
**Petroleum and related products —
Determination of the ageing behaviour of
inhibited oils and fluids — TOST test —**

Part 1:
Procedure for mineral oils

*Pétrole et produits connexes — Détermination du comportement au
vieillissement des fluides et huiles inhibés — Essai TOST —*

Partie 1: Méthode pour les huiles minérales



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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 4263-1 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

ISO 4263 consists of the following parts, under the general title *Petroleum and related products — Determination of the ageing behaviour of inhibited oils and fluids — TOST test*:

- *Part 1: Procedure for mineral oils*
- *Part 2: Procedure for category HFC hydraulic fluids*
- *Part 3: Anhydrous procedure for synthetic hydraulic fluids*
- *Part 4: Procedure for industrial gear oils*

Petroleum and related products — Determination of the ageing behaviour of inhibited oils and fluids — TOST test —

Part 1: Procedure for mineral oils

WARNING — The use of this part of ISO 4263 may involve hazardous materials, operations and equipment. This part of ISO 4263 does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this part of ISO 4263 to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This part of ISO 4263 specifies a method for the determination of the ageing behaviour of rust- and oxidation-inhibited mineral oils having a density less than that of water, used as turbine oils (categories TSA, TGA, TSE, TGE of ISO 6743-5, see [4] in the Bibliography), hydraulic oils (categories HL, HM, HR, HV, HG of ISO 6743-4, see [3] in the Bibliography), and circulating oils (category CKB of ISO 6743-6, see [5] in the Bibliography). Oils containing synthetic components can be tested by this procedure, but no precision statement is available yet for such fluids.

NOTE 1 For the purposes of this part of ISO 4263, the term "% (m/m)" is used to represent the mass fraction of a material.

NOTE 2 Other signs of oil deterioration, such as the formation of insoluble sludge, catalyst coil corrosion or decrease in pH value, may occur, which indicate oxidation of the oil, but are not reflected in the calculated oxidation lifetime. The correlation of these occurrences with field service is under investigation.

This test method is widely used in specifications and is considered of value in comparing the oxidation stability of oils that are prone to contamination with water. However, because of the large number of individual field-service applications, the correlation between the results of this test and actual service performance can vary markedly, and is best judged on experience.

The precision of this part of ISO 4263 for oxidation life was only determined on inhibited turbine oils, and applies to oxidation lives of 700 h to 3 900 h.

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 3170:—¹⁾, *Petroleum liquids — Manual sampling*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

1) To be published. (Revision of ISO 3170:1988)

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 7537:1997, *Petroleum products — Determination of acid number — Semi-micro colour-indicator titration method*

3 Principle

A test portion is reacted, in the absence of light, at 95 °C with oxygen in the presence of water and a steel and copper catalyst coil. Small aliquots of the oil are withdrawn at regular intervals and the acid number is measured (see Note 2 in Clause 1). The test is continued until an acid number of 2,0 mg of potassium hydroxide (KOH) per gram of test portion is reached and the number of hours is recorded as the oxidation life. For some requirements, the test may be discontinued at a fixed number of hours (e.g. 1 000 h) when the value of the acid number is still below 2,0 mg of KOH per gram of test portion.

4 Reagents and materials

4.1 Water, unless otherwise specified, in accordance with the requirements of grade 2 as defined in ISO 3696. Potable water means tap water, unless normal piped supplies are contaminated with particulate or highly soluble mineral content.

4.2 Heptane (C₇H₁₆), of minimum purity 99,75 %.

4.3 Acetone (CH₃COCH₃), of general purpose reagent grade (GPR).

4.4 Propan-2-ol (CH₃CHOHCH₃), of general purpose reagent grade (GPR).

4.5 Oxygen, of minimum purity 99,5 %. Supplied through a pressure-regulation system adequate to maintain the specified flow rate throughout the test duration.

Supply from an oxygen cylinder should be via a two-stage regulation system and a needle valve to improve the consistency of gas-flow regulation.

WARNING — Use oxygen only with equipment validated for oxygen service. Do not allow oil or grease to come into contact with oxygen and clean and inspect all regulators, gauges and control equipment. Check the oxygen-supply system regularly for leaks. If a leak is suspected, turn off immediately and seek qualified assistance.

4.6 Cleaning solutions

4.6.1 Strong oxidizing acid solution

The reference strong oxidizing cleaning solution on which precision was based, is chromosulfuric acid (see the following warning), but alternative non-chromium containing solutions, such as ammonium persulfate in concentrated sulfuric acid (8 g/l) have been found to give satisfactory cleanliness. A 10 % solution of three parts of hydrochloric acid (1 mol/l) and one part of orthophosphoric acid (concentrated GPR grade) removes iron oxide deposits.

WARNING — Chromosulfuric acid is a health hazard. It is toxic, a recognized carcinogen as it contains Cr(VI) compounds, highly corrosive and potentially hazardous in contact with organic materials. When using chromosulfuric acid cleaning solution, eye protection and protective clothing are essential. Never pipette the cleaning solution by mouth. After use, do not pour cleaning solution down the drain, but neutralize it with great care owing to the concentrated sulfuric acid present, and dispose of it in