

OPERATIONS MANUAL

RESIDENTIAL FURNACES CERTIFICATION PROGRAM



AHRI OM RFRN – FEBRUARY 2013

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AHRI Air-Conditioning, Heating,
and Refrigeration Institute

PREFACE

The following manual outlines the procedures and policies of the Performance Certification Program for Residential Furnace (RFRN) operated by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI). This manual is to be used in conjunction with the AHRI General Operations Manual 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.

The RFRN Certification Program by AHRI provides for independent verification of the Residential Furnaces 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 of the AHRI RFRN Certification Mark hereinafter referred to as the "Mark". The Mark is the Participant's public representation that the ratings of randomly selected samples 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 Marks 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 efficiency certification program complies with requirements of Department of Energy (DOE) furnace test procedures as published in the latest edition of the Code of Federal Regulations, 10 CFR Part 430.

Note:

This manual supersedes the Procedural Guide for GAMA Furnace Efficiency Certification Program, March 2006.

CERTIFICATION OPERATIONS MANUAL FOR
RESIDENTIAL GAS AND OIL-FIRED CENTRAL FURNACES

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1. Program Overview

1.1 Applicable Rating Standard. It is mandatory for program Participants to comply with Department of Energy (DOE) furnace test procedures as published in the latest edition of the Code of Federal Regulations, 10 CFR Part 430, Subpart B, Appendix N (Standard). A copy of the Standard is available for download from the U.S. Government Printing Office website, GPO Access, at www.gpo.gov/fdsys.

1.2 Product Definitions.

1.2.1 Residential Central Furnace. A product which is either a gas-fired or oil-fired central furnace, and uses a single-phase electric current or DC, and has a heat input rate of less than 225,000 Btu/h.

1.2.1.1 Residential Gas-Fired Central Furnace. A Residential Central Furnace utilizing natural gas or propane as its fuel source.

1.2.1.2 Residential Oil-Fired Central Furnace. A Residential Central Furnace utilizing heating oil as its fuel source.

1.3 Program Scope. This program applies to Production Models of Residential Furnaces, as defined in Section 1.2.

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

1.5 Basic Model Groups (BMGs). A Participant's listing shall be grouped by BMG. A BMG is a family of models which have identical ratings for heating input (refer to Section 1.5.1 for Oil-Fired Furnaces), output heating capacity, electric power (PE), auxiliary electrical energy consumption (E_{AE}), fossil fuel energy consumption (E_F), and annual fuel utilization efficiency (AFUE).

1.5.1 Oil-Fired Central Furnaces. A BMG shall consist of a common heat exchanger, blower assembly and cabinet. If a Participant provides various burner and/or nozzle options for this model, all models resulting from the various burner and/or nozzle options shall be included in the same BMG. For example, if Model A's shipped-as heating input is 100,000 Btu/h and the manufacturer provides two burner options for Model A, such that the resulting Models B and C have heating inputs of 70,000 Btu/h and 120,000 Btu/h respectively, Models A, B and C shall be considered as one (1) BMG.

1.6 Certify-All Policy. Refer to Section 7 of the AHRI General Operations Manual.

2. Qualification Process

2.1 Original Equipment Manufacturer (OEM) Applicants. With the additions noted below, the OEM qualification process shall 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 and Annual Sales Volume Form noted in the AHRI General Operations Manual, Section 4, STEP 1, Applicants shall submit the following documentation to AHRI:

- Form RFRN-DS1;
- Test reports to support the ratings in accordance with DOE's rating procedure for a model representative of each BMG;
- Published installation instructions in printed or electronic format;
- 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.

Electronic forms shall be obtained from 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. 30% of the Applicant's BMGs shall be tested, with a minimum of two (2) models. Fractional models should be rounded up to the nearest whole number.

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.

STEP 2.1.4 Qualification Testing. AHRI shall supply the Independent Third-Party Laboratory contracted by AHRI (Laboratory) with the Published Ratings. The Laboratory shall conduct the testing of the samples in accordance with the Standard, against the Published Ratings.

A manufacturer qualifying into this certification program is required to pass at least 90% of the first sample qualification tests. Should the pass rate be less than 90%, AHRI shall test additional samples until the passing rate of the first sample qualification tests is at least 90%, or until all BMGs are tested.

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. Refer to Section 3.10.1 of this Operations Manual for details regarding the first sample qualification failure options.

STEP 2.1.4.3 Second Sample Qualification Test Failure. Refer to Section 3.10.2 of this Operations Manual for details regarding the second sample qualification failure options.

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 shall 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

- Certified product data sheets noting PBM/OEM equipment match-ups
- An Applicant requesting AHRI to submit data to CEC, DOE, FTC, and NRCan shall submit third-party authorization and compliance forms.
- Additional information may be needed to meet EPA ENERGY STAR® program requirements.

STEP 2.2.2 Processing Application Package.

