

INTERNATIONAL STANDARD

**ISO
9120**

First edition
1997-12-01

Corrected and reprinted
1998-05-15

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

*Pétroles et produits connexes — Détermination de l'aptitude
à la désaération des huiles pour turbine à vapeur et autres huiles —
Méthode Impinger*



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.

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.

International Standard ISO 9120 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

Annex A forms an integral part of this International Standard.

© ISO 1997

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

Printed in Switzerland

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

WARNING — The use of this International Standard may involve hazardous materials, operations and equipment. 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 a method for the estimation of the ability of a petroleum-type steam turbine oil to be separated from entrained air.

NOTES

- 1 The impinger method described in this International Standard is used for determining the air-release ability of the oils tested. Air bubbles dispersed in the oil influence the compressibility and can cause malfunctions. This method may not be suitable for ranking oils in applications where residence times are short and gas contents high.
- 2 Agitation of lubricating oil with air in equipment such as bearings, couplings, gears, pumps and oil return lines, may produce a dispersion of finely divided air bubbles in the oil. If the residence time in the reservoir is too short to allow the air bubbles to rise to the oil surface, a mixture of air and oil will circulate through the lubricating oil system. This may result in an inability to maintain oil pressure (particularly with centrifugal pumps), incomplete oil films in bearings and gears, and poor hydraulic system performance or failure.
- 3 This test measures the time for the entrained air content to fall to the relatively low value of 0,2 % (V/V) under a standardized set of test conditions, and hence permits the comparison of the ability of oils to separate entrained air under conditions where a separation time is available. Although the significance of the test results is not fully established, sponginess and lack of sensitivity of the control systems of some turbines may be related to the air release properties of the oil. System design and system pressure are other variables.
- 4 For the purposes of this International Standard, the expression “%(V/V)” is used to represent the volume fraction of a material.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standards. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3170:1988, *Petroleum liquids — Manual sampling*.

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

ISO 4259:1992, *Petroleum products — Determination and application of precision data in relation to methods of test*.

ISO 6353-2:1983, *Reagents for chemical analysis — Part 2: Specifications — First series*.

ISO 6353-3:1987, *Reagents for chemical analysis — Part 3: Specifications — Second series*.

ISO 6743-4:1982, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*.

3 Definitions

For the purposes of this International Standard, the following definition applies.

3.1 air release: Time, in minutes, in which air dispersed in the oil is reduced to 0,2 % of the volume, at a specified temperature.

4 Principle

Air is blown into the oil under pressure at a test temperature of 25 °C, 50 °C or 75 °C. After the air flow is stopped, the escape of the dispersed air bubbles from the oil is followed by determinations of density as a function of time. The time for the dispersed air content to reduce to 0,2 % (V/V) is recorded from this graphical representation. Manual and automated apparatus are available and suitable.

5 Reagents and materials

During the analysis, unless otherwise stated, use only reagents specified in ISO 6353-2 and ISO 6353-3, or reagents of analytical reagent grade and water conforming to grade 3 of ISO 3696:1987.

5.1 Methylbenzene (toluene)

5.2 Acetone

5.3 Methanol

5.4 Gum solvent, consisting of equal volumes of toluene (5.1), acetone (5.2), and methanol (5.3).

NOTE — Formerly, 1,1,1-trichloroethane was specified as the gum solvent, but because of its toxicity and environmental harmfulness, alternatives should be used. Any acceptable solvent system that effectively removes the gum deposits from the glassware may be used.

5.5 Air, a regulated supply of dry, filtered and oil-free air.

5.6 Cleaning solution, Chromosulfuric acid or another strongly oxidizing cleaning solution.

NOTE — A strong oxidizing cleaning solution is required to remove traces of silicones that are frequently present in oils as anti-foam agents, and would seriously affect the results of this test.

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 accordance with standard procedures for toxic laboratory waste (chromium is highly dangerous to the environment).

Non-chromium containing, strongly oxidizing acid cleaning solutions are also highly corrosive and potentially hazardous in contact with organic materials, but do not contain chromium which has its own special disposal problems.

6 Apparatus

6.1 A schematic diagram of the apparatus is shown in figure 1 and consists of the parts specified in 6.1.1 to 6.1.5.

6.1.1 Test vessel, of borosilicate glass, of the design illustrated in figure 2. It consists of a jacketed sample tube fitted with an air inlet capillary, baffle plate and air outlet tube. The two parts of each test vessel shall be marked in such a manner as to assure correct connections.