



Standard Practice for Natural Gas Sample-Handling and Conditioning Systems for Pipeline Instrumentation¹

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1. Scope

1.1 This practice covers sample-handling and conditioning systems for typical pipeline monitoring instrumentation (gas chromatographs, moisture analyzers, and so forth). The selection of the sample-handling and conditioning system depends upon the operating conditions and stream composition.

1.2 This practice is intended for single-phase mixtures that vary in composition. A representative sample cannot be obtained from a two-phase stream.

1.3 The values stated in SI units are to be regarded as standard. The values stated in English units are for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D1142 Test Method for Water Vapor Content of Gaseous Fuels by Measurement of Dew-Point Temperature
D3764 Practice for Validation of the Performance of Process Stream Analyzer Systems

2.2 Other Standards:

ANSI/API 2530 (AGA Report Number 3)³
AGA Report Number 8⁴
NACE Standard MR-01-75⁵

¹ This practice is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.01 on Collection and Measurement of Gaseous Samples.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from American Gas Association, 1515 Wilson Blvd., Arlington, VA 22209.

⁵ Available from NACE International (NACE), 1440 South Creek Dr., Houston, TX 77084-4906, <http://www.nace.org>.

3. Terminology

3.1 Definitions:

3.1.1 *compressed natural gas*—natural gas compressed to approximately 3600 psi.

3.1.2 *density*—mass per unit volume of the substance being considered.

3.1.3 *dew point*—the temperature and pressure at which the first droplet of liquid forms from a vapor.

3.1.4 *lag time*—time required to transport the sample to the analyzer.

3.1.5 *natural gas*—mixture of low molecular weight hydrocarbons obtained from petroleum-bearing regions.

3.1.6 *sample probe*—device to extract a representative sample from the pipeline.

3.1.7 *system turnaround time*—the time required to transport the sample to the analyzer and to measure the desired components.

4. Significance and Use

4.1 A well-designed sample-handling and conditioning system is essential to the accuracy and reliability of pipeline instruments. Approximately 70 % of the problems encountered are associated with the sampling system.

5. Selection of Sample-Handling and Conditioning System

5.1 The sample-handling and conditioning system must extract a representative sample from a flowing pipeline, transport the sample to the analyzer, condition the sample to be compatible with the analyzer, switch sample streams and calibration gases, transport excess sample to recovery (or disposal), and resist corrosion by the sample.

5.2 The sample probe should be located in a flowing pipeline where the flow is fully developed (little turbulence) and where the composition is representative. In areas of high turbulence, the contaminants that normally flow along the bottom or the wall of the pipeline will form aerosols.

5.3 The purpose of the sample probe is to extract a representative sample by obtaining it near the center of the pipeline where changes in stream composition can be quickly detected.