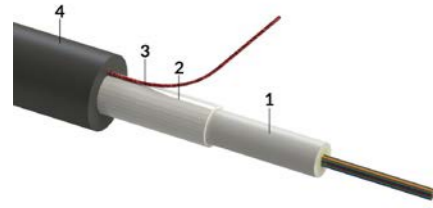
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UX3x2,3GF	UX9x2,3GF	Test Method
Thermal load	4.22 MJ / m	4.24 MJ / m	
Euro classification to CPR	Eca	Eca	EN 50575, EN 13501-6
Declaration of performance number	D9079	D9080	
Flammability - vertical single cable	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



1. Gel filled PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. Rip-cord
4. UV stable LDPE outer sheath

030.6308.A / similar product

## General Description

Non-metallic central loose tube cable with improved rodent protection. With up to 24 fibers maximum, suitable for outdoor duct installation.

## Construction and Dimension

Cable family code	OT1GL	OX1GL
Maximum fiber count	12	24
Maximum fiber count per tube	12	24
Maximum loose tube count	1	1
Loose tube diameter	2.8mm	3.5mm
Outer sheath thickness	1.1mm	1.2mm
Cable outer diameter	6.5mm	7.4mm
Cable weight	37kg / km	50kg / km
Outer sheath material	UV stable LDPE	
Sheath color	black	
Sheath marking method, color	Ink-Jet, white	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)	
DIN / VDE Code	A-DQ(BN)2Y wbg	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OT1GL	4	855581	855588
	6	855582	855589
	8	855583	855590
	12	855584	851102
OX1GL	24	855594	848355

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	OT1GL	OX1GL	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	600N	800N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	1800N	2000N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000N / 100mm		$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000N / 100mm		$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm		$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles		no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles		$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles		no damage
Minimum bend radius – in service		110mm		
Minimum bend radius – during installation		150mm		

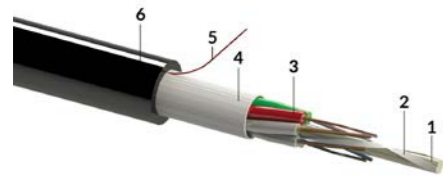
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 70°C - 25°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OT1GL	OX1GL	Test Method
Euro classification to CPR	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9907	D9908	
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking e-glass yarn
5. Rip-cord
6. UV stable HDPE outer sheath

030.6402.A / similar product

## General Description

Improved rodent-protected, non-metallic stranded loose tube cable with up to 216 fibers in a 18-strand stranding, for outdoor duct installation.

## Construction and Dimension

Cable family code	OT6x1,7GH	OT8x1,7GH	OT3x1,7GH	OT9x1,7GH
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.7 mm	1.7 mm	1.7 mm	1.7 mm
Outer sheath thickness	1.4 mm	1.4 mm	1.4 mm	1.4 mm
Cable outer diameter	9.0 mm	10.0 mm	12.2 mm	12.7 mm
Cable weight	70 kg / km	90 kg / km	130 kg / km	135 kg / km
Outer sheath material	UV stable HDPE			
Sheath color	black			
Sheath marking method, color	Ink-Jet, white			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	A-DQ(BN)2Y wbg nx1,7			
Standard put-up length *	2100 m ± 5 %			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OT6x1,7GH	2 x 12 (24)	856623	856654
	4 x 12 (48)	856625	856656
	6 x 12 (72)	856627	856658
OT8x1,7H	8 x 12 (96)	856628	856659
OT3x1,7H	12 x 12 (144)	856629	856660
OT9x1,7H	18 x 12 (216)	856631	856662

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	OT6x1,7GH	OT8x1,7GH	OT3x1,7GH	OT9x1,7GH	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	900 N	1200 N	1400 N	1400 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2700 N	4000 N	4500 N	4500 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	1000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	2000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20 mm, R=300 mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend – no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles				no damage
Minimum bend radius – in service		190 mm				
Minimum bend radius – during installation		255 mm				

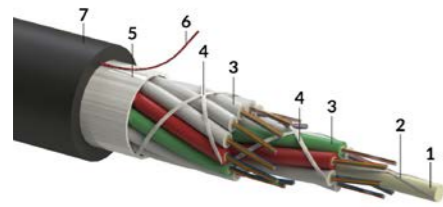
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OT6x1,7GH	OT8x1,7GH	OT3x1,7GH	OT9x1,7GH	Test Method
Euro classification to CPR	Fca	Fca	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9935	D9936	D9937	D9938	
2015 / 863 / EU - RoHS 3	conform				
1907 / 2006 / EU - REACH	conform				



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Fixation yarn
5. Water-blocking e-glass yarn
6. Rip-cord
7. UV stable HDPE outer sheath

030.6410.A / similar product

## General Description

Improved rodent-protected, non-metallic stranded loose tube cable with up to 432 fibers in a 18-strand stranding, for outdoor duct installation. Individual loose tubes are equipped with 24 fibers.

## Construction and Dimension

Cable family code	OX3x2,3GH	OX9x2,3GH
Maximum fiber count	288	432
Maximum fiber count per tube	24	24
Maximum loose tube count	12	18
Loose tube diameter	2.3mm	2.3mm
Outer sheath thickness	1.4mm	1.4mm
Cable outer diameter	15.3mm	15.7mm
Cable weight	190kg / km	195kg / km
Outer sheath material	UV stable HDPE	
Sheath color	black	
Sheath marking method, color	Ink-Jet, white	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink    13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink(ring-marked)	
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black	
DIN / VDE Code	A-DQ(BN)2Y wbg nx2,3	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OX3x2,3GH	12 x 24 (288)	856903	856907
OX9x2,3GH	18 x 24 (432)	856904	856908

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	1500 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	5000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		235mm	
Minimum bend radius – during installation		315mm	

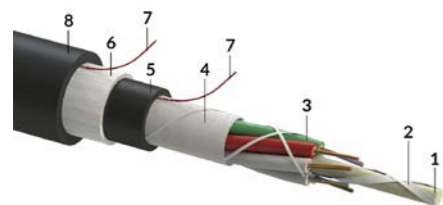
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OX3x2,3GH	OX9x2,3GH	Test Method
Euro classification to CPR	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9947	D9948	
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-swellable tape
5. UV stable LDPE inner sheath
6. Water-blocking e-glass yarn
7. Rip-cord
8. UV stable HDPE outer sheath

030.7628.A / similar product

## General Description

Stranded loose tube, non-metallic cable with up to 144 fibers in a 12-strand stranding featuring double PE sheath and a high degree of rodent protection. It is designed for any outdoor duct or direct burial installation.

## Construction and Dimension

Cable family code	OT6x1,7LGH	OT8x1,7LGH	OT3x1,7LGH
Maximum fiber count	72	96	144
Maximum fiber count per tube	12	12	12
Maximum loose tube count	6	8	12
Loose tube diameter	1.7 mm	1.7 mm	1.7 mm
Outer sheath thickness	1.4 mm	1.4 mm	1.4 mm
Cable outer diameter	12.0 mm	13.0 mm	15.3 mm
Cable weight	115 kg / km	140 kg / km	180 kg / km
Outer sheath material	UV stable HDPE		
Sheath color	black		
Sheath marking method, color	Ink-Jet, white		
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)		
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink		
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black		
DIN / VDE Code	A-DQ2Y(BN)2Y wbg nx1,7		
Standard put-up length *	2100m ± 5%		

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
OT6x1,7LGH	2 x 12 (24)	R885315
	4 x 12 (48)	R885316
	6 x 12 (72)	R885317
OT8x1,7LGH	8 x 12 (96)	R885318
OT3x1,7LGH	12 x 12 (144)	R885319

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	OT6x1,7LGH	OT8x1,7LGH	OT3x1,7LGH	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1600 N	2000 N	2000 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	4000 N	5000 N	5000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1500 N / 100mm			$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	3000 N / 100mm			$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm			$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles			no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=30 x cable diameter, 4 turns, 3 cycles			$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles			no damage
Minimum bend radius – in service		230mm			
Minimum bend radius – during installation		310mm			

## Climatic Data

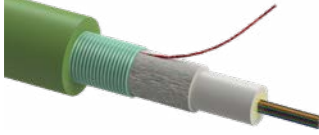
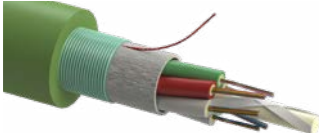



Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C	during installation
		- 40°C ÷ + 70°C	in service
		- 40°C ÷ + 70°C	in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OT6x1,7LGH	OT8x1,7LGH	OT3x1,7LGH	Test Method
Euro classification to CPR	Fca	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9939	D9940	D9941	
2015 / 863 / EU - RoHS 3	conform			
1907 / 2006 / EU - REACH	conform			



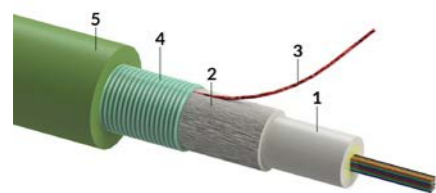
Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Loose Tube Count	Loose Tube Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperatur Range in Operation	CPR Classification	DoP Number	Warranty Classification
<b>Central Loose Tube - Universal Cable</b>  030.6311.B	UX1ECF	64	universal	FRLSZH - UV stable	24	1	3.0	7.7	84.0	1500	2500	-30°C ÷ +70°C	Dca-s2,d1,a1	D9026	R&Mfreenet
	UX1EFCF FiRis	66	universal	FRLSZH - UV stable	24	1	3.0	10.0	125.0	1500	2500	-30°C ÷ +70°C	B2ca-s1a,d0,a1	D9033	product warranty
<b>Stranded Loose Tube - Universal Cable</b>  030.6404.B	UT6x1,7ECF	68	universal	FRLSZH - UV stable	72	6	1.7	11.0	135.0	2500	5000	-40°C ÷ +70°C	Fca	D9018	R&Mfreenet
	UT8x1,7ECF	68	universal	FRLSZH - UV stable	96	8	1.7	12.0	165.0	4000	5000	-40°C ÷ +70°C	Fca	D9046	R&Mfreenet
	UT3x1,7ECF	68	universal	FRLSZH - UV stable	144	12	1.7	14.0	210.0	4000	5000	-40°C ÷ +70°C	Fca	D9047	R&Mfreenet
	UT9x1,7ECF	68	universal	FRLSZH - UV stable	216	18	1.7	14.0	210.0	3500	5000	-40°C ÷ +70°C	Fca	D9048	R&Mfreenet
<b>Stranded Loose Tube - Double Sheathed Universal Cable</b>  030.6406.B	UT6x1,7EFCF	70	universal	FRLSZH - UV stable	72	6	1.7	12.1	180.0	2500	5000	-40°C ÷ +70°C	Fca	D9019	R&Mfreenet
	UT8x1,7EFCF	70	universal	FRLSZH - UV stable	96	8	1.7	13.1	210.0	4000	5000	-40°C ÷ +70°C	Fca	D9023	R&Mfreenet
	UT3x1,7EFCF	70	universal	FRLSZH - UV stable	144	12	1.7	15.1	270.0	4000	5000	-40°C ÷ +70°C	Fca	D9049	R&Mfreenet
	UT9x1,7EFCF	70	universal	FRLSZH - UV stable	216	18	1.7	16.1	290.0	4000	5000	-40°C ÷ +70°C	Fca	D9050	R&Mfreenet
<b>Central Loose Tube - Outdoor Cable</b>  030.6311.A	OX1ECH	72	outdoor / direct buried	HDPE - UV stable	24	1	3.0	7.7	70.0	1500	5000	-20°C ÷ +70°C	Fca	D9911	R&Mfreenet
	OX1ELCH	74	outdoor / direct buried	HDPE - UV stable	24	1	3.1	10.0	100.0	1500	5000	-20°C ÷ +70°C	Fca	D9912	product warranty
<b>Stranded Loose Tube - Outdoor Cable</b>  030.6404.A	OT6x1,7ECH	76	outdoor / direct buried	HDPE - UV stable	72	6	1.7	11.0	115.0	2500	5000	-40°C ÷ +70°C	Fca	D9952	R&Mfreenet
	OT8x1,7ECH	76	outdoor / direct buried	HDPE - UV stable	96	8	1.7	12.0	140.0	4000	5000	-40°C ÷ +70°C	Fca	D9953	R&Mfreenet
	OT3x1,7ECH	76	outdoor / direct buried	HDPE - UV stable	144	12	1.7	14.0	185.0	4000	5000	-40°C ÷ +70°C	Fca	D9954	R&Mfreenet
	OT9x1,7ECH	76	outdoor / direct buried	HDPE - UV stable	216	18	1.7	14.0	185.0	3500	5000	-40°C ÷ +70°C	Fca	D9955	R&Mfreenet



Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Loose Tube Count	Loose Tube Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperature Range in Operation	CPR Classification	DoP Number	Warranty Classification
<b>Stranded Loose Tube – Double Sheathed Outdoor Cable</b> 	OT6x1,7ELCH	78	outdoor / direct buried	HDPE - UV stable	72	6	1.7	12.1	145.0	2500	5000	-40°C ÷ +70°C	Fca	D9956	product warranty
	OT8x1,7ELCH	78	outdoor / direct buried	HDPE - UV stable	96	8	1.7	13.1	175.0	4000	5000	-40°C ÷ +70°C	Fca	D9957	product warranty
	OT3x1,7ELCH	78	outdoor / direct buried	HDPE - UV stable	144	12	1.7	15.1	220.0	4000	5000	-40°C ÷ +70°C	Fca	D9958	product warranty
	OT9x1,7ELCH	78	outdoor / direct buried	HDPE - UV stable	216	18	1.7	16.1	240.0	4000	5000	-40°C ÷ +70°C	Fca	D9959	product warranty
030.6406.A															
<b>Stranded Loose Tube – CSTA &amp; 2 Steel Wire – Outdoor Cable</b> 	OT5x2,3CDH	80	outdoor / direct buried	HDPE - UV stable	60	5	2.3	13.9	200.0	3000	4000	-40°C ÷ +70°C	n.a.	n.a.	product warranty
	OT6x2,3CDH	80	outdoor / direct buried	HDPE - UV stable	72	6	2.3	14.9	220.0	4000	4000	-40°C ÷ +70°C	n.a.	n.a.	product warranty
	OT8x2,3CDH	80	outdoor / direct buried	HDPE - UV stable	96	8	2.3	15.9	250.0	4000	4000	-40°C ÷ +70°C	n.a.	n.a.	product warranty
	OT3x2,3CDH	80	outdoor / direct buried	HDPE - UV stable	144	12	2.3	18.9	335.0	4000	4000	-40°C ÷ +70°C	n.a.	n.a.	product warranty
030.7657.A															
<b>Stranded Loose Tube – 24 Fiber Tubed CSTA &amp; 2 Steel Wire – Outdoor Cable</b> 	OX3x2,3CDH	82	outdoor / direct buried	HDPE - UV stable	288	12	2.3	18.9	335.0	4000	4000	-25°C ÷ 70°C	n.a.	n.a.	product warranty

