Hydrocarbon management

HM 68

Procedures for bulk liquid fatty acid methyl esters (FAME) and blended biodiesel cargo inspections

2nd edition

energy institute

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PROCEDURES FOR BULK LIQUID FATTY ACID METHYL ESTERS (FAME) AND BLENDED BIODIESEL CARGO INSPECTIONS

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The EI's purpose is to develop and disseminate knowledge, skills and good practice towards a safe, secure and sustainable energy system. In fulfilling this mission, the EI addresses the depth and breadth of the energy sector, from fuels and fuels distribution to health and safety, sustainability and the environment. It also informs policy by providing a platform for debate and scientifically-sound information on energy issues.

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A registered charity, the EI serves society with independence, professionalism and a wealth of expertise in all energy matters.

This publication has been produced as a result of work carried out within the Technical Team of the EI, funded by the EI's Technical Partners. The EI's Technical Work Programme provides industry with cost-effective, value-adding knowledge on key current and future issues affecting those operating in the energy sector, both in the UK and internationally.

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FOREWORD

The Energy Institute's (EI's) Hydrocarbon Management Committee (HMC) is responsible for the production and maintenance of standards and guidelines covering various aspects of static and dynamic measurement of petroleum. The Hydrocarbon Management Subcommittee 3 (HMC-3) deals primarily with the independent inspection issues, focusing in particular on marine cargoes.

HMC-3 is made up of experts from independent inspection companies, oil companies, service companies and loss control consultants. Additional participation in document development is also provided by members of the EI Hydrocarbon Management Asian Forum, based in Singapore.

The EI maintains liaison with parallel working groups of the American Petroleum Institute's (API's) Committee on Petroleum Measurement, and other organisations concerned with quantitative measurement in other countries and in other industries.

The EI hydrocarbon management guidelines are widely used by the petroleum industry and have received recognition in many countries by consumers and the authorities. In order to promote their wide adoption internationally, it is the policy to submit selected standards via the British Standards Institute (BSI) to the International Organization for Standardization's (ISO's) technical committee TC-28 Petroleum Products and Lubricants, as potential International Standards.

A full list of hydrocarbon management guidelines is available on request from the EI.

The EI hydrocarbon management guidelines are recommended for general adoption, but should be read and interpreted in conjunction with safety, environmental, weights and measures, customs and excise and other regulations in force in the particular country in which they are to be applied. Such regulatory requirements have precedence over corresponding clauses in the EI document, except where the requirements of the latter are more rigorous, when its use is recommended. Users should also consider contractual constraints imposed by charterers, cargo owners, ship owners and any other interested party.

Although it is believed that adoption of the recommendations of this guideline will assist the user, the EI cannot accept any responsibility, of whatsoever kind, for damage or alleged damage arising or otherwise occurring on vessels or in or about premises where this document has been applied, as final responsibility for adequate preparation of the vessel to receive a cargo lies with the parties controlling this task.

Users of these guidelines are invited to send comments, suggestions, or details of relevant experience to:
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PREFACE

The documents published by the EI dealing with procedures for cargo measurements are:

- *HM 28. Procedures for crude oil cargo inspections.*
- *HM 29. Procedures for petroleum product cargo inspections.*
- *HM 30. Procedures for LPG cargo inspections.*
- *HM 51. Procedures for bulk liquid chemical cargo inspections.*
- *HM 68. Procedures for bulk liquid fatty acid methyl esters (FAME) and blended biodiesel cargo inspections.*

1 SCOPE

1.1 GENERAL

The purpose of this document is to provide systematic cargo measurement procedures directed at minimising cargo contamination and losses, for use primarily by cargo inspectors. In the absence of, or in conjunction with, specific client guidelines, the following document should be considered a summary of best practices used within the industry.

This document is applicable to bulk liquid fatty acid methyl esters (FAME) for use as fuel (FAME, biodiesel or B100) and blends of these materials with petroleum-derived fuel cargoes (blended biodiesel).

This document does not apply to FAME cargoes for food use or for use in pharmaceuticals, cosmetics or personal care applications. These are carried under FOSFA or similar food chain contracts. The final use of the cargo should be confirmed by reference to the client. FOSFA contracts require that the cargo is controlled by accredited superintendents who will ensure that the FOSFA qualifications and operational procedures are followed. These rules cover tank design, including coating and heating systems, maintenance, documentation and cargo history, which is an important issue in the transportation of foodstuffs and oleochemicals.

Where the term 'measurement' is used in a general sense, it should be taken to include all aspects of cargo inspection including (but not limited to) tank inspection, sampling, laboratory analysis and other cargo inspection activities, as required by the inspector's principal(s). The points at which cargo inspectors are required to make their measurements are described and definitions of the terms used throughout this document are provided in Annex F. Whenever possible, terms approved by API, EI and ISO have been adopted. The document also explains the purpose of a cargo survey and summarises general responsibilities which cargo inspectors will be held to accept when they are appointed. Safety matters and related responsibilities are defined and emphasis is placed on the need for cargo inspectors to be continually aware that safety requirements take precedence over all other considerations.

