



SLOVENSKI STANDARD

oSIST prHD 604-S2:2021

01-junij-2021

Elektroenergetski kabli za napetost 0,6/1,0 kV s posebnimi ognjevzdržnimi lastnostmi za uporabo v elektrarnah in podobnih inštalacijah

0,6/1,0 kV power cables with special fire performance for use in power stations and similar installations

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Ta slovenski standard je istoveten z: prHD 604-S2

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ICS:

13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
29.060.20	Kabli	Cables

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HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

DRAFT
prHD 604-S2

April 2021

ICS

Will supersede HD 604 S1:1994 and all of its amendments and corrigenda (if any)

English Version

**0,6/1,0 kV power cables with special fire performance for use in
power stations and similar installations**

To be completed

To be completed

This draft Harmonization Document is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2021-07-09.

It has been drawn up by CLC/TC 20.

If this draft becomes a Harmonization Document, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

This draft Harmonization Document was established by CENELEC 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.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a Harmonization Document. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a Harmonized Document.



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

1 **0,6/1 kV power cables with special fire performance**
2 **PART 0: Contents of HD 604 S2**
3 **PART 1: GENERAL REQUIREMENTS**

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Part 1

68 **European foreword**

69 This document (prHD 604 S2:2021) has been prepared by CLC/TC 20 "Electric cables".

70 This document is currently submitted to the Enquiry.

71 The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

72 This document will supersede HD 604 S1:1994 and all of its amendments and corrigenda (if any).

73 This document has been prepared under a mandate given to CENELEC by the European Commission and
74 the European Free Trade Association, and supports essential requirements of EU Directive(s).

75 For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this
76 document.

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77 **Introduction**

78 — Correspondence between material types and the new material designations in prHD 604 S2.

1. Thermoplastic Insulating		Table in prHD 604 S2 Part 1	
a. Polyvinylchloride	(PVC)	Table 2	(TIV)
b. Thermoplastic non-halogenated compound		Table 3	(TIZ)
2. Cross-linked Insulating			
a. Cross-linked polyethylene	(XLPE)	Table 4	(XIP)
b. Ethylene propylene rubber	(EPR)	Table 5	(XIE)
c. Hard ethylene propylene rubber	(HEPR)	Table 6	(XIH)
d. Silicone rubber		Table 7	(XIQ)
e. Cross-linked non-halogenated compound		Table 8	(XIZ)
3. Thermoplastic Sheathing			
a. Polyvinylchloride	(PVC)	Table 9	(TMV)
b. Thermoplastic non-halogenated compound		Table 10	(TMZ)
4. Cross-linked Sheathing			
a. Cross-linked non-halogenated compound		Table 11	(XMZ)

79 — Correspondence between designation of material types in HD 604 S1/A3 and the new proposed
80 material types in prHD 604 S2.

Part	HD 604 S1:1994 + A1:1997 + A2:2002 + A3:2005 Insulation compound type	prHD 604 S2:2021 Insulation material type	HD 604 S1:1994 + A1:1997 + A2:2002 + A3:2005 Sheathing compound type	prHD 604 S2:2021 NEW Sheath material type	Comment
3-A	TI 1	TIV 1	TM 1	TMV 1	
3-B	“PVC insulation”	(N/A)	“PVC inner sheath & oversheath”	(N/A)	No change
3-C	R2	TIV 2	Rz	TMV 2	
3-D	DIV 11	TIV 3	DMV 19	TMV 3	
3-E	TI1	(N/A)	TM1	(N/A)	Indicated for withdrawal
3-F	(see part 3A)	TIV 1	(see part 3A)	TMV 1	3-F refers to 3-A
4-A	“XLPE insulation”	XIP 1	TM 1	TMV 4	
4-B	“EPR or EPDM”	(N/A)	“Chlorosulphonated Polyethylene”	(N/A)	No change
4-C	G7	XIH 1	Rz	TMV 2	
4-D	XLPE	XIP 2	PVC ST	TMV 5	

