

OPERATIONS MANUAL

VARIABLE FREQUENCY DRIVES CERTIFICATION PROGRAM



AHRI VFD OM – DECEMBER 2019

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PREFACE

The following manual outlines the procedures and policies of the Performance Certification Program for Variable Frequency Drives (VFD) 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 VFD Certification Program by AHRI provides for independent verification of the VFD 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 VFD 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 VFD Operations Manual, January 2018.

CERTIFICATION OPERATIONS MANUAL FOR
VARIABLE FREQUENCY DRIVES

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1. Program Overview

1.1 Applicable Rating Standard. It is mandatory for program Participants to comply with the provisions of the latest edition of AHRI Standard 1210 (I-P), *Performance Rating of Variable Frequency Drives* (Standard). A copy of the Standard is available for download from the AHRI website, www.ahrinet.org.

1.2 Product Definition of Variable Frequency Drives (VFD). A power electronic device that regulates the speed of an alternating current (AC) motor by adjusting the frequency and the voltage of the electrical power supplied to the motor.

1.3 Program Scope. This program applies to VFDs, as defined in Section 1.2, and covered under the scope of the standard.

1.3.1 Program Scope Inclusions. This certification program includes only base VFDs which may be incorporated into other configurations, (i.e. bypasses, filters, enclosures) with the following specifications:

- Designed for use in the control of asynchronous induction motors in HVACR products only designated by the manufacturer;
- Found within a building that are low voltage (≤ 600 Volts) and drives that are stand alone; and
- Custom units – designated to have significantly different system efficiencies harmonic performance or motor stress.

1.3.2 Program Scope Exclusions. This certification program does not include:

- VFDs mechanically integrated into motors;
- Brushless DC motor controllers; and
- Motor Insulation Stress for 208 V VFDs.

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

1.5 Basic Model Groups (BMGs). A Participant's listing shall be grouped by BMG. A BMG is defined by voltage as listed in Table 1A of the Standard. A Participant may choose to further subdivide its products into additional BMGs to account for different drive technology platforms.

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 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.

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. 20% of an Applicant's BMGs shall be tested, with a minimum of two (2) models. Fractional numbers shall be rounded to the nearest whole number using traditional rounding methods.

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.

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 4, STEP 4.4.2 of the AHRI General Operations Manual for details regarding the first sample qualification failure options:

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 qualification testing. PBM product certification is contingent upon the certification of the associated OEM product.

STEP 2.2.1 Certification Application Package. No further action beyond that listed in Section 5, STEP 5.1, the AHRI General Operations Manual.

STEP 2.2.2 Processing Application Package.

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

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

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

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

3. Equipment Selection and Testing

3.1 Annual Testing Requirement. 20% of a Participant's BMGs shall be tested annually, with a minimum of two (2) models. Fractional numbers shall be rounded to the nearest whole number using traditional rounding methods. For example, 12 BMGs shall equal to two (2) tests and 13 BMGs shall equal to three (3) tests.

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. AHRI shall inform the Participant, in writing, of the sample(s) selected for test.

3.4 Methods for Acquiring Test Samples. AHRI or the Laboratory personnel shall make a Random Sample 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 Operations Manual.

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

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

- Drive System Efficiency, %;
- Motor Insulation Stress, peak V and rise time, μ sec; and
- Power Line Harmonics, total harmonic current distortion, %.

3.7 Test Failures.

3.7.1 Options Following 1st Sample Failure. When the Participant is notified of a first 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 proportionate to the failed test's results;
- Test second sample of the same model (sample must be available within the timeframe and procedure allotted in Section 3.4 following notification of decision to AHRI via Manufacturer's Decision Form [MDF]); or
- Obsolete the model, which also obsoletes all models within the same BMG.

3.7.2 Options Following 2nd 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 proportionate to the failed test's results; or
- Obsolete the model, which also obsoletes all models within the corresponding BMG.

4. Challenge Tests

Refer to Section 10 of the AHRI General Operations Manual.

5. AHRI Directory of Certified Product Performance

All certified products shall be listed in the Directory, www.ahridirectory.org. 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);
- Voltage, V;
- Drive Rated Motor Output Power, hp;
- Enclosure Type;
- Drive System Efficiency, %;
- Motor Insulation Stress, peak V and rise time, μ sec;
- Power Line Harmonics, %;
- Carrier Switching Frequency, defined as Fixed at _kHz, Dynamic between _kHz minimum and _kHz Maximum Hz; and
- Volts/Hz (V/f ratio), defined as Linear, Squared, Dynamic in Energy Saving Mode.

5.2 Data Forms. Each Participant shall list its 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

Refer to Section 12 of the AHRI General Operations Manual.

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

Refer to Section 15 of the AHRI General Operations Manual.

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

Refer to Section 8 of the AHRI General Operations Manual.