

EPA Wood Burning Appliance Test Laboratory Proficiency Test Protocol

INTRODUCTION:

40 CFR 60, subpart AAA and subpart QQQQ regulate wood burning appliances and include details that provide a pathway for laboratories wishing to conduct compliance testing on affected appliances a pathway to obtaining EPA Approval.

INTENT:

This document provides a framework, informing a Proficiency Test Provider how an EPA Approved Wood Burning Appliance Test Lab Proficiency Test program is to be conducted, including detailed direction such that PT providers working independently will provide like data to EPA for evaluation.

SCOPE:

This document is intended to provide a framework sufficient for constructing and delivery of a robust and thorough PT test, whether such tests are contracted through a sole provider or multiple providers.

REQUIREMENTS for PT Providers: All entities, both contractor and subcontractor, wishing to provide Proficiency Test services to an EPA Approved Wood Burning Appliance Test Laboratory must register with EPA's Burn Wise Program by sending an e-mail stating that they agree to abide by the terms specified within this protocol and by the requirements specified by US EPA in establishing the PT parameters. Providers must also agree that they will cooperate with EPA's requests for data used to conduct outlier analysis and laboratory comparative analyses. PT providers must provide to EPA, via electronic mail, confirmation of each laboratory successfully completing a PT program. PT providers must provide their contact information and the location (physical address) of their business, and must also disclose to the EPA the name and address of any subcontractor used to deliver their PT services, and their degree of the subcontractors involvement in the PT program.

SECTION 1:

The Wood Burning Appliance Test Laboratory Proficiency Test Protocol consists of the following five elements:

1. PM measurements must be conducted on a pellet burning appliance model common to each laboratory, while burning pellet fuel common to all Wood Burning Appliance Lab PT tests during each PT Test cycle (every two years), and using equipment and procedures specified in ASTM E-2779-10 and E-2515-11, with the appliance operation and PM sampling conducted at a prescribed volumetric rate. Specifics regarding the type of common fuel, operational setting of the pellet burning appliance, and sampling rate of the ASTM E-2515 apparatus will be determined by the EPA for each PT test cycle, and distributed **ONLY** to the PT Provider(s) (not directly to labs, nor to PT Provider subcontractors) for the expressed purposes of conducting Proficiency Tests. The PT provider(s) will obtain common fuel meeting that specified by US EPA, and distribute to the laboratories that they service.
 - a. Specifics that must be met prior to, or during each PT test are:
 - i. Installation of pellet burning appliance per manufacturer's written operation instructions and in compliance with test requirements outlined in ASTM E-2779-10 and ASTM E-2515-11. If the stove has been sealed following a previous PT test, the stove must be unsealed in the presence of the PT Provider.
 - ii. **Prior to the first PT test on the appliance** there must be 10 hours of aging done with same brand and grade of pellets used for PT test. – The fuel used for this process **may be of a different lot than the actual test fuel.**
 - iii. No 60-minute filter information will be collected during any PT test.
 - iv. A room-blank sample must be conducted during the PT test and gravimetric results of that room blank must be reported with the PT data.
 - v. The dilution tunnel and stove flue must be cleaned between aging and prior to conducting a PT test.
 - vi. There is to be no cleaning of the stove between the initial aging and PT tests.
 - vii. **The initial round of PT testing must be conducted such that this portion is done in triplicate**, meaning that three PM measurements are made by each participating lab. For that initial round, all three measurements shall be made at the same operational setting, with the same fuel and sampling parameters.
 - b. The PT test sequence shall be:
 - i. Ignition and 60 minutes of pre-burn at the designated PT test setting (to be communicated to the lab by the PT test provider on site) **using the test fuel specified by the PT provider.**
 - ii. Fuel hopper of the appliance must be filled with the test fuel, and stove weight with full hopper must be noted prior to beginning the test.
 - iii. Once the hopper is full, begin the first PT test pre-burn period of sixty minutes, and begin the sampling portion of the first PT test at the end of this sixty-minute period.

- iv. Sample continuously at the prescribed rate for the entire duration specified by the PT provider.
 - If this is not the first round (2018/2019) of PT testing, the PM sampling ends here. The stove must be re-sealed in the presence of the PT Provider and stored until the next round of PT Testing where it will be un-sealed, again in the presence of the PT provider.
 - v. If this is the initial PT test, at the end of the first PM measurement, and prior to the beginning of a second PM measurement immediately refill the hopper so that the stove weight is +/- 0.1 lb of the initial stove weight recorded in item (ii), above.
 - vi. Once the fuel hopper is filled, record the stove and fuel weight and begin the second sixty-minute pre-burn at the prescribed PT test burn rate.
 - vii. Again, if this is the initial PT test, at the end of the second PM measurement and prior to the beginning of a third PM measurement immediately refill the hopper so that the stove weight is +/- 0.1 lb of the initial stove weight recorded in item (ii), above.
 - viii. Once the fuel hopper is filled, record the stove and fuel weight and begin the third sixty-minute pre-burn at the prescribed PT test burn rate.
 - If this is the 2018/2019 round of PT testing the PM collection testing stops here, at the end of the third PM measurement.
 - ix. The stove, once cooled must be sealed in the presence of the PT Provider, and stored until a subsequent Proficiency Test requires reinstallation of the stove.
- c. The PT Provider will be on site to observe:
- i. Set up of the stove and dilution tunnel
 - ii. Unsealing /sealing of the stove before/after the PT test.
 - iii. Setup and recovery of the room blank sampling system
 - iv. Set up of all sampling equipment including pre-test leak checks
 - v. Entire PT test series from start of first pre-burn to end of the third PT test
 - vi. Post PT test leak checks
 - vii. Post PT sample recovery and sample transport procedures
 - viii. Laboratory sample treatment and gravimetric analysis of audit filter and probe weighing
 - ix. Constant final weight determination of the PM audit sample (Item 2, below)
- d. PT Provider to receive a copy (printed spreadsheet or .pdf file) of calculated test results for each PT particulate test run, including blank correction, laboratory weighing sheets, and all pm calculation results.
- e. PT Provider is to log observations of the PT particulate testing and note all deficiencies and corrective measures effected during the testing

