NOTE: This standard has been consolidated into AHRI Standard 540-2020

AHRI Standard 545

2017 Standard for

Performance Rating of Modulating Positive Displacement Refrigerant Compressors

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NOTE: This standard has been consolidated into AHRI Standard 540-2020

IMPORTANT

SAFETY RECOMMENDATIONS

AHRI does not set safety standards and does not certify or guarantee the safety of any products, components or systems designed, tested, rated, installed or operated in accordance with this standard/guideline. It is strongly recommended that products be designed, constructed, assembled, installed and operated in accordance with nationally recognized safety standards and code requirements appropriate for products covered by this standard/guideline.

AHRI uses its best efforts to develop standards/guidelines employing state-of-the-art and accepted industry practices. AHRI does not certify or guarantee that any tests conducted under its standards/guidelines will be non-hazardous or free from risk.

Notes:

This is a new standard.

As stated in the scope, compressors falling in the scope of other standards such as ammonia compressors (AHRI Standard 510) and carbon dioxide compressors (AHRI Standard 570) are not included in this scope even though these compressors often have modulating capabilities. It is the intent that the future standards will be harmonized and thus it will be possible to rate ammonia and carbon dioxide Modulating Compressors.

It is the responsibility of the user to select its preferred units of measure.

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PERFORMANCE RATING OF MODULATING POSITIVE DISPLACEMENT REFRIGERANT COMPRESSORS

Section 1. Purpose

1.1 Purpose. The purpose of this standard is to establish, for Modulating Positive Displacement Refrigerant Compressors (Modulating Compressors): definitions, test requirements, rating requirements, minimum data requirements for Published Ratings, operating requirements, marking and nameplate data, and conformance conditions.

1.1.1 *Intent.* This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users. The standard defines the minimum amount of information, in a standard form to enable the evaluation and comparison of different Modulating Compressors for use in a particular application.

1.1.2 *Review and Amendment*. This standard is subject to review and amendment as technology advances.

Section 2. Scope

2.1 *Scope.* This standard applies to Modulating Compressors operating in subcritical applications including Discrete Modulating Compressors and Continuous Modulating Compressors. This standard also applies to the presentation of performance data for Modulating Compressors for air-cooled, evaporative-cooled or water-cooled air-conditioning, heat pump and refrigeration applications.

2.2 *Exclusions*.

2.2.1 This standard does not apply to compressors employing ammonia, as defined in ANSI/AHRI Standard 510.

2.2.2 This standard does not apply to compressors employing carbon dioxide in subcritical and transcritical applications, as defined in ANSI/AHRI Standard 570 (I-P) and ANSI/AHRI Standard 571 (SI).

2.2.3 This standard does not apply to fixed displacement refrigerant mass flow compressors as defined in CAN/ANSI/AHRI Standard 540.

2.2.4 This standard does not apply to compressors intended for use in:

2.2.4.1 Household refrigerators and freezers
2.2.4.2 Automotive air-conditioners
2.2.4.3 Dehumidifiers
2.2.4.4 Industrial products other than heating and cooling

2.2.5 This standard does not apply to capacity modulation achieved using multiple compressors.

2.2.6 This standard does not apply to compressors utilizing vapor injection for the purpose of subcooling to gain capacity.

2.2.7 This standard does not apply to Modulating Compressor operation above the Maximum Step or below the Minimum Step.

Section 3. Definitions

All terms in this document will follow the standard industry definitions in the *ASHRAE Terminology* website (https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology) unless otherwise defined in CAN/ANSI/AHRI Standard 540 or this section. Where the same term is defined in CAN/ANSI/AHRI Standard 540 and this section, the definition in this section shall be used.

3.1 *Batch of Compressors*. A number of compressors intended to perform the same function, produced in quantity, manufactured to the same technical specifications and characterized by the same Published Rating.

3.2 *Displacement Capacity.* Volumetric flow rate through the compressor expressed in ft^3/min, m^3/sec.

3.3 *Modulating Positive Displacement Refrigerant Compressor (Modulating Compressor).* A compressor as defined in CAN/ANSI/AHRI Standard 540, including open type, hermetic, and semi-hermetic that have the ability to vary Displacement Capacity.

3.3.1 *Continuous Modulating Compressor.* A compressor with more than four (4) Displacement Capacities or variable Displacement Capacities. This includes but is not limited to variable speed, continuously variable mechanical unloading, or pulse width modulation of discrete unloading Steps.

