Designation: D 5287 – 97

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Practice for Automatic Sampling of Gaseous Fuels[1]

This standard is issued under the fixed designation D 5287; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the collection of natural gases and their synthetic equivalents using an automatic sampler.

1.2 This practice applies only to single-phase gas mixtures that vary in composition. A representative sample cannot be obtained from a two-phase stream.

1.3 This practice includes the selection, installation, and maintenance of automatic sampling systems.

1.4 This practice does not include the actual analysis of the acquired sample. Other applicable ASTM standards, such as Test Method D 1945, should be referenced to acquire that information.

1.5 The selection of the sampling system is dependent on several interrelated factors. These factors include source dynamics, operating conditions, cleanliness of the source gases, potential presence of moisture and hydrocarbon liquids, and trace hazardous components. For clean, dry gas sources, steady source dynamics, and normal operating conditions, the system can be very simple. As the source dynamics become more complex and the potential for liquids increases, or trace hazardous components become present, the complexity of the system selected and its controlling logic must be increased. Similarly, installation, operation, and maintenance procedures must take these dynamics into account.

1.6 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.7 *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:*

D 1945 Test Method for Analysis of Natural Gas by Gas Chromatography[2]

2.2 *Other Standards:*

AGA Report Number 7 Measurement of Gas by Turbine Meters[3]

API 14.3 Part 2 (AGA Report Number 3)[4]

GPA Standard 2166 Methods of Obtaining Natural Gas Samples for Analysis by Gas Chromatography[5]

NACE Standard MR-01-75 Standard Material Requirements. Sulfide Stress Cracking Resistant-Metallic Materials for Oilfield Equipment[6]

2.3 *Federal Documents:*

Code of Federal Regulations, Title 49, 173, 34(e), p. 389[7]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *automatic sampler*—(see Fig. 1(*a*) and (*b*)) a mechanical system, composed of a sample probe, sample loop, sample extractor, sample vessel, and the necessary logic circuits to control the system throughout a period of time, the purpose of which is to compile representative samples in such a way that the final collection is representative of the composition of the gas stream.

3.1.2 *representative sample*—a volume of gas that has been obtained in such a way that the composition of this volume is the same as the composition of the gas stream from which it was taken.

3.1.3 *retrograde condensation*—the formation of liquid phase by pressure drop at constant temperature on a dew-point gas stream.[8]

3.1.4 *sample extractor*—a device to remove the sample from the sample loop and put it into the sample vessel.

3.1.5 *sample loop*—the valve, tubing, or manifold(s), or combination thereof, used for conducting the gas stream from the probe to the sampling device and back to the source pipe (or atmosphere).

3.1.6 *sample probe*—that portion of the sample loop attached to and extending into the pipe containing the gas to be sampled.

3.1.7 *sample vessel*—the container in which the sample is collected, stored, and transported to the analytical equipment.

3.1.8 *source dynamics*—changes in gas supplies, operating pressures, temperatures, flow rate, and other factors that may affect composition or state, or both.

---

[1] This practice is under the jurisdiction of ASTM Committee D-3 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.01 and Collection and Measurement of Gaseous Samples. Originally published as D 5287 – 92. Last previous edition D 5287 – 92.

Current edition approved June 10, 1997. Published May 1998. Originally published as D 5287-92. Last previous edition D 5287 – 92.

[2] *Annual Book of ASTM Standards*, Vol 05.05.

[3] Available from American Gas Association, 8501 Pleasant Valley Rd., Cleveland, OH 44131.

[4] Available from the American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

[5] Available from Gas Processors Assn, 6526 E. 60th St., Tulsa, OK 74145.

[6] Available from National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77218.

[7] Available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

[8] Bergman, D. F., Tek, M. R., and Katz, D. L., *Retrograde Condensation in Natural Gas Pipelines*, American Gas Association, Arlington, VA, 1975.

