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Refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels — General requirements for automatic tank thermometers on board marine carriers and floating storage

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This British Standard is the UK implementation of ISO 8310:2012. It supersedes BS 7575:1992 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PTI/12, Petroleum Measurement and Sampling.

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

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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 8310 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*.

This second edition cancels and replaces the first edition (ISO 8310:1991), which has been technically revised.

Introduction

Large quantities of liquefied natural gas (LNG), liquefied petroleum gas (LPG) and other liquefied gases are usually transported by marine carriers dedicated for these applications and traded based on static measurement on board by automatic tank measurement. Such an automatic tank measurement may be a part of the custody transfer measurement system (CTMS) which involves determination of liquid/vapour interface, i.e. liquid level, average temperatures of liquid and vapour, and vapour pressure. The volumetric quantity of the liquid and gas is then computed with the tank capacity table based on which the delivered quantity in terms of energy content or mass is calculated.

In most cases, shore tank measurement is not used due to the active and dynamic conditions of the shore tank operations. In the absence of other means of acceptable measurement, custody transfer measurement usually takes place on board the carrier or floating production storage offshore (FPSO) and floating storage offshore (FSO). Liquid cargo density is very sensitive to temperature; therefore, obtaining accurate temperature readings is extremely important. For example, a change of 0,2 °C for liquid methane cargo results in a change in density of approximately 0,07 %.

This International Standard also discusses use of automatic tank thermometers on board marine vessels for other volatile, non-petroleum liquids in fully refrigerated conditions. Many of these non-petroleum liquids, such as di-methyl ether (DME) are measured in a similar manner to that used for fully refrigerated LPGs.

Values of temperature in this International Standard are in terms of the International Temperature Scale of 1990, ITS-90. Temperatures in degrees Celsius are denoted by the symbol *t*.

INTERNATIONAL STANDARD ISO 8310:2012(E)

Refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels — General requirements for automatic tank thermometers on board marine carriers and floating storage

1 Scope

This International Standard specifies the essential requirements and verification procedures for automatic tank thermometers (ATTs) consisting of platinum resistance thermometers (PRT) and an indicating device used for custody transfer measurement of liquefied natural gas, liquefied petroleum and chemical gases on board ships. Temperature detectors other than PRT are considered acceptable for use in the custody transfer service of liquefied gases if they meet the performance requirements of this International Standard and are approved by national regulations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60751, *Industrial platinum resistance thermometers and platinum temperature sensors*

3 Terms and definitions

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

3.1
automatic tank gauge
ATG
automatic level gauge
ALG
instrument that automatically measures and displays liquid levels or ullages in one or more tanks, either continuously, periodically or on demand

3.2
automatic tank gauging system
ATG system
system that includes ATGs at the cargo tanks and control/display unit that processes and displays output signals from the ATG along with any other parameters required to determine the liquid level, i.e. liquid/vapour interface

3.3
automatic tank thermometer
ATT
automatic tank temperature system
instrument that continuously measures temperature in cargo tanks

NOTE 1 An ATT typically includes temperature sensors, such as PRTs, field-mounted transmitters for electronic signal transmission, and indicating device(s).

NOTE 2 ATTs on liquefied gas carriers are usually multiple-point ATTs which consist of three or more temperature sensors, such as PRTs, to measure the temperatures at selected heights in the cargo tank.