



ADEC REGULATORY BASIS FOR CRITERIA AND FINDINGS

Residential Wood Heater Test Report Review

This document provides an overview of the review elements and the regulatory citations used.

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Introduction – How to Use this Document

Alaska regulation, 18 AAC 50.077(c), requires new wood heating appliances installed in the Fairbanks North Star Borough nonattainment area to meet additional regulatory requirements beyond obtaining a federal U.S. EPA certification. This rule states that the Alaska Department of Environmental Conservation (ADEC) may approve specific models of wood stoves and pellet stoves for operation in the area. For models with a manufacturer-rated heat output capacity of less than 350,000 British Thermal Units (Btu) per hour, the following criteria apply:

- Unit has obtained a valid U.S. EPA Step 2 certification under the 2015 Residential Wood Heater New Source Performance Standards (NSPS), as specified on July 1, 2019, and ADEC has reviewed and accepted the underlying certification test results.
- Unit has demonstrated a particulate matter annual average emission limit of 2.0 grams per hour as tested by a laboratory with current EPA accreditations; test results must be obtained by either a Federal Reference Method or an alternative test method, including broadly applicable test methods approved by both EPA and ADEC.
- Unit has demonstrated particulate matter emissions certification test results showing either a passing rolling 60-minute period that does not exceed 4.0 grams per hour as measured by a tapered element oscillating microbalance (TEOM) **OR** no valid test run's with a 1-hour filter data pull exceeding 6.0 grams per hour. (This standard became effective September 1, 2020)

In order for ADEC to meet the regulatory requirements prescribed in 18 AAC 50.077(c) and the ADEC State Implementation Plan (SIP) for particulate matter nonattainment area, the Agency must review and approve the appliances certified under the U.S. EPA Residential Wood Heater NSPS as of July 1, 2019, which has been adopted by reference by the state. Under these rules, ADEC must develop a list of approved appliances after completing a review of the certification test reports.

In order to complete this review, ADEC used test reports posted to the manufacturer's websites. The manufacturer's website is the only source of the test reports since EPA does not maintain a public repository of test reports. The 2015 Residential Wood Heater Regulations require as part of a certification application, under 40 CFR §60.533(b)(12), "A statement that the manufacturer will place a copy of the certification test report and summary on the manufacturer's Web site available to the public within 30 days after the Administrator issues a certification of compliance." 40 CFR §60.533(b)(5) defines the test report as:

"All documentation pertaining to a [valid certification test](#), including the complete test report and, for all test [runs](#): Raw data sheets, laboratory technician notes, calculations and test results. Documentation must include the items specified in the applicable test methods. Documentation must include discussion of each test [run](#) and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not

used in the calculations and, for any test [runs](#) not completed, the data collected during the test [run](#) and the reason(s) that the test [run](#) was not completed and why. The burn rate for the low burn rate category must be no greater than the rate that an [operator](#) can achieve in home use and no greater than is advertised by the [manufacturer](#) or retailer. The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs. Submit the test report and all associated required information, according to the procedures for electronic reporting specified in [§ 60.537\(f\)](#). ”

In developing and maintaining a list of state-approved devices, certification test reports underwent a two-step review process before assigning a final determination. Summary sheets reflect the results of the review process. Appendix A contains an example of the summary sheets for pellet and cordwood stoves. The summary sheets identify the review elements and flags generated as report deficiencies that informed the final determination. Based on the number and types of flags generated, the preliminary review classified appliances into the four categories listed below.

- Approved
- Pending - Minor
- Pending - Major
- Disapproved

Approved appliances do not need to take any further action and will be maintained on the ADEC approved heating device list.

Manufacturers that have units on the Transition List or No Determination List can provide clarifications/corrections and submit additional information following the procedures defined by ADEC to inform ADEC’s compilation of the various lists. This document should serve as a guide to those companies who wish to understand the underlying criteria used to make the summary sheet determination so they can determine how to correct an error or rectify an identified deficiency that is preventing the approval of the device for the state’s Approved device list.

This document should be used while reviewing the Summary Review Sheets as each section of the document corresponds to a section of the summary and lists each of the data entry elements in the review sheets. Each of the element sections contains:

- A description of the element and an explanation of the need to review the item
- A summary of the actions needed to remedy a deficiency
- The regulatory basis that requires inclusion of this element in a complete test report. In sections where the regulatory basis is the same for each element, the basis is included at the beginning of the section. For sections where the basis varies from element to element, the regulatory basis is included in the element description.

For models designated as "Disapproved" units, requests to change the determination for a unit must address all items flagged items that led to the disapproval, regardless of the color-coding, and provide data sufficient to determine compliance with ADEC regulations.

For units designated as "Pending" additional information must be submitted to provide the review committee with a complete test report that will inform the final determination. If a unit designated as "Pending" does not submit information to address deficiencies by the milestone date provided by ADEC, that appliance will move to the "No Determination" List.

Questions and materials addressing identified deficiencies should be directed to Steven Hoke – steven.hoke@alaska.gov.

1 Summary of Review Section

1.1 Manufacturer

This element lists the model of the manufacturer. To ease identification of models by manufacturer, appliances manufactured by a single parent company with several manufacturer's names have the name of the parent company listed first. If the summary sheet contains a second manufacturer name, this data matches the listing on the U.S. EPA's database of certified appliances. The EPA database can be accessed at this URL: <https://www.epa.gov/compliance/epa-certified-wood-heater-database>

1.2 Model

This element lists the name of the model using the test report. The model name listed on the certification test does not always include the complete list of model names that could be used. Therefore the name on the certification test has been matched with the EPA database and includes all the model names listed on EPA's database. The EPA database can be accessed at this URL: <https://www.epa.gov/compliance/epa-certified-wood-heater-database>. The approved model names are an element that is managed by the U.S. EPA's Office of Enforcement and Compliance Assurance.

1.3 Control Approach

This element lists the type of control approach used by the appliance. Options include catalytic, which consists of all devices that use an add-on catalyst and non-catalytic, which are units that do not employ a catalyst.

1.4 Preliminary Review Recommendation

This element reflects the initial reviewer's recommendation. An individual reviewed each test report. The review tool auto-generated this recommendation based on the number of flags raised during the review. This recommendation was provided to the committee for consideration.

1.5 Final Determination

This element reflects the final determination of the Review Committee based on the information available in the test report. Four determination possibilities exist for the preliminary review. They include:

1. *Approved* – Appliance test report reviewed and determined to be complete and complies with all US EPA and Alaska requirements.
2. *Pending Minor* – Appliances identified with this status have been reviewed. However, a final determination is not provided regarding compliance with all US EPA and Alaska requirements due to missing elements in the test report. Deficiencies noted were mostly administrative. Additional documentation must be submitted and posted to address the deficiencies, but the test report will require only limited technical review to complete the agency's final determination.
3. *Pending Major* – Appliances identified with this status have been reviewed. However, a final determination is not provided regarding compliance with all US EPA and Alaska requirements

due to missing significant elements in the test report. The differentiation between minor and major reflects the amount and types of missing information in the certification test report. Appliance reports with this determination will require submission of all missing elements and undergo a full review by the technical committee before a final determination can be made. Appliance reports with this determination lacked basic details required to recalculate and confirm emission rate values, and/or lacked sufficient recordkeeping to determine compliance with applicable test methods. Issues identified will likely require the certification test laboratory to modify the test report to address deficiencies. The manufacturer must submit and post a complete test report approved by EPA, notify and submit new information to ADEC. Items with any red or orange flags or those report with more than five yellow flags were deemed “Pending Major.”

4. *Disapproved* – The test report has been reviewed, and the technical review has determined that the appliance is not in conformance with applicable requirements. For the September review, reasons for disapproval only focused on ADEC emission limits. For the final evaluation (after November 1), cause for disapproval of an appliance include but are not limited to the following: appliance does not meet ADEC emission limits, testing was non-representative, test report suffers from significant/unresolvable issues, or test was not in accordance with NSPS requirements.

Approved and disapproved are the only two final determination categories. Units with approval status do not need to take any further action and will be listed on ADEC’s Approved Device List. Units with pending status will need to submit additional data before a final determination can be made. Units tagged with pending that do not submit information to complete their test report shall be moved to the No Determination List, due to an incomplete report and cannot be installed in the non-attainment area until deficiencies are addressed.

1.6 Date

This element reflects the date of the final determination decisions.

1.7 Basis

This element provides the basis for disapproving test reports. The following provides the key to basis codes:

- **ESA** – weighted average emissions exceed ADEC emission limits. EPA regulations allowed units that tested with cordwood to meet a less stringent emission standard. ADEC regulations and review of existing data did not support raising the standard above 2.0 grams per hour for space heating appliances and 0.10 lb/MMBtu for central heating appliances.
- **ES1** – one-hour filter values exceed ADEC emission limits. In developing emissions standards for the 2015 Residential Wood Heater NSPS, EPA did not have data to support a 1-hr standard. However, ADEC regulations did allow for a review of one-hour data for standard-setting purposes and were included in the state regulations. These regulations state that an appliance shall not exceed 6.0 grams per hour for any valid 1-hr filter pull OR TEOM data indicates that no rolling 60-minute period exceeds 4.0 grams per hour.
- **M1** – Certification test reports where the lab did not collect data on mandatory reporting elements, such as carbon monoxide, efficiency, or one-hour PM emission data.

- NTR – Appliances listed on EPA’s residential wood heater database as Step 2 certified, but reviewers were unable to access a certification test report, or the company posted the incorrect test report.
- MD – In these reports, mandatory test elements/data were not reported, but it appears that the report contains the data necessary for the third-party certifier to report these elements. Examples of MD elements include failure to report average carbon monoxide emissions, but the report contains CO values for individual test runs, or 1-hr PM values are listed with weights (mg) rather than the gram per hour metric required by the rule.
- IDU – In these reports, data has been reported inaccurately or the report contains different values for the same element.
- IR – These reports are missing data or sections required to confirm testing was completed in accordance with rule and method requirements.
- NR – These reports ran the appliance in a non-representative manner that did not meet test method requirements or was determined not to reflect how the unit would be operated under normal operating conditions.

2 Testing Information Section

2.1 Test Method

This item identifies the test method used to complete the test report. The test method used must be included to ensure that the items specified in the applicable test method are included in the test report. If the test method used was reported, no flag was generated. Test reports that do not include the test method were flagged yellow since resolving the issue is limited in nature and does not require technical review.

