

**ELEKTRIKAABLID. LISAKATSETUSMEETODID**

**Electric cables - Additional test methods**

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

|                                                                                                                     |                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| See Eesti standard EVS-HD 605-S3:2019 sisaldab Euroopa standardi HD 605-S3:2019 ingliskeelset teksti.               | This Estonian standard EVS-HD 605-S3:2019 consists of the English text of the European standard HD 605-S3:2019.                    |
| Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas                                                   | This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation. |
| Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 09.08.2019. | Date of Availability of the European standard is 09.08.2019.                                                                       |
| Standard on kättesaadav Eesti Standardikeskusest.                                                                   | The standard is available from the Estonian Centre for Standardisation.                                                            |

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 29.060.20

**Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele**

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:  
Koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

**The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation**

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

English Version

## Electric cables - Additional test methods

Câbles électriques - Méthodes d'essais supplémentaires

Starkstromkabel - Ergänzende Prüfverfahren

This Harmonization Document was approved by CENELEC on 2019-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document at national level.

Up-to-date lists and bibliographical references concerning such national implementations may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

| <b>Contents</b>                                                                    | <b>Page</b> |
|------------------------------------------------------------------------------------|-------------|
| European foreword .....                                                            | 4           |
| 1 General .....                                                                    | 5           |
| 1.1 Scope .....                                                                    | 5           |
| 1.2 Applicable tests .....                                                         | 5           |
| 1.3 Classification of tests .....                                                  | 5           |
| 1.4 Sampling .....                                                                 | 5           |
| 1.5 Test conditions .....                                                          | 5           |
| 2 Non-electrical tests .....                                                       | 6           |
| 2.1 Dimensional measurements.....                                                  | 6           |
| 2.2 Mechanical tests on non-metallic components .....                              | 23          |
| 2.3 Mechanical tests on metallic components .....                                  | 33          |
| 2.4 Non-electrical tests on samples of complete cable.....                         | 35          |
| 2.5 Physical and chemical tests .....                                              | 63          |
| 3 Electrical tests .....                                                           | 76          |
| 3.1 Electrical resistance .....                                                    | 76          |
| 3.2 Voltage tests.....                                                             | 80          |
| 3.3 Insulation resistance tests .....                                              | 86          |
| 3.4 Surface resistance of the cable oversheath.....                                | 89          |
| 3.5 (Spare) .....                                                                  | 89          |
| 3.6 Spark tests .....                                                              | 89          |
| 3.7 Measurement of transfer impedance .....                                        | 90          |
| 3.8 Heating cycle test.....                                                        | 92          |
| 3.9 Measurement of the electrical resistivity of the semi-conducting screens ..... | 96          |
| 3.10 Partial discharge test.....                                                   | 98          |
| 3.11 Tan $\delta$ measurement .....                                                | 100         |
| 3.12 Resistance of the insulating sheaths to weather conditions .....              | 100         |
| 3.13 Adherence of screens at short circuit temperature .....                       | 103         |
| 3.14 Resistivity test for water blocking tape .....                                | 104         |
| 3.15 Moisture absorption test – Electric method .....                              | 104         |
| 3.16 (Spare) .....                                                                 | 105         |
| 3.17 (Spare) .....                                                                 | 105         |
| 3.18 (Spare) .....                                                                 | 105         |
| 3.19 (Spare) .....                                                                 | 105         |
| 4 Fire performance tests.....                                                      | 105         |
| 4.1 Flame propagation tests.....                                                   | 105         |
| 4.2 Smoke emission tests .....                                                     | 109         |
| 4.3 (Spare) .....                                                                  | 111         |
| 4.4 Toxic gas emission tests .....                                                 | 111         |
| 4.5 (Spare) .....                                                                  | 118         |
| 4.6 (Spare) .....                                                                  | 118         |
| 5 Long term tests.....                                                             | 118         |
| 5.1 Thermal endurance tests .....                                                  | 118         |
| 5.2 Pulling lubricant immersion test .....                                         | 120         |

