# Manual of Petroleum Measurement Standards Chapter 21—Flow Measurement Using Electronic Metering Systems

## Section 2—Electronic Liquid Volume Measurement Using Positive Displacement and Turbine Meters

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## 1 Scope

### 1.1 GENERAL

**1.1.1** This standard provides guidance for effective utilization of electronic liquid measurement systems for custody transfer measurement of liquid hydrocarbons:

a. Within the scope and field of application of API *MPMS* Chapter 12.2.
b. Which are single-phase liquids at measurement conditions.
c. For systems utilizing turbine or positive displacement meters.
d. For systems using on-line *CTL* and *CPL* compensation.

**1.1.2** The procedures and techniques discussed in this document are recommended for use with new measurement applications. Liquid measurement using existing equipment and techniques not in compliance with this standard may have a higher uncertainty than liquid measurement based on the recommendations contained in this document.

### 1.2 ELECTRONIC LIQUID MEASUREMENT (ELM)

The term "electronic liquid measurement," or ELM, will be freely used throughout this document to denote liquid measurement using electronic metering systems. (Also see 3.20.)

## 2 Referenced Publications

If the wording of this document conflicts with a referenced standard, the referenced standard will govern.

API
*Manual of Petroleum Measurement Standards*

| | | |
|---|---|---|
| Chapter 1 | | "Vocabulary" |
| Chapter 4 | Section 2 | "Conventional Pipe Provers" |
| Chapter 4 | Section 3 | "Small Volume Provers" |
| Chapter 4 | Section 6 | "Pulse Interpolation" |
| Chapter 5 | Section 2 | "Measurement of Liquid Hydrocarbons by Displacement Meters" |
| Chapter 5 | Section 3 | "Measurement of Liquid Hydrocarbons by Turbine Meters" |
| Chapter 5 | Section 4 | "Accessory Equipment for Liquid Meters" |
| Chapter 5 | Section 5 | "Fidelity and Security of Flow Measurement Pulsed-Data Transmission Systems" |
| Chapter 7 | Section 2 | "Dynamic Temperature Determination" |
| Chapter 9 | | "Density Determination" |
| Chapter 11 | | "Physical Properties Data" |
| Chapter 12 | Section 2 | "Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volume Correction Factors" |
| Chapter 13 | | "Statistical Aspects of Measuring and Sampling" |
| Chapter 14 | Section 6 | "Continuous Density Measurement" |
| Chapter 21 | Section 1 | "Electronic Gas Measurement" |
| RP 500 | | *Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Division 1 and Division 2* |

ASTM[1]

| | |
|---|---|
| D5002 | *Test Methods for Density and Relative Density of Crude Oil by Digital Density Analyzer* |

## 3 Definitions and Symbols

### 3.1 INTRODUCTION

The purpose of these definitions is to clarify the terminology used in the discussion of this standard only. The definitions are not intended to be an all-inclusive directory of terms used within the measurement industry, nor are they intended to conflict with any standards currently in use.

### 3.2 WORDS AND TERMS

**3.3 accounting period:** A duration of time usually of fixed length, such as a day or week, or the period of time required to transfer all or part of a batch.

**3.4 analog to digital (A/D) converter:** A signal processor that converts electrical analog signals to a corresponding digital number.

**3.5 accuracy:** The extent to which the results of a calculation or the readings of an instrument approach the true value.

**3.6 audit trail:** The record of an electronic liquid measurement (ELM) system containing verification or calibration measurements for all tertiary and secondary devices, actual specifications for the primary device, constant values, times and dates of any changes affecting reported volumes and all

[1]American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428.