3.3.2 *Discrete Modulating Compressor.* A compressor with two (2) to four (4) discrete Displacement Capacities.

3.4 *Power Input.* The time rate of energy usage of the Modulating Compressor (compressor power) plus any accessories required to sustain operation of the compressor at the Rating Condition. If accessories are not included, it shall be explicitly stated.

3.5 *Published Rating.* A statement of the assigned values of those performance characteristics, under stated operating conditions, by which a unit may be chosen to fit its application. These values apply to all units of like nominal size and type (identification) produced by the same manufacturer. For a Batch of Compressors, the Published Rating shall represent the expected average value for the Batch of Compressors.

Refer to Section 6 for minimum data requirements for published ratings.

3.6 *Rating Condition*. Any set of operating conditions under which a single level of performance results and which cause only that level of performance to occur.

3.7 *Refrigerating Capacity*. The capacity associated with the increase in total enthalpy between the refrigerant entering the evaporator and the superheated return gas entering the Modulating Compressor. Parasitic heat transfer effects shall not be included in the calculation of Refrigerating Capacity, Btu/h, W.

3.7.1 *Maximum Capacity*. The rated Refrigerating Capacity of the Modulating Compressor operating at the Maximum Step for a manufacturer defined Rating Condition, expressed in Btu/h, W.

3.7.2 *Minimum Capacity*. The rated Refrigerating Capacity of the Modulating Compressor operating at the Minimum Step for a manufacturer defined Rating Condition, expressed in Btu/h, W.

3.7.3 *% Capacity.* A percentage of the Maximum Capacity based on specific operating conditions at a specific Step (Maximum Capacity is 100% capacity).

3.8 *Step.* A level of modulation achieved by changing the Displacement Capacity not limited to the examples listed below:

3.8.1 *Step Method*

3.8.1.1 Compressor operating frequency, Hz
3.8.1.2 Compressor speed, RPM
3.8.1.3 Mechanical unloading setting (fixed or time weighted average) (%). Note: This "%" is a representation or name of the Step and not necessarily an actual % in capacity.
3.8.1.4 VFD frequency, Hz

3.8.2 *Maximum Step*. The Step producing the highest Displacement Capacity of the Modulating Compressor for a manufacturer defined Rating Condition.

3.8.3 *Minimum Step*. The Step producing the lowest Displacement Capacity of the Modulating Compressor for a manufacturer defined Rating Condition.

3.9 *"Shall"* or *"Should," shall be interpreted as follows:*

3.9.1 *Shall.* Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

3.9.2 *Should.* "Should" is used to indicate provisions which are not mandatory, but which are desirable as good practice.

3.10 *Variable Frequency Drive (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.

Section 4. Test Requirements

4.1 *Test Requirements*. All Published Ratings shall be verified by tests conducted in accordance with ANSI/ASHRAE Standard 23.1 unless otherwise defined in CAN/ANSI/AHRI Standard 540 or this section.

4.1.1 *Power Input.* For hermetic or semi-hermetic Modulating Compressors with a factory integrated or factory specified VFD, the Power Input is measured at the VFD input terminals.

4.1.2 *Measurements of Pulse Width Modulation of Two (2) Discrete Unloading Steps.* For measurements taken during pulse width modulation of two (2) discrete unloading Steps, a minimum of three (3) sets of measurements shall be taken, each with a constant measurement rate fast enough to include not less than five (5) measurements during the shortest load Step of the Modulating Compressor's modulation cycle, for not less than thirty (30) cycles. Time intervals between individual measurements shall not vary more than ±5% from the average time interval for all measurements.

The individual measurements are averaged together to form an averaged measurement set. The variation of each averaged measurement set shall not differ from the test measurement value by more than ±2% (see Equation 8). The average of all measurements shall be used as the reported test measurement value. See Equations 1 to 8 and Figure 1 for mathematical and graphical representation of Section 4.1.2 requirements.

$$T_{cycle} = T_{Step1} + T_{Step2} \quad (1)$$

$$T_{Step1} \leq T_{Step2} \quad (2)$$

$$t_{sample} < \frac{T_{Step1}}{5} \quad (3)$$

$$n_{sample} = \frac{T_{cycle}}{t_{sample}} \quad (4)$$

$$n = n_{sample} \times n_{cycles} \quad (5)$$

$$\bar{x}_{set_k} = \frac{1}{n}\sum_{i=1}^{n} x_i \quad (6)$$

$$\bar{X}_{value} = \frac{1}{k}\sum_{i=1}^{k} \bar{x}_{Set_k} \quad (7)$$

$$abs\left|\frac{(\bar{x}_{set} - \bar{X}_{value})}{\bar{X}_{value}}\right| \leq 2\% \quad (8)$$

