

OPERATIONS MANUAL

WATER-COOLED WATER-CHILLING AND HEAT PUMP WATER-HEATING PACKAGES USING THE VAPOR COMPRESSION CYCLE

AHRI CERTIFIED®
www.ahridirectory.org

Water-Cooled Water Chilling and
Heat Pump Water-Heating Packages
AHRI Standards 550/590 and 551/591

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Water-Cooled Water Chilling and
Heat Pump Water-Heating Packages
EN Standards 14511 and 14825

AHRI WCCL OM – MAY 2021

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PREFACE

The following manual outlines the procedures and policies of the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle (WCCL) Certification Program 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. It also shall be used in conjunction with the latest effective editions of AHRI Standards 550/590 (I-P) and 551/591 (SI).

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 AHRI WCCL Certification Program provides for independent verification of the 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 WCCL 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 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 AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle Certification Program Operations Manual, January 2021 and is effective May 1, 2021.

Changes to certification statements within software selection applications (Sections 3.7.4 through 3.7.6) shall be completed no later than December 31, 2021.

CERTIFICATION OPERATIONS MANUAL FOR
WATER-COOLED WATER-CHILLING PACKAGES USING VAPOR COMPRESSION CYCLE

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Documents Referenced which are only Available Online (www.ahrinet.org)

- WCCL-DS1 - Data Submittal Form
- WCCL-DS2 - Testing Workbook
- WCCL-FA1 - Application for Test Stand Approval
- WCCL-FA2 - Personnel Experience Questionnaire
- WCCL-FA3 - Test Stand and Equipment Questionnaire
- WCCL-FA4 - Calibration Summary
- WCCL-PC1 - Witness Test Procedure and Checklist
- WCCL-PC2 - In-House Test Procedure and Checklist
- WCCL-PC3 - Test Stand Approval Procedure and Checklist
- WCCL-PC4 - Third-Party Laboratory Procedure and Checklist for Witness Testing
- WCCL-PC5 - Third-Party Laboratory Procedure and Checklist for In-house Testing
- WCCL-PC6 - Test Stand Approval Procedure and Checklist of Third-Party Laboratory
- AHRI Standard 550/590 & 551/591 System Calibration Worksheet
- WCCL Minimum Requirement Catalog Template

1. Program Overview

1.1 Applicable Rating Standards. It is mandatory for program Participants to comply with the provisions of the latest effective edition of either AHRI Standard 550/590 (I-P), *Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle* (Standard) or AHRI Standard 551/591 (SI), *Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle* (Standard). All references to the Standard refer to the latest effective edition, which is available for download from the AHRI website, www.ahrinet.org.

1.2 Definitions. All terms in this document shall follow the AHRI GOM and the Standard definitions unless otherwise defined in this section.

1.2.1 Water-Cooled Water Chilling and Heat Pump Water-Heating Packages. A factory-made and prefabricated assembly (not necessarily shipped as one package) of one (1) or more compressors, condensers and evaporators, with interconnections and accessories including controls, designed for the purpose of cooling or heating water. It is a machine specifically designed to make use of a vapor compression refrigeration cycle to transfer heat from a cold water liquid circulating system to a warm water liquid circulating system.

1.2.2 Custom Unit. A unit that is not specifically listed in a publicly available sales brochure, magazine advertisement, website posting or Catalog / Selection Rating Application that is a single instance product which contains components or additions that change the performance such that ratings cannot be obtained by utilizing the Participant's Catalog / Selection Rating Application. All published performance for a Custom Unit is subject to the requirements of Section 3.7.5.2.

Custom Units shall not be certified and shall not be listed in the AHRI Directory of Certified Product Performance (Directory).

1.2.2.1 Field Trial Unit. A unit that is produced and provided to a customer, for the purpose of gathering data on potential new products. These units are intended to transition into regular production should the field trial be successful. Field Trial Units are subject to the requirements of Custom Units.

Field Trial Units shall not be certified and shall not be listed in the Directory.

1.2.3 New Product Introduction Unit. A new product is one that falls under the Program Scope, that is available to be marketed but is not available for standard production and is not listed in the Directory. Prior to advertising a New Product Introduction Unit, the Participant must obtain approval from AHRI by providing the following:

- Documentation describing the pre-released product.
- Capacity and efficiency at AHRI Standard Rating Conditions for a representative sample of the pre-released product.
- An updated WCCL-DS1 form.

Within nine (9) months after AHRI has approved the New Product Introduction Unit, the Participant shall add the New Product Introduction Units to the Directory in accordance with Section 9.2 or else be in violation of AHRI's Certify-All Policy. AHRI reserves the right to modify annual testing selections to include new product introduction.

New Product Introduction listings shall be shown on the WCCL Certification Program website, <http://www.ahrinet.org/WCCL.aspx> until they are added to the Directory.

All published performance for a New Product Introduction is subject to the requirements of Section 3.7.5.4.

1.2.4 Modular Chiller Array. A combination of individual certified chillers that may or may not include, from the factory, all required piping, wiring and controls to make the modular chiller array complete. The Modular Chiller Array is not certified, per Section 3.8.8, similar to when other certified chillers are piped and controlled together in the field.

1.2.5 Catalog / Selection Rating Application. A catalog or selection rating application that allows for selection of any certified product at any published application rating condition per the latest effective edition of the Standard, and shall be in one of the following forms:

1.2.5.1 Catalog. Any published material capable of displaying previously generated (i.e., static) performance data.

- Paper Catalog – a printed display of product performance
- Electronic Catalog or Spreadsheet – an electronic display of product performance
- Mobile Catalog – a downloadable program capable of displaying performance on one or more mobile device

1.2.5.2 Selection Rating Application. Any application capable of generating (i.e., calculating) performance data.

- PC based Selection Rating Software - a personal computer (PC) based, run on MS Windows® based platform;
- Web based Application - all the applications that communicate with the user via HTTP; and
- Mobile Application – a downloadable program capable of generating performance on one or more mobile device.

1.2.6 Published Ratings. All published ratings of certified products which fall within the scope of the Program shall match the ratings generated using the Participant's Primary Catalog / Selection Rating Application listed in the AHRI Directory at the time of publication.

1.2.6.1 Primary Published Ratings. Ratings published using the Participant's Primary Catalog / Selection Rating Application listed in the AHRI Directory at the time of publication.

1.2.6.2 Secondary Published Ratings. Ratings published using media other than the Participant's Primary Catalog / Selection Rating Application listed in the AHRI Directory at the time of publication. All Secondary Published Ratings shall be generated using the Participant's Primary Catalog / Selection Rating Application listed in the AHRI Directory at the time of publication.

Secondary Published Ratings shown in a Catalog / Selection Rating Application shall reference the Primary Catalog / Selection Rating Application used to generate the certified performance with the following:

- Primary Catalog / Application name; and
- Primary Catalog / Application Version.

1.3 Program Scope. This program applies to electric motor driven Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages as defined in Section 1.2, and that meet the criteria of Table 1.

1.3.1 Optional Certification. If Participants certify units within the optional certification scope of the program as defined in Table 1, the following requirements apply:

1.3.1.1 Optional Certification by Country of Origin. Optional certification of a basic model group may be decided based on country of origin as indicated in the Directory.

1.3.1.2 Optional Certification by BMG. All units within the same basic model group for each country of origin listed in the Directory shall be certified.

1.3.1.3 Optional Certification to EN Standards. All units certified to EN Standards shall also be certified to AHRI Standards.

