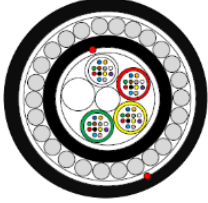
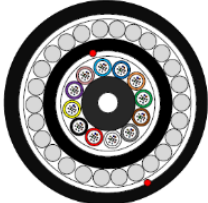



UNDER WATER INSTALLATION CABLE, SWFS-SA

SINGLE ARMOR, FOR INSTALLATION DEPTH ≤50 MTR

1. APPLICATION / CONSTRUCTION

Identification	SWFC-SA – 12/24/48/96/144/192/288 G.652.D		
Application	Under water installation		
Cross Section (not to scale)	12/24/48/96 fibers	144 fibers	192/288 fibers
			
Configuration	<ul style="list-style-type: none"> - Loose tubes with up to 12 optical fibers, filled with thixotropic compound - Stranded loose tubes, SZ strand - Central strength member, fiber reinforced plastic (FRP), or coated FRP - Cable strand: Filled with thixotropic compound. - Inner sheath: PE, black, one ripcord. water blocking tape under the sheath - Armor: Galvanized steel wire - Outer sheath: PE, black, UV proof, one ripcord and wrap tape under the sheath 		
Temperature Range	Storage and transport -40 to +60°C	Installation -20 to +60°C	Operation -40 to +60°C
Standards	IEC 60793-1, IEC 60793-2, IEC 60794-3-30, ITU-T G650, ITU-T G.652		
Specification no.	ZTT 23-XJ22404-2-A		

2. DIMENSIONS

Number of fibers	pcs	12	24	48	96	144	192	288
Loose tube x fibers	pcs	1x12	2x12	4x12	8x12	12x12	16x12	24x12
Loose tubes	pcs	1	2	4	8	12	In 5 Out 11	In 9 Out 15
Fillers	pcs	4	3	1	0	0	0	0
Loose tube ϕ ($\pm 0,1$)	mm	2.1						
CSM (FRP) ϕ ($\pm 0,1$)	mm	1.6			3.6 (FRP 2.5)	6.3 (FRP 3.0)	1.5	4.3 (FRP 2.5)
Inner sheath thickness (nominal)	mm	0.7						
Steel wire armor ϕ ($\pm 0,1$)	mm	1.0				1.6	1.5	1.6
Steel wire armor (± 1)	pcs	26			32	26	26	30
Outer sheath thickness (nominal)	mm	1.5						1.6
Cable ϕ ($\pm 5\%$)	mm	13.0			15.0	18.9	18.1	21.3
Cable weight/km ($\pm 15\%$)	kg	266			394	630	570	745

3. MECHANICAL PROPERTIES

Number of fibers	pcs	12	24	48	96	144	192	288
Max tensile load (N)	N	5000						
Crush resistance	N/10 cm	5000						
Bending radius, installation	/	30 x OD						
Bending radius, operation	/	15 x OD						
Rec. max. installation depth	mtr	≤50						

See point 6: Test Methods

4. MARKING

Fiber colors	1	2	3	4	5	6	7	8	9	10	11	12
	White	Red	Yellow	Green	Blue	Grey	Brown	Black	Violet	Aqua	Orange	Pink
Tube colors 12~144F	1	2	3	4	5	6	7	8	9	10	11	12
	White	Red	Yellow	Green	Blue	Grey	Brown	Black	Violet	Aqua	Orange	Pink
Tube colors 192F Inner layer	1	2	3	4	5							
	White	Red	Yellow	Green	Blue							
Tube colors 192F Outer layer	7	8	9	10	11	12	13	14	15	16	17	
	White	Red	Yellow	Green	Blue	Grey	Brown	Black	Violet	Aqua	Orange	
Tube colors 288F Inner layer	1	2	3	4	5	6	7	8	9			
	White	Red	Yellow	Green	Blue	Grey	Brown	Black	Violet			
Tube colors 288F Outer layer	10	11	12	13	14	15	16	17	18	19	20	21
	White	Red	Yellow	Green	Blue	Grey	Brown	Black	Violet	Aqua	Orange	Pink
	22	23	24									
	Aqua	Orange	Pink									

Remark

 192F cable: All tubes with black tracer, except 14th tube with white tracer.