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4-E	TI 1	(N/A)	TM 1	(N/A)	Indicated for withdrawal
4-F	(see part 4A)	XIP 1	(see part 4A)	TMV 4	4-F refers to 4-A
4-G	DIX 1 {HD 603}	XIP 3	DMV 2 {HD 603}	TMV 6	
5-A	XLPE / "other material" non-halogenated	(N/A)	"non-halogenated" "XL" or "TP"	(N/A)	No change
5-B	G10	XIQ 1	M1 M2	TMZ 1 XMZ 1	
5-C	XLPE	XIP 2	ZH1/ST	TMZ 2	
5-D	"halogen-free ethylene copolymer flame retardant" insulation	TIZ 1	"halogen-free ethylene copolymer flame retardant"	TMZ 3	Indicated introduction of different material
5-E	XLPE or HEPR	(N/A)	ZM1 or ZM2	(N/A)	Indicated for withdrawal
5-F	XLPE Q (silicone rubber)	XIP 1 XIQ 2	"HFFR-sheath"	TMZ 4	
5-G	2X11	XIP 4	HM4	TMZ 5	
5-H	HIC HIT1 HIT2	XIZ 1 TIZ 2 TIZ 3	HMC HMT1 HMT2	XMZ 2 TMZ 6 TMZ 7	
5-I	XLPE	XIP 5	"halogen free thermoplastic polymer compound"	TMZ 8	
5-J	(see part 5F)	XIP 1 XIQ 2	(see part 5F)	TMZ 4	5-J refers to 5-F
5-K	IHN 1 (XL) IHN 2 (TP)	XIZ 2 TIZ 4	MHN 1 (XL) MHN 2 (TP)	XMZ 3 TMZ 9	
5-L	DIX 1 {HD 603} BE IG	XIP 3 TIZ 5	type G	TMZ 10	

(N/A) not applicable – particular part has been indicated for withdrawal.

81 HD 604 S1 was first published in 1996 and the most recent amendment (A3) was made in 2005. Some
82 sections have remained unchanged since the first publication. Due to amendments of other sections, various
83 changes in styles and formats have been introduced to the particular sections. The aim for this maintenance
84 cycle is to provide a full revision (S2) including the following changes:

- 85 — Modification of the title, to include some more fields of application apart from power stations.
- 86 — Collecting the material types in to the common part along with tables detailing the mechanical, physical
87 and electrical requirements.
- 88 — Addition of a guide to use as an Annex A in Part 1. This can be easily reference from the individual
89 sections.
- 90 — Addition of Annex ZZ (Low Voltage Directive), showing the references between the legal requirements
91 on electric safety in the Directive and the relevant clauses of this document.

92 — Review of the format of particular sections to bring them to the same style.

PART 1	<u>General requirements</u>
PART 3	<u>Single core and multicore PVC insulated and sheathed cables</u>
3-A	no change and no document
3-B	withdraw
3-C	withdraw
3-D	to be withdrawn
3-E	withdraw
3-F	withdraw
PART 4	<u>Single core and multicore XLPE or EPR insulated, PVC sheathed cables</u>
4-A	no change and no document
4-B	withdraw
4-C	withdraw
4-D	Cables with copper and aluminium conductors; unarmoured, armoured or double-screened
4-E	withdraw
4-F	withdraw
4-G	Cables with copper conductors; unarmoured or armoured
PART 5	<u>Single core and multicore halogen free cables</u>
5-A	no change and no document
5-B	Unarmoured cables with copper conductors
5-C	Cables with copper or aluminium conductors; unarmoured, armoured or double screened
5-D	withdrawn: should be new section in HD 603 or HD 604
5-E	withdraw
5-F	to be withdrawn
5-G	Cables with copper conductors and optional copper concentric conductor
5-H	Cables with copper conductors, with and without concentric copper conductors, and with optional armouring
5-I	One to four core cables having aluminium or copper conductors
5-J	withdraw
5-K	Cables with copper or aluminium conductors and with or without concentric copper conductor or screen
5-L	Cables with copper conductors; unarmoured or armoured