Table 1. Program Scope						
Intended Market	Electrical Connection		Cooling Capacity ^a , tons [kW] ^b	Heating Capacity ^e , kBtu/h [kW] ^b	Published Ratings in Accordance With the Referenced Standard ^d	
	(Hz)	(V)			AHRI	EN
Water-Chilling Packages						
Sold for use anywhere in the world	50	≤15,000	>0 and <200 [703]	Heating Performance	AHRI 550/590 (I-P) or 551/591 (SI)	EN 14511 and EN 14825
			≥200 and ≤3000 [703 and 10,551]			
	60		>0 and ≤3000 [10,551 kW]			
Heat Pump Water-Heating Packages						
Sold for use anywhere in the world	50	≤15,000	>0 and ≤3000 [10,551]	≥135 and ≤48,000 [40 and 14067]	AHRI 550/590 (I-P) or 551/591 (SI)	EN 14511 and EN 14825
	60					
Heat Recovery Water-Heating Packages						
Sold for use anywhere in the world	50	≤15,000	>0 and ≤3000 [10,551]	Heating Performance	AHRI 550/590 (I-P) or 551/591 (SI)	EN 14511 and EN 14825
	60					
Custom Units						
Condenserless Chillers						
Split system chillers						
Evaporatively-cooled chillers						
Chillers with motors not supplied with the unit by the Participant						
Units with evaporators or condensers that use liquid other than fresh water^c						
Notes: a. Cooling Capacity refers to the net cooling capacity of units rated at application full-load operating conditions provided these conditions are within the scope of AHRI Standard 550/590 (I-P). b. kW conversions provided for reference only. c. Units containing freeze protection liquids in the condenser or in the evaporator are within scope when rated per the Standard with water. d. Applies to all Published Ratings within the scope of AHRI Standard 550/590 (I-P). e. Heating Capacity refers to the net heating capacity of units rated at full-load standard rating conditions per AHRI Standard 550/590 (I-P)					Legend:	
					Required for Participants to Certify	Optional for Participants to Certify

1.4 Basic Model Groups (BMGs). A BMG is defined as a family of chillers using the same compressor type. A Participant may choose to further subdivide its products into additional BMGs.

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, Annual Certified Sales Volume Form, and product-specific ratings and data, noted in the AHRI General Operations Manual, Section 4, STEP 4.1, Applicants shall submit the following documentation to AHRI:

- One test report for each BMG;
- Copy of Applicant's Primary Catalog / Selection Rating Application (refer to Section 3.7); and
- If the Applicant chooses to conduct witness testing at its AHRI Approved Test Stand (Test Stand), all required forms per Section 3.4.1 of this manual for Test Stand Approval shall also be submitted.

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 License Fee Invoice. Payment of the Participation and License 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 is 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. Refer to Section 3 for requirements of selection and acquisition of test samples.

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.

The Applicant may prepare the equipment for test in the Laboratory or their approved Test Stand, validate the setup for the operation of the equipment prior to conducting the test(s), and witness the testing. The Applicant may not interfere with the equipment once testing has begun.

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. An Applicant is required to pass at least 80% of the first sample qualification tests. Should the pass rate be less than 80%:

- The Applicant shall test additional BMGs until the pass rate of the first sample qualification tests is at least 80%, or until all BMGs are tested; or
- The Applicant may choose to re-rate all models within untested BMGs per Section 3.9.4. (for all 5th Point test failures with the exception of Water Pressure Drop refer to Section 3.9.3);

Except as noted below, refer to Section 4, STEP 4.4.2 of the AHRI General Operations Manual for details regarding the first sample qualification failure options.

- Test a second sample from the same BMG (sample must be available for witness testing or ship to the Laboratory for testing within 90 calendar days following notification of failure).

STEP 2.1.4.3 Second Sample Qualification Test Failure. Refer to Section 4, STEP 4.4.3 of the AHRI General 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 witness Test Stand inspection or initial qualification testing. PBM product certification is contingent upon the certification of the associated OEM product. PBM Published Ratings must directly correlate to OEM Published Ratings. If the Published Ratings have variations, the PBM must register and test as an OEM.

STEP 2.2.1 Certification Application Package. In addition to the Application for AHRI Certification and product-specific ratings and data noted in the AHRI General Operations Manual, Section 5, STEP 5.1, Applicants shall submit the following:

- Copy of Applicant's Catalog/Selection Rating Application (refer to Section 3.7);

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.

2.3 AHRI Certification to EN Standards. The following steps are required for Participant without any products claiming AHRI Certification to EN Standards. Once qualified, requirements to add, modify or remove certified products to EN Standards shall follow Section 9.2.

STEP 2.3.1 AHRI Certification to EN Standards Application Package. Applicants shall submit the following documentation to AHRI:

- An updated WCCL-DS1 form showing the exact model(s) to claim AHRI Certification to EN Standards; and
- Copy of Participant's Primary Catalog / Selection Rating Application (refer to Section 3.7).

STEP 2.3.2 Processing Application Package.

STEP 2.3.2.1 Performance Certification Agreement for Original Equipment Manufacturer (OEM Agreement). The Participant will receive an updated Certification Agreement with modifications to comply with requirements for products to be certified to the EN Standards. No further action required beyond that listed in Section 4, STEP 4.2 of the AHRI General Operations Manual.

STEP 2.3.3 Qualification Testing. AHRI shall supply the Laboratory with the Published Ratings to the EN Standards. The Laboratory shall conduct the testing of the samples in accordance with the EN Standards, against the Published Ratings.

STEP 2.3.3.1 Successful Completion of Qualification Test. If qualification test pass proceed to STEP 2.3.5.

STEP 2.3.3.2 First Sample Qualification Test Failure. Refer to Section 3.9.1.

STEP 2.3.3.3 Second Sample Qualification Test Failure. Refer to Section 3.9.2.

STEP 2.3.4 Welcome to AHRI Certification to EN Standards. After all steps have been completed, the Participant shall be sent a welcome letter granting rights to use the AHRI Certification Mark for certification of products to EN Standards and the Participant's certified products to EN Standards shall be listed in the AHRI Directory of Certified Product Performance (Directory).

3. Equipment Selection and Testing

3.1 Annual Testing Requirement. 20% of a Participant's BMGs shall be tested, with a minimum of one (1) test per country of origin (country where unit is originally assembled). Fractional models shall be rounded to the nearest whole number using traditional rounding methods. The minimum number of annual tests shall be one (1) for Participants with only one (1) BMG from one (1) country of origin and two (2) for Participants with more than one (1) BMG from more than one (1) country of origin. Countries where samples are only reassembled shall not be considered as a location of origin.

3.2 Testing Standard. Each test shall be conducted in accordance with either AHRI or EN Standards as follows:

- All units may be tested in accordance with the latest edition of AHRI Standards 550/590 (I-P) or 551/591 (SI).
- Units that are optionally certified to the latest edition of EN Standards 14511 and 14825 may be tested in accordance with these standards.

Testing to either AHRI or EN Standards satisfies the testing requirements of this Program which certifies the performance of products in accordance with AHRI Standards 550/590 (I-P) and 551/591 (SI) and (optionally) EN Standards 14511 and 14825.

Units optionally certified to latest edition of EN Standards 14511 and 14825 shall first be qualified per Section 2.3.

Unless otherwise noted Standard refers to AHRI Standards 550/590 (I-P) or 551/591 (SI).

3.3 Location of Tests. The Participant shall elect to conduct testing at the AHRI Contracted 3rd Party test facility (Laboratory) or at a Participant's AHRI Approved test stand (Test Stand). All tests, regardless of location, shall be setup and tested in accordance with the Participant's installation and operation

instructions in printed or electronic format, and conducted or witnessed by the Representative Contracted by AHRI (Representative).

