ANSI/AHRI Standard 640-2005
(Formerly ARI Standard 640-2005)

2005 Standard for

Performance Rating of Commercial and Industrial Humidifiers

Approved American National Standard
ANSI

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Note:

This standard supersedes ARI Standard 640-1996.

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PERFORMANCE RATING OF COMMERCIAL AND INDUSTRIAL HUMIDIFIERS

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish for Commercial and Industrial Humidifiers: definitions; classifications; 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 factory-made Commercial and Industrial Humidifiers, as defined in Section 3.

2.1.1 *Energy Source.* This standard applies to electric, gas, or hot water operated Commercial and Industrial Humidifiers including those that depend on steam from a central steam boiler.

2.1.2 *Installation.* Commercial and Industrial Humidifiers are intended for installation into an enclosed space or air system.

2.2 *Exclusions.* This standard does not apply to the following:

2.2.1 Central System Humidifiers as defined in the AHRI Standard 610 and to Self-Contained Humidifiers as defined in AHRI Standard 620.

2.2.2 Portable Humidifiers as defined in AHAM HU-1.

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 *Commercial and Industrial Humidifier (Humidifier).* A device designed to add moisture to air.

3.1.1 *Atomizing Humidifiers.* A type of Humidifier intended for duct applications in which water is reduced to minute particles and dispersed to air as a fine mist.

3.1.1.1 *Centrifugal Type Atomizer.* Utilizes a high-speed disk to sling water to its rim where it is thrown onto plates or a comb to produce a fine mist.

3.1.1.2 *Nozzle Type Atomizers*. Utilizes a nozzle, compressed-air, water, or air and water, to reduce water to a fine mist.

a. Compressed *Air*. Compressed air is forced through an annular orifice at the nozzle tip creating a vortex at the tip. Water is forced through the center orifice of the nozzle where it is atomized on contact with the compressed air at the nozzle tip.
b. Compressed *Air and Water.* Compressed air and water are combined inside the nozzle and discharged onto a resonator to produce a fine mist at the nozzle tip.
c. Compressed *Water.* High pressure pump is used to force water through the orifice of a nozzle to produce a fine mist at the nozzle tip.

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3.1.1.3 *Ultrasonic Atomizer*. A piezoelectric transducer immersed in a reservoir of mineral free water. The transducer converts a high-frequency electronic signal into a high-frequency mechanical oscillation. The mechanical oscillation is directed at the surface of the water, where at very high frequencies it creates a fine mist.

3.1.2 *Direct Injection Steam Humidifiers.* A type of Humidifier intended for duct applications in which steam, water vapor under pressure and at high temperature, is dispersed directly into the air.

a. Steam *Cup Type*. Utilizes a cup and drain mounted beneath the duct. Steam is injected into the sides of a cup allowing most of the moisture of the steam to enter into the air while permitting the condensate to fall into the cup by gravity and into the steam trap.
b. Steam *Separator Type*. Utilizes an enclosed distribution pipe, a separating chamber, an integral control valve, and a drain to distribute steam into the air. Steam is injected directly into the enclosed distribution pipe providing reheat to the outgoing steam passing through the distributor pipe before being released into the air. The steam then enters the separating chamber which allows dry steam to pass through the control valve and into the distributor pipe while allowing condensate to fall by gravity into the drain. The moisture of the steam is reheated while in the distributor pipe before being dispersed into the air.
c. Steam *Panel Type.* Utilizes an integral control valve, a header with multiple distributor pipes, and a drain. The control valve regulates the amount of steam that is injected into the header, which allows dry steam to pass into the distributor pipe(s) while allowing condensate to escape through the drain. The moisture of the steam in the distributor pipe(s) is dispersed into the air.

3.1.3 *Heated Tank Humidifiers.* A type of Humidifier which converts tank water to steam using electricity, gas, or steam. The steam is dispersed into a duct system through dispersion manifolds. If the Humidifier is a free standing unit, the steam is dispersed directly into the air space through a fan unit.

a. *Electrode Type*. Utilizes an electric current passing through the water to create heat energy to produce steam.
b. Gas *Heated Type*. Utilizes natural gas or propane as the heating method to convert water to atmospheric steam.
c. Infrared *Type.* Utilizes one or more radiant heat bulbs to create heat energy to produce steam.
d. Resistance *Type.* Utilizes one or more electrical elements to heat the water directly to produce steam.
e. Steam-*to-Steam Type*. Utilizes steam from a central boiler passing through a heat exchanger submersed in water to create heat energy to produce steam.
f. Hot *Water Type.* Utilizes hot water from a central boiler passing through a heat exchanger submersed in water to create heat energy to produce steam.

3.2 *Humidification Capacity.* The capacity associated with a Humidifier's ability to add moisture to air expressed in lb/h [kg/h] of continuous operation.

3.3 *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. 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.

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

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

3.4 *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.

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

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

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

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

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3.6 *Supplementary Heat.* Heat used to enhance evaporation when used in the recirculating system or to heat water for direct evaporation.

Section 4. Classifications

4.1 Commercial and Industrial Humidifiers within the scope of this standard may be classified as shown in Table 1.

Table 1. Classification of Commercial and Industrial Humidifiers

Model Group	Model Designation	AHRI Type
Group I	Centrifugal Type Atomizer	ACA
	Nozzle Type Atomizer	ANA
	Ultrasonic Atomizer	AUA
Group II	Direct Steam Injection (Cup Type)	IDS-C
	Direct Steam Injection (Separator Type)	IDS-S
	Direct Steam Injection (Panel Type)	IDS-P
	Heated Tank (Electrode Type)	IHT-E
	Heated Tank (Gas Heated Type)	IHT-G
	Heated Tank (Infrared Type)	IHT-I
	Heated Tank (Resistance Type)	IHT-R
	Heated Tank (Steam-to-Steam Type)	IHT-SS
	Heated Pan (Hot Water Type)	IHP-HW

Section 5. Test Requirements

5.1 *Test Requirements.* Published Ratings shall be verified by tests conducted in accordance with the test procedure described in Appendix C.

5.1.1 *Equipment.* Humidifiers shall be tested using all components as recommended by the manufacturer.

5.1.2 *Electrical Conditions.* Nameplate voltages are shown in AHRI Standard 110, Table 1. Nameplate voltages for 50 Hz systems shall include one or more of the utilization voltages shown in IEC Standard 60038. Tests shall be performed at the nameplate rated voltage and frequency unless otherwise specified in this standard.

For all dual nameplate voltage equipment covered by this standard, tests shall be performed at both voltages or at the lower voltage if only a single rating is to be published.

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