ADDENDA

ANSI/ASHRAE/IES Addendum av to
ANSI/ASHRAE/IES Standard 90.1-2013

Energy Standard for Buildings Except Low-Rise Residential Buildings

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FOREWORD

This addendum generally adds the phrase "configured to" where "capable of" is used as related to control requirements. The word "capable" alone is not the best mandatory language for controls, as control equipment can be provided that could be said to be capable of achieving the desired result even though the setpoint is not correct or the programming is not even complete. Using "configured" indicates that all programming is complete and setpoints are correct at the time of occupancy, while focusing on the present state at time of inspection rather than future operation.

This addendum looks at cases where "capable of" could be misinterpreted and adds terms like "configured to" to provide more assurance that requirements will actually be met. Note that there are some instances where "capable of" alone is the appropriate word choice, and changes are only suggested where there are specific setpoints or functions that are required. For instance, in this definition, "capable of" is the right choice:

> ***service agency:*** *an agency* ***capable of*** *providing calibration, testing, or manufacture of equipment, instrumentation, metering, or control apparatus, such as a contractor, laboratory, or manufacturer.*

*However in the following requirement, "***capable of***" does not leave you sure that the requirement will be fulfilled:*

> ***6.4.3.4.4 Ventilation Fan Controls****. Fans with motors greater than 0.75 hp shall have automatic controls complying with Section 6.4.3.3.1 that are* ***capable of*** *shutting off fans when not required.*

Unfortunately, a control system could exist that is ***capable of*** *accomplishing the requirement, but is not programmed and configured to fulfill its mission. Stating that the control system shall be* ***configured to*** *meet the requirement makes it much more likely that the requirement will be fulfilled:*

> ***6.4.3.4.4 Ventilation Fan Controls.*** *Fans with motors greater than 0.75 hp shall have automatic controls complying with Section 6.4.3.3.1 that are* ***capable of and configured to*** *shut off fans when not required.*

Cost effectiveness: This addendum represents a clarification rather than a new requirement, so there is no anticipated cost increase and cost effectiveness analysis is not required.

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Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum av to 90.1-2013

Modify the standard as follows (IP and SI Units)
Modify Section 3 as follows:

readily accessible: ~~capable of being~~ installed in a manner and location that allows it to be reached quickly for operation, renewal, or inspection without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, chairs, etc. In public facilities, accessibility may be limited to certified personnel through locking covers or by placing equipment in locked rooms.

Modify Section 6.3.2 (Simplified Approach Option for HVAC Systems, Criteria) as follows:

j. Systems serving spaces other than hotel/motel guest rooms, and other than those requiring continuous operation, which have both a cooling or heating capacity greater than 15,000 Btu/h and a supply fan motor power greater than 0.75 hp, shall be provided with a time clock that (1) can start and stop the system under different schedules for seven different day types per week, (2) is capable of retaining programming and time setting during a loss of power for a period of at least ten hours, (3) includes an accessible manual override that allows temporary operation of the system for up to two hours, (4) is capable of and configured with temperature setback down to 55°F during off hours, and (5) is capable of and configured with temperature setup to 90°F during off hours.

Modify Section 6.4.3 as follows:

6.4.3.1.2 Dead Band. Where used to control both heating and cooling, zone thermostatic controls shall be capable of and configured to provid~~ing~~ a temperature range or dead band of at least 5°F within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum.

. . .

6.4.3.3.2 Setback Controls. Heating systems shall be equipped with controls capable of and configured to automatically restart and temporarily operate the system as required to maintain zone temperatures above an adjustable heating setpoint at least 10°F below the occupied heating setpoint. Cooling systems shall be equipped with controls capable of and configured to automatically restart and temporarily operate the mechanical cooling system as required to maintain zone temperatures below an adjustable cooling setpoint at least 5°F above the occupied cooling setpoint or to prevent high space humidity levels.

Exception: Radiant heating systems capable of and configured with a setback heating setpoint at least 4°F below the occupied heating setpoint

. . .

