Manual of Petroleum Measurement Standards Chapter 14—Natural Gas Fluids Measurement

Section 1—Collecting and Handling of Natural Gas Samples for Custody Transfer

SEVENTH EDITION, MAY 2016

ADDENDUM, AUGUST 2017
ERRATA, AUGUST 2017

energy API®
AMERICAN PETROLEUM INSTITUTE

Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven, sound engineering and operating practices. These publications are not intended to obviate the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

Foreword

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually by API, 1220 L Street, NW, Washington, DC 20005.

Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

Contents

Contents

Figures

Contents

Introduction

This standard concentrates on proper sampling systems and procedures. It recognizes the critical impact of hydrocarbon dew point consideration to the overall accuracy and success of these practices and procedures. Analyses of gas samples are used for many purposes and are applied to various calculations, some of which have an impact on the accuracy of custody transfer calculations (quantity and quality).

Inaccuracies can result from using:

a) inappropriate sampling techniques and/or equipment,

b) inappropriate sample conditioning and handling,

c) samples collected from non-representative locations and/or under non-representative operating conditions, and/or

d) inappropriate analytical methods.

Analyses from samples can be utilized in many different ways, including the following:

a) calculations to determine the heating value, volumetric flow rate, total energy, density, viscosity, hydrocarbon dew point, and compressibility;

b) calculations to determine the gallons per thousand standard cubic feet (liters per cubic meter) of recoverable liquid product from the stream;

c) identification of contaminants contained in the gas stream;

d) compositional information used for process design and to determine whether the stream meets contractual specifications.

This standard incorporates guidelines and recommendations for obtaining representative samples safely. It should be useful as a resource document for training programs as well. This standard attempts to consider both sweet and sour gas streams as well as high- and low-pressure applications. Streams at or above the hydrocarbon dew point temperature, and streams that may contain water vapor up to the point of saturation are addressed.

It is not the intent of this standard to recommend particular equipment suppliers or manufacturers.

Although economic, regulatory, compositional, and contractual considerations must always be evaluated and identified, samples should be collected on a flow-proportional or flow-weighted basis whenever practical. Spot samples, by their nature, cannot fully represent a gas stream of varying composition. Time proportional samplers, particularly if they continue to sample even when flow has stopped, are not capable of accurately characterizing natural gas streams that have variable compositions.

Sampling systems and procedures not in compliance with this guideline may result in errors. Upgrading existing facilities and practices to comply with this standard is strongly encouraged but shall be at the discretion of the parties involved.

Chapter 14—Natural Gas Fluids Measurement
Section 1—Collecting and Handling of Natural Gas Samples for Custody Transfer

1 Scope

The purpose of this standard is to provide a comprehensive guideline for properly collecting, conditioning, and handling representative samples of natural gas that are at or above their hydrocarbon dew point.

The standard considers spot, composite, continuous, and mobile sampling systems. This standard does not include sampling of liquid streams.

This standard includes comments identifying special areas of concern or importance for each sampling method included. It is intended for custody transfer measurement systems and may be applicable to allocation measurement systems.

The accuracy of moisture determinations from samples collected using the recommendations in this standard has not been determined.

This standard does not include sampling multi-phase flow (free liquid and gas) or supercritical fluids.

2 Normative References

The current editions of the following standards, codes, and specifications are cited in this standard:

ASTM[1] D1142*Standard Test Method for Water Vapor Content of Gaseous Fuels by Measurement of Dew-Point Temperature*

DOT 49 *Code of Federal Regulations*

EEMUA 138:1988*Design and Installation of On-Line Analyser Systems*

GPA Std 2166*Obtaining Natural Gas Samples for Analysis by Gas Chromatography*

GPA Std 2261*Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography*

NACE MR-01-75*Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment*

3 Terms and Definitions

For the purposes of this document, the following definitions apply.

3.1
absorption
Occurs when natural gas constituents are dissolved into a liquid or solid that is not considered to be the mixture's liquid phase.

3.2
adsorption
Occurs when a thin film of molecules adheres to a liquid or solid surface.

[1]ASTM International, 100 Bar Harbor Drive, West Conshokocken, Pennsylvania 19428-2959, www.astm.org.