

# OPERATIONS MANUAL

## RESIDENTIAL BOILERS CERTIFICATION PROGRAM

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**AHRI RBLR OM – DECEMBER 2020**

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## **PREFACE**

The following manual outlines the procedures and policies of the Performance Certification Program for Residential Boilers (RBLR) operated by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI). This manual is to be used in conjunction with the AHRI General Operations Manual (GOM) for AHRI Certification Programs. Where the AHRI General Operations Manual and this product-specific manual differ, this product-specific operations manual shall prevail.

The revision of this manual supersedes all previous revisions. The current edition of this manual, as well as the AHRI General Operations Manual, can be accessed through the AHRI website, [www.ahrinet.org](http://www.ahrinet.org).

The RBLR Certification Program by AHRI provides for independent verification of the Residential Boilers manufacturers' stated equipment performance. Safety criteria are not within the scope of this program.

Participation in the Program is voluntary. Any manufacturer, regardless of AHRI membership, may obtain approval of Program Ratings and use the AHRI RBLR Certification Mark hereinafter referred to as the "Mark". The Mark is the Participant's public representation that the ratings of randomly selected units have been verified by an independent laboratory in accordance with test procedures prescribed by this Operations Manual. A Certification Agreement is executed between the manufacturer and AHRI specifying the conditions under which such Ratings and the Mark may be used. No manufacturer has the right to use Program Ratings or to state that their products have been tested in conformance with the procedures outlined in this Rating Procedure unless and until they have received written authority from AHRI to use the Mark as applied to the specific approved Program Ratings.

This Operations Manual has been prepared to assure that administration of the Program is carried out in a uniform manner. It is an amplification of the Certification Agreement signed by licensees and AHRI. General information, procedural details, and copies of forms are included in this Operations Manual. Provisions of the Operations Manual may be amended as provided in the Certification Agreement.

This certification program complies with requirements of the ISO/IEC Standard 17065:2012, *General Requirements for Bodies Operating Product Certification Systems*.

### Note:

This manual supersedes the Residential Boilers Operations Manual, December 2019.

# **CERTIFICATION OPERATIONS MANUAL FOR**

## **RESIDENTIAL BOILERS**

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## 1. Program Overview

1.1 Applicable Rating Standard. It is mandatory for program Participants to comply with the provisions of the latest edition of the applicable Standard and Design Requirements:

- Department of Energy (DOE) Boiler Test Procedure as published in the Federal Register, 10 CFR Part 430 Subpart B Appendix N for United States;
- CAN/CSA P.2-13 (Gas Boilers) / ANSI/ASHRAE Standard 103-2007 (Oil Boilers) for Canada as published in the Canadian Gazette (Standard); and
- *AHRI Residential Boiler Certification Program Design Requirements* (Design Requirements) in Appendix A of this Operations Manual.

1.2 Definition of a Heating Boiler. A heat exchanger, designed with and for fuel-burning devices and other equipment to (1) burn fossil fuels and (2) transfer the released heat to water (in water Heating Boilers) or to water and steam (in steam Heating Boilers) shall conform to the safety and material requirements of the current ASME Boiler and Pressure Vessel Code, Section IV: Rules for Construction of Heating Boilers, or have an approved ASME code case.

1.3 Program Scope. This program applies to gas- and oil-fired, steam and hot water Heating Boilers, as defined in Section 1.2 with inputs less than 300 MBH.

1.4 Intended Market. The Intended Market for this certification program, where the Standard applies, includes all products that are defined in Section 1.3 that are sold for use in the U.S. (including U.S. Territories) and Canada.

1.5 Basic Model Groups (BMGs). Each Participant's listing will be grouped by BMG. A BMG is a regular range of sizes of a similar type, design and construction, and having a common designation as catalogued. Differentiators for BMGs include but are not limited to water or steam, fan-assisted or atmospheric, and continuous or non-continuous ignition system types.

## 2. Qualification Process

2.1 Original Equipment Manufacturer (OEM) Applicants and Participants. With the additions noted below, the OEM qualification process will proceed according to the AHRI General Operations Manual, Section 4.

