



Standard Practice for Sampling Stationary Source Emissions for the Automated Determination of Gas Concentrations¹

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1. Scope

1.1 This practice² covers procedures and equipment that will permit, within certain limits, representative sampling for the automated determination of gas concentrations of effluent gas streams. The application is limited to the determination of oxygen (O_2), carbon dioxide (CO_2), carbon monoxide (CO), sulfur dioxide (SO_2), nitric oxide (NO), nitrogen dioxide (NO_2) and total oxides of nitrogen (NO_x).

1.2 Velocity measurements are required to determine the mass flow rates of gases. This is not included in this practice.

1.3 There are some combustion processes and situations that may limit the applicability of this practice. Where such conditions exist, caution and competent technical judgment are required, especially when dealing with any of the following:

- 1.3.1 Corrosive or highly reactive components,
- 1.3.2 High vacuum, high pressure, or high temperature gas streams,
- 1.3.3 Wet flue gases,
- 1.3.4 Fluctuations in velocity, temperature, or concentration due to uncontrollable variation in the process,
- 1.3.5 Gas stratification due to the non-mixing of gas streams,
- 1.3.6 Measurements made using environmental control devices, and
- 1.3.7 Low levels of gas concentrations.

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.* For more specific safety precautions, refer to 5.1.4.8, 5.2.1.6, and 6.2.2.1.

¹ This practice is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.03 on Ambient Atmospheres and Source Emissions.

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² This practice is based on ISO 10396, “Stationary source emissions—Sampling for the automated determination of gas concentrations,” available from International Organization for Standardization, Casa Postale 56, CH-1211, Geneva, Switzerland.

2. Referenced Documents

2.1 ASTM Standards:³

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D1608 Test Method for Oxides of Nitrogen in Gaseous Combustion Products (Phenol-Disulfonic Acid Procedures)

D3154 Test Method for Average Velocity in a Duct (Pitot Tube Method)

2.2 Other Document:

40 CFR Part 60, Standards of Performance for Stationary Sources, Appendix A, Test Methods 2, 3, 3a, 6, 6c, 7, 7e, and 10⁴

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this practice, refer to Terminology D1356.

4. Summary of Practice

4.1 This practice describes representative sampling of gases in a duct, including both extractive and non-extractive sampling. In extractive sampling, these gases are conditioned to remove aerosols, particulate matter, and other interfering substances before being conveyed to the instruments. In non-extractive sampling, the measurements are made in-situ; therefore, no sample conditioning except filtering is required.

4.1.1 *Extractive Sampling*—Extractive sampling includes extraction of the sample, removal of interfering materials, and maintenance of the gas concentration throughout the sampling system for subsequent analysis by appropriate instrumentation (see Fig. 1).

4.2 *Non-extractive Sampling*—Non-extractive sampling does not involve removal of a sample, and sampling is confined to the gas stream in the stack or duct (see Figs. 2 and 3).

³ 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.

⁴ Available from Supt. of Documents, U.S. Government Printing Office, Washington, DC 20402.