

**SLOVENSKI STANDARD**  
**oSIST prEN IEC 62271-211:2023**  
**01-september-2023**

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**Visokonapetostne stikalne in krmilne naprave - 211. del: Neposredna povezava med elektroenergetskimi transformatorji in plinsko izoliranimi stikalnimi napravami v kovinskih ohišjih za naznačene napetosti nad 52 kV**

High-voltage switchgear and controlgear - Part 211: Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages above 52 kV

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 211: Direkte Verbindungen zwischen Leistungstransformatoren und gasisolierten metallgekapselten Schaltanlagen für Bemessungsspannungen über 52 kV

Appareillage à haute tension - Partie 211: Raccordements directs entre transformateurs de puissance et appareillage sous enveloppe métallique à isolation gazeuse de tension assignée supérieure à 52 kV

**Ta slovenski standard je istoveten z: prEN IEC 62271-211:2023**

**ICS:**

29.130.10	Visokonapetostne stikalne in krmilne naprave	High voltage switchgear and controlgear
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**oSIST prEN IEC 62271-211:2023**                      **en**





# 17C/901/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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OF INTEREST TO THE FOLLOWING COMMITTEES: TC 14,TC 17,SC 17A,SC 36A	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input checked="" type="checkbox"/> QUALITY ASSURANCE <input checked="" type="checkbox"/> SAFETY	
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TITLE:

**High-voltage switchgear and controlgear - Part 211: Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages above 52 kV**

PROPOSED STABILITY DATE: 2032

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IT-1 STANDARD PREVIEW  
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## 74 INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

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**Part 211: Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages above 52 kV**

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## FOREWORD

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International Standard IEC 62271-211 has been prepared by subcommittee 17C: High-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

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This second edition cancels and replaces the first edition of IEC 62271-211:2014, COR1:2015 and COR2:2017 and constitutes a technical revision.

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This second edition includes the following significant technical changes with respect to the previous edition:

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- re-numbering of clauses according to IEC 62271-1:2017,
- clause 1 (former 1.1): Scope (no modifications)
- clause 2 (former clause 1.2): updated dated references,
- clause 3: updating definition about bushing (3.1), updating some pressure definitions (3.6, 3.7, 3.8, 3.9), rewording definition about proctor density (3.11),
- clause 4 (former clause 2): updated references,

- 128 • clause 5 (former clause 4): add a subclause 5.1 General, according to IEC 62271-1:2017  
129 and IEC 62271-203:2022,
- 130     ○ subclause 5.5: new first paragraph, rewording second paragraph,  
131     ○ subclause 5.8: modify the term “Rated duration of thermal short-time current” of  
132     the bushing,
- 133 • clause 6: restructure and rewording of subclauses:
- 134     ○ 6.1 (former 5.3): requirements about gas and vacuum tightness of the  
135     transformer bushing
- 136     ○ 6.3 (former 5.2): harmonization with IEC 62271-203:2022 about typical  
137     maximum pressure in service for SF<sub>6</sub>, other gases and gas mixtures,
- 138     ○ 6.4 (former 8), rewording
- 139     ○ 6.5 (former 5.1), some rewording and modification
- 140     ○ 6.6 (former 5.4), some rewording, updated references
- 141     ○ 6.7 (former 5.5), some rewording
- 142     ○ 6.8 (former 5.6), some rewording
- 143     ○ 6.9 (former 5.7), slight rewording
- 144 • clause 7 (former clause 6) type tests: some rewording and clarifications about  
145 references,
- 146 • clause 8 (former clause 7) routine tests:
- 147     ○ 8.2 (former 7.2): add a paragraph about SF<sub>6</sub>-mixtures and other gases than SF<sub>6</sub>,  
148     ○ 8.3 (former 7.3): update reference to relevant on-site test according to IEC  
149     62271-203:2022,
- 150 • clause 9 Guide to the selection of switchgear and controlgear (new): informative, to  
151 have a reference to IEC 62271-203:2022,
- 152 • clause 10 (former 9) informative: update references
- 153 • clause 11 (former 10): updated headline and updated reference according to IEC 62271-  
154 1:2017,
- 155 • new clauses 12 Safety and 13 Environmental aspects: Adding of references to safety  
156 and environmental aspects,
- 157 • correction of errors in Corrigendum 2 of IEC 62271-211:2017,  
158 • modified orientation of Fig. 1 to Fig. 4 for easier reading the tables,  
159 • update references in the Bibliography.

