



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 63360:2023**  
**01-julij-2023**

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**Tekočine za elektrotehniko - Mešanica plinov kot alternativa SF6**

Fluids for electrotechnical application: Mixtures of gases alternative to SF6

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**Ta slovenski standard je istoveten z: prEN IEC 63360:2023**

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OF INTEREST TO THE FOLLOWING COMMITTEES: TC 14, SC 17A, SC 17C, SC 36A, TC 38, 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.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input checked="" type="checkbox"/> ENVIRONMENT <input checked="" type="checkbox"/> QUALITY ASSURANCE <input checked="" type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <b>Attention IEC-CENELEC parallel voting</b> 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:

**Fluids for electrotechnical application: Mixtures of gases alternative to SF<sub>6</sub>**

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FLUIDS FOR ELECTROTECHNICAL APPLICATION:  
SPECIFICATION OF GASES ALTERNATIVE TO SF<sub>6</sub>  
TO BE USED IN ELECTRICAL POWER EQUIPMENT**

## FOREWORD

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IEC 63360 has been prepared by subcommittee WG 41 of TC 10: SPECIFICATION OF GASES ALTERNATIVE TO SF<sub>6</sub> TO BE USED IN ELECTRICAL POWER EQUIPMENT, of IEC technical committee 10: FLUIDS FOR ELECTROTECHNICAL APPLICATIONS. It is an International Standard

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

Draft	Report on voting
10/XXXX/FDIS	10/XXXX/RVD

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

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

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at <http://www.iec.ch/standardsdev/publications>.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
  - withdrawn,
  - replaced by a revised edition, or
  - amended.

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## INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document can involve the use of a patent. IEC takes no position concerning the evidence, validity, and scope of this patent right.

The holder of this patent right has assured IEC that s/he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information can be obtained from the patent database available at <http://patents.iec.ch>.

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Considering the limited information for some of the data which appear in the informative Annex A, the reader should be aware that the information related with possible gases alternative to SF<sub>6</sub> are still a matter of study.

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16 **FLUIDS FOR ELECTROTECHNICAL APPLICATION:**  
17 **SPECIFICATION OF GASES ALTERNATIVE TO SF<sub>6</sub>**  
18 **TO BE USED IN ELECTRICAL POWER EQUIPMENT**  
19

20 **1. Scope**

21 This document specifies the quality of gases alternative to SF<sub>6</sub> for use in electrical power  
22 equipment.

23 Detection techniques, covering in-situ portable instrumentation, applicable to the analysis of  
24 gases alternative to SF<sub>6</sub> prior to the introduction of these gases into the electrical power  
25 equipment, are also described in this document.

26 Information about gases alternative to SF<sub>6</sub> by-products and the procedure for evaluating the  
27 potential effects of gases alternative to SF<sub>6</sub> and its by-products on human health are covered  
28 by IEC 63359 and IEC 62271-4, their handling and disposal being carried out according to  
29 international, national and local regulations with regard to the impact on the environment and  
30 the safety of operators.

31 It is the responsibility of the gas manufacturer to provide sufficient information for safe handling  
32 of gases alternative to SF<sub>6</sub> and a risk assessment, in accordance with international, national,  
33 and local regulations.

34 For gases alternative to SF<sub>6</sub> not mentioned in this document the electrical power equipment  
35 manufacturer and/or gas manufacturer shall provide the information indicated in this document.  
36 It is the intention of this document to include such gases alternative to SF<sub>6</sub> in a next edition or  
37 in amendments to this edition. This document provides information to prepare risk assessment  
38 associated with the use of gases alternative to SF<sub>6</sub>. It is the responsibility of the user of this  
39 document to establish appropriate health and safety practices and determine the applicability  
40 of regulatory limitations prior to use.

41 NOTE 1 Throughout this document, the term “pressure” stands for “absolute pressure”.

42 NOTE 2 If not otherwise specified in this document, concentration values (e.g. %, ppmv, µl/l) of gas components or  
43 contaminants are given in volume fraction at 20 °C and 100 kPa. More information on temperature and pressure  
44 dependence of mole fraction and volume fraction is given in Annex C.

45 NOTE 3 If gases alternative to SF<sub>6</sub> for electrical power equipment are regulated, their designation and regulation  
46 origin might be found in the IEC 62474 database [1] (available at <https://std.iec.ch/iec62474>).

47 NOTE 4 Handling of gases alternative to SF<sub>6</sub> is covered by IEC 62271-4: 2022.

48 NOTE 5 Additional information is needed from gas manufacturer and/or electrical power equipment manufacturer  
49 to perform a full risk assessment.