STEP 2.2.2.1 PBM License 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 Participation 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. 20% of a Participant's BMGs shall be tested annually, with a minimum of two (2) models. Fractional numbers shall be rounded up to the nearest whole number.

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

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

3.3.1 Basis for Selection. The following criteria may be used to select models for testing:

- Voluntarily re-rated models;
- At random;
- Models anticipated to provide the majority of the participant's production volume;
- For cause; and
- New models.

AHRI reserves the right to request Participants to identify highest sales volume models, as well as the best method of obtaining selected models for testing.

3.4 Methods for Acquiring Test Samples. AHRI or the Laboratory personnel shall make a Random Sample Selection or a Random Component Selection from the Participant's stock inventory 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 Operation Manual.

3.5 Sample Acquisition Timeframe. The Participant shall deliver the selected unit(s) to the Laboratory within 14 calendar days of Random Sample Selection or Random Component Selection by Laboratory personnel.

If the the sample selected are not shipped within 14 calendar days, the Participant may receive a program violation. Refer to Section 9 of the AHRI General Operations Manual.

3.6 Manufacturer's Required Equipment Provisions. The Laboratory is responsible for reviewing the manufacturer's installation instructions and ensuring that all necessary testing equipment and parts are available at the time of testing.

3.7 Defective Furnace Sample. A Defective Furnace Sample is when the sample fails a test due to the sample's inability to operate in accordance with the Participant's installation and operating instructions. A sample is assumed defective if the test results of any verified descriptor is 85% or less of the claimed valued listed in the Directory. Inoperable Samples as defined in the AHRI General Operations Manual Section 9.13 shall be considered as Defective Furnace Sample. Number of Defective Furnace Samples shall be counted into the sum of the Participant's first sample failures and defective samples and could lead the Participant to enter into the Double Selection Mode as described in AHRI General Operations Manual Section 9.18.

3.8 Tolerances. For annual verification testing, the Standard Rating shall be such that any Residential Furnace selected and tested in accordance with the Applicable Rating Standard has an AFUE and an Output Heating Capacity not less than 95% of the Standard Ratings.

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

- Annual Fuel Utilization Efficiency (AFUE), %
- Output Heating Capacity, MBtu/h

3.10 Test Failures.

3.10.1 Options Following First Sample Failure. When the Participant is notified of a first sample certified rating failure, it has seven (7) calendar days to select one (1) of the following options:

- Re-rate all models within the failed sample's BMG proportionate to the failed test's results. The failed model shall be re-rated to the nearest 0.10% for AFUE and/or the nearest thousand Btu/h of the Output Heating Capacity, and no better than the test results. Other models in the BMG shall be re-rated in accordance with the percentage by which the tested unit failed;
- Test second sample of the same model (sample shall be available within the timeframe and procedure allotted in Section 3.5 following notification of decision to AHRI via Manufacturer's Decision Form [MDF]); or
- Obsolete the model, which also obsoletes all models within the corresponding BMG.

3.10.2 Options Following Second Sample Failure. When the Participant is notified of a second sample certified rating failure, it has seven (7) calendar days to select one (1) of the following options:

- Re-rate all models within the failed sample's BMG proportionate to the failed test's results. The failed model shall be re-rated to the nearest 0.10% for AFUE and/or the nearest thousand Btu/h of the Output Heating Capacity, and no better than the test results. Other models in the BMG shall be re-rated in accordance with the percentage by which the tested unit failed.
- Test to isolate rating for failed furnace configuration per 3.10.2.1 (option available for multi-position furnaces only);
- Test additional samples of the same model per 3.10.2.2; or
- Obsolete the model, which also obsoletes all models within the corresponding BMG.

3.10.2.1 Isolate Rating for Failed Furnace Configuration. For multi-position furnaces with identical ratings for all configurations, the Participant may opt to re-test

the furnace (using the same unit from the failed 2nd sample test) in all of the other configurations. The test in the original configuration shall still be considered a 2nd sample failure; however any configurations that pass are not required to be re-rated. The Directory shall explicitly state the certified ratings for each furnace configuration.

3.10.2.2 Additional Sample Testing of the Same Model. In an effort to preserve the Published Ratings for the model in question, the Participant may opt to test up to 20 additional samples of the model that failed. If possible, the samples should be selected from different production runs. The final rating shall be the mean of the 1st sample, 2nd sample, and all tests requested by the Participant.

If a Participant exercises this option, testing of additional samples shall be completed within six (6) months of the second sample test.

- Following each test, if the mean result of all tested samples passes, no further action is required.
- If at the conclusion of additional sample testing, the mean result of all tested samples fails, the Participant shall elect to either obsolete or re-rate within seven (7) calendar days of notification of additional sample testing failure.