030.7657.A





1. Gel filled PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. Rip-cord
4. Corrugated steel tape armor
5. UV-stable FRLSZH outer sheath

030.6311.B / similar product

## General Description

Corrugated steel tape armored central loose tube cable with excellent mechanical protection and thus secure rodent protected. With up to 24 fibers maximum, suitable for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	<b>UX1ECF</b>
Loose tube diameter	3.0mm
Fiber count per tube	24
Outer sheath thickness	1.2mm
Cable outer diameter	7.7mm
Cable weight	84 kg / km
Outer sheath material	UV stable FRLSZH
Sheath color	green
Sheath marking method, color	Ink-Jet, black
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)
DIN / VDE Code	U-DQ(ZN)(SR)H wbg
Standard put-up length *	2100m ± 5 %
Maximum length on drum	4100m ± 5 %

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UX1ECF	4	855738	855748	855767
	6	855739	855749	855768
	8	855740	855750	855769
	12	855741	855751	855770
	24	855742	855752	855771

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	500 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	1500 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2500 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	5000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		95 mm	
Minimum bend radius – during installation		190mm	

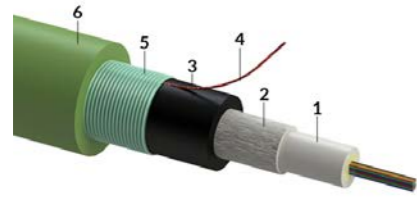
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 30°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 30°C ÷ + 70°C - 35°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	0.87MJ / m	
Euro classification to CPR	Dca-s2,d2,a1	EN 50575, EN 13501-6
Declaration of performance number	D9026	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	IEC 60332-3-22
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Gel filled PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. UV-stable FRLSZH inner sheath
4. Rip-cord
5. Corrugated steel tape armor
6. UV-stable FRLSZH outer sheath

030.6312.B / similar product

## General Description

Corrugated steel tape armored central loose tube cable with excellent mechanical protection and thus secure rodent protected. The cable features a two jacket construction with up to 24 fibers maximum and is suitable for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	UX1EFCF FiRis
Loose tube diameter	3.0mm
Fiber count per tube	24
Outer sheath thickness	1.2mm
Cable outer diameter	10.0mm
Cable weight	125 kg / km
Outer sheath material	UV stable FRLSZH
Sheath color	green
Sheath marking method, color	Ink-Jet, black
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink(ring-marked)
DIN / VDE Code	U-DQ(ZN)H(SR)H wbg
Standard put-up length *	2100m ± 5 %
Maximum length on drum	4100m ± 5 %

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UX1EFCF FiRis	4	855835	855845	855864
	6	855836	855846	855865
	8	855837	855847	855866
	12	855838	855848	855867
	24	855839	855849	855868

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	1000 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	3000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	4000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		120mm	
Minimum bend radius – during installation		240mm	

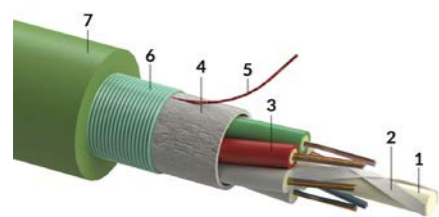
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 30°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 30°C ÷ + 70°C - 35°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	1.65 MJ / m	
Euro classification to CPR	B2ca-s1a,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9033	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	IEC 60332-3-22
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking e-glass yarn
5. Rip-cord
6. Corrugated steel tape armor
7. UV stable FRLSZH outer sheath

030.6404.B / similar product

## General Description

Corrugated steel tape armored stranded loose tube cable with excellent mechanical protection and thus secure rodent protected. The cable is built with up to 216 fibers in a 18-strand stranding and is suitable for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	UT6x1,7ECF	UT8x1,7ECF	UT3x1,7ECF	UT9x1,7ECF
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.7mm	1.7mm	1.7mm	1.7mm
Outer sheath thickness	1.3mm	1.3mm	1.3mm	1.3mm
Cable outer diameter	11.0mm	12.0mm	14.0mm	14.0mm
Cable weight	135 kg / km	165 kg / km	210kg / km	210kg / km
Outer sheath material	UV stable FRLSZH			
Sheath color	green			
Sheath marking method, color	Ink-Jet, black			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	U-DQ(ZN)(SR)H wbg nx1,7			
Standard put-up length *	2100m ± 5%			
Maximum length on drum	4100m ± 5%			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UT6x1,7ECF	2 x 12 (24)	857203	857235	857298
	4 x 12 (48)	857205	857237	857300
	6 x 12 (72)	857207	857239	857302
UT8x1,7ECF	8 x 12 (96)	857208	857240	857303
UT3x1,7ECF	12 x 12 (144)	857209	857241	857304
UT9x1,7ECF	18 x 12 (216)	857211	857243	857306

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	UT6x1,7ECF	UT8x1,7ECF	UT3x1,7ECF	UT9x1,7ECF	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	800 N	1200 N	1200 N	1100 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2500 N	4000 N	4000 N	3500 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	2500 N / 100mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	5000 N / 100mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend – no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles				no damage
Minimum bend radius – in service		210mm				
Minimum bend radius – during installation		280mm				

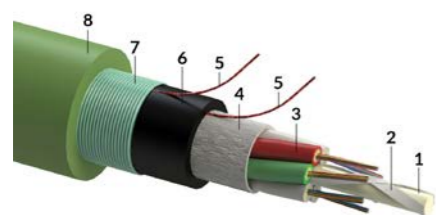
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UT6x1,7ECF	UT8x1,7ECF	UT3x1,7ECF	UT9x1,7ECF	Test Method
Thermal load	1.46MJ / m	1.76MJ / m	2.8MJ / m	2.74MJ / m	
Euro classification to CPR	Eca	Eca	Eca	Eca	EN 50575, EN 13501-6
Declaration of performance number	D9018	D9046	D9047	D9048	
Flammability – vertical single cable	Pass	Pass	Pass	Pass	IEC 60332-1-2
Flammability – vertical cable bundle	Pass	Pass	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	Pass	Pass	IEC 60754-2
2015 / 863 / EU – RoHS 3	conform				
1907 / 2006 / EU – REACH	conform				



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking e-glass yarn
5. Rip-cord
6. UV stable FRLSZH inner sheath
7. Corrugated steel tape armor
8. UV stable FRLSZH outer sheath

030.6406.B / similar product

## General Description

Corrugated steel tape armored stranded loose tube cable with excellent mechanical protection and thus secure rodent protected. The cable features a two jacket construction, is built with up to 216 fibers in a 18-strand stranding and is suitable for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	UT6x1,7EFCF	UT8x1,7EFCF	UT3x1,7EFCF	UT9x1,7EFCF
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.7 mm	1.7 mm	1.7 mm	1.7 mm
Outer sheath thickness	1.3 mm	1.3 mm	1.3 mm	1.3 mm
Cable outer diameter	12.1 mm	13.1 mm	15.1 mm	16.1 mm
Cable weight	180 kg / km	210 kg / km	270 kg / km	290 kg / km
Outer sheath material	UV stable FRLSZH			
Sheath color	green			
Sheath marking method, color	Ink-Jet, black			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	U-DQ(ZN)H(SR)H wbg nx1,7			
Standard put-up length *	2100 m ± 5 %			
Maximum length on drum	4100 m ± 5 %			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
UT6x1,7EFCF	2 x 12 (24)	857425	857457	857520
	4 x 12 (48)	857427	857459	857522
	6 x 12 (72)	857429	857461	857524
UT8x1,7EFCF	8 x 12 (96)	857430	857462	857525
UT3x1,7EFCF	12 x 12 (144)	857431	857463	857526
UT9x1,7EFCF	18 x 12 (216)	857433	857465	857528

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	UT6x 1,7EFCF	UT8x 1,7EFCF	UT3x 1,7EFCF	UT9x 1,7EFCF	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	800 N	1200 N	1200 N	1200 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2500 N	4000 N	4000 N	4000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	2500 N / 100 mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	5000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	25 Nm, 3 impacts, d=20 mm, R=300 mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend – no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles				no damage
Minimum bend radius – in service		240 mm				
Minimum bend radius – during installation		325 mm				

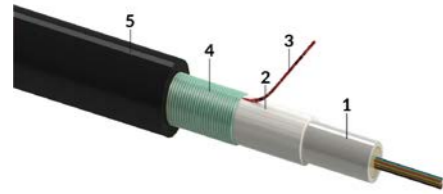
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	UT6x 1,7EFCF	UT8x 1,7EFCF	UT3x 1,7EFCF	UT9x 1,7EFCF	Test Method
Thermal load	2.7 MJ / m	2.43 MJ / m	3.6 MJ / m	3.71 MJ / m	
Euro classification to CPR	Eca	Eca	Eca	Eca	EN 50575, EN 13501-6
Declaration of performance number	D9019	D9023	D9049	D9050	
Flammability – vertical single cable	Pass	Pass	Pass	Pass	IEC 60332-1-2
Flammability – vertical cable bundle	Pass	Pass	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	Pass	Pass	IEC 60754-2
2015 / 863 / EU – RoHS 3	conform				
1907 / 2006 / EU – REACH	conform				



1. Gel filled PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. Rip-cord
4. Corrugated steel tape armor
5. UV stable HDPE outer sheath

030.6311.A / similar product

## General Description

Corrugated steel tape armored central loose tube cable with excellent mechanical protection and thus secure rodent protected. With up to 24 fibers maximum, suitable for outdoor duct or direct buried installation.

## Construction and Dimension

Cable family code	<b>OX1ECH</b>
Loose tube diameter	3.0mm
Fiber count per tube	24
Outer sheath thickness	1.2mm
Cable outer diameter	7.7mm
Cable weight	70kg / km
Outer sheath material	UV stable HDPE
Sheath color	black
Sheath marking method, color	Ink-Jet, white
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)
DIN / VDE Code	A-DQ(ZN)(SR)2Y wbg
Standard put-up length *	2100m ± 5 %
Maximum length on drum	4100m ± 5 %

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OX1ECH	4	855720	855728
	6	852285	855729
	8	855721	855730
	12	855722	855731
	24	855723	855732

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	500N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	1500N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2500 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	5000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		95mm	
Minimum bend radius – during installation		190mm	

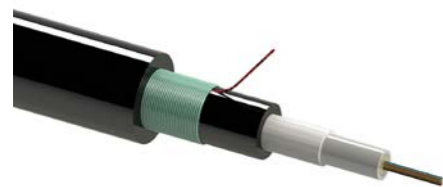
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 70°C - 30°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Euro classification to CPR	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9911	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Gel filled PBT loose tube with optical fibers
2. Water-blocking e-glass yarn
3. UV-stable LDPE inner sheath
4. Rip-cord
5. Corrugated steel tape armor
6. UV stable HDPE outer sheath

030.6312.A / similar product

## General Description

Corrugated steel tape armored central loose tube cable with excellent mechanical protection and thus secure rodent protected. The cable features a two jacket construction with up to 24 fibers maximum and is suitable for outdoor duct or direct buried installation.

## Construction and Dimension

Cable family code	<b>OX1ELCH</b>
Loose tube diameter	3.1mm
Fiber count per tube	24
Outer sheath thickness	1.2mm
Cable outer diameter	10.0mm
Cable weight	100kg / km
Outer sheath material	UV stable HDPE
Sheath color	black
Sheath marking method, color	Ink-Jet, white
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)
DIN / VDE Code	A-DQ(ZN)2Y(SR)2Y wbg
Standard put-up length *	2100m ± 5%
Maximum length on drum	4100m ± 5%

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OX1ELCH	4	855777	855786
	6	855778	855787
	8	855779	855788
	12	855780	855789
	24	855781	855790

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	500N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	1500N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2500 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	5000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		120mm	
Minimum bend radius – during installation		240mm	

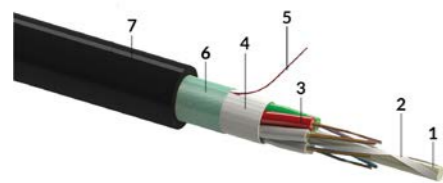
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 70°C - 25°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Euro classification to CPR	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9912	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking e-glass yarn
5. Rip-cord
6. Corrugated steel tape armor
7. UV stable HDPE outer sheath

030.6404.A / similar product

## General Description

Corrugated steel tape armored stranded loose tube cable with excellent mechanical protection and thus secure rodent protected. The cable is built with up to 216 fibers in a 18-strand stranding and is suitable for outdoor duct or direct buried installation.

