



# 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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# 1 Introduction – How to Use this Document

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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 is 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 a new 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 with “Pending” or “Disapproved” status can review their summary sheets, provide clarifications/corrections, and submit additional information following the procedures defined by ADEC to inform ADEC’s final determination. This document should serve as a guide to those companies who wish to understand the underlying criteria used to make the proposed determination and how to correct or change that determination.

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 proposed determination for a unit must address all items flagged, regardless of the color-coding.

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 listed within the Pending List that unit will have a final determination of "Disapproved."

Questions and materials addressing identified deficiencies should be directed to Steven Hoke – [steven.hoke@alaska.gov](mailto:steven.hoke@alaska.gov).

## 2 Summary of Review Section

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### 2.1 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>

### 2.2 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.

### 2.3 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.

### 2.4 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.

### 2.5 Flag Counts

This element provides a number count of flags raised by the review. Red and orange flags represent issues with the items that should automatically disqualify a report based on NSPS required reporting elements. These flags represent serious deficiencies that will require the submission of additional information and technical review to make a final determination. Many of these items will require revisions to the official test report. Yellow flags represent items missing from the report that likely exist. These flags can be rectified by submitting additional



information. Yellow flag items do not automatically trigger another review by the technical committee.

## 2.6 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 make agency 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 automatically deemed disapproved due to an incomplete report.

## 2.7 Date

This element reflects the date of the final determination decisions. Reports delineated with a Pending status will be moved to disapproved or approved status after submission of additional information. Failure to submit additional information will result in a disapproval determination.

## 2.8 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.

## 3 Testing Information Section

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### 3.1 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 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. Failure to report this data element shall result in disapproval based on failure to meet mandatory test reporting requirements.

#### 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.”*

### 3.2 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 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. Failure to report this data element shall result in disapproval based on failure to meet mandatory test reporting 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), 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.”*

### 3.3 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. Failure to report this data element shall result in disapproval based on failure to meet mandatory test reporting 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)(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.*”

### **3.4 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 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. Failure to report this data element shall result in disapproval based on failure to meet mandatory test reporting 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). 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.*”

## 4 Test Report Elements Section

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### 4.1 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. Failure to report this data element shall result in disapproval based on failure to meet mandatory test reporting 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), 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.

### 4.2 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. Failure to report this data element in the correct metric shall result in disapproval based on failure to meet mandatory test reporting requirements. 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.”*

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

### **4.3 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. If the data does not exist or is not submitted, the report will be deemed incomplete and disapproved.

#### 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.”*

### **4.4 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. If the data does not exist or is not submitted, the report will be deemed incomplete and disapproved.

#### 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.”* 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.”*

## **4.5 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. If the data does not exist or is not submitted, the report will be deemed incomplete and disapproved.

### 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.”*

## **4.6 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 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. Failure to submit this information shall result in a disapproved determination.

### Regulatory Basis

Per 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 to comply with the General Provisions of 40 CFR 60.8(b) and (c). A complete copy of that memo has been provided at the end of this document in Appendix B.

## **4.7 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 generated. If the report does not include 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. Failure to submit this information shall result in a disapproved determination.

#### 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 volume calculations were deemed incomplete. Reports that do not include any information on the firebox volume calculations were disapproved. Confirmation that firebox calculation 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.

### **4.8 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. Failure to submit this information shall result in a disapproved determination.

#### 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 volume calculations were deemed incomplete. Reports that do not include any information on the firebox volume calculations were disapproved. Confirmation that firebox calculation 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.

## **4.9 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 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.

### 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 volume calculations were deemed incomplete. Reports that do not include any information on the firebox volume calculations were disapproved. Confirmation that firebox calculation 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.

## **4.10 Efficiency Calculations**

This item identifies whether or not the test report includes efficiency calculations. If this item was included, no flag 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. Failure to submit this information or

lack of this information shall result in a disapproved determination due to an incomplete 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.”*

### **4.11 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 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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.”*

### **4.12 Raw Data Sheets**

This item identifies whether or not the test report includes raw datasheets. If this item was included, no flag generated. If the no raw data sheets were reported, 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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.”*

## 4.13 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 generated. If this information was not reported, the element was flagged red. This item can be resolved by submitting data from the test report. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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.”*

## 4.14 Pre-burn Data

This item identifies the reporting of pre-burn data on the appliance prior to completing certification testing runs. If this item was included, no flag generated. If this information was not reported, the element was flagged red. This item can be resolved by submitting data from the test report. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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.”* 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.