3.4 Laboratory Testing. Selected samples must be shipped to the Laboratory accompanied by the Participant's published installation instructions in printed or electronic format. Instructions shall provide sufficient information to test the sample in accordance with the Standard. Participants shall provide AHRI with a list of contacts available in case the Laboratory has an issue with testing and needs direction. The Participant shall respond within two (2) hours of initial contact, otherwise the sample shall be removed from the test cell. If additional information is required during testing, it shall be approved by AHRI prior to its use.

A Participant may be allowed in the Laboratory for the duration of the test to assist in the setup of the sample and operation of each test point using the tools and diagnostic equipment typically available in the field for this purpose. A Participant may instruct the Laboratory to operate the equipment in accordance with instructions provided per Section 3.6 for a Participant-specified number of test setup validation hours, not to exceed 4 hours of run time at stable Participant defined conditions, prior to testing.

All costs for the set-up and start-up in addition to those required for standard setup of the samples shall be borne by the Participant.

Testing shall be conducted and test reports shall be generated by entering all required data into the WCCL-DS2 Testing Workbook.

3.5 Test Stand Approval and Witness Testing. This Program allows witness testing, where Participant personnel, witnessed by a Representative, conduct testing at an AHRI approved Test Stand. Witness testing requirements are covered in the AHRI General Operations Manual, Section 9 and as specified below.

3.5.1 Test Stand Approval. The Participant shall submit the following to AHRI to schedule a Test Stand inspection for AHRI approval:

- Test Stand Approval (FA) Forms (found online at www.ahrinet.org);
- A completed AHRI Standard 550/590 & 551/591 System Calibration Worksheet (found online at www.ahrinet.org) with a copy of each calibration report showing date of last calibration;
- A schematic drawing of the area of the Test Stand in which AHRI certification testing shall be performed; and
- Photographs of the Test Stand in which AHRI certification testing will take place (which shall include sufficient views to show the location and connection of each instrument as well as the location and connection of the ports to be used by the Laboratory during witness testing).

Following review and approval of the submitted data, AHRI shall forward the application package to the Representative. The Representative shall then complete applicable portions of Form WCCL-PC3, Test Stand Approval Procedure and Checklist to determine whether the Test Stand shall be granted preliminary approval (found online at www.ahrinet.org).

Once the Test Stand has been granted preliminary approval, the Representative shall make arrangements for the Test Stand inspection to verify compliance of the data submitted to the certification program and complete the remaining sections of Form WCCL-PC3. A chiller must be running in the Test Stand for the inspection to be completed.

If the Test Stand Inspection is not conducted in conjunction with an AHRI Certification Test, then the chiller shall be run at 100% and 25% IPLV conditions in accordance with the Standard and data shall be collected to verify Test Stand capabilities.

3.5.1.1 Non-Compliant Inspection Results. If the results of the inspection indicate that a Participant's Test Stand is non-compliant with the Standard or the certification program, all discrepancies must be resolved and resubmitted to AHRI before approval may be granted to proceed with AHRI tests.

3.5.1.2 Final Approval of Witness Test Stand. Upon acceptable results of the inspection, AHRI shall notify the Participant in writing, of final acceptance and approval to proceed with certified rating tests. Testing may be scheduled in conjunction with Test Stand inspection; however, should the Test Stand fail inspection, the testing shall be delayed until the Test Stand is brought into compliance. All approved Test Stands shall be listed in the Test Stand Directory as defined in Table 4.

Previously approved Test Stands may optionally renew the Test Stand up to ninety (90) calendar days prior to the Test Stand expiration date. If the Test Stand is approved during this period, the Test Stand shall be approved for two (2) years from the Test Stand previously established expiration date.

3.5.1.3 Maximum Approved Test Stand Capacity. AHRI will determine the Maximum Approved Test Stand Capacity as the minimum of the following values:

- Tested Full Load Capacity divided by 0.85;
- Declared Maximum Capacity (Operating Range of Test Stand) on Form WCCL-FA3; or
- Program Scope limit per Table 1 (3000 tons or 10,551 kW).

Note: If the tested full load capacity divided by 0.85 exceeds the declared maximum capacity, the Participant has the option to revise Form WCCL-FA3.

The Maximum Approved Test Stand Capacity will be valid for six (6) years, contingent upon the Test Stand remaining continuously approved during that period. If the Test Stand approval expires, the Maximum Approved Test Stand Capacity will also expire and will be recalculated following the next inspection.

3.5.2 Witness Testing.

3.5.2.1 Advance Setup of Sample in the AHRI Approved Test Stand. A Participant may set up the test sample in the Test Stand prior to the arrival of the Representative. The Representative shall complete Form WCCL-PC1, Witness Test Procedure and Checklist in conjunction with conducting the witness test. Prior to test commencement, the Representative shall verify that the unit is the model selected by AHRI for testing and that the sample has been set up in the Test Stand in accordance with the Participant's published installation instructions in printed or electronic format and referenced method of test (PC forms may be found online at: www.ahrinet.org).

3.5.2.2 Duty Assignments of Representative. Sample testing, data acquisition, and data reduction shall be performed by the Participant personnel and assisted and witnessed by the Representative. Testing shall be conducted and test reports shall be generated by entering all required data into the WCCL-DS2 Testing Workbook. The Participant shall provide raw test data to the Representative in a form easily transferable to the WCCL-DS2 Testing Workbook. Participant or Test Stand 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 requested by the Representative responsible for the test.

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

3.5.2.3 Use of Laboratory Instrumentation. The Representative shall use primary test instruments belonging to the Laboratory in line with those provided by the Participant to measure power input, water pressure drop, and air and water temperatures in accordance with the Standard. Readings shall be taken from both devices. The test results from the Participant data acquisition system shall be used provided that:

- The Participant equipment is under current calibration;
- All data acquisition is in accordance with the Standard;
- The Participant’s power input measurement does not differ by more than 2% of the average between the Laboratory’s and Participant’s measurements;
- Water temperature at each location does not differ by more than 0.2°F (0.11°C);
- Water temperature difference across the evaporator or condenser as determined by the average of the two sets of Participant instrumentation does not differ by more than 0.2°F (0.11°C); and
- Water pressure drop does not differ by more than 0.5 ft H₂O (1.5 kPa).

The Representative shall verify that the Test Stand average test conditions remain within the allowable tolerances for the duration of the test time period within 30 seconds of test start and stop, by comparing the Representative’s test results with the Participant’s test results.

Should any of these criteria not be met, steps should be taken to ensure that the discrepancy is resolved. In cases where the discrepancy cannot be resolved and no damage is apparent, the Laboratory instrumentation data for that parameter shall be used. If the instrument is part of a pair to calculate a difference (e.g. temperature or pressure) or part of an instrument set to calculate an average (e.g. ambient air temperature or power) then the Laboratory instrumentation data shall be used for both instruments in the pair or all instruments in the instrument set.

3.5.2.4 Laboratory Instrumentation. Refer to Table 2 for instrumentation requirements.

Table 2. Instrumentation Requirements			
Measurement	Test Stand Instrument Requirements	Additional Accommodations for Laboratory Instrumentation	Additional Verifications
Water Flow	one flow meter per water flow circuit	(none)	(none)
Water Pressure Drop	one gauge or transducer per water flow circuit	one additional pair of ¼ inch NPT ports that connect to the same static pressure ports used by the Test Stand	(none)
Water Temperature	minimum of one temperature sensor at each location	additional thermowell at each temperature location to accept a ¼ inch probe with immersion depth of ⅓ to ½ the diameter of the pipe	(none)

Table 2. Instrumentation Requirements (Continued)			
Electrical Power	one electrical power measurement system	location to clamp on current measurement device and taps for voltage measurement	(none)
Note: All instruments shall be under current calibration that is traceable to NIST or equivalent laboratories that participate in inter-laboratory audits.			