Regulatory Basis

40 CFR 60.533(b)(5) provides the basis for determining whether or not the appliance has complied with this requirement. This citation states, “*All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results. Documentation must include the items specified in the applicable test methods.*”

2.2 EPA Qualified Test Lab

This item identifies the test lab used to conduct all testing for the test report. If the test report included this information, no flag was generated. Reports that do not include the name of the test lab were flagged yellow since resolving the issue is limited in nature and does not require technical review. In the notes section, reviewers tracked the location of testing. Options are at the qualified lab facility or the manufacturer’s facility. If the location was not reported, this was identified and flagged yellow.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5), 60.537(a)(2), and 60.537(a)(4). Per this requirement, “*All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.*” Additionally, 40 CFR 60.533(b)(10) requires, “*A statement that the manufacturer has entered into contracts with an approved laboratory and an approved third-party certifier that satisfy the requirements of paragraph (f) of this section.*”

2.3 EPA Qualified Third-Party Certifier

This item identifies whether or not the report posted identified the third-party certifier for the test report. The NSPS requires the use of a third-party certifier for report reviews. If the report identified the third-party certifier, no flag was generated. Test reports that do not identify the third-party certifier were flagged yellow since resolving the issue is limited in nature and does not require technical review.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(10). Per the requirement, “*A statement that the manufacturer has entered into contracts with an approved laboratory and an approved third-party certifier that satisfy the requirements of paragraph (f) of this section.*”

2.4 Certified Test Report

This item identifies whether or not the posted report was reviewed and certified by the third-party reviewer. If the report contained the signature of the third-party certifier or statements of certification from the third-party certifier, the element was complete, and no flag was generated. If the report was not

certified or it could not be determined if it was the certified report, this item was flagged yellow, and the manufacturer must confirm it is the same as posted and resubmit for review.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b). Per this requirement, *“Any manufacturer of an affected wood heater must apply to the Administrator for a certificate of compliance for each model line.”* To obtain certification, the manufacturer must supply the third-party certifier with all required documentation. Furthermore, 40 CFR 60.533(f)(1)(iii)(B) requires, *“The third-party certifier may certify conformity if the emission tests have been conducted per the appropriate guidelines; the test report is complete and accurate; the instrumentation used for the test was properly calibrated; the test report shows that the representative affected wood heater meets the applicable emission limits specified in 60.532; the quality assurance plan is adequate to ensure that units within the model line will be similar in all material respects that would affect emissions to the wood heater submitted for certification testing; and that the affected heaters would meet all applicable requirements of this subpart.”*

3 Test Report Elements Section

3.1 Weighted Average PM Emissions (g/hr)

This item identifies whether or not the report includes the weighted average of particulate matter emissions (PM). If no value was reported or the value was greater than 2.0 g/hr for stoves or 0.10 lb/MMBtu for central heating appliances, the entry generated a red flag for exceeding ADEC requirements. Alaska DEC's review of the ASTM cordwood test methods determined that a bump-up in the emission standard was not warranted. Therefore under ADEC regulations, cordwood stoves must meet the 2.0 gram per hour standard regardless of the test method used.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5), 60.537(a)(2) and 60.537(a)(4). Per the requirement, *"All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results."* Additionally, 40 CFR 60.533(b)(5), 60.537(a)(2) and 60.537(a)(4) states that, *"The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs."* 40 CFR 60.532(b) sets an emission standard of 2.0 grams per hour of total particulate matter for stoves tested with crib wood. 40 CFR 60.532(c) sets an emission standard of 2.5 grams per hour for stoves tested with cordwood. EPA granted this allowance because manufacturers claimed cordwood warranted an emission standard bump-up. Section 40 CFR 60.534 also states, *"Test methods and procedures specified in this section or in appendices of this part, except as provided under § 60.8(b), must be used to determine compliance with the standards and requirements for certification under §§ 60.532 and 60.533 and for reporting carbon monoxide emissions and efficiency."*

Under Alaska regulation, 18 AAC 50.077 requires all stoves to meet an emission standard of 2.0 grams per hour. This rule also requires all central heaters to meet an emission limit of 0.10 lb/MMBtu (output) for all test runs.

3.2 PM Highest 1-hr

This item identifies the highest one-hour PM value reported in the certification test report. If the value was greater than 6.0 g/hr, the tool generated a red flag for exceeding ADEC requirements. If no one-hour filter values were reported, the tool generated a red-flag for not reporting a mandatory element per the NSPS. If the one-hour values were reported in a metric other than grams per hour, the tool generated a red flag as the metric does not meet the NSPS requirements. The tool did not generate a red flag if the value reported was in the correct metric and met the ADEC emission standards. One-hour data from test runs that are not part of the initial compliance test will not be accepted as meeting this requirement.

Regulatory Basis

The basis for determining whether or not the appliance complies with this requirement is based on 40 CFR 60.534(d), *“For all tests conducted using ASTM E2515-11 (IBR, see § 60.17) pursuant to this section, the manufacturer and approved test laboratory must also measure the first hour of particulate matter emissions for each test run using a separate filter in one of the two parallel trains. The manufacturer and approved test laboratory must report the test results for the first hour separately and also include them in the total particulate matter emissions per run.”*

CFR 60.533(b)(5) requires reporting of that data. The section states, *“The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs.”*

Under 18 AAC 50.077 emission standards, devices shall not have a one-hour emission rate that exceeds 6.0 grams per hour.

3.3 Weighted Average Efficiency (% HHV Report)

This item identifies whether or not the test report includes the weighted average efficiency. Failure to report and document weighted average efficiency shall result in the generation of an orange flag. This item can be resolved by submitting data from the test report.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs.”* Section 40 CFR 60.534 also states, *“Test methods and procedures specified in this section or in appendices of this part, except as provided under § 60.8(b), must be used to determine compliance with the standards and requirements for certification under §§60.532 and 60.533 and for reporting carbon monoxide emissions and efficiency.”*

3.4 Average Carbon Monoxide (g/min) or (g/hr)

This item identifies whether or not the test report includes data on the average carbon monoxide emissions produced by the appliance. Failure to report this element resulted in the generation of an orange flag. This item can be resolved by submitting a revised test report that contains average carbon monoxide information.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.534(e), *“the manufacturer must have the approved test laboratory measure the efficiency, heat output, and carbon monoxide emissions of the tested wood heater.”* Reporting of that data is required based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”* Additionally, 40 CFR 60.533(b)(5) mandates that, *“The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs.”* Section 40 CFR 60.534 also states, *“Test methods and procedures specified in this section or in appendices of this part, except as provided under §60.8(b), must be used to determine compliance with the standards and requirements for certification under §§60.532 and 60.533 and for reporting carbon monoxide emissions and efficiency.”*

3.5 Overall Heat Output (Btu/hr)

This item identifies whether or not the test report includes data on the overall heat output generated by the appliance. If the documentation of overall heat output was not reported in full, it was flagged orange and can be resolved by submitting data from the test report. If the data does not exist or was not submitted, it was flagged red. Reports that do not include the full data on the overall heat output generated were deemed incomplete.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”* Additionally, 40 CFR 60.533(b)(5) mandates that *“The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs.”*

3.6 Manufacturer’s Instructions to Lab

This item identifies whether or not the test report includes the instructions the manufacturer provided to the lab when running the certification test. If this item was included, no flag was generated. If the documentation of overall heat output was not reported in full, it was flagged orange and can be resolved by submitting data from the test report. If the data does not exist or was not submitted, it was flagged red. This element can be resolved by posting a complete test report that includes all instructions and guidance the manufacturer and the manufacturer's consultants provided to the certification testing laboratory.

Regulatory Basis

Per 40 CFR 60.534(h) All communications must be included in the test documentation required to be submitted pursuant to 60.533(b)(5). EPA confirmed this requirement in the memo sent to test laboratories by Steffan Johnson, group leader for US EPA’s Measurement Technology Branch, “manufacturer’s instructions” for conducting the certification test are a required reporting element. A complete copy of that memo has been provided at the end of this document in Appendix B.

3.7 Firebox Dimensions (cordwood stoves only)

This item identifies whether or not the test report includes the dimensions of the firebox. If this item was included, no flag was generated. If the report does not include the dimensions of the firebox in full, it was flagged red. This item can be resolved by submitting and posting data in the test report that clearly delineates the dimensions of the firebox. If firebox dimensions can be calculated to match firebox volumes, no additional information is required. If firebox dimensions reported do not match firebox volumes reported, complete calculations must be submitted under item 3.9.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”* Additionally, 40 CFR 60.533(b)(5) requires that any data not used in the calculations must also be reported. The law states, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed*

and why.” 40 CFR 60.533(b)(3) further explains the firebox calculations, requiring, “A statement whether the firebox or any firebox component (including the materials listed in paragraph (k)(3) of this section) will be composed of material different from the material used for the firebox or firebox component in the wood heater on which certification testing was performed, a description of any such differences and demonstration that any such differences may not reasonably be anticipated to adversely affect emissions or efficiency.”

Reports that do not include the full firebox measurements, schematics of the firebox that include measurement details, and volume calculations were deemed incomplete. Confirmation that firebox calculations must be included in the non-CBI test report were obtained from EPA’s Measurement and Technology Section and have been provided at the end of this document in Appendix B.

Per Steffan Johnson’s email, manufacturer’s instructions cannot be used to modify intent of the method. In his email, Mr. Johnson states, *“This means that while a manufacturer may provide input to the test laboratory on operation of the appliance during the certification test, specific instructions that stray from typical homeowner operation, intended to lower the emissions of the appliance solely for the certification test, are not acceptable.*

MTG believes that examples of such instructions with respect to a cord wood compliance test include (but are not limited to):

- *Removing bark prior to use as test fuel.*
- *Shaping or extreme sorting to constitute preference for a particular shape of fuel or fuel load (not to emulate crib fuel or create ‘triangular crib fuel’).*
- *Loading and lighting fuel inconsistent with instructions in the appliance owner’s manual.*
- *Complicated fuel placement instructions that would not ever be followed by a home owner.*
- *Manipulation of the ash bed inconsistent with, or otherwise in addition to, instructions included in the appliance owner’s manual, or in a manner that a homeowner is unlikely to ever follow.*
- *Failure to meet method required fuel loading specifications (shortened fuel, partial loading, **or not using the full firebox area to calculate fuel loading**).[emphasis added]*
- *Limiting fuel loading during compliance testing that will be easily overridden by a home user seeking a longer burn time.*
- *Instructions that specifically override specified sections of the test method OR the subpart rule language (inside or outside of the test method requirements).”*

Therefore, the Review Committee used the parameters laid out in the August 24, 2017 version of Method 28 to confirm that manufacturer’s measurements and calculations are reasonable and not overriding the intent of testing. The following details the definitions and guidelines used from this method.

- *Height* means the vertical distance extending above the loading door, if fuel could reasonably occupy that space, but not more than 2 inches above the top (peak height) of the loading door, to the floor of the firebox (i.e., below a permanent grate) if the grate allows a 1-inch diameter piece of wood to pass through the grate, or, if not, to the top of the grate. Firebox height is not necessarily uniform but must account for variations caused by internal baffles, air channels, or other permanent obstructions.
- *Length*
- means the longest horizontal fire chamber dimension that is parallel to a wall of the chamber.
- *Width* means the shortest horizontal fire chamber dimension that is parallel to a wall of the chamber.
- *Wood Heater Firebox Volume.*

- Determine the firebox volume using the definitions for height, width, and length in Section 3.
- Volume adjustments due to presence of firebrick and other permanent fixtures may be necessary. Adjust width and length dimensions to extend to the metal wall of the wood heater above the firebrick or permanent obstruction if the firebrick or obstruction extending the length of the side(s) or back wall extends less than one-third of the usable firebox height.
- Use the width or length dimensions inside the firebrick if the firebrick extends more than one-third of the usable firebox height. If a log retainer or grate is a permanent fixture and the manufacturer recommends that no fuel be placed outside the retainer, the area outside of the retainer is excluded from the firebox volume calculations.
- In general, exclude the area above the ash lip if that area is less than 10 percent of the usable firebox volume. Otherwise, take into account consumer loading practices. For instance, if fuel is to be loaded front-to-back, an ash lip may be considered usable firebox volume.
- Include areas adjacent to and above a baffle (up to two inches above the fuel loading opening) if four inches or more horizontal space exist between the edge of the baffle and a vertical obstruction (*e.g.*, sidewalls or air channels).