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- f. PR Provider may remotely witness (video link observation) follow up or corrective action procedures, where feasible, to avert travel costs for a return site visit, provided stove operation is not required to close out the PT activities.
2. The PT Provider will present the laboratory with a filter audit sample of NIST traceable known dry mass intended to verify that desiccation procedures and gravimetric analysis of filter media is within acceptable tolerance (+/- 3.0 mg). These QC samples are commercially available and commonly used in many source particulate measurement compliance programs. An example may be found here: <http://www.eraqc.com/Products/catalogid/1-4GR6WY/categoryid/1-4GSDK2/catalognumber/1150>
3. The PT Provider will present each participating laboratory with a length of sample probe material that has a NIST traceable known dry mass, intended to verify that lab procedures for weighing such objects is within acceptable tolerance (+/- 2.0 %) to the nearest 0.1mg.
4. The PT Provider is to retain and provide records of NIST traceability, available upon request to US EPA. The PT Provider must have each sample probe uniquely marked such that its traceability is assured and the PT Provider must allow EPA to inspect/analyze the length of probe section used for any PT test upon request.
5. The PT Provider will observe each participating laboratory conducting a sampling train blank analysis, including the setup of a full sampling train (loading filters, connecting probes, equipment, etc.). This sampling system will be fully assembled, two complete leak checks performed, then disassembled, sample recovered, and gravimetric analysis conducted with results presented to the PT provider in printed spreadsheet or .pdf file format.
6. The PT Provider will present each participating laboratory with a data set that represents a completed emissions test run and associated room blank and laboratory gravimetric analysis such that the laboratory can calculate a g/hr and g/kg-fuel value from the data set. The laboratory will input this data set into their spreadsheet template(s) and present the PT Provider with an output of the printed spreadsheet or .pdf file that demonstrates the laboratories ability to appropriately calculate emissions values from emissions test data. The EPA Measurement Technology Group will provide the data set directly to each PT Provider, and not to labs or PT subcontractors.

SECTION 2:

The Proficiency Test Program will function as follows:

1. Laboratories must purchase and retain a commercially available pellet stove specifically for the purposes of participating in the PT program. Labs should work together to select an appropriate pellet stove for the PT Test program, and the pellet stove selected must be certified to meet the EPA Step 1 or Step 2 emissions limit. It may be advantageous to the PT Program for laboratories to work with a manufacturer such that an initial stove purchase may be facilitated where stoves

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used for the PT program are sequential in serial number. The laboratories must notify the EPA Burn Wise program of the pellet stove model chosen for the PT program.

2. Laboratories will contract with a PT Provider on terms to deliver elements 1-5 in Section 1 (above). The PT Provider will notify the EPA Burn Wise program quarterly with a list of laboratories having completed a PT during that quarter (if any), and provide results of PM measurement data and sample train blank analysis from numbers 1 and 4, above as well as Verification of Completion of the PT Program for each lab serviced. The Verification statement from the PT Provider is only to be provided to EPA once a PT Program for a specific EPA Approved Laboratory is complete and either no issues of concern were noted or that all issues of concern have been resolved through investigation, root cause analysis, or a repeated section of the PT, to the satisfaction of the PT Provider.
3. If multiple PT Providers are used to service the community of Approved Test Laboratories, ALL PT Providers MUST follow this publicly posted protocol and MUST coordinate their efforts through the Measurement Technology Group at EPA. Each round of PT Testing requires standardization of fuel, burn rate and sampling rate of the PM testing, and coordination of test results for the purposes of outlier analysis. A sole PT provider serving all the EPA Approved Labs must also coordinate each round of PT testing with EPA's Measurement Technology Group and provide quarterly updates with respect to completed PT tests and program progress.
4. PT Providers will submit data and results to EPA in de-identified form, but marked such that the PT Provider(s) retain ability to track and maintain records of each Laboratories results and information. For example, the EPA does not need to know which lab has provided data that is an outlier and yet the PT Provider, once informed by EPA that Lab "4" returned results that are identified as an outlier, must be able to work with Lab "4" to resolve that concern.
5. A statistical outlier analysis will be conducted for each full round of PT Testing, on the results of the PM Measurement outlined in Section 1. The means of outlier analysis will be a statistical test using a Dixon test conducted with ProUCL software, publicly available here: <https://www.epa.gov/land-research/proucl-version-5100-documentation-downloads>
6. Failed PT Tests (where a PT Provider and laboratory cannot resolve an outlier result or a procedural result) will trigger an ISO 17025 Root Cause evaluation for the EPA Approved Lab involved in that PT Test. ISO 17025 procedures must be followed, with corrective measures identified and applied.
7. PT Providers MUST provide records to EPA upon request, including calibration documentation of all NIST traceable items, documentation relating to but not limited to test results, re-test efforts, problem resolution as well as records of notes and data collected during PT testing should EPA feel it necessary to audit a PT Provider.

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Rev 3: 1/31/2019 - Added paragraph F to Section 1.