

BS 2000-306:2011

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BSI Standards Publication

Methods of test for petroleum and its products

**Part 306: Determination of oxidation
stability of straight mineral oil**

(Identical with IP 306/11)

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 12, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 2000 is published by BSI and came into effect on 30 June 2011. It was prepared by Technical Committee PTI/13, *Petroleum Testing and Terminology*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 2000 supersedes BS 2000-306:1994, which is withdrawn.

Information about this document

This new edition has been updated to be in line with changes implemented by the Energy Institute.

BS 2000 comprises a series of test methods for petroleum and its products that are published by the Institute of Petroleum (IP) and have been accorded the status of a British Standard. Each method should be read in conjunction with the preliminary pages of “Standard Methods for Analysis and Testing of Petroleum Products and British Standard 2000 Parts” which gives details of the BSI/IP agreement for publication of the series, provides general information on safety precautions, sampling and other matters, and lists the methods published as parts of BS 2000.

Under the terms of the agreement between BSI and the Institute of Petroleum, the revised version of BS 2000-306 will be published by BSI and by the IP (in “Standard Methods for Analysis and Testing of Petroleum Products and British Standard 2000 Parts” and as a separated publication). The numbering of the parts of BS 2000 follows that of the corresponding IP methods. BS 2000-306:2011 is thus identical with IP 306/11.

WARNING. This part of BS 2000 calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

It has been assumed in the preparation of this part of BS 2000 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its methods are expressed as a set of instructions, a description, or in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This method is designed to give a measure of the tendency of straight (i.e. plain) mineral lubricating oil to oxidize under specified conditions.

It employs the same apparatus and a similar procedure to those used to determine the oxidation stability of Inhibited Mineral Turbine Oil (BS 2000-280). It differs from this test in that (a) the test time is reduced to 48 h, (b) two conditions, namely no catalyst and solid copper metal catalyst are used, and (c) the degree of deterioration is expressed as total oxidation products (TOP) per cent.

WARNING. This part of BS 2000 calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

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.

BS 2000-0.1:1999, *Methods of test for petroleum and its products – Part 0: General introduction – Section 0.1: Specifications – IP standard for thermometers (Identical with IP – Annex A)*

BS 3591, *Specification for industrial methylated spirits*

BS EN 13602, *Copper and copper alloys – Drawn, round copper wire for the manufacture of electrical conductors*

3 Summary of method

Dry oxygen is passed for 48 h into reaction tubes containing the oil, with, in one case no catalyst and in the other case a solid copper catalyst. The tubes and their contents are immersed in a suitable aluminium block heater (or oil bath) maintained at 120 °C. The volatile acids driven off by the flowing oxygen are absorbed in water. The volatile and oil-soluble acidities, and the sludge produced in the oil are determined at the completion of the test.

