

GLOSSARY

Term	Definition
A	
Analyte Calibration	The method of determining the FTIR detector response to a known concentration of target compounds or pollutants.
Analyte Spike	For FTIR, the target analyte(s) is spiked at the outlet of the sampling probe, upstream of the particulate filter, and combined with effluent at a ratio of about 1-part spike to 9 parts effluent.
Analyzer/Measurement Method	The portion of the CEMS that senses the gas or particulate and generates an output proportional to the gas or particulate concentration.
Audit Sample	Unknown concentration of target analyte(s) analyzed by a CEMS operator.
Audit Spectra	Analytical results must be within ± 5 percent of the certified audit concentration for each analyte (plus the uncertainty in the audit concentration). Only tests the analytical program of Fourier Transform Infrared Spectroscopy (FTIR) CEMS.
B	
Beta Gauge Particulate Matter (PM) Continuous Emission Monitoring Systems (CEMS)	A beta gauge PM CEMS uses a beta radiation source and an adhesive filter tape material which collects the PM material at predetermined intervals. The collected PM on the filter tape attenuates the beta radiation, the amount of attenuation being proportional to the mass of collected PM, and independent of particle characteristics.
C	
Calibration Drift (CD)	The difference in continuous emission monitoring systems (CEMS) output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.
Calibration Drift (CD) Assessment	The daily check of the difference in the CEMS readings from a known value, usually a calibration gas.

Term	Definition
Calibration Drift (CD) Test	A test to determine the magnitude of the CD each day for 7 consecutive calendar days. It is conducted at the zero and span values and must not deviate from the reference value by more than 2.5% of the span value.
Calibration Error (CE)	The difference between the concentration indicated by the CEMS and the known concentration generated by a calibration source when the entire CEMS (including the sampling interface) is challenged; CE test is performed to document the accuracy and linearity of the CEMS over the entire measurement range.
Cavity Ring-Down Spectroscopy (CRDS)	In CRDS, the beam from a single-frequency laser diode tuned to the absorbance of the gas being measured enters a cavity defined at least two high reflectivity mirrors with a path length in kilometers, making it extremely sensitive to very low concentrations of the target gas. When the laser is on, the cavity quickly fills with reflected laser light. A photodetector senses the small amount of light leaking through one of the mirrors to produce a signal that is directly proportional to the intensity in the cavity.
Centroid Area	Concentric area that is geometrically similar to the stack or duct cross section and is no greater than 1% of the stack or duct cross-sectional area.
Chemiluminescence Analyzer	Uses the light-emitting chemical reaction of NO and analyzer-generated ozone to measure the concentration of the NO in a gas sample. A successive measurement of the NO, plus NO converted from the NO ₂ in the sample, gives a total NO _x measurement; the difference being between the two measurements is equal to the NO ₂ concentration in the sample.
Clean Air Act (CAA)	The Clean Air Act is the United States federal law designed to control air pollution on a national level. The Act calls for states and EPA to solve multiple air pollution problems through

Term	Definition
	programs based on the latest science and technology information.
Continuous Emission Monitoring Systems (CEMS)	Total equipment necessary to determine a gas or particulate matter emission concentration. The total equipment includes sample extraction and transport hardware, analyzer/measurement method, data recording and processing hardware, and software.
Continuous Emission Rate Monitoring Systems (CERMS)	The total equipment required for determining and recording the pollutant mass emission rate (in terms of mass per unit of time).
Continuous Monitoring Systems (CMS)	Per 40 CFR, 63.2, continuous monitoring systems may include, but are not limited to, “continuous emission monitoring systems, continuous opacity monitoring systems, continuous parameter monitoring systems, or other manual or automatic monitoring that is used for demonstrating compliance with an applicable regulation on a continuous basis as defined by the regulation.”
Continuous Opacity Monitoring Systems (COMS)	The total equipment used to sample, analyze, and provide a permanent record of opacity.
Cylinder Gas Audit (CGA)	Performed as a quarterly audit of a CEMS. It is used to determine its accuracy.
D	
Diluent Analyzer	That portion of the CEMS that senses diluent gases (CO ₂ or O ₂) and generates an output proportional to the gas concentration.
Diluent Gas	A major gaseous constituent in a gaseous pollutant mixture. For combustion sources, either carbon dioxide (CO ₂) or oxygen (O ₂) or a combination of these two gases are the major gaseous diluents of interest.

