
Optični kabli – Kabli za polaganje v kanalizacijo – Rodovna specifikacija za kable, namenjene za napeljavo po meteornih in sanitarnih kanalih

Optical fibre cables - Sewer cables - Family specification for cables to be installed in storm and sanitary sewers

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English version

**Optical fibre cables –
Sewer cables –
Family specification for cables to be installed
in storm and sanitary sewers**

Lichtwellenleiterkabel –
Kabel für Abwasserkanäle –
Familienspezifikation für Kabel
zu Montage in Abwasserkanälen

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This Technical Specification was prepared by the Technical Committee CENELEC TC 86A, Optical fibres and optical fibre cables.

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The following date was fixed:

- latest date by which the existence of the CLC/TS
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1 Scope

This document is a family specification that covers sewer cables and conduits for installation by blowing and/ or pulling in non-man accessible storm and sanitary sewers, also applicable for man-accessible and lateral ones. Systems built with components covered by this standard are subject to the requirements of sectional specifications EN 60794-3 and EN 60794-4 where applicable.

Sewer cable and conduit constructions have to meet the different requirements of the sewer operating companies and / or associations regarding chemical, environmental, operational, cleaning and in general maintenance conditions.

A table of preferential applications, describing sewer cable characteristics versus methods of installation is reported in Annex A for non-man accessible sewers.

Clause 4 describes a blank detail specification for sewer cables and conduits for installation by blowing and/or pulling in storm and sanitary sewers. It incorporates some minimum requirements.

Detail specifications may be prepared on the basis of this family specification.

The parameters specified in this standard may be affected by measurement uncertainty arising either from measurement errors or calibration errors due to lack of suitable standards. Acceptance criteria should be interpreted with respect to this consideration.

The number of fibres tested is representative of the sewer cable and should be agreed between the customer and supplier.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 60068-2-2		<i>Environmental testing (IEC 60068-2-2)</i>
EN 60793-1-20		<i>Optical fibres - Part 1-20: Measurement methods and test procedures - Fibre geometry (IEC 60793-1-20)</i>
EN 60793-1-40		<i>Optical fibres - Part 1-40: Measurement methods and test procedures – Attenuation (IEC 60793-1-40)</i>
EN 60793-1-44		<i>Optical fibres - Part 1-44: Measurement methods and test procedures - Cut-off wavelength (IEC 60793-1-44)</i>
EN 60793-2		<i>Optical fibres - Part 2: Product specifications (IEC 60793-2)</i>
EN 60794-1-1		<i>Optical fibre cables - Part 1-1: Generic specification –General (IEC 60794-1-1)</i>
EN 60794-1-2		<i>Optical fibre cables - Part 1-2: Generic specification - Basic optical cable test procedures (IEC 60794-1-2)</i>
EN 60794-3		<i>Optical fibre cables - Part 3: Sectional specification - Outdoor cables – Duct, buried and aerial cables (IEC 60794-3)</i>
EN 60794-3-10		<i>Optical fibre cables - Part 3-10: Family specification - Outdoor cables - Duct and directly buried optical telecommunication cables (IEC 60794-3-10)</i>
EN 60794-4	2003	<i>Optical fibre cables - Part 3: Sectional specification – Aerial optical cables along electrical power lines (IEC 60794-4:2003)</i>

EN 60811-1-1	1995	<i>Common test methods for insulating and sheathing materials of electric cables and optical cables - Part 1-1: Methods for general application - Measurement of thickness and overall dimensions - Tests for determining the mechanical properties</i> (IEC 60811-1-1:1993)
EN 60811-5-1	1999	<i>Insulating and sheathing materials of electric and optical cables - Common test methods - Part 5-1: Methods specific to filling compounds - Drop point - Separation of oil - Lower temperature brittleness - Total acid number - Absence of corrosive components - Permittivity at 23 °C - D.C. resistivity at 23 °C and 100 °C</i> (IEC 60811-5-1:1990, mod)
EN 187105		<i>Single mode optical cable (duct/direct buried installation)</i>
HD 402 S2	1984	<i>Standard colours for insulation for low-frequency cables and wires</i> (IEC 60304:1982)

3 Symbols

For the purposes of this document, the following symbols apply:

λ_{CC}	cabled fibre cut-off wavelength
d	nominal outer diameter of the sewer cable
DS	detail specification
T_O	threshold tensile load below which no attenuation and/or fibre strain increase should occur in the tensile performance test
T_M	the acceptable amount of short-term tensile load that can be applied to the cable without permanent degradation of the characteristics of the fibres in the tensile performance test
T_{A1}	temperature cycling test low-temperature limit according to EN 60794-1-2, method F1
T_{A2}	temperature cycling test low-temperature limit according to EN 60794-1-2, method F1
T_{B1}	temperature cycling test high-temperature limit according to EN 60794-1-2, method F1
T_{B2}	temperature cycling test high-temperature limit according to EN 60794-1-2, method F1
t_1	temperature cycling dwell time
$n \times d$	a value times cable outer diameter used for bends, mandrels, etc.

4 Family specification for sewer cables and conduits for installation by blowing and/or pulling in sewers (blank detail specification and minimum requirements)

4.1 Construction

4.1.1 General

In addition to the constructional requirements of sectional specifications EN 60794-3 and EN 60794-4, where applicable, the following considerations apply to the sewer cables and/or conduits.

The sewer cables and/or conduits shall be designed and manufactured for an expected operating lifetime of at least 15 years. It shall be possible to install or remove the cable in or from the sewer throughout the operational lifetime. The materials in the sewer cable and / or as well as accessories including fixing elements and conduits shall not present a health hazard within its intended use.

