OHIO LUMEX™

Hg CEM

Portable Speciating Hg Monitoring System

Real-Time Continuous Hg Measurements

Real-time monitoring is an essential tool for understanding and controlling mercury emissions as well as optimizing mercury control technologies. For this reason, Ohio Lumex has created the portable IRM-915 Mercury Process Monitor. It is designed to perform continuous mercury monitoring throughout the plant of flue gas derived from combustion of coal, Portland cement manufacturing, industrial boilers, incinerators, etc. Over 10 years of research and development, extensive testing, and improvements have resulted in an innovative design that focuses on portability, high reliability, low maintenance, ruggedness, ease of use, and flexibility. The industry-leading performance of the system has been demonstrated at more than 100 testing locations under a variety of challenging conditions and results have been presented at conferences as well as published in papers and magazines.

The Ohio Lumex IRM-915 Real-Time Mercury CEMS is based on the analytical approach of Thermal Catalytic Conversion and Atomic Absorption for detection of mercury with Zeeman background correction. The system consists of a probe, heated filter, analyzer cabinet, sample/calibration umbilical line, and zero air generator/dryer. A heated dilution probe which is silco-coated uses a sintered titanium filter and dilutes stack gas to a specific ratio. To obtain total mercury measurement the mercury species in the gas are thermally converted to elemental form. To obtain a speciated mercury measurement the gas is scrubbed of acids and all oxidized mercury bypasses the converter where only the elemental Hg component of the gas is measured. A heated sample line then moves the sample from the probe to the analyzer cabinet. The analyzer measures elemental mercury concentration on a real time basis and feeds the results to a data collection system. The system is automatically calibrated with a built-in elemental mercury calibrator daily. After installation, we perform a verification of the system using Method 30B sorbent traps similar to a mini-RATA. Zero mercury baseline checks are conducted periodically from every 30 minutes to every 4 hours. Data results are recorded via a control system computer and saved in a csv formatted file. The data averaging time can be anywhere from 5 seconds to 5 minutes.

Ohio Lumex Strengths

We are well versed in mercury control technology efficiency studies with both sorbent traps and Continuous Emissions Monitors (CEM). We have conducted more than 175 mercury control technology evaluations, utilizing both methodologies, and have worked successfully with difficult testing locations.

Our equipment is compact, mobile, and rugged. We are modular, fast, and extremely experienced, which is essential for projects like this. Our equipment is specifically built for fast installation (approximately 2-3 hours), easy part swap out, and our staff is very experienced with our equipment because we are the manufacturer. We strive to achieve maximum data availability by strictly maintaining our equipment and always having spare parts for fast in-field service. With 24 portable CEM systems in our shop or in the field and over 350,000 hours of continuous mercury monitoring with these portable systems, we maintain a data availability rate of over 98%.

We back-up and verify every CEM with sorbent traps. Method 30B is the gold standard. You will have no doubt about the real-time results of the CEM because we will run sorbent traps against the CEM after installation or even daily while our operators are on-site. We analyze these sorbent traps on-site with one of our M324 Sorbent Trap Analyzer Systems. This added service comes standard with every CEM rental and operator.

We have vast experience with sorbent traps. We are the most widely used Sorbent Trap Manufacturer in the industry. This is because we never stop innovating and are constantly improving our products and the sampling techniques

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involved. We have the most experience in the industry using these products and are excellent in developing a sampling strategy or custom product to meet your testing objectives.

We manufacture the most widely used Sorbent Trap Analyzer. Hundreds of M324 Sorbent Trap Analyzers have been sold in the power, cement, industrial, and stack testing industries. If you ever want to analyze your own sorbent traps, this is the analyzer you will undoubtedly consider. Our on-site technicians go through an extensive analyst training program making them versatile with Hg analysis. All CEM measurements are verified and tied back to the gold standard, sorbent traps. Because of this added assurance, the IRM-915 typically closely matches sorbent traps.

Standard Project Details

Traditionally, portable Mercury CEMS have been installed at the inlets and outlets of mercury control technologies to verify their effectiveness and for optimization purposes. However, these monitors can be installed at any point throughout the plant for real-time measurements.

