



**SLOVENSKI STANDARD
SIST EN IEC 63012:2019**

01-november-2019

Izolacijske tekočine - Neuporabljeni modificirani ali mešani estri za uporabo v elektrotehniki

Insulating liquids - Unused modified or blended esters for electrotechnical applications

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

Ta slovenski standard je istoveten z: EN IEC 63012:2019

SIST EN IEC 63012:2019

<https://standards.iteh.ai/catalog/standards/sist/8314bb04-9063-4b1b-a0b9-916792849d4f/sist-en-iec-63012-2019>

ICS:

29.040.01 Izolacijski fluidi na splošno Insulating fluids in general

SIST EN IEC 63012:2019

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN IEC 63012:2019](#)

<https://standards.iteh.ai/catalog/standards/sist/8314bb04-9063-4b1b-a0b9-916792849d4f/sist-en-iec-63012-2019>

EUROPEAN STANDARD

EN IEC 63012

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2019

ICS 29.040.10

English Version

Insulating liquids - Unused modified or blended esters for electrotechnical applications (IEC 63012:2019)

Isolants liquides - Esters neufs modifiés ou mélangés pour
applications électrotechniques
(IEC 63012:2019)

Isolierflüssigkeiten – Neue modifizierte oder verschnittene
Ester für elektrotechnische Anwendungen
(IEC 63012:2019)

This European Standard was approved by CENELEC on 2019-06-13. 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, 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.



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

EN IEC 63012:2019 (E)**European foreword**

The text of document 10/1078/FDIS, future edition 1 of IEC 63012, prepared by IEC/TC 10 "Fluids for electrotechnical applications" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63012:2019.

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) 2020-03-13
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-06-13

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.

iTeh STANDARD PREVIEW
Endorsement notice
(standards.iteh.ai)

The text of the International Standard IEC 63012:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60076-14	NOTE	Harmonized as EN 60076-14
IEC 60296	NOTE	Harmonized as EN 60296
IEC 60422	NOTE	Harmonized as EN 60422
IEC 61039	NOTE	Harmonized as EN 61039
IEC 61203	NOTE	Harmonized as EN 61203
IEC 61868	NOTE	Harmonized as EN 61868
IEC 62975	NOTE	Harmonized as EN IEC 62975 ¹
ISO 3015	NOTE	Harmonized as EN ISO 3015

¹ Under preparation. Stage at the time of publication: prEN 62975.

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60156	-	Insulating liquids - Determination of the breakdown voltage at power frequency - Test method	-	-
IEC 60247	-	Insulating liquids - Measurement of relative permittivity, dielectric dissipation factor ($\tan \delta$) and d.c. resistivity	EN 60247	-
IEC 60628	-	Gassing of insulating liquids under electrical stress and ionization	HD 488 S1	-
IEC 60666	-	Detection and determination of specified additives in mineral insulating oils	EN 60666	-
IEC 60814	-	Insulating liquids - Oil-impregnated paper and pressboard - Determination of water by automatic coulometric Karl Fischer titration	EN 60814	-
IEC 60897	-	Methods for the determination of the lightning breakdown voltage of insulating liquids	-	-
IEC 61099	2010	Insulating liquids - Specifications for unused synthetic organic esters for electrical purposes	EN 61099	2010
IEC 61125	-	Insulating liquids - Test methods for oxidation stability - Test method for evaluating the oxidation stability of insulating liquids in the delivered state	EN IEC 61125-	-
IEC/TR 61294	-	Insulating liquids - Determination of the partial discharge inception voltage (PDIV) - Test procedure	-	-
IEC 61619	-	Insulating liquids - Contamination by polychlorinated biphenyls (PCBs) - Method of determination by capillary column gas chromatography	EN 61619	-
IEC 61620	-	Insulating liquids - Determination of the dielectric dissipation factor by measurement of the conductance and capacitance - Test method	EN 61620	-
IEC 62021-3	-	Insulating liquids - Determination of acidity - Part 3: Test methods for non-mineral insulating oils	EN 62021-3	-
IEC 62535	-	Insulating liquids - Test method for detection of potentially corrosive sulphur in used and unused insulating oil	EN 62535	-
IEC 62697-1	-	Test methods for quantitative determination of corrosive sulfur compounds in unused and used insulating liquids - Part 1: Test method for quantitative determination of dibenzyl disulfide (DBDS)	EN 62697-1	-
IEC 62770	-	Fluids for electrotechnical applications - Unused natural esters for transformers and similar electrical equipment	EN 62770	-
IEC 62961	-	Insulating liquids - Test methods for the determination of interfacial tension of insulating liquids - Determination with the ring method	EN IEC 62961-	-

EN IEC 63012:2019 (E)

