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**Dimethyl ether (DME) for fuels —  
Determination of high temperature  
(105°C) evaporation residues — Mass  
analysis method**

*Diméthylether (DME) pour carburants et combustibles —  
Détermination de la température haute (105°C) de résidus  
d'évaporation — Méthode gravimétrique*

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<b>Contents</b>		Page
<b>Foreword</b> .....		<b>iv</b>
<b>Introduction</b> .....		<b>v</b>
<b>1</b>	<b>Scope</b> .....	<b>1</b>
<b>2</b>	<b>Normative references</b> .....	<b>1</b>
<b>3</b>	<b>Principle</b> .....	<b>1</b>
<b>4</b>	<b>Reagents and materials</b> .....	<b>1</b>
<b>5</b>	<b>Apparatus</b> .....	<b>2</b>
<b>6</b>	<b>Procedures</b> .....	<b>4</b>
<b>7</b>	<b>Calculation</b> .....	<b>4</b>
<b>8</b>	<b>Precision</b> .....	<b>5</b>
<b>9</b>	<b>Test report</b> .....	<b>5</b>
<b>Annex A (informative) The report of the interlaboratory tests</b> .....		<b>6</b>
<b>Bibliography</b> .....		<b>8</b>

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

The committee responsible for this document is ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 4, *Classifications and specifications*.

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## Introduction

In general, large amount of DME in the international trade and domestic transportation may be executed using sea and/or various land transportations. Throughout the loading and transportation, there may be a risk of increasing evaporation residues.

The evaporation residues can over time impact the performance of the equipment when DME is used as fuel. Therefore, evaporation residues in the DME shall be determined accurately using procedures recognized by the parties concerned.

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# Dimethyl ether (DME) for fuels — Determination of high temperature (105 °C) evaporation residues — Mass analysis method

**WARNING** — The use of this International Standard can 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 procedure of test for high temperature (105 °C) evaporation residue in DME used as fuel by the mass analysis method. This procedure is applicable to determine the amount of high temperature (105 °C) evaporation residue up to the value specified in ISO 16861.

Several tests can be applied to determine amount of evaporation residue in liquefied products. Among them, this International Standard specifies the method that has detection limit sufficient for a DME specification in ISO 16861, using less resource compared to other methods.

When more precise quantitative test is required, use of ISO 13757 instead of this International Standard is recommended.

Because of the procedure applied, the evaporation residue which has a boiling point lower than 105 °C will not be determined.

**NOTE** The precision of this method has been studied for a limited set of samples and content levels by a limited amount of labs. It allows establishment of a quality specification of DME but cannot be considered as a full precision determination in line with the usual statistical methodology as in ISO 4259.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16861, *Petroleum products — Fuels (class F) — Specifications of Dimethylether (DME)*

ISO 29945, *Refrigerated non-petroleum-based liquefied gaseous fuels — Dimethylether (DME) — Method of manual sampling onshore terminals*

## 3 Principle

After approximately 100 g of liquid sample is evaporated by using an evaporation dish, the residue is weighed, to determine the evaporation residue at 105 °C in mass percentage of the total DME.

## 4 Reagents and materials

**4.1 Ethanol**, methanol and/or isopropanol is used for cooling bath.

**4.2 Dry ice**, used for cooling bath.

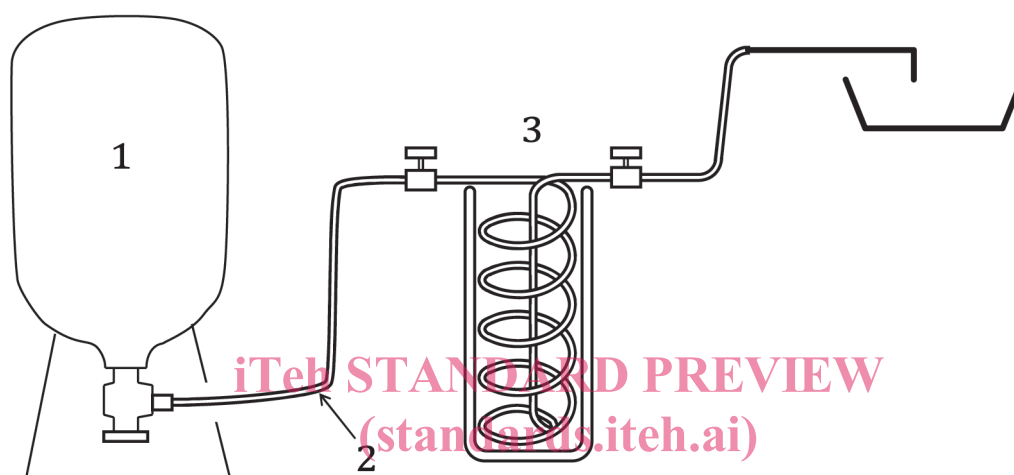
## 5 Apparatus

### 5.1 Sample cylinder.

Sample cylinder is made of stainless steel. (size is 1 l, tested pressure not less than 3,0 MPa) that shall be able to be positioned vertically and is weighable. It shall be equipped so that the sample be drawn as a liquid from the liquid phase of the sample.

### 5.2 Connecting pipe.

This is a pipe of approximately 3 mm~5 mm in diameter, made of stainless steel. It is provided with a connector to the sample cylinder on one end and with a connector to the cooler on the other end.



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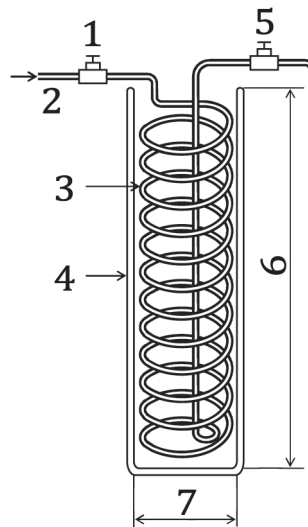
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**Key**

- 1 sample cylinder
- 2 connecting pipe
- 3 cooling bath

**Figure 1 — Assembly drawing of evaporation residue testing equipment**



**Key**

- 1 sample valve
- 2 connecting pipe
- 3 cooling pipe (stainless steel pipe 5 mm)
- 4 dewar vessel
- 5 needle valve
- 6 below 300
- 7 approximately 64 mm

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**Figure 2 — Cooling bath**

**5.3 Cooling bath.**

This is of a type shown in [Figure 2](#).

**5.4 Evaporating dish.**

The evaporating dish is made of platinum, porcelain, stainless steel, or glass and the volume of the evaporating dish is 100 ml. The diameter of the dish is more than 75 mm and the depth is more than 30 mm.

**5.5 Electronic balance.**

- a) Samples weight are determined by means of top loading electronic balance with precision at least 0,1 g.
- b) Evaporation residue weights are determined by means of top loading electronic balance with accuracy at least 0,1 mg.

**5.6 Oven.**

It shall be capable of holding the temperature at  $105\text{ °C} \pm 2\text{ °C}$  and shall not be provided with an ignition source.

**5.7 Desiccator (with silica gel).**

It shall be able to store the evaporating dish.