CEMMs can be installed for periods of a few days to months.

What's Included:

All equipment, materials, and labor to provide the following services:

- Mobilization/Demobilization of Ohio Lumex Hg CEM(s)
- Continuous Mercury Monitoring (using Ohio Lumex Portable Mercury CEM(s)
- Remote access to CEMs data for plant personnel (and Ohio Lumex if field engineer does not remain on-site)
- Sorbent Trap Sampling to Verify CEM Data (using Ohio Lumex sampling system and sorbent traps)

Additional Testing Options:

Depending on what is learned during the primary testing program, the following additional testing can be performed:

- Hg Speciation across the SCRs to determine oxidation efficiencies.
- HBr measurements at different points to help understand calcium bromide behavior.
- SO3 measurements to determine if higher than expected levels are present and potentially hindering the effectiveness of activated carbon injection.
- Ammonia measurements for ammonia slip and its effects on mercury oxidation.
- Arsenic measurements to optimize DSI injection and minimize SCR poisoning rates.
- Scrubber Slurry partitioning or mass balance.
- Testing alternative Hg oxidation additives.
- Testing alternative FGD reemission additives.
- Testing effects/efficiency of varying temperatures and LOI levels on Hg emissions.
- Testing PAC injection in case 30-day rolling average starts approaching critical levels.

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Plant Requirements for Mercury CEM

Power

- ☐ Three separate 20A/110V circuits

Plant Air (at location of the monitor)

- ☐ 80 psi & 2 SCFM minimum, additional 1 SCFM if using inertial probe
- ☐ ¼" compression fitting or 3/8" NPT

Location/Space/Transportation

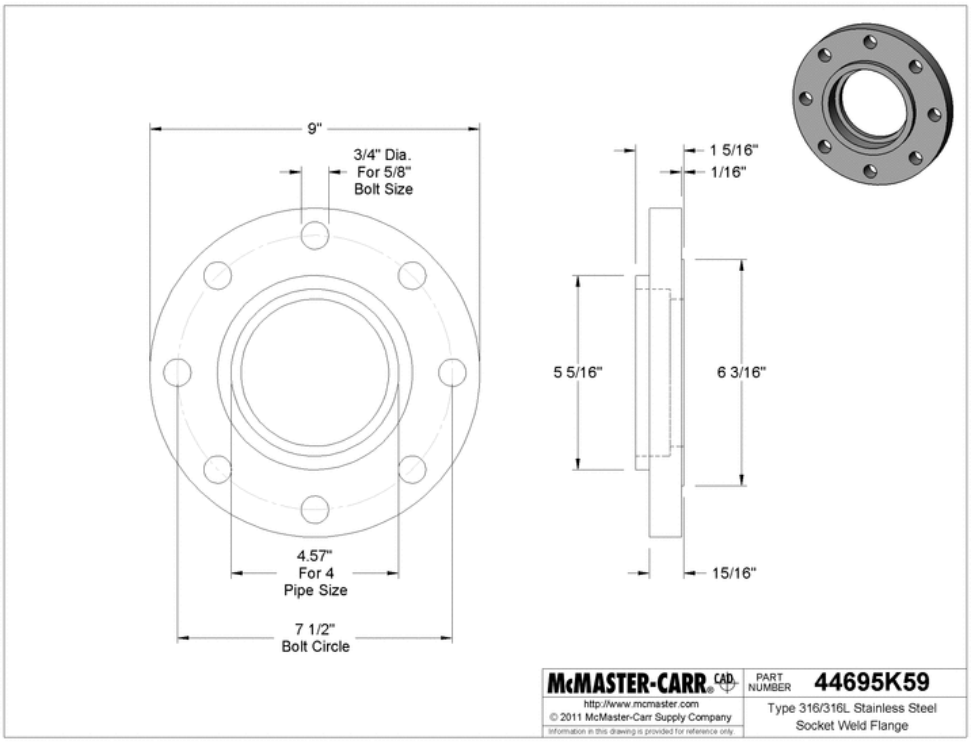
- ☐ 5' x 7' footprint within 40' of port (area to place the continuous mercury monitor)
- ☐ Nearby secondary port for sorbent trap sampling
- ☐ Means of transporting heavy equipment to the testing location (elevator, pulley, etc.)
- ☐ Temperature controlled lab or office space (2' x 6' countertop space to set up the sorbent trap analyzer)