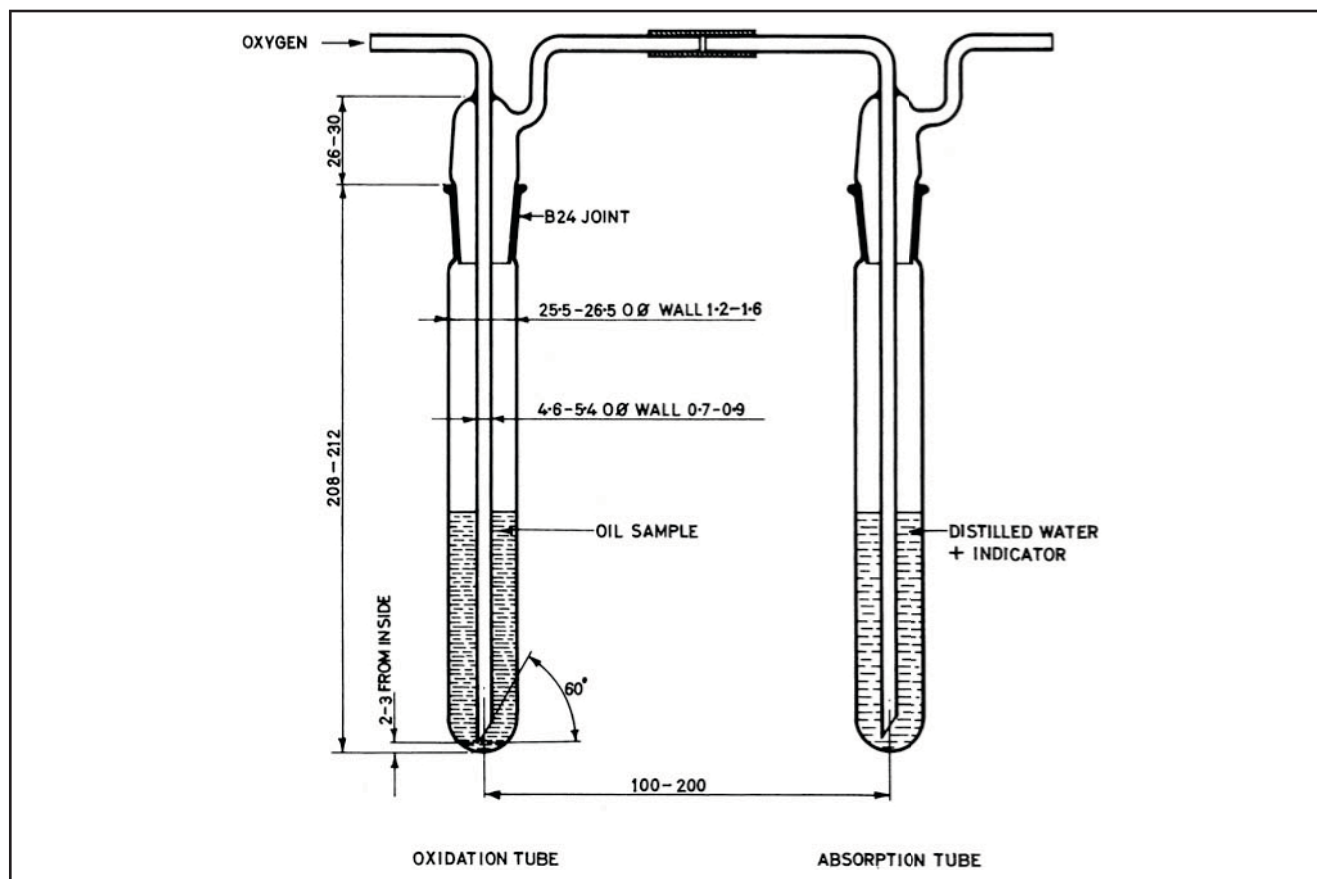
4 Apparatus

4.1 Oxidation tubes, manufactured from borosilicate or neutral glass having the dimensions shown in Figure 1.

4.2 Absorption tubes, these are the same as the oxidation tubes. The connection between oxidation and absorption tubes must be as short as possible and made of glass tubing butt-jointed to the vessels by means of short flexible sleeves (see Note 1) (length between axis of the two tubes 150mm ±50 mm). These tubes are mounted outside the bath.

NOTE 1 *Silicone rubber sleeving has been found suitable for this purpose.*

Figure 1 Oxidation and absorption tubes



4.3 Heating bath, an aluminium alloy block heater or oil bath thermostatically controlled to maintain the oil in the desired number of oxidation tubes at the required temperature of 120 ± 0.5 °C, see Figure 2. This temperature shall be read on a thermometer Type IP 81C as specified in BS 2000-0.1:1999 inserted in a test tube to within 5 mm from the bottom; this test tube shall be filled with oil up to the immersion line of the thermometer and placed in the heating bath. The temperature of the upper surface must be kept at 60 ± 5 °C (see Note 2). Measure this temperature by the use of a thermometer in a drilled aluminium block, see Figure 2; the surfaces of this block, other than that against the upper surface of the heating bath, are protected by suitable insulation. This block should be placed as near to the holes as practicable and within the area of the aluminium heater block. When using an aluminium block heater the test tubes are inserted into the holes to an overall depth of 150 mm. The depth of the holes in the heating part of the block must be at least 125 mm and short metal collars, passing through the insulating cover and surrounding each oxidation tube, will ensure heating over the 150 mm length of the tube. In the case of oil baths the oxidation tubes must be immersed to a depth of 137 mm in the oil and to an overall depth of 150 mm in the bath. For both types of heating bath the height of the oxidation tube above the upper surface must be 60 mm and the diameter of the holes must be just sufficient to allow insertion of the specified tube. In case of slackness a 25 mm diameter O-ring may be placed round the tube and pressed against the heater surface.

NOTE 2 This temperature of 60 ± 5 °C applies for an ambient temperature of 20 °C which should be used for assessing equipment compliance. Operation outside 60 ± 5 °C due to extremes of ambient temperature only has a slight effect on test results.

WARNING. The heating bath should be provided with a safety cut-out to prevent bath overheating.