



SLOVENSKI STANDARD
oSIST prEN 50089:2021
01-september-2021

Deli iz ulitih umetnih materialov za plinske visokonapetostne stikalne in krmilne naprave s kovinskim ohišjem

Cast resin partitions for metal enclosed gas-filled high-voltage switchgear and controlgear

Giessharz-Zwischenwände für metallgekapselte gasgefüllte Hochspannungs-Schaltgeräte und -Schaltanlagen

Appareillage à haute tension - Cloisons en matériau isolant pour enveloppes métalliques sous pression de gaz

ITEH STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/120930b8-2983-47d9-876d-5b938a33088a/sist-pr-en-50089-2021>

Ta slovenski standard je istoveten z: prEN 50089

ICS:

29.130.10	Visokonapetostne stikalne in krmilne naprave	High voltage switchgear and controlgear
-----------	--	---

oSIST prEN 50089:2021

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 50089:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/120930b8-2983-47d9-876d-5b938e33088a/osist-pren-50089-2021>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 50089

June 2021

ICS 29.130.10

Will supersede EN 50089:1992 and all of its
amendments and corrigenda (if any)

English Version

Cast resin partitions for metal enclosed gas-filled high-voltage switchgear and controlgear

Appareillage à haute tension - Cloisons en matériau isolant
pour enveloppes métalliques sous pression de gaz

Giessharz-Zwischenwände für metallgekapselte gasgefüllte
Hochspannungs-Schaltgeräte und -Schaltanlagen

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2021-09-03.

It has been drawn up by CLC/TC 17AC.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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 European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

Contents

2	European foreword.....	3
3	Introduction.....	4
4	1 Scope.....	5
5	2 Normative references.....	5
6	3 Terms and definitions.....	6
7	4 Quality assurance.....	8
8	5 Normal and special service conditions.....	8
9	6 Materials and their selection.....	8
10	7 Design.....	9
11	7.1 General.....	9
12	7.2 Considerations for design.....	9
13	7.3 Stresses due to pressure.....	9
14	8 Manufacture and workmanship.....	9
15	8.1 Consultation between manufacturer and producer.....	9
16	8.2 Manufacturing technique.....	10
17	8.3 Geometry and dimensions.....	10
18	8.4 Mechanical properties.....	10
19	8.5 Metallic inserts.....	11
20	8.6 Surface finish.....	11
21	9 Inspection, testing and certification.....	11
22	9.1 Type test.....	11
23	9.1.1 General.....	11
24	9.1.2 Bursting test procedure.....	11
25	9.2 Inspection and routine tests.....	11
26	9.2.1 General.....	11
27	9.2.2 Visual inspection.....	12
28	9.2.3 Routine pressure test.....	12
29	9.2.4 Production consistency burst pressure test.....	12
30	Table 1 — Reduction of burst tests.....	12
31	9.2.5 Additional tests.....	12
32	9.2.6 Reporting of non-destructive test examinations.....	13
33	9.3 Certification.....	13
34	9.3.1 Design specification, drawings and data sheets.....	13
35	9.3.2 Certificate.....	13
36	9.3.3 Marking.....	13
37	9.3.4 Final inspection.....	13
38	Annex A (informative) A-deviations.....	14
39	Bibliography.....	15

40

41 European foreword

42 This document (prEN 50089:2021) has been prepared by CLC/TC 17AC "High-voltage switchgear and
43 controlgear".

44 This document is currently submitted to the Enquiry.

45 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)

46 This document will supersede EN 50089:1992 and all of its amendments and corrigenda (if any).

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

48 — Title more generally

49 — Scope of voltage, pressure level and gas mixtures

50 — New: Terms and definitions more specifically (e.g. partition)

51 — Material not anymore only cast resin

52 — Mechanical properties

53 — Possibilities of reduction of routine pressure -

iTech STANDARD PREVIEW
(standards.iteh.ai)

oSIST prEN 50089:2021
<https://standards.iteh.ai/catalog/standards/sis/120930b8-2983-47d9-876d-5b938e33088a/osist-pren-50089-2021>

54 **Introduction**

55 This document has been revised by CENELEC Technical Committee 17AC “High-voltage switchgear and
56 controlgear”. It supplements the relevant product standards on gas-insulated switchgear and controlgear
57 providing specific requirements for partitions based on insulating material being part of pressurized high-voltage
58 switchgear and controlgear.

59 In this respect, this document, together with other EN and IEC documents, constitutes the exclusion of HV
60 switchgear from the scope of the Directive 2014/68/EU (superseding 97/23/EC) concerning pressure equipment.
61 Article 1, 2. (l) excludes “enclosures for high-voltage electrical equipment such as switchgear, controlgear,
62 transformers, and rotating machines” from the scope of the Directive.

