



BSI Standards Publication

Refrigerated light hydrocarbon fluids — Sampling of liquefied natural gas — Continuous and intermittent methods

National foreword

This British Standard is the UK implementation of ISO 8943:2025. It supersedes BS ISO 8943:2007, which is withdrawn.

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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**International
Standard**

ISO 8943

**Refrigerated light hydrocarbon
fluids — Sampling of liquefied
natural gas — Continuous and
intermittent methods**

*Hydrocarbures liquides légers réfrigérés — Échantillonnage de
gaz naturel liquéfié — Méthodes en continu et par intermittence*

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Foreword

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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).

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This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*, Subcommittee SC 5, *Measurement of refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels*.

This third edition cancels and replaces the second edition (ISO 8943:2007), which has been technically revised.

The main changes are as follows:

- an overview of gasified LNG sampling has been added;
- a CP/FP sample holder has been introduced;
- a multiple shore transfer pipeline has been considered;
- a stable flow rate has been specified;
- an approach to find an outlier of online analysis results has been introduced;
- an example of a sampling report has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In the custody transfer of liquefied natural gas, hereinafter referred to as LNG, it is common practice to determine the quantity transferred on a calorific-content basis. The total calorific content of the quantities of LNG quoted in the custody transfer is determined by the liquid volume, liquid density and gross calorific value of the LNG delivered.

Knowledge of the composition of LNG is required to calculate its density and calorific content. Therefore, precise sampling is a prerequisite for precise analysis.

LNG is a complex mixture of low-molecular-weight hydrocarbons with nitrogen as a principal inert impurity. Typically, methane is the major component. Minor-component concentrations vary with the source of the raw gas, the liquefaction pre-treatment, the liquefaction process and the storage conditions.

Refrigerated light hydrocarbon fluids — Sampling of liquefied natural gas — Continuous and intermittent methods

1 Scope

This document specifies methods for the continuous and intermittent sampling of liquefied natural gas (LNG) while it is being transferred through an LNG transfer line.

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 terminology databases for use in standardization at the following addresses:

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

3.1

accumulator

storage provided to absorb pressure pulsations of gasified *liquefied natural gas (LNG)* (3.10) and to homogenize it

[SOURCE: ISO 1998-5:1998, 5.20.275]

3.2

bubbling

procedure, in the case of *water-seal-type gas sample holder* (3.22), to saturate the *seal water* (3.19) in a gas sample holder with gasified *liquefied natural gas (LNG)* (3.10) for suppressing the effect of the seal water on the gas sample

[SOURCE: ISO 1998-5:1998, 5.20.287, modified — “in the case of water-seal-type gas sample holder” added to the definition.]

3.3

compressor for transferring gasified LNG

compressor used for boosting the pressure of gasified *liquefied natural gas (LNG)* (3.10) when gasified LNG in the *LNG sample vaporizer* (3.11) cannot be transferred to the gas sample holder by its inherent pressure

3.4

constant pressure/floating piston sample cylinder CP/FP sample cylinder

portable cylinder which has a floating piston dividing sample gas and pre-charge gas, capable of maintaining constant pressure during the sampling period

3.5

constant pressure/floating piston sample holder CP/FP sample holder

unportable holder or cylinder which has a floating piston dividing sample gas and pre-charge gas, capable of maintaining constant pressure during the sampling period

3.6

continuous sampling

process to collect samples from gasified *liquefied natural gas (LNG)* (3.10) stream into a gas sample holder continuously with constant flow rate

Note 1 to entry: The gasified LNG from the vaporizer is thereafter continuously fed into the gas sample holder.

3.7

gas sample cylinder

sample cylinder, usually used for *continuous sampling* (3.6), the retention of the gas sample and its transfer to an analysing instrument

3.8

gas sample compressor

compressor used for charging the gas sample collected in a gas sample holder into a *gas sample cylinder* (3.7)

3.9

intermittent sampling

process to collect samples from a gasified *liquefied natural gas (LNG)* (3.10) stream and place them into a gas sample holder or cylinder intermittently, grab by grab, with predetermined time or flow amount intervals

3.10

liquefied natural gas

LNG

liquids composed predominantly of methane

3.11

liquefied natural gas sample vaporizer

LNG sample vaporizer

apparatus to completely gasify the *liquefied natural gas (LNG)* (3.10) sample collected from the *LNG transfer line* (3.12)

3.12

liquefied natural gas transfer line

LNG transfer line

pipeline used for transferring *liquefied natural gas (LNG)* (3.10)

3.13

offline analysis

procedure of analysis implemented on the representative sample gas that is once charged into a *gas sample cylinder* (3.7) or a *CP/FP sample cylinder* (3.4)

3.14

online analysis

procedure of analysis implemented using an analytical equipment that is directly connected through pipelines or other means to the sampling device

3.15

online gas chromatograph

gas chromatograph that is connected to the gasified *liquefied natural gas (LNG)* (3.10) stream, downstream of an offtake probe and vaporiser, to facilitate *online analysis* (3.14)

3.16

pressure regulator

pressure-regulating valve and pressure sensor provided to keep the gas pressure constant at the gas sample holder inlet

3.17

sample filter

filter used to protect the sampling valve for the *online gas chromatograph* (3.15) from soiling due to the presence of foreign contaminants, such as metal shavings and dirt

3.18**sampling 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 1998-6:2000, 6.40.104]

3.19**seal water**

water used in the *water-seal-type gas sample holder* (3.22) to preclude contact of the gas sample with the atmosphere

3.20**sub-cooling**

lowering the temperature of *liquefied natural gas* (3.10) to below its boiling point at a given pressure, i.e. to a sub-cooled state

3.21**waterless-type gas sample holder**

holder without *seal water* (3.19) used for collecting gasified *liquefied natural gas (LNG)* (3.10)

3.22**water-seal-type gas sample holder**

holder with *seal water* (3.19) used for collecting gasified *liquefied natural gas (LNG)* (3.10)

3.23**direct sampling**

sampling in situations where there is a direct connection between the natural gas to be sampled and the analytical unit

[SOURCE: ISO 10715:2022, 3.5]

3.24**indirect sampling**

sampling in situations where there is no direct connection between the natural gas to be sampled and the analytical unit

[SOURCE: ISO 10715:2022, 3.11]

3.25**spot sampling**

sampling of a specified volume taken at a specified place at a specified time from a stream of gas

3.26**incremental composite sampling**

accumulate sampling from the process line into sample cylinder(s) during a certain period, in order to have a representative sample

4 Outline of sampling system**4.1 General**

The purpose of sampling is to take a representative sample. The sample is analysed to determine the composition of the LNG transferred. Regardless of the sampling method or system design, the LNG sample collected through the sampling probe provided on the LNG transfer line is gasified in the LNG sample vaporizer system. Samples shall be taken after the accumulator if an accumulator is installed in the gasified LNG stream. The samples shall be representative of the transferred LNG.

The primary isolation valve between the sample probe and the vaporizer should be an emergency shutdown (ESD) which fails safe to isolate the liquified LNG from the sampling system or gas chromatograph (GC). The