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Part 1

93 **1 Scope**94 **1.1 General**

95 This document applies to rigid and flexible conductor cables for fixed installations having a rated voltage
 96 U_0/U of 0,6/1,0 kV. The insulation and sheaths are either thermoplastic or thermosetting, halogenated or
 97 halogen free. The cables are mainly intended for use in power generating plants, sub-stations and other
 98 sensitive environments. All cables have specific fire performance requirements. Cables designed to be
 99 installed within the containment area of nuclear power plants (LOCA cables), or cables specifically designed
 100 to be radiation resistant are not included in this document.

101 Control cables having a minimum conductor size of 1 mm² up to 61 cores are included in addition to the
 102 range of power supply cables.

103 This section specifies the general requirements applicable to these cables; additional or deviating
 104 requirements are given in the particular sections of this document.

105 Test methods are specified in EN 50525 series, EN 60811 series, EN 60228, EN 60332-1, HD 605 and
 106 IEC 60096-1.

107 The particular types of cables are specified in Parts 3, 4 and 5.

108 **1.2 Object**

109 The objects of this document are:

- 110 — to standardize cables that are safe and reliable when properly used, in relation to the technical;
- 111 — to state the characteristics and manufacturing requirements directly or indirectly bearing on safety.

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<https://standards.iteh.ai/catalog/standards/sist/c29f03ca-20cf-41e8-a5ac-7dbe740cff8a/osist-prhd-604-s2-2021>

112 **2 Normative references**

113 The following documents are referred to in the text in such a way that some or all of their content constitutes
 114 requirements of this document. For dated references, only the edition cited applies. For undated references,
 115 the latest edition of the referenced document (including any amendments) applies.

116 HD 308 S2, *Identification of cores in cables and flexible cords*

117 HD 605 S3:2019, *Electric cables - Additional test methods*

118 EN 13501-6, *Fire classification of construction products and building elements - Part 6: Classification using*
 119 *data from reaction to fire tests on power, control and communication cables*

120 EN 50334, *Marking by inscription for the identification of cores of electric cables*

121 EN 50395, *Electrical test methods for low voltage energy cables*

122 EN 50396, *Non electrical test methods for low voltage energy cables*

123 EN 60228, *Conductors of insulated cables (IEC 60228)*

124 HD 60364-5-52:2011, *Low-voltage electrical installations - Part 5-52: Selection and erection of electrical*
 125 *equipment - Wiring systems (IEC 60364 5 52:2009)*

126 EN 60754-2, *Test on gases evolved during combustion of materials from cables - Part 2: Determination of*
 127 *acidity (by pH measurement) and conductivity (IEC 60754-2)*

- 128 EN 60811 (series), *Insulating and sheathing materials of electric and optical cables – Common test methods*
 129 (*IEC 60811 series*)
- 130 IEC 60096-1, *Radio-frequency cables - Part 1: General requirements and measuring methods*
- 131 IEC 60287 series, *Electric cables*
- 132 IEC 60502-1:2021, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV*
 133 ($U_m = 1,2 \text{ kV}$) up to 30 kV ($U_m = 36 \text{ kV}$) - Part 1: Cables for rated voltages of 1 kV ($U_m = 1,2 \text{ kV}$) and 3 kV
 134 ($U_m = 3,6 \text{ kV}$)

135 3 Terms and definitions

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

137 ISO and IEC maintain terminological databases for use in standardization at the following addresses:

138 — ISO Online browsing platform: available at <https://www.iso.org/obp>

139 — IEC Electropedia: available at <http://www.electropedia.org/>

140 3.1 Definitions relating to insulating and sheathing compounds

141 3.1.1

142 insulating and sheathing compounds

143 types of insulating and sheathing compounds covered in this document are listed in Table 1, together with
 144 their abbreviated designations