Communication (optional)

- ☐ Allow for use of external cellular hub or run fiber optic cable with ST Connectors from the CEMS Shack to the installation location

Port/Flange

- ☐ 4" ANSI 150 lb standard flange (capable of accepting Ohio Lumex 4" flange containing eight 5/8" diameter welded studs), rated to support minimum 100 lbs. load
- ☐ Port area clear of obstructions that would prevent insertion of 6' probe and mounting of 22" x 18" probe head



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Additional Sorbent Traps & Sampling Methods

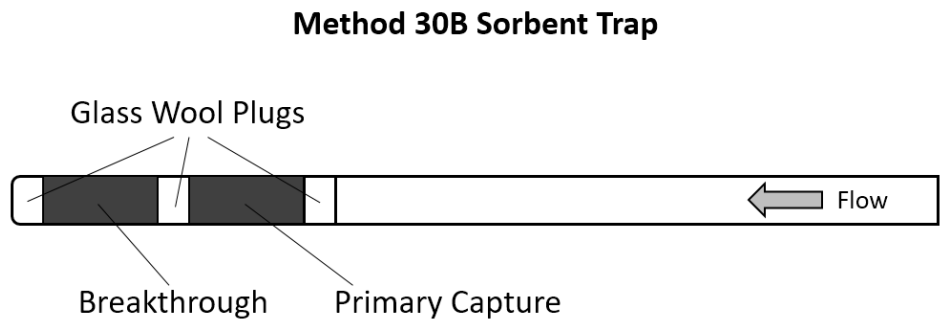
The following sorbent traps are available to be used commercially during Ohio Lumex projects. Here is a brief description of each type as well as the sampling methods associated with them.

Mercury Sorbent Traps

Method 30B sorbent traps are the EPA reference method and are used to measure total vapor-phase Hg (Figure 1).

Speciation traps are used to differentiate elemental mercury from the various oxidized species of mercury by capturing oxidized species on a sorbent bed that selectively captures oxidized species, allowing elemental mercury to pass through and be captured on the primary carbon bed (Figure 2).

Figure 1 - Method 30B Sorbent Trap



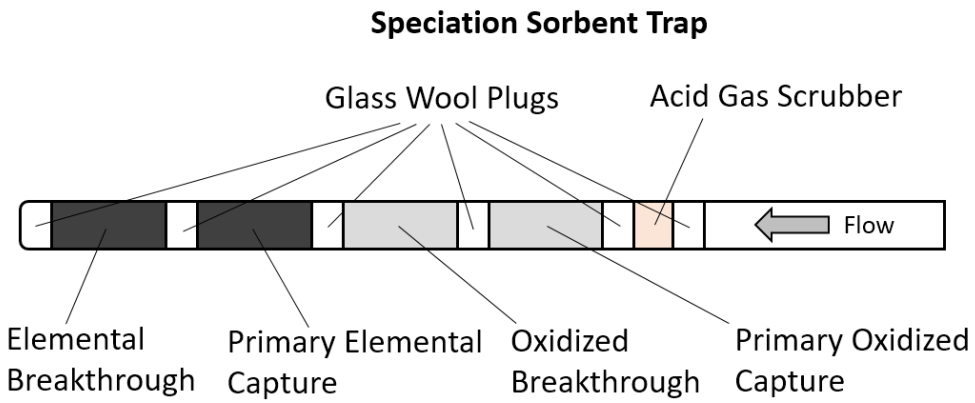


Figure 2 - Speciation Sorbent Trap

Sorbent traps are sampled using the Ohio Lumex OLM30B sampling system (Figure 3).