STEP 2.1.1 Certification Application Package. In addition to the Application for AHRI Certification, Annual Sales Volume Form, and product-specific ratings and data, noted in the AHRI General Operations Manual, Section 4, STEP 1, Applicants shall submit the following documentation to AHRI:

- Test reports, data, and calculations for each BMG. Applicants are only required to submit supporting test data for the smallest and largest sizes in the BMG. These sizes represent the end points of an interpolation line. Applicants shall supply supporting test data for each individual model within the BMG if they choose not to employ interpolation;
- If the Applicant chooses to conduct witness testing at its AHRI Approved Test Stand within a Facility (Facility), all required forms per Section 3.3.1 of this manual for Witness Testing Facility approval shall also be submitted;
- An Applicant requesting AHRI to submit data to CEC, DOE, FTC, and NRCan shall submit third-party authorization, compliance forms and other necessary information; and

All forms can be obtained through AHRI.

STEP 2.1.2 Processing Application package.

STEP 2.1.2.1 Performance Certification Agreement for Original Equipment Manufacturer (OEM Agreement). No further action required beyond that listed in Section 4, STEP 4.2 of the AHRI General Operations Manual.

STEP 2.1.2.2 Participation and Licensing Fee Invoice. Payment of the Participation and Licensing Fee is due within 30 calendar days of the invoice issue date. Testing shall not be conducted until the invoice is paid in full. No further action required beyond that listed in Section 4, STEP 4.2 of the AHRI General Operations Manual.

STEP 2.1.3 Selection and Acquisition of Test Samples.

STEP 2.1.3.1 Number of Qualification Tests. One (1) model from each Applicant's BMG shall be selected for test.

STEP 2.1.3.2 Acquisition of Qualification Test Samples/Selection Criteria. Within 30 calendar days of a request from AHRI, the Applicant shall have samples available for selection. Samples shall be acquired in accordance with Section 3 of this manual. It is acceptable for the Participant to have a single sample available for selection.

STEP 2.1.3.3 Witness Test Facility Approval and Sample Selection. If the Applicant has applied to conduct witness testing at its facility, the Independent Third-Party Laboratory contracted by AHRI (Laboratory) shall contact the Applicant to schedule a preliminary witness test facility inspection. Upon final approval of the Applicant's witness test facility and the approval of the Applicant's submitted ratings, the Laboratory shall contact the Applicant to schedule initial qualification testing. Section 3 further explains the requirements and procedures for applying and conducting witness testing.

Qualification testing may be scheduled simultaneously with facility inspection; however, should the facility fail inspection the testing shall be delayed until the facility is brought into compliance.

If the Applicant has not applied to conduct witness testing at its facility, the qualification process shall continue with the approval of the Applicant's submitted ratings. Upon approval by AHRI, or at another approved facility as specified in Section 8 of this manual, the Laboratory shall contact the Applicant to schedule initial qualification testing.

STEP 2.1.4 Qualification Testing. AHRI shall supply the Laboratory with the Published Ratings. The Laboratory shall conduct the testing of the samples in accordance with the Standard, against the Published Ratings.

For qualification testing, AFUE and Heating Capacity, based on the steady state efficiency, shall meet or exceed 98% of the Participant's Published Rating.

STEP 2.1.4.1 Successful Completion of All Qualification Tests. If all qualification tests pass, proceed to STEP 2.1.5.

STEP 2.1.4.2 First Sample Qualification Test Failure. Upon a qualification test failure, the Participant shall restart the qualification process for that BMG. A Participant shall not sell models that have not passed qualification testing in the Intended Market. An Applicant shall require additional testing to join the program.



STEP 2.1.5 Welcome to the Program. No further action required beyond that listed in Section 4, STEP 4.5 of the AHRI General Operations Manual.

2.2 Private Brand Marketer (PBM) Applicants. With the additions noted below, the PBM qualification process will proceed according to the AHRI General Operations Manual, Section 5.

PBM applicants are not required to undergo qualification testing. PBM product certification is contingent upon the certification of the associated OEM product.

STEP 2.2.1 Certification Application Package. In addition to the Application for AHRI Certification Form noted in the AHRI General Operations Manual, Section 5, STEP 5.1, Applicants shall submit the following documentation to AHRI:

- An Applicant requesting AHRI to submit data to CEC, DOE, FTC, and NRCan shall submit third-party authorization, compliance forms and other necessary information; and
- Additional information may be needed to meet EPA ENERGY STAR® program requirements as referenced in the AHRI General Operations Manual, Section 16.

STEP 2.2.2 Processing Application Package.

STEP 2.2.2.1 Performance Certification Agreement for Private Brand Marketer (PBM Agreement). No further action required beyond that listed in Section 5, STEP 5.2.1 of the AHRI General Operations Manual.

