INTERNATIONAL STANDARD

ISO 4257

First edition
1988-12-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Liquefied petroleum gases — Method of sampling

Gaz de pétrole liquéfiés — Méthode d'échantillonnage

Reference number
ISO 4257 : 1988 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4257 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants.*

Printed in Switzerland

Liquefied petroleum gases — Method of sampling

1 Scope

This International Standard specifies the procedure to be used for obtaining samples of non-refrigerated liquefied petroleum gases (LPG) such as propane, butane or mixtures thereof. It is suitable for sampling into containers to provide samples for laboratory testing of products covered by ISO 9162.

Although this method can be used to provide samples for compositional analysis by ISO 7941, it is strongly recommended that alternative apparatus, such as a variable-volume container, be used to minimize compositional changes that may occur. Development of an appropriate ISO method is under way.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7941 : 1988, *Commercial propane and butane — Analysis by gas chromatography.*

ISO 9162 : —[1], *Petroleum products — Fuels (class F) — Liquefied petroleum gases — Specifications.*

3 Definition

For the purposes of this International Standard, the following definition applies.

liquefied petroleum gases (LPG): Petroleum gases which can be stored and/or handled in the liquid phase under moderate conditions of pressure and at ambient temperature. These consist predominantly of propane, propene, butanes and butenes, with small proportions of ethane, ethene and/or pentanes and pentenes. They are normally described in terms of the predominant hydrocarbon, e.g. commercial butane or commercial propane.

4 Principle

A liquid sample is transferred from the source into a sample container through a transfer line by purging the container and filling it with liquid, then venting the container to provide a 20 % ullage so that 80 % of the liquid volume remains.

5 Significance

Samples of liquefied petroleum gases are examined by various test methods to determine physical and chemical characteristics. The test results are often used for custody transfer and price determination. It is therefore essential that the samples be representative of the product to be tested.

6 General considerations for obtaining a representative sample

Great care is required to obtain a representative sample, especially if the material to be sampled is a mixture of gases. The following factors shall be taken into account:

a) Take samples from the liquid phase only.

b) Avoid sampling from the bottom of a vessel.

c) Because of the wide variations in the construction of tanks for containing liquefied gases, it is difficult to specify a uniform method for obtaining representative samples of heterogeneous mixtures. With large bulk installations it may

1) To be published.

be possible to improve homogeneity by circulating the contents prior to sampling.

d) Directions for sampling cannot be explicit enough to cover all cases. They need to be supplemented by judgement, skill and sampling experience. Extreme care and good judgement are necessary to ensure that samples representing the general character and average conditions are obtained.

e) When sampling from pipelines under flow conditions, the pressure in the line needs to be above vapour pressure to avoid two-phase conditions.

7 Safety precautions

Because of the hazards involved, liquefied gases shall only be sampled by, or under the supervision of, persons familiar with the necessary safety precautions. Three areas of safety shall be considered:

a) safety at the sampling point;

b) safety of the container;

c) safety during transport.

7.1 Safety at the sampling point

Care shall be taken to avoid contact by LPG liquids with the skin. Gloves and protective goggles shall be worn, and care shall be taken to avoid breathing vapours.

Discharge of LPG can give rise to static electricity. Equipment shall be electrically grounded or bonded to the LPG system before commencing and throughout the sampling operations.

During purging and ullaging, safe means for disposal of waste vapours and liquids shall be provided. Compliance with local safety requirements and environmental regulations is necessary.

7.2 Safety of the container

Sample containers for use under pressure shall have been pressure-tested and approved for use in accordance with national or local codes, and the maximum safe operating pressure shall be marked on the container. Sampling operators shall ensure that the pressure rating of the container is suitable for use with the product to be sampled and the conditions under which it is to be handled. Containers shall have been checked for tightness.

Containers shall be placed in a cool location as soon as possible after taking the sample. Keep the sample cool until testing is completed or provide a means to avoid excessive variation in its temperature.

