Hybrid Shipboard Cable

halogen-free, flame retardant

SK-(KS-02YSCH)/KL-U-DQ(ZN)BH/2X(St+C)/H
6 x Cat. 7 (4 x 2 x AWG 23/1 PiMF) + 1 x 3 x 1.5 mm² + 8 x G50/125 OM4 - bendable/ 4 x E 9/125 OS2

Application

For data transmission and controlling on ships.
Recommended for fixed installation indoor and outdoor, in dry and wet locations.

Construction

1. Copper data pairs (6 x (4 x 2 x AWG 23/1) PiMF) 100Ω (Cat. 7)

Conductor ..... solid plain copper, size: AWG 23/1
Insulation..... foamed polyethylene PE with skin layer of PE (Ø 1.45 mm approx.)
Colour code..... white/blue, white/orange, white/green, white/brown
Pair Screen..... plastic coated aluminium tape, metallic surface outside in contact with tinned copper wire braid (overall screen)
Overall Screen ..... tinned copper wire braid
Outer sheath ..... halogen-free flame retardant polymer, yellow
Cable Marking..... continuously numbered

2. Power Supply 1 x 3 x 1.5 mm²

Conductor ..... multistranded plain copper, size: 1.5 mm² (class 5 in acc. to IEC 60228)
Insulation..... cross linked polyethylene XLPE
Colour code..... yellow-green, blue, brown
Laying up..... cores twisted to cable core (with filling elements if necessary)
Overall screen..... at least 1 layer plastic tape, overlapped; 1 layer of aluminium coated plastic tape, overlapped, metallic surface in contact with tinned copper wire braid; opt. coverage min. 84 % (in acc. to IEC 60092-350), geometrical cross section approx. 2.7 mm²

3. Fibre Optic Cable* (loose tube) 8 G 50/125 + 4 E 9/125

8 fibre Multi-Mode (G 50/125 OM4-bendable)
Colour code..... red/green/blue/yellow/white/grey/brown/violet

4 fibre Single- Mode (E 9/125 OS2)
Colour code..... turquois/black/orange/pink
Core ..... jelly filled loose tube (Ø 2.9 mm) with 12 fibres
Strain relief/ Armour. multifunctional E-glass yarns as strain relief and non-metallic rodent protection above the central loose tube
Outer sheath ..... halogen-free, flame retardant polymer, black

4. Cable core

Laying up..... elements twisted to cable core (with filling elements if necessary)
Wrapping..... at least 1 layer of plastic tape, overlapped
Outer sheath ..... halogen-free, flame retardant polymer, green
Cable Marking..... SPEZIALHYBRID V-II-C-1 WIKING KABEL
(inkjet) Production Lot Code Length Marking

Example Sketch

Technical Data

Flame retardant:	IEC 60332-1	***Temperature range:***	
Flame propagation:	IEC 60332-3-22 (cat. A)	-10°C up to +60°C	*(during operation)*
		- 5°C up to +50°C	*(during installation)*
Overall diameter:	approx.: 24.0 mm	***Min. bending radius:***	
	max.: 25.0 mm	10 x cable diameter	
Weight:	approx.: 639 kg/km		
Part. No.:	LKD700000120000		

Abbreviations

SK-	Hybrid cable
02YS	foam skin PE
(St+C)	combined screen
H	halogen-free compound
PiMF	pair in metal foil

*** Colour code in acc. to IEC 60304; please be aware to avoid mistaken identity by application**

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Electrical data at 20°C (copper data pairs - Cat. 7)

	Character	Unit	Values
Conductor resistance	max.	Ω/km	75
Impedance (f = 100 MHz)		Ω	100 Ω ± 5 Ω
Isolation resistance	min.	GΩ x km	5
Mutual capacitance	approx.	nF/km	42
Transfer capacitance (e)	approx.	pF/km	1500
Signal velocity (c)	approx.		0.8
Propagation delay	approx.	ns/100 m	420
Test voltage Ueff		V	1000
Operating voltage	max.	V	125

Electromagnetic behaviour (copper data pairs - Cat. 7)

