

**Manual of Petroleum
Measurement Standards
Chapter 9.4—Continuous Density
Measurement Under Dynamic
(Flowing) Conditions**

FIRST EDITION, JANUARY 2018



AMERICAN PETROLEUM INSTITUTE

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Foreword

This standard, API *MPMS* Chapter 9.4, *Continuous Density Measurement Under Dynamic (Flowing) Conditions*, First Edition, supersedes API *MPMS* Chapter 14.6, *Continuous Density Measurement*, Second Edition, which is withdrawn.

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Contents

	Page
1 Scope	1
2 Field of Application	1
3 Normative References	1
3.1 API Manual of Petroleum Measurement Standards (MPMS)	1
3.2 ASTM	2
3.3 GPA	3
3.4 OIML	3
4 Terms, Definitions, and Symbols	3
4.1 Terms and Definitions	3
4.2 Symbols, Acronyms, and Abbreviations	8
5 Safety Precautions	12
5.1 Overview	12
5.2 Equipment Design	12
5.3 Operation	13
6 Density Determination Methods	13
7 Equipment	14
7.1 General	14
7.2 Vibrating Element (Natural Resonance)	15
7.3 Vibrating Element (Fixed Frequency)	16
7.4 Acoustic	16
7.5 Nuclear	16
7.6 Continuous Weighing	17
7.7 Buoyancy	17
7.8 Hydrostatic Pressure	17
7.9 Gas Chromatograph (GC)	18
8 Applications of Continuous Density Measurement	18
8.1 Overview	18
8.2 Quantity Applications	18
8.3 Quality Determination	20
8.4 Interface Detection	20
8.5 Inventory Control/Process Control	20
9 Performance Requirements- System and Density Meter	20
9.1 General	20
9.2 Inferred Mass Flow Measurement	21
9.3 Volumetric Measurement	21
9.4 Volume from Direct Mass	22
9.5 Other Density Measurement Applications	22
10 Design of Density Measurement System	23
10.1 General	23
10.2 Application Considerations	23
10.3 Fluid Properties	24
10.4 Process Conditions	25
10.5 Density Meter and Method Selection	27
10.6 Sample System	29

Contents

Page

10.7	Sample Conditioning	31
10.8	Density Meter Signals	31
10.9	Mechanical Considerations	32
10.10	Installation Configurations	34
10.11	Verification and Proving Design Considerations	42
11	Proving, Verification, or Calibration of Liquid Density Meters	42
11.1	General	42
11.2	Representativeness	43
11.3	In-situ Proving	44
11.4	Methods for Proving, Verification, and Calibration (In-situ)	46
12	Calculations	48
12.1	Overview	48
12.2	Volume Correction Factor (VCF) Determination and Density	49
12.3	Density Conditions	50
12.4	Fluid Compressibility	51
12.5	Fluid Expansion/Contraction Due to Temperature	51
12.6	Density Computation Methods	51
12.7	Flow-weighting	52
12.8	Density Unit of Measure Conversions	52
	Annex A (informative) Density Sensitivity—Light Hydrocarbon Liquids	53
	Annex B (normative) Test Equipment—Pycnometer Calibration and Proving	68
	Annex C (normative) Pycnometer Calibration—Laboratory Method	72
	Annex D (normative) Density Meter Proving—Pycnometer Method	84
	Annex E (informative) Derivation of Air Buoyancy Equation	99
	Annex F (informative) Reference Fluids (Air and Water)	107
	Annex G (informative) Conversion Factors	110
	Annex H (normative) Offline Density Meter Factor Determination for Crude Oils and Viscous Fluids	118
	Annex I (normative) Density Used in Volume Calculation	122
	Annex J (informative) Concepts of Mass and Weight	123
	Bibliography	127
Figures		
1	Density Determination Methods	14
2	Vibrating-element Density Meters	15
3	Vibrating-element (Insertion) Density Meters	16
4	Nuclear Density Meters	17
5	Volume Measurement	34
6	Inferred Mass Flow Measurement	35
7	Multiple Meter Runs with Individual Density Meters	36
8	Typical Multiple Meter Run with Common Density Meter on Inlet	37
9	Slipstream-type Sampling System: Velocity Head Devices	38
10	Slipstream-type Sampling System: Valve Restriction Devices	38

