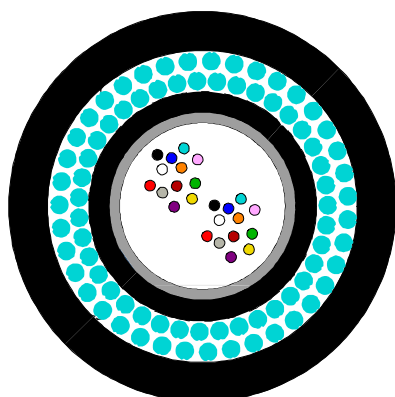




SM-MEWE UNDERWATER CABLE

Cable Design

Steel Tube- inner sheath - Steel wire Armour with Bitumen- outer sheath



Example

- not to scale -

- **Optical fibre:** for fibre specification see optical characteristics(C03e).
- **Fibre identification:** Every fibre in a tube is uniquely identified by a different colour. For fibre counts above 12 fibres grouping with bundle yarns.
- **Steel Tube:** consists of laser welded hermetically sealed stainless steel. The tube is filled with water repellent filling compound
- **Inner sheath:** PE (Black).
- **Aarmor:** two layer of galvanized steel wires, over the wires a layer of bitumen.
- **Outer sheath:** PE (Black).

Application

Water Submarine Cables. Also applications are found in special situations.
Max. water depth 1,5 km.

Configuration

No. of Fibers	Steel tube [mm]	Inner sheath thickness [mm]	Aarmor wire thickness [mm]	Outer Sheath Thickness [mm]	Diameter over Inner sheath [mm]	Diameter over armor [mm]	Cable diameter [mm]	Cable Weight [kg/km]	Pulling Force Long term [kN]	Pulling Force Short term [kN]
12	3.4/3.8	1.5	1.0	2.0	6.8	10.8	15.2	490	12	16
24	3.4/3.8	1.5	1.0	2.0	6.8	10.8	15.2	490	12	16
36	3.4/3.8	1.5	1.0	2.0	6.8	10.8	15.2	490	12	16
48	3.4/3.8	1.5	1.0	2.0	6.8	10.8	15.2	490	12	16
72	4.6/5.1	1.5	1.0	2.0	8.1	12.1	16.5	580	13	17
96	4.6/5.1	1.5	1.0	2.0	8.1	12.1	16.5	580	13	17
12	3.4/3.8	1.5	1.8	2.0	6.8	14.0	18.4	885	24	32
24	3.4/3.8	1.5	1.8	2.0	6.8	14.0	18.4	885	24	32
36	3.4/3.8	1.5	1.8	2.0	6.8	14.0	18.4	885	24	32
48	3.4/3.8	1.5	1.8	2.0	6.8	14.0	18.4	885	24	32
72	4.6/5.1	1.5	1.8	2.0	8.1	15.3	19.7	1015	26	34
96	4.6/5.1	1.5	1.8	2.0	8.1	15.3	19.7	1015	26	34



Configuration

No. of Fibers	Steel tube [mm]	Inner sheath thickness [mm]	Aarmor wire thickness [mm]	Outer Sheath Thickness [mm]	Diameter over Inner sheath [mm]	Diameter over armor [mm]	Cable diameter [mm]	Cable Weight [kg/km]	Pulling Force Long term [kN]	Pulling Force Short term [kN]
12	3.4/3.8	1.5	2.2	2.0	6.8	15.6	20.0	1130	32	42
24	3.4/3.8	1.5	2.2	2.0	6.8	15.6	20.0	1130	32	42
36	3.4/3.8	1.5	2.2	2.0	6.8	15.6	20.0	1130	32	42
48	3.4/3.8	1.5	2.2	2.0	6.8	15.6	20.0	1130	32	42
72	4.6/5.1	1.5	2.2	2.0	8.1	16.9	21.3	1240	33	44
96	4.6/5.1	1.5	2.2	2.0	8.1	16.9	21.3	1240	33	44

Main Mechanical and Environmental Characteristics

Test	Test Standard	Specified Value	Acceptance Criteria
Max. Tension	IEC 60794-1-2-E1	See table above	$\Delta\alpha \leq 0.05$ dB (long term)
Crush	IEC 60794-1-2-E3	10kN / 100 mm	$\Delta\alpha \leq 0.05$ dB
Impact	IEC 60794-1-2-E4	100 Nm, R= 250 mm, 3 spots	$\Delta\alpha \leq 0.05$ dB
Repeated Bending	IEC 60794-1-2-E6	R=25x D	$\Delta\alpha \leq 0.05$ dB
Cable Bend	IEC 60794-1-2-E11	R=20x D	$\Delta\alpha \leq 0.05$ dB
Water Penetration	IEC 60794-1-2-F5B	sample=3m, water column=1m	no water leakage in 24h
Fibre excess length		0.6 ± 0.1	%
Max. cable depth		1,5 km	

All optical measurements at 1550 nm.