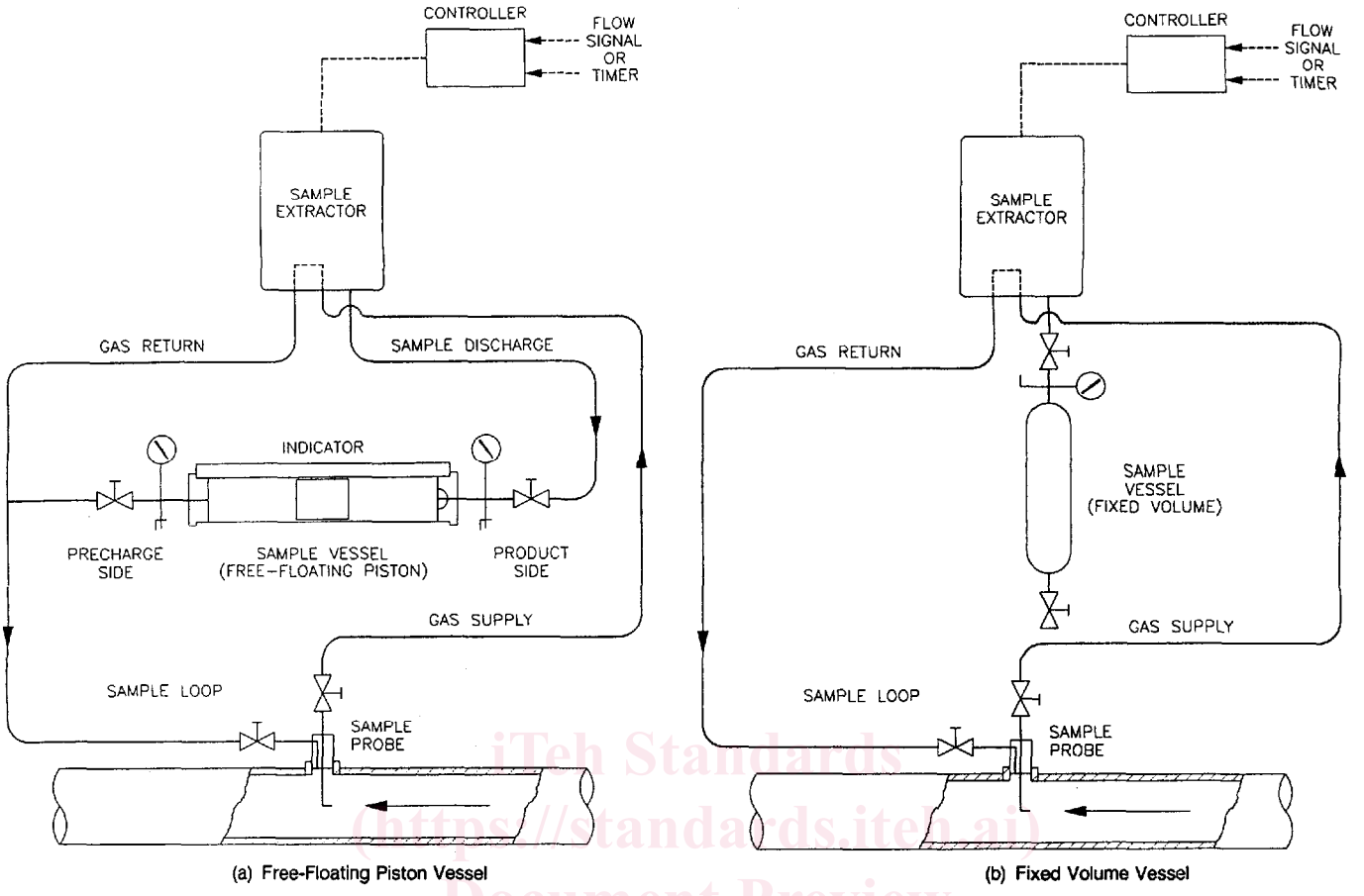

FIG. 1 Continuous Composite Samplers

4. Significance and Use

4.1 This practice should be used when and where a representative sample is required. A representative sample is necessary for accurate billing in custody transfer transactions.

4.2 This practice is not intended to preempt existing contract agreements.

4.3 Principles pertinent to this practice may be applied in most contractual agreements.

5. Material Selection

5.1 The sampling system should be constructed of materials that will not corrode as a result of ambient conditions.

5.2 The selected material should be inert to all expected components of the gas stream.

5.3 If sour gas (gas that contains hydrogen sulfide and carbon dioxide) is suspected, NACE standard MR-01-75 should be adhered to.

6. Sample Probe (see Figs. 2 and 3)

6.1 The sample probe should be mounted vertically in a horizontal run.

6.2 The sample probe should penetrate into the center one third of the pipeline.

6.3 The sample probe should not be located within the defined meter-tube region. (See API 14.3, Part 2, Paragraph 2.5.1).

6.4 The sample probe should be constructed of stainless steel.

6.5 The sample probe should be a minimum of five pipe diameters from any device that could cause aerosols or significant pressure drop.

7. Sample Loop (see Fig. 4)

7.1 All valves should be straight bore, full opening, stainless steel valves.

7.2 The sample loop should be ¼-in. (6.25-mm) or less outside diameter stainless steel tubing.

7.3 The supply line shall slope from the probe up to the sampler. All traps caused by low points shall be avoided.

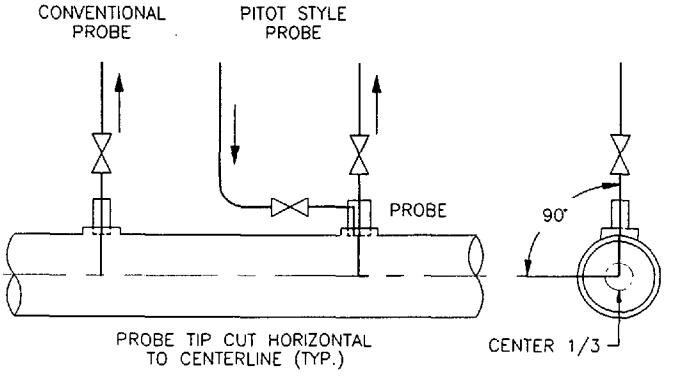

FIG. 2 Acceptable Probe Types and Installations