7.3 Safety during transport

Precautions shall be taken to protect the integrity of the container by packing the container in a crate in accordance with regulatory requirements and by using a protective cap on the valves so that accidental unseating of the valves or tampering with them is avoided. It is recommended that valves should always be capped.

8 Apparatus

8.1 Sample container

Use metal sample containers and fittings of a type which ensure maximum safety and which are corrosion-resistant to the product being sampled. A suitable material is stainless steel. The size of the container depends upon the amount of sample required for the laboratory tests that are to be made. If the container is to be transported, it shall conform to national or international regulations for the transportation of hazardous materials.

The container may be of the one-valve or two-valve type and may contain an outage tube. Typical sample containers are shown in figure 1. The end of the container at which the ullage tube is fitted shall be clearly marked.

8.2 Sample transfer line

Transfer lines shall be made of a material, preferably metal, which is impervious to the product to be sampled. They shall be equipped with two valves in addition to that at the product source and those on the container: a control valve (designated A in figure 1) and a vent valve (designated B in figure 1). For purging the container, means shall be provided at the end of the line connected to the container for inversion of the container. Consideration should be given to installing a relief valve between valves A and B.

8.3 Connection to sample container

Use metal sample connectors.

9 Procedure

9.1 Purging the sample transfer line

9.1.1 Connect the ends of the transfer line securely to the product source and to the inlet valve C of the container. Close the control valve A, vent valve B and inlet valve C (see figure 1). Open the valve at the product source and purge the transfer line by opening the control valve A and the vent valve B.

9.2 Purging the sample container

9.2.1 One-valve sample container

Open the inlet valve C and partly fill the one-valve container. Close the control valve A and bleed a portion of the sample in

the vapour phase through vent valve B. Invert the container and release the remainder of the sample as liquid through vent valve B. Repeat the purging operation at least three times.

9.2.2 Two-valve sample container

With the two-valve container (see figure 1) in an upright position and its outlet valve D at the top, close vent valve B and inlet valve C, and open control valve A. Open inlet valve C, and partly fill the container with sample by slowly opening the outlet valve D. Close the control valve A, and allow part of the sample to escape in the vapour phase through outlet valve D. Close outlet valve D, invert the container, and release the remainder of the sample in the liquid phase by opening valve D. Repeat the purging operation at least three times.

9.3 Transfer of sample

Close the vent valve B, open the control valve A and inlet valve C, and fill the container with sample. Close the inlet valve C and the valve at the product source. Open the vent valve B. After the pressure is fully released, disconnect the transfer line from the source and from the sample container. Discard the sample if a leak develops or if either valve is opened during handling of the sample container before performing the operations outlined in 9.4.1 or 9.4.2.

9.4 Sample ullage

Immediately after obtaining the sample, provide a 20 % ullage in the sample container by one of the following procedures.

9.4.1 By mass

Although ullage can be obtained by the following procedure, this procedure is not recommended.

Weigh the filled container and deduct the tare mass. Calculate the mass of product that should be released to give the required ullage volume. Invert the container so that valve C is at the bottom, slightly open valve C and draw off liquid until it is estimated that the required mass has been released. Close valve C and reweigh the container. If necessary, repeat this operation until the required ullage is obtained.

If the container cannot be weighed immediately, it is important to release a small amount of liquid sample to prevent excessive pressure which may be caused by expansion of the sample when its temperature increases. For samples likely to be subjected to a large increase in temperature prior to testing, an ullage volume of 20 % to 30 % shall be provided.

9.4.2 By ullage tube

If the sample container has an outage tube of the proper length (20 % ullage), place the container in an upright position with the ullage tube uppermost and immediately open the upper valve slightly. Allow the excess liquid to escape and close the valve at the first sign of vapour. If no liquid escapes, discard the sample and refill the container.

9.5 Checking for leaks

After eliminating the excess liquid so that only 80 % (V/V) of the sample remains, the container shall be checked for leaks by a suitable procedure, such as immersion in a water bath. If a leak is detected at any time during the sampling operation, discard the sample. Repair or replace a leaky container before obtaining another sample.

