AHRI Standard 580

2014 Standard for

Performance Rating of Non-condensable Gas Purge Equipment For Use with Low Pressure Centrifugal Liquid Chillers

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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 its standards/guidelines will be non-hazardous or free from risk.

Note:

This standard supersedes AHRI Standard 580-2009.

AHRI CERTIFICATION PROGRAM PROVISIONS

Scope of the Certification Program

The Certification Program includes testing purge systems used in conjunction with Low Pressure Centrifugal Liquid Chillers.

Certified Ratings

The following Certification Program ratings are verified by test:

1. Concentration, ratio of mass of refrigerant to mass of air, g of refrigerant / g of air.

Price $10.00 (M) $20.00 (NM)
Printed in U.S.A.

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NON-CONDENSABLE GAS PURGE EQUIPMENT FOR USE WITH LOW PRESSURE CENTRIFUGAL LIQUID CHILLERS

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish for Non-condensable Gas Purge Equipment for use with Low Pressure Centrifugal Liquid Chillers: definitions; test requirements; rating requirements; minimum data requirements for Published Ratings; 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 Non-condensable Gas Purge Equipment for use with Low Pressure Centrifugal Liquid Chillers as defined in Section 3. This standard defines general equipment requirements, test methods and analysis techniques used to determine the performance rating for Purge Equipment that removes Non-condensable gases from Low Pressure Centrifugal Liquid Chillers. This purge equipment is typically used in conjunction with chillers which operate with at least a portion of the system below atmospheric pressure.

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 this section.

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

3.2 *Concentration.* Ratio of the mass of refrigerant to the mass of air at the Refrigerant Holding Capacity.

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

3.4 *Low Pressure Centrifugal Liquid Chiller*. A centrifugal liquid chiller that typically has a portion of the refrigerating system below atmospheric pressure (100 kPa) when operated at typical conditions for comfort cooling applications.

3.5 *Non-condensable Gases.* Gases, such as nitrogen and oxygen. which do not condense at normal operating temperatures and pressures in centrifugal water-chiller condensers.

3.6 *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.

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

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

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3.7 *Purge Equipment.* A device which will separate Non-condensable Gases from refrigerant and remove them from the refrigeration system.

3.7.1 *Automatically Regenerated Media*. Media that is recycled at the purge system to remove entrained refrigerant and return this refrigerant to the chiller. The regeneration process is initiated automatically by the purge control system**.**

3.7.2 *Manually Regenerated Media*. Media that is recycled at the purge system to remove entrained refrigerant and return this refrigerant to the chiller. The regeneration process is set up and initiated by an operator.

3.7.3 *Refrigerant Holding Capacity*. The amount of refrigerant, designated by the manufacturer, which the media can hold prior to being replaced or regenerated, g.

3.7.4 *Replaceable Media.* Media that is removed from the system and replaced with new or recycled media. The media from the system is processed to ensure refrigerant is not released to the atmosphere.

3.8 *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.

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

3.9 *"Shall"* or *"Should."* "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.

Section 4. Test Requirements

4.1 *Test Requirements*. Non-condensable Gas Purge Equipment shall be tested in accordance with the procedures set forth in Appendices C and D. Calculation of purge equipment concentration rating for the activated carbon method is described in Appendix E. Determination of discharge gas concentration using the gas chromatograph method is described in Appendix F. If alternative test methods are employed for the gas chromatograph method, the user must be able to demonstrate that they produce results at least equivalent to the specified testing method.

Section 5. Rating Requirements

5.1 *Purge Equipment Concentration Rating.* Purge Equipment exhaust gas concentration shall be expressed in g refrigerant / g air.

5.2 *Operating Conditions for Purge Equipment Rating.* The Purge Equipment efficiency rating point shall be established with a chiller operating at the following conditions:

5.2.1 Condenser refrigerant pressure at a nominal dew point temperature of 29°C ± 0.5°C. Allowable pressure limits during the test are equivalent to a dew point temperature range of 28 to 31°C.
5.2.2 Ambient temperature at 25°C ± 1.0°C
5.2.3 Evaporator refrigerant pressure at a Bubble Point temperature of 4.0°C or greater
5.2.4 For Purge Equipment designs that use adsorption or absorption devices to selectively separate refrigerant and air, these devices shall be brought to a normal operating condition prior to test. See Appendix D for specific rating and testing instructions. This may include saturating and then regenerating a device or bringing oil supplies to a typical refrigerant concentration.

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5.3 All tests shall be performed at the nameplate rated voltage and frequency or as otherwise specified in this standard. For 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.

5.4 *Tolerances.* If conformance with this standard is claimed for a Published Rating, then any Purge Equipment tested, following the procedures of Appendices C, D, E and F, shall not have an exhaust gas concentration greater than the Published Rating. If a Manually Regenerated or Replaceable Media is used, then the refrigerant exhaust gas concentration should not be greater than the Published Rating when the absorptive medium has been filled with the amount of refrigerant specified by the manufacturer as the Refrigerant Holding Capacity.

Section 6. Minimum Data Requirements for Published Ratings

6.1 *Minimum Data Requirements for Published Ratings*. As a minimum, Published Ratings shall include Standard Ratings. All claims to ratings within the scope of this standard shall include the statement "Rated in accordance with AHRI Standard 580". All claims to ratings outside the scope of this standard shall include the statement "Outside the scope of AHRI Standard 580". Wherever Application Ratings are published or printed, they shall include a statement of the conditions at which the ratings apply.

6.1.1 Published Ratings shall consist of the following information.

6.1.1 Concentration, g of refrigerant / g of air
6.1.2 Refrigerant Holding Capacity where applicable, g

Section 7. Marking and Nameplate Data

7.1 *Marking and Nameplate Data.* As a minimum, the nameplate shall display the manufacturer's name, model number, electrical characteristics and refrigerant designation(s).

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

Section 8. Conformance Conditions

8.1 *Conformance*. While conformance with this standard is voluntary, conformance shall not be claimed or implied for products or equipment within its *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.

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