160 The text of this document is based on the following documents:

FDIS	Report on voting

161  
162 Full information on the voting for the approval of this document can be found in the report on  
163 voting indicated in the above table.

164 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

165 A list of all parts in the IEC 62271 series, published under the general title *High-voltage*  
166 *switchgear and controlgear*, can be found on the IEC website.

167 The committee has decided that the contents of this publication will remain unchanged until the  
168 stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to  
169 the specific publication. At this date, the publication will be

- 170     • reconfirmed,  
171     • withdrawn,

- 172
- replaced by a revised edition, or
- 173
- amended.
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- 175

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## HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

### Part 211: Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages above 52 kV

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#### 183 **1 Scope**

184 This part of IEC 62271 is applicable to single- and three-phase direct connections between gas-  
185 insulated metal-enclosed switchgear (GIS) for rated voltages above 52 kV and transformer  
186 arrangements to establish electrical and mechanical interchange ability and to determine the  
187 limits of supply for the transformer connection.

188 Direct connections are immersed on one end in the transformer oil or insulating gas and on the  
189 other end in the insulating gas of the switchgear.

190 Transformer arrangements are single-phase transformers with single-phase enclosed  
191 arrangement, three-phase transformers with three single-phase enclosed arrangements or  
192 three-phase transformers with a three-phase enclosed arrangement with three transformer  
193 bushings.

194 The connection satisfies the requirements of IEC 62271-203 for gas-insulated metal-enclosed  
195 switchgear, IEC 60076 for power transformer and IEC 60137 for completely immersed  
196 bushings.

197 For the purposes of this document the term "switchgear" is used for "gas-insulated metal-  
198 enclosed switchgear".

#### 199 **2 Normative references**

200 The following documents, in whole or in part, are normatively referenced in this document and  
201 are indispensable for its application. For dated references, only the edition cited applies. For  
202 undated references, the latest edition of the referenced document (including any amendments)  
203 applies.

204 IEC 60076 (all parts), *Power transformers*

205 IEC 60137:2017, *Insulated bushings for alternating voltages above 1 000 V*

206 IEC 61936-1, *Power installations exceeding 1 kV a.c. – Part 1: Common rules*

207 IEC 62271-1:2017 and IEC 62271-1:2017/AMD1:2021, *High-voltage switchgear and*  
208 *controlgear – Part 1: Common specifications*

209 IEC 62271-203:2022, *High-voltage switchgear and controlgear – Part 203: Gas-insulated metal-*  
210 *enclosed switchgear for rated voltages above 52 kV*

211 IEC 62271-207, *High-voltage switchgear and controlgear – Part 207: Seismic qualification for*  
212 *gas-insulated switchgear assemblies for rated voltages above 52 kV*

#### 213 **3 Terms and definitions**

214 For the purposes of this document, the terms and definitions given in IEC 62271-1, as well as  
215 the following apply.

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

218 • IEC Electropedia: available at <http://www.electropedia.org/>

219 • ISO Online browsing platform: available at <http://www.iso.org/obp>

### 220 3.1

#### 221 **bushing**

222 device that enables one or several conductors to pass through an enclosure and insulate the  
223 conductors from it

224 [SOURCE: IEC 60050-471:2007, 471-02-01, modified – “an enclosure” inserted after “pass  
225 through” and “a partition such as a wall or a tank” deleted. Notes 1 and 2 were deleted.]