 288F cable: 10~21st tube with black tracer, except 17th tube with white tracer. 22~24th tube no tracer.

Outer Sheath: Black, ink jet white print marking with 1-meter intervals as follows:

Fiberworks	SWFC-SA <n> G.652D	<batch ID>	<meter marking>
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<n>: Fiber qty.

5. OPTICAL FIBER

Standard	ITU-T G.652D		
Optical	Fiber attenuation, cabled	1310 nm: ≤0.36dB/km	1550 nm: ≤0.22dB/km
	Mode Field Diameter (MFD)	1310 nm: 9.2 ± 0.4μm	1550 nm: 10.4 ± 0.6μm
	Zero dispersion wavelength	1300~1324 nm	
	Zero dispersion slope	≤0.092 ps/nm ² ·km	
	Polarization mode dispersion (PMD)	≤0.2 ps/√km	
	Cut-off wavelength	≤1260 nm	
	Macro bending loss 100 turns ø50mm	1550 nm: ≤0.05 dB	1625 nm: ≤0.10 dB
	Coating diameter	250 ± 15 μm	
	Cladding diameter	125 ± 1 μm	
	Core/clad concentricity error	≤0.6 μm	
	Cladding non-circularity	≤1.0 %	
Mechanical	Proof stress	≥0.69 Gpa	

6. TEST METHODS

Test	Conditions	Acceptance criteria
Tensile strength IEC 60794-1-2 E1	Tensile load: see Point 3 Sample length: ≥ 50 m Test duration: 1 min	- Fiber strain ≤0.6% - Δα ≤0.1dB - Attenuation reversible - No damage
Crush resistance IEC 60794-1-2 E3	Crush: Ref. point 3 Test duration: 1 min Number of tests: 3	- Δα ≤0.05dB - Attenuation reversible - No damage
Impact resistance IEC 60794-1-2 E4	Impact points: 3 Impact number: 1 Impact energy 10J Radius 300mm	- Δα: ≤0.05dB - Attenuation reversible - No damage
Repeated bending IEC 60794-1-2-E6	Bending radius: 30x cable OD 25N 25 cycles	- No obvious additional attenuation - No damage
Temperature cycling IEC 60794-1-2 F1	Steps: -40°C →+60°C Time pe each step: 12 hours Cycles: 2	- Δα ≤0.10 dB/km - Attenuation reversible - No damage
Water penetration IEC 60794-1-2 F5B	Sample length: 3 m Water column height: 1 m Duration: 24 h	- No water leakage from the opposite of the inner sheath
Filling compound flow IEC 60794-1-2-E14	Sample length: 0.3 m Temperature: 70°C Duration: 24 h	- No compound flow in 24 h

All optical measurement made at 1550 nm

7. ORDERING INFORMATION

Elnr.	Product code	Product	Fiber qty	Fiber type	Category (fiber)
	G12-9/125-SWFC-SA-2D	G12 SWFC-SA G.652.D	12	SM 9/125	OS2
	G24-9/125-SWFC-SA-2D	G24 SWFC-SA G.652.D	24	SM 9/125	OS2
	G48-9/125-SWFC-SA-2D	G48 SWFC-SA G.652.D	48	SM 9/125	OS2
	G96-9/125-SWFC-SA-2D	G96 SWFC-SA G.652.D	96	SM 9/125	OS2
	G144-9/125-SWFC-SA-2D	G144 SWFC-SA G.652.D	144	SM 9/125	OS2
	G192-9/125-SWFC-SA-2D	G192 SWFC-SA G.652.D	192	SM 9/125	OS2
	G288-9/125-SWFC-SA-2D	G288 SWFC-SA G.652.D	288	SM 9/125	OS2

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