145 **Table 1 — Insulating and sheathing compounds**

	Insulating and sheathing compounds	See
Insulating	Thermoplastic	
	- Polyvinylchloride (PVC)	Table 2
	- Thermoplastic Non-halogenated compound	Table 3
	Cross-linked	
	- Cross-linked Polyethylene (XLPE)	Table 4
	- Ethylene propylene rubber (EPR)	Table 5
	- Hard Ethylene propylene rubber (HEPR)	Table 6
	- Silicone rubber	Table 7
- Crosslinked Non-halogenated compound	Table 8	
Sheathing	Thermoplastic	
	- Polyvinylchloride (PVC)	Table 9
	- Thermoplastic Non-halogenated compound	Table 10
	Cross-linked	
- Crosslinked Non-halogenated compound	Table 11	

146 3.1.2

147 type of compound

148 category in which a compound is placed according to its properties, and which is determined by specific
 149 tests; the type designation is not directly related to the composition of the compound

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Part 1

150 **3.2 Definitions relating to the tests**151 **3.2.1**152 **type test**153 **T**

154 tests required to be made before supplying a type of cable covered by this document on a general
155 commercial basis in order to demonstrate satisfactory performance characteristics to meet their intended
156 application and which are of such a nature that, after they have been made, they need not be repeated
157 unless changes are made in the cable material, design or type of manufacturing process which might change
158 the performance characteristics

159 **3.2.2**160 **sample test**161 **S**

162 tests made on selected lengths of completed cable, on samples of completed cable, or components taken
163 from a completed cable adequate to verify that the finished product meets the design specifications

164 Note 1 to entry: Tests classified as Sample (S) or Routine (R) could be required as part of any Type Approval
165 Schemes.

166 **3.2.3**167 **routine test**168 **R**

169 tests made on all production cable lengths to demonstrate their integrity

170 Note 1 to entry: Tests classified as Sample (S) or Routine (R) could be required as part of any Type Approval
171 Schemes.

172 **3.2.4**173 **test after installation**

174 tests intended to demonstrate the integrity of the cable and its accessories as installed

175 **3.3**176 **rated voltage**

177 reference voltage for which the cable is designed, and which serves to define the electrical tests and which
178 is expressed by the combination of the following values U_0/U (U_m) expressed in kV:

179 — U_0 is the r.m.s value between any insulated conductor and earth (metallic covering of the cable or the
180 surrounding medium); $U_0 = 0,6$ kV;

181 — U is the r.m.s. value between any two phase -conductors of a multicore cable or of a system of single-
182 core cables; $U = 1,0$ kV;

183 — U_m is the maximum r.m.s. value of the highest system voltage for which the equipment may be used;
184 $U_m = 1,2$ kV.

185 Note 1 to entry: In an alternating current system, the rated voltage of a cable shall be at least equal to the nominal
186 voltage of the system for which it is intended.

187 Note 2 to entry: If used in d.c. systems, the 0,6/1,0 kV cables of this document shall have a maximum DC voltage:

188 — Conductor to conductor 1,8 kV

189 — Conductor to earth 0,9 kV.

190 4 Marking

191 4.1 Indication of origin

192 4.1.1 General

193 Cables shall be provided with an identification of origin consisting of:

- 194 1. Either the manufacturer's identification thread, or
- 195 2. The continuous marking of the manufacturer's name or trademark, or (if legally protected) identification
196 number

197 by one of the three following methods:

- 198 a) printed tape within the cable;
- 199 b) printing in a contrasting colour on the insulation of at least one core;
- 200 c) printing, indenting or embossing on the outer surface of the cable.

