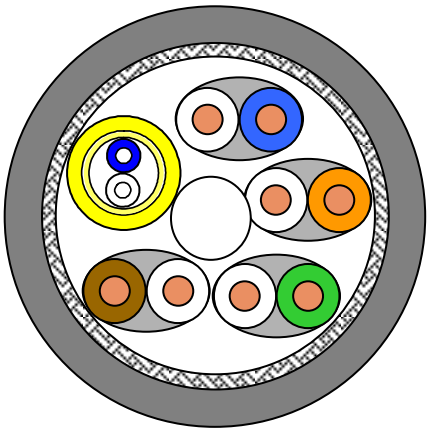
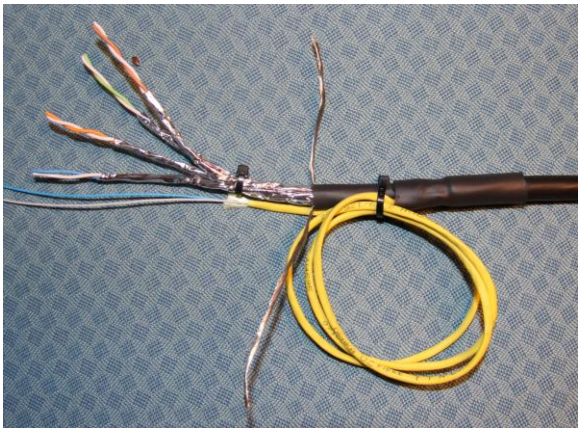
Part. No: BC-10-003 Rev. No: 1.5 Date: 01/05-2016

Bergen Cabling DNV GL approved Maritime LAN
Hybrid cable S/FTP Cat.7 + 2 OS2 single mode fibres





Application

Generic Data transmission. This cable is a **Cat7 S/FTP** cable meant for use as installation/horizontal cable in tougher electrical and mechanical environment, including ships and offshore units. The cable is tested up to 900 MHz and will give good margin for application like 10 Gigabit Ethernet at a bandwidth up to 500 MHz.
Singlemode fiber 2 fiber cable with aramid yarns strength, fulfills ITU G.657 A2, G.657 B2 as well as G.652.A-B-C and D

Standards

EN 50173-1; EN 50288-4-1
ISO/IEC 11801 Class F and OS2,

IEC 60793-2-50, B6 a and b
IEC 60793-1-xx (See separate datasheet)

Fire rating

LSHF-FR(SHF1)	: IEC 60754-2; IEC 61034, IEC 60332-3-24
Fibre cable OS2 LSHF-FR	: IEC 60332-3-24 (3C)

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Construction copper

Conductor	Solid copper wire, ⌀ 0.56 mm (AWG 23)
Insulation	Foamskin PE, ⌀ 1.4 mm
Twisting	2 cores to the pair
Pair screen	Al-laminated plastic foil
Cable lay up	4 pairs (PiMF) to the core
	1 pair OS2 fiber under the braid
Screen	Copper braid, tinned
Sheath	Oil resistant, Fire retardant and halogen free LSHF-FR (SHF1).

Chemical resistance

Mineral oils IRM 902 (IEC60811-2-1) : 7 days/23°C
4 hours/70°C
Diesel - IRM 903 (IEC60811-2-1) : 7 days/23°C
4 hours/70°C

Mechanical properties

Bending radius	Without load	8 x D
	With load	4 x D
Fiber element better than copper		
Temperature range	During operation	-40°C to + 85°C
	During installation	-15°C to + 50°C
Fire load	4 pair	670 MJ/km
Maximum tensile load	During operation	No load
	During installation	200 N

Electrical properties

at 20°C± 5°C

Loop resistance		≤ 150 Ω/km
Resistance unbalance		≤ 2%
Insulation resistance	(500 V)	≥ 5000 MΩ*km
Mutual capacitance	at 800 Hz	Nom. 43 nF/km
Capacitance unbalance	(pair/ground)	≤ 1500 pF/km
Characteristic impedance	(1-100 MHz)	(100 ± 5) Ω
	(100 - 250) MHz	(100 ± 10) Ω
	(250 - 600) MHz	(100 ± 15) Ω
Nominal velocity of propagation		ca. 79 %
Propagation delay		≤ 570 ns/100m
Delay skew		≤ 9 ns/100m
Test voltage	(DC, 1 min) core/core and core/screen	1000 V
Transfer impedance(Grade 1)	at 1 MHz	≤ 10 mΩ/m
	at 10 MHz	≤ 10 mΩ/m
	at 30 MHz	≤ 10 mΩ/m
	at 100MHz	≤ 20 mΩ/m
Coupling attenuation		≥ 85 dB

Technical Data

Description	Variant	Colour	Outer diameter (D) mm	Delivery form	Weight kg/km	BC No.
Maritime LAN Cat.7 S/FTP 4x2/0.56 + 2 OS2 fibres	LSHF-FR(SHF1)	Black	9,2	Reel 500m	92	10-003

Certification

DNV GL approved for Maritime and Offshore. Certificate NO: TAE000000A

Electrical data (nominal) acc. to Cat.7 (at 20°C)