## 4.15 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 data from the test report. If the notes do not exist or are not submitted, the item will be flagged red. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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.”*

## 4.16 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 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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, *“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.”*

## 4.17 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 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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, *“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.”*

## 4.18 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 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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, *“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.”*

## 4.19 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 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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, *“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.”*

## 4.20 Photos

This item identifies whether or not the test report includes photographs. If this item was included, no flag 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete 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. 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: 12.6.1.3.4; 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.

## 5 Test Run Data Section

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### 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 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.”*

### 5.2 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.

### 5.3 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

### 5.4 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **5.5 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **5.6 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **5.7 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **5.8 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **5.9 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **5.10 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.

## **5.11 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **5.12 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.

## **5.13 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.

## **5.14 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 were deemed incorrect. This element can be resolved by revising the report with proper handling of negative values. Failure to submit corrected calculations to address improper treatment of negative values shall result in a disapproved determination due to an inaccurate 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(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.”*

### **5.15 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to a non-representative test report.

#### 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.”*

## 6 Appliance Fueling Section

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### 6.1 Regulatory Basis for Section 6 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.<sup>1</sup> 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/m<sup>3</sup>), 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.*

- 40 CFR 60.8(c) *Performance tests shall be conducted under such conditions as the Administrator shall specify to the plant operator based on representative performance of the affected facility. The owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of the performance tests.*
- 40 CFR 60.8(f)(2). *Per the requirement the performance test must include, “Purpose of the test including the applicable regulation(s) requiring the test, the pollutant(s) and other parameters being measured, the applicable emission standards and any process parameter component, and a brief process description.” Additionally, the performance test must include, “Description of sampling and analysis procedures used and any modifications to*

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<sup>1</sup> EPA communications confirmed that the Residential Wood Heater regulations are covered under this guidance

*standard procedures, quality assurance procedures and results, record of process operating conditions that demonstrate the applicable test conditions are met, and values for any operating parameters for which limits were being set during the test. Where a test method requires you record or report, the following shall be included: Record of preparation of standards, record of calibrations, raw data sheets for field sampling, raw data sheets for field and laboratory analyses, chain-of-custody documentation, and example calculations for reported results.”*

- 40 CFR 60.8(f)(2). Per the requirement, “*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.*”
- 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. 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.*”
- For units tested with cordwood, Memo from Steffan Johnson, Chief of Measurement Technology Branch to the EPA Qualified Labs (dated July 13, July 15, and December 4, 2019) and attached to this document within Attachment B.

## **6.2 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 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **6.3 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **6.4 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. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report.

## **6.5 Log Length Used for Testing**

This reporting element applies only to cordwood appliances. This item requires reporting of the log length(s) used for certification testing. This item can be resolved by submitting and updating publicly available reports to include details on the dimensions of the fuel used in testing. If the element was not reported, an orange flag was generated. If the length used in testing was shorter than five-sixths of the length of the longest dimension, an orange flag was generated. This item can be resolved by modifying the test report to include information on fuel length. If the length is shorter than five-sixths the longest dimension, this issue can be addressed by submitting information to address why the fuel length used was representative using the information detailed in the stack testing guidance. Failure to submit this information or lack of this information shall result in a disapproved determination due to an incomplete test report. Failure to submit data regarding appropriateness of fuel length used in testing shall result in a disapproved determination due to 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 disapproved determination due to non-representative test. Reporting of the element at a length greater than five-sixths the longest dimension resulted in no flag generated.

## **6.6 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.

## **6.7 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.

Failure or inadequate submission to provide an adequate demonstration of why the fuel loading pattern used during the certification test was appropriate, representative, and reflective of the most challenging condition shall result in a disapproved determination due to non-representative test. 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. Failure to submit photos will result in disapproval determination based on non-representative testing and an incomplete test report.

## **6.8 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.

Failure or inadequate submission to provide an adequate demonstration of why the fuel loading pattern used during the certification test was appropriate, representative, and reflective of the most challenging condition shall result in a disapproved determination due to non-representative test. 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. Failure to submit photos will result in disapproval determination based on non-representative testing and an incomplete test report.

