

Guide to

Volumetric metering of viscous hydrocarbons

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Petroleum Standards Policy Committee (PTC/-) to Technical Committee PTC/12, upon which the following bodies were represented:

- Department of Trade and Industry (Gas and Oil Measurement Branch)
- Department of Trade and Industry (National Engineering Laboratory)
- Institute of Petroleum
- Royal Institution of Naval Architects
- Salvage Association

The following body was also represented in the drafting of the standard, through subcommittees and panels:

GAMBICA (BEAMA Ltd.)

This British Standard, having been prepared under the direction of the Petroleum Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 October 1993

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The following BSI references relate to the work on this standard:
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National foreword

This British Standard has been prepared under the direction of the Petroleum Standards Policy Committee. It is identical with ISO 9200:1993 *Crude petroleum and liquid petroleum products — Volumetric metering of viscous hydrocarbons*, published by the International Organization for Standardization (ISO). ISO 9200 was prepared by Subcommittee 2, Dynamic petroleum measurement, of Technical Committee 28, Petroleum products and lubricants, in which the United Kingdom participated.

CAUTION. Attention is drawn to the Health and Safety at Work etc. Act 1974 and the need for ensuring that the guidance given in this British Standard is carried out with suitable precautions.

The guidance given in this British Standard is intended to be carried out by appropriately qualified and experienced persons and/or other suitably trained and/or supervised personnel. Normal safety precautions should be used throughout the use of this guide.

Additional information. In the case of gravimetric meter proving (4.3 and Annex A), care should be exercised to ensure calculations adjust between apparent mass in air, as recorded by a weighing scale and true mass as indicated by density instruments. The buoyancy factors are given in API Table 56 in Annex A of BS 6441:1993. It should also be noted that for LPG containers, weighing scales record a value nearer to true mass than apparent mass in air and therefore, no adjustment is needed for this product.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Introduction

This International Standard is intended as a guide to the design, installation, operation and proving of meters and their auxiliary equipment used in metering viscous hydrocarbons.

The objective of this International Standard is to stress the differences between metering high viscosity hydrocarbons and the normal application of metering to less viscous hydrocarbon liquids.

Some operations require purging the viscous liquids from the lines to prevent congealing during idle periods or to prevent contamination. If the air or gas used to displace the liquid is pumped through the meter when refilling the lines, the meter may operate at excessively high rates. This can cause damage to the moving parts of the meter and may result in erroneous meter registration. The recommendations in this International Standard should assist in avoiding misoperation, and the recommendations, if followed, should protect the meter from damage and inaccurate measurement due to entrapment of air or gas. Where alternative procedures are given, the recommendations of the meter manufacturer should be followed.

1 Scope

This International Standard defines viscous hydrocarbons and describes the difficulties that arise when viscous hydrocarbons are raised to high temperatures. The effects of such temperatures upon meters, auxiliary equipment and fittings are discussed, and advice and warnings to overcome or mitigate difficulties are included.

2 Definition

For the purposes of this International Standard, a viscous hydrocarbon is defined as any liquid hydrocarbon that requires special treatment or equipment in its handling or storage because of its resistance to flow.

Examples of liquid hydrocarbons which are generally considered as viscous are residual fuels with a viscosity greater than $750 \text{ m}^2/\text{s}$ at 50°C , bitumens (both penetration grades and cutbacks), most lubricating oils and grease components, as well as some crude oils. Note that viscosity is a parameter in its own right, regardless of temperature.

NOTE 1 It is possible that another liquid not needing these precautions might have some of the characteristics or present some of the measurement problems characteristic of viscous hydrocarbons.

3 Description of metering systems

3.1 Selection and installation of meters and auxiliary equipment

3.1.1 General

Care should be taken in the selection and installation of meters and auxiliary equipment. The selection of air removers (eliminators) is of particular importance when used in viscous liquid service and is discussed separately in 3.1.6.

If the meter is to be installed in a vertical line, special consideration should be given to equipment design. Some types of meters are not designed for such an installation, and the performance of these types could be affected.

Because of the various types of meters available and the wide differences in liquids and measurement conditions, it is important that the meter manufacturer be given complete information on the proposed application. The information that should be provided is listed in 3.1.2.

3.1.2 Special meter construction

Many viscous liquids are heated in order to reduce viscosity and facilitate handling. If the viscous liquids are to be heated, certain special details in the meter's construction and manufacture are required. Extra clearance between moving parts may be provided to prevent interference, to reduce the work load required, and to compensate for the higher temperature and altered viscosity. Certain viscous liquids can contain corrosive materials, and this corrosivity can increase as the liquid temperature increases. Where significant, the metallurgy of the meter, its trim and auxiliary equipment shall be capable of resisting this corrosion. At elevated temperatures, special meter construction materials may be required. Where dissimilar metals are used, the high temperature can result in mechanical interference caused by differences in metal expansion. This is particularly true where liners or lining sleeves are used. The use of devices such as ventilated counter extensions may be necessary to separate the counter and the meter adjuster from the heat source.