AHRI Standard 1330

2014 Standard for

Performance Rating for Radiant Output of Gas Fired Infrared Heaters

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Note:

This is a new standard.

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PERFORMANCE RATING STANDARD FOR RADIANT OUTPUT OF GAS FIRED INFRARED HEATERS

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish for infrared heaters: definitions; test requirements; rating requirements; nomenclature; 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 Infrared Heaters that are Gas-Fired High-Intensity Infrared Heaters and Gas-Fired Low-Intensity Infrared Heaters with inputs up to and including 117.5 kW per burner intended for installation in and heating of outdoor or indoor spaces.

2.1.1 *Exclusions.* This standard does not apply to heaters that do not radiate their energy into a single measuring plane.

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 *Calibration Factor.* The results of the calibration provided by an ISO 17025 accredited testing/calibration laboratory in the form of a calibration factor consisting of a constant (a) and offset (b).

3.2 *Gross Radiant Coefficient.* Heat emitted by the appliance through the radiation reference plane divided by the gross heat input of the test gas.

3.3 *Infrared Factor.* A performance rating factor based on the gross radiant coefficient. Refer to Table 1.

3.4 *Infrared Heater.* A heater which directs a substantial amount of its energy output in the form of infrared energy into the area to be heated. Such heaters may be of either the vented or unvented type. The following are types of infrared heaters.

3.4.1 *High-intensity Infrared Heater.* An infrared heater which has a radiating surface that typically operates at or above 732.0°C.

3.4.2 *Low-intensity Infrared Heater.* An infrared heater which has a radiating surface that typically operates at temperature less than 732.0°C.

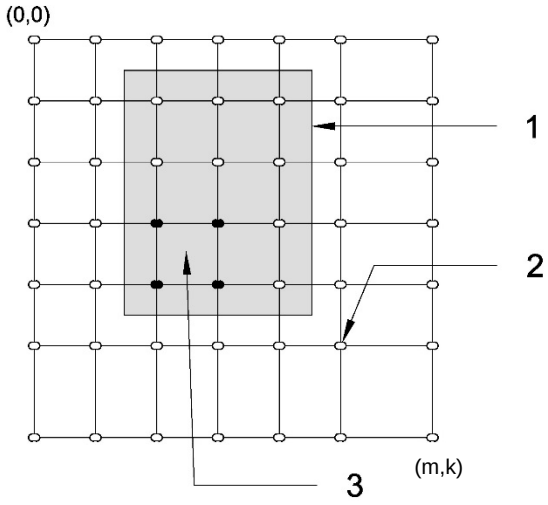
3.4.2.1 *Radiant Tube Infrared Heater.* Typically, a low intensity infrared heater in which combustion takes place within a tube or conduit.

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3.5 *Measuring Cell.* A measuring cell is defined as the area contained by four (4) adjacent nodal points of a measuring grid.

3.6 *Measuring Plane.* A plane parallel and below the radiation reference plane.

3.7 *Measuring Grid.* Regular arrangement in the measuring plane of straight lines running parallel and perpendicular to the longitudinal axis of the appliance.



1 Heater
2 Nodal Point
3 Measuring Cell Fij

Figure 1. Measuring Grid

3.8 *Minimum Angle.* The minimum installation angle specified by the manufacturer. The minimum angle is measured from the horizontal plane.

3.9 *Nodal Point/Node.* A nodal point or node is the intersection of the perpendicular and parallel grid lines on the measuring plane, where an individual measurement is recorded. Four (4) adjacent nodal points confine a measuring cell.

3.10 *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 the model tested and identical models produced by the same manufacturer under different model numbers. 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.

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

3.11 *Radiation Reference Plane.* Flat surface bounded by the lower edge of the reflector or, in the case where radiant parts project below this lower edge of the reflector, the flat surface touching the lowest radiant part (refer to Figure 2).

3.12 *Rating Conditions.* Any set of operating conditions under which a single level of performance results.