3.11 Clarification of Test Procedure. AHRI shall develop a Test Procedure Guideline that shall facilitate running of the DOE test procedures. Such guidelines shall not revise or modify the Applicable Rating Standard, but shall seek to provide uniformity in interpretation of terms, measurements, and application of procedures.

3.11.1 Test Conditions. For consistent and repeatable results, the establishment of the test conditions for the gathering of data supporting the calculation of AFUE and “e” shall be accomplished in accordance with Appendix C.

3.11.2 Air Leakage Test. The cabinet air leakage test and the supporting calculations for calculating ENERGY STAR metric, Air Leakage ($Q_{leak, EPA}$) shall be accomplished in accordance with Appendix D.

3.12 Consequences for Improper Ratings or Defective Samples.

3.12.1 Double Selection Mode Requirements. Refer to Section 9 of the AHRI General Operations Manual.

3.12.2 Probation Mode Requirements. Refer to Section 9 of the AHRI General Operations Manual.

3.12.3 Penalty Mode Requirements. Refer to Section 9 of the AHRI General Operations Manual.

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. 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;
- Name of Manufacturer;
- Model Status;
- Brand Name of Model;
- Model Number(s) or Designation(s);
- Fuel type (gas or oil);
- Input Rating, MBtu/h;
- Output Heating Capacity, MBtu/h;
- Electric Power to Burner (PE), W;
- Auxiliary Electrical Energy Consumption (E_{AE}), kWh/yr;
- Fossil Fuel Energy Consumption (E_F), MMBTU/yr;
- Annual Fuel Utilization Efficiency (AFUE), %; and
- Manufactured Housing

Additional data may be shown for products sold in areas requiring further product information or ratings.

5.2 Data Forms. Each Participant shall list products by BMG. OEM and PBM Participants shall submit/edit product data via the Directory or data submittal sheets, as applicable.

6. Assessment and Payment of Certification Fees

Except as noted below, the assessment and payment of certification fees shall proceed according to the AHRI General Operations Manual, Section 12.

6.1 Equipment Delivery/Disposal Fees. The Participant is responsible for the delivery and expenses associated with shipping test samples to and from the Laboratory. However, following the completion of the test, the sample shall be shipped prepaid by AHRI to the destination specified by the Participant. The Participant shall provide instruction to the Laboratory regarding the disposal/shipment of the sample(s).

7. Issuance of Violations and/or Termination

Refer to Section 14 of the AHRI General Operations Manual.

8. Program Hierarchy, Complaints, and the Appeals Process

8.1 Test Results' Appeals and Dispute Resolution. The test results' appeal process shall proceed according to the AHRI General Operations Manual, Section 15.

8.2 Standard Revisions. The DOE Test Procedure upon which the program is based cannot be changed without proposed amendments being published in the Code of Federal Regulations by DOE and giving interested parties at least 60 calendar days to present oral and written views. See Section 323(b)(2) of the Energy Policy and Conservation Act, 42 USC 6293(b)(2). As a possible step prior to petitioning DOE to amend its test procedure, the RFRN Certification Program offers an opportunity to first have a proposed amendment developed by industry experts that perhaps can achieve industry consensus on needed changes and can be submitted to DOE as a Program-recommended amendment.

8.2.1 Program Steps. Requests from Participants for either revisions of test procedures being used or modifications that would affect only certain models may be sent to AHRI to be processed as follows:

STEP 1 AHRI shall distribute request to AHRI's Furnace Section Compliance Committee for a recommendation of whether the request is of obvious merit and without controversy and can be sent out for review and comment. If it can be so recommended, a petition shall be forwarded to DOE immediately by AHRI as provided for below.

STEP 2 Alternatively, the Furnace Section Compliance Committee can recommend that AHRI distribute the request for comment to all Participants in the RFRN Certification Program.

STEP 3 Comments shall then be reviewed by the Furnace Section Compliance Committee, which, together with the party requesting the modification, shall attempt to agree whether the request has:

- Adequate consensus support,
- Inadequate consensus support, or
- Possible consensus support, if modified.

STEP 4 The Furnace Section Compliance Committee shall make a recommendation on the requests as presented (or modified with the approval of the requesting party) which, together with a tabulation of responses and pertinent comments resulting from distribution of the request as noted above, shall be included in a Letter Ballot to be sent to all Participants for approval by 2/3 of the voting Participants.

STEP 5 If a Federal test procedure is involved, AHRI shall petition the Federal government to revise or modify the Federal test procedure in order to reflect any revision or modification recommended by the AHRI RFRN Certification Program.

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

Refer to the AHRI Brand Usage Manual.