### 226 3.2

#### 227 **completely immersed bushing**

228 bushing, both ends of which are intended to be immersed in an insulating medium other than  
229 ambient air (e.g. oil or gas)

230 [SOURCE: IEC 60050-471:2007, 471-02-04]

### 231 3.3

#### 232 **gas-insulated switchgear enclosure**

233 part of gas-insulated metal-enclosed switchgear retaining the insulating gas under the  
234 prescribed conditions necessary to maintain safely the highest insulation level, protecting the  
235 equipment against external influences and providing a high degree of protection to personnel

236 Note 1 to entry: The enclosure can be single-phase or three-phase.

237 [SOURCE: 3.103 of IEC 62271-203:2022]

### 238 3.4

#### 239 **main circuit end terminal**

240 part of the main circuit of a gas-insulated metal enclosed switchgear forming part of the  
241 connection interface

242 [SOURCE: 3.2 of IEC 62271-209:2019]

### 243 3.5

#### 244 **transformer connection enclosure**

245 part of the gas-insulated metal-enclosed switchgear which houses one end of a completely  
246 immersed bushing fitted on a power transformer and a main circuit end terminal

247

### 248 3.6

#### 249 **maximum external operating gas pressure**

250 maximum pressure of the gaseous insulating medium in which the bushing is partially or  
251 completely immersed when in operation

252 Note 1 to entry: It is at least equal to the maximum pressure in the transformer connection enclosure of the GIS at  
253 the highest temperature that the gas used for insulation can reach under specified maximum service conditions.

254 Note 2 to entry: In case of gas insulated transformers it is also the maximum insulating pressure of the gaseous  
255 insulating medium in which the end of the bushing is immersed into the power transformer, when in operation, the  
256 bushing-power transformer connection assembly carrying its rating continuous current at the maximum ambient  
257 temperature.  
258

259 [SOURCE: 3.32 of IEC 60137:2017, Note 1 to entry and Note 2 to entry were added]  
260

### 261 3.7

#### 262 enclosure design pressure

263 relative pressure used to determine the design of the enclosure

264 Note 1 to entry: It is at least equal to the maximum pressure in the enclosure at the highest temperature that the gas  
265 used for insulation can reach under specified maximum service conditions.

266 Note 2 to entry: The transient pressure occurring during and after a breaking operation (e.g. circuit-breaker) is not  
267 considered in the determination of the design pressure.

268 [Source: 3.114 of IEC 62271-203:2022]  
269

### 270 3.8

#### 271 filling pressure $p_{re}$ for insulation

#### 272 filling density $\rho_{re}$ for insulation

273 pressure (in Pa), for insulation, referred to the standard atmospheric air conditions of +20 °C  
274 and 101,3 kPa (or density), which may be expressed in relative or absolute terms, to which the  
275 assembly is filled before being put into service

276 [SOURCE: 3.6.5.1 of IEC 62271-1:2017, modified – deleted the terms “and/or switching”,  
277 deleted “or automatically replenished”]

### 278 3.9

#### 279 minimum functional pressure $p_{me}$ for insulation

#### 280 minimum functional density $\rho_{me}$ for insulation

281 pressure (in Pa), for insulation, referred to the standard atmospheric air conditions of +20 °C  
282 and 101,3 kPa (or density), which may be expressed in relative or absolute terms, at which and  
283 above which the characteristics of the switchgear-power-transformer connection are maintained

284 [SOURCE: 3.6.5.5 of IEC 62271-1:2017, modified – deleted the terms “and/or switching”, add  
285 “the characteristics of the switchgear-power-transformer connection” deleted “rated  
286 characteristics of switchgear and controlgear”]

### 287 3.10

#### 288 insulated junction

289 all parts which are needed to insulate the transformer from the switchgear including but not  
290 limited to the insulating flange

### 291 3.11

#### 292 proctor density

293 highest dry density of a soil for a given compaction effort depending on the amount of water the  
294 soil contains during soil compaction of controlled magnitude according Proctor Standard test

295 Note 1 to entry: Proctor Standard test is defined in ASTM D-698. However, other tests methods exist providing similar  
296 information, but not always equivalent, like for example ISO 17892-2, BS 1377, UNE 103500, NF P 94-093 and DIN  
297 18127.

## 298 4 Normal and special service conditions

### 299 4.1 Normal service conditions

300 Subclause 4.1 of IEC 62271-203:2022 is applicable.

### 301 4.2 Special service conditions

302 Subclause 4.2 of IEC 62271-203:2022 is applicable.