INTERNATIONAL STANDARD

ISO 11158

Third edition
2023-10

Lubricants, industrial oils and related products (class L) — Family H (hydraulic systems) — Specifications for categories HH, HL, HM, HV and HG

Lubrifiants, huiles industrielles et produits connexes (classe L) — Famille H (systèmes hydrauliques) — Spécifications pour les catégories HH, HL, HM, HV et HG

Reference number
ISO 11158:2023(E)

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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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).

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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 11158:2009), which has been technically revised.

The main changes are as follows:

— introduction of new anti-wear test VICKERS 35VQ25, hydrolytic stability and high temperature requirements.

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.

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Introduction

Fluids for hydraulic systems are used in a wide variety of hydraulic pumps, motors and circuits.

Hydraulic fluids are selected depending upon the anti-wear requirements of the equipment and the operating temperature range (temperature at cold starting and running temperature in stabilized conditions) to ensure the optimum mechanical and volumetric yield of the circuit and to protect pumps and motors against wear.

Mineral hydraulic fluids are formulated with mineral base stocks, from either groups I, II or III and various additives to provide the necessary oxidation stability, wear, rust, corrosion and foaming protection properties. To improve the operating temperature range, viscosity modifier polymers are added.

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Lubricants, industrial oils and related products (class L) — Family H (hydraulic systems) — Specifications for categories HH, HL, HM, HV and HG

1 Scope

This document specifies the minimum requirements for new mineral oil hydraulic fluids and is intended for hydraulic systems, particularly for hydrostatic hydraulic fluid power application. The purpose of this document is to guide suppliers and end users of mineral oil hydraulic fluids and to direct equipment manufacturers of hydraulic systems.

This document is written in a general form so that its application can accommodate various climatic conditions. This document also stipulates the requirements for mineral-oil hydraulic fluids at the time of delivery.

This document is intended to be used in conjunction with ISO 6743-4, which classifies fluids used in hydraulic applications. Among the categories covered by ISO 6743-4, only five types of mineral oil-based fluids are covered in this document. These categories are HH, HL, HM, HV and HG.

This document does not cover the extreme cases of use in terms of hydraulic circuits design, temperature and extreme conditions.

NOTE For use in exceptional conditions, suppliers and purchasers of lubricants can mutually agree upon additional testing methods and acceptability criteria of the products.

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 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, *Petroleum and related products — Determination of flash and fire points — Cleveland open cup method*

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

ISO 3016, *Petroleum and related products from natural or synthetic sources — Determination of pour point*

ISO 3104, *Petroleum 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 — 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 methods of test*

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

ISO 5598, *Fluid power systems and components — Vocabulary*

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

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

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

ISO 6619, *Petroleum products and lubricants — Neutralization number — Potentiometric titration method*

ISO 6743-4, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

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

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

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

ISO 20763, *Petroleum and related products — Determination of anti-wear properties of hydraulic fluids — Vane pump method*

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 26422, *Petroleum and related products — Determination of shear stability of lubricating oils containing polymers — Method using a tapered roller bearing*

ASTM D2070, *Standard Test Method for Thermal Stability of Hydraulic Oils*

ASTM D2619, *Standard Test Method for Hydrolytic Stability of Hydraulic Fluids (Beverage Bottle Method)*

ASTM D6203, *Standard Test Method for Thermal Stability of Way Lubricants*

ASTM D6973, *Standard Test Method for Indicating Wear Characteristics of Petroleum Hydraulic Fluids in a High Pressure Constant Volume Vane Pump*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Sampling

Sampling of hydraulic oils for the purpose of this document, unless otherwise specified, shall be carried out in accordance with the pertinent procedure described in ISO 3170. The sample shall be evaluated on a representative portion. Any drum, barrel, tanker compartment or any type of container delivered to the end user may be sampled and analysed at the discretion of the purchaser.

5 Specifications

5.1 General

Most of the test methods used in the specifications in Tables A.1 to A.5 contain a precision statement. In cases of dispute, the procedure described in ISO 4259-2 shall apply.

5.2 Specifications for hydraulic oils, categories HH, HL, HM, HV and HG

5.2.1 General

For the purpose of this document, oils shall be refined petroleum oils. The classification of these hydraulic oils shall be in accordance with ISO 6743-4.

Oils, when tested under prescribed methods, shall be in accordance with limiting values set out in Tables A.1 to A.5.

The appearance of the delivered oils shall be clear and bright and free of any visible particulate matter, under normal visible light at ambient temperature.

5.2.2 Specifications of ISO-L-HH hydraulic oils

These oils are based upon mineral base oils of either groups I, II or III, or blends thereof. They do not normally contain any additive. These oils shall be in accordance with the detailed specifications given in Table A.1.

5.2.3 Specifications of ISO-L-HL hydraulic oils

These oils are based upon mineral base oils of either groups I, II or III, or blends thereof. These base oils are supplemented with anti-corrosion, anti-rust, anti-oxidants, pour point depressants and foam inhibitors. These oils shall be in accordance with the detailed specifications given in Table A.2.

5.2.4 Specifications of ISO-L-HM hydraulic oils

These oils are of ISO-L-HL type, with supplementary anti-wear/extreme pressure additives to provide the necessary wear protection properties for the hydraulic equipment. Numerous technologies of anti-wear additives are available, e.g. zinc di-thiophosphate, combinations of phosphorus and sulfur-based additives. Additionally, filterability is required to protect the most sensitive hydraulic circuits. These oils shall be in accordance with the detailed specifications given in Table A.3.

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