APPENDIX A: Data Submittal Sheets

AHRI RESIDENTIAL FURNACE CERTIFICATION PROGRAM DATA SUBMITTAL SHEET

		FORM RFRN-DS1
NOTE - * preceding field name indicates required field		Updated - 10-01-11
AHRI RESIDENTIAL FURNACE PROGRAM		
*OEM:		
*Location:		
PROGRAM & PRODUCT IDENTIFIERS	REQUIRED SECTION (complete all)	
*AHRI Program:	AHRI Certification Program - Residential Furnaces - RFRN	
*AHRI Type:	type of unit - (refer to OM for descriptions)	
*Trade/Brand Name:		
PRODUCT MODEL CHARACTERISTICS	COMPLETE ONLY THE APPROPRIATE FIELDS	
*RESIDENTIAL FURNACE MODEL:	*FUEL TYPE: (Nat. Gas, Oil, Propane)	
*FURNACE TYPE:	*CONFIGURATION: (Upflow; Downflow; Horizontal)	
*Weatherized:	*LOWBOY* (Optional) Yes or No	
*Non-Weatherized:		
*NOX COMPLIANT: Yes or No	*MANUFACTURED HOUSING: (Required if fuel is Nat. Gas or Propane) Yes or No	
*INPUT: (Whole Number)	*SINGLE PACKAGE UNIT: (Required if fuel is Nat. Gas or Propane) Yes or No	
*Ef: (One decimal place and greater than 0)	*BASIC MODEL: Yes or No	
*Eae (Including Eso): (Whole Number)	*ELECTRONIC IGNITION: (Required if fuel is Nat. Gas or Propane) Yes or No	
*Eso (kWh) (Whole Number)	*ELECTRO-MECHANICAL VENT DAMPER: Yes or No	
*PE: (Whole Number)	*POWER COMBUSTION OR POWER VENT: Yes or No	
*CONDENSING TYPE: Yes or No	*DIRECT VENT: Yes or No	
	*BASIC MODEL ID: (Required for Oil-Fired Furnace Only) (Whole Number)	
PRODUCT PERFORMANCE RATINGS		FOR PRODUCT BEING SOLD IN CANADA (Cont'd)
*OUTPUT HEATING CAPACITY: (Whole Number)	*VOLTAGE AT HEATING SPEED: (Whole Number)	
*AFUE: (One decimal place, greater than 0 and less than 100)	*BLOWER MOTOR'S CONSUMPTION AT HEATING SPEED: (Whole Number)	
	*VOLTAGE AT CIRCULATION SPEED: (Whole Number)	
FOR PRODUCT BEING SOLD IN CANADA		*BLOWER MOTOR'S CONSUMPTION AT CIRCULATION SPEED: (Whole Number)
SOLD IN CANADA: Yes or No	*INTEGRATED COOLING COMPONENT: Yes or No	
*VOLTAGE OF POWER BURNER CONSUMPTION: (Whole Number)	*THROUGH-THE-WALL WITH AN INTEGRATED COOLING: Yes or No (If Sold in Canada and Furnace is Non-Weatherized)	
*STANDBY POWER (Watts): (Whole Number)	*Sold in California? Yes or No (See below)	
Additional Data to be Submitted to California		Additional Data to be Submitted to California
*BURNER TYPE: (Induced Draft; Luminous; Injection Type; Power; Pressure)	*OFF-CYCLE DEVICES: (Stack Damper; Electro Mechanical Flue Damper; Electro Mechanical Inlet Damper; None)	
*ELECTRICAL PHASE: (Option 1)	*FAN MOTOR TYPE: (Premium or Standard)	
*CONTROL: (Single-Stage; Two-Stage; Step-Modulating)	*NAMEPLATE INPUT RATING (Btuh)	
*TOTAL NOMINAL FAN MOTOR HP: (Number with 2 decimal places)	*RATED OUTPUT: (Btuh)	
By submission of this form, I certify that the model listed above meets all of the requirements of the applicable AHRI standards.		
Signed: _____	Date: _____	Title: _____

APPENDIX B: Sample Manufacturer's Decision Forms

	<p>MANUFACTURER'S DECISION FORM – FIRST SAMPLE QUALIFICATION TEST FAILURE NOTIFICATION</p> <p>AHRI CERTIFICATION PROGRAM FOR RESIDENTIAL FURNACES</p>
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<Date>

Dear Certification Program Applicant:

Please be advised that the following sample, when tested under the AHRI Certification Program for Residential Furnaces, failed to perform in accordance with the latest edition of DOE 10 CFR Part 430. Test data is attached to this notification.

Manufacturer: _____ **AHRI Test #:** _____
Model: _____ **Date of Test:** _____

Per program rules, following notification of a qualification test failure the Applicant has seven (7) calendar days to elect one of the following options. If a completed Manufacturer's Decision Form is not received by AHRI within seven (7) calendar days, the Applicant forfeits the opportunity for further testing and all models within the Basic Model Group (BMG) shall be re-rated proportionate to the failed test's results.