Also, note that ASTM methods 2780 and 3053 provide broad discretion to allow manufacturer instructions to over-ride actual appliance measurements. However, M28R requires under section 2.1.3 that manufacturers shall not specify a smaller volume of the firebox for testing than the full usable firebox. For units that tested with cribs, ADEC interpreted that element to include the full usable firebox. Manufacturers cannot minimize firebox volumes at their discretion. For ASTM 3053, however, EPA has not clarified their position on firebox volume within the test method. However, 40.533(l)(1)(iii) states that labeling of the wood heater model line, the owner's manual or the associated marketing information does not comply with the requirements of 60.536 qualifies as criteria for certification revocation. 40CFR 60.536(g)(1) states that "information must be consistent with the operating instructions provide by the manufacturer to the approved test laboratory for operating the wood heater during certification testing, except for details of the certification test that would not be relevant to the user." Based on this regulatory requirement, any appliance tested that states a different firebox measurement for certification testing than communicated in the owner's manual or associated marketing materials was deemed as non-compliant with the regulation.

3.8 Longest Dimension (cordwood stoves only)

The tool identifies the longest dimension of the appliance to assess fuel length for testing, log loading direction, and testing representativeness. If this data was not reported, reviewers input maximum log length to complete an initial assessment. However, reporting of firebox dimensions is a mandatory data element of the test report. If the report does not include dimensions of the firebox in full, the longest dimension element was flagged red. This item can be resolved by submitting and posting data in the test report that clearly delineates the dimensions of the firebox. If firebox dimensions can be calculated to match firebox volumes, no additional information is required. If firebox dimensions reported, do not match firebox volumes reported, complete calculations must be submitted under item 3.9. Reports that do not include the full firebox measurements were deemed incomplete. Confirmation that firebox calculations must be included in the non-CBI test report were obtained from EPA's Measurement and Technology Section and have been provided at the end of this document in Appendix B. Also, see Section 3.7 for MTG email on elements that the manufacturer's instructions cannot override. For appliances tested

with M28R, the longest firebox dimension was used to determine compliance with fuel length requirements.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”* Additionally, 40 CFR 60.533(b)(5) requires that any data not used in the calculations must also be reported. The law states, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”* 40 CFR 60.533(b)(3) further explains the firebox calculations, requiring, *“A statement whether the firebox or any firebox component (including the materials listed in paragraph (k)(3) of this section) will be composed of material different from the material used for the firebox or firebox component in the wood heater on which certification testing was performed, a description of any such differences and demonstration that any such differences may not reasonably be anticipated to adversely affect emissions or efficiency.”*

3.9 Firebox Calculations (cordwood stoves only)

This item identifies whether or not the test report includes the firebox volume calculations in the test report. If this item was included, no flag was generated. If the documentation of firebox volume calculations was not reported in full, it was flagged orange and can be resolved by submitting data from the test report. If the data does not exist or was not submitted, it was flagged red. Reports that do not include the full firebox schematics and volume calculations were deemed incomplete. Confirmation that firebox calculations must be included in the non-CBI test report were obtained from EPA’s Measurement and Technology Section and have been provided at the end of this document in Appendix B.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”* Additionally, 40 CFR 60.533(b)(5) requires that any data not used in the calculations must also be reported. The law states, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”* 40 CFR 60.533(b)(3) further explains the firebox calculations, requiring, *“A statement whether the firebox or any firebox component (including the materials listed in paragraph (k)(3) of this section) will be composed of material different from the material used for the firebox or firebox component in the wood heater on which certification testing was performed, a description of any such differences and demonstration that any such differences may not reasonably be anticipated to adversely affect emissions or efficiency.”*

3.10 Efficiency Calculations

This item identifies whether or not the test report includes efficiency calculations. If this item was included, no flag was generated. If the documentation of efficiency calculations was not reported at all, it was flagged red. If the item was partially reported, the item was flagged yellow. This item can be resolved by submitting data from the test report.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”* Additionally, *“The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs.”*

3.11 Burn Rate Calculations

This item identifies whether or not the test report includes burn rate calculations for the appliance. If this item was included, no flag was generated. If the documentation of the burn rates was not reported at all, it was flagged red. If the item was partially reported, the item was flagged yellow. This item can be resolved by submitting data from the test report.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”* Additionally, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”* Lastly, 40 CFR 60.533(b)(5) further explains the burn rate categories requiring that, *“The burn rate for the low burn rate category must be no greater than the rate than an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer.”*

3.12 Raw Data Sheets

This item identifies whether or not the test report includes raw datasheets. If this item was included, no flag was generated. If no raw data sheets were included in the test report, the item was flagged red. If the item was partially reported, the item was flagged yellow. This item can be resolved by submitting data from the test report.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”*

3.13 Pre-burn Completed By

This item identifies who completed pre-burns on the appliance prior to completing certification testing runs. If this item was included, no flag was generated. If this information was not reported, the element was flagged red. This item can be resolved by submitting data from the test report.

Regulatory Basis

All test methods require aging or conditioning (ASTM 2779, 9.1.3; ASTM 3053, 8.14; M28R, 8.10). The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”*

3.14 Pre-burn/Conditioning Data

This item identifies the reporting of pre-burn (also known as conditioning or aging) data on the appliance prior to completing certification testing runs. If this item was included and compliance with conditioning data included in test methods could be determined, no flag was generated. If this information was not reported, the element was flagged red. If there was information in the report but compliance with test method requirements could not be determined, the item was flagged as partially reported. This item can be resolved by submitting a complete data set to assess conformance with method requirements.

Regulatory Basis All test methods require aging or conditioning (ASTM 2779, 9.1.3; ASTM 3053, 8.14; M28R, 8.10). The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”*

40 CFR 60.531 defines a valid certification test as one, “that meets the following criteria:

- (1) The Administrator was notified about the test in accordance with § 60.534(g);
- (2) The test was conducted by an approved test laboratory as defined in this section;
- (3) The test was conducted on a wood heater similar in all material respects that would affect emissions to other wood heaters of the model line that is to be certified; and
- (4) The test was conducted in accordance with the test methods and procedures specified in § 60.534.”

The following requirements are laid out in the test methods that must be followed for a valid certification test. Each method contains specific conditioning requirements. The following provides aging requirements per the individual test methods:

- EPA M28R/ASTM 2780
 - Operation – Per US EPA M28R 2.1.4
 - Heater must be operated for a minimum of 50 hours using a medium burn rate. The conditioning may be at the manufacturer’s facility. If conditioning takes place at the certification lab, the pre-burn for the first test can be included as part of the conditioning requirement. Reporting
 - Time and weight for all fuel added.(ASTM 9.1.4)

- Flue gas temperature at least once per hour during testing (ASTM 9.1.5)
 - For catalytic appliances, record hourly catalytic combustor exit temperature (ASTM 2780 9.1.6)
- ASTM 3053
 - Operation –
 - Per section 8.1.4, run the appliance for a minimum of 50 hours at the medium combustion air setting used the fuel specified in section 8.4 with a moisture content of 18 -28% dry basis.
 - The method does not require continuous operation for conditioning.
 - Conditioning may be conducted at either the manufacturing facility or the certification lab. Both require full documentation.
 - Manufacturer conditioning test equipment must meet all requirements listed in Section 6 – Equipment and Supplies and Section 7 – Calibration and Standardization.
 - Reporting
 - Weight and moisture content for all fuel added.
 - Record flue temperature at least once during each hour of operation
 - For catalytic appliances, record hourly catalytic combustor exit temperature.
- ASTM 2779: Section 9.1 specifies pre-conditioning requirements to include:
 - Operation:
 - At least 48 hours at the medium burn rate.
 - The method does not require continuous operation.
 - Reporting:
 - Fuel addition: time and weight of fuel added.
 - Flue gas temperature at least once an hour
 - Documentation that the appliance ran for at least 48 hours at the medium burn rate as defined in Section 9.5.1.
 - Section 9.5.1 directs procedures for calculating thermal efficiency and burn rates, indicating that hourly burn rates shall be reported for aging.

ADEC determined that a complete data set included the information required by the test method and all underlying data to determine compliance with burn rate requirements. Please note that methods detail minimum data reporting. Note that the citation above requires reporting of all data, not just the minimum items required by the test method.

3.15 Lab Technician Notes

This item identifies whether or not the test report includes the lab technician notes. If this item was included, no flag generated. If the lab technician notes are not included in full, it was flagged orange and can be resolved by submitting the test report's data. If the notes do not exist or are not submitted, the item will be flagged red.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, “*All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.*”

3.16 Documentation of Run Appropriateness

This item identifies whether or not the test report includes documentation of run appropriateness. If this item was reported in full, no flag was generated. If the documentation of run appropriateness was partially reported, it was flagged orange. This item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”*

3.17 Documentation of Run Validity

This item identifies whether or not the test report includes documentation of run validity. If this item was reported in full, no flag was generated. If the documentation of run validity was partially reported, it was flagged orange. This item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”*

3.18 Documentation of Run Anomalies

This item identifies whether or not the test report includes documentation of run anomalies. If this item was reported in full, no flag was generated. If the documentation of run anomalies was partially reported, it was flagged orange. This item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”*

3.19 Documentation of Run Burn Rates

This item identifies whether or not the test report includes documentation of run burn rates. If this item was reported in full, no flag was generated. If the documentation of run burn rates was partially reported, it was flagged orange. This item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”*

3.20 Photos

This item identifies whether or not the test report includes photographs. If this item was included, no flag was generated. If the pictures were not included in full, it was flagged orange and can be resolved by submitting the pictures. This item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results. Documentation must include the items specified in the applicable test methods.”* The test methods specify photo documentation requirements. Specific photo documentation requirements are listed in the test methods as follows:

- *M28R/ASTM 2780:*
 - Chimney used for testing
 - Test fuel crib arrangement (ASTM 2780 9.5.5.3) Sampling location relative to wood heater. Include drawing or photograph. (12.6.1.4.1)
- *ASTM 3053:* 8.2.7; 8.5.4.1; 8.5.9; 8.6.1.1; 8.6.3.1; 8.6.8, and 8.9.9.
 - The complete test installation including venting, front view, rear view, and side view. (8.2.7)
 - Kindling/start-up fuel configuration. (8.5.9.2)
 - Detailed written description, picture, or video of residual start-up fuel bed before and after any adjustments. (8.5.9.3), (8.5.9.5), (8.6.8),
 - Photograph or video of residual fuel bed (8.5.9.3), (8.6.9.1)
 - Photograph or video of test fuel load before it is placed in the firebox (8.5.9.3), (8.6.9.1)
 - Photograph or video of test fuel load after it is placed in the firebox (8.5.9.3), (8.6.9.1)
 - Written description, photograph or video before fuel adjustments. (8.5.9.5)
 - Written description, photograph or video after fuel adjustments.
- *ASTM 2779* – No requirements.

4 Test Run Data Section

4.1 Regulatory Basis for Section 4 Elements

The required reporting elements and determinations for adherence in this section used regulatory requirements defined under the federal NSPS based on the following citations:

- 40 CFR 60.533(5). Per the requirement, *“The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat output.”* Additionally, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”*
- 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”*
- 40 CFR 60.533(b)(5) states, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”*

4.2 Run

This item identifies the number of test runs completed for the certification test. If the number of test runs was included, the tool did not generate a flag. Reports that do not include this item were flagged yellow since resolving the issue is limited in nature and does not require technical review. In the notes section, a flag is generated if there are additional runs that were not appropriately used in the calculation or if the test run was stopped without a proper regulatory basis. For tests that included incomplete runs, the company must submit data providing evidence that a filter change was not feasible to complete the test run.

