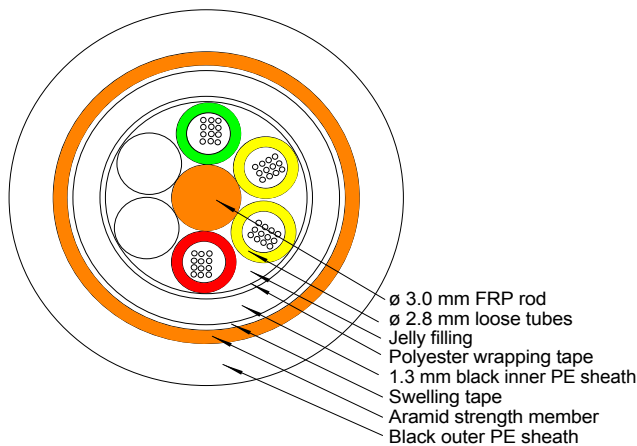




4 - 96 fibre self supporting all dielectric optical cable

Round aramid reinforced ADSS cable



APPLICATION

- Telecom trunk and access lines
- CATV trunk lines
- Data communication connections

GENERAL

This specification covers a family of optical cables with 4 - 96 fibres for intermediate and long spans. The expected installation conditions for this family of optical cables are the power grid poles of utilities.

The cables are designed with two different grades of reinforcement, thus making the cables suitable for different span lengths and loads.

Table 1 defines the two grades of cables.

Grade	Cable stiffness; EA	Cable ultimate tensile strength
T-028-1100	1100 kN	>30 kN
T-028-1900	1900 kN	>45 kN

The cables have a sheathing of weatherproof black polyethylene. The cables can resist high voltage of up to 132 kV by suitable positioning of the cable with regard to the conductors.

CABLE CONSTRUCTION

OPTICAL FIBRES

The cable can be supplied with any Draka Denmark optical fibre. For optical fibre properties and performance please see the appropriate Fibre Specification.

The fibres in each tube are individually coloured for easy identification.

The colour code for the fibres is given in "General Information; Fibre colours and colour coding." Sheet B07.

The fibre colours are marking colours according to IEC 304.

CABLE CORE

The cable has a \varnothing 3.0 mm glass fibre rod (FRP) as central strength member.

The fibres are contained in jelly filled loose tubes. The loose tubes have a nominal outer diameter of 2.8 mm.

There are 4 - 12 fibres in each of the loose tubes, depending on the number of fibres in the cable and customer requirements.

6 or 8 loose tubes or dummies are stranded around the central strength member, giving a 6 or 8 unit construction. The 6 unit construction is used for cables with up to 72 fibres, the 8 unit construction is used for cables with up to 96 fibres.

The lay-up of the cable elements and the colour code used is given in: "General Information; Standard colour codes". Sheet B04.



The cable core is water blocked using jelly.

The jellies for filling of the cables fulfil the requirements of IEC 811-5-1.

Two layers of non-hydroscopic tape, wrapped around the core, protect the cable core.

INNER SHEATH

The cables have a 1.3 mm thick black HDPE inner sheath.

The black HDPE is weatherproof and UV resistant. It contains 2.5 ± 0.5 % carbon black and fulfils the requirements of IEC 60708 and IEC 60811

ARAMID YARN REINFORCEMENT

The cables are reinforced with a number of high modulus aramid yarns.

The aramid yarns are Twaron™ or Kevlar™ yarns. The yarns are stranded around the cable inner sheath in a cross ply.

The amount of yarns determines the tensile properties of the cables and thus the possible span lengths.

OUTER SHEATH

The cables have a black HDPE outer sheath with the same properties as the inner sheath. The outer sheath thickness is >1.4 mm.

CABLE PHYSICAL PROPERTIES

Table 2 gives the physical properties for the cables in this family of cables.

INSTALLATION CONDITIONS

The cables can be installed using helically formed dead-ends and suspension units. For use with

short spans and low loads simple support clamps can be used.

The cables can be used for spans up to 250 m or more, however this is depending of allowable sag as well as climatic conditions.

SPAN LENGTH AND STRINGING

The cables are characterised by their tensile strength and their EA (product of modulus of elasticity and cross section area).

For the planner and installer the span length and sag are the important figures. However, these figures are only partly a function of the cable properties. Local factors as the climate and the allowed sag are most important.

Tables 3, 4, 5, 6 and 7 are given as an aid for selection of the right type of cable.

