

EMISSION MEASUREMENT TECHNICAL INFORMATION CENTER NSPS TEST METHOD

Method 7E - Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)

1. APPLICABILITY AND PRINCIPLE

- 1.1 Applicability. This method is applicable to the determination of nitrogen oxides (NO_x) concentrations in emissions from stationary sources only when specified within the regulations.
- 1.2 Principle. A sample is continuously extracted from the effluent stream; a portion of the sample stream is conveyed to an instrumental chemiluminescent analyzer for determination of NO_x concentration. Performance specifications and test procedures are provided to ensure reliable data.

2. RANGE AND SENSITIVITY

Same as in Method 6C, Sections 2.1 and 2.2.

3. DEFINITIONS

- **3.1 Measurement System.** The total equipment required for the determination of NO_x concentration. The measurement system consists of the following major subsystems:
- **3.1.1** Sample Interface, Gas Analyzer, and Data Recorder. Same as in Method 6C, Sections 3.1.1, 3.1.2, and 3.1.3.
- **3.1.2** NO_2 to NO Converter. A device that converts the nitrogen dioxide (NO_2) in the sample gas to nitrogen oxide (NO).
- 3.2 Span, Calibration Gas, Analyzer Calibration Error, Sampling System Bias, Zero Drift, Calibration Drift, and Response Time. Same as in Method 6C, Sections 3.2 through 3.8.
- **3.3 Interference Response.** The output response of the measurement system to a component in the sample gas, other than the gas component being measured.

4. MEASUREMENT SYSTEM PERFORMANCE SPECIFICATIONS

Same as in Method 6C, Sections 4.1 through 4.4.

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5. APPARATUS AND REAGENTS

- 5.1 Measurement System. Use any measurement system for $\mathrm{NO_x}$ that meets the specifications of this method. A schematic of an acceptable measurement system is shown in Figure 6C-1 of Method 6C. The essential components of the measurement system are described below:
- 5.1.1 Sample Probe, Sample Line, Calibration Valve Assembly, Moisture Removal System, Particulate Filter, Sample Pump, Sample Flow Rate Control, Sample Gas Manifold, and Data Recorder. Same as in Method 6C, Sections 5.1.1 through 5.1.9, and 5.1.11.
- **5.1.2** NO_2 to NO Converter. That portion of the system that converts NO_2 in the sample gas to NO. A NO_2 to NO converter is not necessary if the NO_2 portion of the exhaust gas is less than 5 percent of the total NO_x concentration.
- 5.1.3 NO_x Analyzer. An analyzer based on the principles of chemiluminescence to determine continuously the NO_x concentration in the sample gas stream. The analyzer must meet the applicable performance specifications of Section 4. A means of controlling the analyzer flow rate and a device for determining proper sample flow rate (e.g., precision rotameter, pressure gauge downstream of all flow controls, etc.) must be provided at the analyzer.
- **5.2** NO_x Calibration Gases. The calibration gases for the NO_x analyzer shall be NO in N_2 . Use four calibration gases as specified in Method 6C, Sections 5.3.1 through 5.3.3. Ambient air may be used for the zero gas.

6. MEASUREMENT SYSTEM PERFORMANCE TEST PROCEDURES

Perform the following procedures before measurement of emissions (Section 7).

- **6.1 Calibration Gas Concentration Verification.** Same as in Method 6C, Section 6.1, except if calibration gas analysis is required, use Method 7, and change all 5 percent performance values to 10 percent (or 10 ppm, whichever is greater).
- **6.2 Interference Response.** Conduct an interference response test of the analyzer prior to its initial use in the field. Thereafter, recheck the measurement system if changes are made in the instrumentation that could alter the interference response (e.g., changes in the gas detector). Conduct the interference response in accordance with Section 5.4 of Method 20.

- **6.3** Measurement System Preparation, Analyzer Calibration Error, Response Time, and Sample System Bias Check. Same as in Method 6C, Sections 6.2 through 6.4.
- **6.4** NO_2 to NO Conversion Efficiency. If the NO_2 concentration within the sample stream is greater than 5 percent of the NO_x concentration, conduct an NO_2 to NO conversion efficiency test in accordance with Section 5.6 of Method 20.

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7. EMISSION TEST PROCEDURE

- 7.1 Selection of Sampling Site and Sampling Points. Select a measurement site and sampling points using the same criteria that are applicable to tests performed using Method 7.
- 7.2 Sample Collection. Position the sampling probe at the first measurement point, and begin sampling at the same rate as used during the response time test. Maintain constant rate sampling (i.e., ±10 percent) during the entire run. The sampling time per run shall be the same as the total time required to perform a run using Method 7 plus twice the average system response time. For each run, use only those measurements obtained after twice the response time of the measurement system has elapsed to determine the average effluent concentration.
- 7.3 Zero and Calibration Drift Test. Same as in Method 6C, Section 7.4.

8. EMISSION CALCULATION

Same as in Method 6C, Section 8.

BIBLIOGRAPHY

Same as the bibliography of Method 6C.