STEP 2.2.2.2 OEM Agreement on Behalf of the PBM Applicant. No further action required beyond that listed in Section 5, STEP 5.2.2 of the AHRI General Operations Manual.

STEP 2.2.2.3 Licensing Fee Invoice. Payment of the Licensing Fee is due within 30 calendar days of the invoice issue date.

STEP 2.2.3 Welcome to the Program. No further action required beyond that listed in Section 5, STEP 5.3 of the AHRI General Operations Manual.

### 3. Equipment Selection and Testing

3.1 Annual Testing Requirement. 30% of a Participant's BMGs shall be tested annually, with a minimum of one (1) test. Fractional numbers shall be rounded up to the nearest whole number using traditional rounding methods.

3.2 Testing Requirement for Introduction of New BMG. Prior to being listed in the AHRI Directory of Certified Product Performance (Directory), any new BMG introduced by the Participant shall undergo qualification testing as referenced in Section 2. When a previously certified BMG manufactured by one Participant is to be manufactured and marketed by a second Participant, no qualification test is required unless the second Participant is making design changes that could affect ratings. In such cases, the qualification procedure shall be determined in accordance with Section 3.3.

Where a qualification test is required, one (1) model from each new BMG shall be tested.

AHRI shall arrange for the BMG to be tested against the ratings submitted by the Participant. The BMG shall pass qualification testing before it is listed in the Directory and before the Participant can claim AHRI certified ratings for models within the BMG.

3.2.1 Required Data. A Participant wishing to certify a new BMG shall submit supporting test data consisting of no fewer than two (2) separate tests for each model. The tests shall be conducted on separate units of the same model. The claimed Annual Fuel Utilization Efficiency (AFUE) ratings shall be determined as outlined in 10 CFR 429.18 truncated to the one-tenth of a percentage point. The claimed Heating Capacity rating shall be no greater than the mean of the measured results. The participant shall submit calculated results for mean and lower confidence limit.

Where models within a BMG share similar enough geometry to make rating interpolation possible, Participants are only required to submit supporting test data for the smallest and largest sizes in the BMG. These sizes represent the end points of an interpolation line. Participants shall supply supporting test data for each individual model within the BMG if they choose not to employ interpolation.

3.3 Testing Requirement for Voluntarily Changed BMG. A BMG shall be considered voluntarily changed if the Participant makes a physical change(s) to any model within the BMG and continues to market the product under the same designation as the product since its last submittal to AHRI. If the product has changed in such a way that may affect the BMG's certified ratings, one (1) model from the changed BMG shall undergo qualification testing.

3.3.1 Notification of Voluntarily Changed BMG. Prior to introducing of the changed product to the market, introducing Program Ratings for the changed product, or updating the Directory, the Participant shall notify AHRI, in writing, of the exact changes proposed, the date the changed product is expected to be introduced on the market, and the requested rating for the changed product. AHRI shall review the submitted materials and notify the Participant, in writing, if qualification testing is required. The Participant shall not implement the changes, publish ratings for the changed product, or update Directory ratings, until necessary AHRI testing is completed and passed or AHRI notifies the Participant that the BMG shall not be subject to qualification testing.

AHRI reserves the right to make unannounced physical inspections at the Participant's facility to determine if products have been changed and to verify Participant compliance with procedures for notifying AHRI of changed BMGs.

3.3.1.1 Increased Product Ratings. If the Participant notifies AHRI that the product ratings will increase, or AHRI determines the product's certified ratings may be affected by the proposed change, the Participant shall complete the qualification procedure as prescribed in Section 3.2.

3.3.1.2 Decreased Product Ratings. If the Participant notifies AHRI that the product ratings will decrease, the Participant may be required, at the discretion of AHRI, to complete the qualification procedure as prescribed in Section 3.2.

3.3.1.3 Unchanged Product Ratings. If AHRI determines a BMG's certified ratings are unaffected by the physical changes made to the product, the BMG shall not be subject to qualification testing.

3.4 Location of Test. Testing shall be performed at the Laboratory or Facility and the sample shall be installed in the test facility in accordance with the Participant's published installation instructions in printed or electronic format.

The Participant shall elect to conduct testing at the Laboratory or at the Facility. The Facility shall be approved by AHRI prior to any test being conducted. Testing shall continue to be conducted at the Participant's Facility, contingent upon it remaining AHRI-approved, or until the Participant notifies AHRI, in writing, of its desire to change facilities. All tests, regardless of location, must be conducted or witnessed by the Laboratory's Representative (Representative).

