INTERNATIONAL STANDARD

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Lubricants, industrial oils and related products (class L) — Family H (Hydraulic systems) — Specifications for hydraulic fluids in categories HFAE, HFAS, HFB, HFC, HFDR and HFDU

Lubrifiants, huiles industrielles et produits connexes (classe L) — Famille H (Systèmes hydrauliques) — Spécifications applicables aux fluides hydrauliques des catégories HFAE, HFAS, HFB, HFC, HFDR et HFDU

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 12922 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 4, *Classifications and specifications*.

This second edition cancels and replaces the first edition (ISO 12922:1999), which has been technically revised. It also incorporates the Technical Corrigendum ISO 12922:1999/Cor.1:2001.

Lubricants, industrial oils and related products (class L) — Family H (Hydraulic systems) — Specifications for hydraulic fluids in categories HFAE, HFAS, HFB, HFC, HFDR and HFDU

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

1 Scope

This International Standard specifies the minimum requirements of unused fire-resistant and less-flammable hydraulic fluids for hydrostatic and hydrodynamic systems in general industrial applications. It is not intended for use in aerospace or power-generation applications, where different requirements apply. It provides guidance for suppliers and end users of these less hazardous fluids and to the manufacturers of hydraulic equipment in which they are used.

Of the categories covered by ISO 6743-4, which classifies the different types of fluids used in hydraulic applications, only the following are detailed in this International Standard: HFAE, HFAS, HFB, HFC, HFDR and HFDU.

Types HFAE, HFAS, HFB, HFC and HFDR are “fire-resistant” fluids as defined by ISO 5598. Most HFDU fluids, while displaying an improvement in combustion behaviour over mineral oil, fall outside this definition and are more appropriately considered “less-flammable” fluids.

NOTE For the purposes of this International Standard, the terms “% (*m*/*m*)” and “% (*V*/*V*)” are used to represent, respectively, the mass fraction and the volume faction of a material.

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.

ISO 760:1978, *Determination of water — Karl Fischer method (General method)*

ISO 2160:1998, *Petroleum products — Corrosiveness to copper — Copper strip test*

ISO 3104:1994, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity*

ISO 3170:2004, *Petroleum liquids — Manual sampling*

ISO 3448:1992, Industrial liquid lubricants — ISO viscosity classification

ISO 3675:1998, *Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method*

ISO 3733:1999, *Petroleum products and bituminous materials — Determination of water — Distillation method*

ISO 4259:2006, *Petroleum products — Determination and application of precision data in relation to methods of test*

ISO 4263-2:2003, *Petroleum and related products — Determination of the ageing behaviour of inhibited oils and fluids — TOST test — Part 2: Procedure for category HFC hydraulic fluids*

ISO 4263-3:2010, *Petroleum and related products — Determination of the ageing behaviour of inhibited oils and fluids using the TOST test — Part 3: Anhydrous procedure for synthetic hydraulic fluids*

ISO 4404-1:2012, *Petroleum and related products — Determination of the corrosion resistance of fire-resistant hydraulic fluids — Part 1: Water-containing fluids*

ISO 4404-2:2010, *Petroleum and related products — Determination of the corrosion resistance of fire-resistant hydraulic fluids — Part 2: Non-aqueous fluids*

ISO 5598:2008, *Fluid power systems and components — Vocabulary*

ISO 6072:2011, *Rubber — Compatibility between hydraulic fluids and standard elastomeric materials*

ISO 6247:1998, *Petroleum products — Determination of foaming characteristics of lubricating oils*

ISO 6296:2000, *Petroleum products — Determination of water content — Potentiometric Karl Fischer titration method*

ISO 6618:1997, *Petroleum products and lubricants — Determination of acid or base number — Colour-indicator titration method*

ISO 6619:1988, *Petroleum products and lubricants — Neutralization number — Potentiometric titration method*

ISO 6743-4:1999, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

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

ISO 7745:2010, *Hydraulic fluid power — Fire-resistant (FR) fluids — Requirements and guidelines for use*

ISO 9120:1997, *Petroleum and related products — Determination of air-release properties of steam turbine and other oils — Impinger method*

ISO 12185:1996, *Crude petroleum and petroleum products — Determination of density — Oscillating U-tube method*

ISO 14635-1:2000, *Gears — FZG test procedures — Part 1: FZG test method A/8,3/90 for relative scuffing load-carrying capacity of oils*

ISO 14935:1998, *Petroleum and related products — Determination of wick flame persistence of fire-resistant fluids*

ISO 15029-1:1999, *Petroleum and related products — Determination of spray ignition characteristics of fire-resistant fluids — Part 1: Spray flame persistence — Hollow-cone nozzle method*

ISO/TS 15029-2:2012, *Petroleum and related products — Determination of spray ignition characteristics of fire-resistant fluids — Part 2: Spray test — Stabilized flame heat release method*

ISO 20623:2003, *Petroleum and related products — Determination of the extreme-pressure and anti-wear properties of fluids — Four ball method (European conditions)*

ISO 20763:2004, *Petroleum and related products — Determination of anti-wear properties of hydraulic fluid — Vane pump method*

ISO 20764:2003, *Petroleum and related products — Preparation of a test portion of high-boiling liquids for the determination of water content — Nitrogen purge method*

ISO 20783-1:2011, *Petroleum and related products — Determination of emulsion stability of fire-resistant fluids — Part 1: Fluids in category HFAE*

ISO 20783-2:2003, *Petroleum and related products — Determination of emulsion stability of fire-resistant fluids — Part 2: Fluids in category HFB*

ISO 20823:2003, *Petroleum and related products — Determination of the flammability characteristics of fluids in contact with hot surfaces — Manifold ignition test*

ISO 20843:2011, *Petroleum and related products — Determination of pH of fire-resistant fluids within categories HFAE, HFAS and HFC*

ISO 20844:2004, *Petroleum and related products — Determination of the shear stability of polymer-containing oils using a diesel injector nozzle*

EN 14832:2005, *Petroleum and related products — Determination of the oxidation stability and corrosivity of fire-resistant phosphate ester fluids*

EN 14833:2005, *Petroleum and related products — Determination of the hydrolytic stability of fire-resistant phosphate ester fluids*

3 Sampling

Sampling of hydraulic fluids for the purposes of this International Standard shall be carried out in accordance with the appropriate procedure described in ISO 3170. A representative sample shall be evaluated.

Any drum, barrel, tanker, compartment or any type of container delivered to the end user may be sampled and analysed at the request of the purchaser.

4 Requirements for fire-resistant hydraulic fluids and less-flammable hydraulic fluids

For the purposes of this International Standard, fluids shall be classified according to ISO 6743-4. Guidelines for their selection and use can be found in ISO 7745 and CEN/TR 14489. The latter also includes information on health and safety requirements.

Where applicable and when tested in accordance with the specified methods, fluids shall meet the limit values indicated in Table 1 (HFAE and HFAS fluids), Table 2 (HFB and HFC fluids) and Table 3 (HFDR and HFDU fluids). It should be noted that a significant variation exists in the level of fire resistance displayed by the different fluid types.

The majority of test methods specified within Tables 1 to 3 contain a statement of precision (repeatability and reproducibility). ISO 4259, which covers the use of precision data in the interpretation of test results, shall be used in cases of dispute.