Regulatory Basis

The regulatory basis for this requirement relies on the following citations:

- 40 CFR 60.534(h), *“manufacturers must not involve themselves in the conduct of the test after the pretest burn has begun. Communications between the manufacturer and laboratory or third-party certifier personnel regarding operation of the wood heater must be limited to written communications transmitted prior to the first pretest burn of the certification test series. During certification tests, the manufacturer may communicate with laboratory personnel only in writing and only to notify them that the manufacturer has observed a deviation from proper test procedures.”*
- US EPA Stack Guidance on Stoppages:
 - *• The primary issue is whether it is appropriate to stop a stack test being conducted to determine and demonstrate compliance once it has been started, and if so, under what circumstances.*
 - *There are no regulatory provisions in the NSPS, NESHAP, or MACT programs that address whether a facility is allowed to stop a stack test once it has been started.*

Depending on the circumstances surrounding the stoppage, the facility may be found in violation of the requirement to conduct a stack test, the underlying regulatory requirement, or both. For example: - If a facility stopped the stack test because it was exceeding applicable emission standards and would have failed the test, it would be considered in violation of both the requirement to conduct a stack test (if it does not complete a performance test by the applicable deadline) and to comply with the underlying regulatory requirement or permit condition. Consistent with 40 CFR §§ 60.11 and 61.12, any credible evidence may be used to demonstrate non-compliance.”

4.3 Run Category

This item identifies whether or not the run categories are identified and appropriately categorized in the test report. If this item was reported accurately, the tool did not generate a flag. If the documentation of run categories was partially reported or incorrectly reported, it was flagged yellow. Questions about runs are noted. Any issues with this item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis: See Section 4.1.

4.4 Burn Rate (kg/hr)

This item identifies whether or not the certification test reports the burn rates for each test run. If this item was reported accurately, the tool did not generate a flag. If the documentation of burn rates was partially reported or incorrectly reported, it was flagged yellow. Questions about burn rates are noted. Any issues with this item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis: See Section 4.1.

4.5 PM Emissions by run (g/hr)

This item reports the emissions in grams per hour (the regulatory metric) by individual test runs. If this item was reported accurately, the tool did not generate a flag. If the documentation of run emission rates was not reported or incorrectly reported, it was flagged red. Any issues with this item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis: See Section 4.1.

4.6 PM Emissions for 1 hr filter pull (g/hr)

This item details the PM emissions in the first hour of the test run on a grams per hour basis provided in the certification test report. If this item was reported accurately, the tool did not generate a flag. If the first hour emissions are not reported in grams per hour, the item is flagged red. Any issues with this item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis: See Section 4.1.

4.7 Heat Output by Run (Btu)

This item details the heat output in Btu for each test run provided in the certification test report. If this item was reported accurately, the tool did not generate a flag. If the heat output is not reported, the item is flagged red. Any issues with this item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis: See Section 4.1.

4.8 CO Emissions test report (g/hr)

This item details the carbon monoxide emissions in grams per hour for each test run provided in the certification test report. If this item was reported accurately, the tool did not generate a flag. If the heat output is not reported, the item is flagged red. Any issues with this item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis: See Section 4.1.

4.9 Efficiency: Test Report

This item details the efficiency performance using the higher heating value (HHV) of wood for each test run provided in the certification test report. If this item was reported accurately, the tool did not generate a flag. If the data was reported, the item is flagged red. Any issues with this item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis: See Section 4.1.

4.10 All Run Data

This item provides an overarching metric for this section. If this section identifies missing run data or reviewers identify information that suggests not all data was reported, the item will be flagged as not reported. If the reviewer determined that all information was reported, no flag was generated.

Regulatory Basis: See Section 4.1.

4.11 Filter Data

This item details the data reported regarding filter weights. If filter weights were contained in the report, it was marked “yes” for the individual runs for cordwood appliances or “reported” for pellet appliances. If filter values were not reported, this item was flagged red. This element is required under ASTM 2515-13 section 10.2 and becomes a mandatory reporting element per the regulatory citations listed at the beginning of this section. This item can be resolved by submitting the full data from the test report or third-party certifier. If the data does not exist or is not submitted, it will be flagged red.

Regulatory Basis: See Section 4.1.

4.12 Train Precision

This item details the precision of the two trains used for PM emission measurements. EPA Method 5G requires a train precision of 7.5%. ASTM 2515-13 includes the same train precision as Method 5G but added the ability to have higher imprecision between the two trains if the grams per kilogram between the two trains was less than 0.5 grams per kilograms of dry fuel. The team found the addition of the gram per kilogram metric highly problematic. Therefore any test run with precision greater than 7.5% generated a red flag. For any item marked as “pending,” a final determination on run validity will be made based on the data from a complete test report.

Reports that do not report both train precision and gram per kilogram data are incomplete as the definition of a complete test under 40CFR 60.531 require conformance with all test method elements. Reviewers cannot confirm compliance with test methods if the labs do not report mandatory elements of the specified test method.

Regulatory Basis:

Section 11.7 of ASTM 2515 states for dual train comparison, “Calculate the total emissions from each sampling train as shown in 11.5 separately and determine the average total emissions from the two values. Calculate the emissions factors for each sample train by dividing the total emissions by the weight of dry fuel burned. The total emissions values calculated for each sampling train shall not differ by more than 7.5 % from the average total emissions value or the difference between the emissions factors for the two trains shall not be greater than 0.5 grams per kilogram of dry fuel. If this specification is not met, the results are unacceptable.” ADEC has interpreted the test method to require calculation of both the train precision and gram per kilogram metric. Under 40 CFR 60.533(b)(5). All calculation must be reported, “All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”

4.13 Negative Weights

This item details if negative filter weights were identified in the test reports. If filter weights were contained in the report, it was marked “yes.” Negative filter weights did not generate a flag, and this item merely identified if negative weights were present.

Regulatory Basis: See Section 4.1.

4.14 Negative Weights Handled Appropriately

This item details if calculations handled negative weights appropriately. ASTM 2515-13 section 10.2 provides a methodology for addressing negative values associated with probe measurements but provides no guidance on other negative values. Based on best practices, negative filter values were deemed handled appropriately if the values were set to zero in the calculations of emission rates or the testing lab completed acetone rinses to assure that all lost materials were captured in the measurement process. If negative values were subtracted without completing appropriate recovery practices, the calculation of filter weights was deemed incorrect. This element can be resolved by revising the report with proper handling of negative values.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(l)(1)(ii). Per this law, certification can be revoked if there is, “A finding that the certification

test was not valid. The finding will be based on problems or irregularities with the certification test or its documentation but may be supplemented by other information.”

EPA has not provided guidance on proper procedures for handling negative values. ADEC does not believe that silence allows the laboratory or manufacturer to interpret the test method. Rather ADEC believes that EPA should provide detailed information to labs on proper procedures for handling negative values. Currently, the determination to allow their subtraction appears to be an interpretation made by the regulated community without concurrence from US EPA. The current measurement method has its foundations in the Oregon methods. Oregon methods require the use of acetone rinses to ensure all materials have been captured. Oregon Methods document C.8.14, it states:

*“*Total PM = (Filter) – (Average (pre-test blank & post-test blank)) + (Acetone Rinse) – (Acetone Blank Corrected for Rinse Volume). Note: The blank corrections for the filter and/or rinse samples are ‘0’, if the blank filter or rinse samples yield negative weight gains. Therefore a report that contained negative values but took measures to recover all samples, such as acetone rinses to ensure capture of all materials were identified, were classified as handling negative values correctly. Those reports which assumed negative values were captured elsewhere without detailing any recovery procedures to confirm all losses were captured were deemed as, “handled inappropriately.”*

4.15 Lowest Burn Rate Tested

If the reviewers could not determine if the appliance was tested at a setting that achieves the lowest burn rate, this element was marked with a red flag. This element can be resolved by submitting information that provides clear evidence that the unit was tested at the lowest burn rate a homeowner can achieve in house use.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.534(a)(1). Per the requirement, *“The burn rate for the low burn rate category must be no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer.”*

5 Appliance Fueling Section

5.1 Regulatory Basis for Section 5 Elements

The required reporting elements and determinations for adherence in this section used regulatory requirements defined under the federal NSPS and US EPA OECA's stack testing guidance.¹ based on the following citations:

- EPA National Stack Testing Guidance in Section 5 states that the fuel conditions must represent fuel loading configurations that “constitute the most challenging conditions.” Specifically, the Guidance states:
 - *In light of the fact that: (a) the Act requires that facilities continuously comply with emission limits; (b) the NSPS, MACT, and NESHAP programs all require that performance tests be conducted under such conditions as the Administrator specifies; and the NSPS and MACT programs further require that such tests be conducted under representative operating conditions; EPA recommends that performance tests be performed under those representative (normal) conditions that:*
 - *represent the range of combined process and control measure conditions under which the facility expects to operate (regardless of the frequency of the conditions); and*
 - *- are likely to most challenge the emissions control measures of the facility with regard to meeting the applicable emission standards, but without creating an unsafe condition.*

The following are factors that should be considered in developing the plan for a performance test that challenges to the fullest extent possible a facility's ability to meet emissions limits.

- For a facility operating under an emission rate standard (e.g., lb/hr) or concentration standard (e.g., µg/m³), normal process operating conditions producing the highest emissions or loading to a control device would generally constitute the most challenging conditions with regard to the emissions standard.*
 - *“ The primary issue is what information is needed to adequately document the results of a stack test conducted to determine and demonstrate compliance. The written test report should be sufficient to assess compliance with the underlying regulatory requirements, permit conditions, or enforcement order, and adherence to the test requirements. When reviewing the site-specific test plan, the delegated agency should identify for the facility any information that should be included in the test report. During the actual test program, there are usually modifications to the procedures specified in the site-specific test plan, and these modifications should be documented in the test report.*

¹ EPA communications confirmed that the Residential Wood Heater regulations are covered under this guidance

- Similar to the site-specific test plan, certain basic elements should be addressed in a test report to document the testing conditions and results, and enable the delegated agency to determine whether a complete and representative stack test was performed. For a prototype of a sufficiently detailed test report, see Emission Measurement Center Guideline Document (GD043), "Preparation and Review of Emission Test Reports," (www.epa.gov/ttn/emc/guidlnd.html). If the test report does not contain sufficient information with which to adequately review the testing process and data results, it is within the discretion of Page 19 the delegated agency to request additional information, or require another test if appropriate. The test report should include chain-of-custody information from sample collection through laboratory analysis including transport. It also should include sufficient raw data and cross correlations in the appendices such that a new set of calculations including statistics could be independently generated from the raw data if necessary e.g., median versus geometric-mean). ”
- 40 CFR60.533(b)(5). Per the requirement, “All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results. Documentation must include the items specified in the applicable test methods. Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”
- 40 CFR 60.537(2) and 60.5475(b)(5) which state: “All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results. Documentation must include the items specified in the applicable test methods. Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed. The documentation must show that the burn rate for the low burn rate category is no greater than the rate that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer. The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs. Submit the test report and all associated required information according to the procedures for electronic reporting specified in § [60.5479\(f\)](#).”
- ASTM methods 2780 and 3053 provide broad discretion to allow manufacturer instructions to override actual appliance measurements. Per Steffan Johnson’s memo 12/3/2019 memo contained in the appendix of this document, manufacturer’s instructions cannot be used to modify the intent of the method. In his memo, Mr. Johnson states, “This means that while a manufacturer may provide input to the test laboratory on operation of the appliance during the certification test, specific instructions that stray from typical homeowner operation, intended to lower the emissions of the appliance solely for the certification test, are not acceptable.

