ANSI/AHRI Standard 470-2006
(Formerly ARI Standard 470-2006)

2006 Standard for

Performance Rating of Desuperheater/Water Heaters

Approved American National Standard
ANSI

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Note:

This standard supersedes ARI Standard 470-2001.

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PERFORMANCE RATING OF DESUPERHEATER/WATER HEATERS

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish for Desuperheater/Water Heaters: 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 Desuperheater/Water Heaters supplied as separate components, as defined in Section 3 and using single component and azeotropic refrigerants only.

2.2 *Exclusions.* This standard does not apply to Desuperheater/Water Heaters supplied as components of factory-assembled refrigeration or air conditioning units. This standard does not apply to systems using zeotropic refrigerants.

Section 3. Definitions

Definitions. All terms in this document 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 *Desuperheater/Water Heater.* A factory-made assembly of elements by which refrigerant vapor flow and water flow are maintained in such heat transfer relationship that the refrigerant vapor is desuperheated and the water is heated.

3.2 *Field Fouling Allowance.* Provisions for anticipated Fouling Factor during use.

3.2.1 *Fouling Factor.* The thermal resistance due to fouling accumulated on the heat transfer surface.

3.3 *Net Heating Capacity.* The useful heat exchanged between the refrigerant vapor and the water being heated. This value is the product of the mass flow rate of water, the specific heat of water and the water temperature rise, Btu/h [W].

3.3.1 *Clean Tube Capacity.* This is the Net Heating Capacity of the heat exchanger, Btu/h [W], with clean tubes at the Standard Rating Conditions.

3.4 *Published Rating.* A statement of 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 Desuperheater/Water Heaters of like nominal size and type (identification) produced by the same manufacturer. As used herein, the term Published Rating includes all performance characteristics shown on the unit or published in specifications, advertising or other literature controlled by the manufacturer, at stated Rating Conditions.

3.4.1 *Application Rating.* A rating based on tests performed at application Rating Conditions.

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

3.5 *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.

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

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

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

3.6.2 *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.* The tests shall be conducted in accordance with the test procedure contained in Appendix C.

Section 5. Rating Requirements

5.1 *Published Ratings.* Published Ratings consist of Standard Ratings and Application Ratings. Such ratings shall be based on tests of Desuperheater/Water Heaters with the refrigerant specified in the ratings.

5.2 *Standard Ratings.* Published Ratings shall include the Standard Rating, given for one of the Standard Rating Conditions shown in Table 1 and properly identified as the Standard Rating. Standard Ratings shall be based on tests with initially clean tubes.

5.3 *Application Ratings.* Application Ratings give performance data at operating conditions other than those shown in Table 1. Application Ratings shall contain all information shown in 6.2. When Application Ratings include water-side Field Fouling Allowance(s) they shall be calculated by the method specified in 5.4. Published Ratings shall be subject to the tolerances of this standard.

5.3.1 Either Application Ratings or a method of adjusting the clean tube ratings may be presented to show the effect of various water-side Field Fouling Allowances. These calculation methods or method of adjusting these ratings shall be calculated in accordance with 5.4.

5.4 *Determination of Ratings.* Ratings shall be determined in accordance with the following (where steady state operation is in a condensing mode, this analysis will be in error):

5.4.1 *Clean Tube Ratings.* Published Ratings shall be determined by test with initially clean tubes at conditions specified for the selected system in Table 1 and conducted in accordance with Appendix C. The results of these tests shall be accepted as including a Fouling Factor of zero.

Table 1. Standard Rating Conditions

Type System	Saturated Temperature of Entering Refrigerant Vapor		Actual Temperature of Entering Refrigerant Vapor		Temperature of Entering Water		Temperature of Leaving Water	
	°F	°C	°F	°C	°F	°C	°F	°C
Air Cooled	125	51.7	220	104	90 and 120	32 and 48.9	140	60.0
Water Cooled	105	40.6	180	82.2	90 and 120	32 and 48.9	140	60.0

Note: Ratings are for single component and azeotropic refrigerants only. Zeotropic refrigerants are excluded.

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