3.5 Witness Testing Procedures and Operations. This Certification Program allows for witness testing, where Participant personnel, witnessed by the Representative, conducts testing at a Facility. Witness testing requirements are covered in the AHRI General Operations Manual, Section 9 and as specified below.

3.5.1 Application for Witness Testing. A Participant shall submit all of the following to AHRI:

- Form RBLR-WT1, Application for Witness Testing;
- Form RBLR-WT2, Calibration Report, a complete list of all instruments and equipment being used to perform certification testing in accordance with the applicable Standard;
- A copy of each calibration report showing date of last calibration;
- Photographs of the test facility in which AHRI certification testing will take place, which shall include sufficient views to show the location and connection of each instrument.

Electronic copies of these forms are available on the AHRI website ([www.ahrinet.org](http://www.ahrinet.org))

3.5.1.1 Acknowledgement of Request. AHRI shall acknowledge receipt of the Participant's application to conduct witness testing. AHRI shall review the material and shall inform the Participant if additional information and/or changes are required for the Facility to meet the applicable Standard.

3.5.2 Inspection of Witness Test Facility. Following preliminary facility approval based on submitted data, the Representative shall inspect the facility to verify compliance to the data submitted and to the certification program. Testing may be scheduled simultaneously with facility inspection; however, should the facility fail its inspection, the testing must be delayed until the facility is brought into compliance. A boiler shall be running in the facility for the inspection to be completed. The Representative shall confirm the submitted data on Form RBLR-WT1 and RBLR-WT2.

3.5.2.1 Non-Compliant Inspection Results. If the results of the inspection indicate that a Facility is non-compliant with the certification program, all discrepancies shall be resolved and resubmitted to the AHRI before approval may be granted to proceed with certified ratings tests.

3.5.2.2 Final Approval of Witness Test Facility. Upon acceptable results of the inspection, AHRI shall notify the Facility, in writing, of final acceptance and approval to proceed with certification tests. AHRI shall provide the Facility with a certificate of approval that shall be displayed in the Facility.

3.5.3 Scheduled Witness Test Facility Re-approval. The Facility shall remain approved for no more than two (2) years. At this time, re-approval shall be required, including submittal of the documents outlined in Section 3.5.1 and inspection outlined in Section 3.5.2. Upon re-approval by AHRI, the Facility shall receive a new certificate of approval to be displayed in the Facility.

3.5.4 Unscheduled Facility Re-approval. Any changes that may affect a Facility's ability to function per the certification program requirements, shall be required to be re-approved by Laboratory personnel prior to conducting any witness testing. At this time, re-approval shall be required, including submittal of the documents outlined in Section 3.5.1 and inspection outlined in Section 3.5.2.

3.5.5 Witness Test Operations at a Facility.

3.5.5.1 Advance Set-Up of Sample in an AHRI-Approved Test Facility. A

Participant may set up the test sample in the Facility prior to the arrival of the Representative. Prior to witness test commencement, the Representative shall verify that the sample is the model selected by AHRI for testing and that the sample has been set up in the Facility in accordance with the Participant's installation instructions and referenced method of test.

3.5.5.2 Duty Assignments of the Representative. Sample testing, data acquisition, and generation of test data shall be performed by the Participant personnel and assisted and witnessed by the Representative. Participant or Facility personnel shall be on-hand to assist the Representative as requested and are permitted to be present but are not permitted to tamper or adjust samples during tests, unless specifically approved by the Representative responsible for the test.

Verification of instrument application (in accordance with the procedures defined in the applicable Standard) and verification of calibrations shall be performed by the Representative.

3.5.5.3 Use of Instrumentation. The Representative shall use primary test instruments belonging to the Facility, in accordance with certification program requirements.

3.5.5.4 Sample Start-Up and Operation. Start-up and operation of the sample shall be in accordance with the Participant's published installation instructions in printed or electronic format.

3.6 Selection of Test Samples. Selections shall be made based on data contained in the Directory. AHRI shall inform the Participant, in writing, of the sample(s) selected for test.

3.7 Methods for Acquiring Annual Test Samples. The Representative shall make a Random Sample Selection from the Participant's production lines or distribution within 30 calendar days of a selection by AHRI. Selected samples shall be shipped to the Laboratory accompanied by the Participant's published installation instructions in printed or electronic format. Refer to Section 9 of the AHRI General Operations Manual.

