

API MPMS Chapter 20.3

Measurement of Multiphase Flow

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This standard addresses multiphase flow measurement in the production environment, upstream of the custody transfer (single-phase) measurement point, where allocation measurement for onshore, offshore, or subsea is applied. For other multiphase flow measurement applications such as reservoir management, well tests, and flow assurance, the standard can be used as a reference or guide. However, the focus of this standard is on those applications where the accuracy of multiphase flow measurement for allocation systems is required.

This document refers to existing standards and recommended practices to supplement the guidance it provides in this subject area. The document addresses principles used in multiphase flow measurement, multiphase metering types and classifications, assessment of expected performance, and selecting and operating multiphase measurement systems. Operational requirements or constraints are addressed, including expectations for flow meter acceptance, calibration criteria, flow loop and in situ verifications, and other guidance specific to different multiphase flow metering applications. The document does not address specific meter configurations.

This edition of *API Manual of Petroleum Measurement Standards (MPMS) Chapter 20.3* supersedes API Recommended Practice 86-2005, which is withdrawn.

This edition of API MPMS Chapter 20.3 also supersedes the below listed sections of API MPMS Chapter 20.1, *Allocation Measurement*, First Edition, 1993:

- Section 1.16.1—Flow Measurement Systems,
- Section 1.16.3—Proving and Calibration Techniques and Equipment,
- Section 1.16.3.1—Equipment Considerations,
- Section 1.16.3.2—Field Test Separators, and
- Section 1.16.3.3—Portable Test Separators.

This edition of API MPMS Chapter 20.3 also supersedes the below listed sections of API Recommended Practice 85, *Use of Subsea Wet-gas Flowmeters in Allocation Measurement Systems*, First Edition, 2003:

- Section 4—Subsea Meter Calibration and Testing,
- Section 6.1—Overview,
- Section 6.2—Normal Operating Conditions Over Field Life,
- Section 6.2.1—Pressure,
- Section 6.2.2—Temperature,
- Section 6.2.3—Flow Rates,
- Section 6.2.4—Gas and Liquid Volume Fractions (GVF/LVF),

- Section 6.2.5—Water Volume Fraction, Watercut,
- Section 6.2.6—Fluid Properties,
- Section 6.3—Measurement Uncertainty Expected for Normal Operating Conditions,
- Section 6.4—Design Considerations,
- Section 6.4.1—External Design Pressure,
- Section 6.4.2—Internal Design Pressure,
- Section 6.4.3—Material Selection and Manufacture,
- Section 6.4.4—Erosion and Corrosion,
- Section 6.4.5—Hydrate Susceptibility Analysis,
- Section 6.4.6—In-situ Re-Calibration,
- Section 6.4.7—Sensor Redundancy,
- Section 6.4.8—Leak Path Minimization,
- Section 6.4.9—Installability/Removability from Service,
- Section 6.4.10—Stresses Due to Environmental Conditions,
- Section 6.4.10.1—Handling, Lifting and Installation,
- Section 6.4.10.2—Thermal Effects,
- Section 6.4.10.3—Pressure,
- Section 6.4.10.4—Hydrodynamic Loading,
- Section 6.4.10.5—Impact Loading,
- Section 6.4.11—Collapse,
- Section 6.4.12—Other Factors,
- Section 6.4.12.1—Sensor Accuracy,
- Section 6.4.12.2—Power Requirements,
- Section 6.4.12.3—Mechanical Protection,
- Section 6.4.12.4—Software Development,
- Section 6.5—Installation Effects on Measurement,
- Section 6.6—Additional Testing on Measurement Systems
- Section 6.6.1—Systems Integration Test (SIT),
- Section 6.6.2—Installation Demonstration,
- Section 6.6.3—Software Testing,
- Section 6.7—Routine Verification,
- Section 6.7.1—Comparison of Redundant Sensors,
- Section 6.7.2—Monthly System Balance Check,
- Section 6.7.3—Sensor Zero and Offset check at Shut-in,
- Section 6.7.4—Other Recommended Diagnostics.

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