Term	Definition
Dilution Extractive Systems	The sample gas is diluted with dry, contamination-free air to a level below the dew point of the diluted sample gas to eliminate condensation in the sample line. The diluted sample is measured by pollutant and CO ₂ monitors operating at or near ambient concentration ranges to provide concentration measurements on a wet basis.
E Extractive System	A CEMS where you withdraw flue gas from the stack and transport the gas to the analyzers. An extractive system may be either source-level or dilution.
F Flame Ionization Detector (FID)	Measures the current induced by ions attracted to and hitting a collector plate. The ions are formed by the combustion of organic compounds in a sample gas. A gas sample is extracted from the source through a heated sample line and heated filter to an FID. The FID measures the current, which is directly proportional to the concentration of volatile organic compounds in the sample. Results are reported as volume concentration equivalents of the calibration gas (usually methane or propane).
Fourier Transform Infrared Spectroscopy (FTIR)	An analytical technique used to obtain an infrared spectrum of absorption or emission of a gas. An FTIR spectrometer simultaneously collects high-spectral-resolution data over a wide spectral range. A Fourier Transform (a mathematical process) is required to convert the raw data into the actual spectrum which is compared to a library of spectra to find a match.
G Gas Chromatograph (GC)	Uses an inert carrier gas to transport the sample through a capillary column and separates the chemical constituents in the sample by their relative affinity for the column material. The constituents come off, or elute, from the column at different retention times, based on their specific chemical properties, and are measured by the chosen detector type, usually a Flame

Term	Definition
	Photometric Detector (FPD) or Thermal-conductivity Detector (TCD) for H ₂ S measurement.
Gas Filter Correlation (GFC)	A method is similar to NDIR, but instead of two parallel cells it uses a rotating filter wheel with a section of the wheel containing a sample of the gas being measured. The IR light passing through this gas is already absorbed before reaching the sample gas cell. The IR beam passes through the rotating wheel including the section with the gas, causing an alternating IR spectrum which then passes through the sample gas cell and is read by the detector.
Gas Velocity	The average velocity of the exhaust flowrate at the measurement location.
H	
I	
In-situ System	A CEMS where you have at least some part of their analysis subsystem mounted in the stack in direct contact with the flue gas.
J	
K	
L	
Light Scattering Particulate Matter (PM) Continuous Emission Monitoring Systems (CEMS)	A Light Scattering PM CEMS measures the light scattered by the entrained particulate in the stack exhaust, the amount of scattering being proportional to the particulate concentration, and affected by particle size, shape and color.
M	
Measurement Range	The full range of values that an analyzer is capable of measuring.
N	
Non-Dispersive Infrared (NDIR)	A type of infrared (IR) absorption spectroscopy using parallel sample and reference (non-absorbing) cells. It is one of the most commonly used IR methods. For the measurement of CO ₂ concentration, the IR light is filtered for a specific wavelength absorbed by CO ₂ , and the difference in intensity of the specific

Term	Definition
O	IR wavelength between the two cells is proportional to the CO ₂ concentration in the sample gas.
Opacity	The percentage of light that is attenuated by an optical medium.
Optical Alignment	Optical alignment is an indication of alignment that is objectively apparent relative to reference markers or conditions.
Out-of-Control (OOC)	An out-of-control (OOC) period occurs when a CEMS fails to meet the performance requirements. During an OOC period the data generated may not be used.
P	
Paramagnetic O ₂ Analyzer	In this analyzer, a sample gas containing oxygen is drawn into two parallel sample paths, one passing through a magnetic field and one not. The oxygen is attracted into the magnetic field path, with the rest of the sample being split between the two paths, and the difference between the two measured gas flow rates is proportional to the O ₂ content of the sample.
Performance Audit	A quantitative evaluation, which includes things such as a Cylinder Gas Audit (CGA), Relative Accuracy Test Audit (RATA), and Relative Accuracy Audit (RAA). Performance audit procedures are critical for verifying proper performance of the monitoring systems and identifying problems which may lead to inaccurate emissions accounting.
Performance Specifications (PS)	Performance specifications are used for evaluating the acceptability of the CEMS at the time of, or soon after installation, or whenever specified in the regulations.
Pitot Tubes	Use the differential pressure between the measurements of total pressure and the static pressure at a point in the stack to calculate the stack gas velocity and volumetric flowrate.

