



BSI Standards Publication

Refrigerated hydrocarbon liquids — Static measurement — Calculation procedure

National foreword

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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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ISO 6578

**Refrigerated hydrocarbon liquids —
Static measurement — Calculation
procedure**

*Hydrocarbures liquides réfrigérés — Mesurage statique —
Procédure de calcul*

**Third edition
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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 document 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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For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

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 6578:2017), which has been technically revised.

The main changes are as follows:

- [Table D.1](#) has been aligned with ISO 6976:2016;
- calculation examples have been moved from the main body to [Annex E](#).

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

Large quantities of refrigerated hydrocarbon liquids such as liquefied natural gas (LNG) and liquefied petroleum gas (LPG), are transported by marine carriers especially designed for these applications. These gases are traded based on the static measurement on board marine carriers rather than the measurement at shore tanks or pipelines, mainly due to the nature of the tank operation.

The measurement on board involves determining the liquid/vapour interface, i.e. liquid level, average temperatures of liquid and vapour, and the vapour pressure in the tanks of marine carriers. The volumetric quantity of the liquid and gas is then computed with the tank capacity tables.

This document specifies calculations for the volume at standard conditions, the liquid density from chemical composition and the mass and energy content of fully refrigerated hydrocarbon liquids at a vapour pressure near to atmospheric pressure from the results of custody transfer measurement. This document also specifies calculations for ascertaining the inventory in shore tanks. This document does not cover calculation procedures for refrigerated hydrocarbon liquids consisting predominantly of ethane or ethylene or partially refrigerated hydrocarbon liquids at pressures substantially above atmospheric. No recommendations are given for the measurement of small parcels of refrigerated liquids, which are directly weighed.

Aspects of safety are not dealt with in this document. It is the responsibility of the user to ensure that the procedure of measurement meets applicable safety regulations.

Basic data and source references used in the calculation procedures are given in [Annexes A to E](#).

Refrigerated hydrocarbon liquids — Static measurement — Calculation procedure

1 Scope

This document specifies the calculation procedure for converting the volume of liquefied petroleum gas (LPG) and liquefied natural gas (LNG) under the conditions at the time of measurement to the equivalent volume of liquid or vapour at the standard condition (i.e. 15 °C and 101,325 kPa absolute), or to the equivalent mass or energy (calorific content). This document applies to the quantities of refrigerated hydrocarbon liquids that are stored in or transferred to or from tanks and measured under static storage conditions. This document does not cover the calculation of pressurized gases.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 91:2017, *Petroleum and related products — Temperature and pressure volume correction factors (petroleum measurement tables) and standard reference conditions*

3 Terms, definitions and symbols

3.1 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/>

3.1.1

compression factor

actual (real) volume of a given amount of gas at a specified pressure and temperature divided by its volume, under the same conditions as calculated from the ideal gas law

[SOURCE: ISO 6976:2016, 3.10]

3.1.2

gross calorific value

amount of heat that would be released by the complete combustion with oxygen of a specified quantity of gas, in such a way that the pressure, p_1 , at which the reaction takes place remains constant, and all the products of combustion are returned to the same specified temperature, T_1 , as that of the reactants, all of these products being in the gaseous state except for water, which is condensed to the liquid state at T_1

Note 1 to entry: T_1 and p_1 are the combustion reference temperature and combustion reference pressure, respectively.

[SOURCE: ISO 6976:2016, 3.1, modified — Note 1 to entry has been replaced; t_1 has been replaced by T_1 .]