

**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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# CONTENTS

	Page
1 SCOPE.....	1
1.1 General.....	1
1.2 Electronic Liquid Measurement (ELM).....	1
2 REFERENCED PUBLICATIONS.....	1
3 DEFINITIONS AND SYMBOLS.....	1
3.1 Introduction.....	1
3.2 Words and Terms.....	1
4 FIELD OF APPLICATION.....	4
5 DESCRIPTION OF AN ELECTRONIC LIQUID MEASUREMENT SYSTEM....	4
5.1 Elements of an Electronic Liquid Measurement System.....	4
5.2 Placement of ELM System Components.....	4
5.3 Data Processing.....	4
6 SYSTEM UNCERTAINTY.....	4
6.1 General.....	4
7 GUIDELINES FOR DESIGN, SELECTION, AND USE OF ELM SYSTEM COMPONENTS.....	5
7.1 Primary Devices—Selection and Installation.....	5
7.2 Secondary Devices—Selection and Installation.....	6
7.3 Tertiary Devices—Selection and Installation.....	8
7.4 ELM Devices and Associated Equipment.....	8
7.5 Cabling.....	9
8 COMMISSIONING NEW AND MODIFIED SYSTEMS.....	9
8.1 General.....	9
9 ELECTRONIC LIQUID MEASUREMENT ALGORITHMS.....	9
9.1 General.....	9
9.2 Guidelines.....	9
10 AUDITING AND REPORTING REQUIREMENTS.....	18
10.1 General.....	18
10.2 Configuration Log.....	19
10.3 Quantity Transaction Record.....	20
10.4 Viewing ELM Data.....	20
10.5 Data Retention.....	21
10.6 Event Log.....	21
10.7 Alarm or Error Log.....	21
10.8 Test Record.....	21
11 EQUIPMENT CALIBRATION AND VERIFICATION.....	21
11.1 Devices Requiring Calibration/Verification.....	21
11.2 Verification and Calibration—Purpose and Use.....	21
11.3 Verification and Calibration Frequency.....	22
11.4 Verification and Calibration Equipment.....	22

	Page
11.5 Calibration Procedures . . . . .	22
11.6 Verification Procedures . . . . .	25
11.7 Ambient Temperature Considerations . . . . .	26
12 SECURITY . . . . .	27
12.1 Access . . . . .	27
12.2 Restricting Access . . . . .	27
12.3 Integrity of Logged Data . . . . .	27
12.4 Algorithm Protection . . . . .	27
12.5 Memory Protection . . . . .	27
APPENDIX A COMPUTER MATH HARDWARE AND SOFTWARE LIMITATIONS . . . . .	29
APPENDIX B A/D CONVERTERS AND RESOLUTION . . . . .	31
APPENDIX C EMERGENT STEM CORRECTION FOR LIQUID-IN-GLASS THERMOMETERS . . . . .	33
APPENDIX D RESISTANCE VERSUS TEMPERATURE FOR INDUSTRIAL PLATINUM RTDS . . . . .	35
APPENDIX E CALIBRATION AND VERIFICATION EQUIPMENT . . . . .	37
APPENDIX F REQUIRED ACCURACY IN MEASURED TEMPERATURE, PRESSURE, AND DENSITY FOR DESIRED ACCURACY OF CORRECTION FACTORS <i>CTL</i> AND <i>CPL</i> . . . . .	41
APPENDIX G UNCERTAINTY CALCULATIONS . . . . .	57

Figures

1 Typical ELM System . . . . .	5
2 Example of System Uncertainty Calculation . . . . .	6
3 100 Ohm RTD Tolerance Plots . . . . .	23
B-1 A/D Counts vs. Sensor Input Showing Support for Over/Under Range Regions . . . . .	31
G-1 Example of System Uncertainty Calculation . . . . .	57
G-2 Nonlinearity Example for NGL . . . . .	58