Contents

Page

11	Slipstream-type Sampling System: Orifice Restriction Devices	39
12	Slipstream-type Continuous Density Sampling Systems: Pump Devices (for Light Hydrocarbons and Refined Products)	39
13	Insertion-type Sampling System—Pumped Density Prover Loop	40
14	In-line-type Sampling System with Pumped Density Prover Loop	40
15	Parallel Density Prover Loop	41
16	Parallel Pumped Density Prover Loop	41
17	Double-wall Vacuum Sphere Pycnometer	45
18	Density Meter Calculation Sequence	49
C.1	Vacuum Filling the Water Reservoir (Laboratory Calibration) (optional procedure)	76
C.2	Deaerating the Water Reservoir (Laboratory Calibration)	76
C.3	Vacuum Emptying the Pycnometer	77
C.4	Pycnometer Calibration Test Apparatus	78
C.5	Reinstallation of Test Tubing	80
C.6	Optional E_t Test Apparatus	83
E.1	Net Forces on Pycnometer	99
F.1	Buoyancy Illustration	107
J.1	Report of Mass Values	125

Tables

1	Typical Density Meter Performance Expectations at 0.25 % Total Measurement System Uncertainty	21
A.1	Density Sensitivity for 0.2 °F Difference for Fluid Temperatures Between 40 °F and 100 °F and Pressures Between 400 psig and 1200 psig	53
A.2	Density Sensitivity for 1 psi Difference For Fluid Pressures Between 400 psig and 1200 psig and Temperatures Between 40 °F and 100 °F	60
A.3	Composition Matrix	67
C.1	Test Equipment for Laboratory Calibration of a Pycnometer	74
C.2	Pycnometer Certificate Heading	81
C.3	Pycnometer Weights and Volume	82
C.4	Pycnometer Report Calibration Devices	82
C.5	Pycnometer Report Test Run Data	83
D.1	Proving Report Heading	96
D.2	Proving Report Density Meter Data	96
D.3	Proving Report Field Calibration Data	96
D.4	Proving Report Pycnometer Identification Data	97
D.5	Proving Report Proving Data and Calculations	98
G.1	Density Conversion Factors (SI units to SI units)	111
G.2	Density Conversion Factors (SI units to USC units)	112
G.3	Density Conversion Factors (USC units to SI Units)	112
G.4	Density Conversion Factors (USC Units to USC Units—lb/gal and RD)	112
G.5	Density Conversion Factors (USC Units to USC Units – lb/gal, RD and °API)	113
G.6	Temperature Conversion Units (SI and USC)	114
G.7	Pressure Conversion Units (SI and USC)	115
G.8	Dynamic (Absolute) Viscosity Conversion Units (SI and USC)	117
G.9	Kinematic Viscosity Conversion Units (SI and USC)	117

Continuous Density Measurement Under Dynamic (Flowing) Conditions

1 Scope

This standard covers the continuous on-line determination and application of flowing liquid densities for custody transfer. This standard covers liquid and dense phase fluids, including: natural gas liquids, refined products, chemicals, crude oil, and other liquid products commonly encountered in the petroleum industry. This document does not apply to the density measurement of natural gas, LNG, multiphase mixtures, semi-solid liquids such as asphalt, and solids such as coke and slurries.

This standard also provides criteria and procedures for designing, installing, operating, and proving continuous on-line density measurement systems for custody transfer. This standard also discusses the different levels and requirements of accuracy for various applications.

2 Field of Application

The application of this standard provides a minimum set of requirements for density measurement applications, including custody transfer. In all cases, the measured density has to accurately represent the density of the flowing stream. Accurate density measurements are essential for custody transfer and for many quantitative purposes. For allocation measurement and process control applications, this standard can be used as a guide.

Common technologies utilized in continuous density measurement include vibrating element, buoyancy, and nuclear devices. The most widely utilized device in custody transfer applications is the vibrating element.

This standard also includes analytical systems that work in conjunction with equations of state or empirically derived calculations to determine the flowing density.

3 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

3.1 API Manual of Petroleum Measurement Standards (MPMS)

API MPMS Chapter 8.1, *Standard Practice for Manual Sampling Petroleum and Petroleum Products*

API MPMS Chapter 8.2, *Standard Practice for Automatic Sampling of Petroleum and Petroleum Products*

API MPMS Chapter 8.5, *Standard Practice for Manual Piston Cylinder Sampling for Volatile Crude Oils, Condensates, and Liquid Petroleum Products*

API MPMS Chapter 9.1, *Standard Test Method for Density, Relative Density or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method*

API MPMS Chapter 9.2, *Standard Test Method for Density or Relative Density of Light Hydrocarbons by Pressure Hydrometer*

API MPMS Chapter 9.3, *Standard Test Method for Density, Relative Density, and API Gravity of Crude Petroleum and Liquid Petroleum Products by Thermohydrometer Method*