## Construction and Dimension

Cable family code	OT6x1,7ECH	OT8x1,7ECH	OT3x1,7ECH	OT9x1,7ECH
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.7 mm	1.7 mm	1.7 mm	1.7 mm
Outer sheath thickness	1.3 mm	1.3 mm	1.3 mm	1.3 mm
Cable outer diameter	11.0 mm	12.0 mm	14.0 mm	14.0 mm
Cable weight	115 kg / km	140 kg / km	185 kg / km	185 kg / km
Outer sheath material	UV stable HDPE			
Sheath color	black			
Sheath marking method, color	Ink-Jet, white			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	A-DQ(ZN)(SR)2Y wbg nx1,7			
Standard put-up length *	2100m ± 5%			
Maximum length on drum	4100m ± 5%			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OT6x1,7ECH	2 x 12 (24)	857108	857139
	4 x 12 (48)	857110	857141
	6 x 12 (72)	857112	857143
OT8x1,7ECH	8 x 12 (96)	857113	857144
OT3x1,7ECH	12 x 12 (144)	857114	857145
OT9x1,7ECH	18 x 12 (216)	857116	857147

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	OT6x1,7ECH	OT8x1,7ECH	OT3x1,7ECH	OT9x1,7ECH	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	800 N	1200 N	1200 N	1100 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2500 N	4000 N	4000 N	3500 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	2500 N / 100mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	5000 N / 100mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend – no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles				no damage
Minimum bend radius – in service		210mm				
Minimum bend radius – during installation		280mm				

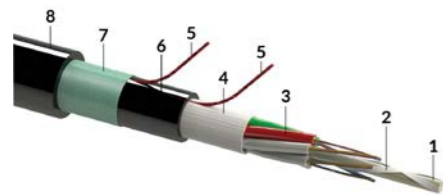
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OT6x1,7ECH	OT8x1,7ECH	OT3x1,7ECH	OT9x1,7ECH	Test Method
Euro classification to CPR	Fca	Fca	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9952	D9953	D9954	D9955	
2015 / 863 / EU - RoHS 3	conform				
1907 / 2006 / EU - REACH	conform				



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking e-glass yarn
5. Rip-cord
6. UV stable LDPE inner sheath
7. Corrugated steel tape armor
8. UV stable HDPE outer sheath

030.6406.A / similar product

## General Description

Corrugated steel tape armored stranded loose tube cable with excellent mechanical protection and thus secure rodent protected. The cable features a two jacket construction, is built with up to 216 fibers in a 18-strand stranding and is suitable for outdoor duct or direct buried installation.

## Construction and Dimension

Cable family code	OT6x1,7ELCH	OT8x1,7ELCH	OT3x1,7ELCH	OT9x1,7ELCH
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.7 mm	1.7 mm	1.7 mm	1.7 mm
Outer sheath thickness	1.3 mm	1.3 mm	1.3 mm	1.3 mm
Cable outer diameter	12.1 mm	13.1 mm	15.1 mm	16.1 mm
Cable weight	145 kg / km	175 kg / km	220 kg / km	240 kg / km
Outer sheath material	UV stable HDPE			
Sheath color	black			
Sheath marking method, color	Ink-Jet, white			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	A-DQ(ZN)2Y(SR)2Y wbg nx1,7			
Standard put-up length *	2100m ± 5 %			
Maximum length on drum	4100m ± 5 %			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
OT6x1,7ELCH	2 x 12 (24)	857330	857361
	4 x 12 (48)	857332	857363
	6 x 12 (72)	857334	857365
OT8x1,7ELCH	8 x 12 (96)	857335	857366
OT3x1,7ELCH	12 x 12 (144)	857336	857367
OT9x1,7ELCH	18 x 12 (216)	857338	857369

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	OT6x1,7ELCH	OT8x1,7ELCH	OT3x1,7ELCH	OT9x1,7ELCH	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	800 N	1200 N	1200 N	1200 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2500 N	4000 N	4000 N	4000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	2500 N / 100 mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	5000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	25 Nm, 3 impacts, d=20 mm, R=300 mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend – no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles				no damage
Minimum bend radius – in service		240 mm				
Minimum bend radius – during installation		325 mm				

## Climatic Data

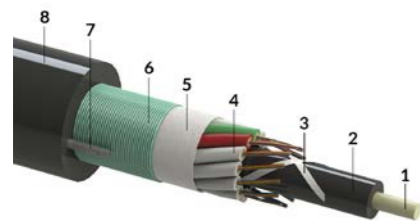
Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	OT6x1,7ELCH	OT8x1,7ELCH	OT3x1,7ELCH	OT9x1,7ELCH	Test Method
Euro classification to CPR	Fca	Fca	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9956	D9957	D9958	D9959	
2015 / 863 / EU - RoHS 3	conform				
1907 / 2006 / EU - REACH	conform				





1. FRP central strength member
2. PE coating (96 fibers or more)
3. Water-blocking yarn
4. Gel filled PBT loose tube with optical fibers
5. Water-blocking tape
6. Corrugated steel tape armor
7. diametral positioned steel wires in outer sheath
8. UV stable HDPE outer sheath

030.7657.A / similar product

## General Description

Corrugated steel tape armoured multi-loose-tube cable with up to 144 fibers in a up to 12-strand stranding featuring two opposite steel wires incorporated in black HDPE outer sheath. These constructions are predominantly designed for outdoor duct or direct buried installation. Steel tape armour combined with steel wires provide high mechanical resistance and full rodent protection. Water swellable tape protects the cable core against longitudinal water penetration.

## Construction and Dimension

Cable family code	OT5x2,3CDH	OT6x2,3CDH	OT8x2,3CDH	OT3x2,3CDH
Maximum fiber count	60	72	96	144
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	5	6	8	12
Loose tube diameter	2.3mm	2.3mm	2.3mm	2.3mm
Outer sheath thickness	2.7mm	2.7mm	2.7mm	2.7mm
Cable outer diameter	13.9mm	14.9mm	15.9mm	18.9mm
Cable weight	200kg / km	220kg / km	250kg / km	335kg / km
Outer sheath material	UV stable HDPE			
Sheath color	black			
Sheath marking method, color	Ink-Jet, white			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	A-DQ(ZN)(SR)2Y (2TR1,4)			
Standard put-up length *	4100m ± 5 %			
Maximum length on drum	4100m ± 5 %			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
OT5x2,3CDH	5 x 12 (60)	883501
OT6x2,3CDH	6 x 12 (72)	883502
OT8x2,3CDH	8 x 12 (96)	883503
OT3x2,3CDH	12 x 12 (144)	883504

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	OT5x2,3CDH	OT6x2,3CDH	OT8x2,3CDH	OT3x2,3CDH	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1500 N	2500 N	2500 N	2500 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	3000 N	4000 N	4000 N	4000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2000 N / 100mm				$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	4000 N / 100mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 3 cycles				no damage
Minimum bend radius – in service		285mm				
Minimum bend radius – during installation		380mm				

## Climatic Data

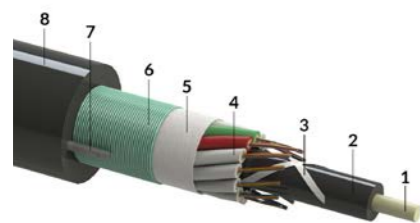
Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 10°C ÷ + 50°C - 30°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	

# Stranded Loose Tube – 24 Fiber Tubed CSTA & 2 Steel Wire – Outdoor Cable



1. FRP central strength member
2. PE coating (96 fibers or more)
3. Water-blocking yarn
4. Gel filled PBT loose tube with optical fibers
5. Water-blocking tape
6. Corrugated steel tape armor
7. diametral positioned steel wires in outer sheath
8. UV stable HDPE outer sheath

030.7657.A / similar product

## General Description

Corrugated steel tape armored multi-loose-tube cable with up to 288 fibers in a 12-strand stranding features two opposite steel wires incorporated in black HDPE outer sheath and is predominantly designed for outdoor duct or direct buried installation. Steel tape armor combined with steel wires provide this construction high mechanical resistance and full rodent protection. Water swellable tape protects the cable core against longitudinal water penetration.

## Construction and Dimension

Cable family code	<b>OX3x2,3CDH</b>
Loose tube diameter	2.3 mm
Fiber count per tube	24
Loose tube count	12
Outer sheath thickness	2.7 mm
Cable outer diameter	18.9 mm
Cable weight	335 kg / km
Outer sheath material	UV stable HDPE
Sheath color	black
Sheath marking method, color	Ink-Jet, white
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black
DIN / VDE Code	A-DQ(ZN)(SR)2Y (2TR1,4)
Standard put-up length *	4100 m ± 5 %
Maximum length on drum	4100 m ± 5 %

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
OX3x2,3CDH	12 x 24 (288)	883505

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	2500 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	4000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	4000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 3 cycles	no damage
Minimum bend radius – in service		285 mm	
Minimum bend radius – during installation		380 mm	

## Climatic Data


Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 10°C ÷ + 50°C - 30°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11


## Fire Properties

Test	Value / Value Range	Test Method
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Loose Tube Count	Loose Tube Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperatur Range in Operation	CPR Classification	DoP Number	Warranty Classification
	UAF250 FiRis	86	universal- façade	FRLSZH - UV stable	6	n.a.	n.a.	2.8	13.0	250	1000	-10°C ÷ +60°C	Cca-s2,d0,a1	D9084	product warranty
	UAF250 FiRis	86	universal- façade	FRLSZH - UV stable	12	n.a.	n.a.	3.2	11.0	250	1000	-10°C ÷ +60°C	Cca-s2,d0,a1	D9084	product warranty
	UAF 1000 FiRis	88	universal- façade	FRLSZH - UV stable	2	n.a.	n.a.	3.2	11.0	1000	1000	-10°C ÷ +60°C	Cca-s2,d0,a1	D9085	product warranty
	UAF 1000 FiRis	88	universal- façade	FRLSZH - UV stable	8	n.a.	n.a.	3.6	13.0	1000	1000	-10°C ÷ +60°C	Cca-s2,d0,a1	D9085	product warranty
	UAF 1000 FiRis	88	universal- façade	FRLSZH - UV stable	12	n.a.	n.a.	3.8	14.0	1000	1000	-10°C ÷ +60°C	Cca-s2,d0,a1	D9085	product warranty

030.6414.A

	UAF250	90	universal - aerial	FRLSZH - UV stable	6	n.a.	n.a.	2.8	13.0	250	1000	-20°C ÷ +70°C	Fca	D9010	product warranty
	UAF250	90	universal - aerial	FRLSZH - UV stable	12	n.a.	n.a.	3.2	11.0	250	1000	-20°C ÷ +70°C	Fca	D9010	product warranty
	UAF1000	92	universal - aerial	FRLSZH - UV stable	2	n.a.	n.a.	3.2	11.0	1000	1000	-20°C ÷ +70°C	Fca	D9011	product warranty
	UAF1000	92	universal - aerial	FRLSZH - UV stable	8	n.a.	n.a.	3.6	13.0	1000	1000	-20°C ÷ +70°C	Fca	D9011	product warranty
	UAF1000	92	universal - aerial	FRLSZH - UV stable	12	n.a.	n.a.	3.8	14.0	1000	1000	-20°C ÷ +70°C	Fca	D9011	product warranty

030.6414.A

	ST1fH	94	outdoor - aerial	HDPE - UV stable	12	1	1.9	8.0 x 4.0	38.0	1600	4000	-40°C ÷ +70°C	Fca	D9971	product warranty
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030.6412.A

	ST2fH	96	outdoor - aerial	HDPE - UV stable	24	2	1.9	9.8 x 4.0	59.0	1600	4000	-40°C ÷ +70°C	Fca	D9972	product warranty
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030.6413.A



1. Optical fibers
2. Aramid yarn
3. FRLSZH UV stable outer jacket

030.6415.A / similar product

## General Description

Non-metallic FTTH drop cable with up to 12 fibers for indoor or outdoor duct, façade or aerial short span installation. In addition, this cable construction has a „Cca“ CPR classification and is therefore a true universal cable that can also be installed in buildings without further problems.

## Construction and Dimension

Cable family code	UAF250 FiRis	UAF250 FiRis
Fiber count	6	12
Outer sheath thickness	0.8mm	0.8mm
Cable outer diameter	2.8mm	3.2mm
Cable weight	9 kg / km	11 kg / km
Outer sheath material	UV stable FRLSZH	
Sheath color	black	
Sheath marking method, color	Ink-Jet, white	
Fiber types available	Bend optimized singlemode fibers (G.657.A1, G.657.A2)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink	
DIN / VDE Code	U-(ZN)H	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
UAF250 FiRis	2	857713
	4	857714
	6	857715
	8	857716
	12	857717

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	250N (max. allow-able tension)	$\Delta\alpha \leq 0,05$ dB
Crush resistance - long term	IEC 60794-1-21:E3A	500N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	1000N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	3Nm, 3 impacts, d=20mm,R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 2 m, rotation angle $\pm 180^\circ$ , 5 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=15 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Maximal recommended span	Telenco clamp 7593	40 m (min. sag 60 cm), max. allow-able tension	$\Delta\alpha \leq 0,05$ dB, no damage
Minimum bend radius – in service		55 mm	
Minimum bend radius – during installation		75 mm	

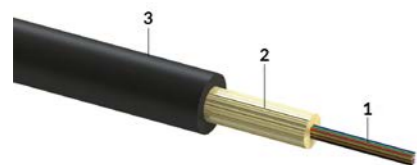
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 60°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 60°C - 25°C ÷ + 60°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Euro classification to CPR	Cca-s2,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9084	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Optical fibers
2. Aramid strength members
3. FRLSZH UV stable outer jacket

030.6414.A / similar product

## General Description

Non-metallic FTTH drop cable with up to 12 fibers for outdoor duct, façade or aerial short span installation. Additionally, this cable construction features an intensified tensile force compared to the UAF250 construction. What's more, this cable construction has a „Cca“ CPR classification and is therefore a true universal cable that can also be installed in buildings without further problems.