Where:

k = Number of sets
n_{cycles} = Number of cycles
n_{sample} = Number of samples taken in a single cycle
T_{Cycle} = Total cycle time, s

t_{sample} = Sample interval time, s
T_{Step1} = Total operating time at Step #1, s
T_{Step2} = Total operating time at Step #2, s
x_i = Individual measurement
$\bar{x}_{Set_k}$ = Average of all individual measurements across *k* cycles ($k \geq 3$)
$\bar{X}_{Value}$ = Grand average of all $\bar{x}_{Set}$ across a minimum of three (3) $\bar{x}_{Set}$

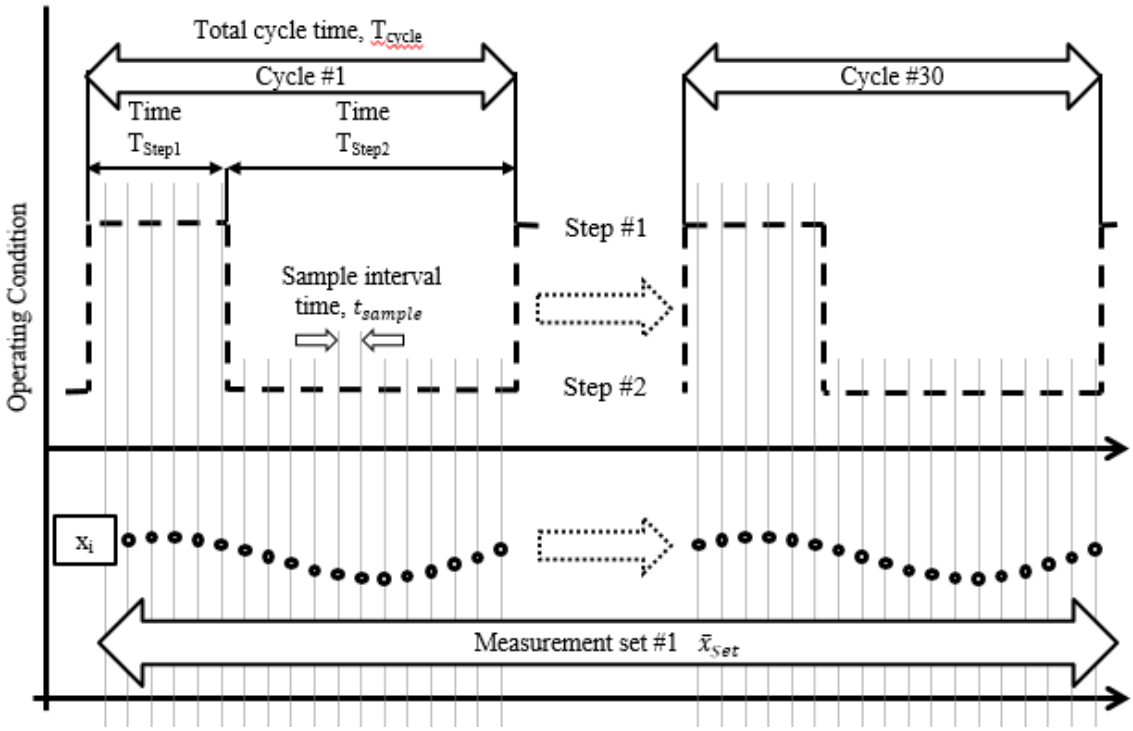

Figure 1. Measurements of Pulse Width Modulation of Two (2) Discrete Unloading Steps

Section 5. Rating Requirements

5.1 *Published Ratings.* The Published Ratings of the Modulating Compressor shall consist of the following individual ratings. Each individual rating shall be comprised of a set of individual Published Ratings of the Modulating Compressor at unique Steps that follow the requirements of Section 5 of CAN/ANSI/AHRI Standard 540. The number of individual Steps to comprise each set is specified in Section 5.2.