FOLLOWING A FAILURE, PLEASE CHOOSE ONE (1) OF THE FOLLOWING OPTIONS. THE OPTION CHOSEN SHALL CORRESPOND TO THE OPTION AVAILABLE PER THE AHRI GENERAL OPERATIONS MANUAL AND THE RESIDENTIAL FURNACES CERTIFICATION PROGRAM OPERATIONS MANUAL.

Re-rate. The failed model shall be re-rated to the nearest 0.10% for AFUE and/or the nearest thousand Btu/h of the Output Heating Capacity, and no better than the test results

Other models within the BMG shall be re-rated proportionate to the failed test's results. These re-rates shall be reflected in the AHRI Directory of Certified Product Performance.

Within 14 calendar days of this failure notification, the Applicant is required to advise AHRI of the steps being taken to correct advertising literature, specifications, software, etc.

Within 60 calendar days of this failure notification, the Applicant is required to have withdrawn all known advertising literature, specifications, software, etc. and to have submitted corrected publications/software to AHRI, distributors, dealers, and all other affected parties. The draft public notification of corrections, a copy of the distribution list of those to receive the notification and corrections, as well as a copy of the corrected publication(s)/software, shall be reviewed by AHRI prior to dissemination to the public.

Failure to comply with program rules regarding publication/software correction shall result in a program violation.

2nd Sample (Following 1st Sample Failure). The Applicant shall have a 2nd sample available for selection within 30 calendar days from the date of this failure notification. Failure to present samples for selection within this timeframe shall forfeit the Applicant's opportunity for a 2nd sample test, thus automatically re-rating all models within the BMG proportionate to the failed test's results.

AHRI shall invoice the Applicant for the 2nd sample test prior to conducting the test. Payment shall be received within 30 calendar days from date of invoice. Failure to make payment within that timeframe shall forfeit the Applicant's opportunity to conduct a 2nd sample test, thus automatically re-rating all models within the BMG proportionate to the failed test's results.

To ensure the opportunity to preserve this BMG, please return this completed Manufacturer's Decision Form via email or fax within seven (7) calendar days to the certification engineer noted below. More details on the above options can be found in the AHRI General Operations Manual and the Residential Furnaces Certification Program Operations Manual. The engineer can address any questions regarding the available options.

Anuj Mistry, Engineer, Certification
Phone: (703) 524-8800, x304
Email: amistry@ahrinet.org
Fax: (703) 562-1942

Thank you for your participation in the AHRI Certification Program.

(Please complete all fields)

Company:	_____	Date:	_____
Submitted by:	_____	Email:	_____
	<i>Print</i>	Fax:	_____
Signature:	_____	Phone:	_____
Title:	_____		



MANUFACTURER'S DECISION FORM – SECOND SAMPLE QUALIFICATION TEST FAILURE NOTIFICATION

AHRI CERTIFICATION PROGRAM FOR RESIDENTIAL FURNACES

<Date>

Dear Certification Program Applicant:

Please be advised that the following sample, when tested under the AHRI Certification Program for Residential Furnaces, failed to perform in accordance with the latest edition of DOE 10 CFR Part 430. Test data is attached to this notification.

Manufacturer: _____ **AHRI Test #:** _____
Model: _____ **Date of Test:** _____

Per program rules, following notification of a qualification test failure the Applicant has seven (7) calendar days to elect one of the following options. If a completed Manufacturer's Decision Form is not received by AHRI within seven (7) calendar days, the Applicant forfeits the opportunity for further testing and all models within the Basic Model Group (BMG) shall be re-rated proportionate to the failed test's results.

FOLLOWING A FAILURE, PLEASE CHOOSE ONE (1) OF THE FOLLOWING OPTIONS. THE OPTION CHOSEN SHALL CORRESPOND TO THE OPTION AVAILABLE PER THE AHRI GENERAL OPERATIONS MANUAL AND THE RESIDENTIAL FURNACES CERTIFICATION PROGRAM OPERATIONS MANUAL.

Re-rate. The failed model shall be re-rated to the nearest 0.10% for AFUE and/or the nearest thousand Btu/h of the Output Heating Capacity, and no better than the test results

Other models within the BMG shall be re-rated proportionate to the failed test's results. These re-rates shall be reflected in the AHRI Directory of Certified Product Performance.

Within 14 calendar days of this failure notification, the Applicant is required to advise AHRI of the steps being taken to correct advertising literature, specifications, software, etc.

Within 60 calendar days of this failure notification, the Applicant is required to have withdrawn all known advertising literature, specifications, software, etc. and to have submitted corrected publications/software to AHRI, distributors, dealers, and all other affected parties. The draft public notification of corrections, a copy of the distribution list of those to receive the notification and corrections, as well as a copy of the corrected publication(s)/software, shall be reviewed by AHRI prior to dissemination to the public.

Failure to comply with program rules regarding publication/software correction shall result in a program violation.

