
**Varnost transformatorjev, dušilk, napajalnikov in njihovih kombinacij - 2-10. del:
Posebne zahteve in preskusi za ločilne transformatorje z visoko izolacijsko
stopnjo in ločilne transformatorje z izhodnimi napetostmi nad 1000 V**

Safety of transformers, reactors, power supply units and combinations thereof - Part 2-10: Particular requirements and tests for separating transformers with high insulation level and separating transformers with output voltages exceeding 1 000 V

Sicherheit von Transformatoren, Netzgeräten, Drosseln und dergleichen - Teil 2-10: Besondere Anforderungen und Prüfungen an Netztransformatoren mit hohem Isolationspegel und Netztransformatoren mit Ausgangsspannungen über 1 000 V

Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et des combinaisons de ces éléments - Partie 2-10: Règles particulières et essais pour les transformateurs d'isolement à enroulements séparés à niveau d'isolement élevé et pour les transformateurs d'isolement à enroulements séparés à tensions secondaires supérieures à 1 000 V

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IEC TC 96 : TRANSFORMERS, REACTORS, POWER SUPPLY UNITS, AND COMBINATIONS THEREOF	
SECRETARIAT: Germany	SECRETARY: Mr Wolfgang Reichelt
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 3C,TC 14,TC 22,SC 22F,SC 34C,TC 51,TC 55,TC 61,SC 62A,TC 64,TC 66,TC 77,TC 85,TC 97,TC 106,TC 108,TC 109,TC 111,TC 112	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
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<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Safety of transformers, reactors, power supply units and combinations thereof - Part 2-10: Particular requirements and tests for separating transformers with high insulation level and separating transformers with output voltages exceeding 1 000 V

PROPOSED STABILITY DATE: 2025

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CONTENTS

1		
2	FOREWORD.....	3
3	INTRODUCTION.....	5
4	1 Scope.....	6
5	2 Normative references	7
6	3 Terms and definitions	7
7	4 General requirements	8
8	5 General notes on tests.....	8
9	6 Ratings.....	8
10	7 Classification.....	9
11	8 Marking and other information.....	9
12	9 Protection against electric shock.....	10
13	10 Change of input voltage setting.....	11
14	11 Output voltage and output current under load	11
15	12 No-load output voltage.....	11
16	13 Short-circuit voltage.....	12
17	14 Heating	12
18	15 Short-circuit and overload protection.....	12
19	16 Mechanical strength.....	12
20	17 Protection against harmful ingress of dust, solid objects and moisture	12
21	18 Insulation resistance, dielectric strength and leakage current.....	12
22	19 Construction.....	13
23	20 Components.....	14
24	21 Internal wiring.....	14
25	22 Supply connection and other external flexible cable or cords	14
26	23 Terminals for external conductors	15
27	24 Provisions for protective earthing	15
28	25 Screws and connections	15
29	26 Creepage distances, clearances and distances through insulation	15
30	27 Resistance to heat, fire and tracking	16
31	28 Resistance to rusting	16
32	Annexes	17
33	Bibliography	18
34		
35	Table 101 – Symbols indicating the kind of transformer	10
36	Table 102 – Output voltage difference	12
37	Table 103 – Table of dielectric strength test voltages for working voltages above	
38	1 000 V	13
39	Table 104 – Minimum clearances in air up to 2 000 m above sea level.....	15
40	Table 105 – Minimum Creepage distances for basic or supplementary insulation	16
41		
42		

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF TRANSFORMERS, REACTORS,
POWER SUPPLY UNITS AND COMBINATIONS THEREOF –****Part 2-10: Particular requirements and tests for separating
transformers with high insulation level and separating
transformers with output voltages exceeding 1 000 V**

FOREWORD

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International standard IEC 61558-2-10 has been prepared by IEC technical committee 96: Transformers, reactors, power supply units and combinations thereof.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

- a) Adjustment of structure and references in accordance with IEC 61558-1:2017
- b) Overvoltage categories I, II, III and IV for clearances and dielectric strength tests are included
- c) Clearances for homogenous field conditions deleted

98 The text of this International Standard is based on the following documents:

Draft	Report on voting
96/XXX/FDIS	96/XXX/RVD

99
100 Full information on the voting for its approval can be found in the report on voting indicated in
101 the above table.

102 The language used for the development of this International Standard is English.

103 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
104 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available
105 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
106 described in greater detail at www.iec.ch/standardsdev/publications.

107 It has the status of a group safety publication in accordance with IEC Guide 104.

108 This International Standard is to be used in conjunction with IEC 61558-1:2017.

109 This document supplements or modifies the corresponding clauses in IEC 61558-1:2017, so as
110 to convert that publication into the IEC standard: *Particular requirements and tests for*
111 *separating transformers with high insulation level and separating transformers with output*
112 *voltages exceeding 1 000 V*.

113 A list of all parts in the IEC 61558 series published under the general title *Safety of transformers,*
114 *reactors, power supply units and combinations thereof*, can be found on the IEC website.

115 Future standards in this series will carry the new general title as cited above. Titles of existing
116 standards in this series will be updated at the time of the next edition.

