

ISO/FDIS 8068:2023/2024(E)

ISO TC 28/SC 4/WG 16

Secretariat: AFNOR

Date: 2023-10-20/2024-01-22

Lubricants, industrial oils and related products (class L) — Family T (Turbines) — Specifications for lubricating oils for turbines

Lubrifiants, huiles industrielles et produits connexes (classe L) — Famille T (Turbines) — Spécifications pour les huiles lubrifiantes pour turbines

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

ISO/FDIS 8068

<https://standards.itih.ai/catalog/standards/iso/cae5bb77-d59d-4107-9ecc-0df9>

Style Definition: Heading 1: Indent: Left: 0 pt, First line: 0 pt, Tab stops: Not at 21.6 pt

Style Definition: Heading 2: Font: Bold, Tab stops: Not at 18 pt

Style Definition: Heading 3: Font: Bold

Style Definition: Heading 4: Font: Bold

Style Definition: Heading 5: Font: Bold

Style Definition: Heading 6: Font: Bold

Style Definition: ANNEX

Style Definition: Mot-dièse1

Style Definition: Mention1

Style Definition: Smart Hyperlink1

Style Definition: Mention non résolue2

Style Definition: AMEND Terms Heading: Font: Bold

Style Definition: AMEND Heading 1 Unnumbered: Font: Bold

Style Definition: IneraTableMultiPar: Tab stops: 19.85 pt, Left + 39.7 pt, Left + 59.55 pt, Left + 79.4 pt, Left + 99.25 pt, Left + 119.05 pt, Left + 138.9 pt, Left + 158.75 pt, Left + 178.6 pt, Left + 198.45 pt, Left

Formatted: Font: Arial

Formatted: Font: Arial

Formatted: Font: Arial

Formatted: Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers

Formatted: Font: Arial

Formatted: Font: Arial, Bold, Not Italic

Edited DIS - MUST BE USED FOR FINAL DRAFT

© ISO 2023/2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO ~~copyright office~~ Copyright Office

Formatted: Indent: Left: 14.2 pt, Right: 14.2 pt, Space Before: 0 pt, No page break before, Adjust space between Latin and Asian text, Adjust space between Asian text and numbers

Formatted: Default Paragraph Font

CP 401 • ~~Ch. de Blandonnet 8~~

CH-1214 Vernier, Geneva

Phone: +41 22 749 01 11

Formatted: Indent: Left: 14.2 pt, First line: 0 pt, Right: 14.2 pt, Adjust space between Latin and Asian text, Adjust space between Asian text and numbers

Email: copyright@iso.org

Email: copyright@iso.org

Website: www.iso.org

Published in Switzerland.

Formatted: Indent: Left: 14.2 pt, First line: 0 pt, Right: 14.2 pt, Adjust space between Latin and Asian text, Adjust space between Asian text and numbers

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

ISO/FDIS 8068

<https://standards.itih.ai/catalog/standards/iso/cae5bb77-d59d-4107-9ecc-0df9f56ea60e/iso-fdis-8068>

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Sampling	1
5 Requirements for turbine oils	1
6 Specific environmental requirements for THCH and THCE grades	5
6.1 General	5
6.2 Biodegradability	7
6.3 Acute daphnia or copepods toxicity	7
7 Specification tables	7
7.1 General	7
7.2 Specification for TSA and TGA turbine oils	7
7.3 Specification for TSE and TGE turbine oils	7
7.4 Specification for TGB and TGSB turbine oils	7
7.5 Specification for TGF and TGSE turbine oils	7
7.6 Specification for THA and THE turbine oils	7
7.7 Specification for TGCH turbine oils	8
7.8 Specification for TGCH (EP) turbine oils	8
7.9 Specification for TGCE turbine oils	8
7.10 Specification for THCH turbine oils	8
7.11 Specification for THCE turbine oils	8
7.12 Specification for TSD and TGD turbine oils	8
Bibliography	25
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	4
4 Sampling	4
5 Requirements for turbine oils	4
6 Specific environmental requirements for THCH and THCE grades	5
6.1 General	5
6.2 Biodegradability	6
6.3 Acute daphnia or copepods toxicity	7
7 Specification tables	7
7.1 General	7
7.2 Specification for TSA and TGA turbine oils	7
7.3 Specification for TSE and TGE turbine oils	7
7.4 Specification for TGB and TGSB turbine oils	7

