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

*Combustibles gazeux non pétroliers liquéfiés réfrigérés —
Diméthyléther (DME) — Méthode d'échantillonnage manuel sur des
terminaux à terre*

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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).

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).

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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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 28, *Petroleum products and related products of synthetic or biological origin*, Subcommittee SC 5, *Measurement of refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels*.
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This second edition cancels and replaces the first edition (ISO 29945:2009), which has been technically revised.

Introduction

Measures for environmental protection are required on a global scale. In this context, various methods of achieving these aims have been independently studied or undertaken in many countries. One such project, the development of the use of dimethylether (DME) as a new form of energy, has been undertaken in several countries. The use of DME generates neither sulfur oxide nor any other particulate matter known to cause environmental pollution at the time of combustion.

Another benefit of the use of DME as a petroleum alternative is that it can be produced easily from natural gases, coals and biomasses with only slight additional development of the existing techniques of production, transportation, storage and consumption.

In international trade, especially bulk transportation by sea, DME is liquefied by either refrigeration or pressurization and transported using ocean-going DME tankers and/or LPG tankers. To detect qualitative deterioration of the DME that can take place during transportation or storage, the establishment of an International Standard, agreed to by all concerned nations and parties, is required.

This document specifies a method of manual sampling of DME liquefied by refrigeration for analysis to define and/or confirm adherence to contractual specifications.

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

1 Scope

This document specifies a manual sampling method for refrigerated liquefied DME at terminals in both loading and unloading ports along with precautions.

This document does not include recommendations for the location of a sampling point in a line or vessel.

This document is also applicable to the following cases, with necessary modifications:

- sampling of DME on board liquefied gas tankers where appropriate sampling apparatus is provided;
- sampling of other refrigerated, non-petroleum-based, liquefied gaseous fuels whose chemical and physical properties are similar to those of DME.

The detailed chemical and physical properties of DME differ from those of LPG, which suggests that DME requires precautions different from those of LPG. However, their basic properties are similar to each other and so general reference is made in this document to precautions for LPG that have been applied in many countries. Reference can also be made to the appropriate individual items in this document for precautions concerning the quality.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

sampling line

line used to connect a *sample probe* (3.2) and a sample cylinder

3.2

sample probe

device inserted into gas or liquid to be sampled from the transfer line or fitted to the transfer line for collecting a sample

[SOURCE: ISO 1988-6:2000, 6.40.104]

3.3

ullage tube

outage tube

tube fitted in a sample cylinder in order to easily adjust volume of the DME vapour

4 Chemical and physical properties of DME

4.1 General characteristics

DME has the following general characteristics, which should be considered with respect to personal safety precautions.

- a) It is non-corrosive.
- b) It has a relatively small coefficient of thermal expansion.
- c) It acts as an effective solvent for many materials.
- d) It is hydrophilic.

4.2 Chemical and physical properties

DME has the following general chemical and physical properties:

- a) boiling point (at atmospheric pressure) -25,1 °C;
- b) saturated vapour pressure (at 25 °C) 0,61 MPa;
- c) explosive range 3,4 % to 27,0 % volume fraction;
- d) gas density (relative to air) 1,59;
- e) liquid density (at 20 °C) 670 kg/m³;
- f) chemical structure (CH3)2O;
- g) molecular weight 46,07 g mol⁻¹;
- h) auto ignition temperature 350 °C.

5 Precautions

5.1 General

[Clause 5](#) introduces the safety precautions that should be observed at the time of sampling and general precautions for the sample cylinders being used. It is the responsibility of the user of this document to ensure that the procedure of sampling meets the applicable safety regulations.

5.2 Safety precautions

- 5.2.1 Wear appropriate protective clothing, helmet, goggles, gloves and safety work shoes.
- 5.2.2 Stand upwind and complete sampling in short a time as practicable.
- 5.2.3 Sampling work should be performed by skilled and experienced staff, or carried out under the supervision of such staff.
- 5.2.4 While in use, sample equipment should be grounded against generation of static electricity.
- 5.2.5 In-house safety instructions should be applied.

5.3 General precautions for sample cylinders

5.3.1 The sample cylinders used should conform to any requirements, for example, periodic inspections, that are required by the regulatory authority and should be used within the validity period of the test certificate.

5.3.2 Even if the sample cylinders being used are under the period of validity/conformity, sample cylinders showing any apparent damage shall not be used.

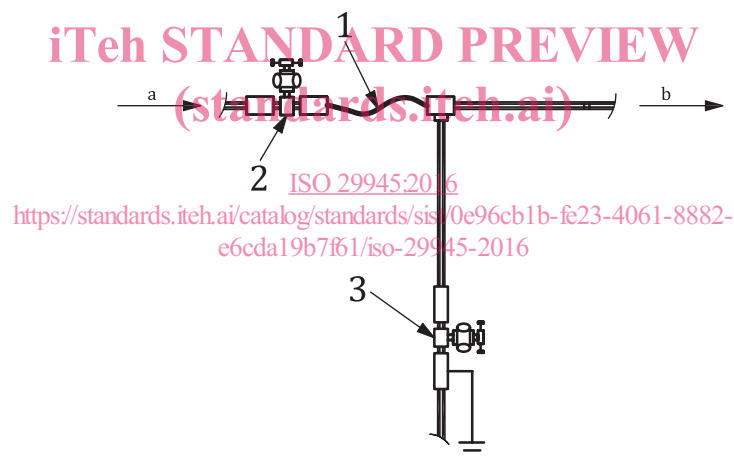
5.4 Sampling point

Sampling points shall be located so as to obtain representative samples. To prevent vaporization of DME in the line before sampling, it is preferable to locate the sampling point at a place where the pressure and temperature of the DME in the line are constant.

6 Sampling system

6.1 Apparatus used for sampling

The apparatus used for sampling shall consist of a sampling line and sample cylinder. Typical types of apparatus are shown in [Figures 1 to 3](#).



Key

- 1 sampling line
- 2 control valve
- 3 exhaust valve
- a DME.
- b To sample cylinder.

Figure 1 — Example of typical sampling line