
**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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ISO 29945:2009

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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 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 29945 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 5, *Measurement of refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels*.

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Introduction

Measures for environmental protection are required on a global scale. In this connection, 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 International Standard specifies a method of manual sampling of DME liquefied by refrigeration for analysis to define and/or confirm “contractual specifications.”

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

1 Scope

This International Standard specifies a manual sampling method for refrigerated liquefied DME at terminals in both loading and unloading ports. It also specifies detailed precautions to ensure safety during sampling work. However, safety measures, proposed for equipment being used for sampling, such as sampling lines and sample cylinders, are limited to general terms because they are governed mostly by national regulatory requirements.

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

NOTE It is the responsibility of the user to ensure that the sampling point is located so as to obtain a representative sample. However, 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 kept constant to ensure that a single-phase sample is obtained.

This International Standard 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 International Standard to precautions for LPG that have been applied in many countries. Reference can also be made to the appropriate individual items in this International Standard for precautions concerning the quality.

2 Terms and definitions

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

2.1

sampling line

line used to connect a sample prove and a sample cylinder

2.2

sample prove

prove mounted on the DME receiving/delivery line connected to a shore tank used to connect with a sampling line

2.3

ullage tube

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

3 Chemical and physical properties of DME

3.1 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.

3.2 Chemical and physical properties

DME has the following general chemical and physical characteristics:

- a) boiling point (at atmospheric pressure) $-25,1\text{ }^{\circ}\text{C}$;
- b) saturated vapour pressure (at $25\text{ }^{\circ}\text{C}$) $0,61\text{ MPa}$;
- c) explosive range $3,4\text{ to }27,0\text{ \% volume fraction}$;
- d) gas density (relative to air) $1,59$;
- e) liquid density (at $20\text{ }^{\circ}\text{C}$) 670 kg/m^3 .

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4 Precautions

4.1 General

Clause 4 introduces the safety precautions that should be observed at the time of sampling and general precautions for the sample cylinders being used.

4.2 Safety precautions

- 4.2.1 Wear appropriate protective clothing, helmet, goggles, gloves and safety work shoes.
- 4.2.2 Stand upwind and complete sampling in as short a times as practicable.
- 4.2.3 Sampling work should be performed by skilled and experienced staff, or carried out under the supervision of such staff.
- 4.2.4 The sample line should be grounded against generation of static electricity.
- 4.2.5 In-house safety instructions should be applied.

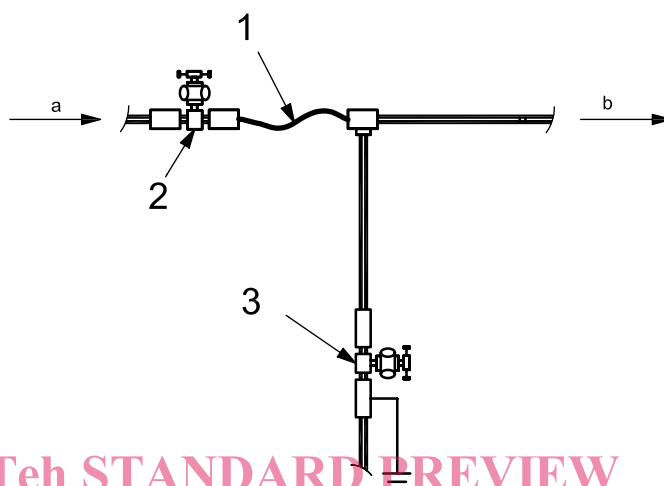
4.3 General precautions for sample cylinders

- 4.3.1 The sample cylinders used should conform to any requirements (e.g. periodic inspections) that are required by the regulatory authority and should be used within the validity period of the test certificate.
- 4.3.2 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 Sampling system

5.1 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, 2 and 3.



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Key

- 1 sampling line
- 2 control valve
- 3 exhaust valve

a DME.

b To sample cylinder.

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Figure 1 — Example of typical sampling line