The document describes detailed procedures which inspectors are required to follow and provides references to analytical test methods and calculations. Reference is made to alternative methods, since the procedures recognise that within the industry opinions may vary regarding the use of test methods, especially where different methods may be specified by parties and contractors.

1.2 THE BIOFUEL INDUSTRY AND THE NEED FOR THIS STANDARD

In recent years there has been a marked increase in the production and use of transport fuels derived from nominally renewable resources. These increases have been driven by legislation, and the incorporation of biofuels derived from renewable matter looks set to continue in the coming years.

At present, the two most common commercially viable biofuels are FAME and bioethanol. FAME is produced from vegetable oils or animal fats and, whilst it can be used directly as a fuel, is typically blended with conventional petroleum diesel. Bioethanol, which can again be used directly as fuel, is typically blended with conventional petroleum gasoline.

It has been the introduction of FAME into the transport fuel infrastructure that has brought with it the greatest challenges for those involved in the industry, and this document will therefore focus on the particular issues that arise for inspectors involved in the measurement of these cargoes.

In the future, other bio-derived blending components for middle distillate fuels; for example, biomass to liquid (BTL) fuels, hydrogenated vegetable oils (renewable diesel), FAME produced from novel feedstocks and fatty acid ethyl esters (FAEE) may become more widely commercially available and therefore warrant inclusion in this document. However, at this stage these guidelines are applicable only to cargoes of FAME and blends of FAME with conventional petroleum diesel.

1.3 MEASUREMENT STAGES

When a cargo is transported by vessel from one terminal to another, measurements are normally made at four points as shown in Figure 1, for the purpose of establishing:

a. the quantity of cargo loaded from the loading terminal (i.e. to confirm the quantity of cargo shown on the Bill of Lading);
b. the quantity of cargo loaded to the vessel;
c. the quantity of cargo discharged by the vessel;
d. the quantity of cargo received by the receiving terminal, and
e. the difference between the quantities established under (a) to (d) above.

Note: for a particular voyage involving more than one loading terminal or discharge terminal, measurements should be made at all such additional ports in order that a reliable comparison can be made between the quantities shown on the Bill of Lading, the cumulative outturn and ship's figures.

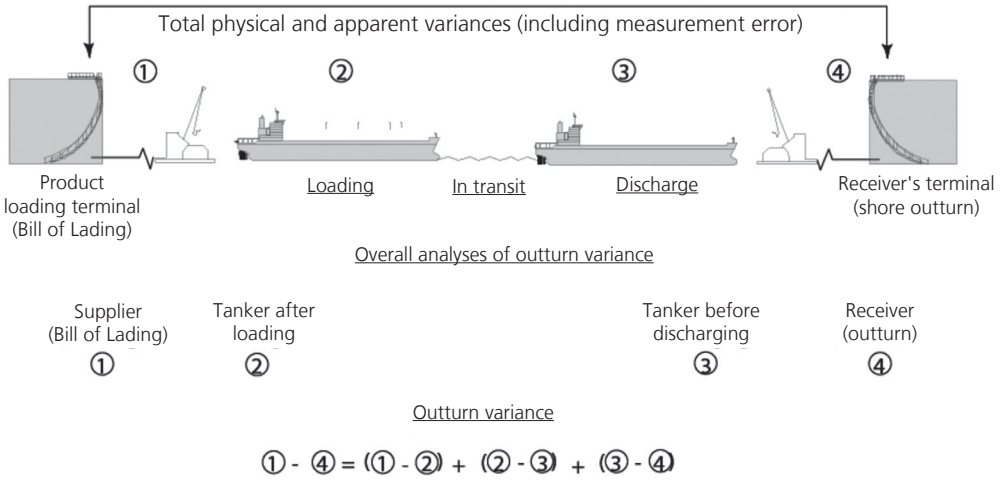

Figure 1: Overall analysis of outturn difference

1.4 QUALITY CONTROL

Contamination may occur during the various transfer and transportation stages of a cargo movement. Procedures and recommendations for a sampling and testing schedule are given which will minimise such contamination risk and identify potential problems at the earliest opportunity.

1.5 SUMMARY OF DATA TO BE REPORTED

It is recognised that cargo inspection companies and their principal(s) each have their preferred way of recording the data to be reported, particular forms; therefore, they are not prescribed by this procedure. However, for information, a listing of the typical information sufficient to define a cargo loading or discharge operation is provided in section 7. This listing represents a consensus of several cargo inspection companies and their principal(s). The detailed format of these forms should be agreed with principal(s) when contracts are being arranged.