ANSI/AHRI Standard 365 (I-P)

2009 Standard for

Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units

Approved American National Standard
ANSI

AHRI Air-Conditioning, Heating, and Refrigeration Institute

2111 Wilson Boulevard, Suite 500
Arlington, VA 22201, USA
www.ahrinet.org

PH 703.524.8800
FX 703.562.1942

Approved by ANSI on 4 January 2011

AVA Documents
Document Sharing Hub

Full document details: AHRI Standard 365-2009 (I-P) - Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units

IMPORTANT

SAFETY DISCLAIMER

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 the standards/guidelines will not be non-hazardous or free from risk.

AHRI CERTIFICATION PROGRAM PROVISIONS

Scope of the Certification Program

The Certification Program includes Commercial and Industrial Unitary Air-Conditioning Condensing Units rated at or above 135,000 Btu/h but below 250,000 Btu/h at the AHRI Standard Rating Conditions (Cooling).

Certified Ratings

The following Certification Program ratings are verified by test:

1. Single Number Rating Cooling Capacity, Btu/h
2. Single Number Rating Energy Efficiency Ratio, EER, Btu/(W·h)
3. Integrated Energy Efficiency Ratio, IEER (effective January 1, 2010) or Integrated Part-Load Value, (IPLV) (effective through December 31, 2009)

Conformance to the requirements of the Maximum Operating Conditions Tests (Section 8) is also verified by test.

Note:

This standard supersedes ARI Standard 365-2002.
For SI ratings, see ANSI/AHRI Standard 366 (SI)-2009.

Price $15.00 (M) $30.00 (NM)
Printed in U.S.A.

© Copyright 2009, by Air-Conditioning, Heating, and Refrigeration Institute
Registered United States Patent and Trademark Office

Document Sharing Hub

Full document details: AHRI Standard 365-2009 (I-P) - Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units

TABLE OF CONTENTS

PAGE

Section 1. Purpose 1

Section 2. Scope 1

Section 3. Definitions 1

Section 4. Classifications 2

Section 5. Test Requirements 2

Section 6. Rating Requirements 3

Section 7. Minimum Data Requirements for Published Ratings 8

Section 8. Operating Requirements 8

Section 9. Marking and Nameplate Data 9

Section 10. Conformance Conditions 9

TABLES

Table 1. Classifications of Commercial and Industrial Air-Conditioning Condensing Units 2

Table 2. Standard Rating Conditions 3

Table 3. IEER Part-Load Rating Conditions 5

APPENDICES

Appendix A. References - Normative 10

Appendix B. References - Informative 10

Appendix C. Method and Example of Calculating Integrated Part-Load Values (IPLV) – Normative 11

Documents
Document Sharing Hub

Full document details: AHRI Standard 365-2009 (I-P) - Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units

PERFORMANCE RATING OF COMMERCIAL AND INDUSTRIAL UNITARY AIR-CONDITIONING CONDENSING UNITS

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish for Commercial and Industrial Unitary Air-Conditioning Condensing Units: definitions; classifications; 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.

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 factory-made Commercial and Industrial Unitary Air-Conditioning Condensing Units greater than or equal to 135,000 Btu/h as defined in Section 3.

2.1.1 *Energy Source.* This standard applies only to electrically-driven, mechanical compression-type condensing units.

2.2 *Exclusions.* This standard does not apply to the testing and rating of condensing units for refrigeration purposes, as defined in AHRI Standard 520.

Section 3. Definitions

All terms in this document shall follow the standard industry definitions in the current edition of ASHRAE *Terminology of Heating, Ventilation, Air-Conditioning and Refrigeration* unless otherwise defined in this section.

3.1 *Bubble Point.* Refrigerant liquid saturation temperature at a specified pressure.

3.2 *Commercial and Industrial Unitary Air-Conditioning Condensing Unit.* A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. It consists of one or more refrigerant compressors, refrigerant condensers (air-cooled, evaporatively – cooled, and/or water-cooled), condenser fans and motors (where used) and factory-supplied accessories.

3.3 *Cooling Capacity.* The capacity in Btu/h obtained at specific conditions. It is equal to the increase in total enthalpy between the liquid refrigerant entering the expansion valve and superheated return gas multiplied by the mass flow rate of the refrigerant.

3.4 *Dew Point.* Refrigerant vapor saturation temperature at a specified pressure.

3.5 *Energy Efficiency Ratio (EER).* A ratio of the Cooling Capacity in Btu/h to the power input values in watts at any given set of Rating Conditions expressed in Btu/(W·h).

3.6 *Integrated Energy Efficiency Rating (IEER).* A single number part-load efficiency figure of merit calculated per the method described in this standard.

3.7 *Integrated Part-Load Value (IPLV).* A single number cooling part-load figure of merit calculated per the method described in Appendix C.