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

3.6 Selection of Test Samples and Test Timeframe. AHRI shall make a Scheduled Production Model Selection based on the Participant’s Primary Catalog / Selection Rating Application version as listed in the Directory.

The Participant’s AHRI approved Primary Catalog / Selection Rating Application shall be used to select a sample to operate within the limits of rating conditions per the Standard. Refer to Section 9 of the AHRI General Operations Manual.

The following timeline applies:

- At least ninety (90) calendar days before the first scheduled test date, AHRI shall notify the Participant of the Annual Testing Requirement (by manufacturing location), selected BMG for each test, scheduled test date, and the scheduled Laboratory for each test.
- At least forty-five (45) calendar days before the scheduled test date, the Participant shall:
 - Provide AHRI with a list of available models for selection within the selected BMG. Alternate BMGs may be selected based on product availability. If a BMG is not available for selection for three (3) consecutive years, the BMG shall be removed from the Directory and classified as Custom Units; and
 - Coordinate test date(s) with the Laboratory.
- At least thirty (30) calendar days before the scheduled test date, AHRI shall notify the Participant of the selected model, testing standard (AHRI or EN), and random operating point (if applicable).
- Within seven (7) calendar days after notification of selected sample for testing, the Participant shall provide the following:
 - Notify AHRI if any of the selected units cannot be made available;
 - For Laboratory testing: Notify AHRI if the Participant is interested in having a representative present during the setup, startup and testing of the sample(s). If notification is not received within the specified time frame, the Participant will not be permitted to observe the setup, startup or testing of the sample(s);
 - Participant’s Primary Catalog / Selection Rating Application Output Report(s) and a completed WCCL-DS2 Testing Workbook shall be provided at Published Ratings. Test conditions shall be provided per Section 5 of the Standard; and
 - Confirmation of the test location at the Laboratory or AHRI approved Test Stand.
- On or before the scheduled test date, the selected samples shall be shipped to the Laboratory or be available for Witness Testing at the AHRI approved Test Stand with refrigerant charging instructions as well as instructions that provide sufficient information to operate the selected unit at each test condition (i.e., manual operation of compressors and fans, etc.). If additional information is required during testing, it shall be approved by AHRI prior to its use.

3.7 Primary Catalog / Selection Rating Application Requirements, A Participant shall provide AHRI with the most up to date version of its Primary Catalog(s) (if applicable) or Primary Selection Rating Application(s) (including all necessary instructions and passwords required for access and updates), which complies with the following requirements:

If the Participant has more than one (1) Primary Catalog / Selection Rating Application available to users, each shall be provided to AHRI for review and approval per Section 3.7.2.

3.7.1. Primary Catalog / Selection Rating Application Output Reports. Primary Catalogs and Selection Rating Application Output Reports may be printed or electronic from PC based applications or screen captures from mobile applications and shall include the minimum information required by Section 6.2 of the Standard to allow AHRI to generate identical certified performance in addition to the following:

- Manufacturer name;
- Certified performance (Refer to Section 3.8);
- Proper Statement(s) Regarding Certification (Refer to Sections 3.7.4, 3.7.5, and 3.7.6); and
- Each Primary Selection Rating Application Output Report page shall contain the following:
 - Application name and version;
 - Reference page number (example: 1 of 2); and
 - Date each output sheet is generated.
- Each Primary Catalog page shall contain the following:
 - Catalog name and version; and
 - Date catalog was created.

3.7.2 Primary Catalog / Selection Rating Applications Approval. Per the AHRI General Operational Manual, Section 9, AHRI shall have an updated copy of any Primary Catalog / Selection Rating Application being used in the field to produce Primary Published Ratings.

3.7.2.1 Initial Approval. If the participant is using a Catalog, PC based Selection Rating Software, or Mobile Application, AHRI shall provide the Participant with a login/password to a personalized Virtual Machine (VM) to install their Primary Catalog / Selection Rating Application. For Web based Applications, the Participant shall provide AHRI with access.

3.7.2.2 Update Approval. Any updates shall promptly be provided to AHRI via installation to the Participant's VM or notification of Web based Application updates.

Once the Participant notifies AHRI that the Selection Rating Application is ready for review, AHRI shall grant approval of updates to the Primary Catalog / Selection Rating Application within seven (7) calendar days.

3.7.3 Minimum Certified Data Required in Primary Catalog / Selection Rating Application. All published AHRI Certified Data shall be included in a Participant's Primary Catalog / Selection Rating Application. Publishing additional Certified Data not included in a Participant's Catalog / Selection Rating Application shall result in a Program Violation. A WCCL Minimum Requirement Catalog Template may be found online at www.ahrinet.org.

3.7.3.1 Water-Chilling Packages. At a minimum, Primary Catalog / Selection Rating Applications shall provide the data defined in Table 5 of the Standard or within the operational limits of each unit for full and part load ratings from 100% to 25% (or lowest stage of cooling capacity for units with discrete unloading) and IPLV or NPLV.

3.7.3.2 Heat Pump Water-Heating Packages. At a minimum, Primary Catalog / Selection Rating Applications shall provide ratings at the Standard Rating Conditions at which the unit is designed to operate.

3.7.4 Statements Regarding Certification – Certified Selections. All Primary Catalogs and Primary Selection Rating Application output reports for certified selections which reference AHRI shall include one (1) of the statements shown in Sections 3.7.4.1 through 3.7.4.5. Refer to Section

3.7.4.6 for Selection Rating Application outputs which include performance which is rated or certified by an organization other than AHRI.

The Mark shall be included on all certified performance Primary Catalog and Selection Rating Application Reports, other than those which include rated or certified performance by an organization other than AHRI.

Regardless of reference to AHRI, all units remain subject to the scope requirements of the Program, and all AHRI Certified Performance shall be accessible from an approved Selection Rating Application on an output sheet which references AHRI.

Appendix C contains a certification statement flowchart summarizing sections 3.7.4 through 3.7.6.

3.7.4.1 Units in which Statements 3.7.4.2 Through 3.7.4.5 Do Not Apply. “Certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Certified units may be found in the AHRI Directory at www.ahridirectory.org”

3.7.4.2 Heat Pump Water-Heating Units Operating in Cooling. “Certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Heat Pump Water-Heating unit is certified when operating in cooling. Certified units may be found in the AHRI Directory at www.ahridirectory.org.”

3.7.4.3 Heat Pump Water-Heating Units Operating in Heating. “Certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Heat Pump Water-Heating unit operating in heating is only certified at full-load standard rating conditions. Certified units may be found in the AHRI Directory at www.ahridirectory.org.”

Note: Heating performance at full-load standard rating conditions shall be included on the selection software output report or catalog in order to claim certification; otherwise, the selection is outside the scope of the certification program.

3.7.4.4 Heat Pump Water-Heating Units Operating in Heating and Cooling. “Certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Heat Pump Water-Heating unit operating in heating and cooling is only certified at full-load heating standard rating conditions and cooling application rating conditions. Certified units may be found in the AHRI Directory at www.ahridirectory.org.”

Note: Heating performance at full-load standard rating conditions shall be included on the selection software output report or catalog in order to claim certification; otherwise, the selection is outside the scope of the certification program.

3.7.4.5 Heat Recovery Units with Heat Recovery Off. “Certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Heat Recovery unit is certified when operating with heat recovery off. Certified units may be found in the AHRI Directory at www.ahridirectory.org.”

3.7.4.6 Alternate Certification. If AHRI certified performance is presented in accordance with another standard or certification program (i.e. certified by an organization other than AHRI) the following statement may be included: “Within the scope of AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program. AHRI Certified performance may be obtained from the manufacturer’s representative.”

