Irish Standard
I.S. EN 62535:2009

Insulating liquids - Test method for detection of potentially corrosive sulphur in used and unused insulating oil (IEC 62535:2008 (EQV))

I.S. EN 62535:2009

Incorporating amendments/corrigenda issued since publication:

This document replaces:	*This document is based on:* EN 62535:2009	*Published:* 14 January, 2009

This document was published under the authority of the NSAI and comes into effect on:
3 April, 2009

ICS number:
29.040.10

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Údarás um Chaighdeáin Náisiúnta na hÉireann

I.S. EN 62535:2009

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62535

January 2009

ICS 29.040.10

English version

Insulating liquids - Test method for detection of potentially corrosive sulphur in used and unused insulating oil

(IEC 62535:2008)

Liquides isolants -
Méthode d'essai pour la détection
du soufre potentiellement corrosif
dans les huiles usagées et neuves
(CEI 62535:2008)

Isolierflüssigkeiten -
Prüfverfahren für den Nachweis
von potenziell korrosivem Schwefel in
gebrauchtem und ungebrauchtem Isolieröl
(IEC 62535:2008)

This European Standard was approved by CENELEC on 2008-12-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 62535:2009 E

Foreword

The text of document 10/746/FDIS, future edition 1 of IEC 62535, prepared by IEC TC 10, Fluids for electrotechnical applications, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62535 on 2008-12-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2009-09-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-12-01

Annex ZA has been added by CENELEC.

———————

Endorsement notice

The text of the International Standard IEC 62535:2008 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 60567	NOTE Harmonized as EN 60567:2005 (not modified).

———————

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
-	-	Copper and copper alloys - Copper rod, bar and wire for general electrical purposes	EN 13601	- [1)]
IEC 60475	- [1)]	Method of sampling liquid dielectrics	-	-
IEC 60554-3-1	- [1)]	Specification for cellulosic papers for electrical purposes - Part 3: Specifications for individual materials - Sheet 1: General purpose electrical paper	-	-
ASTM D1275	- [1)]	Methods A and B: Standard test method for corrosive sulfur in electrical insulating oils	-	-
ASTM D130	- [1)]	Standard test method for corrosiveness to copper from petroleum products by copper strip test	-	-
DIN 51353	- [1)]	Testing of insulating oils; detection of corrosive sulfur; silver strip test	-	-

[1)] Undated reference.

I.S. EN 62535:2009

IEC 62535

Edition 1.0 2008-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Insulating liquids – Test method for detection of potentially corrosive sulphur in used and unused insulating oil

Liquides isolants – Méthode d'essai pour la détection du soufre potentiellement corrosif dans les huiles usagées et neuves

IEC 62535:2008

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About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

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I.S. EN 62535:2009

IEC 62535

Edition 1.0 2008-10

INTERNATIONAL STANDARD

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

P

ICS 29.040.10

ISBN 2-8318-1004-6

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSULATING LIQUIDS – TEST METHOD FOR DETECTION OF POTENTIALLY CORROSIVE SULPHUR IN USED AND UNUSED INSULATING OIL

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.
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International Standard IEC 62535 has been prepared by IEC technical committee 10: Fluids for electrotechnical applications.

The text of this standard is based on the following documents:

FDIS	Report on voting
10/746/FDIS	10/749/RVD

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

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

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

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

INTRODUCTION

In recent years, several failures of transformers and reactors due to copper sulphide formation in/on the cellulose insulation have been reported worldwide. The tendency of transformer oils to form copper sulphide in the presence of copper is seen as one of the major contributing factors.

The most common reason for such failures is arcing between adjacent disks or conductors of a winding, due to the formation of deposits of copper sulphide on the cellulosic insulating paper.

It has been demonstrated that existing test methods for corrosive sulphur, ASTM D1275 method A and DIN 51353, are unable to detect oils having potentially corrosive behaviour.

For this reason, IEC technical committee 10 has prepared this International Standard for the detection of potentially corrosive sulphur in mineral insulating oils. The wrapped conductor test method is suitable for used and unused mineral oils.

This test method is based on a study performed by Conseil International des Grands Réseaux Electriques (CIGRE) working group A2.32 [1][1].

Health and safety

This International Standard does not purport to address all the safety problems associated with its use. It is the responsibility of the user of the standard to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to use.

The mineral oils which are the subject of this standard should be handled with due regard to personal hygiene. Direct contact with eyes may cause slight irritation. In the case of eye contact, irrigation with copious quantities of clean running water should be carried out and medical advice sought.

Some of the tests specified in this standard involve the use of processes that could lead to a hazardous situation. Attention is drawn to the relevant standard for guidance.

Environment

This standard involves mineral oils, chemicals and used sample containers. The disposal of these items should be carried out in accordance with current national legislation with regard to the impact on the environment. Every precaution should be taken to prevent the release into the environment of mineral oil.

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1 Figures in square brackets refer to the bibliography.

INSULATING LIQUIDS – TEST METHOD FOR DETECTION OF POTENTIALLY CORROSIVE SULPHUR IN USED AND UNUSED INSULATING OIL

1 Scope

This International Standard specifies a test method for detection of potentially corrosive sulphur in used and unused mineral insulating oil.

Most recent failures due to corrosive sulphur are related to the formation of copper sulphide deposits in and on the surface of winding cellulosic paper.

The test method uses a copper conductor, wrapped with one layer of paper, immersed in the oil and heated to evaluate the capability of the oil to yield copper sulphide and transfer it to paper layers.

The growth of copper sulphide on bare copper may cause the presence of conductive particulates in the oil, which can act as nuclei for electrical discharge and may lead to a fault. Other test methods exist using a bare copper strip immersed in oil and heated to detect the corrosive behaviour of oil against copper. ASTM D1275 Method B is also used for this test and a modified procedure using low oil volumes is included in Annex A.

Tests with and without paper are considered as complementary and may lead to different results.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60475, *Method of sampling liquid dielectrics*

IEC 60554-3-1, *Specification for cellulosic papers for electrical purposes – Part 3: Specifications for individual materials – Sheet 1: General purpose electrical paper*

ASTM D1275, *Methods A and B: Standard test method for corrosive sulfur in electrical insulating oils*

ASTM D130, *Standard test method for corrosiveness to copper from petroleum products by copper strip test*

DIN 51353, *Testing of insulating oils; detection of corrosive sulfur; silver strip test*

EN 13601, *Copper and copper alloys. Copper rod, bar and wire for general electrical purposes*

3 Terms and definitions

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