
Ohlajene lahke ogljikovodikove tekočine - Kalibracija membranskih rezervoarjev in samostojnih prizmatičnih rezervoarjev na ladjah - Fizikalna meritev (ISO 8311:1989)

Refrigerated light hydrocarbon fluids - Calibration of membrane tanks and independent prismatic tanks in ships - Physical measurement (ISO 8311:1989)

Verflüssigte leichte Kohlenwasserstoffe - Kalibrierung von Membrantanks und abhängigen Prismentanks in Schiffen - Physikalische Messung (ISO 8311:1989)
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Hydrocarbures légers réfrigérés - Etalonnage des réservoirs a membrane et réservoirs pyramidaux - Mesurage physique (ISO 8311:1989)

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**Refrigerated light hydrocarbon fluids - Calibration
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(ISO 8311:1989)**

Hydrocarbures légers réfrigérés - Etalonnage
des réservoirs à membrane et réservoirs
pyramidaux - Mesurage physique (ISO 8311:1989)

Verflüssigte leichte Kohlenwasserstoffe -
Kalibrierung von Membrantanks und unabhängigen
Prismantanks in Schiffen - Physikalische
Messung (ISO 8311:1989)

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INTERNATIONAL STANDARD

**ISO
8311**

First edition
1989-07-01

Refrigerated light hydrocarbon fluids — Calibration of membrane tanks and independent prismatic tanks in ships — Physical measurement

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*Hydrocarbures légers réfrigérés — Etalonnage des réservoirs à membrane
et réservoirs pyramidaux — Mesurage physique*

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ISO 8311 : 1989 (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 8311 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

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Annexes A to F are for information only.

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Introduction

Large quantities of light hydrocarbons consisting of compounds having 1 to 4 carbon atoms are stored and transported by sea as refrigerated liquids at pressures close to atmospheric. These liquids can be divided into two main groups, liquefied natural gas (LNG) and liquefied petroleum gas (LPG). Bulk transportation of these liquids requires a special technology in ship design and construction to enable shipborne transportation to be safe and economical.

Measurement of cargo quantities in ships' tanks for custody transfer purposes has to be of a high order of accuracy. This International Standard, together with others in the series, specifies methods of internal measurement of ships' tanks from which tank calibration tables can be derived.

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This International Standard covers calibration techniques applicable to membrane type tanks, i.e. tanks in which the containment system comprises a relatively thin membrane of either stainless steel or high-nickel steel alloy supported by insulation and also, with some modifications, to tanks constructed of aluminium alloy or steel for low-temperature service that are independent, self-supporting and approximately prismatic in shape.

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Annex A gives recommendations on safety precautions to be observed during the calibration.

Annex B gives an analysis of the sources of error for a typical membrane tank.

Annex C gives an example of a calibration table relating partial filling volume as a function of liquid level and annexes D, E and F give examples of trim, list and temperature correction tables.

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Refrigerated light hydrocarbon fluids — Calibration of membrane tanks and independent prismatic tanks in ships — Physical measurement

1 Scope

1.1 This International Standard specifies a method for the internal measurement of membrane tanks and independent prismatic tanks used in ships for the transport of refrigerated light hydrocarbon fluids. In addition to the actual process of measurement, it sets out the calculation procedures for compiling the calibration table and correction tables to be used for the computation of cargo quantities.

1.2 For membrane tanks, the procedures of this International Standard utilize the scaffolding used for the installation of the membranes to support the measuring equipment but, for independent prismatic tanks, other safe means of access to the required measuring positions have to be used.

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 4512 : —¹⁾, *Petroleum and liquid petroleum products — Equipment — Tank gauging and calibration — Manual methods*.

ISO 7507-1 : —¹⁾, *Petroleum and liquid petroleum products — Volumetric calibration of vertical cylindrical tanks — Part 1 : Strapping method*.

3 Definitions

For the purposes of this International Standard, the following definitions shall apply.

3.1 calibration : The process of determining the total capacity or partial capacities of a tank corresponding to different levels.

3.1.1 bottom calibration : Measurements made to provide calibration of the bottom part of a tank to take account of undulation in the bottom plate.

3.2 calibration table (main gauge table) : A table, often referred to as a tank table or a tank capacity table, showing the capacity of, or volumes in, a tank corresponding to various liquid levels measured from the gauge reference point (see 3.6), with the ship on an even keel and upright.

3.3 chamfer : A slanting surface connecting the walls of a tank with its top or bottom surface (see figure 5).

3.4 deadwood : Any tank fitting or structure, including rounded corners or radiused ends, which affect the capacity of the tank. Deadwood is referred to as "positive deadwood" when the capacity of the fitting adds to the effective capacity of the tank, or "negative deadwood" when the volume of the fitting displaces liquid and reduces the effective capacity.

3.5 gauging : All the measurements taken in a tank necessary to determine the quantity of liquid and vapour contained therein.

3.6 gauge reference point : The point from which the liquid depths are measured.

3.7 horizontal plane : A plane established parallel to the tank bottom.

3.8 liquid level : Height of the liquid surface measured from the gauge reference point. When the ship is in list or trim condition, the height is measured at a right angle to the tank bottom.

3.9 list : Transverse inclination of a ship.

3.10 longitudinal line : A line formed by a longitudinal plane crossing a horizontal plane.

3.11 longitudinal plane : A vertical plane running parallel to the centreline of the tank.

1) To be published.