## Construction and Dimension

Cable family code	UAF1000 FiRis	UAF1000 FiRis	UAF1000 FiRis
Fiber count	2	8	12
Outer sheath thickness	0.8mm	0.8mm	0.8mm
Cable outer diameter	3.2mm	3.6mm	3.8mm
Cable weight	11 kg / km	13 kg / km	14 kg / km
Outer sheath material	UV stable FRLSZH		
Sheath color	black		
Sheath marking method, color	Ink-Jet, white		
Fiber types available	Bend optimized singlemode fibers (G.657.A1, G.657.A2)		
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink		
DIN / VDE Code	U-(ZN)H		
Standard put-up length *	2100m ± 5%		

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
UAF 1000 FiRis	2	857731
	4	857732
	6	857733
	8	857734
	12	857735

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1000 N (max. allow-able tension)	$\Delta\alpha \leq 0,05$ dB
Crush resistance - long term	IEC 60794-1-21:E3A	500 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	3 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 2 m, rotation angle $\pm 180^\circ$ , 5 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=15 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Maximal recommended span	Telenco clamp 7593	60 m (min. sag 90 cm), max. allow-able tension	$\Delta\alpha \leq 0,05$ dB, no damage
Minimum bend radius – in service		55 mm	
Minimum bend radius – during installation		75 mm	

## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 60°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 60°C - 25°C ÷ + 60°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Euro classification to CPR	Cca-s2,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9085	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Optical fibers
2. Aramid yarn
3. FRLSZH UV stable outer jacket

030.6415.A / similar product

## General Description

Non-metallic FTTH drop cable with up to 12 fibers for indoor, aerial short span, façade or outdoor duct installation.

## Construction and Dimension

Cable family code	UAF250	UAF250
Fiber count	6	12
Outer sheath thickness	0.8mm	0.8mm
Cable outer diameter	2.8mm	3.2mm
Cable weight	9 kg / km	11 kg / km
Outer sheath material	UV stable FRLSZH	
Sheath color	black	
Sheath marking method, color	Ink-Jet, white	
Fiber types available	Bend optimized singlemode fibers (G.657.A1, G.657.A2)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink	
DIN / VDE Code	U-(ZN)H	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
UAF250	2	857705
	4	857706
	6	851161
	8	857707
	12	851162

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	250N (max. allow-able tension)	$\Delta\alpha \leq 0,05$ dB
Crush resistance - long term	IEC 60794-1-21:E3A	500N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	3 Nm, 3 impacts, d=20mm,R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 2 m, rotation angle $\pm 180^\circ$ , 5 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=15 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Maximal recommended span	Telenco clamp 7593	40 m (min. sag 60 cm), max. allow-able tension	$\Delta\alpha \leq 0,05$ dB, no damage
Minimum bend radius – in service		55 mm	
Minimum bend radius – during installation		75 mm	

## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 60°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 60°C - 25°C ÷ + 60°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Euro classification to CPR	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9010	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Optical fibers
2. Aramid strength members
3. FRLSZH UV stable outer jacket

030.6414.A / similar product

## General Description

Non-metallic FTTH drop cable with up to 12 fibers for indoor, aerial short span, façade or outdoor duct installation. Additionally, this cable construction features an intensified tensile force and thus a longer short span length compared to the UAF250 construction.

## Construction and Dimension

Cable family code	UAF1000	UAF1000	UAF1000
Fiber count	2	8	12
Outer sheath thickness	0.8mm	0.8mm	0.8mm
Cable outer diameter	3.2mm	3.6mm	3.8mm
Cable weight	11 kg / km	13 kg / km	14 kg / km
Outer sheath material	UV stable FRLSZH		
Sheath color	black		
Sheath marking method, color	Ink-Jet, white		
Fiber types available	Bend optimized singlemode fibers (G.657.A1, G.657.A2)		
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink		
DIN / VDE Code	U-(ZN)H		
Standard put-up length *	2100m ± 5%		

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
UAF 1000	2	857723
	4	857724
	6	851164
	8	857725
	12	851165

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1000 N (max. allow-able tension)	$\Delta\alpha \leq 0,05$ dB
Crush resistance - long term	IEC 60794-1-21:E3A	500 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	3 Nm, 3 impacts, d=20mm,R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 2 m, rotation angle $\pm 180^\circ$ , 5 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=15 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Maximal recommended span	Telenco clamp 7593	60 m (min. sag 90 cm), max. allow-able tension	$\Delta\alpha \leq 0,05$ dB, no damage
Minimum bend radius – in service		55 mm	
Minimum bend radius – during installation		75 mm	

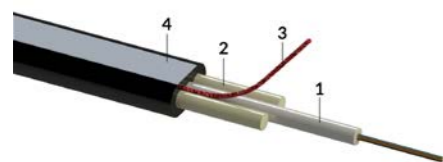
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 60°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 60°C - 25°C ÷ + 60°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Euro classification to CPR	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9011	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Gel filled PBT loose tube with optical fibers
2. FRP strength members
3. Rip-cord
4. HDPE UV stable outer jacket

030.6412.A / similar product

## General Description

Non-metallic and flat self-supporting loose tube cable in a uni-tube construction for up to 12 fibers. The cable is built for outdoor aerial or direct buried installation.

## Construction and Dimension

Cable family code	ST1fH
Loose tube diameter	1.9 mm
Fiber count per tube	12
Outer sheath thickness	1.0 mm
Cable outer diameter	8,0 x 4,0 mm
Cable weight	38 kg / km
Outer sheath material	UV stable HDPE
Sheath color	black
Sheath marking method, color	Ink-Jet, white
Fiber types available	Bend optimized singlemode fibers (G.657.A1)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink
DIN / VDE Code	A-D(ZN)2YT (2FRP 2,0)
Standard put-up length *	2100 m ± 5 %

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
ST1fH	1 x 2 (2)	857698
	1 x 4 (4)	857699
	1 x 6 (6)	857700
	1 x 8 (8)	857701
	1 x 12 (12)	851140

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1600 N (max. allow-able tension)	$\Delta\alpha \leq 0,05$ dB
Crush resistance - long term	IEC 60794-1-21:E3A	2000 N / 100 mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	4000 N / 100 mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10 Nm, 3 impacts, d=20 mm, R=300 mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 2 m, rotation angle $\pm 180^\circ$ , 5 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	R=150 mm, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=150 mm, 25 cycles	no damage
Maximal recommended span	Telenco clamp 5126	80 m (min. sag 1 m), max. allow-able tension	$\Delta\alpha \leq 0,05$ dB, no damage
Minimum bend radius – in service		120 mm	
Minimum bend radius – during installation		160 mm	

## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

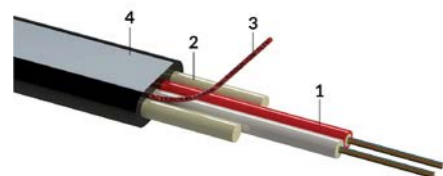
## Fire Properties

Test	Value / Value Range	Test Method
Euro classification to CPR	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9971	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



# Flat ADSS TWIN Loose Tube Cable – Short Span

## Aerial drop & Façade Cables



1. Gel filled PBT loose tube with optical fibers
2. FRP strength members
3. Rip-cord
4. HDPE UV stable outer jacket

030.6413.A / similar product

### General Description

Non-metallic and flat self-supporting loose tube cable in a twin-tube construction for up to 24 fibers. The cable is built for outdoor aerial or direct buried installation.

### Construction and Dimension

Cable family code	ST2fH
Maximum fiber count	24
Maximum fiber count per tube	12
Maximum loose tube count	2
Loose tube diameter	1.9 mm
Outer sheath thickness	1.0 mm
Cable outer diameter	9.8 x 4.0 mm
Cable weight	59 kg / km
Outer sheath material	UV stable HDPE
Sheath color	black
Sheath marking method, color	Ink-Jet, white
Fiber types available	Bend optimized singlemode fibers (G.657.A1)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink
DIN / VDE Code	A-D(ZN)2YT (2FRP 2,0)
Standard put-up length *	2100 m ± 5 %

\* other put-up length available on special request

### Order Information

Cable Family	Fiber Count	G.657.A1 *
ST2fH	2 x 4 (8)	857702
	2 x 6 (12)	857703
	2 x 8 (16)	857704
	2 x 12 (24)	851160

### Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1600 N (max. allow-able tension)	$\Delta\alpha \leq 0,05$ dB
Crush resistance - long term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	4000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 2 m, rotation angle $\pm 180^\circ$ , 5 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	R=150mm, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=150mm, 25 cycles	no damage
Maximal recommended span	Telenco clamp 5126	80 m (min. mid-span sag 1 m), max. allow-able tension	$\Delta\alpha \leq 0,05$ dB, no damage
Minimum bend radius – in service		150mm	
Minimum bend radius – during installation		200mm	

### Climatic Data





Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

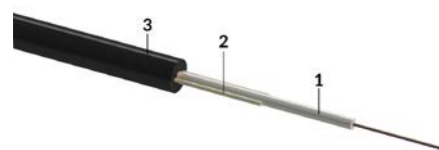
\* IEC 60794-3-10, IEC 60794-3-11

### Fire Properties

Test	Value / Value Range	Test Method
Euro classification to CPR	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9972	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Loose Tube Count	Loose Tube Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperatur Range in Operation	CPR Classification	DoP Number	Warranty Classification
<b>FTTH Micro Cable</b> 	MT1RF	100	universal	FRLSZH - UV stable	4	1	1.2	3.0	11.0	150	500	-20°C ÷ +70°C	Fca	D9038	product warranty
<b>Central Loose Tube Micro Cable</b> 	MT1H	102	outdoor	HDPE - UV stable	12	1	1.7	3.0	8.0	50	500	-20°C ÷ +70°C	Fca	D9903	product warranty
	MX1H	102	outdoor	HDPE - UV stable	24	1	2.3	4.0	14.0	50	500	-20°C ÷ +70°C	Fca	D9904	product warranty
<b>Stranded Loose Tube Micro Cable</b> 	MT6x1,5AH	104	outdoor	HDPE - UV stable	72	6	1.55	5.7	30.0	600	1000	-40°C ÷ +70°C	Fca	D9920	product warranty
	MT8x1,5AH	104	outdoor	HDPE - UV stable	96	8	1.55	6.6	40.0	1200	1000	-40°C ÷ +70°C	Fca	D9921	product warranty
	MT3x1,5AH	104	outdoor	HDPE - UV stable	144	12	1.55	8.6	64.0	1200	1000	-40°C ÷ +70°C	Fca	D9922	product warranty
	MT9x1,5AH	104	outdoor	HDPE - UV stable	216	18	1.55	8.9	64.0	800	1000	-40°C ÷ +70°C	Fca	D9923	product warranty
<b>Stranded Loose Tube 144 Fiber Micro Cable</b> 	MT3x1,5AHs	106	outdoor	HDPE - UV stable	144	12	1.55	7.6	44.0	400	500	-40°C ÷ +70°C	Fca	D9919	product warranty



1. Gel filled PBT loose tube with optical fibers
2. FRP strength members
3. FRLSZH UV stable outer jacket

030.6411.A / similar product

## General Description

Non-metallic Micro-Cable in a mini central loose tube construction designed for up to a maximum of 4 fibers. The cable is designed for indoor or outdoor use for blow-in technology in Microducts.

## Construction and Dimension

Cable family code	<b>MT1RF</b>
Loose tube diameter	1.2 mm
Fiber count per tube	4
Outer sheath thickness	0.9 mm
Cable outer diameter	3.0 mm
Cable weight	11 kg / km
Outer sheath material	UV stable FRLSZH
Sheath color	black
Sheath marking method, color	Ink-Jet, white
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)
Fiber color coding (IEC 60304)	1.-4.: red, green, blue, yellow
DIN / VDE Code	U-DQ(ZN)H (2FRP 0,5)
Standard put-up length *	2100m ± 5%

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	G.657.A1 *
MT1RF	1 x 2 (2)	857693
	1 x 4 (4)	851139

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance - during installation	IEC 60794-1-21:E1	150 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - short term	IEC 60794-1-21:E3A	500 N / 100 mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	1 Nm, 3 impacts, d=20 mm, R=300 mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Kink resistance	IEC 60794-1-21:E10	d=20 x cable diameter	no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=40 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=40 x cable diameter, 25 cycles	no damage
Minimum bend radius - in service		50 mm	
Minimum bend radius - during installation		70 mm	

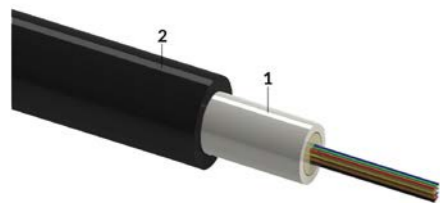
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 70°C - 30°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	0.19 MJ / m	
Euro classification to CPR	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9038	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	IEC 60332-3-22
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Gel filled PBT loose tube with optical fibers
2. UV stable HDPE outer sheath

030.6307.A / similar product

## General Description

Non-metallic central loose tube Micro-Cable for up to a maximum of 24 fibers, used outdoors for „air-blown“ installations into Micro-ducts.

## Construction and Dimension

Cable family code	MT1H	MX1H
Maximum fiber count	12	24
Maximum fiber count per tube	12	24
Maximum loose tube count	1	1
Loose tube diameter	1.7mm	3mm
Outer sheath thickness	0.5mm	0.5mm
Cable outer diameter	3.0mm	4.0mm
Cable weight	8 kg / km	14 kg / km
Outer sheath material	UV stable HDPE	
Sheath color	black	
Sheath marking method, color	Ink-Jet, white	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)	
DIN / VDE Code	A-D2Y	
Standard put-up length *	2100m ± 5%	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
MT1H	2	855479	855485
	4	855480	855486
	6	848280	855487
	8	855481	855488
	12	848281	855489
MX1H	24	855491	855493

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – during installation	IEC 60794-1-21:E1	50N (short term)	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - short term	IEC 60794-1-21:E3A	500N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	1 Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Kink resistance	IEC 60794-1-21:E10	d=40 x cable diameter	no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=40 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=40 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		60mm	
Minimum bend radius – during installation		100mm	

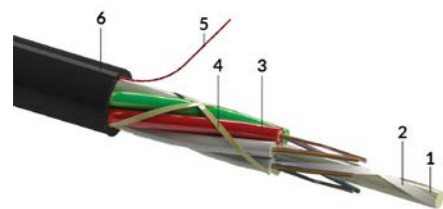
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 20°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 20°C ÷ + 70°C - 30°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	MT1H	MX1H	Test Method
Thermal load	0.28MJ / m	0.49MJ / m	
Euro classification to CPR	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9903	D9904	
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking aramid yarn
5. Rip-cord
6. UV stable HDPE outer sheath

030.6397.A / similar product

## General Description

Non-metallic stranded loose tube Micro cable with up to 216 fibers in a 18-strand stranding, used outdoors for „air-blown“ installations into Microducts.