F (MHZ)	Attenuation (dB/100m)	NEXT (dB)	PS-NEXT (dB)	ACR (dB/100m)	PS-ACR (dB/100m)	ELFEXT (dB/100m)	PS-ELFEXT (dB/100m)	Return loss (dB)
1,0	1,8	100	97	98	95	105	105	-
4,0	3,4	100	97	97	94	105	102	27
10,0	5,4	100	97	95	92	97	94	30
16,0	6,8	100	97	93	90	93	90	30
20,0	7,7	100	97	92	89	91	88	30
31,2	9,6	100	97	90	87	87	84	30
62,5	13,7	100	97	86	83	81	78	30
100,0	17,4	100	97	83	80	77	74	30
125,0	19,5	95	92	75	72	75	72	26
155,5	21,9	94	91	72	69	73	70	26
175,0	23,3	93	90	70	67	72	69	25
200,0	25,0	92	89	67	64	71	68	25
250,0	28,1	90	87	62	59	69	66	24
300,0	30,9	89	86	58	55	67	64	24
450,0	38,3	87	84	48	45	64	61	23
600,0	44,8	85	82	40	37	61	58	22
750,0	52,0	83	80	31	28	59	56	21
900,0	59,4	82	79	23	20	58	55	20

Specification of the 2 single mode fibres in the hybrid cable

Enhanced bend insensitive, low water peak fibre; G.657.A2 and G.657.B2

General and application

This enhanced low macro bending sensitive, low water peak fibre, gives unsurpassed bending performance. The preferred use of the BendBright$_{®}^{XS}$ fibre is in office installations, for patch cords, interconnection cables and for Fibre-to-the-Home networks. The BendBright$_{®}^{XS}$ offers reduced bending radii for many cables types. The fibre fulfils the new ITU G.657 A2 and G.657 B2 specification (edition 2009), as well as G.652.D. The low macro bending sensitivity further guarantees that the 1625 nm window (L-band) will be available for future use in this bandwidth hungry environment

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Standards and Norms

IEC 60793-2-50 Category B6_a and B6_b	EN 50 173-1:2007, cat. OS2
EN 60793-2-50: Class B6_a and B6_b	ISO/IEC 11801:2002, cat. OS2
ITU Recommendation G.657.A2 and G.657.B2 (2009)	ISO/IEC 24702:2006 cat. OS2 and OS1
ITU Recommendation G.652 designations A, B, C and D (2009)	IEEE 802.3 – 2002 incl. 802.3ae

Attenuation (cabled fibre) IEC 60793-1-40

1310 nm	≤ 0.38 dB/km
1383 nm *	≤ 0.38 dB/km
1550 nm	≤ 0.23 dB/km
1625 nm	≤ 0.25 dB/km
Inhomogeneity of OTDR trace for any two 1000 metre fibre lengths	Max. 0.1 dB/km

** Including H2-ageing according to IEC 60793-2-50, type B.1.3, @1383nm*

Group index of refraction IEC 60793-1-22

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

Other properties IEC 60793-1-xx

Cladding diameter	IEC/EN 60793-1-20	µm	125.0 ± 0.7
Cladding non-circularity	IEC/EN 60793-1-20	%	≤ 0.7
Core (MDF) -cladding concentricity error	IEC/EN 60793-1-20	µm	≤ 0.5
Primary coating diameter – ColorLock®^{XS} and natural	IEC/EN 60793-1-21	µm	242 ± 7
Primary coating non-circularity	IEC/EN 60793-1-21	%	≤ 5
Primary coating-cladding concentricity error	IEC/EN 60793-1-21	µm	≤ 12
Proof stress level	IEC/EN 60793-1-30	GPa	≥ 0.7 (≈ 1 %)
Strip force (peak)	IEC/EN 60793-1-32	N	$1.2 \leq F_{peak.strip} \leq 8.9$
Static fatigue, aged n_s		-	>23
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	 ≤ |3.7| ≤ 18.5 ≤ 23.0
Zero dispersion wavelength, λ_0		nm	1300 - 1324
Zero dispersion slope		ps/(nm^2 • km)	≤ 0.092
Cut-off wavelength	IEC/EN 60793-1-44	λ_{cc} nm	≤ 1260 *
Mode field diameter at 1310 nm Mode field diameter at 1550 nm	IEC/EN 60793-1-45	µm µm	8.8 ± 0.4 9.8 ± 0.5
Macro bending loss 10 turns on a mandrel R = 15 mm, @1550nm 10 turns on a mandrel R = 15 mm, @1625nm 1 turn on a mandrel R = 10 mm, @1550nm 1 turn on a mandrel R = 10 mm, @1625nm 1 turn on a mandrel R = 7.5 mm, @1550nm 1 turn on a mandrel R = 7.5 mm, @1625nm	IEC/EN 60793-1-47	dB	 ≤ 0.03 ≤ 0.1 ≤ 0.1 ≤ 0.2 ≤ 0.5 ≤ 1.0
Polarisation mode dispersion (PMD) coefficient, cabled	IEC/EN 60793-1-48	ps/√km	≤ 0.1
PMD_Q Link Design Value**	IEC/EN 60794-3	ps/√km	≤ 0.06

** guaranteed value according to the ITU-T (ATM G650) method*

*** according to IEC 60794-3, Ed3 (Q=0.01%)*

All measurements in accordance with ITU-T G650 recommandations.