Temperature Range Transportation & Storage: - 30 to + 70°C
Installation: - 15 to + 50°C
Operation: - 30 to + 70°C

Identification and Packing

Fiber Colors

No.	1	2	3	4	5	6	7	8	9	10	11	12
Color	blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	turquoise

Yarn Colors

No.	1	2	3	4	5	6	7	8
Color	blue	Orange	Green	Brown	Grey	White	Red	Black

Sheath Color:

The outer sheath color is black.



Sheath Marking:

The outer sheath is marked in 1 meter intervals as follows:

DRAKA COMTEQ TELECOM [year of manufacture] OPTICAL CABLE [fibre count]x[fibre type] [length marking in meter]

Packing:

Wooden drums with protection.

Delivery Lengths:

Standard delivery lengths are 2 km, 4 km, with a tolerance of - 1% / + 3%



C03e: General purpose enhanced SM fibre

ESMF: Low water-peak OS2 and OS1 fibre

General and application

This enhanced Single mode fibre provides improved performance across the entire 1260 nm to 1625 nm wavelength spectrum due to its low attenuation in 1383 nm the water-peak region.

Standards and Norms

IEC 60793-2-50 Category B.1.3	ISO/IEC 11801:2002, cat. OS1
EN 60793-2-50: Class B1.3	ISO/IEC 24702: 2006, cat. OS2; also OS1 requirements are fulfilled
ITU Recommendation G.652.D – the older ITU designations A, B and C are also fulfilled	IEEE 802.3 – 2002 incl. 802.3ae
EN 50173-1:2007, cat. OS2; also OS1 requirements are fulfilled	

Attenuation (of cable with fibres)

IEC 60793-1-40

1310 nm – 1625 nm	≤ 0.39 dB/km
1550 nm	≤ 0.25 dB/km
Inhomogeneity of OTDR trace for any two 1000 metre fibre lengths	Max. 0.1 dB/km

Group index of refraction

IEC 60793-1-22

Group index of refraction at 1310 nm	1.467
Group index of refraction at 1550 nm	1.468
Group index of refraction at 1625 nm	1.468

Other properties

IEC 60793-1-xx

Attribute	Measurement method	Units	Limits
Cladding diameter	IEC/EN 60793-1-20	µm	125.0 ± 0.7
Cladding non-circularity	IEC/EN 60793-1-20	%	≤ 0.7
Core (MFD) non-circularity	IEC/EN 60793-1-20	%	≤ 6
Core (MFD) -cladding concentricity error	IEC/EN 60793-1-20	µm	≤ 0.5
Primary coating diameter - uncoloured	IEC/EN 60793-1-21	µm	242 ± 7
Primary coating diameter - coloured	IEC/EN 60793-1-21	µm	250 ± 15
Primary coating non-circularity	IEC/EN 60793-1-21	%	≤ 5
Primary coating-cladding concentricity error	IEC/EN 60793-1-21	µm	≤ 12.0
Proof stress level	IEC/EN 60793-1-30	GPa	≥ 0.7 (≈ 1 %)
Strip force (peak)	IEC/EN 60793-1-32	N	1.0 ≤ F _{peak.strip} ≤ 8.9
Chromatic dispersion coefficient: In the interval 1285 nm – 1330 nm At 1550 nm At 1625 nm	IEC/EN 60793-1-42	ps/km • nm ps/km • nm ps/km • nm	≤ 3 ≤ 18.0 ≤ 22.0
Zero dispersion wavelength, λ ₀		nm	1311 ± 11
Zero dispersion slope		ps/(nm ² • km)	≤ 0.090
Cut-off wavelength	IEC/EN 60793-1-44	λ _c nm λ _{cc} nm	1034 - 1330 ≤ 1260
Mode field diameter at 1310 nm Mode field diameter at 1550 nm	IEC/EN 60793-1-45	µm µm	9.0 ± 0.4 10.1 ± 0.5
Macrobending loss at 1550 nm, 100 turns on a ø 60 mm mandrel.	IEC/EN 60793-1-47	dB	≤ 0.05
Polarisation mode dispersion (PMD) coefficient, cabled	IEC/EN 60793-1-48	ps/√km	≤ 0.5
PMD ₀ Link Design Value	IEC/EN 60794-3	ps/√km	≤ 0.2