For Witness Testing, AHRI shall request several serial numbers of stock units from which a sample can be chosen at random. Selected samples shall be accompanied by the Participant's published installation instructions in printed or electronic format. Upon notification of selections by AHRI, the Participant will work with AHRI to determine a mutually agreed upon test date which may require the Participant to accelerate production.

Participants in the Certification Program have the option of having two (2) units initially selected and sealed with the additional option of having both units shipped to the testing laboratory, or to have one (1) held at the Participant's location for a possible second sample test after a first sample failure.

3.8 Testing Punch List. The Participant shall complete and provide a Punch List (refer to the AHRI website) in electronic format to the Laboratory prior to sample arrival at the Laboratory. Punch lists shall not be required for witness testing. The Participant may choose to furnish a single Punch List for multiple tests.

The Punch List shall not contradict the installation and operations manual provided by the Participant. If there is a discrepancy between notes written on the Punch List, Installation and Operations Manual, product specific operations manual, Standard, and/or the Directory, AHRI shall determine which document takes precedence.

3.9 Sample Acquisition Timeframe. For testing at Laboratory or the Facility, the Participant shall deliver the selected sample(s) to the Laboratory within 14 calendar days of the Random Sample Selection

by the Laboratory personnel. The Participant is responsible for supplying all proprietary components, and components normally shipped with the boiler at the same time the unit is made available at the designated test facility.

3.10 Certified Data. In accordance with the applicable Standard, the following certified ratings are verified by test:

- Heating Capacity, MBH; and
- Annual Fuel Utilization Efficiency (AFUE), %

3.11 Rating and Testing Procedures for Establishing Input, AFUE, DOE Heating Capacity and Net AHRI Ratings.

3.11.1 Input, AFUE, and DOE Heating Capacity. Input, AFUE, and DOE Heating Capacity shall be determined by following the applicable Standard. A value of 140,000 Btu/gal shall be used to determine oil input in GPH, expressed to the nearest 0.05.

3.11.2 Determination of Net AHRI Ratings. Net AHRI Ratings are determined by dividing the Heating Capacity by the piping and pickup factors of 1.333 and 1.15 respectively as Steam Factor and Water Factor, and rounding to the nearest MBH. Net AHRI Rating, Steam (sq ft) shall be determined by dividing the rounded Net AHRI Steam Rating, Steam (MBH) by 0.240 square feet of steam radiation per MBH. It may be catalogued to the nearest square foot or the nearest 5 square feet.

3.12 Clarifications in Running of the Test Procedure. AHRI and Testing Agency may develop Test Procedure Guidelines that will facilitate a standardized running of the DOE test procedures. Such guidelines shall not revise or modify the basic DOE test procedure, but will seek to provide uniformity in interpretation of terms, measurements, and application of procedures

3.13 Test Data. The Laboratory personnel or Representative shall collect and submit the following data, for each boiler tested, to AHRI at the conclusion of testing:

- Computer printout showing test results for each boiler tested for verification; and
- RBLR-DS3, Boiler Test Log Sheet

3.14 Testing Threshold. For annual verification testing, AFUE and Heating Capacity shall meet or exceed 95% of the published rating.

3.15 Test Failures.

3.15.1 Options Following First Sample Failure. When the Participant is notified of a first sample certified rating failure, they have seven (7) calendar days to select one of the following options:

- Re-rate all models within the failed sample's BMG proportionate to the failed test's results;
- Test second sample of the same model (sample shall be available within the timeframe and procedure allotted in Section 3.9 following notification of decision to AHRI via Manufacturer's Decision Form [MDF]);
- Obsolete the model, which also obsoletes all models within the corresponding BMG.

3.15.2 Options Following Second Sample Failure. When the Participant is notified of a second sample certified rating failure, they have seven (7) calendar days to select one of the following options:

- Re-rate all models within the failed sample's BMG proportionate to the failed test's results or the average of the two (2) test results, whichever rating is lower;
- Obsolete the model, which also obsoletes all models within the corresponding BMG.

#### **4. Challenge Tests**

Refer to Section 10 of the AHRI General Operations Manual.

#### **5. AHRI Directory of Certified Product Performance**

All certified products shall be listed in the Directory, [www.ahridirectory.org](http://www.ahridirectory.org). Certification shall not be implied nor claimed for any product not listed in the Directory. Except as noted below, the Participant shall follow the steps outlined in Section 11 of the AHRI General Operations Manual.