MTG believes that examples of such instructions with respect to a cord wood compliance test include (but are not limited to):

- **Removing bark prior to use as test fuel.**

- *Shaping or extreme sorting to constitute preference for a particular shape of fuel or fuel load (not to emulate crib fuel or create ‘triangular crib fuel’).*
- *Loading and lighting fuel inconsistent with instructions in the appliance owner’s manual.*
- *Complicated fuel placement instructions that would not ever be followed by a home owner.*
- *Manipulation of the ash bed inconsistent with, or otherwise in addition to, instructions included in the appliance owner’s manual, or in a manner that a homeowner is unlikely to ever follow.*
- *Failure to meet method required fuel loading specifications (shortened fuel, partial loading, or not using the full firebox area to calculate fuel loading.*
- *Limiting fuel loading during compliance testing that will be easily overridden by a home user seeking a longer burn time.*
- *Instructions that specifically override specified sections of the test method OR the subpart rule language (inside or outside of the test method requirements).”*

5.2 Fuel Species for Cordwood Stoves – Pellet Species/Type for Pellet Stoves

This item lists the type of fuel used for testing. For cordwood appliances, this lists the wood species for fuel used in the certification test. For pellet stoves, this list provides the information included in the test report to describe the type of pellet fuels used. Reports with complete data for the element did not generate a flag. If the element was not reported, an orange flag was generated. This item can be resolved by modifying the test report to include information on the species of fuel used for cordwood testing. For pellet stoves, this element can be resolved by identifying the brand and location of the manufacturing facility of the pellet used for certification testing. If this information is not available, incorporation of proximate/ultimate analysis of the pellet used for testing can be used.

Regulatory Basis: See Section 5.1.

5.3 Pellet Fuel Certification

This element applies only to pellet fuels and reports if the fuel used was a quality certified fuel using either the Pellet Fuel Institute (PFI) program or the ENPlus program. Reports with complete data for the element did not generate a flag. If the element was not reported, an orange flag was generated. This item can be resolved by modifying the test report to include information regarding the pellet fuels.

Regulatory Basis: See Section 5.1.

5.4 Source of the Pellet Specification

This element applies only to pellet fuels. This item specifies if default values were used to calculate report results or if the fuel used in testing was sent for analysis and that data was used in calculations. Reports with complete data for the element did not generate a flag. If the element was not reported, an orange flag was generated. This item can be resolved by modifying the test report to include information regarding the pellet fuels.

Regulatory Basis

Section 9.3.1.1 requires analysis of pellet fuel used for testing to determine efficiency and output. Pellet stove tests lacking pellet fuel analysis were flagged.

5.5 Log Length

Fuel length must be reported as part of a complete test report. If no log length is reported a flag was generated. This item can be resolved by submitting and updating publicly available reports to include details on the dimensions of the fuel used in testing. Failure to submit data regarding appropriateness of fuel length used in testing shall result in the device being moved to the No Determination List due to the concern of a non-representative test. Failure to provide an adequate demonstration of why the fuel length used was appropriate, representative and reflective of the most challenging condition shall result in a No Determination due to the concern of a non-representative test. Fuel lengths that were greater than five-sixths the longest reported dimension did not generate a flag.

5.5.1 M28R Testing

Information in this section only applies to appliances tested with M28R. In section 9.4.1.6 of ASTM 2780, the test method states, “each test fuel piece...shall closely approximate 5/6 the dimensions of the firebox length..” 3.2.8 of ASTM 2780 defines firebox length as “the longest horizontal firebox dimension.” The review team identified the longest firebox dimension reported in section 3, multiplied that length by 5/6, and subtracted 1 inch. This calculation was then compared to the fuel length used for testing. If the fuel length used for certification testing was less than the calculated value using the formula above, ADEC determined that the fuel did not meet the requirements of the test method, and a flag was generated. If the report did not contain firebox dimension, a determination on fuel length could not be made and therefore, a flag was generated. If the length used in testing was equal or greater than the calculated value, no flag was generated.

5.5.2 ASTM 3053 Testing

Information in this section applies only to cordwood appliances. Fuel log length is a mandatory reporting element as detailed in Section 5.1. ASTM 3053 details no requirements for fuel length. However, ADEC regulations do not require automatic acceptance of ATMs, and therefore ADEC has the ability to review the method to determine if it is sufficient for use in identifying clean appliances for the Fairbanks North Star Borough. If the fuel length used for certification testing was shorter than results of the M28R calculation stated in section 5.5.1, a flag was generated. This issue may be resolved by submitting information to address why the fuel length used was representative using the information detailed in the stack testing guidance. ADEC will review this information and make a final determination.

Regulatory Basis: See Section 5.1.

5.6 Direction of Longest Dimension

This item only applies to cordwood stoves tested with the Broadly Applicable Alternative Test Method (ASTM 3053). This element identifies the direction of the longest direction of the appliance. This information determines if the appropriate loading direction is east/west or north/south. For units whose firebox depth and width measurements are within 2 inches, the unit shall be assumed to be an east/west stove, as this is the most common configuration of loading. A flag was generated on the determination on 5.6 conflicted with data reported under element 5.7.

Regulatory Basis: See Section 5.1.

5.7 Log Direction for Testing

This item only applies to cordwood stoves tested with the Broadly Applicable Alternative Test Method (ASTM 3053). This element identifies the loading pattern used during the certification test. If the unit was tested in a loading direction that differs from the direction defined by the determination in 5.5, an orange flag is generated. To resolve this flag, manufacturers must submit data and information to show that the loading condition used is representative and reflective of the most challenging fuel configuration. Emissions testing conducted by a certification lab using certification procedures detailing the results of the normal loading configuration with the loading configuration used in certification testing shall be reviewed to complete a final determination. If the load direction configurations match, the tool did not generate a flag.

If this information could not be determined from reviewing the report data and/or photos were deemed insufficient, a determination of “cannot be determined” with a yellow flag was generated. To resolve this issue, the test report must be revised to show pictures that can accurately assess the fuel used for the certification test. Another round of review will be completed to develop a final recommendation.

Regulatory Basis: See Section 5.1.

5.8 Squared

This item only applies to cordwood stoves tested with the Broadly Applicable Alternative Test Method (ASTM 3053). This element identifies the shape of the fuel pieces used in the certification test. If the unit was tested with wood that the reviewer determined had more than 50% of the pieces shaped or squared, this resulted in the generation of a red flag. To resolve this flag, manufacturers must submit data and information to show that the loading condition used was representative and reflective of the most challenging fuel configuration. Emissions testing conducted by a certification lab using certification procedures using typical cordwood versus those used in initial testing shall be reviewed to complete a final determination. If the photos from testing reflected typical cordwood, the tool did not generate a flag.

If this information could not be determined from reviewing the report data and/or photos were deemed insufficient, a determination of “cannot be determined” with a yellow flag was generated. To address this issue, the test report must be revised to show pictures that can accurately assess the fuel used for the certification test. Another round of review will be completed to develop a final recommendation.

Regulatory Basis: ASTM 3053 defines cordwood in section 3.2.3 as, “typically round wood 12 to 24 in. Long that has been split into triangular, half-round, quarter-round, wedge-shaped, or trapezoidal segments.” The definition of cordwood contained in ASTM 3053 does not define squared wood as cordwood. Therefore ADEC has determined that if the fuel charge is composed of pieces using squared wood, the pieces do not meet the definition of cordwood contained in the test method.

5.9 Debarked Wood

This item only applies to cordwood stoves tested with the Broadly Applicable Alternative Test Method (ATM), known as ASTM 3053. This element identifies the amount of bark on the fuel pieces used in the

certification test. If the unit was tested with wood that the reviewer determined had more than 50% of the pieces without bark, the review tool generated a red flag.

If this information could not be determined from reviewing the report data and/or photos were deemed insufficient, a determination of “cannot be determined” with a yellow flag was generated. In section 8.4.2.1, ASTM 3053 states that “Only cordwood pieces that are free of decay, fungus, and loose bark shall be used.” The review team assessed the fuel charge to determine if it appeared that bark had been removed purposely. Evidence of purposeful debarking was defined as more than 50% of the pieces appearing to have bark removed, and a flag was generated. If photos of the fuel charge did not exist or were insufficient to determine manual removal, the flag indicating that compliance could not be determined was generated. The group interpreted the method to require bark based on the requirements in section 8.4.2.2, where the method provides direction for fuel moisture measurement when adhered thick bark conditions are encountered.

To address this issue, the test report must be revised to show pictures that can accurately assess the fuel used for the certification test. Another round of review will be completed to develop a final recommendation.

Regulatory Basis: See Section 5.1.

5.10 Loading Volume (lb/ft³)

This element identifies whether or not the loading volume was clearly and accurately reported in the test report and the details of that data. If the item was included, no flag was generated. If the item was not included, it was flagged yellow, which can be resolved by submitting the applicable data. The item was flagged red if the loading volume is not within the specified norms.

Regulatory Basis: See Section 5.1.

5.11 Fuel Moisture Content Load (% db)

This element identifies whether or not the fuel moisture content for the load was included in the test report and the details of that data. If the item was included, no flag was generated. If the item was not included, it was flagged yellow, which can be resolved by submitting the applicable data. The item was flagged red if the moisture content is not within the specified norms.

Regulatory Basis: See Section 5.1.

5.12 Fuel Piece Configuration

This element provides a determination of whether all fueling data for the fuel load was completely reported in the test report. If all items were completed satisfactorily, the tool did not generate a flag. If the data was not completely reported, an incomplete flag was generated. This flag can be resolved by submitting and posting complete fuel data.

Regulatory Basis: See Section 5.1.

6 Owner's Manual Requirements Section

6.1 Stack Height

This item identifies whether or not the owner's manual states the stack height that should be used when operating the appliance. The owner's manuals included in the test reports that contained this information did not generate a flag. If the stack height was not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(2). Per the requirement, the owner's manual must provide "*Guidance on proper installation, include stack height, location, and achieving proper draft.*"

6.2 Installation Guidance on Location

This item identifies whether or not the owner's manual provides installation guidance to the user. The owner's manuals included in the test report that contained this information did not generate a flag. If the guidance was not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(2). Per the requirement, the owner's manual must provide "*Guidance on proper installation, include stack height, location, and achieving proper draft.*"

6.3 Guidance on Proper Draft

This item identifies whether or not the owner's manual provides guidance on proper draft to the user. If the item was included, no flag was generated. The owner's manuals included in the test reports that contained this information did not generate a flag. If the guidance was not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(2). Per the requirement, the owner's manual must provide "*Guidance on proper installation, include stack height, location, and achieving proper draft.*"

6.4 Fuel Loading and Reloading

This item identifies whether or not the owner's manual provides fuel loading and re-loading guidance to the user. If the item was included, no flag was generated. The owner's manuals included in the test reports

that contained this information did not generate a flag. If the guidance was not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). *"Fuel loading and re-loading procedures; recommendations on fuel selection and warnings on what fuels not to use, such as unseasoned wood, treated wood, colored paper, cardboard, solvents, trash and garbage."*

6.5 Fuel Selection Recommendations

This item identifies whether or not the owner's manual provides fuel selection recommendations. The owner's manuals included in the test reports that contained this information did not generate a flag. If the fuel selection recommendations were not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement, the owner's manual must provide, *"Fuel loading and re-loading procedures; recommendations on fuel selection and warnings on what fuels not to use, such as unseasoned wood, treated wood, colored paper, cardboard, solvents, trash and garbage."*

6.6 Warnings on Improper Fuels

This item identifies whether or not the owner's manual provides a warning on improper fuels for the appliance. The owner's manuals included in the test reports that contained this information did not generate a flag. If the fuel warnings were not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement, the owner's manual must provide, *"Fuel loading and re-loading procedures; recommendations on fuel selection and warnings on what fuels not to use, such as unseasoned wood, treated wood, colored paper, cardboard, solvents, trash and garbage."*

6.7 Fire Starting Procedures

This item identifies whether or not the owner's manual provides information on fire starting procedures for the appliance. The owner's manuals included in the test reports that contained this information did not generate a flag. If the procedures were not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement the owner's manual must provide, *"Proper operation and*

maintenance information, including minimizing visible emissions,” including “Fire starting procedures,” to the user.