Isolate Rating for Failed Furnace Configuration. For multi-position furnaces with identical ratings for all configurations, the Participant may opt to re-test the furnace (using the same unit from the failed 2nd sample test) in all of the other configurations. The test in the original configuration shall still be considered a 2nd sample failure; however any configurations that pass are not required to be re-rated. The Directory shall explicitly state the certified ratings for each furnace configuration.

AHRI shall invoice the Participant for the re-test prior to conducting the test. Payment shall be received within 30 calendar days from date of invoice. Failure to make payment within that timeframe shall forfeit the Participant's opportunity to conduct the re-test, thus automatically re-rating all models within the BMG proportionate to the failed test's results.

Additional Sample Testing of the Same Model. The Participant may opt to test up to 20 additional samples of the model that failed. If possible, the samples should be selected from different production runs. The final rating shall be the mean of the 1st sample, 2nd sample, and all tests requested by the Participant.

If a Participant exercises this option, testing of additional samples shall be completed within six (6) months of the second sample test.

AHRI shall invoice the Participant for the additional sample tests prior to conducting the tests. Payment shall be received within 30 calendar days from date of invoice. Failure to make payment within that timeframe shall forfeit the Participant's opportunity to conduct additional testing, thus automatically re-rating all models within the BMG proportionate to the failed test's results.

To ensure the opportunity to preserve this BMG, please return this completed Manufacturer's Decision Form via email or fax within seven (7) calendar days to the certification engineer noted below. More details on the above options can be found in the AHRI General Operations Manual and the Residential Furnaces Certification Program Operations Manual. The engineer can address any questions regarding the available options.

Anuj Mistry, Engineer, Certification
Phone: (703) 524-8800, x304
Email: amistry@ahrinet.org
Fax: (703) 562-1942

Thank you for your participation in the AHRI Certification Program.

(Please complete all fields)

Company:	_____	Date:	_____
Submitted by:	_____	Email:	_____
	<i>Print</i>	Fax:	_____
Signature:	_____	Phone:	_____
Title:	_____		



MANUFACTURER'S DECISION FORM – FIRST SAMPLE TEST FAILURE NOTIFICATION

AHRI CERTIFICATION PROGRAM FOR RESIDENTIAL FURNACES

<Date>

Dear Certification Program Participant:

Please be advised that the following sample, when tested under the AHRI Certification Program for Residential Furnaces (RFRN), failed to perform in accordance with the latest edition of DOE 10 CFR Part 430. Test data is attached to this notification.

Manufacturer: _____ **AHRI Test #:** _____
Model: _____ **Date of Test:** _____
AHRI Reference #: _____

Per program rules, following notification of a test failure the Participant has seven (7) calendar days to elect one of the following options. If a completed Manufacturer's Decision Form is not received by AHRI within seven (7) calendar days, the Participant forfeits the opportunity for further testing and all models within the Basic Model Group (BMG) shall be re-rated proportionate to the failed test's results.

FOLLOWING A FAILURE, PLEASE CHOOSE ONE (1) OF THE FOLLOWING OPTIONS. THE OPTION CHOSEN SHALL CORRESPOND TO THE OPTIONS AVAILABLE PER THE AHRI GENERAL OPERATIONS MANUAL AND THE RESIDENTIAL FURNACES CERTIFICATION PROGRAM OPERATIONS MANUAL.

Re-rate. The failed model shall be re-rated to the nearest 0.10% for AFUE and/or the nearest thousand Btu/h of the Output Heating Capacity, and no better than the test results.

Other models in the BMG shall be re-rated proportionate to the failed test's results. These re-rates shall be reflected in the AHRI Directory of Certified Product Performance.

2nd Sample (Following 1st Sample Failure). The Participant shall have a 2nd sample available for selection within 30 calendar days from the date of this failure notification. Failure to present samples for selection within this timeframe shall forfeit the Participant's opportunity for a 2nd sample test, thus automatically re-rating all models within the BMG proportionate to the failed test's results.

AHRI shall invoice the Participant for the 2nd sample test prior to conducting the test. Payment shall be received within 30 calendar days from date of invoice. Failure to make payment within that timeframe shall forfeit the Participant's opportunity to conduct a 2nd sample test, thus automatically re-rating all models within the BMG proportionate to the failed test's results.

Obsolete. Obsolete Models are those that the manufacturer stops producing following an AHRI test failure. If this option is chosen, all models within the BMG shall be obsolete. Obsolete models, with their correct ratings, are shown in the AHRI Directory of Certified Product Performance for six (6) months.

Changes to Literature (for Re-Rate and Obsolete):

Within 14 calendar days of this failure notification, the Participant is required to advise AHRI of the steps being taken to correct its advertising literature, specifications, software, etc.

Within 60 calendar days of this failure notification, the Participant is required to have withdrawn all known advertising literature, specifications, software, etc. and to have submitted corrected publications/software to AHRI, distributors, dealers, and all other affected parties. The draft public notification of corrections, a copy of the distribution list of those to receive the notification and corrections, as well as a copy of the corrected publication(s)/software, shall be reviewed by AHRI prior to dissemination to the public.