5.1 Publication of Ratings in Certified Directory. The following information pertaining to each model certified shall be published in the Directory:

- AHRI Certified Reference Number;
- Model Status;
- Trade or Brand Name of Model;
- Name of Manufacturer;
- Model Number(s) or Designation(s);
- Material;
- Location (Indoor or Outdoor);
- Fuel Type;
- Input (MBH or GPH);
- Net AHRI ratings, square feet (steam) or MBH (steam or water);
- Heating Capacity, MBH;
- Condensing (Yes or No);
- Control;
- Ignition Type;
- Annual Fuel Utilization Efficiency (AFUE), %;
- CO<sub>2</sub> that is the basis for rating (where air/fuel ratio is field-adjustable independent of input); and,
- Draft that is the basis for rating (Oil and Power-Gas burner only).

Note that only Heating Capacity and AFUE are certified ratings. All other ratings are considered non-certified program ratings.

5.2 Data Forms. Each Participant shall list its products by BMG. OEM and PBM Participants shall submit/edit product data via the Directory.

#### **6. Assessment and Payment of Certification Fees**

Refer to Section 12 of the AHRI GOM.

## 7. Issuance of Violations and/or Termination

Refer to Section 14 of the AHRI GOM.

## 8. Program Hierarchy, Complaints, and the Appeals Process

Refer to Section 15 of the AHRI GOM,

## 9. Proper Use of the AHRI Certification Mark and Claims to Certification

Refer to Section 8 of the AHRI GOM.

## 10. Minimum Data Requirements for Certified and Non-Certified Program Ratings

10.1 *Definition of Program Ratings.* All efficiency and performance measures that are certified (AFUE and Heating Capacity), and non-certified (i.e. Net AHRI Ratings), shall be published in accordance with the applicable Standard and this operations manual.

10.2 *Publication of Non-Certified Ratings.* A Participant's printed or online material may contain non-certified ratings (i.e. Net AHRI Ratings). The literature shall clearly distinguish between certified and non-certified ratings.

10.3 *Minimum Data Requirements for Publication in Literature.* The minimum data requirements listed in this section shall be published in all literature in which Program Ratings are shown or which contain statements or representations, expressed or implied, to the effect that ratings have been determined as prescribed in this Operations Manual (including, without limitation, any catalogs, installation instructions, bulletins, circulars, advertisements, price sheets, or other items that contain Program Ratings, or such statements or representations). However, literature may contain statements or representations that ratings have been determined as prescribed in this Operations Manual or indicate that boilers have Program Ratings without including the minimum data listed below if such literature does not contain the actual ratings and makes a specific reference to, and positive identification of, other literature that is customarily distributed with, and usually accompanies, the literature in question and contains all the required minimum data, including the actual approved ratings.

### 10.3.1 *Oil-Fired Boiler.*

- Model Number;
- Heating Capacity;
- AFUE;
- Net AHRI Rating;
  - Steam boiler - in square feet and MBH steam;
  - Steam and water boilers - in square feet and MBH steam, and MBH water;
  - Water boiler - in MBH water;
- Input in GPH and heat value of fuel on which it is based;
- AHRI Certification Mark

### 10.3.2 *Gas-Fired Boiler.*

- Model Number;
- Heating Capacity;
- AFUE;

- Net AHRI Rating;
  - Steam boiler - in square feet and MBH steam;
  - Steam and water boilers - in square feet and MBH steam, and MBH water;
  - Water boiler - MBH water;
- Input;
- AHRI Certification Mark

10.3.3 Net AHRI Ratings. All product literature in which Net AHRI Ratings are shown shall include statements covering the following points:


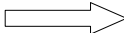
- The Net AHRI Steam Ratings shown are based on a piping and pickup allowance of 1.333.
- The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15.
- The manufacturer should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.
- If the ratings have been determined under the provisions governing forced draft boiler- burner units, a statement shall be included to this effect.
- Literature shall be identified by a form number or some other means, including the date of printing or issuance.
- If literature contains some ratings that are not Net AHRI Ratings, the Mark (as described in Section 5) shall be positioned in such a way as to make clear which are Net AHRI Ratings.
- Literature in which Net AHRI Water Ratings are shown may include the following statement:

*“For forced hot water heating systems where the boiler and all the piping are within the area to be heated, the boiler may be selected on the basis of its Heating Capacity.”*

- Literature in which Net AHRI Ratings are shown shall not contain any references to a specific adjustment of the Net AHRI Rating due to changes in piping and pickup loads except that listed in part g above, nor shall such literature contain a listing of any other Net AHRI Ratings.