Tables

1 Coefficients of Thermal Expansion for Steel ( <i>Gc</i> , <i>Ga</i> , <i>Gl</i> ) . . . . .	16
2 Modulus of Elasticity for Steel Containers, <i>E</i> . . . . .	17
B-1 A/D Converter Resolutions in Percent of Full Scale . . . . .	31
F-1 Temperature Tolerance in °F for Generalized Crude Oil and JP4 to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 6A . . . .	42
F-2 Temperature Tolerance in °F for Generalized Crude Oil and JP4 to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 24A . . . .	42
F-3 Temperature Tolerance in °C for Generalized Crude Oil and JP4 to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 54A . . . .	42
F-4 Gravity Tolerance in °API for Generalized Crude Oil and JP4 to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 6A . . . .	43
F-5 Relative Density Tolerance for Hydrocarbon Liquids to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 24A . . . . .	43
F-6 Density Tolerance for Hydrocarbon Liquids to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 54A . . . . .	43
F-7 Temperature Tolerance in °F for Generalized Products to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 6B . . . . .	44

	Page
F-8 Temperature Tolerance in °F for Generalized Products to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 24B. . . . .	44
F-9 Temperature Tolerance in °C for Generalized Products to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 54B. . . . .	44
F-10 Gravity Tolerance in °API for Generalized Products to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 6B. . . . .	45
F-11 Relative Density Tolerance for Generalized Products to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 24B. . . . .	45
F-12 Density Tolerance for Generalized Products to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 54B. . . . .	45
F-13 Temperature Tolerance in °F for Lubricating Oils to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 6D. . . . .	46
F-14 Temperature Tolerance in °C for Lubricating Oils to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 54D. . . . .	46
F-15 Gravity Tolerance in °API for Lubricating Oils to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 6D. . . . .	47
F-16 Density Tolerance for Lubricating Oils to Maintain Accuracy in <i>CTL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.1, Table 54D. . . . .	47
F-17 Temperature Tolerance in °F for Light Hydrocarbons to Maintain Accuracy in <i>CTL</i> of ±0.05 Percent Using GPA <i>Research Report 148</i> . . . . .	48
F-18 Temperature Tolerance in °C for Light Hydrocarbons to Maintain Accuracy in <i>CTL</i> of ±0.05 Percent Using GPA <i>Research Report 148</i> . . . . .	48
F-19 Relative Density Tolerance for Light Hydrocarbons to Maintain Accuracy in <i>CTL</i> of ±0.05 Percent Using GPA <i>Research Report 148</i> . . . . .	49
F-20 Relative Density Tolerance for Light Hydrocarbons to Maintain Accuracy in <i>CTL</i> of ±0.05 Percent Using GPA <i>Research Report 148</i> . . . . .	49
F-21 Pressure Tolerance in PSI for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.1. . . . .	50
F-22 Pressure Tolerance in kPa for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.1M. . . . .	50
F-23 Temperature Tolerance in °F for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.1. . . . .	51
F-24 Temperature Tolerance in °C for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.1M. . . . .	51
F-25 Gravity Tolerance in °API for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.1. . . . .	52
F-26 Density Tolerance for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.1M. . . . .	52
F-27 Pressure Tolerance in PSI for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.2. . . . .	53
F-28 Pressure Tolerance in kPa for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.2M. . . . .	53
F-29 Temperature Tolerance in °F for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.2. . . . .	54
F-30 Temperature Tolerance in °C for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.2M. . . . .	54
F-31 Relative Density Tolerance for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.2. . . . .	55
F-32 Density Tolerance for Hydrocarbon Liquids to Maintain Accuracy in <i>CPL</i> of ±0.02 Percent Using API <i>MPMS</i> Chapter 11.2.2M. . . . .	55
G-1 ELM System Uncertainty Example . . . . .	60



# Chapter 21—Flow Measurement Using Electronic Metering Systems

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

### 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	<i>Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Division 1 and Division 2</i>

ASTM<sup>1</sup>

D5002	<i>Test Methods for Density and Relative Density of Crude Oil by Digital Density Analyzer</i>
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### 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

<sup>1</sup>American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428.