	Character	Unit	Values
Transfer impedance at 10 MHz	nom.	mΩ/m	5
Screen attenuation up to 1000 MHz	nom.	dB	70
Coupling attenuation up to 1000 MHz	nom.	dB	85
Segregation class	in acc. to EN 50174-2		d

Electrical characteristics (copper data pairs - Cat. 7)

Frequency MHz	Attenuation dB/100m		NEXT dB		PS-NEXT dB		ACR dB@100 m		PS-ACR dB@100 m		ACR-F dB@100 m		PSACR-F dB@100 m		RL dB	
	typ.	Cat.7 max.*	typ.	Cat.7 min.*	typ.	Cat.7 min.*	typ.	Cat.7 min.*	typ.	Cat.7 min.*	typ.	Cat.7 min.*	typ.	Cat.7 min.*	typ.	Cat.7 min.*
1	1.9	2	105	80	102	77	104	78	101	75	98	80	95	77	26.6	23
10	4.8	5.7	105	80	102	77	101	74	98	71	103	74	100	71	35.3	25
100	16.3	18.5	105	72	102	69	89	54	86	51	89	54	86	51	39.6	20.1
200	24.3	26.8	105	68	102	65	81	41	78	38	82	48	79	45	36	18
250	27.5	30.2	105	66	102	63	78	36	75	33	79	46	76	43	34	17.3
500	37.9	44.1	100	62	97	59	62	18	59	15	67	40	64	37	29	17.3
600	42.4	48.9	95	61	92	58	53	12	50	9	60	38	57	35	25.4	17.3
700	47.2	---	95	---	92	---	48	---	45	---	57	---	54	---	24.6	---
800	50.3	---	93	---	90	---	43	---	40	---	53	---	50	---	23.5	---
900	54.6	---	90	---	87	---	35	---	32	---	49	---	46	---	22.6	---
1000	58	---	88	---	85	---	30	---	27	---	44	---	41	---	21.5	---
1150	61.9	---	86	---	83	---	25	---	22	---	39	---	36	---	20.6	---

*EN 50288-4-1 (2004) / IEC 61156-5 (2002) **The effect of overall twisting of single elements can lead to an additional attenuation of 3% or frequency selective reflection at multicables.**

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Electrical data at 20°C (Power Supply 230 V)			
	Character	***Unit***	***Values***
Conductor Size	nom.	Mm²	1.5
Conductor resistance	max.	Ω/km	13.3
Test voltage U_{eff} core:core		V	3500
core:screen		V	3500
Operating voltage	max.	V	0.6/1 kV

Geometrical data (Power Supply 230 V)			
No. of cores	***RT of insulation***	***RT of core***	***Overall diameter***
	nom.	*nom.*	*approx.*
	(mm)	*(mm)*	*(mm)*
1.5 mm²			
3	0.7	3.0	7.5

Optical Properties Multimode G 50/125 (OM4 – Fibre - bendable)			
Cladding diameter		***µm***	125 ± 1
Coating diameter		***µm***	245 ± 0.5
Coating non-circularity	***max.***	***%***	1
Optical attenuation at 850 nm	***max.***	***dB/km***	2.5
Optical attenuation at 1300 nm	***max.***	***dB/km***	0.7
Bandwidth at 850 nm	***min.***	***MHz x km***	3500
Bandwidth at 1300 nm	***min.***	***MHz x km***	500
laser bandwidth at 850 nm	***min.***	***MHz x km***	4700

Optical Properties Singlemode E 9/125 (OS2 – Fibre)			
Cladding diameter		***µm***	125 ± 1
Coating diameter		***µm***	245 ± 0.5
Coating non-circularity	***max.***	***%***	1
Optical attenuation at 1310 nm	***max.***	***dB/km***	0.36
Optical attenuation at 1550 nm	***max.***	***dB/km***	0.22

Geometrical data overall		
RT of outer sheath	**Ø over outer sheath**	***Weight***
nom.	*nom. / max.*	*approx.*
(mm)	*(mm)*	*kg/km*
1.4	24.0 / 25.0	639

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