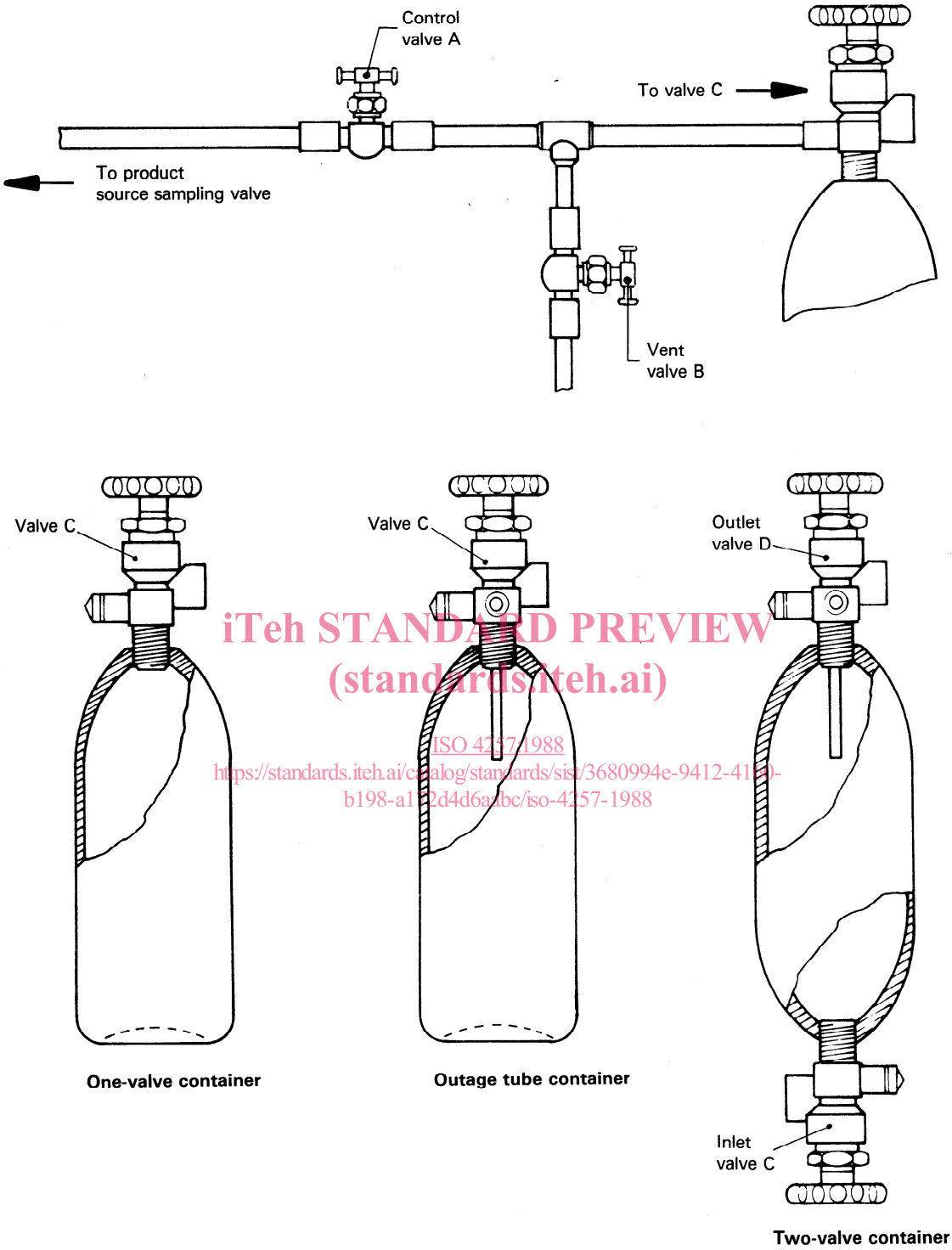

Figure 1 — Sample containers and transfer line

This page intentionally left blank

UDC 665.725 : 543.05

Descriptors : petroleum products, liquefied petroleum gases, sampling.

Price based on 4 pages