5.1.1 Power Input, W, W
5.1.2 Refrigerant Mass Flow Rate, lbm/h, kg/s
5.1.3 Refrigerating Capacity, Btu/h, W

5.2 *Number of Published Ratings Requirements*

5.2.1 *Discrete Modulating Compressor*

Published Ratings of Discrete Modulating Compressors shall be provided at every discrete Step to comprise each set of individual ratings. All of the discrete Steps of the Modulating Compressor shall be included in the Published Ratings of the Modulating Compressor unless the number of Steps can be satisfied by the requirements in the continuous modulation section (Section 5.2.2).

5.2.2 *Continuous Modulating Compressor*

Published Ratings of Continuous Modulating Compressors shall be provided per the following requirements to comprise each set of individual ratings.

5.2.2.1 A Published Rating of the Modulating Compressor at the Maximum Step.
5.2.2.2 A Published Rating of the Modulating Compressor at the Minimum Step.
5.2.2.3 If the Minimum Capacity is greater than or equal to 40% of the Maximum Capacity, at least one Published Rating of the Modulating Compressor at an evenly spaced Step (or Steps) between the Maximum and Minimum Capacity for a manufacturer defined Rating Condition.
5.2.2.4 If the Minimum Capacity is less than 40% of the Maximum Capacity, at least two Published Ratings of the Modulating Compressor at evenly spaced Steps between the Maximum and Minimum Capacity for a manufacturer defined Rating Condition.
5.2.2.5 Each Step shall be evenly spaced between the Maximum and Minimum Capacity within +/- 5% for a manufacturer defined Rating Condition.

5.3 *Uncertainties of Published Ratings.* Uncertainties shall follow the requirements of CAN/ANSI/AHRI Standard 540, Sections 5.4 to 5.7 with the following modification to Table 3 of CAN/ANSI/AHRI Standard 540 as shown in Table 1 below.

Table 1. Rating Uncertainty Limits for the Verification of Published Ratings

Published Rating	Region 1	Region 2	Region 3
Refrigerant Mass Flow Rate, lbm/hr, kg/s	Minimum of -0.0625 · % Capacity + 16.25%	Minimum of -0.0625 · % Capacity + 13.75%	Minimum of -0.0625 · % Capacity + 11.25%
Refrigerating Capacity, Btu/h, W			
Maximum Power Input, W, W	Maximum of -0.0625 · % Capacity + 16.25%	Maximum of -0.0625 · % Capacity + 13.75%	Maximum of -0.0625 · % Capacity + 11.25%

Figure 2 is a graphical representation of the related uncertainty equation for Refrigerant Mass Flow Rate, Refrigerating Capacity and maximum Power Input as noted in Table 1.

