

10.3.2 **Appendix C.2 – Subsea Cable Data Sheets**

Design data for TFVA 36 kV 3x1x240 mm² KQ
15 MW

Conductor	Diameter of conductor Round stranded compressed copper conductor of 37 wires filled with a semiconducting compound	18.4 mm
Conductor screen	Extruded layer of semiconducting crosslinked compound	
Insulation	Nominal thickness Diameter over insulation Extruded layer of insulating crosslinked polyethylene (XLPE)	8.0 mm 36.8 mm
Insulation screen	Extruded layer of semiconducting crosslinked compound	
Metallic screen	Thickness of tape One layer of copper tape overlapped	0.1 mm
Laying up	The cores are laid up. Polypropylene yarn fillers and a fiber optic cable are located in the interstices between the cores. Binder tapes are applied over the phases.	
Inner sheath	Thickness Extruded sheath of semiconducting polyethylene	2.0 mm
Bedding	One layer of semiconducting nylon tape	
Armor	Shape of armor wires Dimension of armor wires Number of armor wires, approx. Two layers of flat galvanized steel wires applied in opposite direction	Flat 7.5x2.5 mm 35/37
Outer serving	Two layers of polypropylene yarn and bitumen	
Diameter	Diameter of cable, approx.	108 mm
Weight	Total weight of cable in air, approx. Total weight of cable in water, approx.	23 kg/m 14 kg/m

Mechanical data for TFVA 36 kV 3x1x240 mm² KQ
15 MW

Bending radius	Minimum permissible bending radius during laying	1.9 m
Pulling tension	Maximum permissible pulling tension	150 kN

Electrical data for TFVA 36 kV 3x1x240 mm² KQ
15 MW

Current rating	Current rating in seabed	555 A		
Conductor temperature	Max. permissible conductor temperature	90 °C		
Ambient conditions	Max. ambient temperature for the cable in seabed at burial depth Max. burial depth in seabed Thermal resistivity of seabed Metallic screens and armor are bonded and earthed at both ends	15 °C 1.0 m 0.7 K.m/W		
Frequency	Frequency	60 Hz		
Short circuit current	Permissible thermal short circuit current in the conductor for 1 second	34 kA		
Rated voltage	Rated RMS system voltage between conductor and metallic screen/between conductors (U_0/U)	18/33 kV		
Operating voltage	Normal operating voltage	34.5 kV		
Highest voltage	Highest continuous RMS system voltage (U_m)	36 kV		
Basic insulation level	Lightning impulse withstand voltage (1.2/50 μ sec.)	170 kV		
Electrical stress	Maximum electrical stress in insulation at highest system voltage U_m	3.5 kV/mm		
Conductor resistance	Max. DC resistance at 20 °C AC resistance at 90 °C	0.0754 Ω /km 0.099 Ω /km		
Cable impedance	Cable impedance at 257 A (15 MW)	0.10 + j0.13 Ω /km		
Capacitance	Capacitance between conductor and screen	0.24 μ F/km		
Charging current	Charging current at 34.5 kV	1.8 A/km		
Loss angle	Maximum value at ambient temperature and rated voltage	0.004		
Losses	Losses at 34.5 kV and 257 A (15 MW): - conductor losses - dielectric losses - metallic screen losses - armor loss Total losses per cable	3x5.4 W/m 3x0.1 W/m 3x0.1 W/m 3.7 W/m 20.5 W/m		
Voltage drop	Voltage drop at 15 MW, 34.5 kV, 257 A, 60 km and compensation of the charging current at both ends	7.7 %		
Compensation	Compensation of charging current at each end	3.2 MVar		
Power	100 % 15 MW	80 % 12 MW	50 % 7.5 MW	0% 0 MW
Max. current	257 A	208 A	137 A	54 A
Voltage drop	7.7 %	6.1 %	3.7 %	0.0 %
Power losses	1160 kW	740 kW	295 kW	17 kW

Design data for TFVA 36 kV 3x1x800 mm² KQ
30 MW

Conductor	Diameter of conductor Round stranded compressed copper conductor of 61 wires filled with a semiconducting compound	35.0 mm
Conductor screen	Extruded layer of semiconducting crosslinked compound	
Insulation	Nominal thickness Diameter over insulation Extruded layer of insulating crosslinked polyethylene (XLPE)	8.0 mm 54.4 mm
Insulation screen	Extruded layer of semiconducting crosslinked compound	
Metallic screen	Thickness of tape One layer of copper tape overlapped	0.1 mm
Laying up	The cores are laid up. Polypropylene yarn fillers and a fiber optic cable are located in the interstices between the cores. Binder tapes are applied over the phases.	
Inner sheath	Thickness Extruded sheath of semiconducting polyethylene	2.2 mm
Bedding	One layer of semiconducting nylon tape	
Armor	Shape of armor wires Dimension of armor wires Number of armor wires, approx. Two layers of flat galvanized steel wires applied in opposite direction	Flat 7.5x2.5 mm 51/54
Outer serving	Two layers of polypropylene yarn and bitumen	
Diameter	Diameter of cable, approx.	149 mm
Weight	Total weight of cable in air, approx. Total weight of cable in water, approx.	48 kg/m 33 kg/m

Mechanical data for TFVA 36 kV 3x1x800 mm² KQ
30 MW

Bending radius	Minimum permissible bending radius during laying	2.7 m
Pulling tension	Maximum permissible pulling tension	290 kN

Electrical data for TFVA 36 kV 3x1x800 mm² KQ
30 MW

Current rating	Current rating in seabed	895 A		
Conductor temperature	Max. permissible conductor temperature	90 °C		
Ambient conditions	Max. ambient temperature for the cable in seabed at burial depth Max. burial depth in seabed Thermal resistivity of seabed Metallic screens and armor are bonded and earthed at both ends	15 °C 1.0 m 0.7 K.m/W		
Frequency	Frequency	60 Hz		
Short circuit current	Permissible thermal short circuit current in the conductor for 1 second	114 kA		
Rated voltage	Rated RMS system voltage between conductor and metallic screen/between conductors (U_0/U)	18/33 kV		
Operating voltage	Normal operating voltage	34.5 kV		
Highest voltage	Highest continuous RMS system voltage (U_m)	36 kV		
Basic insulation level	Lightning impulse withstand voltage (1.2/50 μ sec.)	170 kV		
Electrical stress	Maximum electrical stress in insulation at highest system voltage U_m	3.1 kV/mm		
Conductor resistance	Max. DC resistance at 20 °C AC resistance at 90 °C	0.0221 Ω /km 0.036 Ω /km		
Cable impedance	Cable impedance at 510 A (30 MW)	0.055 + j0.11 Ω /km		
Capacitance	Capacitance between conductor and screen	0.39 μ F/km		
Charging current	Charging current at 34.5 kV	2.9 A/km		
Loss angle	Maximum value at ambient temperature and rated voltage	0.004		
Losses	Losses at 34.5 kV and 510 A (30 MW): - conductor losses - dielectric losses - metallic screen losses - armor loss Total losses per cable	3x8.4 W/m 3x0.2 W/m 3x0.6 W/m 15.5 W/m 43.1 W/m		
Voltage drop	Voltage drop at 30 MW, 34.5 kV, 510 A, 60 km and compensation of the charging current at both ends	8.3 %		
Compensation	Compensation of charging current at each end	5.2 MVar		
Power	100 % 30 MW	80 % 24 MW	50 % 15 MW	0% 0 MW
Max. current	510 A	411 A	266 A	87 A
Voltage drop	8.3 %	6.6 %	4.0 %	0.0 %
Power losses	2480 kW	1570 kW	620 kW	25 kW