3.7.5 Statements Regarding Certification – Non-Certified Selections. All Primary Catalogs and Primary Selection Rating Application outputs for non-certified selections which reference AHRI and are within the scope of the Standard shall include one (1) of the statements shown in Sections 3.7.5.1 through 3.7.5.4. For application ratings outside the scope of the standard, refer to Section 6.1 of the Standard. Refer to Section 3.7.5.5 for Primary Catalogs and Primary Selection Rating Application outputs which include performance which is rated or certified by an organization other than AHRI.

The Mark shall not be included on non-certified Primary Catalogs and Primary Selection Rating Application outputs.

3.7.5.1 Units in which Statements 3.7.5.2 through 3.7.5.4 Do Not Apply. “Outside the scope of AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program or not optionally certified, but is rated in accordance with AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI).”

3.7.5.2 Custom or Field Trial Units. “Custom Unit which is not certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, but is rated in accordance with AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI).”

3.7.5.3 Non-Current Catalog or Selection Rating Application Version. “Non-Current Selection which is not certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, but is rated in accordance with AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI).”

3.7.5.4 New Product Introduction Units. “New Product Introduction which is not certified in accordance with the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program, but is rated in accordance with AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). New Product Introduction Units may be found at www.ahrinet.org/WCCL.”

3.7.6 Additional Statements Regarding Certification. In addition to statements shown in Sections 3.7.4 and 3.7.5, Primary Selection Rating Application outputs which reference AHRI shall include all of the statements shown in Sections 3.7.6.1 through 3.7.6.4 that apply.

3.7.6.1 Non-Standard Tolerances. Performance presented with Non-Standard Tolerances (i.e. tolerances that are more stringent than those specified in AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI)) shall be presented with the following statement: “Performance presented with Non-Standard Tolerances”.

3.7.6.2 Combined Units or Modular Chiller Array Selections. For system performance presented with combined units or Modular Chiller Array systems the following statement shall be provided: “Combined units or modular chiller array rating is outside of the scope of the AHRI Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Certification Program. Individual unit ratings are subject to the governing documents of the AHRI Certification Program.”

3.7.6.3 Units with an Evaporator or Condenser Which Contains Liquid for Freeze Protection. For performance presented of units with an evaporator or condenser which contains liquid for freeze protection, the following statement shall be presented: “Unit contains freeze protection liquids in the condenser or in the evaporator and is certified when rated per the Standard with water.”

Note: Performance of the unit rated per the Standard with water shall be displayed on the same selection software output or catalog; otherwise, the selection is outside the scope of the certification program.

3.7.6.4 Units Certified in Accordance with EN Standards. For performance presented of units certified in accordance with EN Standards 14511 and 14825 the following statement shall be presented: “Unit is certified in accordance with EN Standards 14511 and 14825 Standard Rating Conditions.”

3.8 Tested and Certified Ratings. This Program tests and certifies Water-Cooled Water-Chilling and Heat Pump Water-Heating Packages Ratings as defined in this Section.

3.8.1 Tested Cooling Ratings. AHRI tests published ratings to AHRI Standards 550/590 (I-P) and 551/591 (SI) and EN Standards 14511 and 14825.

3.8.1.1 AHRI Standards 550/590 (I-P) and 551/591 (SI) Ratings. The following ratings are verified by test in accordance with AHRI Standards 550/590 (I-P) and 551/591 (SI):

- Full-load cooling capacity;
- Cooling efficiency;
- Evaporator and condenser water pressure drop; and
- Integrated Part-load Value (IPLV.IP or IPLV.SI) or
- Non-Standard Part-load Value (NPLV.IP or NPLV.SI).

Units that are not able to operate at Standard Rating Conditions shall be tested at the unit design conditions and NPLV.IP or NPLV.SI conditions.

Additionally, AHRI shall select a random point within each unit’s published AHRI Certified operating map. This random operating point (5th point) shall be selected to allow AHRI to certify the published operating map conditions at which the unit can operate.

AHRI will select a capacity for the 5th point. Selection software programs may not be able to add the 5th point condition to the selection of the unit at Standard Rating Conditions. If a separate selection is needed to generate performance at the 5th point condition, the capacity requested by AHRI should be the target. See A1.1 for an example.

For 5th point testing, Tolerance 1, performance tolerance limit (Tol₁) shall be calculated per the Standard using the following definitions for percent load (%Load) and temperature differential at rated full load design conditions (ΔT_{FL}). See A2.1 for an example.

$$\%Load = \frac{AHRI\ Selected\ Condition\ Capacity}{100\% \ IPLV\ or\ 100\% \ NPLV\ Rating\ Condition\ Capacity}$$

Where:

$$\%Load \leq 100\% \text{ for any value of } AHRI \text{ Selected Condition Capacity}$$

$$\Delta T_{FL} = 100\% \ IPLV \ or \ 100\% \ NPLV \ Rating \ Condition \ \Delta T$$

3.8.1.2 EN Standards 14511 and 14825 Ratings. For units certified to EN Standards 14511 and 14825, The following ratings are verified by test at EN Standard Rating Conditions in accordance with EN Standards 14511 and 14825:

- Full-load cooling capacity;
- Cooling efficiency;
- Evaporator and condenser water pressure drop;
- Seasonal Energy Efficiency Ratio (SEER); and
- Off mode ratings listed below.
 - Thermostat off
 - Standby
 - Crankcase heater (as applicable)
 - Off (as applicable)

3.8.2 Certified Cooling Ratings. AHRI certifies published ratings to AHRI Standards 550/590 (I-P) and 551/591 (SI) and EN Standards 14511 and 14825.

3.8.2.1 AHRI Standards 550/590 (I-P) and 551/591 (SI) Ratings. AHRI certifies the following published operating map ratings in accordance with AHRI Standards 550/590 (I-P) and 551/591 (SI):

- Full-load cooling capacity operating map (100% of rated full-load capacity);
- Cooling efficiency operating map (100% to 25% of rated full-load capacity);
- Evaporator and condenser water pressure drop operating map (100% to 25% of rated full-load capacity);
- Integrated Part-load Value (IPLV.IP and IPLV.SI); and
- Non-Standard Part-load Value (NPLV.IP and NPLV.SI).

3.8.2.2 EN Standards 14511 and 14825 Ratings. For units certified to EN Standards 14511 and 14825, AHRI certifies the following published EN Standard Rating Condition ratings in accordance with EN Standards 14511 and 14825:

- Full-load cooling capacity;
- Cooling efficiency;
- Evaporator and condenser water pressure drop; and
- Seasonal Energy Efficiency Ratio (SEER).

3.8.3 Tested Heating Ratings. AHRI tests published ratings to AHRI Standards 550/590 (I-P) and 551/591 (SI).

3.8.3.1 AHRI Standards 550/590 (I-P) and 551/591 (SI) Ratings. The following ratings are verified by test in accordance with AHRI Standards 550/590 (I-P) and 551/591 (SI):

- Standard Rating Conditions: Each AHRI selected test sample shall be tested at one (1) of the Standard Rating Conditions defined in Table 4 of the Standard.
- Selection of Tested Condition: AHRI shall select one (1) Standard Rating Condition from those listed in Table 4 of the Standard for verification. This selected rating condition must be one in which the Participant's Primary Catalog / Selection Rating Application claims as AHRI Certified for the particular unit being tested.