Table 1: Physical properties

Property	Reference according to IEC 60794-1	T-028-1100		T-028-1900	
		6 units	8 units	6 units	8 units
Outer diameter of cable	-	16 mm	17.5 mm	16.5 mm	18.5 mm
Nominal weight		200 kg/km	235 kg/km	220 kg/km	255 kg/km
Min. bending radius	E11	320 mm	350 mm	330 mm	370 mm
Coefficient of thermal expansion	-	12 · 10-6	14 · 10-6	6.2 · 10-6	7.9 · 10-6
Tensile strength (permanent)	E1	8.5 kN		14.5 kN	
Tensile strength (dynamic)	E1	13 kN		21 kN	
Cable breaking strength (UTS)	(E1)	>30 kN		>45 kN	
Cable stiffness (EA)	(E1)	1100 kN		1900 kN	
Compressive strength (crush)	E3	3000 N/100 mm			
Impact	E4	25 J			
Torsion	E11	1/m 5 times			
Temperature range	F1	-40°C to +70°C			
Water penetration	F5	No water on free end			

**Table 2: Stringing example for cable type T-028-1100 and 100 m span**

External loading For 100 m span and 2% (= 2 m) initial sag	Number of optical units in cable	Initial cable load without external load	Sag with external load	Cable load with external load
25 m/s (90 km/h) wind load	6	1.2 kN	3.1 m	3.1 kN
	8	1.5 kN	3.3 m	3.4 kN
50 m/s (180 km/h) wind load	6	1.2 kN	5.1 m	7.7 kN
	8	1.5 kN	5.2 m	8.3 kN
1 kg/m ice load	6	1.2 kN	3.7 m	4.0 kN
	8	1.5 kN	4.2 m	6.2 kN
2 kg/m ice load	6	1.2 kN	4.5 m	6.1 kN
	8	1.5 kN	4.5 m	6.2 kN
3 kg/m ice load	6	1.2 kN	5.1 m	7.8 kN
	8	1.5 kN	5.1 m	7.9 kN

Table 3: Stringing example for cable type T-028-1100 and 150 m span

External loading For 150 m span and 2% (= 3 m) initial sag	Number of optical units in cable	Initial cable load without external load	Sag with external load	Cable load with external load
25 m/s (90 km/h) wind load	6	1.8 kN	5.2 m	4.3 kN
	8	2.2 kN	5.3 m	4.7 kN
50 m/s (180 km/h) wind load	6	1.8 kN	8.6 m	10.4 kN *)
	8	2.2 kN	8.8 m	11.1 kN *)
1 kg/m ice load	6	1.8 kN	6.1 m	5.5 kN
	8	2.2 kN	6.0 m	5.7 kN
2 kg/m ice load	6	1.8 kN	7.6 m	8.1 kN
	8	2.2 kN	7.5 m	8.4 kN

*) The dynamic tensile strength may be used as maximum acceptable tension in this case

Table 4: Stringing example for cable type T-028-1900 and 150 m span

External loading For 150 m span and 2% (= 3 m) initial sag	Number of optical units in cable	Initial cable load without external load	Sag with external load	Cable load with external load
25 m/s (90 km/h) wind load	6	2.0 kN	4.7 m	5.0 kN
	8	2.4 kN	4.8 m	5.5 kN
50 m/s (180 km/h) wind load	6	2.0 kN	7.4 m	12.4 kN
	8	2.4 kN	7.6 m	13.5 kN
1 kg/m ice load	6	2.0 kN	5.3 m	6.4 kN
	8	2.4 kN	5.3 m	6.6 kN
2 kg/m ice load	6	2.0 kN	6.5 m	9.5 kN
	8	2.4 kN	6.5 m	9.7 kN
3 kg/m ice load	6	2.0 kN	7.4 m	12.2 kN
	8	2.4 kN	7.5 m	12.5 kN

**Table 5: Stringing example for cable type T-028-1900 and 200 m span**

External loading For 200 m span and 2% (= 4 m) initial sag	Number of optical units in cable	Initial cable load without external load	Sag with external load	Cable load with external load
25 m/s (90 km/h) wind load	6	2.7 kN	6.6 m	6.3 kN
	8	3.1 kN	6.8 m	6.9 kN
50 m/s (180 km/h) wind load	6	2.7 kN	10.7 m	15.2 kN *)
	8	3.1 kN	11.1 m	16.6 kN *)
1 kg/m ice load	6	2.7 kN	7.6 m	8.0 kN
	8	3.1 kN	7.5 m	8.3 kN
2 kg/m ice load	6	2.7 kN	9.4 m	11.8 kN
	8	3.1 kN	9.3 m	12.0 kN

*) The dynamic tensile strength may be used as maximum acceptable tension in this case

Table 6: Stringing example for cable type T-028-1900 and 250 m span

External loading For 250 m span and 2% (= 5 m) initial sag	Number of optical units in cable	Initial cable load without external load	Sag with external load	Cable load with external load
25 m/s (90 km/h) wind load	6	3.4 kN	8.7m	7.5 kN
	8	3.9 kN	8.9 m	8.3 kN
50 m/s (180 km/h) wind load	6	3.4 kN	14.3 m	17.9 kN *)
	8	3.9 kN	14.8 m	19.5 kN *)
1 kg/m ice load	6	3.4 kN	10.0 m	9.5 kN
	8	3.9 kN	9.9 m	9.8 kN
2 kg/m ice load	6	3.4 kN	12.5 m	13.9 kN
	8	3.9 kN	12.3 m	14.3 kN

*) The dynamic tensile strength may be used as maximum acceptable tension in this case