ISO/FDIS 8068:~~2023~~2024(E)

7.5	Specification for TGF and TGSE turbine oils	7
7.6	Specification for THA and THE turbine oils.....	7
7.7	Specification for TGCH turbine oils.....	8
7.8	Specification for TGCH (EP) turbine oils	8
7.9	Specification for TGCE turbine oils	8
7.10	Specification for THCH turbine oils	8
7.11	Specification for THCE turbine oils.....	8
7.12	Specification for TSD and TGD turbine oils.....	8
	Bibliography.....	32

Formatted: Right: 25 pt

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/FDIS 8068

<https://standards.iteh.ai/catalog/standards/iso/cae5bb77-d59d-4107-9ecc-0df9f56ea60e/iso-fdis-8068>

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*, Subcommittee SC 4, *Classifications and specifications*.

This third edition cancels and replaces the second edition (ISO-8068:2006), which has been technically revised. It also incorporates the Amendment ISO 8068:2006/Amd 1:2019.

The main changes are as follows:

- updating of the environmental requirements for environmentally acceptable products;
- introduction of steam demulsibility for steam and combined cycle single shaft turbine grades;
- precision with respect to the stage of the filterability tests, wet and dry;
- addition of new viscosity grades for TGCH and THCH categories;
- addition of an EP category for TGCH.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2023/2024 – All rights reserved

Formatted: Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers

Formatted: English (United Kingdom)

Formatted: std_publisher, English (United Kingdom)

Formatted: English (United Kingdom)

Formatted: std_docNumber, English (United Kingdom)

Formatted: English (United Kingdom)

Formatted: std_year, English (United Kingdom)

Formatted: English (United Kingdom)

Formatted: std_suppl, English (United Kingdom)

Formatted: English (United Kingdom)

ISO/FDIS 8068:2023/2024(E)

Introduction

New requirements for steam and gas turbine lubricants have arisen from technological changes ~~in technology for higher~~ including the increased efficiency of turbines, more severe operating conditions (cycling, peaking duty) and the increased use of alternative fuels. In addition, the simultaneous operation of gas and steam turbines with the same lubrication circuit means that lubricants are ~~required~~ expected to satisfy the requirements for both steam and gas turbine lubrication.

The growing concern ~~about~~ over environmental protection has led to the use of lubricants that show minimum toxicity towards flora and fauna. Lubricants used in hydraulic power plants, showing risks of leakage either on surface or ground water, are ~~particularly concerned of~~ particular concern. Therefore, minimum aquatic toxicity is required for these lubricants. In addition, biodegradability is desired to respect the ecosystem.

iTeh Standards (<https://standards.iteh.ai>) Document Preview

ISO/FDIS 8068

<https://standards.iteh.ai/catalog/standards/iso/cae5bb77-d59d-4107-9ecc-0d9f56ea60e/iso-fdis-8068>

Lubricants, industrial oils and related products (class L) — Family T (Turbines) — Specifications for lubricating oils for turbines

WARNING — The handling and use of products as specified in this document can be hazardous, if suitable precautions are not observed. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the users of this document to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This document specifies the minimum requirements for lubricants for turbine oils, as delivered. It is intended to be used in conjunction with ISO 6743-5.

This document specifies the requirements for a wide variety of lubricants for the lubrication of most types of turbines for power generation, including steam turbines, gas turbines, single shaft combined cycle turbines with common lubrication system and hydraulic turbines. This document does not specify the requirements for lubricants for wind turbines, which are covered in ISO 12925-1.

The following lubricants are considered:

- mineral oils, of either API groups I, I⁺, II, II⁺, III, including group III from GTL (gas to liquid) process. Some API groups II and III are suitable for high temperature gas turbines;
- synthetic lubricants, ester and polyalphaolefin types intended for high temperature gas turbines;
- synthetic lubricants, ester and polyalphaolefin types, environmentally acceptable for use in hydraulic turbines;
- fire resistant phosphate-ester type lubricants.