3.8.3.2 EN Standards 14511 and 14825 Ratings. For units certified to EN Standards 14511 and 14825, The following ratings are verified by test at EN Standard Rating Conditions in accordance with EN Standards 14511 and 14825:

- Full-load heating capacity;
- Full-load heating coefficient of performance;
- Evaporator and condenser water pressure drop;
- Seasonal Efficiency (SCOP); and
- Off mode ratings listed below.
 - Thermostat off
 - Standby
 - Crankcase heater (as applicable)
 - Off (as applicable)

3.8.4 Certified Heating Ratings. AHRI certifies published ratings to AHRI Standards 550/590 (I-P) and 551/591 (SI).

3.8.4.1 AHRI Standards 550/590 (I-P) and 551/591 (SI) Ratings. AHRI certifies the following published ratings at Standard Rating Conditions as defined in Table 1 of AHRI Standards 550/590 (I-P) and 551/591 (SI) which the Participant's Primary Catalog / Selection Rating Application claims as AHRI Certified.

- Full-load heating capacity;
- Full-load heating coefficient of performance;
- Full-load heat recovery coefficient of performance; and
- Evaporator and condenser water pressure drop.

3.8.4.2 EN Standards 14511 and 14825 Ratings. For units certified to EN Standards 14511 and 14825, AHRI certifies the following published EN Standard Rating Condition ratings in accordance with EN Standards 14511 and 14825:

- Full-load heating capacity;
- Full-load heating coefficient of performance;
- Evaporator and condenser water pressure drop; and
- Seasonal Efficiency (SCOP).

3.8.5 Tested Cooling and Heating Ratings. Published ratings of units selected for testing that AHRI Certifies in both Water-Chilling and Heat Pump Water-Heating modes shall be verified according to Sections 3.8.1 and 3.8.3 during the same scheduled test.

3.9 Test Failures. Test failures shall be determined in accordance with Section 5 of the Standard or any full-load test condition in which the unit cannot operate.

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

- Re-rate all models within the failed sample's BMG per Section 3.9.4.
 - For all 5th Point test failures with the exception of water pressure drop, refer to Section 3.9.3. The Participant may elect not to conduct any additional testing because the entire operating map will be re-rated if the re-rate option is chosen.
 - Water Pressure Drop re-rates shall be across the entire operating map.
 - Only certified ratings (e.g. capacity, efficiency, water pressure drop, or IPLV) that fail the original test are required to be re-rated. Refer to Section 9 of the AHRI General Operations Manual.
 - An additional test is required in the year following an involuntary re-rate per Section 3.9.4.1.

- Test a second sample to the same Standard that was used with the first sample. The second sample shall have similar published performance (within +/- 10% capacity and 0 to 5% improved full-load efficiency and IPLV.IP/IPLV.SI or NPLV.IP/NPLV.SI at the same conditions as the first sample) and be within the same BMG of the first sample tested (sample must be available for witness testing or ship to the Laboratory for testing within 90 calendar days following notification of decision to AHRI via Manufacturer's Decision form [MDF]); or
- Obsolete the model, which also obsoletes the corresponding BMG.

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

- Re-rate all models within the failed sample's BMG per Section 3.9.4. (for all 5th Point test failures with the exception of Water Pressure Drop refer to Section 3.9.3); or
- Obsolete the model, which also obsoletes the corresponding BMG.

3.9.3 5th Point Failure Re-rate Procedure. This is performed immediately after the failure and before the MDF is issued. The Participant is responsible for all additional fees associated with this procedure.

- Four (4) additional tests of the failed certified rating(s) shall be conducted at Participant-defined higher and lower capacities and higher and lower lift conditions relative to the failed test point condition.
- Certified ratings that passed the original test are not retested and are not required to be re-rated.
- If the original failed point is at or close to an operating boundary limit (maximum capacity and/or maximum lift capability), three (3) points may be used provided that the Participant demonstrate that the points define a region around the failed point and the operating boundary, with two (2) of the three (3) points lying on the boundary limit.
- If one (1) or more of the additional test points fail, testing shall be conducted in an expanding search window until a sufficient number of test points pass to define a region around the original failed point.
- For discrete unloading machines, it may be necessary to choose the additional test points at the next stage of unloading.
- Published ratings shall be re-rated within the entire region from the original failed test point to the surrounding passing test points. Interpolation may be used to determine the passing test points. Performance shall be re-rated by the percentage difference between the original test failure and the original ratings. No adjustment for testing tolerances is allowed; the re-rated performance at the failed test point must be equal to or worse than the tested performance.
- At any time during this procedure, the Participant may elect a different Sample Failure Option (refer to Sections 3.9.1 and 3.9.2) or decide to re-rate the entire operating map.
- Refer to A3.1 for an example.

3.9.4 Re-rate Requirements for Water-Chilling Packages. In addition to completing the Actions required by Section 8.2 of the AHRI General OM, the Participant shall provide the following to AHRI within 60 calendar days of test failure notification.

- A written description of the changes made to performance prediction calculations which explain the magnitude and range of revised performance.
- Performance generated from the Primary Catalog / Selection Rating Application before and after the re-rate which shows the magnitude and range of revised performance for a representative sample of models within the failed sample BMG.

3.9.4.1 *Involuntary Re-rate Confirmation.* Following an involuntary re-rate, participants shall be subject to a Penalty Test in addition to the requirements of Section 3.1, to confirm the re-rated performance of a model selected from the re-rated BMG. Depending on when the re-rate occurs, the Penalty Test may be assigned to the same test year as the failed test or the following test year. If the re-rated BMG is discontinued, then a model from another BMG shall be selected to complete the Penalty Test. The Penalty Test satisfies the requirements of Section 9.16 of the General OM.

4. Challenge Tests

Challenge Test process shall proceed according to the AHRI General Operations Manual, Section 10.

5. AHRI Directory of Certified Product Performance

All certified products shall be listed in the Directory, www.ahridirectory.org and all approved Test Stands shall be listed on the WCCL Certification Program website, <http://www.ahrinet.org/WCCL>. Certification shall not be implied nor claimed for any product not listed in the Directory, and AHRI approval shall not be implied nor claimed for any Test Stand not listed in the WCCL Certification Program website.

Except as noted below, the Participant shall follow the steps outlined in Section 11 of the AHRI General Operations Manual.

5.1 *Publication of Certified Products or New Product Introduction Directories.* The following information pertaining to each certified model shall be published in the Directory as defined in Table 3:

Table 3. Publication of Ratings in the Certified Products and New Product Introduction Directories				
Information	Certified Product Directory		New Product Introduction Directory	
	Public ^a	Private ^b	Public ^a	Private ^b
AHRI Certified Reference Number ^d	X			
Model Status	X			
Manufacturer	X		X	
Brand Name	X		X	
Model Designation ^e	X		X	
Refrigerant Used per ASHRAE 34 ^d	X		X	
Compressor Model Series Information	X		X	
Compressor Type ^d (Reciprocating, Scroll, Centrifugal or Screw)	X		X	
Primary Catalog or Selection Rating Application Name	X			
Primary Catalog or Selection Rating Application Version	X			
Hertz ^d (50 or 60 Hz)	X		X	
Country of Origin ^d	X		X	
Manufacturing Location, City ^d		X		X
Application Type ^d (Heating, Cooling, or Heating and Cooling)	X		X	
Nominal Cooling Capacity Range ^e (kW or tons) – Low and High	X		X	
Nominal Heating Capacity Range ^e (kW or kBtu/h) – Low and High	X		X	
Certified by AHRI to EN 14511 and EN 14825 (Yes or No)		X		

Table 3. Publication of Ratings in the Certified Products and New Product Introduction Directories (Continued)				
Variable Speed Compressor Control Available (Yes or No) ^d		X		X
Basic Model Group Number ^d		X		
New Product Introduction Approval Date			X	
<p>Notes:</p> <ul style="list-style-type: none"> a. Public Listing Information may be viewed in the public portion of the Directory at www.ahridirectory.org. b. Private Listing Information for each Participant's listings may only be viewed by Participants whose company corresponds to that listing. c. Nominal Capacity refers to the named capacity of units rated at full-load AHRI Standard 550/590 (I-P) Standard Rating Conditions. This value is not AHRI Certified and intended only for general categorization of Basic Model Groups. d. Information is linked between OEM and PBM listings. e. May refer to a single model or range of models. 				

