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

ANSI/API MPMS CHAPTER 9.4
FIRST EDITION, JANUARY 2018

REAFFIRMED, MAY 2026

American Petroleum Institute

Approved American National Standard ANSI

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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First Edition, supersedes API *MPMS* Chapter 14.6, *Continuous Density Measurement*, Second Edition, which is withdrawn.

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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*