## Construction and Dimension

Cable family code	MT6x1,5AH	MT8x1,5AH	MT3x1,5AH	MT9x1,5AH
Maximum fiber count	72	96	144	216
Maximum fiber count per tube	12	12	12	12
Maximum loose tube count	6	8	12	18
Loose tube diameter	1.55 mm	1.55 mm	1.55 mm	1.55 mm
Outer sheath thickness	0.5 mm	0.5 mm	0.5 mm	0.5 mm
Cable outer diameter	5.7 mm	6.6 mm	8.6 mm	8.9 mm
Cable weight	30 kg / km	40 kg / km	64 kg / km	64 kg / km
Outer sheath material	UV stable HDPE			
Sheath color	black			
Sheath marking method, color	Ink-Jet, white			
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)			
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink			
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black			
DIN / VDE Code	A-DQ(ZN)2Y nx1,5			
Standard put-up length *	2100m ± 5%			

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
MT6x1,5AH	2 x 12 (24)	856106	856136
	4 x 12 (48)	856108	856138
	6 x 12 (72)	856110	851115
MT8x1,5AH	8 x 12 (96)	856111	856140
MT3x1,5AH	12 x 12 (144)	856112	851116
MT9x1,5AH	18 x 12 (216)	856113	856141

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	MT6x1,5AH	MT8x1,5AH	MT3x1,5AH	MT9x1,5AH	Acceptance Criteria *
Tensile performance - during installation	IEC 60794-1-21:E1	600 N	1200 N	1200 N	800 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - short term	IEC 60794-1-21:E3A	1000 N / 100 mm				$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	5 Nm, 3 impacts, d=20 mm, R=300 mm				$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles				no damage
Kink resistance	IEC 60794-1-21:E10	d=20 x cable diameter				no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=40 x cable diameter, 4 turns, 3 cycles				$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=40 x cable diameter, 25 cycles				no damage
Minimum bend radius - in service		85 mm	100 mm	130 mm	135 mm	
Minimum bend radius - during installation		115 mm	135 mm	175 mm	180 mm	

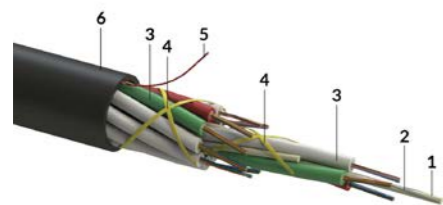
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	MT6x1,5AH	MT8x1,5AH	MT3x1,5AH	MT9x1,5AH	Test Method
Thermal load	0.77 MJ / m	0.98 MJ / m	1.78 MJ / m	1.79 MJ / m	
Euro classification to CPR	Fca	Fca	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9920	D9921	D9922	D9923	
2015 / 863 / EU - RoHS 3	conform				
1907 / 2006 / EU - REACH	conform				



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Water-blocking aramid yarn
5. Rip-cord
6. UV stable HDPE outer sheath

030.6398.A / similar product

## General Description

Non-metallic stranded loose tube Micro cable with up to 144 fibers maximum in a 12-strand stranding, used outdoors for „air-blown“ installations into Microducts.

## Construction and Dimension

Cable family code	<b>MT3x1,5AHs</b>
Maximum fiber count	144
Maximum fiber count per tube	12
Loose tube count	12
Loose tube diameter	1.55 mm
Outer sheath thickness	0.5 mm
Cable outer diameter	7.6 mm
Cable weight	44 kg / km
Outer sheath material	UV stable HDPE
Sheath color	black
Sheath marking method, color	Ink-Jet, white
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black
DIN / VDE Code	A-DQ(ZN)2Y 12x1,5
Standard put-up length *	2100m ± 5%

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM4	G.657.A1 *
MT3x1,5AHs	12 x 6 (72)	856145	856151
	12 x 8 (96)	856146	856152
	12 x 12 (144)	856147	856153

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – during installation	IEC 60794-1-21:E1	400 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - short term	IEC 60794-1-21:E3A	500 N / 100 mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	1 Nm, 3 impacts, d=20 mm, R=300 mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Kink resistance	IEC 60794-1-21:E10	d=20 x cable diameter	no kinking
Cable bend - no tension	IEC 60794-1-21:E11A	d=40 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=40 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		115 mm	
Minimum bend radius – during installation		155 mm	

## Climatic Data






Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

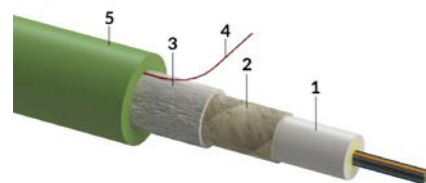
\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	1.3 MJ / m	
Euro classification to CPR	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9919	
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



Cable Type	Cable Family	Page	Application	Cable Sheath Material	Fiber Count	Loose Tube Count	Loose Tube Ø [mm]	Cable Ø [mm]	Cable Weight [kg / km]	Tensile Performance Short [N]	Crush Performance Short [N/100mm]	Temperatur Range in Operation	CPR Classification	DoP Number	Warranty Classification
<b>Central Loose Tube – Non Armored, Intensified Cable</b> 	QT1GF	110	universal	FRLSZH – UV stable	12	1	2.3	7.0	58.0	2000	2000	-30°C ÷ +70°C	Dca-s1,d1,a1	D9004	product warranty
	QX1GF	110	universal	FRLSZH – UV stable	24	1	3.0	7.8	68.0	2000	2000	-30°C ÷ +70°C	Dca-s2,d1,a1	D9008	product warranty
<b>Stranded Loose Tube – Non Armored, Intensified Cable</b> 	QT6x2,3GF	112	universal	FRLSZH – UV stable	72	6	2.3	13.0	180.0	4500	2000	-40°C ÷ +70°C	Fca	D9006	product warranty
	QT8x2,3GF	112	universal	FRLSZH – UV stable	96	8	2.3	14.6	225.0	4500	2000	-40°C ÷ +70°C	Fca	D9042	product warranty
	QT3x2,3GF	112	universal	FRLSZH – UV stable	144	12	2.3	18.0	340.0	6000	2000	-40°C ÷ +70°C	Fca	D9043	product warranty
<b>Central Loose Tube – Corrugated Steel Tape Armored Cable</b> 	QX1ECF FiRis	114	universal	FRLSZH – UV stable	24	1	3.0	8.0	90.0	3000	7000	-30°C ÷ +70°C	Cca-s1,d0,a1	D9044	product warranty
<b>Central Loose Tube – Double Sheathed &amp; CST Armored Cable</b> 	QX1EFCF FiRis	116	universal	FRLSZH – UV stable	24	1	3.0	11.0	150.0	3000	4000	-30°C ÷ +70°C	B2ca-s1,d0,a1	D9045	product warranty
<b>Stranded Loose Tube – Double Sheathed &amp; CST Armored Cable</b> 	QT6x2,3EFCF	118	universal	FRLSZH – UV stable	72	6	2.3	16.5	300.0	3000	5000	-40°C ÷ +70°C	Fca	D9062	product warranty
	QT8x2,3EFCF	118	universal	FRLSZH – UV stable	96	8	2.3	17.5	350.0	3000	5000	-40°C ÷ +70°C	Fca	D9063	product warranty
	QT3x2,3EFCF	118	universal	FRLSZH – UV stable	144	12	2.3	21.5	500.0	3500	5000	-40°C ÷ +70°C	Fca	D9064	product warranty



1. Gel filled PBT loose tube with optical fibers
2. Fire-resistant tape
3. Water-blocking e-glass yarn
4. Rip-cord
5. UV-stable FRLSZH outer sheath

030.6314.B / similar product

## General Description

Non-metallic fire-resistant central loose tube cable with improved rodent protection. With up to 24 fibers maximum, suitable for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	QT1GF	QX1GF
Loose tube diameter	2.3mm	3mm
Fiber count per tube	12	24
Outer sheath thickness	1.3mm	1.3mm
Cable outer diameter	7.0mm	7.8mm
Cable weight	58 kg / km	68 kg / km
Outer sheath material	UV stable FRLSZH	
Sheath color	green	
Sheath marking method, color	Ink-Jet, black	
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)	
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)	
DIN / VDE Code	U-DQ(BN)H wbg fr	
Standard put-up length *	2100m ± 5 %	

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
QT1GF	4	855931	855939	855954
	6	855932	855940	855955
	8	855933	855941	855956
	12	855934	855942	855957
QX1GF	24	855959	855961	855964

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	800N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	2000N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	1000 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	2000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		115mm	
Minimum bend radius – during installation		190mm	

## Climatic Data

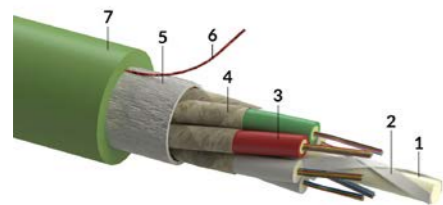
Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 30°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 30°C ÷ + 70°C - 35°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	QT1GF	QX1GF	Test Method
Thermal load	0.72 MJ / m	0.91 MJ / m	
Euro classification to CPR	Dca-s1,d1,a1	Dca-s2,d1,a1	EN 50575, EN 13501-6
Declaration of performance number	D9004	D9008	
Flammability - vertical single cable	Pass	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform		
1907 / 2006 / EU - REACH	conform		





1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Fire-resistant tape
5. Water-blocking e-glass yarn
6. Rip-cord
7. UV stable FRLSZH outer sheath

030.6407.B / similar product

## General Description

Non-metallic fire-resistant stranded loose tube cable with improved rodent protection. The cable is built with up to 144 fibers in a 12-strand stranding and is suitable for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	QT6x2,3GF	QT8x2,3GF	QT3x2,3GF
Maximum fiber count	72	96	144
Maximum fiber count per tube	12	12	12
Maximum loose tube count	6	8	12
Loose tube diameter	2.3mm	2.3mm	2.3mm
Outer sheath thickness	1.8mm	1.8mm	1.8mm
Cable outer diameter	13.0mm	14.6mm	18.0mm
Cable weight	180 kg / km	225 kg / km	340 kg / km
Outer sheath material	UV stable FRLSZH		
Sheath color	green		
Sheath marking method, color	Ink-Jet, black		
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)		
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink		
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black		
DIN / VDE Code	U-DQ(BN)H wbg nx2,3 fr		
Standard put-up length *	2100m ± 5%		

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
QT6x2,3GF	2 x 12 (24)	857590	857597	857604
	4 x 12 (48)	857592	857599	857606
	6 x 12 (72)	857594	857601	857608
QT8x2,3GF	8 x 12 (96)	857595	857602	857609
QT3x2,3GF	12 x 12 (144)	857596	857603	857610

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	QT6x2,3GF	QT8x2,3GF	QT3x2,3GF	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1400 N	1400 N	1800 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	4500 N	4500 N	6000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	1000 N / 100mm			$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	2000 N / 100mm			$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	10Nm, 3 impacts, d=20mm, R=300mm			$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles			no damage
Cable bend – no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles			$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles			no damage
Minimum bend radius – in service		270mm			
Minimum bend radius – during installation		360mm			

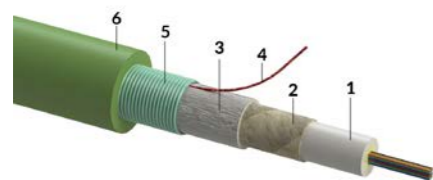
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	QT6x2,3GF	QT8x2,3GF	QT3x2,3GF	Test Method
Thermal load	2.48MJ / m	3.38MJ / m	5.55MJ / m	
Euro classification to CPR	Fca	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9006	D9042	D9043	
Flammability – vertical single cable	Pass	Pass	Pass	IEC 60332-1-2
Flammability – vertical cable bundle	Pass	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	Pass	IEC 60754-2
2015 / 863 / EU – RoHS 3	conform			
1907 / 2006 / EU – REACH	conform			



1. Gel filled PBT loose tube with optical fibers
2. Fire-resistant tape
3. Water-blocking e-glass yarn
4. Rip-cord
5. Corrugated steel tape armor
6. UV-stable FRLSZH outer sheath

030.6315.B / similar product

## General Description

Fire-resistant and corrugated steel tape armoured central loose tube cable with excellent mechanical protection and thus secure rodent protected. With up to 24 fibers maximum, suitable for indoor or outdoor duct or direct buried installation.