2 Normative references

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.

ISO 760, *Determination of water* — Karl Fischer method (General method)

ISO 1817, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 2049, *Petroleum products* — Determination of colour (ASTM scale)

ISO 2160, *Petroleum products* — Corrosiveness to copper — Copper strip test

ISO 2592, *Determination of flash and fire points* — Cleveland open cup method

ISO 2909, *Petroleum products* — Calculation of viscosity index from kinematic viscosity

ISO 3016, *Petroleum products* — Determination of pour point

ISO/FDIS 8068:2023/2024(E)

ISO 3104, Petroleum ~~product~~ ~~products~~ — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity

ISO 3170, Petroleum liquids — Manual sampling

ISO 3448, Industrial liquid lubricants — ISO viscosity classification

ISO 3675, Crude petroleum and liquid petroleum products — Laboratory determination of density or relative density — Hydrometer method

ISO 4259-2, Petroleum and related products — Precision of measurement methods and results — Part 2: Interpretation and application of precision data in relation to ~~method tests~~ ~~methods of test~~

ISO 4263-1, Petroleum and related products — Determination of the ageing behaviour of inhibited oils and fluids — TOST test — Part 1: Procedure for mineral oils

ISO 4263-3, Petroleum and related products — Determination of the ageing behaviour of inhibited oils and fluids — ~~using the~~ TOST test — Part 3: ~~Procedure~~ ~~Anhydrous procedure~~ for ~~anhydrous~~ synthetic hydraulic fluids

ISO 4263-4, Petroleum and related products — Determination of the ageing behaviour of inhibited oils and fluids — TOST test — Part 4: Procedure for industrial gear oils

ISO 4406, Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles

ISO 6247, Petroleum products — Determination of foaming characteristics of lubricating oils

ISO 6296, Petroleum products — Determination of water — Potentiometric Karl Fischer titration method

ISO 6341, Water quality — Determination of the inhibition of the mobility of *Daphnia magna* Straus (*Cladocera, Crustacea*) — Acute toxicity test

ISO 6614, Petroleum ~~oils~~ ~~products~~ — Determination of water separability of petroleum oils and synthetic fluids

ISO 6618, Petroleum products and lubricants — Determination of acid or base number — Colour-indicator titration method

ISO 6743-5, Lubricants, industrial oils and related products (class L) — Classification — Part 5: Family T (Turbines)

ISO 7120:1987, Petroleum products and lubricants — Petroleum oils and other fluids — Determination of rust-preventing characteristics in the presence of water

ISO 7346-2, Water quality — Determination of the acute lethal toxicity of substances to a ~~fresh~~ ~~water~~ ~~freshwater~~ fish [*Brachydanio rerio* Hamilton — ~~Buchanan~~ (*Teleostei, Cyprinidae*)] — Part 2: Semi-static method

ISO 8192, Water quality — Test for inhibition of oxygen consumption by activated sludge

ISO 9120, Petroleum and related products — Determination of air-release properties of steam turbine and other oils — Impinger method

Formatted: Default Paragraph Font

Formatted: Default Paragraph Font

Formatted: std_year

ISO 9439, Water quality.— Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium.— Carbon dioxide evolution test

Formatted: Default Paragraph Font

ISO 12185, Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method

ISO 12937, Petroleum products.— Determination of water.— Coulometric Karl Fischer titration method

ISO 13226, Rubber.— Standard reference elastomers (SREs) for characterizing the effects of liquids on vulcanized rubbers

ISO 13357-1, Petroleum products.— Determination of the filterability of lubricating oils.— Part 1: Procedure for oils in the presence of water

ISO 13357-2, Petroleum products.— Determination of the filterability of lubricating oils.— Part 2: Procedure for dry oils

ISO 14593, Water quality.— Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium.— Method by analysis of inorganic carbon in sealed vessels (CO₂ headspace test)

ISO 14635-1, Gears.— FZG test procedures.— Part 1: FZG test method A/8,3/90 for relative scuffing load-carrying capacity of oils

ISO 14669, Water quality.— Determination of the acute lethal toxicity to marine copepods (Copepoda, Crustacea)

