ANSI/ASHRAE/IESNA Addendum *u* to
ANSI/ASHRAE/IESNA Standard 90.1-2001

ASHRAE® STANDARD

Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on June 26, 2004; by the ASHRAE Board of Directors on July 1, 2004; and by the American National Standards Institute on July 1, 2004.

This standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. The change submittal form, instructions, and deadlines are given at the back of this document and may be obtained in electronic form from ASHRAE's Internet Home Page, *http://www.ashrae.org*, or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard and printed copies of a public review draft may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: *orders@ashrae.org*. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in U.S. and Canada).

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SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Consensus is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution." Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Manager of Standards of ASHRAE should be contacted for:

a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard,
d. permission to reprint portions of the Standard.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process.)

FOREWORD

This addendum adds dew-point and dry-bulb temperature as a shutoff control type in Tables 6.3.1.1.3.A and 6.3.1.1.3B and adds the required high-limit values for this type of control.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions).

Addendum u to 90.1-2001 (I-P and SI editions)

Modify Tables 6.3.1.1.3A and 6.3.1.1.3B (I-P versions) as follows:

TABLE 6.3.1.1.3A
High-Limit Shutoff Control Options for Air Economizers

Climate	Allowed Control Types	Prohibited Control Types
Dry T_{wb} < 69°F or (T_{wb} < 75°F and T_{db} ≥ 100°F[a]	Fixed Dry Bulb Differential Dry Bulb Electronic Enthalpy[b] Differential Enthalpy <u>Dew-Point and Dry-Bulb Temperature</u>	Fixed Enthalpy
Intermediate 69°F ≤ T_{wb} ≤ 73°F T_{db} < 100°F	Fixed Dry Bulb Differential Dry Bulb Fixed Enthalpy Electronic Enthalpy[b] Differential Enthalpy <u>Dew-Point and Dry-Bulb Temperature</u>	
Humid T_{wb} > 73°F	Fixed Dry Bulb Fixed Enthalpy Electronic Enthalpy[b] Differential Enthalpy <u>Dew-Point and Dry- Bulb Temperature</u>	Differential Dry Bulb

a T_{wb} is the 1% *cooling design* wet-bulb temperature. T_{db} is the 1% *cooling design* dry-bulb temperature.

b Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.

TABLE 6.3.1.1.3.B
High-Limit Shutoff Control Settings for Air Economizers

Device Type	Climate	Required High Limit (Economizer Off When):	
		Equation	**Description**
Fixed Dry Bulb	Dry Intermediate Humid	$T_{OA} > 75°F$	Outside air temperature exceeds 75°F
		$T_{OA} > 70°F$	Outside air temperature exceeds 70°F
		$T_{OA} > 65°F$	Outside air temperature exceeds 65°F
Differential Dry Bulb	All	$T_{OA} > T_{RA}$	Outside air temperature exceeds return air temperature
Fixed Enthalpy	All	$h_{OA} > 28$ Btu/lb[a]	Outside air enthalpy exceeds 28 Btu/lb of dry air[a]
Electronic Enthalpy	All	$(T_{OA}, RH_{OA}) > A$	Outside air temperature/RH exceeds the "A" setpoint curve[b]
Differential Enthalpy	All	$h_{OA} > h_{RA}$	Outside air enthalpy exceeds return air enthalpy
Dew-Point and Dry-Bulb Temperature	All	$DP_{oa} \geq 55°F$ or $T_{oa} \geq 75°F$	Outside air dry bulb exceeds 75 °F or outside dew point exceeds 55 °F (65g/lb)

a At altitudes substantially different from sea level, the fixed enthalpy limit value shall be set to the enthalpy value at 75°F and 50% relative humidity. As an example, at approximately 6000 ft elevation, the fixed enthalpy limit is approximately 30.7 Btu/lb.

b Setpoint "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40% relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

Modify Tables 6.3.1.1.3A and 6.3.1.1.3B (SI versions) as follows:

TABLE 6.3.1.1.3.A
High-Limit Shutoff Control Options for Air Economizers

Climate	Allowed Control Types	Prohibited Control Types
Dry $T_{wb} < 21°C$ or ($T_{wb} < 24°C$ and $T_{db} \geq 38°C$[a]	Fixed Dry Bulb Differential Dry Bulb Electronic Enthalpy[b] Differential Enthalpy Dew-Point and Dry-Bulb Temperature	Fixed Enthalpy
Intermediate $21°C \leq T_{wb} \leq 23°C$ $T_{db} < 38°C$	Fixed Dry Bulb Differential Dry Bulb Fixed Enthalpy Electronic Enthalpy[b] Differential Enthalpy Dew-Point and Dry-Bulb Temperature	
Humid $T_{wb} > 23°C$	Fixed Dry Bulb Fixed Enthalpy Electronic Enthalpy[b] Differential Enthalpy Dew-Point and Dry-Bulb Temperature	Differential Dry Bulb

a T_{wb} is the 1% *cooling design* wet-bulb temperature. T_{db} is the 1% *cooling design* dry-bulb temperature.

b Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.

TABLE 6.3.1.1.3.B
High-Limit Shutoff Control Settings for Air Economizers

Device Type	Climate	Required High Limit (Economizer Off When):	
		Equation	**Description**
Fixed Dry Bulb	Dry Intermediate Humid	$T_{OA} > 24°C$	Outside air temperature exceeds 24°C
		$T_{OA} > 21°C$	Outside air temperature exceeds 21°C
		$T_{OA} > 18°C$	Outside air temperature exceeds 18°C
Differential Dry Bulb	All	$T_{OA} > T_{RA}$	Outside air temperature exceeds return air temperature
Fixed Enthalpy	All	$h_{OA} > 47$ kJ/kg[a]	Outside air enthalpy exceeds 47 kJ/kg of dry air[a]
Electronic Enthalpy	All	$(T_{OA}, RH_{OA}) > A$	Outside air temperature/RH exceeds the "A" setpoint curve[b]
Differential Enthalpy	All	$h_{OA} > h_{RA}$	Outside air enthalpy exceeds return air enthalpy
Dew-Point and Dry-Bulb Temperature	All	$DP_{oa} > 13°C$ or $T_{oa} > 24°C$	Outside air dry-bulb temperature exceeds 24 °C or outside dew point exceeds 13 °C

a At altitudes substantially different from sea level, the fixed enthalpy limit value shall be set to the enthalpy value at 24°C and 50% relative humidity. As an example, at approximately 1830 m elevation, the fixed enthalpy limit is approximately 53.5 Btu/lb.

b Setpoint "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 24°C and 40% relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.