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Hydrogen Halide Sorbent Trap Sampling

Hydrogen halide sorbent traps are primarily used to capture HCl and HBr in flue gas from a variety of sample gas matrices. The sorbent traps consist of two sections of sorbent material separated by glass wool plugs, similar to a Method 30B Hg sorbent trap. The quality control metrics used for these traps are similar to Method 30B (breakthrough, pair agreement, and the option for field spike recovery). Analysis is performed via ion chromatography.

Selenium/Arsenic Sorbent Trap Sampling

These sorbent traps consist of two sections of sorbent material separated by glass wool plugs, similar to a Method 30B Hg sorbent trap. The quality control metrics used for these traps are similar to Method 30B (breakthrough, pair agreement, and the option for field spike recovery). Analysis is performed via hydride generation atomic fluorescence or graphite furnace atomic absorption.

Ammonia Sorbent Trap Sampling

These sorbent traps consist of two sections of sorbent material separated by glass wool plugs, similar to a Method 30B Hg sorbent trap. The quality control metrics used for these traps are similar to Method 30B (breakthrough, pair agreement, and the option for field spike recovery). Analysis is performed via ion chromatography.

Sulfur Trioxide Sorbent Trap Sampling

These sorbent traps consist of two sections of sorbent material separated by glass wool plugs, similar to a Method 30B Hg sorbent trap. The quality control metrics used for these traps are similar to Method 30B (breakthrough, pair agreement, and the option for field spike recovery). Analysis is performed via ion chromatography.

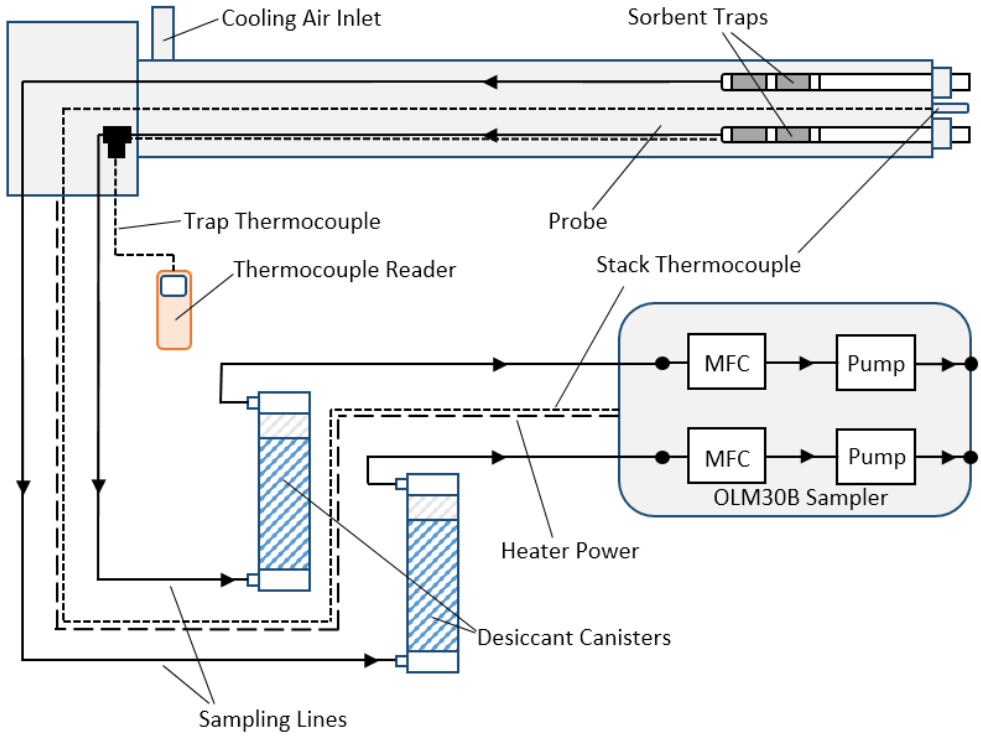

Figure 3 - Ohio Lumex OLM30B Sampling system

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