

Performance Specification 19 (PS-19)

Specifications and Test
Procedures for Ethylene Oxide
(EtO) Continuous Emission
Monitoring Systems (CEMS) in
Stationary Sources



New PS, added by instructor

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PS-19 Overview

PS-19 is used to evaluate the acceptability of EtO continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in the regulations.

The specification includes requirements for initial acceptance including instrument accuracy and stability assessments and use of audit samples if they are available.

Additional CEMS components may be necessary to convert the units reported by the CEMS to the units of the standard.



New PS, added by instructor

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CEMS Installation and Measurement Location Specifications

- Must be accessible and representative.
- At least two equivalent diameters downstream from the nearest control device, the point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate may occur and one-half an equivalent diameters upstream from the effluent exhaust or control device
- Single point sample gas extraction should be no less than 1.0 m (3.3 ft.) from the stack or duct wall or be within the centroidal area of the stack or duct cross section
- Not required that the Relative Accuracy (RA) sampling location to be the same as CEMS location



New PS, added by instructor

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Interference Test Procedure

- Prior to its initial use in the field, you must demonstrate that your monitoring system meets the performance requirements of the interference test
- Must be conducted in a controlled environment
- Perform the interference check using an EtO reference gas concentration of approximately ten times the LOD or at 50 parts per billion, whichever is greater
- Introduce the interference test gases
- Measure the baseline EtO response, followed by the response after adding the interference test gas(es) while maintaining a constant EtO concentration
- Perform each interference gas injection and evaluation in triplicate
- The sum of the interference response(s) from Equation 2 must not be greater than 2.5 percent of the calibration span or ± 3.0 percent of the equivalent EtO concentration used for the interference test, whichever is less restrictive.
- The results are also acceptable if the sum of the interference response(s) does not exceed ten times the LOD or 30 ppbv



New PS, added by instructor

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Performance and Equipment Specifications: CalibrationDrift

- Source owners or operators of CEMS must check, record, and quantify the CD at two levels, using a zero gas and high-level gas at least once daily
- The daily zero-and high-level CD must not exceed two times the drift limits specified
- The zero- and high-level calibration drift for the CEMS must not exceed 5.0 percent of the span value or an absolute difference of 10.0 ppbv for 7 consecutive operating days

Calibration Drift



New PS, added by instructor

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Performance and Equipment Specifications:Measurement Error

- The measurement error test must be performed at the same time as the calibration drift test when the system is being placed in service or any time a substantive change has been made to the measurement system
- Introduce zero and 3 reference gas concentrations, 3runs
- Determine the average of the three CEMS responses
- The ME must be less than or equal to 5.0 percent of the span or an absolute difference of 10.0 ppbv value at the low-, mid-, and high-level reference gas concentrations

Measurement Error



New PS, added by instructor

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Reference Method Traverse Points Minimum Requirements

Sample at twelve traverse points located according to section 11.3 of Method 1 or
Establish a measurement line through the stack centroid that includes three traverse points at:

- 16.7,
- 50.0, and
- 83.3% of the duct/stack diameter

Alternate:

- Conduct a stratification test to justify sampling at a single point

New PS, added by instructor

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Performance and Equipment Specifications: Relative Accuracy

- Unless otherwise specified in an applicable regulation, use Method 320 as the RM for EtO measurement
- Conduct the RA test during representative process and control operating conditions (minimum of 9 runs)
- RA must be less than or equal to 20.0 percent of the RM when RM_{avg} is used in the denominator

Relative Accuracy

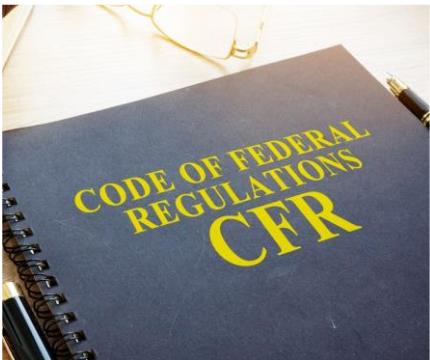


New PS, added by instructor

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Quality Assurance Procedure 7

- PS-19 uses QA procedure 7
 - Calibration Drift (CD) checks of CEMS
 - CD determination and adjustment of CEMS
 - Routine and preventative maintenance of CEMS (including spare parts inventory)
 - Data recording, calculations, and reporting
 - Accuracy audit procedures for CEMS including reference method(s)
 - Program of corrective action for malfunctioning CEMS



New PS, added by instructor

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Procedure 7 – Checks/Auditing Requirements

Daily	Quarterly	Annual
<ul style="list-style-type: none">• CD at two concentration values – zero and high-level• Out of control checks for excessive CD	<ul style="list-style-type: none">• Audits at least once each quarter	<ul style="list-style-type: none">• Annual audit at least once every four consecutive calendar quarters• RATA – conducted at least once every four calendar quarters

New PS, added by instructor

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Commonly Used Technologies: Cavity Ring-Down Spectrometry and Fourier Transform Infrared

Cavity Ring -Down Spectrometry (CRDS)

- Measures the ring-down time of an optical signal in a highly reflective cavity
 - A laser pulse is trapped in a highly reflective detection cavity
 - The intensity of the trapped pulse will decrease by a fixed percentage during each round trip within the cell due to absorption, scattering by the medium within the cell, and reflectivity losses
 - The intensity of light within the cavity is then determined as an exponential function of time.
- Detection limit < 100 ppt



Fourier Transform Infrared (FTIR)

- Converts the infrared (IR) radiation absorbed by a compound into an absorbance spectrum
- Detection limit ~ 100 ppt



New PS, added by instructor

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