6.4.3.3.4 Zone Isolation. HVAC systems serving zones that are intended to operate or be occupied non-simultaneously shall be divided into isolation areas. Zones may be grouped into a single isolation area provided it does not exceed 25,000 ft2 of conditioned floor area nor include more than one floor. Each isolation area shall be equipped with isolation devices capable of and configured to automatically shut~~ting~~ off the supply of conditioned air and outdoor air to and exhaust air from the area. Each isolation area shall be controlled independently by a device meeting the requirements of Section 6.4.3.3.1. For central systems and plants, controls and devices shall be

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provided to allow stable system and equipment operation for any length of time while serving only the smallest isolation area served by the system or plant.

Note: Section 6.4.3.3.5 is as added by addendum d to 90.1-2013

6.4.3.3.5 Automatic Control of HVAC in Hotel/Motel Guest Rooms. ~~In h~~Hotels and motels with greater than 50 guest rooms shall be provided with~~,~~ *automatic* controls for the HVAC equipment serving each guest room ~~shall be~~ capable of and configured according to the following requirements:

. . .

6.4.3.4.1 Stair and Shaft Vents. Stair and elevator shaft vents shall be equipped with motorized dampers that are capable of ~~being~~ and configured to automatically close~~d~~ during normal building operation and are interlocked to open as required by fire and smoke detection systems.

6.4.3.4.2 Shutoff Damper Controls. All outdoor air intake and exhaust systems shall be equipped with motorized dampers that will automatically shut when the systems or spaces served are not in use. Ventilation outdoor air and exhaust/relief dampers shall be capable of and configured to automatically shut~~ting~~ off during preoccupancy building warm-up, cooldown, and setback, except when ventilation reduces energy costs or when ventilation must be supplied to meet code requirements.

. . .

6.4.3.4.4 Ventilation Fan Controls. Fans with motors greater than 0.75 hp shall have automatic controls complying with Section 6.4.3.3.1 that are capable of and configured to shut~~ting~~ off fans when not required.

. . .

6.4.3.6 Humidification and Dehumidification. Humidity control shall prevent the use of fossil fuel or electricity to produce RH above 30% in the warmest zone served by the humidification system and to reduce RH below 60% in the coldest zone served by the dehumidification system. Where a zone is served by a system or systems with both humidification and dehumidification capability, means (such as limit switches, mechanical stops, or, for DDC systems, software programming) shall be provided capable of and configured to prevent~~ing~~ simultaneous operation of humidification and dehumidification equipment.

Exceptions:

1. Zones served by desiccant systems, used with direct evaporative cooling in series
2. Systems serving zones where specific humidity levels are required, such as museums and hospitals, and approved by the authority having jurisdiction or required by accreditation standards and humidity controls are capable of and configured to maintain a deadband of at least 10% RH where no active humidification or dehumidification takes place
3. Systems serving zones where humidity levels are required to be maintained with precision of not more than ±5% RH to comply with applicable codes or accreditation standards or as approved by the authority having jurisdiction

. . .

6.4.3.7 Freeze Protection and Snow/Ice Melting Systems.
Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include automatic controls capable of and configured to shut~~ting~~ off the systems when outdoor air temperatures are above 40°F or when the conditions of the protected fluid will prevent freezing. Snow- and ice-melting systems shall include automatic controls capable of and configured to shut~~ting~~ off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F so that the potential for snow or ice accumulation is negligible.

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*Note: Section 6.4.3.9 is as modified by addendum **ag** to 90.1-2013.*

6.4.3.9 Heated or Cooled Vestibules. Heating for vestibules and for air curtains with integral heating shall include automatic controls capable and configured to shut off the heating system when outdoor air temperatures are above 45°F (7°C). Vestibule heating and cooling systems shall be controlled by a thermostat in the vestibule ~~that~~ capable of and configured to limit~~s~~ heating to a maximum of 60°F (16°C) and cooling to a minimum of 85°F (29°C).
Exception: Heating or cooling provided by site-recovered energy or by transfer air that would otherwise be exhausted.
. . .
6.4.3.10.2 DDC Controls. Where DDC is required by Section 6.4.3.10.1, the DDC system shall be capable of and configured with all of the following, as required, to provide the control logic required in Section 6.5:

a. Monitoring zone and system demand for fan pressure, pump pressure, heating, and cooling
b. Transferring zone and system demand information from zones to air distribution system controllers and from air distribution systems to heating and cooling plant controllers
c. Automatically detecting those zones and systems that may be excessively driving the reset logic and generate an alarm or other indication to the system operator
d. Readily allowing operator removal of zone(s) from the reset algorithm

. . .