117 Where this document states "*addition*", "*modification*" or "*replacement*", the relevant text of
118 IEC 61558-1:2017 is to be adopted accordingly.

119 In this document, the following print types are used:

- 120 – requirements proper: in roman type;
- 121 – *test specifications: in italic type*;
- 122 – explanatory matter: in smaller roman type.

123 In the text of this document, the words in **bold** are defined in Clause 3.

124 Subclauses, notes, figures and tables additional to those in IEC 61558-1:2017 are numbered
125 starting from 101; supplementary annexes are entitled AA, BB, etc.

126 The committee has decided that the contents of this document will remain unchanged until the
127 stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to
128 the specific document. At this date, the document will be

- 129 • reconfirmed,
- 130 • withdrawn,
- 131 • replaced by a revised edition, or
- 132 • amended.

133

INTRODUCTION

134 IEC TC 96 has a group safety function in accordance with IEC Guide 104 for transformers other
135 than those intended to supply distribution networks, in particular transformers and power supply
136 units intended to allow the application of protective measures against electric shock as defined
137 by TC 64, but in certain cases including the limitation of voltage and horizontal safety function
138 for SELV, in accordance with IEC 60364-4-41.

139 The group safety function (GSF) is used because of responsibility for safety extra-low voltage
140 (SELV) in accordance with IEC 61140:2016, 5.2.6 and IEC 60364-4-41:2017, 414.3.1 or control
141 circuits in accordance with IEC 60204-1:2016, 7.2.4.

142 The group safety function is used for each part of IEC 61558-2 because different standards of
143 the IEC 61558 series can be combined in one construction but in certain cases with no limitation
144 of rated output power.

145 For example an auto-transformer in accordance with IEC 61558-2-13 can be designed with a
146 separate SELV-circuit in accordance with the particular requirements for IEC 61558-2-6 relating
147 to the general requirements of IEC 61558-1.

148

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149 **SAFETY OF TRANSFORMERS, REACTORS,**
150 **POWER SUPPLY UNITS AND COMBINATIONS THEREOF –**

151
152 **Part 2-10: Particular requirements and tests for separating**
153 **transformers with high insulation level and separating**
154 **transformers with output voltages exceeding 1 000 V**
155
156

157 **1 Scope**

158 *Replacement*

159 This part of IEC 61558 deals with the safety of **separating transformers with high insulation**
160 **level** and **separating transformers with output voltages exceeding 1 000 V**. Transformers
161 incorporating **electronic circuits** are also covered by this document.

162 NOTE 1 Safety includes electrical, thermal and mechanical aspects.

163 Unless otherwise specified, from here onward, the term **transformer** covers **separating**
164 **transformers with high insulation level** and **separating transformers with output voltages**
165 exceeding 1 000 V AC or 1 500 V DC.

166 This document is applicable to **stationary** or **portable**, single-phase or polyphase, air-cooled
167 (natural or forced) **independent** or **associated dry-type transformers**. The windings can be
168 encapsulated or non-encapsulated.

169 For **power supply units** (linear) this document is applicable. For **switch mode power supply**
170 **units**, IEC 61558-2-16 is applicable together with this document. Where two requirements are
171 in conflict, the most severe take precedence.

172 The **rated supply voltage** does not exceed 1 000 V AC, and the **rated supply frequency** and
173 the **internal operating frequencies** do not exceed 500 Hz.

174 The **rated output** does not exceed:

- 175 – 25 kVA for single-phase **transformers**;
- 176 – 40 kVA for poly-phase **transformers**.

177 This document is applicable to **transformers** without limitation of the **rated output** subject to
178 an agreement between the purchaser and the manufacturer.

179 Where applicable the **no-load output voltage** or the **rated output voltage**:

- 180 – does not exceed 1 000 V AC or 1 500 V DC for **separating transformers with high**
181 **insulation level**;
- 182 – does exceed 1 000 V AC or 1 500 V DC and does not exceed 15 000 V AC or 15 000 V
183 DC for **separating transformer with output voltage exceeding 1 000 V**.

184 This document does not apply to:

- 185 – **transformers** covered by IEC 60076-11;
- 186 – neon **transformers** covered by IEC 61050 and
- 187 – **power supplies** and converters for use with or in products according to IEC 61347-2-
188 10.

189 This document is not applicable to external circuits and their components intended to be
190 connected to the input terminals and output terminals of the **transformers**.

191 NOTE 2 **Transformers** covered by this document are used only in applications where **double or reinforced**
192 **insulation** between circuits is not required by the installation rules or by the end product standard.

193 NOTE 3 Normally, the **transformers** are intended to be used with equipment to provide voltages different from the
194 **supply voltage** for the functional requirements of the equipment. The protection against electric shock can be
195 provided (or completed) by other features of the equipment, such as the **body**. Parts of **output circuits** can be
196 connected to the **input circuits** or to **protective earthing**.

197 This document is applicable to **transformers** associated with specific equipment, to the extent
198 decided upon by the relevant IEC technical committees.