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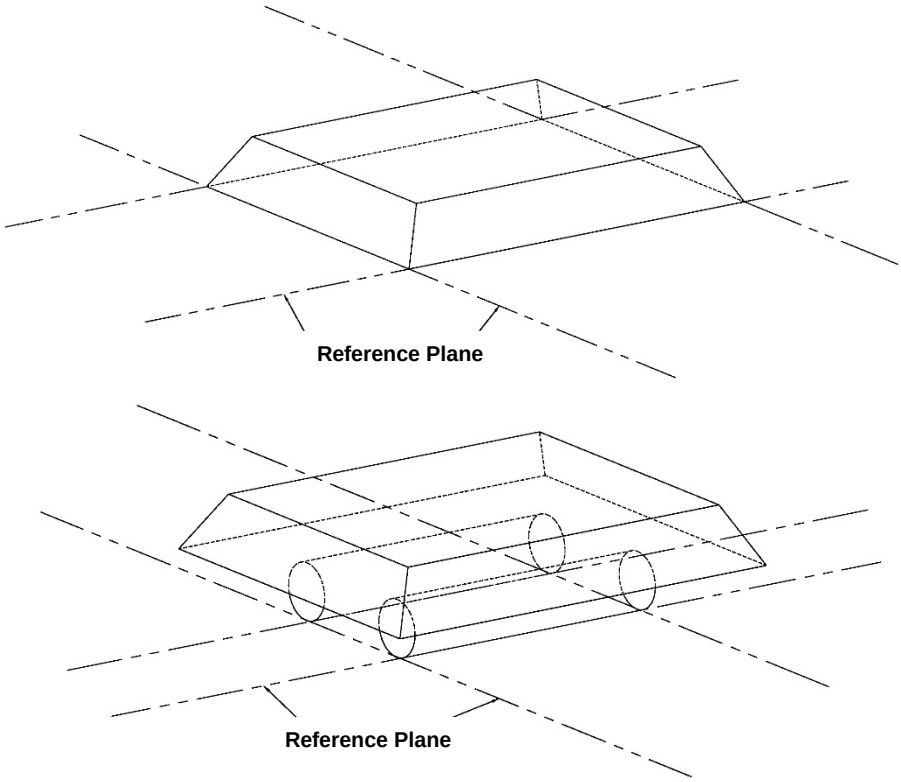


Figure 2. – Radiation Reference Plane

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

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

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

3.13.2 *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.* Published Ratings shall be verified by tests conducted in accordance with the test method described in Appendix C and in accordance with the rating requirements of Section 5.

Section 5. Rating Requirements

5.1 *Rating Requirements.* The Infrared Factor shall be established by using Table 1.

5.2 *Standard Ratings.* Standard Ratings shall be established at the operating conditions specified in Section C4. All Standard Ratings shall be verified by tests in accordance with Appendix C.

5.3 *Tolerances.* If the Gross Radiant Coefficient falls within ±0.005 of the ranges shown in Table 1, the rating shall be determined by the average of 3 sequential tests or by selecting the next lower Infrared Factor. The published rating shall not exceed the Infrared Factor calculated in accordance with Appendix C.

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Table 1. Rating Requirements	
Gross Radiant Coefficient	Infrared Factor (IF)
≤ .35	7
> .35 ≤ .40	8
> .40 ≤ .45	9
> .45 ≤ .50	10
> .50 ≤ .55	11
> .55 ≤ .60	12
> .60 ≤ .65	13
> .65 ≤ .7	14
> 0.7	15

Section 6. Nomenclature

Table 2. Nomenclature		
Symbol	Title	Unit
a	Constant	—
a_{CO_2}	Coefficient in equation for $k_{CO_2(t_a)}$	$kPa^{-1}\ m^{-1}$
a_{H_2O}	Coefficient in equation for $K_{H_2O(t_a)}$	$kPa^{-1}\ m^{-1}$
A_{CO_2}	Absorption factor of carbon dioxide	—
A_{H_2O}	Absorption factor of water vapor	—
A_{TOT}	Total Radiant correction factor for water vapor and CO_2 in air	—
β	Partial pressure factor	—
b	Signal offset	—
b_{CO_2}	Coefficient in equation for $k_{CO_2(t_a)}$	$kPa^{-1}m^{-1}°C^{-1}$
b_{H_2O}	Coefficient in equation for $K_{H_2O(t_a)}$	$kPa^{-1}m^{-1}°C^{-1}$
D	Thickness of Radiation Gas Layer.	m
E_{if}	Average irradiance over the measuring cell	kW/m^2
F_{if}	Area of measuring cell	m^2
H_s	Gross calorific value of the test gas (at 15 °C, 1013.25 mbar, dry gas)	kWh/m^3
k_{CO_2}	Coefficient in equation for emission factor of carbon dioxide	$kPa^{-1}\ m^{-1}$
k_{H_2O}	Coefficient in equation for emission factor of water vapor	$kPa^{-1}\ m^{-1}$
L	Length of the radiating surface of the heater	m
n	Coefficient in equations for k_{CO_2} and k_{H_2O}	—
p_{CO_2}	Partial pressure of carbon dioxide in ambient air	kPa
p_{H_2O}	Partial pressure of water vapor in ambient air	kPa
p	Gas supply pressure	mbar
p_a	Atmospheric pressure	mbar
Q_m	Measured heat input based on the net calorific value of the test gas	W
$Q_{(R)C}$	Radiant output after correction for absorption of radiation in air	W
$Q_{(R)M}$	Radiant output	W

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