Manual of Petroleum Measurement Standards Chapter 20.3

Measurement of Multiphase Flow

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Introduction

This standard addresses how the user measures multiphase flow rates of oil, gas, and water present in the production stream.

This document does not describe allocation or well testing methods. Refer to API *MPMS* Chapter 20.1 for direction on allocation methods and API *MPMS* Chapter 20.5 for direction on well testing.

This document does not describe the flow loop testing protocols or methods. Refer to API *MPMS* Chapter 22.7, *Flow Loop Testing Protocols*.

In this document, the use of multiphase metering systems is focused on the role they can play in production measurement and allocation applications. However, there are numerous other instances in which they can be extremely helpful. To preserve the focus on production measurement and allocation, these other instances will not be discussed in any depth.

Measurement of Multiphase Flow

1 Scope

This document addresses inline 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.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

API Recommended Practice 17S, *Design, Testing, and Operation of Subsea Multiphase Flow Meters*

API MPMS Chapter 20.5, *Recommend Practice for Application of Production Well Testing in Measurement and Allocation*

API MPMS Chapter 22.7, *Flow Loop Testing Protocol*

3 Terms, Definitions, Abbreviations, and Symbols

3.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply. The definitions for many terms used in this document can be found in ISO/IEC Guide 98-3:2008 [13] unless specified otherwise.

3.1.1
actual conditions
Line conditions, flowing conditions, conditions of pressure and temperature of the fluid at the point where fluid properties or flows are measured or calculated.

3.1.2
allocation
The mathematical process of determining the proportion of produced fluids from individual entities (zones, wells, fields, leases, or producing units) when compared with the total production from the entire system (reservoir, production system, and gathering systems) to determine value or ownership to attribute to each entity.

3.1.3
allocation measurement
Measurement systems and procedures required to perform a fair and equitable allocation.

NOTE Such systems and procedures may not meet full custody transfer standards of measurement while still being sufficient for allocation purposes.