199 Attention is drawn to the following if necessary:

200 – for **reactors** intended to be used in vehicles, on board ships, and aircraft, additional
201 requirements (from other applicable standards, national rules, etc.);

202 – measures to protect the **enclosure** and the components inside the enclosure against
203 external influences such as fungus, vermin, termites, solar-radiation, and icing;

204 – the different conditions for transportation, storage, and operation of the **transformers**;

205 – additional requirements in accordance with other appropriate standards and national rules
206 can be applicable to **reactors** intended for use in special environments.

207 Future technological development of **reactors** can necessitate a need to increase the upper
208 limit of the frequencies. Until then this document can be used as a guidance document.

209 This group safety publication focusing on safety guidance is primarily intended to be used as a
210 product safety standard for the products mentioned in the scope, but is also intended to be used
211 by technical committees in the preparation of publications for products similar to those
212 mentioned in the scope of this group safety publication, in accordance with the principles laid
213 down in IEC Guide 104 and ISO/IEC Guide 51.

214 One of the responsibilities of a technical committee is, wherever applicable, to make use of
215 basic safety publications and/or group safety publications in the preparation of its publications.

216

217 **2 Normative references**

218 This clause of IEC 61558-1 is applicable, except as follows:

219 *Addition*

220 IEC 61558-1:2017, *Safety of transformers, reactors, power supply units and combinations*
221 *thereof – Part 1: General requirements and tests*

222 IEC 61558-2-16:2021, *Safety of transformers, reactors, power supply units and combinations*
223 *thereof – Part 16: Particular requirements and tests for switch mode power supply units and*
224 *transformers for switch mode power supply units for general applications*

225

226 **3 Terms and definitions**

227 For the purposes of this document, the terms and definitions given in IEC 61558-1 apply.

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

- 230 • IEC Electropedia: available at <http://www.electropedia.org/>
- 231 • ISO Online browsing platform: available at <http://www.iso.org/obp>

232 3.1 Transformers

233 *Addition*

234 3.1.101

235 **separating transformer with high insulation level**

236 a **separating transformer** where the **output voltage** does not exceed 1 000 V AC or 1 500 V
237 DC and does exceed 50 V AC or DC for **independent transformers**

238 Note 1 The **output winding(s)** are isolated from both, **input winding(s)** and **body** for a **working voltage** exceeding
239 1 000 V AC or 1 500 V DC but not exceeding 15 000 V AC or 15 000 V DC.

240 3.1.102

241 **separating transformer with output voltages exceeding 1 000 V**

242 a **separating transformer** the **output circuits** of which are designed to give voltages
243 exceeding 1 000 V AC or 1 500 V DC and not exceeding 15 000 V AC or 15 000 V DC

244

245 4 General requirements

246 This clause of IEC 61558-1 is applicable.

247

248 5 General notes on tests

249 This clause of IEC 61558-1 is applicable.

250

251 6 Ratings

252 This clause of IEC 61558-1 is not applicable.

253 *Replacement*

254 **6.101** The **rated output voltage** is limited as follows:

255 For **separating transformers with high insulation level**:

- 256 – the **no-load output voltage** or the **rated output voltage** shall not exceed 1 000 V AC or
257 1 500 V DC;
- 258 – for **independent transformers** the **rated output voltage** shall exceed 50 V AC or DC and
259 this **output voltage** applies even when **output windings**, not intended for interconnection,
260 are connected in series.

261 For **separating transformers with no load output voltages exceeding 1 000 V**:

- 262 – the **rated output voltage** shall exceed 1 000 V AC or 1 500 V DC and shall not exceed
263 15 000 V AC or 15 000 V DC;
- 264 – for **independent transformers** this **output voltage** limitations applies even when **output**
265 **windings**, not intended for interconnection, are connected in series.

266 **6.102** The **rated output** shall not exceed:

- 267 – 25 kVA for single-phase **transformers**;
- 268 – 40 kVA for polyphase **transformers**;

269 **Transformers** without limitation of the **rated output** shall be subject to agreement between the
270 purchaser and the manufacturer.

271

272 **6.103** The **rated supply frequency** and the **internal operating frequencies** shall not exceed
273 500 Hz.

274

275 **6.104** The **rated supply voltage** shall not exceed 1 000 V AC.

276 *Compliance with the requirements of 6.101 to 6.104 is checked by inspection of the marking.*

277

278 **7 Classification**

279 This clause of IEC 61558-1 is applicable.

280

281 **8 Marking and other information**

282 This clause of IEC 61558-1 is applicable, except as follows:

283

284 **8.1** h)

285 *Replacement of the content up to the first semi-colon by the following:*

286 relevant graphical symbols shown in Table 101 that indicate the kind of **transformer**

287 The voltage of the **insulation level**, expressed in kV is not a part of the symbol.

288

<https://standards.iteh.ai/catalog/standards/sist/9ffcb222-334b-42ef-bde9-15549fc8c6d3/osist-pren-iec-61558-2-10-2023>

289 **8.11**

290 *Addition*

291 The symbol for linear **power supply units** shall be used in conjunction with the symbol
292 indicating the kind of **transformer**.

293