Term	Definition
Predictive Emission Monitoring Systems (PEMS)	The total equipment necessary to predict an emission concentration or emission rate.
Pulsed Fluorescence	Uses the property of SO ₂ molecules to absorb ultraviolet (UV) light and become excited at one wavelength, then decay to a lower energy state emitting UV light at a different wavelength, the measured emitted light corresponding to the concentration of SO ₂ in the sample gas. The pulsing of the UV source lamp allows the analyzer to use both the light and dark phases of the pulsed light to continuously detect and correct for electronic noise, and to measure lower pollutant concentrations.
Q Quality Assurance (QA)	Quality assurance (QA) procedures are used to evaluate the effectiveness of QC and the quality of data produced by any CEMS that are used for determining compliance with the emission standards on a continuous basis as specified in the applicable regulation.
Quality Control (QC)	Quality control (QC) is the procedures, policies, and corrective actions necessary to ensure product quality.
R Relative Accuracy (RA)	A measure of the accuracy of a facility's CMS when compared to a series of simultaneous measurements made by a reference method measurement system.
Relative Accuracy Audit (RAA)	An alternative quarterly audit procedure which correlates the CEMS data to simultaneously collected reference method (RM) data.
Relative Accuracy Test Audit (RATA)	The annual comparative evaluation of the CEMS performance using a RM. Consists of 9 or more RM test runs, each run being at least 21 minutes in duration.
Response Time	Time interval between the start of a step change in the system input and when the pollutant analyzer output reaches 95% of the final value.

Term	Definition
S	
Sample Interface	The portion of the system that is used for one or more of the following: sample acquisition, sample transportation, sample conditioning, or protection of the analyzer from the effects of the stack effluent.
Source-level Extractive System	The stack gas sample is withdrawn from the stack without conditioning or modification of the sample, other than coarse particulate removal, until it reaches the measurement system, where the sample is conditioned to remove any moisture and remaining fine particulate to prevent damage to the gas concentration analyzers. The sample line is heated to maintain the sample at stack gas temperature to prevent condensation that might scrub water-soluble pollutants and to prevent freezing in cold winter climates.
Span Value	The calibration portion of the measurement range as specified in the applicable regulation or other requirement.
Stratification	Difference in excess of 10% between the average concentration at any point more than 1 meter from the duct or stack wall.
System Calibration	Sampling system is purged with the calibration standard to verify that the absorbance measured is equal to the absorbance in the analyte calibration.
System/Field Audit	A qualitative evaluation involving an inspection. System or field audits are an opportunity to provide information to the source on the regulatory requirements, and for the inspector to observe monitoring practices that may lead to regulatory problems.
T	
Transmissometry	The measurement of the amount of light that can be transmitted through a stack exhaust.
Transmittance (Tr)	The percentage of light that is transmitted through an optical medium.

Term	Definition
Tunable Diode Laser (TDL)	TDL spectroscopy uses the absorbance spectra of target gases and the ability to tune the laser to a specific absorbance wavelength of the gas to measure the gas concentration. It can achieve very low detection limits (ppb), and it is also possible to determine the temperature, pressure, velocity and mass flux of the gas being measured. It is sometimes used as the light source in cavity ring-down spectroscopy (CRDS).
U	
Ultrasonic Flowmeter	Uses a pair of transmitter/receivers mounted on opposite side of the stack, with one upstream from the other. The signal is alternated between them, sending it in the direction of stack gas flow, where it is speeded up, and then against the direction of flow, where it is slowed down. The difference in the time between the two signals is proportional to the stack gas velocity.
V	
W	
X	
Y	
Z	
Zirconium Oxide O ₂ Analyzer	An electrochemical cell which is porous to O ₂ when heated to high temperature, allowing the O ₂ to pass from the high concentration side (reference) to low concentration side (sample) and generating a voltage proportional to the difference in O ₂ concentrations.