|                     |                                                                                  |     |
|---------------------|----------------------------------------------------------------------------------|-----|
| 5.3                 | Long term water immersion test.....                                              | 120 |
| 5.4                 | Long term voltage test.....                                                      | 121 |
| 5.5                 | Radial watertightness test and corrosion resistance test of metallic screen..... | 126 |
| 5.6                 | Insulation water resistance test.....                                            | 126 |
| Annex A (normative) | Normative references .....                                                       | 128 |
| Annex B (normative) | Rounding of numbers .....                                                        | 130 |
| B.1                 | Rounding of numbers for the purpose of the fictitious calculation method .....   | 130 |
| B.2                 | Rounding of numbers for other purposes.....                                      | 130 |
| Bibliography        | .....                                                                            | 132 |

## European foreword

This document (HD 605 S3:2019) has been prepared by CLC/TC 20, "Electric cables".

The following dates are fixed:

- latest date by which this document has to be (dop) 2020-07-01  
implemented at national level by publication of  
an identical national standard or by  
endorsement
- latest date by which the national standards (dow) 2022-07-01  
conflicting with this document have to be  
withdrawn

This document supersedes HD 605 S2:2008 and all of its amendments and corrigenda (if any).

In order to maintain the integrity of existing clause numbers, and hence avoid unnecessary amendments to over 100 particular sections of the product HDs, the normative references are given in Annex A.

The numbering of tables and figures in this standard is not conventional. It retains the scheme as used in HD 605 S1. This is to facilitate easier cross referencing in national sections of HD 603, HD 620 and other compendia HDs. It also allows for continuing work to rationalize and harmonize more of these test methods in the future, without the need for further re-numbering.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

# 1 General

## 1.1 Scope

This HD collates and specifies the test methods to be used for testing polymeric insulated and sheathed electric cables, of rated voltage up to and including 20,8/36 kV, intended for public distribution systems, and for use in power generating plants and sub-stations.

Test methods in this HD are additional to those already harmonized, e.g. EN 60332-1 series and EN 60811 series, and are used for testing cable types specified in HD 603, HD 604, HD 620, HD 622, HD 626 and HD 627. In each case, these HDs give complementary information needed for the practical application to each specific type. Therefore the present HD as such is not sufficient for carrying out and evaluating the tests on electric cables.

Full test conditions (e.g. temperatures, durations) and/or test requirements are not specified in this HD. Such data needed to carry out the tests is given in the particular sections.

**NOTE** The words 'particular section' refer throughout to the section of HD 603 or HD 604, or other HD to which HD 605 applies, in which a particular cable type is specified.

## 1.2 Applicable tests

Tests applicable to each type of cable are given in the particular section, which may also state the sequence, the frequency of test, and the possibility of repeating failed tests.

## 1.3 Classification of tests

The classification of tests is given in Parts 1 of HD 603, HD 604, HD 620, HD 622, HD 626 and HD 627.

## 1.4 Sampling

The size and number of samples are given either in this HD or in the particular HDs.

If a marking is indented in the insulation or sheath surface, the samples used for the tests shall be taken so as to include such markings.

For multicore cables, except for the test specified in 2.1.1, not more than three cores (of different colours, if available) shall be tested unless otherwise specified.

## 1.5 Test conditions

### 1.5.1 Ambient temperature

Unless otherwise specified in the details for the particular test, tests shall be made at an ambient temperature of  $(20 \pm 15) ^\circ\text{C}$ .

### 1.5.2 Tolerance on temperature values

Unless otherwise specified in the particular specification, the tolerance on temperature values quoted in the test methods are the following:

**Table 1.5.2 — Tolerance on temperature values**

| Specified temperature, $t$<br>$^\circ\text{C}$ | Tolerance<br>$\text{K}$      |
|------------------------------------------------|------------------------------|
| $-40 \leq t \leq 0$                            | $\pm 2$                      |
| $0 < t \leq 50$                                | according to relevant clause |
| $50 < t \leq 150$                              | $\pm 2$                      |