201 4.1.2 Continuity of marks

202 Unless otherwise specified in the particular section, each specified mark shall be regarded as continuous if
203 the distance between the end of the mark and the beginning of the next identical mark does not exceed:

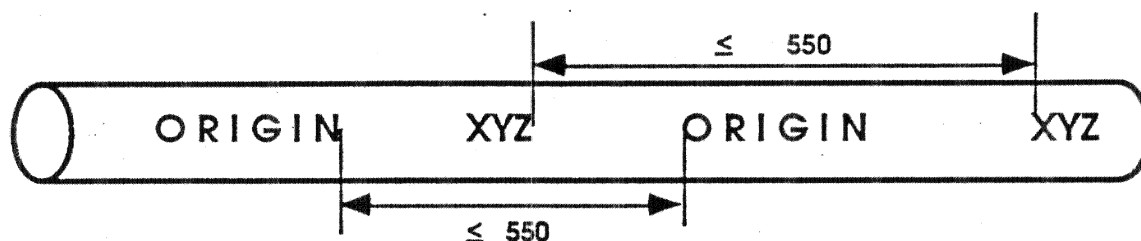
204 550 mm if the marking is on the outer surface of the cable.

205 275 mm if the marking is

- 206 i) on the insulation of a sheathed cable [oSIST prHD 604-S2:2021](https://standards.iteh.ai/catalog/standards/sist/c29f03ca-20cf-41e8-a5ac-7dbe740cff8a/osist-prhd-604-s2-2021)
- 207 ii) on a tape within a sheathed cable <https://standards.iteh.ai/catalog/standards/sist/c29f03ca-20cf-41e8-a5ac-7dbe740cff8a/osist-prhd-604-s2-2021>

208 NOTE A "Specified Mark" is any mandatory mark covered by this section or by the particular requirements of
209 Clause 4 onwards of this document.

210 Figure 1 shows an example of the marking as used on the outer surface of the cable, where the word
211 "ORIGIN" is for the mandatory information required for 4.1, and "XYZ" is one of any other mandatory marks.



212 **Figure 1 — Example of marking**

213 4.2 Additional marking

214 Additional marking requirements could be specified in the particular sections.

prHD 604 S2:2021 (E)**Part 1**215 **4.3 Durability**

216 Printed markings shall be durable. Compliance with this requirement shall be checked by the test given in
217 HD 605 S3:2019, 2.5.4.

218 The printed legend shall be legible after carrying out the test.

219 **4.4 Legibility**

220 All markings shall be legible. Printed markings shall be in contrasting colours.

221 All colours of the identification thread shall be easy to recognize or easily be made recognizable, if
222 necessary, by cleaning with a suitable solvent.

223 **4.5 Common marking**

224 Under consideration.

225 **4.6 Use of the name CENELEC**

226 The name CENELEC, in full or abbreviated, shall not be directly marked on, or in, the cables.

227 **5 Core identification**

228 The cores shall be identified by colours or numbers when specified in the particular sections. Colouring shall
229 be achieved by the use of coloured insulation or by a coloured surface.

230 If the core identification is by colours it shall comply with HD 308 S2, unless otherwise specified in the
231 particular sections.

232 When identification is by numbers, they shall be printed in a colour which contrasts with the core colours.

233 Marking shall comply with EN 50334 unless otherwise specified.

234 The colours shall be clearly identifiable and durable. Durability shall be checked by the test given in
235 HD 605 S3:2019, 2.5.4.

236 Compliance with these requirements shall be verified by visual examination.

237 **6 General requirements for the construction of cables**238 **6.1 Conductors**239 **6.1.1 Material**

240 Conductors shall be either plain or metal-coated annealed copper or plain aluminium in accordance with
241 EN 60228, and with particular requirements in particular sections.

242 **6.1.2 Construction**

243 The maximum diameters of the wires of flexible conductors, and the minimum number of the wires of rigid
244 conductors, shall be in accordance with EN 60228, unless otherwise specified in the particular sections.

245 The classes of the conductors relevant to the various types of cables are given in the particular sections.

246 Conductors shall be either circular or sector in shape, and of solid metal or stranded.

247 **6.1.3 Check of construction**

248 Compliance with the requirements of 6.1.1 and 6.1.2 including the requirements of EN 60228, shall be
249 checked by inspection and by measurement.