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Introduction

For any given vessel, a ratio can be established between the quantity of liquid bulk cargoes measured on board the vessel and the corresponding measurement by a load or discharge facility. This ratio, called a Vessel Experience Factor (VEF) is a historical compilation of shore-to-vessel or vessel-to-shore cargo quantity differences and is used as a loss control tool to assess the validity of quantities derived from shore measurements. When agreed by interested parties, Bill of Lading or Outturn quantities may be determined based on vessel received or delivered quantities adjusted by the VEF, in cases where shore based measurements are not available, or are known to be inadequate for custody transfer. In the event of a dispute regarding the application of a VEF, resolution shall be made by the commercial parties involved.

Vessel capacity tables (Gauge Tables) are often calculated from the vessel's building plans, rather than based on accurate physical tank calibration measurements. There are usually differences between the quantity of a cargo measured in a calibrated shore tank or by a custody transfer meter, and the same cargo determined by vessel tank measurements. For a given vessel the use of quantity data from many voyages provides an indication of vessel measurement differences, as a numerical ratio. This ratio can also include other load and discharge factors. For each voyage a Vessel Load Ratio (VLR) and Vessel Discharge Ratio (VDR) can be calculated. The VLR or VDR is the quantity received or discharged as measured on the vessel (TCV – ROB or OBQ) divided by the Bill of Lading (shore delivered at loading) or Outturn Quantity (shore received at discharge) respectively. The mean of the qualifying VLRs or the VDRs over several voyages is called the VEF (VEFL and VEFD for load and discharge respectively.)

This standard provides a method for calculating VEF. The method uses an average of qualifying ratios, which fall within ±0.30 % of the mean. Certain voyages, including those considered to contain Gross Errors will be excluded from the mean calculation, as described in Section 8 of this standard. This method is preferred and should be used unless all parties specifically agree to an alternate method. See Annex D for an alternate method employing a statistical outlier rejection technique to discard unsatisfactory data.

A VEF cannot be calculated using voyages where load or discharge shore quantities are based on vessel measurement.

This document was developed by a joint American Petroleum Institute and Energy Institute Hydrocarbon Management Working Group.

Vessel Experience Factor (VEF)

1 Scope

This standard provides a recommended practice for the calculation and application of a VEF and provides guidelines for data compilation, data validation, and recommendations on the appropriate use of VEF during custody transfer involving marine tank vessels. It also provides clear guidance on maintenance of quantity data on board the vessel, calculation of VEFs and application of VEFs. The key aim is to provide a single unambiguous figure for VEFL or VEFD and to remove the possibility of any arbitrary inclusion or exclusion of data on the part of the individual(s) performing the final calculation. Close attention has been paid to the calculation method which has been tested using historical data. Bearing in mind the uncertainty which will attach to any individual measurement (including those being 'corrected' using the VEF figure) the calculation method will provide a stable and robust ratio.

The standard also provides instruction for parcel tankers, part cargoes, compartmental VEFs, and vessel-to-vessel transfers. The methods are applicable to liquid bulk cargoes including crude oil, petroleum products, chemicals, and LPGs.

2 Normative References

2.1 General

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.

2.2 API/EI Documents

API *MPMS*, Chapter 17.5/EI HM 54, *Guidelines for Cargo Analysis and Reconciliation*

2.3 API Documents

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

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

API *MPMS*, Chapter 17.4, *Method for the Quantification of Small Volume on Marine Vessels (OBQ/ROB)*

2.4 EI Documents

HM 28 [1], *Procedures for oil cargo measurements by cargo surveyors,* Section 1—*Crude oil*

HM 29, *Procedures for petroleum product cargo measurements by cargo inspectors*

HM 30, *Procedures for oil cargo measurements by cargo surveyors,* Section 3—*Liquefied petroleum gases*

2.5 Other Documents

ISO 8697 [2], *Crude petroleum and petroleum products—Transfer accountability—Assessment of on board quantity (OBQ) and quantity remaining on board (ROB)*

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1 Energy Institute, formerly the Institute of Petroleum, 61 New Cavendish Street, London W1G 7AR, UK, www.energyinst.org.uk.

2 International Organization for Standardization, 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, www.iso.org.