Failure to comply with program rules regarding publication/software correction shall result in a program violation.

To ensure the opportunity to preserve this BMG, please return this completed Manufacturer's Decision Form via email or fax within seven (7) calendar days to the certification engineer noted below. More details on the above options can be found in the AHRI General Operations Manual and the RFRN Certification Program Operations Manual. The engineer can address any questions regarding the available options.

Anuj Mistry, Engineer, Certification
Phone: (703) 524-8800, x304
Email: amistry@ahrinet.org
Fax: (703) 562-1942

Thank you for your participation in the AHRI Certification Program.

(Please complete all fields)

Company:	_____	Date:	_____
Submitted by:	_____	Email:	_____
	<i>Print</i>	Fax:	_____
Signature:	_____	Phone:	_____
Title:	_____		



MANUFACTURER'S DECISION FORM – SECOND SAMPLE TEST FAILURE NOTIFICATION

AHRI CERTIFICATION PROGRAM FOR RESIDENTIAL FURNACES

<Date>

Dear Certification Program Participant:

Please be advised that the following sample, when tested under the AHRI Certification Program for Residential Furnaces (RFRN), failed to perform in accordance with the latest edition of DOE 10 CFR Part 430. Test data is attached to this notification.

Manufacturer: _____ **AHRI Test #:** _____
Model: _____ **Date of Test:** _____
AHRI Reference #: _____

Per program rules, following notification of a test failure the Participant has seven (7) calendar days to elect one of the following options. If a completed Manufacturer's Decision Form is not received by AHRI within seven (7) calendar days, the Participant forfeits the opportunity for further testing and all models within the Basic Model Group (BMG) shall be re-rated proportionate to the failed test's results.

FOLLOWING A FAILURE, PLEASE CHOOSE ONE (1) OF THE FOLLOWING OPTIONS. THE OPTION CHOSEN SHALL CORRESPOND TO THE OPTIONS AVAILABLE PER THE AHRI GENERAL OPERATIONS MANUAL AND THE RESIDENTIAL FURNACES CERTIFICATION PROGRAM OPERATIONS MANUAL.

- Re-rate.** The failed model shall be re-rated to the nearest 0.10% for AFUE and the nearest thousand Btuh of the Output Heating Capacity, and no better than the test results. Other models in the BMG shall be re-rated proportionate to the failed test's results. These re-rates shall be reflected in the AHRI Directory of Certified Product Performance.
- Obsolete.** Obsolete Models are those that the manufacturer stops producing following an AHRI test failure. If this option is chosen, all models within the BMG shall be obsolete. Obsolete models, with their correct ratings, are shown in the AHRI Directory of Certified Product Performance for six (6) months.
- Isolate Rating for Failed Furnace Configuration.** For multi-position furnaces with identical ratings for all configurations, the Participant may opt to re-test the furnace (using the same unit from the failed 2nd sample test) in all of the other configurations. The test in the original configuration shall still be considered a 2nd sample failure; however any configurations that pass are not required to be re-rated. The Directory shall explicitly state the certified ratings for each furnace configuration.

AHRI shall invoice the Participant for the re-test prior to conducting the test. Payment shall be received within 30 calendar days from date of invoice. Failure to make payment within that timeframe shall forfeit the Participant's opportunity to conduct the re-test, thus automatically re-rating all models within the BMG proportionate to the failed test's results.

- Additional Sample Testing of the Same Model.** The Participant may opt to test up to 20 additional samples of the model that failed. If possible, the samples should be selected from different production runs. The final rating shall be the mean of the 1st sample, 2nd sample, and all tests requested by the Participant.

If a Participant exercises this option, testing of additional samples shall be completed within six (6) months of the second sample test.

AHRI shall invoice the Participant for the additional sample tests prior to conducting the tests. Payment shall be received within 30 calendar days from date of invoice. Failure to make payment within that timeframe shall forfeit the Participant's opportunity to conduct additional testing, thus automatically re-rating all models within the BMG proportionate to the failed test's results.

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Anuj Mistry, Engineer, Certification
Phone: (703) 524-8800, x304
Email: amistry@ahrinet.org
Fax: (703) 562-1942

Thank you for your participation in the AHRI Certification Program.

(Please complete all fields)

Company:	_____	Date:	_____
Submitted by:	_____	Email:	_____
	<i>Print</i>	Fax:	_____
Signature:	_____	Phone:	_____
Title:	_____		

APPENDIX C: Procedure for Establishing Test Conditions for Consistent and Repeatable Measurement of the Parameters Used in the Calculation of 'e' and AFUE.