6.8 Proper Use of Air Controls

This item identifies whether or not the owner’s manual provides information on the proper use of air controls for the appliance. If the required information is not in the owner’s manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner’s manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement, *“Proper use of air controls, including how to establish good combustion and how to ensure good combustion at the lowest burn rate for which the heater is warranted.”*

6.9 Good Combustion Low Air Setting/Opacity

This item identifies whether or not the owner’s manual provides information on good combustion for the low air setting of the appliance. The owner’s manuals included in the test reports that contained this information did not generate a flag. If the required information was not included in the owner’s manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner’s manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement, *“Proper use of air controls, including how to establish good combustion and how to ensure good combustion at the lowest burn rate for which the heater is warranted.”*

6.10 Ash Removal Procedures

This item identifies whether or not the owner’s manual provides information on ash removal procedures for the appliance. The owner’s manuals included in the test reports that contained this information did not generate a flag. If the procedures were not included in the owner’s manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner’s manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3)(iv). Per the requirement, *“ash removal procedures,”* are included in the owner’s manual to ensure, *“Proper operation and maintenance information, including minimizing visible emissions.”*

6.11 Instructions for Replacement Parts

This item identifies whether or not the owner’s manual provides instructions for replacement parts for the appliance. The owner’s manuals included in the test reports that contained this information did not generate a flag. If the instructions were not included in the owner’s manual, a yellow flag was generated.

This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement, the owner's manual must provide, *"Instructions for the replacement of gaskets, air tubes and other parts that are critical to the emission performance of the unit, and other maintenance and repair instructions."*

6.12 Federal Warning (C or NC)

This item identifies whether or not the owner's manual includes the proper federal warning for the appliance. Catalytic and non-catalytic appliances require different federal warnings in the owner's manual. The owner's manuals included in the test reports that contained this information did not generate a flag. If the warnings were not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g). Per the requirement the owner's manual must state, *"For catalytic or hybrid models, the following statement— 'This wood heater contains a catalytic combustor, which needs periodic inspection and replacement for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual, or if the catalytic element is deactivated or removed,' "* if the appliance is a catalytic or hybrid model. For non-catalytic models, the owner's manual must state, *"This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual."*

6.13 Warranty Rights

This item identifies whether or not the owner's manual includes warranty rights. The owner's manuals included in the test reports that contained this information did not generate a flag. If the warranty rights were not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement the owner's manual for catalytic or hybrid models must provide, *"This wood heater contains a catalytic combustor, which needs periodic inspection and replacement for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual, or if the catalytic element is deactivated or removed."* For noncatalytic models the following statement must be included, *"This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual."*

6.14 Achieving and Maintaining Catalyst Activity

This item identifies whether or not the owner's manual includes information on achieving and maintaining catalyst activity. The owner's manuals included in the test reports that contained this information did not generate a flag. If the required information was not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement, the owner's manual must provide, *"For catalytic or hybrid models, information on the following pertaining to the catalytic combustor: Procedures for achieving and maintaining catalyst activity, maintenance procedures, procedures for determining deterioration or failure, procedures for replacement and information on how to exercise warranty rights."*

6.15 Catalyst Maintenance Procedures

This item identifies whether or not the owner's manual includes information on catalyst maintenance procedures. The owner's manuals included in the test reports that contained this information did not generate a flag. If the maintenance procedures were not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement, the owner's manual must provide, *"For catalytic or hybrid models, information on the following pertaining to the catalytic combustor: Procedures for achieving and maintaining catalyst activity, maintenance procedures, procedures for determining deterioration or failure, procedures for replacement and information on how to exercise warranty rights."*

6.16 Determining Catalyst Deterioration or Failure

This item identifies whether or not the owner's manual includes information on the procedures for determining catalyst deterioration or failure. The owner's manuals included in the test reports that contained this information did not generate a flag. If the procedures were not included in the owner's manual, a yellow flag was generated. This item can be resolved by modifying the test report to include an owner's manual with sufficient information to address the reporting element.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g)(3). Per the requirement, the owner's manual must provide, *"For catalytic or hybrid models, information on the following pertaining to the catalytic combustor: Procedures for achieving and maintaining catalyst activity, maintenance procedures, procedures for determining deterioration or failure, procedures for replacement and information on how to exercise warranty rights."*

7 Reporting Section

This section summarizes the review of the main report elements and findings.

7.1 Summary Tables Completed

This item identifies whether or not the completed summary tables were included in the test report. If all items were included in the summary report accurately, the tool did not generate a flag. If items were partially reported, the tool generated a yellow flag. If no summary items were reported, the tool generated an orange flag. If this item was flagged orange, the summary tables are missing in their entirety and modification is needed to the test report that will require significant additional review. If the summary tables were partially missing information that is limited in nature and does not require significant review, this item was flagged yellow.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“The test report must include a summary table that clearly presents the individual and overall emission rates, efficiencies and heat outputs.”*

7.2 All Run Data Submitted

This item identifies whether or not all of the run data was included in the test report. If the item was completed, no flag generated. If this item was flagged orange, the data is missing in its entirety and will require significant additional review. If the data was partially missing, this item will be flagged yellow.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.533(b)(5). Per the requirement, *“All documentation pertaining to a valid certification test, including the complete test report and, for all test runs: Raw data sheets, laboratory technician notes, calculations and test results.”*

All run data must also be included in the test report, even if it is not used in calculations. CFR 60.533(A)(5) states, *“Documentation must include discussion of each test run and its appropriateness and validity, and must include detailed discussion of all anomalies, whether all burn rate categories were achieved, any data not used in the calculations and, for any test runs not completed, the data collected during the test run and the reason(s) that the test run was not completed and why.”*

7.3 Test Report Complete

This item identifies whether or not the test report is complete. A complete test report is required to confirm that the data in the summary report was completed in accordance with the specified test method. If significant underlying data for the emission test was not provided in the publicly available test report, this item was flagged orange. If minor elements of the test report were missing from the publicly available test report, a yellow flag was generated.

The report shall also include all communication between the manufacturer and the test lab. Per the rule, all communication during testing must be in written form and included in the test report. Reports that indicate manufacturer involvement or communication but do not include written communication in the test report are not complete.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on several elements. 40 CFR 60.537(g) requires that, “*within 30 days of receiving a certification of compliance for a model line, the manufacturer must make the full non-CBI test report and the summary of the test report available to the public on the manufacturer’s Web site.” For purposes of the review, all test report data was obtained from the manufacturer’s website. To determine if the report was complete, reviewers were guided by Section 60.537(f) which states that all, “*emission data, including all information necessary to determine compliance, except sensitive engineering drawings and sensitive detailed material specifications, may not be claimed as CBI.*” Review was also guided by 40 CFR 60.534(h), “*However, manufacturers must not involve themselves in the conduct of the test after the pretest burn has begun. Communications between the manufacturer and laboratory or third-party certifier personnel regarding operation of the wood heater must be limited to written communications transmitted prior to the first pretest burn of the certification test series. During certification tests, the manufacturer may communicate with the third-party certifier, and only in writing, to notify them that the manufacturer has observed a deviation from proper test procedures by the laboratory. All communications must be included in the test documentation required to be submitted pursuant to § 60.533(b)(5) and must be consistent with instructions provided in the owner’s manual required under § 60.536(g).*”*

Reports that excluded required reporting elements, other than CBI engineering drawings and material specifications, were deemed incomplete.

7.4 Owner’s Manual Complete

This item identifies whether or not the owner’s manual is complete. If the item is complete, the tool did not generate a flag. If less than three items were flagged yellow in Section 6, the item was flagged yellow. If three or more items were flagged in Section 6, this item was flagged orange. Test reports that are not accompanied by a complete owner’s manual were deemed incomplete.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.536(g). Per the requirement, “*Each affected wood heater offered for sale by a commercial owner must be accompanied by an owner’s manual that must contain the information listed in paragraph (g)(2) of this section (pertaining to installation) and paragraph (g)(3) of this section (pertaining to operation and maintenance). Such information must be adequate to enable consumers to achieve optimal emissions performance. Such information must be consistent with the operating instructions provided by the manufacturer to the approved test laboratory for operating the wood heater during certification testing, except for details of the certification test that would not be relevant to the use.*”

7.5 Test Dates

This item identifies whether or not the test dates were reported. If the item was included, no flag generated. If the item was not included, it was flagged yellow which can be resolved by submitting the applicable information. If a resolution of this issue is not possible (i.e. the data was not recorded during testing), the item will be flagged red.

If there were significant delays between the time the unit was received and the time it was tested, defined as more than two weeks, an orange flag was generated. If appliance testing deviated from normal timelines and this deviation was not adequately described in the test report, an orange flag was generated.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.537(g). Per the requirement, *“Within 30 days of receiving a certification of compliance for a model line, the manufacturer must make the full non-CBI test report and the summary of the test report available to the public on the manufacturer’s Web site.”* Additionally, 40 CFR 60.535(a)(2)(viii) explains that the test facility must, *“Agree to immediately notify the Administrator of any suspended tests through email and in writing, giving the date suspended, the reason(s) why, and the projected date for restarting. The laboratory must submit the operation and test data obtained, even if the test is not completed.”*

7.6 30-day Notice Submitted.

This item identifies whether or not the manufacturer submitted thirty-day testing notice meeting EPA reporting timelines. If the notice was included, no flag generated. If the 30-day notice was not submitted in the EPA correspondence section of the test report, the item was flagged yellow. Issues with this element can be resolved by submitting and incorporating the applicable information into the test reports.

Regulatory Basis

The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.534(g). Per the requirement, *“The manufacturer of an affected wood heater model line must notify the Administrator of the date that certification testing is scheduled to begin by email to WoodHeaterReports@epa.gov. This notice must be received by the EPA at least 30 days before the start of testing. The notification of testing must include the manufacturer’s name and physical and email addresses, the approved test laboratory’s name and physical and email addresses, the third-party certifier name, the model name and number (or, if unavailable, some other way to distinguish between models), and the dates of testing. The laboratory may substitute certification testing of another affected wood heater on the original date in order to ensure regular laboratory testing operations.”*

40 CFR 60.531 defines a valid certification test as one, “that meets the following criteria:

- (1) The [Administrator](#) was notified about the test in accordance with [§ 60.534\(g\)](#);
- (2) The test was conducted by an [approved test laboratory](#) as defined in this section;
- (3) The test was conducted on a [wood heater similar in all material respects that would affect emissions](#) to other [wood heaters](#) of the [model line](#) that is to be certified; and
- (4) The test was conducted in accordance with the test methods and procedures specified in [§ 60.534](#).”

[§ 60.534\(g\)](#) specifies that a 30-day notice must be submitted. Reports without this notice are incomplete since conformance with rule requirements cannot be confirmed.

7.7 Tested on the Proposed Date

This item identifies whether or not the testing was conducted on the dates proposed to EPA. If an EPA notice was not provided in the test report, a yellow flag was generated. Issues with this element can be resolved by submitting and incorporating the applicable information into the test reports. Failure to post a publicly available complete test report with the 30-day notice shall result in a final determination of disapproved for an incomplete test report. Issues with this element can be addressed by revising the test report to describe in detail why test timeframe deviations occurred.

7.8 Tested on Consecutive Days/One day

This element identified if the certification testing period was completed within normal timeframes for completing the test. The following defines normal

- Method 28R: typical timeline if four to six days. Four day unless fan confirmation or catalyst equivalency testing conducted.
- ASTM 3053: 2 days
- ASTM 2779: 1 day

This element also identifies if testing was not completed on concurrent days. If appliance testing deviated from normal timelines or was not tested on concurrent days and this deviation was not adequately described in the test report, an orange flag was generated. This flag on its own cannot be a basis for disapproval, however, it may be used as a weight of evidence consideration.