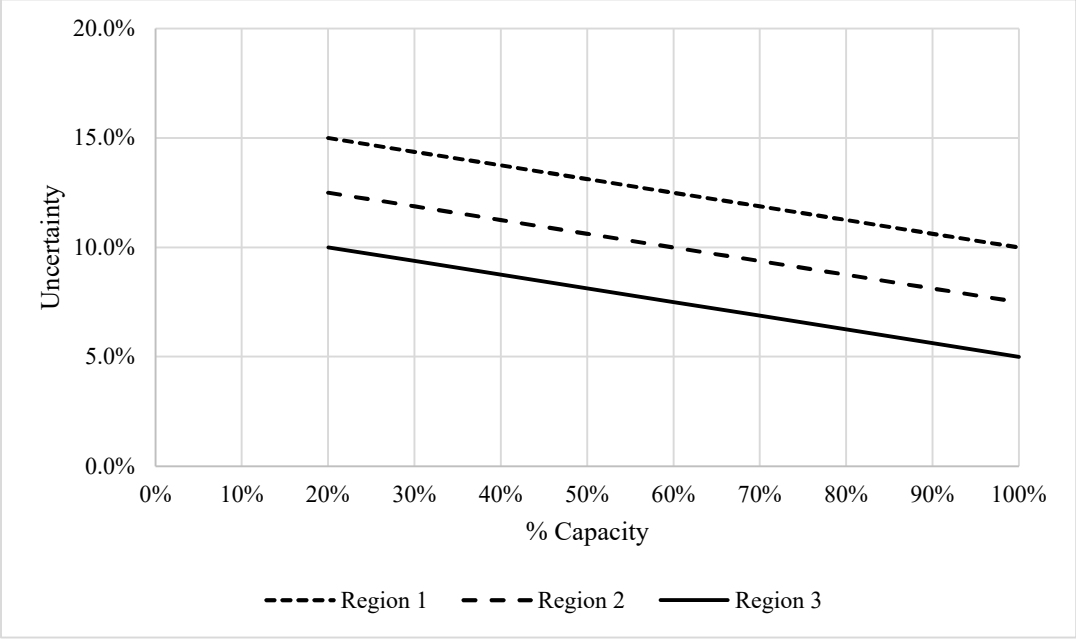

Figure 2. Rating Uncertainty Limits for the Verification of Published Ratings

Section 6. Minimum Data Requirements for Published Ratings

6.1 *Minimum Data Requirements for Published Ratings.* The manufacturer is solely responsible for the determination of values to be used in published product information. As a minimum, Published Ratings shall include:

6.1.1 The performance data per Step required by Section 6.1 of CAN/ANSI/AHRI Standard 540.
6.1.2 The performance data per Step required by Section 6.2 of CAN/ANSI/AHRI Standard 540 if tabular data is published.
6.1.3 VFD part number if VFD power is included in ratings and not shipped with the Modulating Compressor.
6.1.4 Step for the level of modulation achieved as described in Section 5.2
6.1.5 Step Method (how the compressor is modulated)
6.1.6 If Published Ratings include the power of the VFD and are established with additional cooling means, or an ambient temperature other than defined in Section 4, the details of the cooling fluid, fluid flow rate and entering fluid temperature cooling the drive shall be stated by the manufacturer.
6.1.7 Additional data as required by Section 4.

6.2 *Superheat Corrections.* Refer to CAN/ANSI/AHRI Standard 540, Appendix D for suggested superheat correction methodology.

6.3 *Claims to Ratings.* All claims to ratings within the scope of this standard shall include the statement "Rated in accordance with AHRI Standard 545". All claims to ratings outside the scope of this standard shall include the statement "Outside the scope of AHRI Standard 545". Wherever ratings are published or printed, they shall include a statement of the conditions at which the ratings apply.

Section 7. Operating Requirements

7.1 *Loading Requirements*. The Modulating Compressor shall be capable of operating continuously at all operating points in the published operating envelope for a minimum period of two hours at the minimum and maximum utilization voltage as described in ANSI/AHRI Standard 110, Table 1.

Section 8. Marking and Nameplate Data

8.1 *Modulating Compressor Nameplate Marking*. As a minimum, each Modulating Compressor shall have a nameplate, affixed on which the following information shall be marked:

8.1.1 Modulating Compressor manufacturer's name and/or symbol
8.1.2 Modulating Compressor model number
8.1.3 Electrical Information
8.1.3.1 Input voltage, V
8.1.3.2 Phase
8.1.3.3 Frequency, Hz

Nameplate voltages for 60 Hertz systems shall include one or more of the utilization voltages specified in Table 1 of ANSI/AHRI Standard 110. Nameplate voltages for 50 Hertz systems shall include one or more of the equipment nameplate voltages specified in Table 1 of IEC Standard 60038.

Section 9. Conformance Conditions

9.1 *Conformance*. While conformance with this standard is voluntary, conformance shall not be claimed or implied for products or equipment within the standard's Purpose (Section 1) and Scope (Section 2) unless such product claims meet all of the requirements of the standard and all of the testing and rating requirements are measured and reported in complete compliance with the standard. Any product that has not met all the requirements of the standard shall not reference, state, or acknowledge the standard in any written, oral, or electronic communication.

APPENDIX A. REFERENCES - NORMATIVE

A1 Listed here are all standards, handbooks, and other publications essential to the formation and implementation of the standard. All references in this appendix are considered as part of the standard.

A1.1 ANSI/AHRI Standard 110-2016, *Air-Conditioning, Heating, and Refrigerating Equipment Nameplate Voltages,* 2016, Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, U.S.A.

A1.2 ANSI/AHRI Standard 510-2006, *Performance Rating of Positive Displacement Ammonia Compressors and Compressor Units*, 2006, Air- Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, U.S.A.

A1.5 CAN/ANSI/AHRI Standard 540-2015, *Performance Rating of Positive Displacement Refrigerant Compressors and Compressor Units*, 2015, Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, U.S.A.

A1.2 ANSI/AHRI Standard 570 (I-P)-2012, *Performance Rating of Positive Displacement Carbon Dioxide Refrigerant Compressors and Compressor Units*, 2012, Air- Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, U.S.A.