5.2 *Data Forms.* Each OEM and PBM Participant shall list and submit its certified model listings via the Directory. AHRI shall be notified any time changes or additions are made to model listings.

5.3 *Publication of Approved Test Stands in the Directory.* The following information pertaining to approved Test Stands shall be published in the Directory as defined in Table 4:

Table 4. Publication of Approved Test Stands in the Test Stand Directory		
Information	Public ^a	Private ^b
Test Stand Reference Number	X	
Manufacturer	X	
Test Stand Designation	X	
City and Country of Location	X	
Maximum AHRI Approved Capacity (tons or kW)	X	
Date Maximum AHRI Approved Capacity Expires		X
Facility Address		X
Facility Contact (name, phone number, email)		X
AHRI Inspection Date		X
Approval Expiration Date		X
Date Provided Testing to Another Participant		X
<p>Notes:</p> <ul style="list-style-type: none"> a. Public Listing Information may be viewed in the public portion of the Directory at http://www.ahrinet.org/WCCL.aspx. b. Private Listing Information for each Participant's listings may only be viewed by Participants whose company corresponds to that listing. 		

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 or another AHRI approved Test Stand.

Following the completion of the test, the Participant shall provide instruction to the Laboratory regarding the disposal/shipment of the sample(s). The Laboratory shall invoice the Participant for expenses associated with the disposal/shipment of sample from the Laboratory to a location designated by the Participant.

7. Issuance of Violations and/or Terminations

Except as noted below, the Issuance of Violations and/or Termination shall proceed according to the AHRI General Operations Manual, Section 14.

7.1 Program Violation. When a Participant breaches any term(s) of the Governing Documents, they shall receive a program violation. Each instance of program violation will remain on the Participant’s record for three (3) consecutive years from the violation letter date.

7.1.1 Program Violation Letter. AHRI will send a program violation letter providing:

- The specific term(s) of the Governing Documents breached;
- The assigned Violation Level Type per Table 5;
- Required corrective action and, in some cases, a request for evidence of corrective action; and
- Instructions for appealing the violation.

Table 5. Program Violation Level Types and Examples	
Level 1: Performance Based Violations	<ul style="list-style-type: none"> • Misrepresentation of AHRI Certified Data within the defined Operating Map of the latest effective edition of AHRI Standards 550/590 (I-P) and 551/591 (SI) • Violations of Certify-All Policy; • Failure to issue corrections to marketing materials and Published Ratings for a re-rate due to test failure; • Failure to correct a program violation; or • Improper or unauthorized claims to AHRI Certification from an AHRI approved Catalog / Selection Rating Application
Level 2: Administrative Based Violations	<ul style="list-style-type: none"> • Failure to maintain accurate product data in AHRI Directory; • Misleading marketing using the AHRI name or AHRI Certification Mark; • Misleading marketing material with improper or unauthorized claims to AHRI Certification; • Failure to provide AHRI with most recent version(s) of Primary Catalog / Selection Rating Application(s); • Failure to submit product-specific data submittal forms for new model listings prior to listing in the AHRI Directory; or • Failure to provide test samples for selection and testing within required timeframe.
<p><i>Note: The examples in this table are not exhaustive. For violations not covered in this example, AHRI will assign a Program Violation Level in accordance with the severity of the Governing Document breach.</i></p>	

7.1.2 Accumulation of Program Violations. If program violations accumulate, they will have consequence per Table 6.

Table 6. Consequences of Program Violation Accumulation^{a,b}	
Seven (7) Level 1 Violations accumulated within a consecutive three-year period	<ul style="list-style-type: none"> Participant will be terminated from the certification program as per the AHRI General OM;
Five (5) Level 1 Violations accumulated within a consecutive three-year consecutive period	<ul style="list-style-type: none"> Certification participant is listed in the AHRI Directory for one (1) year as having five (5) or more Level 1 Violations in a three-year consecutive period (violation reason will not be listed) \$10,000 flat fee to be invested back into AHRI Certification Programs
Three (3) Level 1 Violations accumulated within a consecutive three-year period	<ul style="list-style-type: none"> \$10,000 flat fee to be invested back into AHRI Certification Programs
Two (2) Level 1 Violations or any combination of three (3) Violations (Level 1 and Level 2) accumulated within a one-year period	<ul style="list-style-type: none"> Participant and Company Executive Officer to submit corrective action plan for review and discussion at AHRI's office in Arlington, VA
Three (3) Level 2 Violations within a consecutive three-year period	<ul style="list-style-type: none"> Equivalent to receiving one (1) Level 1 violation
<p>Notes:</p> <p>a. As per Section 12.4, Payment Deadlines, of the AHRI General OM, Failure to make payment shall result in removal of Directory data and Termination for Non-Payment.</p> <p>b. Consequences shown are administered sequentially across the one-year or three-year time period in which the violations are accumulated. For example, a Participant is required to pay a \$10,000 flat fee for the third violation accumulated within a consecutive three-year period, but a Participant is not required to pay a \$10,000 flat fee for the fourth violation accumulated within a consecutive three-year period.</p>	

8. Program Hierarchy, Complaints, and the Appeals Process

Refer to Section 15 of the AHRI General Operations Manual.

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

9.1. AHRI Verification and Validation of Published Ratings.

9.1.1 Published Primary Rating Verification. AHRI provides verification of Primary Published Ratings to all legitimate parties. Verifications shall only be made on jobs in which the Primary Catalog / Selection Rating Application implemented by the user matches that of the Primary Catalog / Selection Rating Application shown in the AHRI Directory. All requesters shall provide the following information before verifications are completed:

- Name of the requester;
- Affiliation of the requester;
- Contact information of the Requester (email, phone number);
- Original job submittal with the job name;
- Performance provided in accordance with Section 3.8.1.2; and
- If available, the Manufacturer representative that provided the selection.

9.1.2 Published Rating Validation. Primary and Secondary Published Ratings are subject to validation to confirm compliance with the Program requirements at the time of publication.

9.1.3 Responsibility of Participant for Primary Catalog / Selection Rating Application Revisions. Whenever a Participant's Primary Catalog / Selection Rating Application is revised, the Participant shall promptly supply the revised version(s) to AHRI. Version numbers shall comply with the following:

- Version shall be in increasing numerical order so that the revision level can be determined by AHRI;
- Version shall match the number listed on the performance output data sheet generated from the Selection Rating Application and the Directory; and
- Version shall be tied to ratings; if any ratings are changed, a new version of the application shall be issued.

Notification to AHRI of revisions to Secondary Catalog / Selection Rating Application is not required.

Once the Participant notifies AHRI that the Primary Catalog / Selection Rating Application has been successfully installed, AHRI shall grant approval of the Selection Rating Application within seven (7) calendar days.

Upon approval from AHRI, the Participant may release the Primary Catalog / Selection Rating Application to other users. Primary Catalog / Selection Rating Application released to other users prior to obtaining approval from AHRI shall result in a program violation. Participants shall not be allowed to make changes to Primary Catalog / Selection Rating Application version updates until the Participant has obtained approval from AHRI.