## Construction and Dimension

Cable family code	QX1ECF FiRis
Loose tube diameter	3.0mm
Fiber count per tube	24
Outer sheath thickness	1.3mm
Cable outer diameter	8.0mm
Cable weight	90kg / km
Outer sheath material	UV stable FRLSZH
Sheath color	green
Sheath marking method, color	Ink-Jet, black
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)
DIN / VDE Code	U-DQ(ZN)(SR)H wbg fr
Standard put-up length *	2100m ± 5%
Maximum length on drum	4100m ± 5%

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
QX1ECF FiRis	4	855970	855980	855999
	6	855971	855981	856000
	8	855972	855982	856001
	12	855973	855983	856002
	24	855974	855984	856003

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	1000 N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	3000 N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	3500 N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	7000 N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		100mm	
Minimum bend radius – during installation		200mm	

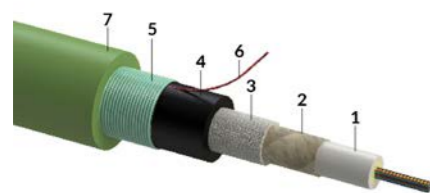
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 30°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 30°C ÷ + 70°C - 35°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	0.93MJ / m	
Euro classification to CPR	Cca-s1a,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9044	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Flammability - vertical cable bundle	Pass	IEC 60332-3-22
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. Gel filled PBT loose tube with optical fibers
2. Fire-resistant tape
3. Water-blocking e-glass yarn
4. UV-stable FRLSZH inner sheath
5. Rip-cord
6. Corrugated steel tape armor
7. UV-stable FRLSZH outer sheath

030.6405.B / similar product

## General Description

Fire-resistant and corrugated steel tape armoured central loose tube cable with excellent mechanical protection and thus secure rodent protected. The cable features a two jacket construction with up to 24 fibers maximum and is suitable for indoor or outdoor duct or direct buried installation.

## Construction and Dimension

Cable family code	<b>QX1EFCF FiRis</b>					
Loose tube diameter	3.0mm					
Fiber count per tube	24					
Outer sheath thickness	1.2mm					
Cable outer diameter	11.0mm					
Cable weight	150kg / km					
Outer sheath material	UV stable FRLSZH					
Sheath color	OM1 orange	OM2 orange	OM3 turquoise	OM4 heather-violet	OM5 lime-green	Singlemode yellow
Sheath marking method, color	Ink-Jet, black					
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)					
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink 13.-24.: red, green, blue, yellow, white, grey, brown, violet, turquoise, natural, orange, pink (ring-marked)					
DIN / VDE Code	U-DQ(ZN)H(SR)H wbg fr					
Standard put-up length *	2100m ± 5%					
Maximum length on drum	4100m ± 5%					

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
QX1EFCF FiRis	4	856009	856019	856038
	6	856010	856020	856039
	8	856011	856021	856040
	12	856012	856022	856041
	24	856013	856023	856042

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Tensile performance – in service	IEC 60794-1-21:E1	1000N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	3000N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance - long term	IEC 60794-1-21:E3A	2500N / 100mm	$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance - short term	IEC 60794-1-21:E3A	5000N / 100mm	$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm	$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles	no damage
Cable bend - no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles	$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles	no damage
Minimum bend radius – in service		135mm	
Minimum bend radius – during installation		270mm	

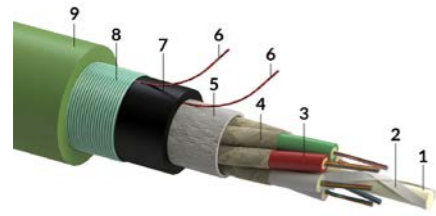
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria*
Temperature cycling	IEC 60794-1-22:F1	- 30°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 30°C ÷ + 70°C - 35°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3m, h = 1m, 24h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	Value / Value Range	Test Method
Thermal load	1.63MJ / m	
Euro classification to CPR	B2ca-s1a,d0,a1	EN 50575, EN 13501-6
Declaration of performance number	D9045	
Flammability - vertical single cable	Pass	IEC 60332-1-2
Smoke density	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	IEC 60754-2
2015 / 863 / EU - RoHS 3	conform	
1907 / 2006 / EU - REACH	conform	



1. FRP central strength member
2. Water-blocking yarn
3. Gel filled PBT loose tube with optical fibers
4. Fire-resistant tape
5. Water-blocking e-glass yarn
6. Rip-cord
7. UV stable FRLSZH inner sheath
8. Corrugated steel tape armor
9. UV stable FRLSZH outer sheath

030.6408.B / similar product

## General Description

Fire-resistant and corrugated steel tape armoured stranded loose tube cable with excellent mechanical protection and thus secure rodent protected. The cable features a two jacket construction (both sheath in FRLSZH), is built with up to 144 fibers in a 12-strand stranding and is suitable for indoor or outdoor duct installation.

## Construction and Dimension

Cable family code	QT6x2,3EFCF	QT8x2,3EFCF	QT3x2,3EFCF
Maximum fiber count	72	96	144
Maximum fiber count per tube	12	12	12
Maximum loose tube count	6	8	12
Loose tube diameter	2.3mm	2.3mm	2.3mm
Outer sheath thickness	1.5mm	1.5mm	1.5mm
Cable outer diameter	16.5mm	17.5mm	21.5mm
Cable weight	300kg / km	350kg / km	500kg / km
Outer sheath material	UV stable FRLSZH		
Sheath color	green		
Sheath marking method, color	Ink-Jet, black		
Fiber types available	Bend optimized single- and multi-mode fibers (G.657.A1, OM3, OM4)		
Fiber color coding (IEC 60304)	1.-12.: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink		
Loose tube color coding	1. red, 2. green, rest of tubes white, fillers uncolored or black		
DIN / VDE Code	U-DQ(ZN)H(SR)H wbg nx2,3 fr		
Standard put-up length *	2100m ± 5%		
Maximum length on drum	4100m ± 5%		

\* other put-up length available on special request

## Order Information

Cable Family	Fiber Count	OM3	OM4	G.657.A1 *
QT6x2,3EFCF	2 x 12 (24)	857631	857638	857645
	4 x 12 (48)	857633	857640	857647
	6 x 12 (72)	857635	857642	857649
QT8x2,3EFCF	8 x 12 (96)	857636	857643	857650
QT3x2,3EFCF	12 x 12 (144)	857637	857644	857651

other fiber counts and/or fiber types available on request

## Mechanical Data

Test	Test Method	QT6x2,3EFCF	QT8x2,3EFCF	QT3x2,3EFCF	Acceptance Criteria *
Tensile performance – in service	IEC 60794-1-21:E1	900N	900N	1100N	$\Delta\alpha \leq 0,05$ dB
Tensile performance – during installation	IEC 60794-1-21:E1	3000N	3000N	3500N	$\Delta\alpha \leq 0,05$ dB after test
Crush resistance – long term	IEC 60794-1-21:E3A	2500N / 100mm			$\Delta\alpha \leq 0,05$ dB prior release, no damage
Crush resistance – short term	IEC 60794-1-21:E3A	5000N / 100mm			$\Delta\alpha \leq 0,05$ dB after release, no damage
Impact resistance	IEC 60794-1-21:E4	20Nm, 3 impacts, d=20mm, R=300mm			$\Delta\alpha \leq 0,05$ dB after test, no damage
Torsion	IEC 60794-1-21:E7	L = 1 m, rotation angle $\pm 180^\circ$ , 10 cycles			no damage
Cable bend – no tension	IEC 60794-1-21:E11A	d=20 x cable diameter, 4 turns, 3 cycles			$\Delta\alpha \leq 0,05$ dB after test, no damage
Repeated bending	IEC 60794-1-21:E6	R=20 x cable diameter, 25 cycles			no damage
Minimum bend radius – in service		320mm			
Minimum bend radius – during installation		430mm			

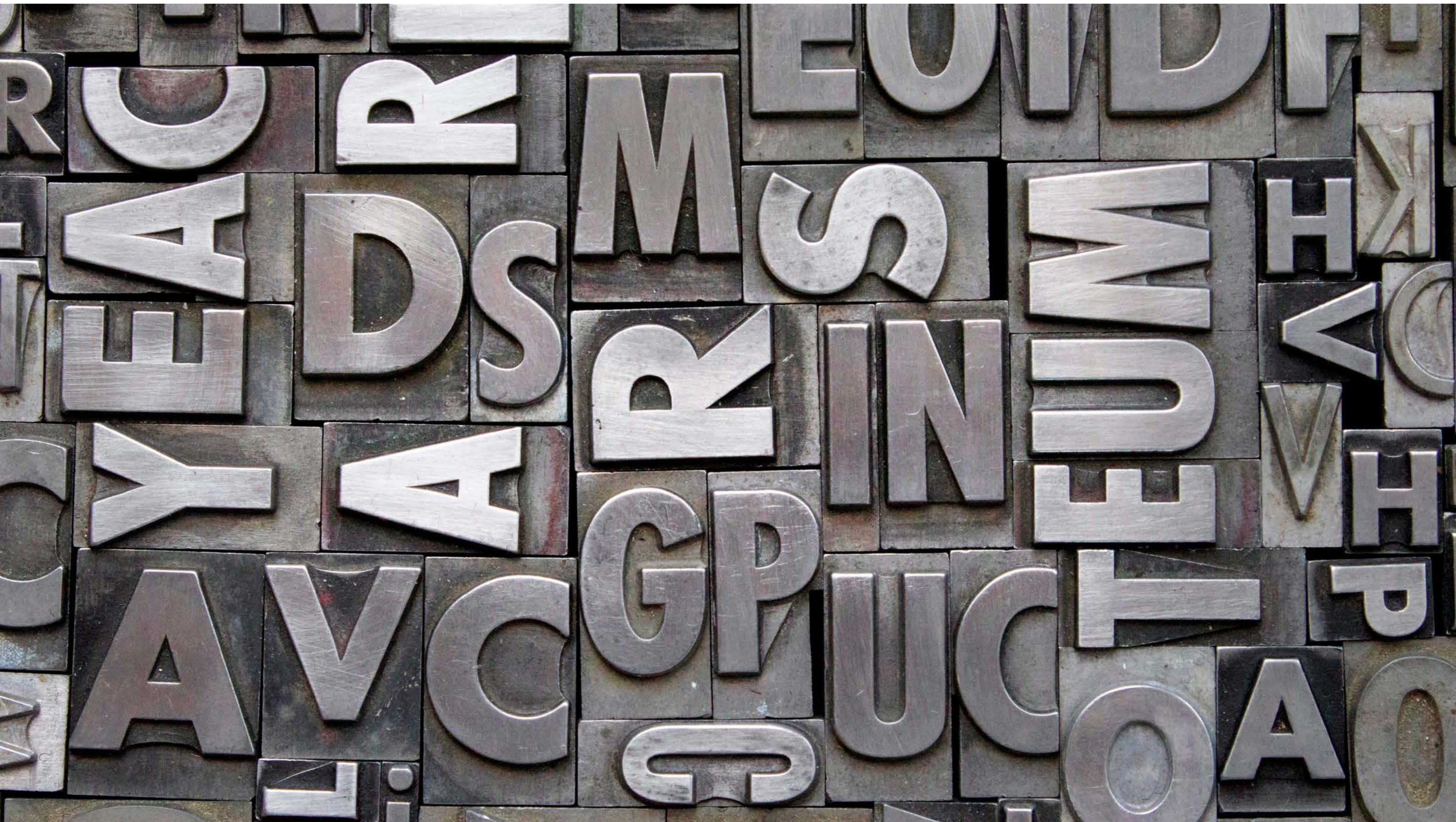
## Climatic Data

Test	Test Method	Value / Value Range	Acceptance Criteria *
Temperature cycling	IEC 60794-1-22:F1	- 40°C ÷ + 70°C	$\Delta\alpha \leq 0,05$ dB
Temperature range		- 5°C ÷ + 50°C - 40°C ÷ + 70°C - 40°C ÷ + 70°C	during installation in service in storage & transport
Water penetration	IEC 60794-1-22 F5B	L = 3 m, h = 1 m, 24 h	no water leakage
Expected lifetime		minimum 30 years	

\* IEC 60794-3-10, IEC 60794-3-11

## Fire Properties

Test	QT6x2,3EFCF	QT8x2,3EFCF	QT3x2,3EFCF	Test Method
Thermal load	3.5MJ / m	4.37MJ / m	5.71MJ / m	
Euro classification to CPR	Fca	Fca	Fca	EN 50575, EN 13501-6
Declaration of performance number	D9062	D9063	D9064	
Flammability – vertical single cable	Pass	Pass	Pass	IEC 60332-1-2
Flammability – vertical cable bundle	Pass	Pass	Pass	IEC 60332-3-22
Smoke density	Pass	Pass	Pass	IEC 61034-1, IEC 61034-2
Halogen free, acid gases	Pass	Pass	Pass	IEC 60754-2
2015 / 863 / EU – RoHS 3	conform			
1907 / 2006 / EU – REACH	conform			





## Optical Specification

Designation		G.657.A1	G.657.A2
Attenuation maximum in cable	1310 Nm	≤ 0.40 dB / km	≤ 0.40 dB / km
	1383 Nm	≤ 0.40 dB / km	≤ 0.40 dB / km
	1550 Nm	≤ 0.25 dB / km	≤ 0.25 dB / km
	1625 Nm	≤ 0.25 dB / km	≤ 0.25 dB / km
In homogeneity of OTDR trace for any two 1000-meter fiber lengths		max. 0.1 dB / km	max. 0.1 dB / km
Dispersion	1550 Nm	≤ 18.0 ps / km × Nm	≤ 18.0 ps / km × Nm
	1625 Nm	≤ 22.0 ps / km × Nm	≤ 23.0 ps / km × Nm
Zero dispersion wavelength, λ <sub>0</sub>		1304 - 1324 Nm	1304 - 1324 Nm
Zero dispersion slope		≤ 0.092 ps / (Nm <sup>2</sup> × km)	≤ 0.092 ps / (Nm <sup>2</sup> × km)
Point Discontinuity		≤ 0.05 dB	≤ 0.05 dB
Cut-off wavelength λ <sub>cc</sub>		≤ 1260 Nm	≤ 1260 Nm
Mode field diameter	1310 Nm	9.2 ± 0.4 μm	8.6 ± 0.4 μm
	1550 Nm	10.4 ± 0.5 μm	9.6 ± 0.5 μm
Polarization mode dispersion (PMD)	cabled	≤ 0.1 ps / √km	≤ 0.2 ps / √km
	link value	≤ 0.05 ps / √km	≤ 0.06 ps / √km
Group index of refraction	1310 Nm	1.467	1.467
	1550 Nm	1.468	1.468
Macro bending loss, 10 turns, r = 15 mm mandrel	1550 Nm	≤ 0.1 dB	≤ 0.03 dB
	1625 Nm	≤ 0.3 dB	≤ 0.1 dB
Macro bending loss, 1 turn, r = 10 mm mandrel	1550 Nm	≤ 0.5 dB	≤ 0.1 dB
	1625 Nm	≤ 1.5 dB	≤ 0.2 dB
Macro bending loss, 1 turn, r = 7.5 mm mandrel	1550 Nm	--	≤ 0.5 dB
	1625 Nm	--	≤ 0.9 dB