Documents
Document Sharing Hub
Full document details: AHRI Standard 365-2009 (I-P) - Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units

3.8 *Published Rating.* A statement of the assigned values of those performance characteristics, under stated Rating 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. As used herein, the term Published Rating includes the rating of all performance characteristics shown on the unit or published in specifications, advertising, or other literature controlled by the manufacturer, at stated Rating Conditions.

3.8.1 *Application Rating.* A rating based on tests performed at application Rating Conditions (other than Standard Rating Conditions).

3.8.2 *Standard Rating.* A rating based on tests performed at Standard Rating Conditions.

3.9 *Rating Conditions.* Any set of operating conditions under which a single level of performance results and which causes only that level of performance to occur.

3.9.1 *Standard Rating Conditions.* Rating Conditions used as the basis of comparison for performance characteristics.

3.10 *"Shall" or "Should."* "Shall" or "should" shall be interpreted as follows:

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

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

3.11 *Single Number Rating*. The Cooling Capacity and EER determined by the results of the tests at Rating Condition No. 1 for air-cooled and evaporatively-cooled condensing units and at Rating Condition No. 3 for water-cooled condensing units (Section 6).

Section 4. Classifications

Equipment covered within the scope of this standard shall be classified as shown in Table 1:

Table 1. Classifications of Commercial and Industrial Air-Conditioning Condensing Units

Designation	AHRI Type	Condenser Type	Arrangement
Remote Condensing Unit (RCU)	RCU-A	Air	COMP COND
	RCU-E	Evaporatively	
	RCU-W	Water	

Section 5. Test Requirements

5.1 *Test Requirements.* All Standard Ratings shall be verified by tests conducted in accordance with ANSI/ASHRAE Standard 23 and with the test methods and procedures as described in this standard.

Documents
Document Sharing Hub
Full document details: AHRI Standard 365-2009 (I-P) - Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units

5.1.1 An alternate method of verification may be by tests conducted in accordance with ANSI/ASHRAE Standard 37 provided that the suction dew point temperature and the return gas temperature are determined from the procedures in this standard.

Section 6. Rating Requirements

6.1 *Standard Ratings.* Published Ratings shall be obtained at one or more of the Standard Rating Conditions as shown in Table 2. Power input shall be the total power input to the compressor(s), fan(s), controls, and any other components included as part of the condensing unit.

Table 2. Standard Rating Conditions

Air- and Evaporatively-Cooled Condensing Units				
Rating Condition	Air Temperature Entering and Surrounding Unit		Refrigerant Temperature Entering Condensing Unit[1]	
	Dry-Bulb, °F	Wet-Bulb[2], °F	Suction Dew Point, °F	Return Gas, °F
1[3]	95.0	75.0	45.0	60.0
2	80.0	67.0	45.0	60.0
Water-Cooled Condensing Units				
Rating Condition	Water Temperature Entering, °F	Water Temperature Leaving, °F	Suction Dew Point, °F	Return Gas, °F
3[3]	85.0	95.0	45.0	60.0
4	75.0	Same water flow rate as established above.	45.0	60.0

Notes:

1) The liquid temperature and pressure leaving the condensing unit shall be reported by the manufacturer in its ratings.
2) Required for evaporatively-cooled condensing units only.
3) The Single Number Ratings are determined by the results of the tests at Rating Condition No. 1 or at Rating Condition No. 3.

6.1.1 *Values of Standard Cooling Capacity Ratings.* These ratings shall be expressed only in terms of thousands of Btu/h in multiples of 2,000 Btu/h for units with Standard Ratings of 400,000 Btu/h and under. For units with Standard Ratings of over 400,000 Btu/h, the ratings shall be expressed in multiples of 5,000 Btu/h.

6.1.2 *Values of Standard Efficiency Ratings.* EER, in Btu/(W·h), and IEER shall be expressed in multiples of 0.1.

6.1.3 *Single Number Ratings.* The reported values shall be determined by the results obtained at Rating Condition No. 1 or at Rating Condition No. 3.

6.1.4 *Electrical Conditions.* Standard Rating tests shall be performed at the nameplate rated voltage(s) and frequency.

For condensing units with dual nameplate voltage ratings, Standard Rating tests shall be performed at both voltages, or at the lower of the two voltages, if only a single Standard Rating is to be published.

6.1.5 *Condenser Airflow Rate.* All Standard Ratings for condensing units shall be determined at the condenser airflow rate specified by the manufacturer where the fan drive is adjustable. Where the fan drive is direct-connected, Standard Ratings shall be determined at the condenser airflow rate established when the condensing unit is operated with all of the associated inlet louvers and any duct work and attachments considered by the manufacturer as normal installation practice. Once established, the airflow circulation rate of the condensing unit shall remain unchanged throughout all tests prescribed herein, except as altered by automatic controls.

AVA Documents Document Sharing Hub

Full document details: AHRI Standard 365-2009 (I-P) - Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units