9.2 Changes to Directory Listings. AHRI shall be informed of changes to certified products prior to such changes being implemented. The Participant shall submit the following to AHRI for approval:

- An updated WCCL-DS1 form showing the exact changes proposed, indication of any effects on published ratings, and an approximate date on which production of the changed chiller(s) is to begin.
- Updated Primary Catalog / Selection Rating Application that includes the updated performance.

AHRI shall grant approval of the submitted changes within seven (7) calendar days.

10. Test Stand Availability Requirements

10.1 Purpose. To promote participation in and the integrity of this Program, Participants shall make available test stands for Participants not having the ability to test products which they wish AHRI to certify.

10.2 Definitions.

10.2.1 Test Stand Provider. A Participant who is allowing the use of their test facility by another Participant for certification testing.

10.2.2 Test Stand User. A Participant who is using another Participant's test facility for certification testing.

10.3 Requirements.

10.3.1 AHRI. AHRI shall work directly with the Test Stand Provider and Test Stand User to determine the location and date of each test and shall promote the equal distribution of testing among all Program Participant's test facilities by global region (China, Europe, India, Middle East, North America).

10.3.2 Test Stand Provider. The Test Stand Provider shall:

- Allow AHRI Certification testing of Test Stand User's units at AHRI approved test facilities within 120 days of notification by AHRI;
- Permit Test Facility Users to witness the testing in accordance with the Program Governing Documents. All data, test results, calculations, reports, information and other documents gathered or prepared by Test Stand Provider become the property of AHRI in accordance with the Program License Agreement and shall be removed (i.e. deleted and destroyed) from the records of the Test Stand Provider immediately after it has been provided to AHRI;
- Operate the Test Stand when conducting testing to be witnessed by the Representative. The Test Stand User shall not be permitted to participate in the operation of the Test Stand during test but may supervise the operation and adjustment of the chiller; and
- Invoice the Test Stand User testing fees which have been approved by the AHRI WCCL Compliance Committee for AHRI Certification Program testing.

10.3.3 Test Stand User. The Test Stand User shall:

- Schedule AHRI Certification testing at AHRI approved test facilities a minimum of 60 days prior to testing; and
- Provide installation and setup instructions a minimum of 30 days prior to testing; and
- Pay invoiced Test Stand User testing fees.

The Test Stand User may provide personnel to witness the setup, testing, and tear down of the unit. These personnel shall be escorted at all times by the Test Stand Provider.

APPENDIX A: AHRI SELECTED CONDITION EXAMPLES

A1.1 *5th Point Capacity and Percent Load Example.* A chiller will be tested at Standard Rating Conditions as listed in Table A1. AHRI selects the 5th point as 165 tons, 46°F evaporator leaving water temperature, 58°F evaporator entering water temperature, and 80°F condenser entering water temperature.

Table A1: Standard Rating Conditions				
% Load	Capacity Ton	Evaporator Entering Water Temperature °F	Evaporator Leaving Water Temperature °F	Condenser Entering Water Temperature °F
100.0	275.0	54.00	44.00	85.00
75.0	206.3	51.50	44.00	75.00
50.0	137.5	49.00	44.00	65.00
25.0	68.70	46.50	44.00	65.00

To generate the performance at the 5th point conditions, the selection software calculates a new full load capacity of 300 tons due to the selected temperatures. The test will be run at the 55.0% load conditions listed in Table A2. The 300 ton and 55.0% load values are not used in any calculations.

Table A2: 5th Point Rating Conditions				
% Load	Capacity ton	Evaporator Entering Water Temperature °F	Evaporator Leaving Water Temperature °F	Condenser Entering Water Temperature °F
100.0	300.0	58.00	46.00	80.0
55.0	165.0	58.00	46.00	80.0

A2.1 *5th Point Tolerance Example.* For the chiller in A1.1, the 5th point tolerance is calculated using Percent Load and ΔT_{FL} as listed below.

$$\% \text{ Load} = 165 \text{ tons} / 275 \text{ tons} = 60\%$$

$$\Delta T_{FL} = 100\% \text{ IPLV or } 100\% \text{ NPLV Rating Condition } \Delta T = (54^\circ\text{F} - 44^\circ\text{F}) = 10^\circ\text{F}$$

A3.1 *5th Point Re-Rate Example.* AHRI selects the 5th point at 70% Load and 80°F condenser entering water temperature for a discrete unloading chiller. The Participant’s selection rating software generates performance at these conditions. The chiller is tested at 60% Load and 80% Load, and interpolation is used to calculate the performance at 70% Load. The test fails at 8% below rated efficiency, and the Participant decides to re-rate.

The Participant selects four (4) additional test points as shown in Figure A1. Efficiency at all four points passes, so no further testing is required. The Participant chooses to use interpolation to determine four (4) additional intermediate points that pass, and these points are used to determine the re-rate boundary. The re-rate must be applied to reduce efficiency within the entire shaded region by 8%.

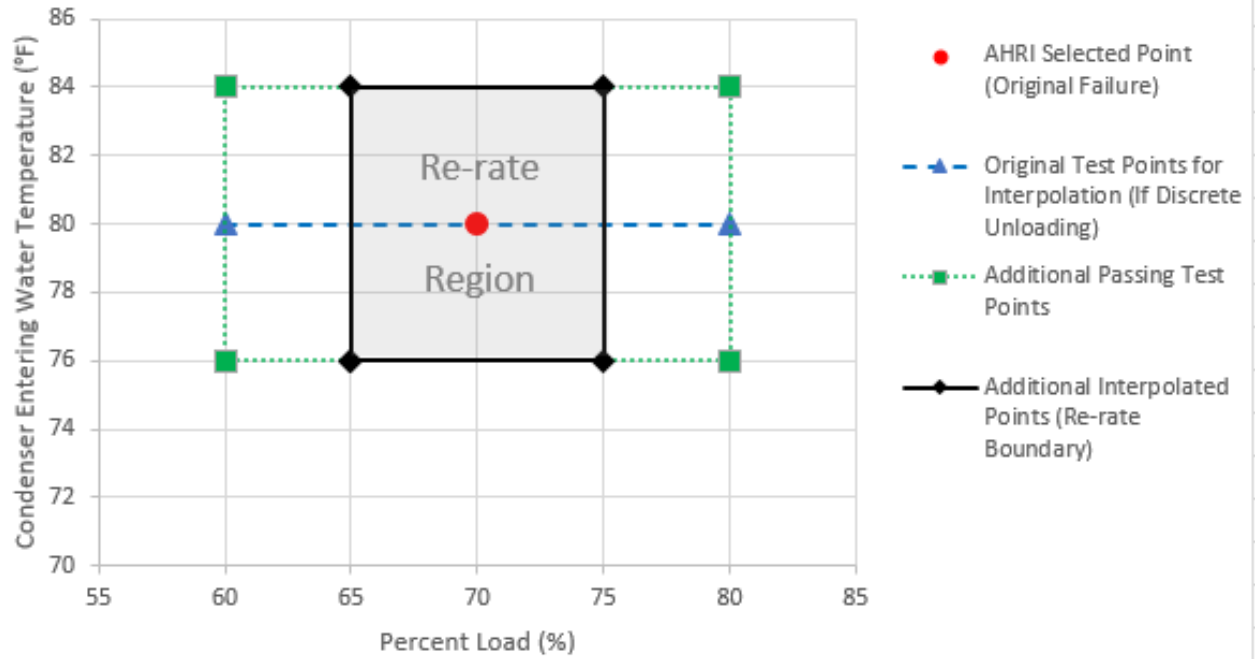


Figure A1: Example of 5th Point Re-rate

APPENDIX B: CERTIFICATION STATEMENT FLOWCHART

