

Technical Manual 1005

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AEMS, Division of Air Enforcement

EMS CEMS Program



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BTS Technical Manual #1005

(Last revision June 1, 2010)

Guidelines for
Continuous Emissions Monitoring Systems (CEMS),
Continuous Opacity Monitoring Systems (COMS)
and
Periodic Monitoring Procedures (PMPs)

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Technical Manual 1005 - Introduction

- ❑ TM1005 is not intended to provide step-by-step instructions on designing, selecting, installing or performance testing CEMS/COMS. It contains design specifications, performance specifications, performance test procedures, data storage and reporting requirements, quality assurance criteria, and administrative procedures for obtaining Department approval of CEMS/COMS.
- ❑ Each proposed CEMS/COMS will be evaluated on an individual basis. No list of approved equipment will be maintained by the Department. Requests to deviate from the requirements specified in this guideline must have prior written approval from EMS. Such requests will be reviewed on a case-by-case basis and must include a sufficient justification.
- ❑ The CEMS/COMS approval process consists of four phases: The CEMS/COMS equipment protocol review, the Performance Specification Test (PST) protocol review, PST report review; and the development of a Quality Assurance (QA) and Preventive Maintenance (PM) plan. Specifications for each are included in this manual.

Technical Manual 1005 - Definitions

- ❖ CEMS (Continuous Emission Monitoring System) - The total equipment required for the determination of a gas concentration or emissions rate. The system consists of the following major subsystems; sample collection (probe, heated sample line, sample conditioning), calibration interface (gases injected at the probe), pollutant analyzer, diluent analyzer (O₂/CO₂ if applicable), fuel flow monitors (if applicable), stack gas volumetric flow monitors (if applicable) and data recording and storage devices.

Technical Manual 1005 – Minimum Requirements

Performance Specifications (PS)

- PS 1 – Opacity
- PS 2 – NO_x and SO₂
- PS 3 – O₂ / CO₂
- PS 4 and 4A – CO
- PS 5 – Total Reduced Sulfur
- PS 6 – Flow
- PS 7 – H₂S
- PS 8 and 8A – THC
- PS 9 – GC based CEMS
- PS 11 – Particulate
- PS 12A – Mercury
- PS 15 – Extractive FTIR
- PS 16 – Predictive Emissions Monitoring
- PS 18 – Gaseous Hydrogen Chloride

Technical Manual 1005 – Equipment Requirements

➤ General Requirements

- ✓ Equipment Protocol
- ✓ Conditioning System Exit Temp
- ✓ Quarterly NOx Converter Efficiency Requirement

➤ Calibration Requirements

- ✓ Calibration Gases Injected at the Probe
- ✓ Calibration Once Per 24 hours, No longer than 15 Minutes (Zero First then Upscale Gas)
- ✓ 2% Calibration Gas Accuracy Required

Technical Manual 1005 – Equipment Requirements

- Data Recording and Storage Requirements
 - ✓ Strip Chart Required at a Minimum (No Round Recorders)
 - ✓ DAS must be able to produce historical and present one-minute averages (visually and graphically)
 - ✓ One-minute data must be retained for a period of one calendar quarter from the date of EEMPR submission
 - ✓ Data recording and storage equipment upgrades, replacements or repairs do not require a full recertification

- Valid Data Capture Requirements
 - ✓ CEMS must provide a minimum of 75% [45 minutes] of the one-minute data averages for each one-hour (60 minute) clock period
 - ✓ CEMS must provide for a minimum 90% valid data capture of one-minute data for each calendar quarter, based on source operating time (95% for COMS)

Technical Manual 1005 – Performance Specification Tests

➤ PST Protocol

- ✓ Procedures and Equipment Used
- ✓ Reference Method Calibration Procedures
- ✓ Reference Method Traverse Points

➤ PST Test

- ✓ Conducted After EMS Approval
- ✓ Relative Accuracy Conducted During 7-day Drift Period
- ✓ 2% Calibration Gas Accuracy Required
- ✓ Required after significant change or repair is made
- ✓ Notify EMS 30 days prior to conducting PST
- ✓ Submit PST report to EMS within 30 days of PST completion
- ✓ PST report must include analyzer serial numbers
- ✓ PST report must be certified per N.J.A.C. 7:27-1.39(a)1 and 2 including certification language specified

Technical Manual 1005 – Quality Assurance/Quality Control

- Must develop and maintain a QA/QC Manual
- QA/QC Manual must be kept on site and is a “Living Document”
- All quarterly and annual QA/QC reported in Excess Emissions and Monitor Performance Report (EEMPR)
- Failure to conduct a quarterly audit on a CEMS required for compliance purposes will result in downtime being accumulated beginning on the last day of the quarter in which the facility failed to conduct the audit. Downtime resulting from a failure to conduct a quarterly audit may not be included as allowable downtime in the quarterly report. This may not invalidate the Part 75 data as these rules may allow a grace period and/or data substitution.
- Must develop a Preventative Maintenance Plan (procedures and spare parts to ensure Valid Data Capture)
- Preventative Maintenance Plan must be reviewed annually