A1.3 ANSI/AHRI Standard 571 (SI)-2012, *Performance Rating of Positive Displacement Carbon Dioxide Refrigerant Compressors and Compressor Units*, 2012, Air- Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, U.S.A.

A1.4 ANSI/ASHRAE Standard 23.1-2010, *Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units That Operate at Subcritical Temperatures*, 2010, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle N.E., Atlanta, GA 30329, U.S.A.

A1.6 ASHRAE *Terminology,* https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology, 2015, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle, N.E., Atlanta, GA 30329, U.S.A

A1.7 IEC 60338:2009, *IEC Standard Voltages,* International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, 1211 Geneva 20, Switzerland.

APPENDIX B. REFERENCES – INFORMATIVE

B1 Listed here are all standards, handbooks, and other publications not essential to the formation and implementation of the standard and intended for referenced only.

B1.1 ISO 3951:2013, *Sampling procedures for inspection by variables,* International Organization for Standardization, Case Postale 56, CH-1211, Geneva 21 Switzerland.

B1.2 ISO 3534 Parts 1-4:2006, *Statistics — Vocabulary and symbols,* International Organization for Standardization, Case Postale 56, CH-1211, Geneva 21 Switzerland.

B1.3 ISO 7574:1985, *Statistical methods for determining and verifying stated noise emission values of machinery and equipment,* International Organization for Standardization, Case Postale 56, CH-1211, Geneva 21 Switzerland.

APPENDIX C. VERIFICATION OF PUBLISHED RATINGS FOR BATCHES OF COMPRESSORS – INFORMATIVE

C1 *General Discussion*. To characterize the performance of a Batch of Compressors, it is necessary to provide an estimate of the average performance for the Batch of Compressors and to also provide information on the uncertainty that can be expected. The uncertainty is the result of a number of factors that include manufacturing/product tolerances, testing procedures, instrument accuracies, random variation during testing in a given lab and random variation between different testing locations. In this standard, additional uncertainty is introduced when using a regression model to represent the performance over the entire operating envelop using a curve fit of a limited set of data.

The total uncertainty is generally assumed to follow a normal distribution and can therefore be described in terms of a total standard deviation or the percentage of the Batch of Compressors that falls within a specified uncertainty limit. Historically, this standard has not addressed the verification for a Batch of Compressors explicitly as it has not provided specific expectations or guidance regarding the interpretation of the Published Ratings relative to the average value for the Batch of Compressors and the total standard deviation for the Batch of Compressors. Very accurate estimates of the average values and standard deviations for a Batch of Compressors over an operating envelop can be difficult, time consuming, and expensive to obtain and so the verification process should represent a reasonable balance between the accuracy of the Published Ratings and the cost to develop them. The purpose of this appendix is to provide additional information and a proposed method to verify Published Ratings for a Batch of Compressors.

C2 *Verification Requirements*. The Published Ratings provide an estimate of the average value for the Batch of Compressors. The uncertainty is represented by a normal distribution and expressed in terms of a total standard deviation and is quantified by specifying the portion of the Batch of Compressors which is expected to be within the uncertainty limit. To verify the Published Ratings, verification test results should meet the acceptability requirements shown in Sections C5 and C6. This standard uses the verification process described in ISO 7574 which is based on information from ISO 3951 and ISO 3534. There are two cases to be considered when verifying Published Ratings for a Batch of Compressors. In the first case, the product design is complex and/or product production volume is small so testing of multiple samples may not be practicable. For this case, published data will be verified using a single sample. In the second case, the product design is reasonably simple and production volumes are reasonably large so that the testing of multiple samples is practicable. For this case, published ratings will be verified using a sample size of three.

C3 *Rating Uncertainties*. For verification purposes, it is necessary to specify both an uncertainty limit and the size of the portion that can be expected to fall within the limit. The uncertainty limits are given in Table C1 and for this standard it is assumed that 95% of the Batch of Compressors will fall within these limits. Given the uncertainty limit, the size of the portion of the Batch of Compressors within the limit, and the distribution, it is possible to calculate the corresponding total standard deviation which is given in Table C2. The total standard deviation includes all of the uncertainties listed above. The actual product performance may or may not match the assumption used in the verification process. To the extent that a manufacturer's product performs at a level equal to or better than the assumptions made in the standard then the risk to the manufacturer and consumer will be equal to or less than the risks defined in the standard. To the extent that the product performs at a level worse than the assumptions made in this standard, then the risks will be higher. The actual level of performance required by a particular customer for a particular application is the responsibility of the manufacturer and customer. This allows the manufacturer and customer to properly balance the cost and effort to develop the published information with the actual requirements for a given application.

