



Manual of Petroleum Measurement Standards Chapter 17.10

**Measurement of Cargoes On Board Marine Gas
Carriers**

**Part 2—Liquefied Petroleum and Chemical
Gases**

**El Hydrocarbon Management
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Introduction

This standard provides guidance to vessel and shore personnel regarding accepted methods for determining quantities of Liquefied Petroleum and Chemical Gas cargoes on board refrigerated and/or pressurized gas carriers. It includes recommended methods for measuring, sampling, documenting, and reporting quantities on board these vessels.

Accounting for quantities on refrigerated and/or pressurized gas carriers requires some additional steps and care which may be contained in specific commercial agreements, operational guidelines or regulations. Other requirements should be discussed at the key meeting (pre-transfer conference), as detailed in API *MPMS* Chapter 17.1, or as noted in this section. All should be referred to and taken into account during the measurement process for these cargoes. General considerations and precautions that should be taken during the measurement of these cargoes are as follows.

Prior to Loading

Personnel performing measurement procedures should be made aware of the specific relevant safety and operational requirements for the refrigerated and/or pressurized gas carrier and its cargo. Specific conditions of carriage should be determined prior to loading including any relevant terminal regulations and restrictions enforced at the discharge port. It should also be determined if the cargo being loaded will be placed into tanks already containing cargo or whether the vessel's tanks need to first be prepared, which may include gassing-up and cooling down operations. The amount of cargo on board prior to loading (on board quantity [OBQ]) shall be measured, documented, and reported.

If tank inspection is required, it shall be carried out according to the procedure as detailed in API *MPMS* Chapter 17.8 or other defined operating instructions and in accordance with all appropriate safety guidelines. If the tank is to be gassed up and cooled down, one should account for the amount of product used in the process. See Section 8 for further discussion of special operational considerations.

During Loading

While loading the liquid cargo, vapor in the tanks will be displaced. Either the vapor is reliquefied on board the vessel or sent ashore for reliquefaction, flaring, or other combustion. The amount of vapor returned to the shore should be accounted for and the method of doing so agreed to by all parties.

After Loading

Ensure the cargo is at equilibrium at conditions with lines drained and no movement into or out of the tanks.

During Transit

During the transit from the load port to the discharge port, any vaporization of the cargo is reliquefied, contained at higher pressure, or vented, depending on vessel configuration and regulations. Such operations should be duly noted in the vessel's log and made available to concerned parties at the discharge port.

Prior to Discharge

Ensure the cargo is at equilibrium at conditions with lines drained and no movement into or out of the tanks.

During Discharge

Any vapors supplied by the discharge port or returned to the cargo tanks to maintain proper pressure should be monitored and their source noted in the cargo inspection report.

After Discharge

Vessels in continuous service will often intentionally sail from the discharge port with cargo left on board after discharge (heel) in order to keep their cargo tanks cold, gassed up and in a “ready to load” state at the next load port. If the tanks are to be emptied of liquid cargo (no liquid remaining on board [ROB]) at the discharge port, the method of vaporization and the amount of vapor discharged and remaining on board should be reported.

If cargo is left on board after discharge (ROB), then the amount of vapor and liquid left in the tanks should be measured, calculated, documented and reported. The variance between the ROB and the OPQ should be reported, and an appropriate protest filed as needed and the concerned parties notified.

Measurement of Refrigerated and/or Pressurized Cargoes on Board Marine Gas Carriers

Liquefied Petroleum and Chemical Gases

1 Scope

This standard details the steps needed to properly measure and account for the quantities of liquefied petroleum and chemical gas cargoes described in IGC Chapter 19, excluding liquefied natural gas (LNG), on board refrigerated and/or pressurized gas carriers. This standard covers all measurement systems commonly used on refrigerated and/or pressurized gas carriers designed to carry those types of cargoes.

2 Normative References

The following referenced documents are indispensable for the application 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.

API MPMS Chapter 3.5, *Standard Practice for Level Measurement of Light Hydrocarbon Liquids Onboard Marine Vessels by Automatic Tank Gauging*

API MPMS Chapter 3.6, *Measurement of Liquid Hydrocarbons by Hybrid Tank Measurement Systems*

API MPMS Chapter 7, *Temperature Determination*

API MPMS Chapter 7.3, *Fixed Automatic Tank Temperature Systems*

API MPMS Chapter 16.2, *Mass Measurement of Liquid Hydrocarbons in Vertical Cylindrical Storage Tanks by Hydrostatic Tank Gauging*

API MPMS Chapter 17.1, *Guidelines for Marine Cargo Inspection*

API MPMS Chapter 17.2, *Measurement of Cargoes On Board Tank Vessels*

API MPMS Chapter 17.8, *Guidelines for Pre-Loading Inspection of Marine Vessel Cargo Tanks*

ASTM D2598¹, *Standard Practice for Calculation of Certain Physical Properties of Liquefied Petroleum (LP) Gases from Compositional Analysis*

IMO Gas Code², including amendments thereto

International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) (generally applies to ships built after 17 July 1986)

International Code for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (GC Code) (generally applies to ships built on or after 31 December 1976 but prior to 17 July 1986)

IMO Code for Existing Ships Carrying Liquefied Gases (generally applies to ships delivered before 31 December 1976).

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.

² International Maritime Organization, 4 Albert Embankment, London, SE1 7SR, United Kingdom, www.imo.org.