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Liquid tight sheathing systems for cable management

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EUROPEAN STANDARD **EN 50369**

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English version

Liquid tight sheathing systems for cable management

Systèmes de gaines souples de protection contre les liquides pour la gestion du câblage

Flüssigkeitsdichte Elektroinstallations-schlauchsysteme

This European Standard was approved by CENELEC on 2005-04-12. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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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 European Standard was prepared by the Technical Committee CENELEC TC 213, Cable management. The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50369 on 2005-04-12.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2006-04-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2008-04-01

Contents

1 Scope

This European Standard specifies the requirements against ingress of water and tests for flexible non-flame propagating liquid tight sheathing systems for the protection and management of insulated conductors and/or cables in electrical installations or in communication systems up to 1 000 V a.c. and/or 1 500 V d.c. This standard applies to metallic, non-metallic and composite liquid tight sheathing systems including threaded fittings which terminate the system This European Standard does not apply to conduit systems for electrical installations which come within the scope of EN 50086 series as well as EN 61386 series. Liquid tight sheathing systems do not provide mechanical protection to insulated conductors and/or cables. They are not for use within the construction of buildings as a component of a fixed wiring system.

NOTE Earthing conductors may or may not be insulated.

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 60423	1994	Conduits for electrical purposes – Outside diameters of conduits for electrical installations and threads for conduits and fittings (IEC 60423:1993, mod.)
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)
EN 60695-2-11	2001	Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (IEC 60695-2-11:2000)
EN 60695-11-2	2003	Fire hazard testing – Part 11-2: Test flames - 1 kW nominal pre-mixed flame - Apparatus, confirmatory test arrangement and guidance (IEC 60695-11-2:2003)

3 Definitions

For the purposes of this document, the following terms and definitions apply.

3.1
liquid tight sheathing system
closed wiring system consisting of liquid tight sheathing and terminating fittings for the protection against ingress of liquid and management of insulated conductors and/or cables in electrical or communication installations, allowing them to be drawn in and/or replaced, but not to be inserted laterally

3.2
liquid tight sheathing
component of a closed wiring system which protects insulated conductors and/or cables against water

3.3
terminating fitting
terminating device designed to terminate a liquid tight sheathing system

3.4
metallic sheathing and/or terminating fitting
sheathing or terminating fitting which consists of metal only

3.5
non-metallic sheathing and/or terminating fitting
sheathing or terminating fitting which consists uniquely of non-metallic material and which has no metallic components whatsoever

3.6
composite sheathing and/or terminating fitting
sheathing or terminating fitting comprising both metallic and non-metallic materials

3.7
non-flame propagating sheathing and/or terminating fitting
sheathing or terminating fitting which is liable to catch fire as a result of an applied flame, but in which the flame does not propagate and which extinguishes itself within a limited time after the flame is removed

3.8
external influence
factors which may affect the sheathing system

NOTE Examples of such factors are a presence of water, oil or building materials, low and high temperatures and corrosive or polluting substances.

4 General requirements

4.1 Liquid tight sheathing systems shall be so designed and constructed that in normal use their performance is reliable and they provide protection to the user or surroundings.

When assembled in accordance with manufacturer's instructions, the liquid tight sheathing system, shall provide protection against ingress of liquids and electrical protection of the insulated conductors and cables contained therein.

4.2 Liquid tight sheathing and terminating fittings shall withstand the stresses likely to occur during transport, storage, recommended installation practice and application.

4.3 *Compliance is checked by carrying out all the tests specified.*

5 General conditions for tests

5.1 Tests in accordance with this standard are type tests.

5.2 Unless otherwise specified, the tests shall be carried out at an ambient temperature of (20 ± 5) °C.

5.3 Unless otherwise specified, each test shall be made on three new samples.

NOTE Certain tests, for instance the checking of dimensions, do not affect a change in the property of the samples, therefore these samples are considered as new samples and can be used for further tests.

5.4 Samples of liquid tight sheathing and fittings shall be conditioned for at least 240 h, at a temperature of (23 ± 2) °C and a relative humidity between 40 % and 60 %. All tests shall be carried out immediately after general conditioning.

5.5 Unless otherwise specified, the samples for each test shall be in a clean and new condition, with all parts in place and mounted as in normal use. After checking dimensions in accordance with Clause 8, and unless otherwise specified in the relevant test, the fittings shall be assembled with adequate lengths of liquid tight sheathing of the type for which they are intended. Due regard shall be taken of the manufacturer's instructions, especially where force is required in the assembly of the joint.

NOTE Where similarities are claimed, the selection of representative fittings for test purposes can be agreed between the manufacturer, or responsible vendor, and the testing station

5.6 Unless otherwise specified, three samples are subjected to the tests and the requirements are satisfied if the tests are met.

If only one of the samples does not satisfy a test, due to an assembly or a manufacturing defect, that test and any preceding one which may have influenced the result of the test shall be repeated and also the tests which follow shall be carried out in the required sequence on another full set of samples, all of which shall comply with the requirements.

NOTE If the additional set of samples is not submitted at the same time, a failure of one sample will entail a rejection. The applicant when submitting the first set of samples, may also submit the additional set of samples which may used, should one sample fail. The testing station will then, without further request, test the additional set of samples and will not be accepted only if a further failure occurs.

5.7 When toxic or hazardous processes are used, due regard shall be taken of the safety of the persons within the test area.

5.8 Liquid tight sheathing systems which are used as an integral part of other equipment shall also be tested in accordance with the relevant standard for that equipment.