ISO 2049	-	Petroleum products - Determination of colour (ASTM scale)	-	-
ISO 2211	-	Liquid chemical products - Measurement of colour in Hazen units (platinum-cobalt scale)	-	-
ISO 2592	-	Petroleum products - Determination of flash and fire points - Cleveland open cup method	-	-
ISO 2719	-	Determination of flash point - Pensky-Martens closed cup method	EN ISO 2719	-
ISO 3016	-	Petroleum products - Determination of pour point	EN ISO 3016	-
ISO 3104	-	Petroleum products - Transparent and opaque liquids - Determination of kinematic viscosity and calculation of dynamic viscosity	EN ISO 3104	-
ISO 3675	-	Crude petroleum and liquid petroleum products - Laboratory determination of density - Hydrometer method	EN ISO 3675	-
ISO 12185	-	Crude petroleum and petroleum products - Determination of density - Oscillating U-tube method	EN 12185	ISO-
		Surface active agents - Determination of interfacial tension of solutions of surface active agents by the stirrup or ring method	EN 14210	
ASTM D1275	-	Methods A and B: Standard test method for corrosive sulfur in electrical insulating oils	-	-
ASTM D1903	-	Standard practice for determining the coefficient of thermal expansion of electrical insulating liquids of petroleum origin, and askarels	-	-
ASTM D3300	-	Standard test method for dielectric breakdown voltage of insulating oils of petroleum origin under impulse conditions	-	-
ASTM D4172	-	Standard test method for wear preventive characteristics of lubricating fluid (four-ball method)	-	-
ASTM D7150	-	Standard test method for the determination of gassing characteristics of insulating liquids under thermal stress at low temperature	-	-
ASTM D7896	-	Standard test method for thermal conductivity, thermal diffusivity and volumetric heat capacity of engine coolants and related fluids by transient hot wire liquid thermal conductivity method	-	-
ASTM E1269	-	Standard test method for determining specific heat capacity by differential scanning calorimetry	-	-
DIN 51350-1	-	Testing of lubricants - Testing in the four-ball tester - Part 1: General working principles	-	-
DIN 51350-2	-	Testing of lubricants - Testing in the four-ball tester - Part 2: Determination of welding load of liquid lubricants	-	-
DIN 51350-3	-	Testing of lubricants - Testing in the four-ball tester - Part 3: Determination of wearing characteristics of liquid lubricants	-	-
OECD 301-B	-	OECD Guidelines for the testing of chemicals - Section 3: Environmental fate and behaviour - 301 Ready biodegradability - 301 B: CO2 Evolution test	-	-
OECD 301-C	-	OECD Guidelines for the testing of chemicals - Section 3: Environmental fate and behaviour - 301 Ready biodegradability - 301 C: Modified MITI test	-	-
OECD 301-F	-	OECD Guidelines for the testing of chemicals - Section 3: Environmental fate and behaviour - 301 Ready biodegradability - 301 F: Manometric respirometry test	-	-
EPA 712-C-98-076	-	US EPA OPPTS Series 835: Fate, transport and transformation test guidelines - Group C: Laboratory biological transformation test guidelines - 835.3110 Ready biodegradability	-	-



IEC 63012

Edition 1.0 2019-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Insulating liquids – Unused modified or blended esters for electrotechnical applications

(standards.iteh.ai)

Isolants liquides – Esters neufs modifiés ou mélangés pour applications électrotechniques

<https://standards.iteh.ai/catalog/standards/sist/8314bb04-9063-4b1b-a0b9-916792849d4f/sist-en-iec-63012-2019>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.040.10

ISBN 978-2-8322-6894-0

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	9
4 Classification.....	10
4.1 General.....	10
4.2 Fire performance classification	10
4.3 Viscosity classification	10
5 Properties, significance and test methods.....	10
5.1 Physical properties	10
5.1.1 Appearance	10
5.1.2 Colour	11
5.1.3 Viscosity.....	11
5.1.4 Lubricity.....	11
5.1.5 Thermal conductivity.....	11
5.1.6 Thermal expansion coefficient.....	11
5.1.7 Specific heat capacity.....	11
5.1.8 Pour point.....	11
5.1.9 Water content	12
5.1.10 Water saturation	12
5.1.11 Density.....	12
5.1.12 Interfacial tension.....	12
5.2 Electrical properties	12
5.2.1 AC breakdown voltage.....	12
5.2.2 Lightning impulse breakdown voltage	12
5.2.3 Partial discharge inception voltage (PDIV).....	13
5.2.4 Dielectric dissipation factor (DDF)	13
5.2.5 Relative permittivity (dielectric constant).....	13
5.2.6 DC resistivity	13
5.2.7 Electrostatic charging tendency (ECT).....	13
5.3 Chemical properties	13
5.3.1 Acidity	13
5.3.2 Additive content.....	13
5.3.3 Corrosive and potentially corrosive sulphur compounds.....	13
5.3.4 Methanol content.....	14
5.4 Properties related to long term performance	14
5.4.1 Oxidation stability	14
5.4.2 Operating temperature.....	14
5.4.3 Material compatibility.....	15
5.4.4 Stray gassing.....	15
5.4.5 Gassing tendency	15
5.5 Health, safety and environmental properties	15
5.5.1 General	15
5.5.2 Polychlorinated biphenyls (PCBs).....	15
5.5.3 Environmental toxicity.....	15

5.5.4	Flash point and fire point	15
5.5.5	Sustainability	16
5.5.6	Biodegradation	16
5.5.7	Disposal	16
6	Minimum performance requirements	16
7	Identification and general delivery requirements	16
Annex A (informative) Miscibility and compatibility of liquids and retrofilling of transformers		19
Bibliography.....		20
Table 1 – Required performance characteristics of modified or blended esters		17
Table 2 – Optional performance characteristics of modified or blended esters		18

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN IEC 63012:2019

<https://standards.iteh.ai/catalog/standards/sist/8314bb04-9063-4b1b-a0b9-916792849d4f/sist-en-iec-63012-2019>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSULATING LIQUIDS – UNUSED MODIFIED OR BLENDED ESTERS FOR ELECTROTECHNICAL APPLICATIONS

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 63012 has been prepared by IEC Technical Committee 10: Fluids for electrotechnical applications.

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

FDIS	Report on voting
10/1078/FDIS	10/1082/RVD

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

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN IEC 63012:2019](#)

<https://standards.iteh.ai/catalog/standards/sist/8314bb04-9063-4b1b-a0b9-916792849d4f/sist-en-iec-63012-2019>