50 **2. Normative references**

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

55 IEC 60050-212, *International Electrotechnical Vocabulary – Part 212: Electrical insulating*  
56 *solids, liquids and gases* (available at <http://www.electropedia.org>)

57 IEC 60050-441, *International Electrotechnical Vocabulary (IEV) – Part 441: Switchgear,*  
58 *controlgear and fuses* (available at <http://www.electropedia.org>)

59 IEC 60050-826, *International Electrotechnical Vocabulary (IEV) – Part 826: Electrical*  
60 *installations* (available at <http://www.electropedia.org>)

61 IEC 62271-4:2022, *High-voltage switchgear and controlgear – Part 4: Handling procedures for*  
62 *gases for insulation and/or switching*

63 **IEC 63359:20xx**, *Fluids for electrotechnical application: Specifications for the re-use of mixtures*  
64 *of gases alternative to SF<sub>6</sub>*

65 IEC 60480:2019, *Specifications for the re-use of sulphur hexafluoride (SF<sub>6</sub>) and its mixtures in*  
66 *electrical equipment*

### 67 **3. Terms, definitions and abbreviated terms**

68 For the purposes of this document, the terms and definitions given in IEC 60050-212,  
69 IEC 60050-441 and IEC 60050-826 as well as the following apply.

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

- 72 • IEC Electropedia: available at <https://www.electropedia.org/>
- 73 • ISO Online browsing platform: available at <https://www.iso.org/obp/ui>

#### 74 **3.1. General terms and definitions**

##### 75 **3.1.1**

##### 76 **electrical power equipment**

77 any high-voltage or medium-voltage equipment containing gas for insulation and/or switching,  
78 e.g. switchgear and controlgear, gas-insulated lines, transformers, instrument transformers,  
79 etc.

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##### 80 **3.1.2**

##### 81 **gas**

82 matter characterized by molecules or atoms being arranged without structure so that they are  
83 collectively fluid and have neither a definite shape nor a definite volume

84 NOTE 1 to entry: a gas might contain contaminants.

85 EXAMPLE 1 CO<sub>2</sub> (at standard atmospheric conditions) is a typical example of a gas.

86 EXAMPLE 2 CO<sub>2</sub>/O<sub>2</sub> mixture (at standard atmospheric conditions) is a typical example of a gas.

##### 87 **3.1.3**

##### 88 **single gas**

89 gas made up of identical atoms or molecules

90 NOTE 1 to entry: a single gas might contain contaminants.

91 EXAMPLE CO<sub>2</sub> (at standard atmospheric conditions) is a typical example of a single gas.

##### 92 **3.1.4**

##### 93 **gas mixture**

94 gas made up of a minimum of two single gases

95 NOTE 1 to entry: a gas mixture might contain contaminants.

96 EXAMPLE CO<sub>2</sub>/O<sub>2</sub> (at standard atmospheric conditions) is a typical example of a gas mixture of two single gases.

- 97 **3.1.5**  
98 **contaminant**  
99 foreign substance or material in an insulating liquid, gas or solid
- 100 [SOURCE: IEC 60050-212:2010, 212-17-27, modified – "and which usually has a deleterious  
101 effect on one or more properties" has been deleted.]
- 102 **3.1.6**  
103 **by-product**  
104 contaminant which is formed by the degradation of the gas by electrical arcs, corona effect or  
105 sparks, or formed by chemical reaction with other substances or materials
- 106 [SOURCE: IEC 62271-4:2022, 3.1.6.]
- 107 **3.1.7**  
108 **gas container**  
109 vessel (cylinder) suitable for the containment of pressurized gases either in gaseous or liquid  
110 phase, according to local and/or international safety and transportation regulations  
111 [SOURCE: IEC 60480:2019, 3.2, modified "gas" added]
- 112 **3.2 Terms and definitions for compressed air**
- 113 **3.2.1**  
114 **compressed air**  
115 air processed in accordance with Table 1
- 116 **3.3 Terms and definitions for natural-origin gases**
- 117 **3.3.1**  
118 **technical grade natural-origin gas**  
119 technical grade nitrogen (N<sub>2</sub>), technical grade oxygen (O<sub>2</sub>) or technical grade carbon dioxide  
120 (CO<sub>2</sub>) or their mixtures in any combination
- 121 **3.3.2**  
122 **technical grade N<sub>2</sub>**  
123 N<sub>2</sub> in accordance with Table 3
- 124 **3.3.3**  
125 **technical grade O<sub>2</sub>**  
126 O<sub>2</sub> in accordance with Table 4
- 127 **3.3.4**  
128 **technical grade CO<sub>2</sub>**  
129 CO<sub>2</sub> in accordance with Table 5
- 130 **3.3.5**  
131 **technical grade synthetic air**  
132 gas mixture in accordance with Table 2