Technical Manual 1005 – Reporting

- A quarterly report of CEMS/COMS performance and emission exceedances is required to be submitted to the appropriate Regional Enforcement Office (REO) for the facility's location. This report shall be submitted to the appropriate REO whether an emission exceedance has occurred or not.
- The quarterly report specified in Section VIII.A. must be submitted to the REO within thirty (30) calendar days of the end of each calendar quarter.
- CEMS/COMS quarterly reports shall be submitted to the appropriate REO for the first quarter in which the CEMS/COMS is installed and for every quarter thereafter.
- Certified CEMS/COMS data will be utilized to demonstrate compliance with applicable emission limits or emission standards beginning on the completion date of the successful certification test
- Any CEMS/COMS which does not successfully demonstrate that the equipment meets the appropriate PST, after two PST attempts, shall either install a replacement CEMS/COMS approved by EMS within 180 calendar days following the rejection of the second PST results or provide a temporary CEMS/COMS within thirty (30) calendar days that is reviewed and approved by EMS to monitor the compliance status of the source.

Technical Manual 1005 – Appendices

- Appendix A Equipment Protocol Guidelines
- Appendix B EEMPR Format
- Appendix C NJDEP Regional Enforcement Office Locations
- Appendix D Procedure for the Determination of a THC Allowable
- Appendix E Policy for Validating CEMS Data After a Significant Equipment Change

Technical Manual 1005 - June 1, 2010 revision

- Quarterly converter efficiency checks added as part of the Quarterly Audits required by Parts 60 and 75 (Section VI.H.).
- Downtime clarification added for those permits which do not allow downtime (Section B.4.i.).
- Clarification added for those sources with CEMs required for both permit compliance determinations as well as a budgeting program purposes. Linearity checks (if conducted in the applicable quarter) satisfy the CGA requirement under Appendix F. If not conducted due to a grace period allowance, the CGA must be conducted (Section VI.I.).
- Periodic Monitoring Procedures (PMP) and clarifications added (Section IX.).

Technical Manual 1005 - June 1, 2010 revision

- Language added to address establishing a THC allowable (Appendix D).

Procedure for Establishing a THC Allowable

Correlating CEMS or Periodic Monitor Data to DRE Testing

Calculation Procedure

WCOA = Worse Case Outlet Allowable (PPM)

TIPPH = Tested inlet pounds per hour

TOPPH = Tested outlet pounds per hour (= $TIPPH * [1 - TDE]$)

MAOPPH = Maximum Allowed outlet pounds per hour (= $TIPPH * [1 - MADE]$)

TDE = Tested Destruction Efficiency (expressed as a decimal fraction, ie: 0.950 for 95.0% DE)

MADE = Minimum allowed DE (usually 95.0%...decimal 0.950)

MOPPM = Measured outlet ppm from calibrated THC CEMS or Periodic Monitor during the DE test.

$$WCOA = MOPPM \times [MAOPPH] / TOPPH$$

$$WCOA = MOPPM \times [TIPPH * (1 - MADE)] / TIPPH * (1 - TDE)$$

Substituting and assuming MADE = 0.950

$$WCOA = MOPPM \times \cancel{TIPPH} \times (1 - 0.950) / \cancel{TIPPH} \times (1 - TDE)$$

$$\text{FINAL EQUATION for MADE = 95\%}$$
$$WCOA = MOPPM \times 0.050 / (1 - TDE)$$

Technical Manual 1005 - June 1, 2010 revision

- Language added to address recertification requirements (Appendix E).

Procedure for Validating CEMS Data After a Significant Equipment Change

- ✓ Option 1: Conduct CGA then conduct PST within 30 days of installation of new equipment. Limits downtime.
- ✓ Option 2: Conduct PST within 7 days of installation of new equipment. Data valid from Day 1 of 7-day calibration drift period.

Other CEMS Modifications/Changes: EPA Part 75 Emissions Monitoring Policy Manual

Section 12 -- Recertification

https://www.epa.gov/sites/production/files/2015-05/documents/part_75_emissions_monitoring_policy_manual.pdf

EMS CEMS ListServ Updates

| Date | Subject |
|------------|--|
| 11/16/2022 | TM1005 Clarification on Unit Operation and CEMS Downtime for Partial Hours |
| 5/3/2022 | *Update 2* Use of NO2 Cylinders for NOx Converter Efficiency Checks and SO2 in Air Calibration Gases |
| 4/20/2022 | Use of NO2 Cylinders for NOx Converter Efficiency Checks and SO2 in Air Calibration Gases |
| 4/20/2022 | Use of NO2 Cylinders for NOx Converter Efficiency Checks and SO2 in Air Calibration Gases |
| 9/29/2021 | CEMS Date of Certification |
| 8/26/2021 | CEMS Multi-hour or Block Average Emission Limits |
| 5/21/2019 | CEMS QA Requirements for Non-Operating Quarters |
| 11/20/2018 | 2018 Revisions to Test Methods, Performance Specifications, and Testing Regulations for Air Emission Sources |
| 9/8/2016 | Procedure for Certifying a THC CEMS and also Establishing a THC CEMS Allowable |
| 3/27/2015 | CEMS Submittals |
| 9/19/2012 | Extended Certification Periods for EPA Protocol Gases |
| 8/1/2012 | CEMS RA and RATA Reference Method Calibrations |
| 3/9/2012 | Part 75 Listserv |


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