10.3.4 Display of Minimum Data. Minimum data shall appear on an individual page of manufacturer literature and may include product pictures, dimensional drawings or shipment information. Program Ratings and other minimum data shall be placed into a table meeting the specified format found in the examples below.


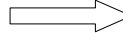


Brand X Gas Series						
						
Model Number	Input, MBH		Heating Capacity, MBH	Net AHRI Rating Water, MBH	AFUE, %	Other Dimensional or Shipping Data 
	Min	Max				
BX-G1	21	75	61	53	82.8	
BX-G2	42	165	134	116	81.9	
BX-G3	56	280	227	192	80.7	
* <i>Manufacturers may choose to list maximum input only as "Input, MBH"</i>						

Example 1: Residential Gas Modulating Boilers with Water Ratings.

Brand X Oil Series							
							
Model Number	Input		Heating Capacity, MBH	Net AHRI Rating		AFUE, %	Other Dimensional or Shipping Data 
	GPH	MBH		Steam square foot	Steam MBH		
BX-O1	0.6	84	70	221	53	82.0	
BX-O2	1.1	154	128	400	96	82.1	
BX-O3	1.7	238	198	621	149	82.2	

Example 2: Residential Oil Boilers with Steam Ratings

Brand X Gas Series								
								
Model Number	Input, MBH		Output, MBH	Net AHRI Rating Water, MBH	AFUE, %	Thermal Efficiency, %	Combustion Efficiency, %	Other Dimensional or Shipping Data 
	Min	Max						
BX-G1	30	120	111	97	92.4	–	–	
BX-G2	52.5	210	193	168	91.9	–	–	
BX-G3	73	290	264	230	91.2	–	–	
BX-GC4	92.5	370	342	297	–	92.4	93.7	
	185		172	150	–	93.1	94.1	
BX-GC5	92.5		87	76	–	94.3	95.2	
	112.5	450	410	357	–	91.1	93.1	
	112.5		106	92	–	94.1	94.9	
* <i>Shown with optional Thermal and Combustion Efficiencies.</i>								
* <i>When both residential and commercial boilers of a single product series share a common table, an accompanying footnote shall state "Output" is "Heating Capacity" for units with inputs &lt;300 MBH and "Gross Output" for units ≥300 MBH.</i>								

Example 3: Residential and Commercial Gas Modulating Boilers of a Single Series Tested at Alternate Inputs Sharing a Common Table\*

10.3.5 Minimum Data to be Shown on Boiler.

10.3.5.1 Oil-Fired Boilers.

- Model Number;
- Heating Capacity;
- Net AHRI Rating;
  - Steam boiler - in square feet and MBH steam;
  - Steam and water boilers - in square feet and MBH steam, and MBH water;
  - Water boiler - in MBH water;
- Input in GPH;
- AHRI Certification Mark; and

\* For modular boilers, the individual burner capacity shall be shown on each module

10.3.5.2 Gas-Fired Boilers.

- Model Number;
- DOE Heating Capacity;
- Net AHRI Rating;
  - Steam boiler - in square feet and MBH steam;
  - Steam and water boilers - in square feet and MBH steam, and MBH water;
  - Water boiler - in MBH water;
- Input in MBH;
- AHRI Certification Mark; and

10.4 Minimum Data to be Provided to Certify Compliance with the AHRI Residential Boiler Certification Program Design Requirements, Appendix A.

- Does the Model have a Single Input Rate (Yes/No);
- Model Equipped with Tankless Coil?: (Yes/No);
- Boiler Type: Hot Water or Steam;

10.4.1 Hot Water Boilers Not Equipped with a Tankless Coil.

- Automatic Means Employed for Boiler (choose one):
  - Adjustment of boiler supply set point based on inferred heating load. If used, the input used to infer heat load shall be indicated (choose at least one):
    - Outdoor temperature
    - Thermostat demand pattern
    - Indoor temperature
    - Burner cycling and/or modulation pattern
  - Burner delay (only an option for Single Input Rate boilers). If used, the method(s) used to delay the burner shall be indicated (choose at least one):
    - Delayed as a function of residual heat available in the system so that a greater calculated residual heat results in a greater delay
    - Delayed operation until boiler water temperature is 140 F or less.
- Is the boiler equipped with an override?: (Yes or No)
  - If Yes, is the notice shown in Appendix A, Item 7, included in the installation instructions? (Yes or No)