Table C1. Rating Uncertainty Limits for the Verification of Published Ratings of a Batch of Compressors

Published Rating	Region 1	Region 2	Region 3
Minimum Refrigerant Mass Flow Rate, lbm/h, kg/s	90%	92.5%	95%
Minimum Refrigerating Capacity, Btu/h, W	90%	92.5%	95%
Maximum Power Input, W, W	110%	107.5%	105%

Table C2. Total Standard Deviations Associated with the Rating Uncertainty Limits for the Verification of Published Ratings of a Batch of Compressors	
Uncertainty Limit	Total Standard Deviation
5%	3.0
7.5%	4.6
10%	6.1

C4 *Verification Risk*. A statistically based sampling approach requires the definition of a level of risk or confidence level. The verification process is based on a 95% probability of acceptance of the verification test, if no more than 6.5% of values are outside of the appropriate uncertainty limit.

C5 *Verification for a Batch of Compressors Using a Single Compressor*. Determine the measured performance value V_m in accordance with Section 4. If V_m is within the acceptance criteria given in Table C3, the Published Rating is verified. Note that for this case with a sample size of one, the acceptance criteria is equivalent to the uncertainty limits given in Table C1.

Table C3. Acceptance Criteria for the Verification of Published Ratings Using a Sample Size of 1			
Published Rating	Region 1	Region 2	Region 3
Minimum Refrigerant Mass Flow Rate, lbm/h, kg/s	90%	92.5%	95%
Minimum Refrigerating Capacity, Btu/h, W	90%	92.5%	95%
Maximum Power Input, W, W	110%	107.5%	105%

C6 *Verification for a Batch of Compressors Using a Sample Size of 3*. A sample size of n=3 is taken at random from the Batch of Compressors. The measured performance values V_i are determined in accordance with Section 4 and the average value for the sample is calculated using Equation C1.

$$V_{avg} = \frac{1}{n} \sum_{i=1}^{n} V_i \quad \text{C1}$$

Where:

i = Counter
n = Sample size
V_{avg} = Average performance value
V_i = Measured performance value for sample i

If V_{avg} is within the acceptance criteria for the average of three samples as given in Table C4, the Published Rating is verified. Note that for this case when the sample size is larger than one, the acceptance criteria is less than the uncertainty limit as given in Table C1. This is a reflection of the fact that you have a better estimate of the average value with the larger sample size and so for the same risk of passing the verification test, the average value for the larger sample should be closer to the Published Rating.

Table C4. Acceptance Criteria for the Verification of Published Ratings Using a Sample Size of 3			
Published Rating	Region 1	Region 2	Region 3
Minimum Refrigerant Mass Flow Rate, lbm/hr, kg/s	94.5%	95.5%	97.0%
Minimum Refrigerating Capacity, Btu/h, W	94.5%	95.5%	97.0%
Maximum Power Input, W, W	105.5%	104.5%	103.0%

C7 *Examples.*

C7.1 *Example 1 (I-P).*

A Batch of Compressors has a published value for Power Input of 3000 W at -25/105 °F.

A single compressor is selected for verification and tested at -25/105° as outlined in Section 4. The tested value is 3225 W. The ratio of the tested value to the published value is 107.5%. For this case, the published value is verified.

Three compressors are selected for verification and tested at -25/105°F as outlined in Section 4. The tested values are 3225 W, 3100 W, and 3270 W respectively. The average for the three samples is 3198 W. The ratio of the average value to the published value is 106.6%. For this case the published value is not verified.

C7.2 *Example 2 (SI).*

A Batch of Compressors has a published Refrigerating Capacity of 8,200 W at 10/46 °C.

A single compressor is selected for verification and tested at 10/46 °C as outlined in Section 4. The tested value is 7,878 W. The ratio of the tested value to the published value is 96.1%. For this case, the published value is verified.

Three compressors are selected and tested at 10/46 °C as outlined in Section 4. The tested values are 7,878 W, 8,294 W, and 7,913 W respectively. The average for the three samples is 8,028 W. The ratio of the average value to the published value is 97.9%. For this case the published value is verified.