7.9 60-day Report to EPA

This item identifies whether or not the performance test data was submitted to the EPA within 60 days of the test completion. If the report included a compliant date that it was submitted to EPA, the review tool did not generate a flag. If the item was not included, it was flagged yellow. This item can be resolved by submitting data to provide evidence for timely EPA submission.

Regulatory Basis

- The basis for determining whether or not the appliance has complied with this requirement is based on 40 CFR 60.537(f). Per the requirement, *“Within 60 days after the date of completing each performance test, e.g., initial certification test, tests conducted for quality assurance, and tests for renewal or recertification, each manufacturer must submit the performance test data electronically to WoodHeaterReports@epa.gov. Owners or operators who claim that some of the information being submitted is CBI (e.g., design drawings) must submit a complete file, including the information claimed to CBI, on a compact disk or other commonly used electronic storage media (including, but not limited to, flash drives) by mail, and the same file, with the CBI omitted, electronically. The compact disk must be clearly marked CBI and mailed to U.S. EPA, OECA CBI Office, Attention: Residential Wood Heater Compliance Program Lead, 1200 Pennsylvania Avenue NW., Washington DC 20004. Emission data, including all information necessary to determine compliance, except sensitive engineering drawings and sensitive detailed material specifications, may not be claimed as CBI.”*
- 40 CFR 60.533(l)(1)(iii) specifies that the Administrator may revoke the certification if there is, *“A finding that the labeling of the wood heater model line, the owner’s manual or the associated marketing information does not comply with the requirements of 60.536.”*

Appendix A – Cordwood and Pellet Stove Summary Sheet Templates

Cordwood summary sheet template part 1

Summary of Review									
Manufacturer									
Model					Control approach	Non-Catalytic			
Prelim review recomm.									
Red flags			Orange flags			Yellow flags			
Final Determination							Basis:		
Testing Information	Determination						Notes		
Test method									
Test Lab									
Third-party certifier									
Report certified									
Test Report Elements	Determination						Notes		
Wght Avg PM emissions (g/			PM Highest 1-hr (g/hr)						
Wght Avg HHV Efficiency (%)									
Wght Avg CO (g/hr)			Wght Avg CO (g/min)						
Max heat output (Btu/hr)									
Manufacturers Instructions									
Firebox vol. test report									
Firebox dimensions			Longest dim. (in)						
Firebox calculations									
Efficiency calculations									
Burn rate calculations									
Raw data sheets									
Pre-burn completed by									
Pre-burn data									
Lab technician notes									
Doc. of run appropriateness									
Doc. of run validity									
Doc. of run anomalies									
Doc. of run burn rates									
Photos of the fuel loaded									
Test Run Data	Determination						Notes		
Run #									
Run Category									
Burn rate (kg/hr)									
PM emissions by run (g/hr)									
PM 1-hr filter pull (g/hr)									
Filter data									
Train precision (%)									
Negative weights									
Negs handled appropriately									
Heat output by run (Btu/hr)									
CO by run (g/hr)									
HHV efficiency (%)									
Lowest burn rate tested									
All run data									

Cordwood summary sheet template part 2

Appliance Fueling	Determination							Notes
Fuel species	Maple							
Log length (in)								
Direction of longest dimension								
Log direction for testing								
Squared (ASTM test only)								
Debarked (ASTM test only)								
Load density (lb/ft ³)								
Fuel moisture content load (%db)								
Fuel piece configuration								
Owners Manual Req.	Determination							Notes
Stack height								
Location recommendation								
Guidance on proper draft								
Fuel loading & reloading								
Fuel selection recomm.								
Improper fuels warnings								
Fire starting procedures								
Proper use of air controls								
Proper operation low								
Ash removal procedures								
Replacement parts								
Federal warning (C or NC)								
Warranty rights								
Catalyst operation								
Cat maintenance procedure								
Determining catalyst det. o								
Reporting	Determination							Notes
Summary tables complete								
All run data submitted								
Test report complete								
Owner manual complete								
Test dates								
30 Day notice submitted to								
Tested on the proposed date								
Tested in consecutive days								
60 Day report to EPA								

Pellet summary sheet template part 1

Summary of Review										
Manufacturer										
Model										
Prelim review recomm.										
Red flags			Orange flags				Yellow flags			
Final Determination						Basis:				
Testing Information	<i>Determination</i>					<i>Notes</i>				
Test method										
Test Lab										
Third-party certifier										
Report certified										
Test Report Elements	<i>Determination</i>					<i>Notes</i>				
Overall PM emissions (g/hr)			PM Highest 1-hr (g/hr)							
Overall HHV efficiency (%)										
Overall heat output (Btu/hr)										
Overall CO (g/hr)			Overall CO (g/min)							
Manufacturers Instructions										
Efficiency calculations										
Burn rate calculations										
Raw data sheets										
Pre-burn completed by										
Pre-burn data										
Lab technician notes										
Doc. of run appropriateness										
Doc. of run validity										
Doc. of run anomalies										
Doc. of run burn rates										
Test Run Data	<i>Determination</i>					<i>Notes</i>				
Run #										
Run Category										
Burn rate (kg/hr)										
Heat output (Btu/hr)										
CO (g/min)										
HHV efficiency (%)										
Overall PM emissions (g/hr)										
PM 1-hr filter pull (g/hr)										
Filter data										
Train precision (%)										
Negative weights										
Negs handled appropriately										
Lowest burn rate tested										
All run data										
Appliance Fueling										
Pellet species/type										
Pellet fuel certification										
Source of the pellet specific										

Pellet summary sheet template part 2

Owners Manual Req.	Determination	Notes
Stack height		
Location recommendation		
Guidance on proper draft		
Fuel loading & reloading		
Fuel selection recomm.		
Improper fuels warnings		
Fire starting procedures		
Proper use of air controls		
Proper operation low		
Ash removal procedures		
Replacement parts		
Federal warning (C or NC)		
Warranty rights		
Reporting	Determination	Notes
Summary tables complete		
All run data submitted		
Test report complete		
Owner manual complete		
Test dates		
30 Day notice submitted to		
Tested on the proposed dat		
Tested in one day		
60 Day report to EPA		

Appendix B - EPA clarification correspondence

Subject: RE: Reporting Emissions Test Results when using Alt-125, or Alt-127 (ASTM E-3053)

From: "Johnson, Steffan" <johnson.steffan@epa.gov>

Date: 7/15/19 11:31 am

To: "Alex Tieg" <atiegs@omni-test.com>, "brian.brunson@intertek.com" <brian.brunson@intertek.com>, "brian.ziegler@intertek.com" <brian.ziegler@intertek.com>, "claude.pelland@intertek.com" <claude.pelland@intertek.com>, "dpower@polytests.com" <dpower@polytests.com>, "dvoracek@szutest.cz" <dvoracek@szutest.cz>, "gpiedalue@polytests.com" <gpiedalue@polytests.com>, "Henrik Persson" <henrik.persson@ri.se>, "Jared Sorenson" <jsorenson@omni-test.com>, "Jes Andersen" <jsa@teknologisk.dk>, "jsteinert@dirigolab.com" <jsteinert@dirigolab.com>, "Kelli O'Brian" <kelli@clearstak.com>, "lennart.aronsson@sp.se" <lennart.aronsson@sp.se>, "Toney, Mike" <Toney.Mike@epa.gov>, "John Steinert" <john.steinert@pfsteco.com>, "WTerpstra@PFSCorporation.com" <WTerpstra@PFSCorporation.com>, "Benjamin.Barker@csagroup.org" <Benjamin.Barker@csagroup.org>, "Travis.F.Hardin@ul.com" <Travis.F.Hardin@ul.com>, "Laura Hinton" <lhinton@guardiantestlabs.com>

Cc: "Sanchez, Rafael" <Sanchez.Rafael@epa.gov>, "Scinta, Robert" <scinta.robert@epa.gov>, "Toney, Mike" <Toney.Mike@epa.gov>

CORRECTION TO ITEM 2 BELOW: NO EMISSIONS TEST INFORMATION IS CONFIDENTIAL. The last sentence is intended to read "is NOT Confidential Business Information".

I regret the confusion this may have caused. Such information MUST be included in the non-CBI report.

Sincerely,

Stef Johnson

From: Johnson, Steffan

Sent: Thursday, June 13, 2019 4:19 PM

To: Alex Tieg <atiegs@omni-test.com>; 'brian.brunson@intertek.com' <brian.brunson@intertek.com>; 'brian.ziegler@intertek.com' <brian.ziegler@intertek.com>; 'claude.pelland@intertek.com' <claude.pelland@intertek.com>; 'dpower@polytests.com' <dpower@polytests.com>; 'dvoracek@szutest.cz' <dvoracek@szutest.cz>; 'gpiedalue@polytests.com' <gpiedalue@polytests.com>; Henrik Persson <henrik.persson@ri.se>; Jared Sorenson <jsorenson@omni-test.com>; Jes Andersen <jsa@teknologisk.dk>; 'jsteinert@dirigolab.com' <jsteinert@dirigolab.com>; Kelli O'Brian <kelli@clearstak.com>; 'lennart.aronsson@sp.se' <lennart.aronsson@sp.se>; Toney, Mike <Toney.Mike@epa.gov>; 'John Steinert' <john.steinert@pfsteco.com>; 'WTerpstra@PFSCorporation.com' <WTerpstra@PFSCorporation.com>; 'Benjamin.Barker@csagroup.org' <Benjamin.Barker@csagroup.org>; 'Travis.F.Hardin@ul.com' <Travis.F.Hardin@ul.com>; Laura Hinton <lhinton@guardiantestlabs.com>

Cc: Sanchez, Rafael <Sanchez.Rafael@epa.gov>; Lischinsky, Robert <Lischinsky.Robert@epa.gov>; Aldridge, Amanda <Aldridge.Amanda@epa.gov>; Baumgart-Getz, Adam <Baumgart-Getz.Adam@epa.gov>; French, Chuck <French.Chuck@epa.gov>; Boyd, Rochelle <Boyd.Rochelle@epa.gov>; Lowe, Theresa <Lowe.Theresa@epa.gov>; Cozzie, David <Cozzie.David@epa.gov>; Jordan, Scott <Jordan.Scott@epa.gov>; Wayland, Richard <Wayland.Richard@epa.gov>; Hemby, James <Hemby.James@epa.gov>

Subject: Reporting Emissions Test Results when using Alt-125, or Alt-127 (ASTM E-3053)

Importance: High

To all EPA Approved Wood Heater Test Laboratories and Third Party Certifiers,

In reviewing some recent test reports that have been submitted to EPA with the intent to certify a wood heater to the Subpart AAA cordwood emissions standard, there are some discrepancies and concerns

that we are observing, and we will be asking some manufacturers to revise and resubmit a corrected compliance test report. At least one of these concerns (noted below) is critical and may require re-testing. All of these items are important enough to request a corrected report, and we wanted to let all of you know just why you may be contacted by your client(s) with such a request.

We have seen a number of test reports using the Alternate Test Method and ASTM E-3053 that do not identify the species of cordwood used for the compliance testing. While it is true that the ASTM method allows selection from a wide list of wood species, the test report must identify the species of fuel used. This is specified not in the test method but in the General Provisions to EPA 40, Part 60.8 (f)(2) which governs content that must be included in the test report. Paragraph (iii) of this section reads: *“(iii) Description of the emission unit tested including fuel burned, control devices, and vent characteristics; the appropriate source classification code (SCC); the permitted maximum process rate (where applicable); and the sampling location.”*

We are asking that test reports that did not identify the wood fuel species burned during a compliance test submit an amended test report to this Agency. If you are a third party reviewer and have certified such a test report, we request that you include this item, along with other items listed in the General Provisions, in your review checklist.