- 1 FURNACES WITH A SINGLE RATED INPUT
 - 1.1 Select the lowest blower speed that allows the furnace to run at or above the minimum static pressure, at the rated input, and at a maximum rise of $([\text{mid-point rise}] + 2)^{\circ}\text{F}$ but not less than $([\text{mid-point rise}] - 2)^{\circ}\text{F}$.
 - 1.1.1. Permanent Split Capacitor (PSC) or constant torque Brushless Direct Current (BLDC) motor – If airflow at the lowest speed is still too high, increase static pressure to achieve temperature rise of $([\text{mid-point rise}] + 2)^{\circ}\text{F}$
 - 1.1.2. PSC or constant torque BLDC motor – If airflow at the highest speed is still too low, the unit will be considered an inoperable sample. The Laboratory should contact AHRI and the manufacturer.
 - 1.1.3. BLDC Motor with Constant Cubic Foot per Minute (CFM) control – If the test conditions at the minimum static pressure is not attainable at any of the available blower settings, the unit will be considered an inoperable sample. The Laboratory should contact AHRI and the manufacturer.

- 2 FURNACES WITH MULTIPLE RATED INPUTS OR CONTINUOUSLY VARIABLE INPUT
 - 2.1 At maximum rate, select the lowest blower speed that allows the furnace to run at or above the minimum static pressure, at the rated input, and at a maximum rise of $([\text{mid-point rise}] + 2)^{\circ}\text{F}$ but not less than $([\text{mid-point rise}] - 2)^{\circ}\text{F}$.
 - 2.1.1. PSC or constant torque BLDC motor – If airflow at the lowest speed is still too high, increase static pressure to achieve $([\text{mid-point rise}] + 2)^{\circ}\text{F}$
 - 2.1.2. PSC or constant torque BLDC motor – If airflow at the highest speed is still too low, the unit will be considered an inoperable sample. The Laboratory should contact AHRI and the manufacturer.
 - 2.1.3. BLDC Motor with Constant CFM control – If the test conditions at the minimum static pressure is not attainable at any of the available blower settings, the unit will be considered an inoperable sample. The Laboratory should contact AHRI and the manufacturer.

 - 2.2 Testing at minimum rate shall be conducted without changing the duct system - the same physical restriction as determined in 2.1 above.
 - 2.2.1. Furnaces with the capability to set the low-fire blower speed independently from the high-fire blower speed. Set the blower speed such that the rise is the highest achievable value below the mid-point rise but no lower than the minimum nameplate rise. If this is not possible, the blower shall be set such that the rise is the lowest possible value above the mid-point rise but not higher than the maximum nameplate rise. If neither condition is attainable, the unit will be considered an inoperable sample. The Laboratory should contact AHRI and the manufacturer.
 - 2.2.2. Furnaces without the capability to set the low-fire blower speed independently from the high-fire blower speed – No adjustment to the blower speed shall be made. For the test, the control system of the furnace shall be provided a normal input corresponding to a low-fire call, and the blower shall be allowed to respond normally to the control system of the furnace. If the resulting rise is outside of the nameplate rise range, the unit will be considered an inoperable sample. The Laboratory should contact AHRI and the manufacturer.

APPENDIX D: Procedure for Measuring Cabinet Air Leakage and Calculating ENERGY STAR Metric, Air Leakage

1 MEASUREMENT OF CABINET AIR LEAKAGE

1.1 The Cabinet Air Leakage ($Q_{leak,ASHRAE-193}$) in cubic feet per minute (cfm), shall be measured per the method of test described in ANSI/ASHRAE 193-2010, Method of Test for Determining the Airtightness of HVAC Equipment.

2 CALCULATION OF RATED AIRFLOW

2.1 Rated Airflow shall be 21.7 cfm per MBtu/hr of rated heating output capacity or 400 cfm per ton of rated cooling capacity, whichever is greater.

$$\text{Or} \quad Q_{Rated-Airflow} = 21.7 * Q_{out}$$

$$Q_{Rated-Airflow} = 400 * \frac{Q_c}{12000}$$

Where;

$Q_{Rated-Airflow}$ = Rated Airflow of the heating/cooling appliance (cfm)
 Q_{out} = Rated Heating Output Capacity (Mbtu/h)
 Q_c = Maximum Rated Cooling Capacity (btu/h)

3 CALCULATION OF ENERGY STAR METRIC AIR LEAKAGE

3.1 ENERGY STAR metric, Air Leakage ($Q_{leak,EPA}$) is defined as the percent of the rated airflow of the fan that is required to maintain the applied pressures, accounting for air that leaves or enters through cracks, joints and penetration in the furnace cabinet rather than through supply and return ducts installed in accordance with manufacturer's instructions. Air Leakage ($Q_{leak,EPA}$) shall be calculated as follows:

$$Q_{leak,EPA} = 100 * \frac{Q_{leak,ASHRAE-193}}{Q_{Rated-Airflow}}$$