## Dimensional Specification

Designation	G.657.A1	G.657.A2
Cladding diameter	125.0 ± 0.7 μm	125.0 ± 0.7 μm
Cladding non-circularity	≤ 0.7%	≤ 0.7%
Core (MFD) non-circularity	≤ 6%	≤ 6%
Core - cladding concentricity	≤ 0.5 μm	≤ 0.5 μm
Primary coating diameter - uncolored	242 ± 7 μm	242 ± 7 μm
Primary coating diameter - colored	250 ± 15 μm	250 ± 15 μm
Primary coating non-circularity	≤ 5%	≤ 5%
Primary coating-cladding concentricity error	≤ 12.0 μm	≤ 12.0 μm

## Mechanical and Environmental Specification

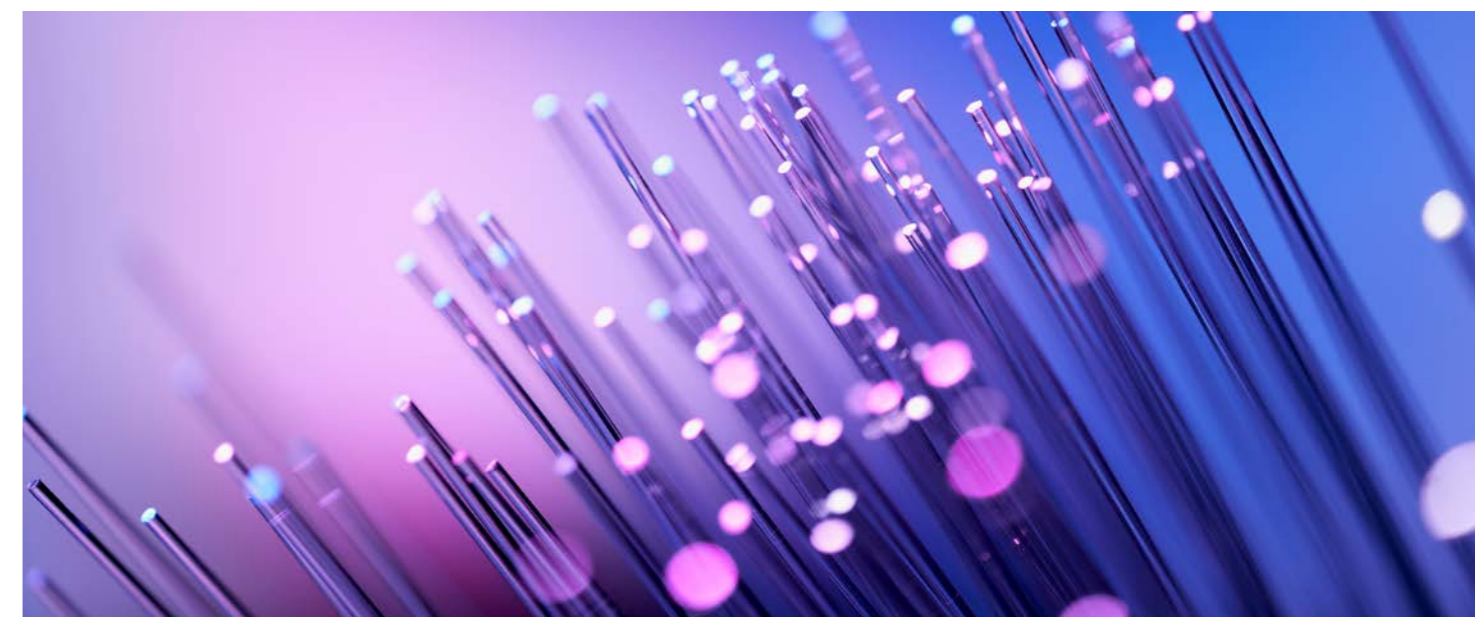
Designation		G.657.A1	G.657.A2
Coating material		dual layer UV curable acrylate	dual layer UV curable acrylate
Tensile proof test (fiber elongation ≤ 1%)		≥ 100 kpsi	≥ 100 kpsi
Operation temperature range -60°C to 85°C	1310,1550 and 1625 Nm	≤ 0.5 dB / km	≤ 0.5 dB / km
Water immersion 23°C ±2°C	1310,1550 and 1625 Nm	≤ 0.5 dB / km	≤ 0.5 dB / km
Heat aging	1310,1550 and 1625 Nm	≤ 0.5 dB / km	≤ 0.5 dB / km
Damp heat	1310,1550 and 1625 Nm	≤ 0.5 dB / km	≤ 0.5 dB / km

## Standards

Designation	G.657.A1	G.657.A2
This fiber fulfills the requirements of:	<ul style="list-style-type: none"> <li>IEC 60793-2-50 Cat. B.1.3 and B6_a1</li> <li>ITU Recommendation G.657 table A1</li> <li>ITU Recommendation G.652 table D (including older ITU designations A, B and C)</li> <li>TIA / EIA-492 CAAC</li> </ul>	<ul style="list-style-type: none"> <li>IEC 60793-2-50 Cat. B.1.3, B6a.1, B6a.2</li> <li>ITU Recommendation G.657 table A2 / B2</li> <li>ITU Recommendation G.652 table D (including older ITU designations A, B and C)</li> <li>TIA / EIA-492 CAAC</li> </ul>
When cabled, the fibers fulfil the requirements for use in a number of cabling systems, among them is:	<ul style="list-style-type: none"> <li>EN 50 173-1: 2011, cat. OS1 + OS2</li> <li>ISO / IEC 24702: 2006, cat. OS1 + OS2</li> <li>ISO / IEC 11801: 2002, cat. OS1 + OS2</li> <li>IEEE 802.3 - 2002 incl. 802.3 Section Four</li> </ul>	
Testing methods are in accordance with the following standards:	<ul style="list-style-type: none"> <li>IEC 60793-1-XX</li> </ul>	

R&M's ITU-T G657.A1 fiber is an ITU-T Recommendation G652.D fully compliant optical fiber with enhanced low-loss and bending performances that exceeds the ITU-T Recommendation G.657.A1 standard and still splices the same as the installed base of standard single-mode fibers.

R&M's ITU-T G657.A2 fiber exceeds Recommendation ITU-T G657.A2/B2 and remains compatible and fully compliant with Recommendation ITU-T G.652.D. The optical fiber delivers enhanced macro bending performance while maintaining compatible with current equipment, practices and procedures.





## Optical Specification

Designation		OM1	OM2	OM3	OM4	OM5 <sup>1</sup>	Units
Overfilled Modal Bandwidth	850nm	≥ 200	≥ 500	≥ 1500	≥ 3500	≥ 3500	MHz x km
	1310nm	≥ 500	≥ 500	≥ 500	≥ 500	≥ 500	MHz x km
Effective Modal Bandwidth	850nm			≥ 2000	≥ 4700	≥ 4700	MHz x km
	953nm					≥ 2470	MHz x km
Cabled Fiber Attenuation (maximum)	850nm	≤ 3.5	≤ 3.0	≤ 3.0	≤ 3.0	≤ 3.0	dB/km
	1310nm	≤ 1.5	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	dB/km
Numerical aperture		0.275 ±0.015	0.200 ±0.015	0.200 ±0.015	0.200 ±0.015	0.200 ±0.015	
Group Index of Refraction	850nm	1.496	1.482	1.482	1.482	1.482	
	1310nm	1.491	1.477	1.477	1.477	1.477	
Macro bending loss, r = 7.5 mm, 2 turns	850nm		≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	dB
	1310nm		≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	dB
Macro bending loss, r = 15 mm, 2 turns	850nm		≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	dB
	1310nm		≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	dB
Macro bending loss, r = 37.5 mm, 100 turns	850nm	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	dB
	1310nm	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	dB
Bending-optimized fiber			yes	yes	yes	yes	

## Dimensional Specification

Designation	OM1, OM2, OM3, OM4, OM5	Units
Core Diameter	50 ± 2.5	μm
Core non-Circularity	≤ 5	%
Core-Cladding Concentricity Error	≤ 1.5	μm
Cladding Diameter	125.0 ± 1.0	μm
Cladding non-Circularity	≤ 1.0	%
Coating Diameter	242 ± 7	μm
Coating non-Circularity	≤ 5	%
Coating-Cladding Concentricity Error	≤ 10	μm

## Mechanical Specification

Designation	OM1, OM2, OM3, OM4, OM5	Units
Tensile proof test at fiber elongation = 1%	≥ 0.7 (100 kpsi)	GPa
Dynamic Tensile Strength	median > 3.8 (550 kpsi)	GPa
Dynamic Fatigue, unaged and aged <sup>2</sup>	nd ≥ 20	-
Average Coating Strip Force	1 ≤ F <sub>avg-strip</sub> ≤ 3	N
Peak Coating Strip Force	1.3 ≤ F <sub>peak-strip</sub> ≤ 8.9	N

## Environmental Specification

Designation	Induced attenuation	OM1, OM2, OM3, OM4, OM5
Temperature Cycling,	Δα ≤ 0.1 dB/km 850/1300nm	-60°C to +85°C
Temperature - Humidity Cycling	Δα ≤ 0.1 dB/km 850/1300nm	-10°C to +85°C, 4-98% RH
Water Immersion	Δα ≤ 0.1 dB/km 850/1300nm	30 days; 23°C
Dry Heat	Δα ≤ 0.1 dB/km 850/1300nm	30 days; 85°C
Damp Heat	Δα ≤ 0.1 dB/km 850/1300nm	30 days; 85°C; 85% RH

## Others

Designation	OM1, OM2, OM3, OM4, OM5
Coating material	Acrylate

## Standards

Designation	OM1	OM2	OM3	OM4	OM5
IEC / EN 60793-2-10	Type A1-OM1	Type A1-OM2	Type A1-OM3	Type A1-OM4	Type A1-OM5
ISO / IEC 11801	Category OM1	Category OM2	Category OM3	Category OM4	Category OM5
TIA / EIA 492	AAAF (formerly AAAA)	AAAF (formerly AAAB)	AAAF (formerly AAAC)	AAAF (formerly AAAD)	AAAF (formerly AAAE)
ITU-T	G.651.1	G.651.1	G.651.1	G.651.1	G.651.1

## Minimum System Reach - Transmission Distance

IEEE Standard	OM1	OM2	OM3	OM4	OM5
100BASE-FX	2'000m	2'000m	2'000m	2'000m	2'000m
1000BASE-SX	275m	550m	550m	550m	550m
10GBASE-SR	33m	82m	300m	550m	550m
25GBASE-SR			70m	100m	100m
40GBASE-SR4 <sup>3</sup>			100m	150m	150m
100GBASE-SR4			100m	100m	100m
400GBASE-SR4.2			70m	100m	100m
40G-BiDi			100m	150m	200m
100G-BiDi			70m	100m	150m
40G SWDM4				350m	400m
100G SWDM4				100m	150m



## 1- Way of installation

I	indoor
O	outdoor
U	universal
S	ADSS (All Dielectric Self-Supporting)
Q	Fire-resistant to EN60331-25
M	Micro-cable (for blowing to micro-duct)

## 2- Buffer type

B9	900µm tight buffer
B6	600µm tight buffer
_e	«semi-tight» buffer for «easy-stripability» (e.g. B9e)
_t	«tight» buffer for short stripability length (e.g. B6t)
T	gel-filled PBT loose-tube (with up to 12 fibres)
Td	gel-free PBT loose-tube (with up to 12 fibres)
X	gel filled PBT loose-tube (with up to 24 fibres)

## 3a- Buffer count

1	unitube (LT) or simplex construction (TB)
2	2 loose-tubes (flat LT cable) or duplex construction (TB)
3	12 loose-tubes or tight-buffers
4	number of loose-tubes or tight-buffers
5	number of loose-tubes or tight-buffers
6	number of loose-tubes or tight-buffers
8	number of loose-tubes or tight-buffers
7	16 (5+11) loose-tubes or tight-buffers (in two layers)
9	18 (6+12) loose-tubes or tight-buffers (in two layers)
0	24 (9+15) loose-tubes or tight-buffers (in two layers)

## 3b- Buffer diameter (for stranded loose tube constructions)

1.5	1.5 mm
1.7	1.7 mm
2.3	2.3 mm

## 4- Strength member(s) in/under sheath

A	aramid yarns
E	e-glass yarns (standard rodent protection)
G	e-glass yarns (improved rodent protection)
R	2 FRP rods integrated in the outer sheath
D	2 steel wires integrated in the outer sheath
f	2 FRP rods under the outer sheath - flat construction

## 5- Armor

C	corrugated steel tape armor (CSTA)
W	steel wire armor (SWA)
P	fiber reinforced plastic rod armor (FRPA)
Z	laminated aluminium tape under sheath

## 6- Sheath material

F	FRLSZH (fire-retardant, low-smoke, zero-halogen)
H	HDPE (high-density polyethylene)
L	LDPE (low-density polyethylene)
N	PA (polyamide)
Y	PVC (polyvinylchloride)
V	PUR (polyurethane)
FIRis	FRLSZH sheath for higher CPR classifications

## 7- Fiber count & type

structure: xx.yy.zz

xx	number of buffers / tubes containing fibers
yy	fiber count per each buffer / tube
zz	fiber type - code as follows:

### S- Singlemode

S2	G.652.D
S5	G.655
S6	G.656
S7	G.657.A1
S8	G.657.A2
S9	G.657.B3

### M- Multimode

M1	OM1 (BW 220/600 MHz x km)
M2	OM2 (BW 500/500 MHz x km)
M3	OM3 (BW 1500/500 MHz x km)
M4	OM4 (BW 3500/500 MHz x km)
M5	OM5 (BW 3500/500 MHz x km)

## 8- Outer sheath color

R	red	V	violet
E	green	T	turquoise /aqua
U	blue	B	black
Y	yellow	O	orange
W	white	P	pink
G	gray	I	ivory
N	brown	L	lime green
H	heather-violet	M	olive green

## 1- Application area

A	outdoor cable
AT	divideable outdoor cable
B	loose tube gel-free
D	loose tube with gel filled
F	fiber
H	reinforced tube, empty
J	indoor cable
U	universal cable (for indoor and outdoor)
V	tight tube
W	reinforced tube, filled

## 2- Tube type

B	loose tube, gel-free
D	loose tube, gel filled
H	reinforced tube, gel-free
V	tight tube
W	reinforced tube, gel filled

## 3- Cable construction

B	rodent protection armor
F	core filled
Q	dry and longitudinal watertight
(ZN)	non-metallic strain-relief
(BN)	improved rodent protected non-metallic strain-relief
(ZS)	strain-relief with steel
(SR)	overlapping corrugated steel tape

## 4- Jacket material

H	halogen free jacket (FRLSZH)
Y	PVC, polyvinylchloride
2Y	PE, polyethylen (LDPE; HDPE)
4Y	PA, polyamide
11Y	PUR, polyurethane

## 5- Quantity of fiber resp. tube

n	amount of fiber
nxm	amount of loose tube x amount of fiber per tube

## 6a- Fiber Type

E	single-mode fiber (glass core/glass buffer)
G	multimode, graded index fiber (glass core/glass buffer)
GK	multimode, graded index fiber - PCF (glass core/plastic buffer)
K	multimode, step index fiber - PCF (glass core/plastic buffer)
P	plastic fiber - POF (plastic core/plastic buffer)
S	multimode step index fiber (glass core/glass buffer)

## 6b- Core diameter

n	diameter in µm e.g. 9, 50, 62.5, 200
---	--------------------------------------

## 6c- Core diameter

n	diameter in µm e.g. 125, 250
---	------------------------------

## 7a- Attenuation

xx	attenuation at wave length in dB/km
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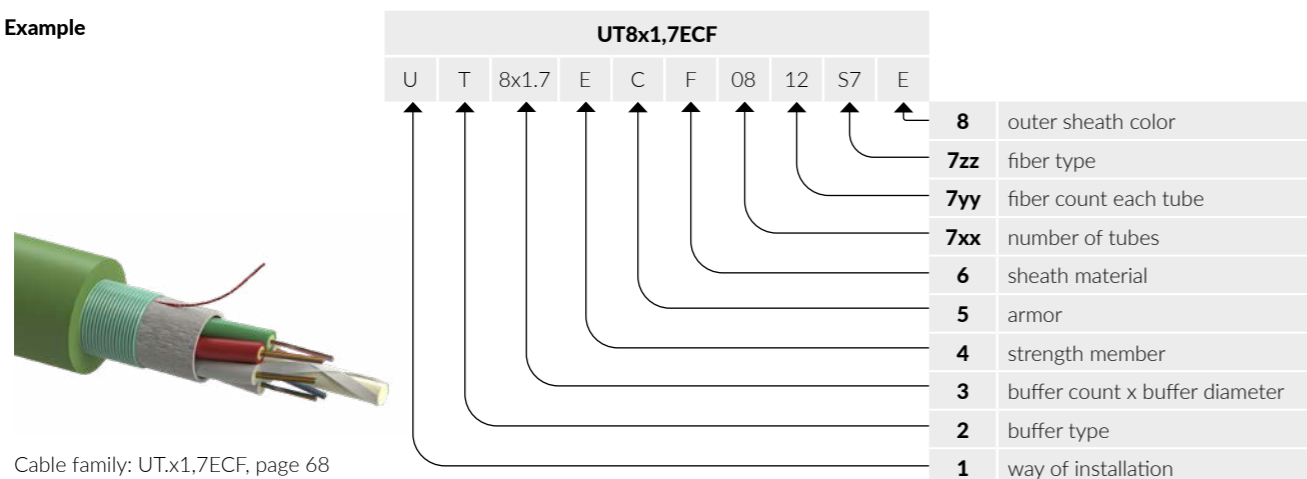
## 7b- Wave length

A	at 650 nm
B	at 850 nm
F	at 1300 nm (MM)
F	at 1310 nm (SM)
H	at 1550 nm

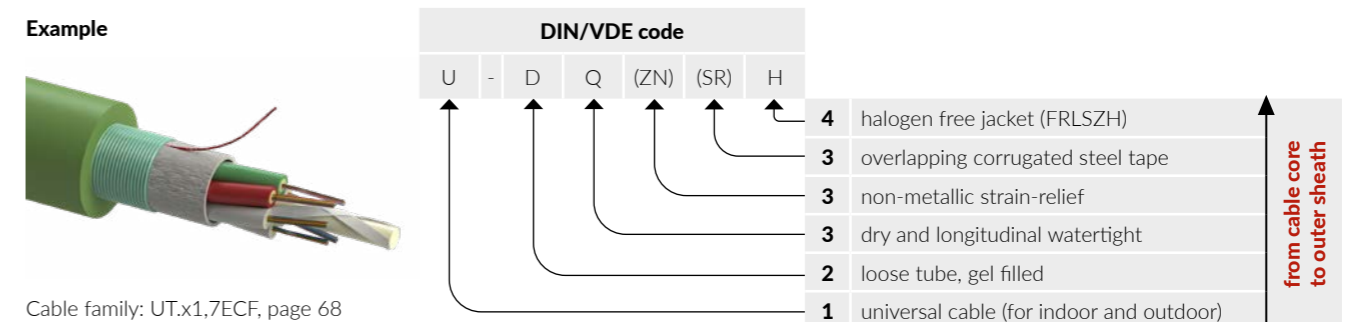
## 7c- Bandwidth

yy	MHz x 100m bandwidth at 650 nm
yy	MHz x km bandwidth at 850 nm / 1300 nm
yy	ps/(nm x km) dispersion at 1310 nm / 1550 nm

### Example



### Example







## Chemical resistance

As a rule, chemical resistance is only required in heavily polluted or potentially hazardous environments. Knowledge of the effects of chemical exposure on the cabling component is of primary importance for the assessment of the suitable product. Put simply, the combination of the intensity and duration of chemical exposure can be interpreted as „chemical exposure“.

Basically, a distinction is made between 3 types of exposure:

- Exposure to less aggressive chemicals
- Exposure to aggressive chemicals
- Exposure to swelling chemicals

The following table gives an overview of the commercially available sheath materials and shall be seen as a simple orientation aid.

Description	Polyolefins flame retardant	Polyethylene		Polybutylene terephthalate	Polyurethane	Polyamide	Polyvinyl-chloride
	Abbreviation	FRLSZH	LDPE	HDPE	PBT	PUR	PA
Groups of chemicals	Oil	ML	ML	OK	ML	OK	ML
	Petrol /Kerosene	NR	ML	OK	ML	ML	NR
	Salt water	OK	OK	OK	OK	OK	OK
	Aggressive, watery acids	OK	OK	OK	ML	ML	ML
	Diluted, watery acids	OK	OK	OK	ML	OK	ML
	Aggressive, watery lye's	OK	OK	OK	NR	NR	ML
	Diluted, watery lye's	OK	OK	OK	ML	OK	ML
	Acids, less aggressive	OK	OK	OK	NR	ML	ML
	Acids, aggressive	OK	OK	OK	NR	ML	OK
	Soaps	OK	OK	OK	OK	NR	OK
Solvents, thinners	NR	NR	NR	NR	NR	NR	

**OK:** no problem, constant exposure causes no damage  
**ML:** suitable for medium load, some effect after few days of constant exposure  
**NR:** not recommended, immediate damage

## Mechanical Properties

Mechanical properties describe its behavior under the action of loads on it. There are many mechanical properties of materials and some key properties related to cable sheath are given below. These properties are mostly of importance during installation.

Description	Polyolefins flame retardant	Polyethylene		Polybutylene terephthalate	Polyurethane	Polyamide	Polyvinyl-chloride
Abbreviation	FRLSZH	LDPE	HDPE	PBT	PUR	PA	PVC
Abrasion resistance	low	med	good	good	good	good	medium
Flexibility	high	med	low	low	high	low	high
Hardness	medium	med	hard	hard	soft	hard	soft

## Combustion Properties

Flammability and/or combustion properties come into play any time a part or product will be used in a regulated space or application, such as aircraft, residential living units, public buildings, and so on.

Description	Polyolefins flame retardant	Polyethylene		Polybutylene terephthalate	Polyurethane	Polyamide	Polyvinyl-chloride
Abbreviation	FRLSZH	LDPE	HDPE	PBT	PUR	PA	PVC
Halogen free	yes	yes		yes	yes	yes	no
Flame retardant	yes	no		no	no	no	yes
Smoke emission	low	low		strong	strong	medium	strong
Corrosive gasses	low	no		no	low	low	high

## Color code for fibers

### IEC 60304 - R&M Standard

1	2	3	4	5	6	7	8	9	10	11	12
red	green	blue	yellow	white	gray	brown	violet	turquoise	black	orange	pink
13	14	15	16	17	18	19	20	21	22	23	24
red ring-marked	green ring-marked	blue ring-marked	yellow ring-marked	white ring-marked	gray ring-marked	brown ring-marked	violet ring-marked	turquoise ring-marked	transparent ring-marked	orange ring-marked	pink ring-marked

### ANSI/TIA-598

1	2	3	4	5	6	7	8	9	10	11	12
blue	orange	green	brown	gray	white	red	black	yellow	violet	pink	turquoise
13	14	15	16	17	18	19	20	21	22	23	24
blue ring-marked	orange ring-marked	green ring-marked	brown ring-marked	gray ring-marked	white ring-marked	red ring-marked	transparent ring-marked	yellow ring-marked	violet ring-marked	pink ring-marked	turquoise ring-marked

### Loose-tube color coding

1	2	3	4	5	6-17	18
red	green	white	white	white	...	white

### Outer jacket color

B	R	G	B	Y	W	I	G	B	V	T	O	P
black	red	green	blue	yellow	white	ivory	gray	brown	violet	turquoise	orange	pink



## Construction Products Regulation

### Euro class B2ca and class Cca

Products with very high or high fire protection, no continuous flame propagation, limited fire development, and a limited heat release rate.

### Euro class Eca

Products with normal fire protection, exposure to a small flame may ignite the cable, low resistance to temperature increases.

### Euro class Dca

Products with medium fire protection, continuous flame propagation, moderate fire development, and a limited heat release rate.

### Additional classification

#### Production / density of smoke

There are three classes for smoke production and density in cables:

- s1** weak smoke production
- s1a** **s1** plus transmission value according to EN 61034-2  $\geq 80\%$
- s1b** **s1** plus transmission value according to EN 61034-2  $\geq 60\% < 80\%$
- s2** moderate smoke production
- s3** potentially strong smoke production

Euro classification (ca)	Classification criterion	Additional criteria	Assessing and examining the consistency of the performance system
<b>A</b>	EN ISO 1716 Gross heat of combustion		1+ Verification documents: • Type testing • Regular works audit • Regular sampling of ongoing production
<b>B1</b>	EN 50399 Heat release	Smoke production (s1a, s1b, s2, s3) EN 50399 / EN 61034-2	
<b>B2</b>		Acidity (a1, a2, a3) EN 50267-2-3	
<b>C</b>	Flame propagation EN 60332-1-2	Flaming droplets (d0, d1, d2) EN 50399	
<b>D</b>	Flame propagation		
<b>E</b>	EN 60332-1-2 Flame propagation		4 No verification documents
<b>F</b>			

### Acid production / corrosivity

There are three classifications of corrosivity:

- a1** slightly corrosive fumes
- a2** moderately corrosive fumes
- a3** potentially highly corrosive fumes

### Flaming droplets

There are three classes for the production of flaming droplets:

- d0** no flaming droplets
- d1** flaming droplets for a short time
- d2** potentially long-lasting flaming droplets

### Recommendations for the future use of EU fire protection classification

First and foremost, the CPR enables a comparison between the fire protection properties of different products. However, every member state is instructed and required to define the minimum necessary fire protection classification for the various applications themselves. The requirements placed on products can thus differ greatly across Europe for each building type. Therefore, the planner must check and comply with the local regulations. Various organizations and international associations have also declared their own recommendations, which sometimes go well beyond the legal minimum requirements.

In consideration of cost vs. benefit, R&M makes the following recommendation:

Euro classification	Additional classification			Fire protection level of the installation cables (Use recommendations from R&M)*	
	Flame propagation Heat production	Smoke production / density	Acid production / corrosivity		Flaming droplets
A <sub>ca</sub>				<b>NA</b>	
B1 <sub>ca</sub>				<b>NA</b>	
B2 <sub>ca</sub>		s1	a1	d1	<b>Very high</b> (e.g. escape routes, tunnels, high-risk industries)
C <sub>ca</sub>		s1	a1	d1	<b>High</b> (e.g. hospitals, nursing homes, schools)
D <sub>ca</sub>		s2	a2	d1	<b>Medium</b> (e.g. public buildings, hotels, airports, industrial environments)
E <sub>ca</sub>					<b>Normal</b> (e.g. normal office buildings, residential premises)
F <sub>ca</sub>					<b>Low</b> (not recommended)

\* The necessary fire protection classification for installation cables is prescribed by the relevant fire prevention authority.



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