ISO 14935, Petroleum and related products.— Determination of wick flame persistence of fire-resistant fluids

ISO 20764, Petroleum and related products.— Preparation of a test portion of high-boiling liquids for the determination of water content.— Nitrogen purge method

ISO 20823, Petroleum and related products.— Determination of the flammability characteristics of fluids in contact with hot surfaces.— Manifold ignition test

Formatted: Default Paragraph Font

Formatted: std_publisher

Formatted: Default Paragraph Font

Formatted: std_docNumber 0168

EN 14832, Petroleum and related products — Determination of the oxidation stability and corrosivity of fire-resistant phosphate ester fluids

Formatted: Default Paragraph Font

Formatted: Default Paragraph Font

EN 14833, Petroleum and related products — Determination of the hydrolytic stability of fire-resistant phosphate ester fluids

Formatted: std_publisher

Formatted: Default Paragraph Font

EN 16807, Liquid petroleum products — Bio-lubricants — Criteria and requirements of bio-lubricants and bio-based lubricants

Formatted: std_docNumber

Formatted: Default Paragraph Font

EN 17181, Lubricants — Determination of aerobic biological degradation of fully formulated lubricants in an aqueous solution — Test method based on CO₂-production

Formatted: Default Paragraph Font

Formatted: Default Paragraph Font

ASTM D2272, Standard Test Method for Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel

Formatted: Default Paragraph Font, Font: Not Italic

Formatted: std_docTitle, Font: Not Italic

Formatted: std_docTitle, Font: Not Italic

ASTM D2711-22, Standard Test Method for Demulsibility Characteristics of Lubricating Oils

Formatted: std_docTitle, Font: Not Italic

Formatted: Default Paragraph Font

Formatted: std_docPartNumber

Table 1.— Test conditions for the determination of the elastomer compatibility index

Fluid	Symbol ^a	Suitable elastomer ^b	Test temperature ± 1 °C	Test duration ± 2 h	
Mineral oils	TSA, TGA, TSE, TGE, TGB, TGSE, TGF, TGE, THA, THE	SRE-NBR-28/PX	100	168	1 000
		SRE-HNBR/1	130		
		SRE-FKM/2X	150		
Synthetic esters	TGCE THCE	SRE-NBR-28/PX	60	168	1 000
		SRE-HNBR/1	100		
		SRE-FKM/2X	100		
Synthetic hydrocarbons	TGCH THCH	SRE-NBR-28/PX	100	168	1 000
		SRE-HNBR/1	130		
		SRE-FKM/2X	150		
Alkyl phosphate ester	TSD	SRE-EPM/1	100	168	1 000
Aryl phosphate ester	TGD	SRE-FKM/2X	100		

^a See ISO-6743-5 for an explanation of the symbols in this column.
^b See ISO-13226 for details on the elastomer references.

Table 2.— Acceptable limits for change of properties

Immersion time h	Maximum volume swell %	Maximum volume shrinkage %	Hardness change IRHD ^a	Maximum tensile stress change %	Maximum elongation change %
168	15	-4	± 8	-20	-20
1 000	20	-5	± 10	-50	-50

^a IRHD = international rubber hardness degree.

6 Specific environmental requirements for THCH and THCE grades

6.1 General

For the purpose of this document, hydraulic turbine fluids shall be synthetic esters, polyalphaolefins and related hydrocarbon products. The classification of these hydraulic turbine fluids shall be in accordance with ISO-6743-5 for categories THCH and THCE.

The minimum category-defining base oil type content for each category shall be in accordance with Table 3.

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt, Not Bold

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Table footer, Left, Indent: Left: 0 pt, Hanging: 17 pt, No bullets or numbering, Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers, Tab stops: 19.85 pt, Left + 39.7 pt, Left + 59.55 pt, Left + 79.4 pt, Left + 99.25 pt, Left + 119.05 pt, Left + 138.9 pt, Left + 158.75 pt, Left + 178.6 pt, Left + 198.45 pt, Left

Formatted: Default Paragraph Font

Formatted: Default Paragraph Font, Font: 9 pt

Formatted: std_docNumber

Formatted: Default Paragraph Font

Formatted: Space Before: 6 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted Table

Formatted

Formatted