## **6.9 Debarked**

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. To resolve this flag, manufacturers must submit data and information to show that the use of debarked wood was representative and reflective of the most challenging fuel configuration.

Failure to provide, or an inadequate submission providing, an adequate demonstration of why the use of debarked wood for certification test was appropriate, representative, and reflective of the most challenging condition shall result in a disapproved determination due to non-representative test. 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. Failure to submit photos will result in disapproval determination based on non-representative testing and an incomplete test report.

## **6.10 Loading Volume (lb/ft<sup>3</sup>)**

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 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.

## **6.11 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 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.

## **6.12 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. Failure to provide additional data to allow for a determination that fuel piece elements conformed to specification will result in a determination of disapproval.

## 7 Owner's Manual Requirements Section

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### 7.1 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."*

### 7.2 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."*

### 7.3 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 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."*

### 7.4 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 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.”*

## **7.5 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.”*

## **7.6 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.”*

## **7.7 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.

## **7.8 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."*

## **7.9 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."*

## **7.10 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.*”

## **7.11 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.*”

## **7.12 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.*”

## **7.13 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 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."*

### **7.14 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."*

### **7.15 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."*

### **7.16 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.”*

## 8 Reporting Section

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

### 8.1 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. Failure to submit complete summary table data will result in a final determination of disapproved for an incomplete 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.”*

### 8.2 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. Failure to submit all run data will result in a final determination of disapproved for an incomplete 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.”*

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.”*

## 8.3 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. Failure to post a publicly available complete test report will result in a final determination of disapproved for an incomplete test report.

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

## 8.4 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.*”

## 8.5 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. Failure to post a publicly available complete test report with this information shall result in a final determination of disapproved for an incomplete and non-representative test report.

#### 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.”*

### **8.6 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. 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.

#### 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.”*

### **8.7 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.

## 8.8 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. Failure to post a publicly available complete test report with this information shall result in a final determination of disapproved for an incomplete and non-representative test report.

## 8.9 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](mailto: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:
<b>Testing Information</b>	<b>Determination</b>								<b>Notes</b>
Test method									
Test Lab									
Third-party certifier									
Report certified									
<b>Test Report Elements</b>	<b>Determination</b>								<b>Notes</b>
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									
<b>Test Run Data</b>	<b>Determination</b>								<b>Notes</b>
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 <sup>3</sup> )								
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:	
<b>Testing Information</b>	<b>Determination</b>							<b>Notes</b>	
Test method									
Test Lab									
Third-party certifier									
Report certified									
<b>Test Report Elements</b>	<b>Determination</b>							<b>Notes</b>	
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									
<b>Test Run Data</b>	<b>Determination</b>							<b>Notes</b>	
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									
<b>Appliance Fueling</b>									
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

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

From: "Johnson, Steffan" <[johnson.steffan@epa.gov](mailto:johnson.steffan@epa.gov)>

Date: 7/15/19 11:31 am

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

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

**Cc:** Sanchez, Rafael <[Sanchez.Rafael@epa.gov](mailto:Sanchez.Rafael@epa.gov)>; Lischinsky, Robert <[Lischinsky.Robert@epa.gov](mailto:Lischinsky.Robert@epa.gov)>; Aldridge, Amanda <[Aldridge.Amanda@epa.gov](mailto:Aldridge.Amanda@epa.gov)>; Baumgart-Getz, Adam <[Baumgart-Getz.Adam@epa.gov](mailto:Baumgart-Getz.Adam@epa.gov)>; French, Chuck <[French.Chuck@epa.gov](mailto:French.Chuck@epa.gov)>; Boyd, Rochelle <[Boyd.Rochelle@epa.gov](mailto:Boyd.Rochelle@epa.gov)>; Lowe, Theresa <[Lowe.Theresa@epa.gov](mailto:Lowe.Theresa@epa.gov)>; Cozzie, David

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**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-3025 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](mailto:bdavis@omni-test.com)

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

**Subject:** RE: Morso Model 5660B Certification Inquiry

**From:** Toney, Mike <[Toney.Mike@epa.gov](mailto: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