BS EN IEC 60376:2018

BSI Standards Publication

Specification of technical grade sulphur hexafluoride (SF6) and complementary gases to be used in its mixtures for use in electrical equipment

Documents
Document Sharing Hub

Full document details: BS EN IEC 60376:2018

National foreword

This British Standard is the UK implementation of EN IEC 60376:2018. It is identical to IEC 60376:2018. It supersedes BS EN 60376:2005, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/10, Fluids for electrotechnical applications.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2018
Published by BSI Standards Limited 2018

ISBN 978 0 580 85305 0

ICS 29.130.01; 29.040.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2018.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS EN IEC 60376:2018

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60376

August 2018

ICS 29.040.20

Supersedes EN 60376:2005

English Version

Specification of technical grade sulphur hexafluoride (SF_6) and complementary gases to be used in its mixtures for use in electrical equipment (IEC 60376:2018)

Spécification de la qualité technique de l'hexafluorure de soufre (SF6) et des gaz complémentaires à employer dans les mélanges de SF_6 pour utilisation dans les appareils électriques (IEC 60376:2018)

Bestimmung der Reinheit der technisch einsetzbaren Qualität von Schwefelhexafluorid (SF6) sowie Gasen für den Gebrauch in SF_6-Mischungen zur Verwendung in elektrischen Betriebsmitteln (IEC 60376:2018)

This European Standard was approved by CENELEC on 2018-06-28. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

© 2018 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN IEC 60376:2018 E

AVA Documents Document Sharing Hub

Full document details: BS EN IEC 60376:2018

European foreword

The text of document 10/1056/FDIS, future edition 3 of IEC 60376, prepared by IEC/TC 10 "Fluids for electrotechnical applications" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60376:2018.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2019-03-28
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2021-06-28

This document supersedes EN 60376:2005.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60376:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60068-2-17	NOTE	Harmonized as EN 60068-2-17.
ISO 14040:2006	NOTE	Harmonized as EN ISO 14040:2006 (not modified).

Documents
Document Sharing Hub

Full document details: BS EN IEC 60376:2018

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050-212	-	International Electrotechnical Vocabulary - Part 212: Electrical insulating solids, liquids and gases	-	-
IEC 60050-441	-	International Electrotechnical Vocabulary (IEV) - Chapter 441: Switchgear, controlgear and fuses	-	-
IEC 60050-826	-	International Electrotechnical Vocabulary - Part 826: Electrical installations	-	-
IEC 60480	-	Guidelines for the checking and treatment of sulphur hexafluoride (SF_6) taken from electrical equipment and specification for its re-use	EN 60480	-
IEC 62271-4	-	High-voltage switchgear and controlgear - Part 4: Handling procedures for sulphur hexafluoride (SF_6) and its mixtures	EN 62271-4	-

Documents
Document Sharing Hub
Full document details: BS EN IEC 60376:2018

CONTENTS

FOREWORD 4
1 Scope 6
2 Normative references 6
3 Terms, definitions and abbreviated terms 7
3.1 Terms and definitions 7
3.2 Abbreviated terms 7
4 General requirements 8
5 Requirements for technical grade SF_6 8
6 Requirements for complementary gases to be used in SF_6 mixtures 9
7 Environmental impact 10
8 Handling, storage and transportation 10
8.1 Gas handling procedures 10
8.2 Storage and transportation 10
Annex A (informative) Sulphur hexafluoride 11
A.1 General 11
A.2 Chemical properties 11
A.3 Physical properties 11
A.4 Electrical properties 12
Annex B (informative) Environmental effects of SF_6 and its mixtures 14
B.1 General 14
B.2 Ecotoxicology 14
B.3 Ozone depletion 14
B.4 Global warming/climate change (greenhouse effect) 14
B.5 Reducing the environmental impact of the use of SF_6 and CF_4 in electrical equipment 15
Annex C (informative) Detection techniques 16
C.1 Detection techniques of SF_6 16
C.2 Detection techniques of N_2 17
C.3 Detection techniques of CF_4 17
Bibliography 18

Figure A.1 – Pressure/temperature/density characteristics for SF_6 [3] 12

Table 1 – Requirements for technical grade SF_6 8
Table 2 – Requirements for N_2 to be used in SF_6 mixtures 9
Table 3 – Requirements for CF_4 to be used in SF_6 mixtures 9
Table A.1 – Main chemical characteristics of SF_6 [3] 11
Table A.2 – Main physical characteristics of SF_6 [3] 12
Table A.3 – Main electrical characteristics of SF_6 [3] 13
Table C.1 – Detection techniques for laboratory analysis of technical grade SF_6 (not exhaustive) 16
Table C.2 – Detection techniques for on-site analysis of technical grade SF_6 (not exhaustive) 16

Documents
Document Sharing Hub
Full document details: BS EN IEC 60376:2018

Table C.3 – Detection techniques for laboratory analysis of technical grade N_2 used in SF_6 mixtures (not exhaustive) 17
Table C.4 – Detection techniques for laboratory analysis of technical grade CF_4 used in SF_6 mixtures (not exhaustive) 17

Documents
Document Sharing Hub
Full document details: BS EN IEC 60376:2018

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATION OF TECHNICAL GRADE SULPHUR HEXAFLUORIDE (SF_6) AND COMPLEMENTARY GASES TO BE USED IN ITS MIXTURES FOR USE IN ELECTRICAL EQUIPMENT

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60376 has been prepared by IEC technical committee 10: Fluids for electrotechnical applications.

This third edition cancels and replaces the second edition published in 2005. This edition constitutes a technical revision.

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

a) the requirements for the use of SF_6 in electrical equipment have been confirmed;
b) a specification for complementary gases to be used in SF_6 mixtures with N_2 and CF_4 has been included;
c) the introduction and scope have been merged;
d) a new repartition of the annexes of IEC 60376, IEC 60480 and IEC 62271-4 has been included.

Documents
Document Sharing Hub
Full document details: BS EN IEC 60376:2018