THE INSTITUTE OF PETROLEUM

PETROLEUM MEASUREMENT MANUAL

PART X
Meter Proving

SECTION 13

RECOMMENDED OPERATIONAL PRACTICE FOR PROVING LPG METERS

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FOREWORD

This publication has been prepared for international use. Some of the procedures contained herein therefore differ to those which are specified in other parts of the *Petroleum Measurement Manual* that are specifically intended for UK operations.

Throughout this publication the procedures are specified with the use of the words 'should' and 'may'. 'Should' is used to indicate that a provision is recommended as good practice. 'May' is used to indicate that a provision requires consideration, but is optional.

Although it is hoped and anticipated that this publication will assist in the proving of aviation fuelling equipment meters, the Institute of Petroleum cannot accept any responsibility, of whatever kind, for damage or loss, or alleged damage or loss, arising or otherwise occurring as a result of the application of the procedures contained herein. The Institute disclaims responsibility for any personal injury, howsoever caused, arising from the use or abuse of any Part or Section of the Manual.

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

The Technical Manager, Standards
Institute of Petroleum
61 New Cavendish Street
London W1G 7AR
United Kingdom

The *Petroleum Measurement Manual* is widely used by the petroleum industry and has received recognition in many countries by consumers and the authorities.

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

Note

The IP *Petroleum Measurement Manual* is recommended for general adoption but shall be read and interpreted in conjunction with weights and measures, safety 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 Manual except where the requirements of the Manual are more rigorous, when its use is recommended.

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E Lowres	Consultant
J Miles	Consultant to SGS Redwood Ltd.
J Phipps	Institute of Petroleum editorial

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INTRODUCTION AND SCOPE

This section of the *Petroleum Measurement Manual* is applicable only to meters measuring Liquid Petroleum Gas (LPG) on vehicles, in distribution terminals and refineries. It does not cover forecourt dispensers that meter Auto Gas during the filling of vehicle fuel tanks.

The document addresses the proving of LPG meters by methods currently employed within the industry. Its primary objective is to promote uniformity and consistency in both the meter proving and the interpretation of the results.

In order to ensure that an LPG meter is reading accurately, it is necessary to periodically carry out a test or series of tests in which its readings are compared with measurements obtained from proving equipment that is traceable to national standards.

LPG may be measured either volumetrically or gravimetrically. PD meters produce an output in volume units and are generally proved against a volumetric device such as a reference meter, a pipe prover or a proving tank. Coriolis meters are essentially mass meters but since they can produce an output in volume units they are often used as volumetric meters. They may be proved against volumetric or gravimetric devices. Recent developments involve the use of load cells to measure the mass of LPG in storage or vehicle tanks. These are effectively metering devices and need to be calibrated gravimetrically.

The proving operation consists of determining the volume or mass of product measured by a reference device and comparing this quantity with that indicated by the counter of the meter under test. The meter display is then adjusted by means of a calibration device to indicate the same quantity as measured by the reference meter. In practice a number of corrections may have to be applied to the readings of the reference device to compensate for changes in operating conditions from those under which it was calibrated, e.g. flow rate, viscosity, temperature and pressure.

For satisfactory results skilled personnel should carry out proving in accordance with an agreed procedure based on this document.

Records should be maintained for each proving exercise for each meter to determine error shift and systematic error.