We have seen some test reports that reference “manufacturer’s instructions” for conducting the certification test, yet those instructions were not included in the test report. The requirement to submit this information is to comply with the General Provisions of 60.8(b) and (c). The guiding principle here is that ONLY the EPA Administrator has the ability to modify a test method for any reason, and these manufacturers instructions do NOT supersede the test method. Also, the National Stack Test Guidance Document (available here: <https://www.epa.gov/compliance/clean-air-act-national-stack-testing-guidance>) clearly states that the emissions test report “*must demonstrate all information from the test lab such that it is a stand-alone document capable of reproducing the entirety of the test results*”. As such, all information pertinent to the operation of the appliance during the testing must be included in the test report (per 40 CFR 60.534). Also, as such instructions are relevant to how the testing was conducted, this documentation is Confidential Business Information (CBI).

We are asking manufacturers that have issued test reports where the manufacturers provided instructions to the test lab regarding appliance operation during the test, and that documentation was NOT included in the emissions test report available to the public, to take corrective action and submit an amended test report to this Agency. If you are a third party reviewer and have certified such a test report, we request that you now include this item, along with other items listed in the General Provisions, in your review checklist.

We have seen some test reports that contain manufacturer’s instructions that may run contrary to the test method and rule requirements. Specifically, we have seen instances where manufacturers have directed laboratories to conduct low load testing with air inlet damper settings at “specified distances from fully closed”, meaning that the unit may not be getting tested at the lowest operating rate that a homeowner will have access to during the course of normal daily operation. Testing at the lowest setting a consumer will be able to operate the appliance in their home is specifically required in 40 CFR 60.534.

Test labs and third party certifiers who are conducting /observing testing where manufacturers provided such instructions AND where you have knowledge that such devices are capable of combustion with air

inlet dampers more fully closed than those setpoints specified by the manufacturer review the rule requirements with their client(s) and either select the lowest available setpoint or modify that stove model to fix the lowest available air inflow setting at that specified point, to remain fixed thereafter. Furthermore, we insist that laboratories and third party certifiers add the requirement(s) of 60.534 to their checklists and take necessary steps to not look past this requirement in the future. Appliance models found to have been tested in this manner and subsequently certified, will need to be reviewed by EPA on a case-by-case basis. As a reminder, third-party certification is an attestation that all testing was conducted as specified in the regulation; certification of testing that does not meet the regulatory requirements may result in loss of EPA Approval status.

We have seen some test reports where cordwood fuel is used to demonstrate compliance, and the dimensions of the “cordwood” very closely match the dimensions of crib fuel. While we recognize that it may happen that occasionally a wood splitter would produce a piece where the minor cross section is nearly equal to the major cross section of the fuel piece, we expect that this happens infrequently and is not normal for every piece in a fuel load.

We ask that labs and third party certifiers use pieces that approximate hand-split fuel and not something that seems to be far more selective. While fuel pieces are ‘selected’ for the test based on size and weight and, to some extent, dimension, we expect to see fuel loads that are more random (in terms of piece-to-piece comparisons) than not.

As always, thank you for continuing to support the EPA Wood Burning Appliance Certification Program. Please do not hesitate to reach out to us and ask questions, any time, with respect to any certification testing you are undertaking; we are happy to offer our technical direction to help you, and your clients, meet the subpart AAA and QQQQ regulatory requirements.

My best regards,

Stef Johnson

Steffan M Johnson | Leader – Measurement Technology Group | US EPA Office of Air Quality Planning and Standards | Air Quality Assessment Division | 109 T.W. Alexander Drive, RTP, NC 27710 | Mail Drop: E-143-02 | Phone: (919) 541-4790 | Cell: (919) 698-5096

From: Johnson, Steffan

Sent: Wednesday, December 4, 2019 10:11 AM

To: bdavis@omni-test.com

Cc: Alex Tiegs <atiegs@omni-test.com>; Ken Morgan <kmorgan@omni-test.com>; Boyd, Rochelle <Boyd.Rochelle@epa.gov>; Sanchez, Rafael <Sanchez.Rafael@epa.gov>; French, Chuck <French.Chuck@epa.gov>; Scinta, Robert <scinta.robert@epa.gov>; Jordan, Scott <Jordan.Scott@epa.gov>; Yellin, Patrick <Yellin.Patrick@epa.gov>; Aldridge, Amanda <Aldridge.Amanda@epa.gov>; Baumgart-Getz, Adam <Baumgart-Getz.Adam@epa.gov>; Hemby, James <Hemby.James@epa.gov>; Wayland, Richard <Wayland.Richard@epa.gov>; Lowe, Theresa <Lowe.Theresa@epa.gov>; Lessard, Patrick <Lessard.Patrick@epa.gov>

Subject: RE: Morso Model 5660B Certification Inquiry

From: Toney, Mike <Toney.Mike@epa.gov>

Sent: Tuesday, December 3, 2019 9:13 AM

Dear Mr. Davis,

Mike Toney forwarded your questions below to my attention, and I will endeavor to address your concerns to an appropriate level.

First off, let me be very clear that the Third Party Certification program is intended to function as an "...independent third party accredited under ISO-IEC Standards 17025 and 17065 to perform certifications, inspections and audits by an accreditation body that is a full member signatory to the International Laboratory Accreditation Corporation Mutual Recognition Arrangement and approved by EPA for conducting certifications, inspections and audits" under subparts AAA and QQQQ of US CFR, Part 60. I state this up front to point out that EPA expects that Third Party Certifiers have processes in place that guide them through situations such as the questions you pose below, or the statements made by the manufacturer in the attached letter and instructions. That said, we're all trying to navigate the rule and cordwood compliance testing is relatively new, so I'll try to shed some light on how the Measurement Technology Group views the compliance test process in order to help you in your Determination Guidances. Keep in mind that the final review is conducted by our Office of Enforcement and Compliance Assistance in Washington, D.C., who conducts a 'trust but verify' review of the submitted test report and associated/required materials prior to granting a model Certification; I say that to let you know that what the Measurement Technology Group may view about a particular test question is not the final word on compliance certification.

Let me begin by turning back the clock to the 1988 NSPS rule that established Subpart AAA. Here is an excerpt from the preamble of EPA's 1988 wood heater rule:

"In response to questions received after proposal from accredited laboratories, a provision has been added clarifying the role of wood heater manufacturers during certification testing. This provision limits instructions by the wood heater manufacturer on wood heater operation to written communications prior to the beginning of the certification test. The only exception as for the manufacturer who observes that the test is being improperly conducted. He may then notify in writing laboratory personnel of the problem(s). All instructions and notifications relating to the certification test shall be reported in the test documentation. Any special instructions are to be consistent with the operating instructions in the owner's manual, except to the extent that they address details of the certification test (e.g. achieving

specific burn rates) that would not be relevant to homeowner operation. In other words, the wood heater should not be operated during the certification test in a manner significantly different from homeowner operation in order to increase the likelihood of passing.”

That statement holds today, under the new NSPS as well as it did in 1988. This means that while a manufacturer may provide input to the test laboratory on operation of the appliance during the certification test, specific instructions that stray from typical homeowner operation, intended to lower the emissions of the appliance solely for the certification test, are not acceptable.

MTG believes that examples of such instructions with respect to a cord wood compliance test include (but are not limited to):

Removing bark prior to use as test fuel.

Shaping or extreme sorting to constitute preference for a particular shape of fuel or fuel load (not to emulate crib fuel or create ‘triangular crib fuel’).

Loading and lighting fuel inconsistent with instructions in the appliance owner’s manual.

Complicated fuel placement instructions that would not ever be followed by a home owner.

Manipulation of the ash bed inconsistent with, or otherwise in addition to, instructions included in the appliance owner’s manual, or in a manner that a homeowner is unlikely to ever follow.

Failure to meet method required fuel loading specifications (shortened fuel, partial loading, or not using the full firebox area to calculate fuel loading).

Limiting fuel loading during compliance testing that will be easily overridden by a home user seeking a longer burn time.

Instructions that specifically override specified sections of the test method OR the subpart rule language (inside or outside of the test method requirements).

For reference, we have put together what we feel reasonably describes cord wood fuel:

A cross sectional area end view should not form a perfect (or near perfect) square (except occasionally) but to be of a triangular or trapezoid shape with ill regular lines, some curvy some, zig zag. But not all having the same length (pie shape is fine). It is acceptable to have some bark but not having all the bark stripped off. It is not acceptable for a test fuel load to consist of all bark being stripped off of every piece. We expect to have wood pieces that are torsion shaped or pieces that are rounds, semi-rounds, have rounded edges, or are larger at one end and smaller at the opposite end. No fuel load should consist of pieces all chosen to be the same size/shape characteristics.

Regarding the comment that states “we do not read that the procedure we have used is illegal, therefore we must assume that we can use the procedure” is not a statement that we ascribe to be true, on its face. Meaning, that we look for common sense and reasonableness in such interpretations. For example, the method does not say that the lab cannot cube the fuel into square, even chunks. It might burn clean, but would a home owner ever operate the appliance in that manner? No. So, use a reasonableness test when reviewing such procedures and ask yourself if you feel it is reasonable for the manufacturer to assume that such instructions, which should also be included in the operators manual, would be followed by the average homeowner during day to day operations. If yes, then I think you have your answer and, if no, likewise, you have your answer.

I would suggest that you pay close attention to items not included in the test method as well, such as instructions for setting a damper for a low burn rate test. Subpart 60.533(b)(5) has some requirements that must be in the test report and while this is a good checklist, the requirement there for documentation of “...the burn rate for the low burn rate category must be no greater than the burn rate

that an operator can achieve in home use and no greater than is advertised by the manufacturer or retailer...” is of particular importance. So where you have a manufacturer telling you that “...*the damper setting for the low burn rate test should be set to XX millimeters from a fully closed position...*”, it is of key importance for your process to verify that the aforementioned damper is incapable of being closed further during ANY operation in the home than where it was placed during the compliance test. To clarify, the homeowner shall not be able to burn fuel at a lower rate than the lowest achieved during the compliance test, and this must be documented and such documentation included in the report to EPA.

Regarding your question about the room air blower, MTG feels that it is not a good idea to make assumptions about the impact of the blower when burning crib fuel and apply that directly to a cord wood test.

I hope this is helpful. Should you have questions about certification I would recommend you contact Dr. Rafael Sanchez who is copied on this e-mail.

Very sincerely,

Stef Johnson

Steffan M Johnson | Leader – Measurement Technology Group | US EPA Office of Air Quality Planning and Standards | Air Quality Assessment Division | 109 T.W. Alexander Drive, RTP, NC 27710 | Mail Drop: E-143-02 | Phone: (919) 541-4790 | Cell: (919) 698-5096

From: Johnson, Steffan <johnson.steffan@epa.gov>
Sent: Tuesday, January 21, 2020 9:12 AM
To: Lisa Rector <lrector@nescaum.org>
Subject: RE: firebox dimensions

Dear Lisa,

Thank you very much for your questions.

EPA would find that firebox dimensions are NOT CBI, in that those dimensions are themselves necessary to appropriately calculate fuel loading needed to conduct the test. Without those dimensions, it is impossible to recreate the test result from the data presented in the report. In other words, those data are essential to the report and are required by the General Provisions of Part 60.8.

I will elevate your question and my reply to Rafael and Bob at OECA, and ask them to review their processes. Also, if several such deficiencies are found, EPA will reach out to third party certifiers and labs with a request for those data.

Appreciatively,

Stef