INTERNATIONAL STANDARD

ISO 3733

Second edition
1999-09-15

Petroleum products and bituminous materials — Determination of water — Distillation method

Produits pétroliers et produits bitumineux — Dosage de l'eau — Méthode par distillation

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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 3.

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.

ISO 3733 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 6, *Bulk cargo transfer, accountability, inspection and reconciliation*.

This second edition cancels and replaces the first edition (ISO 3733:1976), of which it constitutes a technical revision.

Annex A forms an integral part of this International Standard.

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Petroleum products and bituminous materials — Determination of water — Distillation 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 limitation prior to use.

1 Scope

This International Standard specifies a method for determination of water up to 25 % in petroleum products, bitumens, tars and products derived from these materials, excluding emulsions, by the distillation method. The specific products considered during the development of this test method are listed in Table 3.

This International Standard may be used to determine water content in excess of 25 %. However, no precision data has been determined at levels greater than 25 %. Volatile water-soluble material, if present, is measured as water.

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NOTE 1 A knowledge of the water content of petroleum products is important in the refining, purchase, sale and transfer of products.

NOTE 2 The amount of water determined by this method can be used to correct the volume involved in the custody transfer of product.

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2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

ISO 3171:1988, *Petroleum liquids — Automatic pipeline sampling.*

ISO 3405:—[1)], *Petroleum products — Determination of distillation characteristics at atmospheric pressure.*

3 Principle

The test material is heated under reflux with a water-immiscible solvent, which co-distills with the water in the sample. Condensed solvent and water are continuously separated in a trap, the water settling in the graduated section of the trap and the solvent returning to the still.

1) To be published. (Revision of ISO 3405:1988)

4 Reagents

NOTE For the purposes of this International Standard, the expression "% (*V*/*V*)" is used to represent the volume fraction of a material.

A solvent-carrier liquid appropriate to the materials being tested (see Table 3) shall be used.

4.1 Aromatic solvent

The following aromatic solvents, free of water (0,02 % maximum) are suitable:

a) industrial grade xylene (mixed xylenes);

b) a blend of 20 % (*V*/*V*) industrial grade toluene and 80 % (*V*/*V*) industrial grade xylene (mixed xylenes);

c) petroleum distillate, yielding not more than 5 % (*V*/*V*) distillates at 125 °C and not less than 20 % (*V*/*V*) at 160 °C when tested in accordance with ISO 3405 and with a density not lower than 855 kg/m^3 at 15 °C.

4.2 Petroleum distillate solvent

A petroleum solvent, free of water, of which 5 % (*V*/*V*) boils between 90 °C and 100 °C, and 90 % (*V*/*V*) distils below 210 °C.

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4.3 Paraffinic solvents

The following paraffinic solvents, free of water, are suitable:

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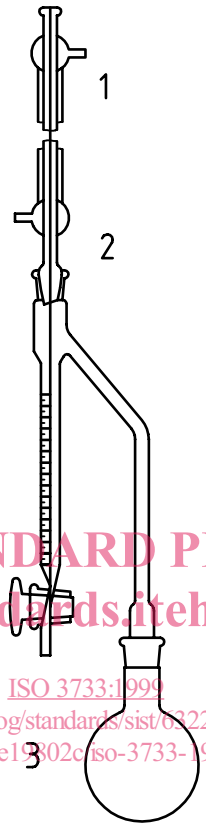
a) light petroleum with a boiling range of 100 °C to 120 °C;

b) 2,2,4-trimethylpentane (*iso*-octane) of 95 % purity or better.

5 Apparatus

5.1 General

The apparatus comprises a glass or metal still, a heater, a reflux condenser, and a graduated glass trap. The still, trap and condenser shall be connected by any suitable method that produces a leak-proof joint. Preferred connections are ground joints for glass, and O-rings for metal to glass. Typical assemblies of the glassware are shown in Figures 1 to 3 and the dimensions are given in Table 1. Any given testing apparatus will be deemed suitable, if accurate results are obtained using the methods described in 6.2 and 6.3. However, a straight water-cooled condenser with a length of 400 mm is recommended. The stills and traps shall be chosen to cover the range of materials and water contents expected. If the amount of water collected is likely to exceed 25 ml, a 25 ml trap fitted with a stopcock shall be used and the excess water shall be drained off into a graduated cylinder meeting the requirements of 6.2 and 6.3.



