Cable Data - Submarine Inter Turbine Cable (nominal values)

1. Cable type

attached drawing no.

1.1 Specification

IEC 60502-2: 2005, centrica energy TS, section 3.2 and Nexans Comments

2. Power cable construction data

2.1 Conductor

thirtyseven (37) copper wires, circular stranded compacted, watertight longitudinally watertight by semi-conductive crosslinked polyolefine elastomere

- nominal cross sectional area mm² 185
- nominal diameter mm 16.1

2.2 Conductor screening made of extruded semi-conductive compound

- wall thickness mm min. 0.3

2.3 Insulation made of XLPE

- nominal wall thickness mm 8.0

2.4 Insulation screening made of extruded semi-conductive compound

- wall thickness mm min. 0.3

2.5 Screen bedding made of semi-conductive tape(s)

2.6 Screen made of copper wires and equalizing tape

- nominal cross sectional area mm² 25

2.7 Longitudinal water blocking made of swelling powder in the screen area
2.8 Laminated sheath made of aluminium tape
   - nominal thickness mm 0.2
   bonded to PE sheath
   - nominal thickness mm 2.3
   - min. thickness at any point mm 1.64
   plus extruded thin electrode

2.9 Outer Electrode Identification: manufacturer,
   1x185/25 19/33 kV, year of manufacture,
   metre marking, code no. and phase identification
   [L1, L2 or L3]

2.10 The three (3) power cores shall be laid-up
   with the fibre optic cable with polypropylene
   fillers with a right hand direction of lay

2.11 Binder made of plastic tapes

2.12 Armour bedding made of polypropylene
   strings
   - wall thickness, approx. mm 2.5

2.13 Armour made of round steel wires,
   heavy galvanized
   - nominal wire diameter mm 4.0

2.14 Serving made of bituminous compound,
   hessian tapes and polypropylene strings
   (with coloured strip)
   - wall thickness, approx. mm 4

2.15 Diameter of finished cable mm 110

2.16 Cable length marking shall be at the outside
   of the cable by coloured tape at intervals of
   500 m in manufacturing direction. The markers
   shall be applied to show one tape each 500 m,
   two tapes each 1000 m and three tapes each
   5000 m. The tapes shall be approx. 100 mm wide
   and shall completely encircle the cable.

   From each cable end up to 250 m the marking
   shall be every 50 m.

   Tape colour shall be different to above markings.
3. Electrical data

3.1 Maximum continuous operating voltage \( kV \) \( 36 \)

3.2 D.c./a.c. conductor resistance
- at \( 20 \, ^\circ C \), max. \( \Omega/km \) \( 0.0991 / 0.0999 \)

3.3 A.C. conductor resistance at \( 90 \, ^\circ C \) \( \Omega/km \) \( 0.127 \)

3.4 Conductor reactance \( \Omega/km \) \( 0.118 \)

3.5 Working inductance \( mH/km \) \( 0.375 \)

3.6 Working capacitance \( (\varepsilon = 2,5) \) \( \mu F/km \) \( 0.218 \)

3.7 Charging power of cable \( kVA/km \) \( 74.7 \)

3.8 Charging current per core \( A/km \) \( 1.31 \)

3.9 Losses per system *)
- rating as per 3.12 \( kW/km \) \( 90.9 \)

3.10 Dielectric losses *) \( kW/km \) \( 0.3 \)

3.11 Screen and armour losses *)
- rating as per 3.12 \( kW/km \) \( 5.7 \)

3.12 Current rating *)
- laying depth 2.0 m \( A \) \( 472 \)

3.13 Current rating in J-tube (PE, \( D_i = 280 \, mm \), \( D_a = 320 \, mm \)) in air **) 
- ambient air temperature \( 25 \, ^\circ C \) \( A \) \( 444 \)

3.14 Permissible conductor operating temperature
- continuous \( ^\circ C \) \( 90 \)
- short circuit \( ^\circ C \) \( 250 \)

3.15 Short circuit current for 1 s / 0.2 s
- conductor \( (90^\circ C - 250^\circ C) \) \( kA \) \( 27.0 / 59.8 \)
- screen \( (80^\circ C - 200^\circ C) \) \( kA \) \( 3.73 / 7.75 \)
4. Technical cable data

4.1 Permissible bending radius
- during delivery on drum mm 800
- during laying mm 1650
- after laying mm 1100

4.2 Approximate cable weight
- in air kg/km 18300
- in water kg/km 12000

4.3 Permissible pulling strength
- during laying kN 33.3
- in J-tube (safety factor 4.0) kN 68.4
- in case of recovery/repair kN 51.3

4.4 Cable tests and standards followed, Routine tests
(Sample tests generally according to IEC 60502)

4.4.1 On single lengths
- conductor resistance/20 °C Ω/km ≤ 0.0991
  Standard: IEC 60502
- A.C. Voltage test/5 min kV 63
- Partial discharge test pC ≤ 10
  A.C. 30 kV
  Standard: IEC 60502

4.4.2 After laying (outside of Nexans scope of work)
- D.C. Voltage test/15 min kV 72
  Standard: IEC 60502

4.4.2.1Alternative test
- A.C. Voltage test 0.1 Hz/60 min kV 54
  Standard: DIN VDE 0276-620

4.5 Insulation resistance MΩ x km ≥ 1012

4.6 Voltage drop
- cos ϕ = 0.9/90 °C V/A x km 0.30
- cos ϕ = 0.9/20 °C V/A x km 0.25

4.7 Expected life span years ≥ 40

*) Continuous load, ambient ground temperature 16 °C, soil thermal resistivity 0.7 K x m/W, screens are bonded at both ends.
**) Continuous load without additional heating-up by sun rays.