63 This document covers the requirements for the design, construction, testing, inspection and certification of
64 partitions based on insulating material for gas-filled enclosures for use specifically in high-voltage switchgear
65 and controlgear, or for associated gas-filled equipment.

66 Special consideration is given to these partitions for the following reasons.

- 67 a) For electrical reasons the partitions need to be manufactured from an insulating material.
- 68 b) The partitions usually form the containment of electrical equipment, thus their shape is determined by
69 electrical rather than mechanical requirements. The mechanical requirements should be met in any case.
- 70 c) The enclosures in which the partitions are integrated are installed in restricted access areas and the
71 equipment is operated by instructed, authorized persons only.
- 72 d) The insulating material is generally qualified against decomposition products of SF₆ and other insulating
73 gases. The thorough drying of gas-filling medium is fundamental for the satisfactory operation of the
74 electrical equipment. The gas is periodically checked. For this reason, no corrosion allowance is required
75 on the wall thickness of these partitions.
- 76 e) The enclosures are subjected to only small (in the relation to design pressure) fluctuations of pressure as
77 the gas-filling density will be maintained within close limits to ensure satisfactory insulating and arc-
78 quenching properties. Therefore, the partitions are not liable to fatigue due to pressure cycling.

79 Due to the foregoing reasons and to ensure maximum service continuity as well as to reduce the risk of moisture
80 and dust entering the enclosures which could endanger safe electrical operation of the switchgear, no pressure
81 tests should be carried out after installation and before placing in service and no periodic inspection of the
82 enclosure interiors or pressure tests should be carried out after the equipment is placed in service.

83 This document should be a base for a mutual agreement between a manufacturer of electrical equipment and
84 producer of partitions but not limited to it. Additional delivery and test instructions may be agreed between the
85 parties if necessary.

86 1 Scope

87 This document applies to pressurized partitions used in indoor and outdoor installations of high-voltage AC and
88 DC switchgear and controlgear with rated voltages (U_r) above 1 kV AC / 1,5 kV DC and with design pressure
89 higher than 300 kPa, where the gas is used principally for its dielectric and/or arc-quenching properties.

90 Gases with insulating properties are dry air, inert gases, for example sulphur hexafluoride or nitrogen or a
91 mixture of such gases.

92 The partitions comprise pressurized barriers in electrical equipment not necessarily limited to the following
93 examples:

94 — circuit-breakers;

95 — switch-disconnectors;

96 — disconnectors;

97 — earthing switches;

98 — current transformers;

99 — voltage transformers;

100 — surge arrestors;

101 — busbars and connections;

102 — cable connections / terminations

103 — cable bushings

104 — etc.

STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 50089:2021](https://standards.iteh.ai/catalog/standards/sist/120930b8-2983-47d9-876d-5b938e33088a/osist-pren-50089-2021)

<https://standards.iteh.ai/catalog/standards/sist/120930b8-2983-47d9-876d-5b938e33088a/osist-pren-50089-2021>

105 Partitions which are only pressurized from one side are also covered.

106 1 kV AC / 1,5 kV DC means it is valid for the apparatus applied and where the partitions are installed, however,
107 the application of voltages below 1 kV AC / 1,5 kV DC as in e.g. current and voltage transformer are not
108 excluded.

109 This document does not apply to high voltage bushings (see EN 60137, EN 61462 and EN 62155).

110 2 Normative references

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

114 EN 10204, *Metallic products - Types of inspection documents*

115 EN 62271-1, *High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current*
116 *switchgear and controlgear (IEC 62271-1)*

117 EN 62271-200:2012, *High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and*
118 *controlgear for rated voltages above 1 kV and up to and including 52 kV (IEC 62271-200:2011)*

119 prEN 62271-203:2021, *High-voltage switchgear and controlgear - Part 203: Gas-insulated metal-enclosed*
120 *switchgear for rated voltages above 52 kV (IEC 62271-203:202X)*

121 EN ISO 527 series, *Plastics - Determination of tensile properties (ISO 527 series)*

3 Terms and definitions

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

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

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

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

3.1

gas-insulated metal-enclosed switchgear

GIS

metal-enclosed switchgear in which the insulation is obtained, at least partly, by an insulating gas or gas mixture other than air at atmospheric pressure

Note 1 to entry: This term generally applies to high-voltage switchgear and controlgear.

Note 2 to entry: Three-phase enclosed gas-insulated switchgear applies to switchgear with the three phases enclosed in a common enclosure.

Note 3 to entry: Single-phase enclosed gas-insulated switchgear applies to switchgear with each phase enclosed in single independent enclosure.

[SOURCE: prEN IEC 62271-203:2021, 3.102]

3.2

partition

gas tight support insulator of gas-insulated metal-enclosed switchgear separating two adjacent compartments

Note 1 to entry: Or an insulator in the gas compartment which is pressurized on one side and atmospheric pressure exists at all times on the other side (e.g. enclosure of opening with cable bushings, cable terminations, viewports, earthing insulations, instrument transformers terminals, etc.)