- When there is no inferred heat load, does the automatic means limit the boiler water temperature to 140°F or less? (Yes or No)
- Are the Automatic Means, and any field installed Devices required for it to operate, supplied with the model? (Yes or No)
- Except that a boiler may operate in the event a Device (defined in Appendix A) becomes defective and provides indication of this fault, does the boiler operate without the Automatic Means installed? (Yes or No)

10.4.2 Gas-Fired Boilers.

- Ignition type (choose one)
  - Intermittent/Electronic Ignition
  - Standing Pilot

## **APPENDIX A: AHRI RESIDENTIAL BOILER CERTIFICATION PROGRAM DESIGN REQUIREMENTS**

### A1 Definitions

A1.1 Automatic Means. A function within the boiler control system that uses measured quantities having a correlation to the inferred heat load to automatically adjust at least one of the following boiler operating parameters: water temperature set-point, set point differential, or burner enable.

A1.2 Residual Heat. Heat from the previous boiler heating cycle that may provide usable heat to the building prior to enabling burner operation.

A1.3 Tankless Coil. A heat exchanger that is installed inside the boiler pressure vessel and which is used to transfer heat from the boiler water to domestic water.

A1.4 Inferred Heat Load. An estimate of the heating need derived by the automatic means.

A1.5 Devices. Field installed components that provide information to the automatic means. This information may include temperature, heating load, or other parameters required to fulfill the requirements of this document. This information may be either directly or indirectly measured and transmitted to the automatic means by direct wire, wireless, internet or other means.

### A2 Requirements

Standing pilots shall not be used on gas fired steam or hot water boilers. In addition, all residential hot water boilers not equipped with a tankless coil must be supplied with an automatic means of adjusting the supply water temperature as a function of the inferred heating load. This “automatic means” must meet the requirements below:

A2.1 The automatic means shall measure one or more of the quantities listed below that affect, and/or are affected by, the heat load:

- Outdoor temperature
- Thermostat demand patterns
- Indoor temperature
- Burner cycling and/or modulation pattern

At the discretion of the manufacturer, the automatic means may use other inputs in conjunction with those listed above to infer the heat load.

A2.2 The automatic means shall cause the temperature of the water supplied by the boiler to incrementally increase when any of the measured quantities infer that the heat load is incrementally increasing, and conversely, cause the temperature of the water supplied by the boiler to incrementally decrease when any of the measured quantities infers that the heat load is incrementally decreasing.

A2.3 In lieu of requirements 1 and 2, the manufacturer may supply a single input boiler with an automatic means that prevents the burner from operating unless this means has determined that the residual heat in the system water is insufficient to meet the inferred heat load. This may be done in one, or both, of two ways:

- The automatic means may adjust the delay in the operation of the burner, as a function of the amount of residual heat available in the system so that a greater

- calculated residual heat results in a greater delay.
- The automatic means may delay the burner operation until the boiler water temperature is 140°F or less.

A2.4 When there is no inferred heat load, the automatic means shall limit the boiler water temperature to 140°F or less.

A2.5 The automatic means need not adjust the water temperature when the boiler is responding to a demand that is for something other than space heating (such as domestic hot water production using an indirect water heater or a snow melt system).

A2.6 The boiler must not operate without the automatic means installed. Where this automatic means is dependent upon sensors, or other devices, which are field installed remotely from the boiler, the manufacturer must provide these devices. The control system may permit boiler operation in the event that such a device becomes defective as long as the control system provides an indication of the presence of this fault.

A2.7 The automatic means may be equipped with an override to permit the use of a field supplied energy management system that provides the same function or to permit the use of the boiler in applications that are outside the scope of Section 303 of the 2007 Energy Act. Where such an override is supplied, the installation instructions supplied with the boiler must include the following notice:

**IMPORTANT**

This boiler is equipped with a feature that saves energy by reducing the boiler water temperature as the heating load decreases. This feature is equipped with an override which is provided primarily to permit the use of an external energy management system that serves the same function. **THIS OVERRIDE MUST NOT BE USED UNLESS AT LEAST ONE OF THE FOLLOWING CONDITIONS IS TRUE:**

- An external energy management system is installed that reduces the boiler water temperature as the heating load decreases.
- This boiler is not used for any space heating
- This boiler is part of a modular or multiple boiler system having a total input of 300,000 BTU/hr or greater.
- This boiler is equipped with a tankless coil.