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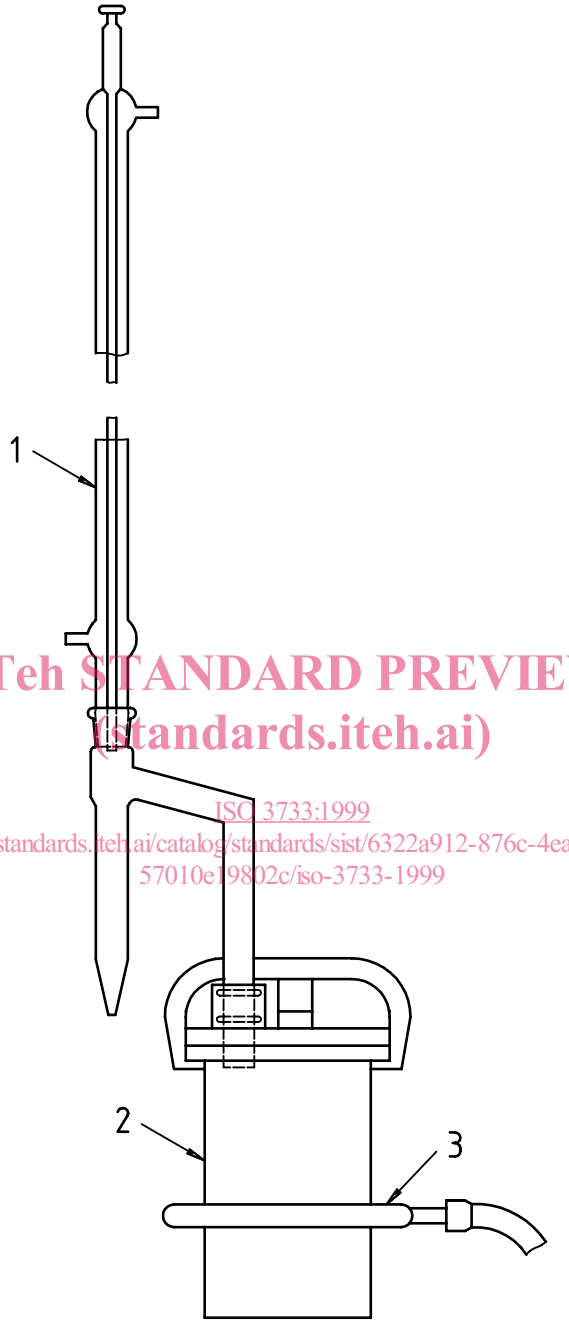
Key

1 Condenser
2 Receiver
3 Distillation vessel

Figure 1 — Typical assembly with glass still (Dean and Stark apparatus)



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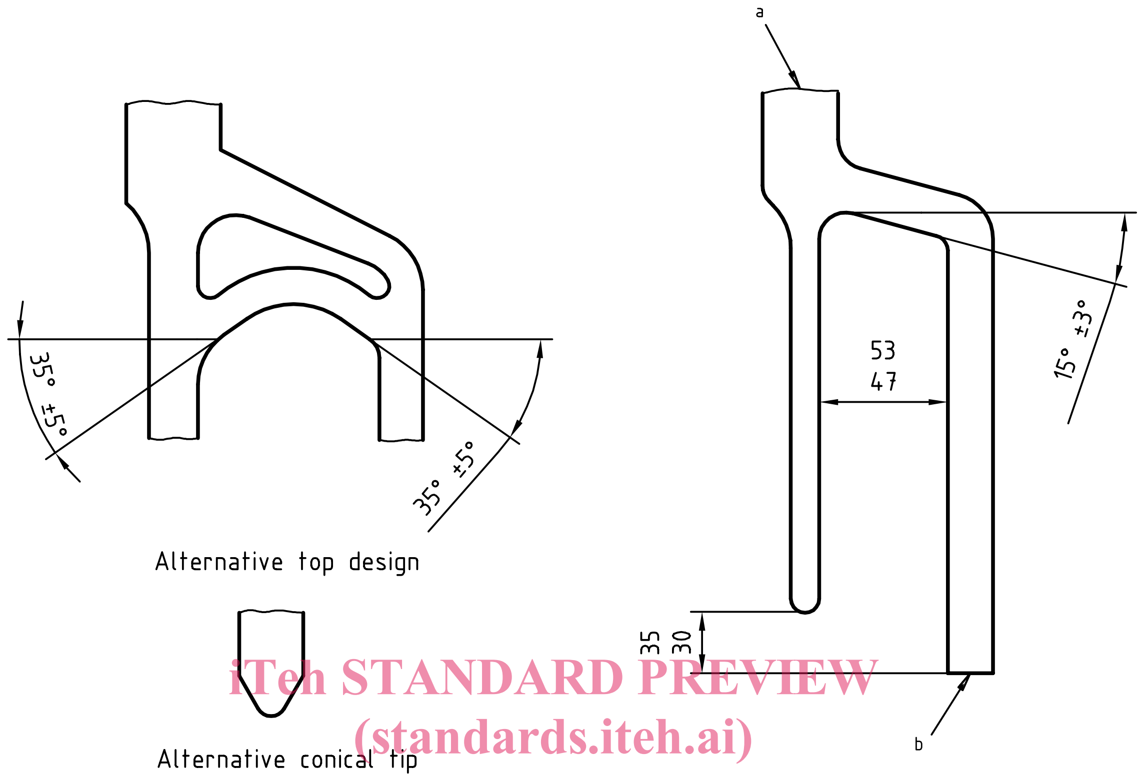
Key

1 Water-cooled condenser
2 Metal still
3 Ring burner

Figure 2 — Typical assembly with metal still

Dimensions in millimetres



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NOTE 1 Dimensions than those shown other in Table 1 are for guidance only.

NOTE 2 25 ml traps may be fitted with a stopcock if required.

a Top finish:
beaded edge;
or
conical ground-glass joint, ISO 383/24/29 socket;
or
spherical ground-glass joint, ISO 641/35/20 cup.

b Bottom finish:
fire polished;
or
conical ground-glass joint, ISO 383/24/29 cone;
or
spherical ground-glass joint, ISO 641/35/20 ball.

Figure 3 — Details of typical traps