[SOURCE: prEN IEC 62271-203:2021, 3.109]

3.3

enclosure

compartment as part of GIS retaining the insulating gas under the prescribed conditions necessary to maintain safely the rated insulation level, protecting the equipment against external influences and providing a high degree of protection to personnel

3.4

manufacturer

organization that is responsible for the design of the partition and the production of the GIS

Note 1 to entry: In this document, this is mostly the GIS manufacturer or the cable manufacturer or cable accessory supplier.

3.5

producer

organisation that produces the partition

- 158 **3.6**
159 **design pressure of partitions**
160 relative pressure across the partition
- 161 Note 1 to entry: It is at least equal to the maximum differential pressure across the partition during maintenance activities.
- 162 Note 2 to entry: The transient pressure occurring during and after a breaking operation (e.g. circuit-breaker) is not to be
163 considered in the determination of the design pressure.
- 164 Note 3 to entry: the significant pressure is at least equal to the maximum pressure in the enclosure at the highest
165 temperature that the gas used for insulation can reach under specified maximum service conditions.
- 166 [SOURCE: prEN IEC 62271-203:2021, 3.115]
- 167 **3.7**
168 **design stress**
169 maximum permissible stress on the partition imposed by conditions of operation, environment or test that
170 determine the (material) characteristics of a partition
- 171 **3.8**
172 **normal load**
173 load for which the occurrence and level can be planned or predicted
- 174 **3.9**
175 **exceptional load**
176 load for which the probability of occurrence during the lifetime of product is very small or accidental
- 177 **3.10**
178 **routine test pressure of enclosures and partitions**
179 relative pressure to which all enclosures and partitions are subjected after manufacturing
[SOURCE: prEN IEC 62271-203:2021, 3.117]
<https://standards.iteh.ai/catalog/standards/sist/120930b8-2983-47d9-870d-5b938c53088a/osist-pren-50089-2021>
- 181 **3.11**
182 **type test pressure of enclosures and partitions**
183 relative pressure to which all enclosures and partitions are subjected for type test
- 184 [SOURCE: prEN IEC 62271-203:2021, 3.118]
- 185 **3.12**
186 **defect**
187 inner and surface imperfections of partitions after production
- 188 **3.12.1**
189 **inclusion**
190 extraneous material entrapped in the raw material or entrapped during the manufacture of the product
- 191 **3.12.2**
192 **crack**
193 cracks in materials caused by stresses in the material or the manufacturing process
- 194 **3.12.3**
195 **shrinkage cavity**
196 cavity created during the curing of parts

prEN 50089:2021 (E)

197 **3.13**
 198 **thermal treatment**
 199 heating, holding at elevated temperature and cooling of the material in such a way as to obtain desired internal
 200 structure or mechanical properties

201 Note 1 to entry: The term "heat treatment" is used for the same concept as a synonym.

202 **3.14**
 203 **batch**
 204 — each separate mix or

205 — where the mix is continuous charging, changing of the critical raw material batch of the mix or

206 — each week production whichever is the lower

207 **3.15**
 208 **tensile strength**
 209 ratio of maximum load before rupture in a tensile test to original cross-sectional area

210 **3.16**
 211 **glass transition temperature**
 212 **T_G**
 213 characteristic value of the temperature range over which the glass transition takes place

214 Note 1 to entry: The assigned glass transition temperature (T_G) may vary, depending on the specific property and on the
 215 method and conditions selected to measure it.

216 [SOURCE: ISO 11357-2:2020]

217 **4 Quality assurance**

218 The manufacturer is responsible for achieving and maintaining a consistent and adequate quality of the
 219 switchgear. The producer is responsible for achieving and maintaining a consistent and adequate quality of the
 220 partition.

221 Sufficient examinations including the requirement specified under chapter 8 and 9 of this document shall be
 222 made by the producer to ensure that the materials, production and testing comply in all respects with the
 223 requirements of this document.

224 Third party inspections shall not absolve the switchgear manufacturer from his responsibility to exercise such
 225 quality assurance procedures as to ensure that the requirements and intent of this document are satisfied.

226 **5 Normal and special service conditions**

227 The normal and special conditions of EN 62271-1 are applicable.

228 **6 Materials and their selection**

229 The standard applies to partitions made of polymers, polymer-based composites or ceramics, any thermoplastic
 230 (e.g. polyethylene terephthalate - PET) or thermosetting (e.g. epoxy resin) polymers with a suitable filler
 231 provided the requirements of this document are met.

232 Material characterizations and qualifications shall be provided per each kind of material used to produce
 233 partitions (e.g. general technical data sheet).

234 The main properties of the material types shall regularly be tested by the producer according to material
 235 specification. The main properties to be measured should be agreed between producer and manufacturer.