

THE INSTITUTE OF PETROLEUM

PETROLEUM MEASUREMENT MANUAL

**User Guidelines for
Standard Temperature Accounting**

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FOREWORD

Measurement accuracy is essential for the sale, purchase and handling of petroleum products. It reduces the likelihood of disputes between buyer and seller and facilitates control of losses. Accurate measurement demands the use of standard equipment and procedures.

The Petroleum Measurement Committee of the Institute of Petroleum is responsible for the production and maintenance of standards and guides covering the various aspects of static and dynamic measurement of petroleum. These are issued as separate Parts and Sections of the Institute's *Petroleum Measurement Manual*, which was first published in 1952, or as *Petroleum Measurement Papers* for smaller documents or those covering specialist background aspects of measurement.

Membership of the IP working panels is made up of experts from the oil industry, equipment manufacturers, cargo surveyors and government authorities. Liaison is maintained with parallel working groups of the Committee on Petroleum Measurement of the American Petroleum Institute, and is extended as necessary to embrace other organizations concerned with quantitative measurement in other countries and in other industries.

Users are invited to send comments, suggestions, or details of experience with this issue to:

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The *Petroleum Measurement Manual* and *Petroleum Measurement Papers* 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 through the British Standards Institute to Technical Committee TC 28 - Petroleum Products and Lubricants - of the International Organization for Standardization (ISO/TC 28) as potential International Standards.

A full list of the Parts and Sections of the *Petroleum Measurement Manual* and *Papers* is available on request from the Institute of Petroleum.

Note

The IP *Petroleum Measurement Manual* and *Petroleum Measurement Papers* are recommended for general adoption but should be read and interpreted in conjunction with weights and measures, safety, customs and excise and other regulations in force in a particular country in which it is to be applied. Such regulatory requirements shall have precedence over the corresponding clauses in the IP Document except where the requirements of the latter are more rigorous, when its use is recommended. The Institute disclaims responsibility for any personal injury, or loss or damage to property howsoever caused, arising from the use or abuse of any Part or Section of the Manual or Papers.

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SCOPE

This document provides guidelines for the design and operation of Standard Temperature Accounting (STA) systems and covers the basic concepts, measurement parameters, data requirements and operating and calculation procedures.

Guidance is provided on which segments of petroleum stock control are best suited for the application of STA. The document also highlights a number of circumstances where the STA system is, or may not be, suitable.

INTRODUCTION

This Paper is published at a time when various National Government bodies are considering the regulatory adoption of STA for the taxation of petroleum fuels. States of the European Community are implementing in 1993 revised procedures for the charging of duty on petroleum products leaving bonded installations. Whereas taxes and duties on most finished products in several EC countries, including the UK, have previously been levied on observed volumes (i.e. volumes measured at the prevailing liquid temperature), the EC Directive requires States to adopt volumes at a standard temperature as the basis for charging with effect from 1 January 1993; derogation for the deferment of the implementation date until 15 October 1993 has been granted to the UK.

These Guidelines are intended to assist the change to STA procedures in providing guidance on practical options which may be available for their adoption at petroleum installations. The Institute will consider issue of a revision or addendum to this Paper during or after implementation of the Directive if further guidance is required.

The material balance of any petroleum storage location will consist of inventories, receipts and deliveries. The basic equation for the material balance is:

$$\begin{array}{ccc}
 \boxed{\begin{array}{c} \text{Opening} \\ \text{Inventory} \\ + \\ \text{Receipts} \end{array}} & \text{minus} & \boxed{\text{Deliveries}} \\
 & & \\
 = & & \boxed{\text{Book Stock}}
 \end{array}$$

while loss or gain may be obtained from:

$$\begin{array}{ccc}
 \boxed{\text{Book Stock}} & \text{minus} & \boxed{\begin{array}{c} \text{Physical} \\ \text{Inventory} \end{array}} \\
 & & \\
 = & & \boxed{\begin{array}{c} \text{Loss or} \\ \text{Gain} \end{array}}
 \end{array}$$

A separate material balance is usually maintained for each product handled by a plant.

Historically, many petroleum installations downstream of refineries did not consider it economic or practical to maintain this balance in other than observed volumes. This enabled them to avoid measurement of product temperature and density and the need to make numerous calculations.

Since the escalation of oil prices in the mid-1970s, many companies have adopted STA to improve their stock control and thereby enable them to quantify and identify losses more precisely. This has been a move dominated by economics, taking into account not only the value of oil but also the costs of STA equipment and its application.

For this reason, observed volumes are still retained for accounting for some operations where the benefits of STA have been outweighed by the costs of making the change, such as for most road and some rail transportation, at some storage locations and at minor distribution plants and service stations.