4.1.2 Conduits

In case of use, the conduits with outer nominal diameters ranging from 10 mm to 16 mm shall be able to resist pressure differences needed for installation by blowing. They shall be circular and, if needed, corrugated in cross-section throughout their length; the inner surface shall have a low coefficient of friction. The material shall withstand all possible chemical attacks by the sewer liquid itself, as for instance the stainless steel type VA4. Inner- and outer-diameter and overall minimum wall thickness shall be specified.

4.1.3 Sewer cables

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A sewer cable in accordance to this specification should be suitable for installation in non-man accessible storm and sanitary sewers by the following installation methods, also applicable for man-accessible sewers and for lateral sewer systems:

- ∇ blowing and /or pulling into a conduit, previously fixed to the sewer wall or, for laterals, placed in between the lateral sewer wall and the in-liner system;
- ∇ direct installation into the sewer duct, according to the following applications:
 - drilling and screwing to the inner wall;
 - spanning between manholes, etc., similarly to aerial cables;
 - laying on the ground of the sewer.

The attenuation of the installed cable at the operational wavelength(s) shall not exceed values agreed between the customer and supplier.

There shall be no fibre splice in a delivery length unless otherwise agreed by the customer and supplier.

It shall be possible to identify each individual fibre throughout the length of the sewer cable.

4.1.4 Rodent protection

Rodent protection is generally needed but there is presently no standard test to measure the level of rodent protection.

It is recognized that an effective protection is provided by a metallic layer at level of conduit or cable. Other solutions using non metallic elements, for example rigid glass members or glass tapes are under consideration.

4.2 Product descriptions

4.2.1 Sewer cables description

4.2.1.1 Cable for installation within conduits (previously fixed to the sewer wall)

Such sewer cable has to be blown or pulled into the conduits described in subclause 4.2.2.

(1) Prepared by		(2) Document No.: Issue: Date:
(3) Available from:	(4) Generic specifications: Sectional specification:	EN 60794-1-1 and EN 60794-1-2 EN 60794-3
(5) Additional references:		
Construction - Tube - unfilled - Tube - filled Inner sheath Outer sheath Additional armouring - Non-metallic armouring - Metallic armouring Additional outer sheath Marking identification - Customer requirement - Identification of manufacturer	Additional remarks <div style="text-align: center;"> <p>ITeh STANDARD PREVIEW</p> <p>(standards.iteh.ai)</p> <p>https://standards.iteh.ai/catalog/standards/sist/e569040c-38bd-4057-9ab8-89f27c8e9838/sist-ts-clc-ts-50429-2006</p> </div>	
(8) Application information:		
Maximum outer diameter (d) Rated maximum tensile load Minimum bending radius for no-load bending Minimum bending radius for rated-load bending Temperature range: - Transport and storage - Installation - Operation Manufacturing length - Typical - Nominal/tolerances	mm N mm or n x d mm or n x d °C °C °C m -0 + 1%	

4.2.1.2 Cables for direct installation into the sewer duct

Such cables are directly screwed on the sewer wall by means of proper “hooks” using a special designed robot, or spanned – similar to aerial cables – by means of anchors between two man-holes limiting sag and interference with lateral tubes, or laid and fixed on the ground of the sewer mainly by gravity and a certain number of anchor devices.

(1) Prepared by		(2) Document No.: Issue: Date:
(3) Available from:	(4) Generic specifications: Sectional specifications:	EN 60794-1-1 and EN 60794-1-2 EN 60794-3 and EN 60794-4
(5) Additional references:		
Construction - Tube - unfilled - Tube - filled Inner sheath Outer sheath Additional armouring - Non-metallic armouring - Metallic armouring Additional outer sheath Marking identification - Customer requirement - Identification of manufacturer	Additional remarks	
(8) Application information: SIST-TS CLC/TS 50429:2006		
Maximum outer diameter (d) Rated maximum tensile load Minimum bending radius for no-load bending Minimum bending radius for rated-load bending Temperature range: - Transport and storage - Installation - Operation Manufacturing length - Typical - Nominal/tolerances	 standards.iteh.ai/catalog/standards/sist/e569040c-3814-4057-9ab8-89f27c8e9838/sist-ts-clc-ts-50429-2006 mm N mm or n x d mm or n x d °C °C °C m -0 + 1%	

4.2.2 Conduit description

Such conduit is directly attached on the sewer wall by means of proper fittings. In case of use of stainless-steel-conduits, the conduit is fixed by clamps to spring loaded stainless-steel rings installed into the cleaned and inspected sewer tube, distanced about 1,5 m, using a special installation robot.

(1) Prepared by		(2) Document No.: Issue: Date:
(3) Available from:	(4) Generic specifications: EN 60794-1-1 and EN 60794-1-2 Sectional specification: EN 60794-3 (all as applicable to conduits)	
(5) Additional references:		
Construction - Corrugated conduit (metallic) - Non corrugated conduit Additional armouring - Metallic - Non metallic Additional outer sheath Marking identification - Customer requirement - Identification of the manufacturer		
(8) Application information:		
Maximum outer diameter (d)	SIST-TS CLC/TS 50429:2006	mm
Rated maximum tensile load	standards.iteh.ai/catalog/standards/sist/e569040c-3881-4057-9ab8-8927-8e9838/sist-ts-clc-ts-50429-2006	N
Minimum bending radius for no-load bending		mm
Minimum bending radius for rated-load bending		mm
Temperature range:		°C
- Transport and storage		°C
- Installation		°C
- Operation		
Manufacturing tube length		m
- Typical		
- Nominal/tolerances		-0 + 1%