6 Classification

6.1 According to mechanical properties

6.1.1 Resistance to impact

1 Very light
2 Light
3 Medium

6.1.2 Tensile strength

1 Very light
2 Light
3 Medium

6.2 According to temperature

6.2.1 According to low temperature

Table 1 – Lower temperature range

Classification (1st numeral)	Transport, application and installation temperature not less than
1X	+5 °C
2X	-5 °C
3X	-15 °C
4X	-25 °C

6.2.2 According to high temperature

Table 2 – Upper temperature range

Classification (2nd numeral)	Application and installation temperature not more than
X1	60 °C
X2	90 °C
X3	105 °C
X4	120 °C
X5	150 °C
X6	250 °C

6.3 According to electrical characteristics

6.3.1 With electrical continuity characteristics

6.3.2 With electrical insulating characteristics

6.3.3 None declared

6.4 According to resistance to external influences

6.4.1 Protection against ingress of solid objects: Protection in accordance with EN 60529 to a minimum of IP5X

6.4.2 Protection against ingress of water: Protection in accordance with EN 60529 to a minimum of IPX5

6.4.3 Resistance against corrosion

6.4.3.1 Without protection

6.4.3.2 With protection as detailed in Table 6

7 Marking and documentation

7.1 The liquid tight sheathing and terminating fitting shall be marked on the product with a trademark or a name identifying the manufacturer or responsible vendor.

7.2 The liquid tight sheathing shall in addition be marked in such a way that it can be identified in the manufacturer's, or responsible vendor's, literature.

7.3 The marking shall be durable and clearly legible.

Compliance is checked by inspection and by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

NOTE 1 Petroleum spirit is defined as the aliphatic solvent hexane with a content of aromatics of maximum 0,1 % volume, a kauri-butanol value of 29, initial boiling point 65 °C, a dry point 69 °C and density approximately 0,68 kg/l.

NOTE 2 Marking may be applied, for example, by moulding, pressing, engraving, printing, adhesive labels, or water slide transfers.

NOTE 3 Marking made by moulding, pressing or engraving is not subjected to this test.

After the test, the marking shall be legible.

7.4 The manufacturer or responsible vendor shall declare and document in his literature the suitability of the liquid tight sheathing system with specific liquids at specific temperatures, the minimum inside diameter of the system, the minimum bending radius and the classification according to Clause 6.

7.5 The manufacturer or responsible vendor shall be responsible for providing guidelines to assist the safe transport, installation and application of the liquid tight sheathing system.

7.6 The manufacturer or responsible vendor shall declare in his literature that liquid tight sheathing systems are not suitable for use within the construction of buildings as a component of a fixed wiring system.

8 Dimensions

8.1 Threads shall comply with EN 60423.

Compliance is checked by means of the gauges specified in EN 60423.

8.2 The manufacturer shall declare the minimum internal diameter of the liquid tight sheathing system.

Compliance is checked by measurement by means of a cylindrical gauge as shown in Figure 1. The gauge must pass through the liquid tight sheathing system without effort.

9 Construction

9.1 Within the liquid tight sheathing system there shall be no sharp edges, burrs or surface projections which are likely to damage insulated conductors or cables or inflict injury on the installer or user.

Compliance is checked by inspection, if necessary after cutting the samples apart.

10 Mechanical properties

10.1 Mechanical strength

10.1.1 Liquid tight sheathing systems shall have adequate mechanical strength.

10.1.2 Liquid tight sheathing, according to their classification, when exposed to impact or extreme temperature of a specified value in accordance with impact and temperature classification declared for the product, either during, or after, installation according to the manufacturer's instructions, shall not crack and shall not be deformed to such an extent that introduction of the insulated conductors or cables becomes difficult, or that the installed insulated conductors or cables are likely to be damaged, while being drawn in.

10.1.3 *Compliance for 10.1.1 and 10.1.2 is checked by the tests specified in 10.2 to 10.4.*

10.2 Impact test

10.2.1 Twelve samples of liquid tight sheathing, each (200 ± 5) mm in length or fittings are subjected to an impact test by means of the apparatus shown in Figure 2.

Before the test on terminating fittings, the samples are assembled with the appropriate liquid tight sheathing required as for normal use.

NOTE Fittings are not required when testing liquid tight sheathing.

Parts which are not accessible when mounted in normal use, and small fittings whose maximum dimension is less than 20 mm are not subjected to this test.

10.2.2 The test apparatus, together with the samples shall be placed in a refrigerator the temperature within which shall be maintained at the declared temperature as given in Table 1 with a tolerance of ± 2 °C.

When the samples have attained the temperature specified, or after 2 h, whichever is the longer period, each sample shall be placed in position on the steel base as shown in Figure 2. The hammer shall be allowed to fall, once on each sample. The mass of the hammer and the fall height shall be as given in Table 3.

The test shall be made on the weakest part of the fitting except that it shall not be applied to within 5 mm of any entry. Samples of liquid tight sheathing are tested at the centre of their length.

Table 3 – Impact test values

Classification	Liquid tight sheathing and fittings	Mass of hammer Tolerance (+ 1, - 0) %	Fall height Tolerance (± 1) %
1	Very light	0,5 kg	100 mm
2	Light	1,0 kg	100 mm
3	Medium	2,0 kg	100 mm

10.2.3 After the test the samples shall show no sign of disintegration, nor shall there be any crack visible to normal or corrected vision without magnification.

After the impact test the samples of liquid tight sheathing shall continue to provide the IP code declared by the manufacturer performing the tests according to 14.1.