6.5.1.1 Air Economizers
6.5.1.1.1 Design Capacity. Air economizer systems shall be capable of and configured to modulat~~ing~~ outdoor air and return air dampers to provide up to 100% of the design supply air quantity as outdoor air for cooling.

6.5.1.1.2 Control Signal. Economizer controls ~~dampers~~ shall be capable of and configured to ~~being~~ sequence~~d~~ the dampers with the mechanical cooling equipment and shall not be controlled by only mixed-air temperature.
. . .

6.5.1.1.3 High-Limit Shutoff. All air economizers shall be capable of and configured to automatically reduc~~ing~~ outdoor air intake to the design minimum outdoor air quantity when outdoor air intake will no longer reduce cooling energy usage. High-limit shutoff control types and associated setpoints for specific climate zones shall be chosen from Table 6.5.1.1.3.
. . .

6.5.1.3 Integrated Economizer Control. Economizer systems shall be integrated with the mechanical cooling system and be capable of and configured to provid~~ing~~ partial cooling even when additional mechanical cooling is required to meet the remainder of the cooling load. Controls shall not false load the mechanical cooling systems by limiting or disabling the economizer or by any other means, such as hot gas bypass, except at the lowest stage of mechanical cooling.
. . .

*In section **6.5.2.2.3 (Hydronic (Water Loop) Heat Pump Systems):***

a. Controls that are capable of and configured to provid~~ing~~ a heat-pump water supply temperature dead band of at least 20°F between initiation of heat rejection and heat addition by the central devices (e.g., tower and boiler).

. . .

*In section **6.5.2.3 (dehumidification, Exceptions):***

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1. The system is capable of and configured to reduce supply air volume to 50% or less of the design airflow rate or the minimum outdoor air ventilation rate specified in ASHRAE Standard 62.1 or other applicable federal, state, or local code or recognized standard, whichever is larger, before simultaneous heating and cooling takes place.
2. The individual fan cooling unit has a design cooling capacity of 65,000 Btu/h or less and is capable of and configured to unload~~ing~~ to 50% capacity before simultaneous heating and cooling takes place.

. . .

6.5.4.2 Hydronic Variable Flow Systems. HVAC pumping systems having a total pump system power exceeding 10 hp that include control valves designed to modulate or step open and close as a function of load shall be designed for variable fluid flow and shall be capable of and configured to reduce~~ing~~ pump flow rates to 50% or less of the design flow rate. Individual chilled-water pumps serving variable-flow systems having motors exceeding 5 hp shall have controls and/or devices (such as variable-speed control) that will result in pump motor demand of no more than 30% of design wattage at 50% of design water flow. The controls or devices shall be controlled as a function of desired flow or to maintain a minimum required differential pressure. Differential pressure shall be measured at or near the most remote heat exchanger or the heat exchanger requiring the greatest differential pressure. The differential pressure setpoint shall be no more than 110% of that required to achieve design flow through the heat exchanger. Where differential pressure control is used to comply with this section and DDC systems are used, the setpoint shall be reset downward based on valve positions until one valve is nearly wide open.

. . .

6.5.7.1.4 If a kitchen/dining facility has a total kitchen hood exhaust airflow rate greater than 5000 cfm then it shall have one of the following:

a. At least 50% of all replacement air is transfer air that would otherwise be exhausted.
b. Demand ventilation system(s) on at least 75% of the exhaust air. Such systems shall be capable of and configured to provide at least 50% reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent, and combustion products during cooking and idle.
c. Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40% on at least 50% of the total exhaust airflow.

. . .

6.5.7.2 Laboratory Exhaust Systems. Buildings with laboratory exhaust systems having a total exhaust rate greater than 5000 cfm shall include at least one of the following features:

a. VAV laboratory exhaust and room supply system capable of and configured to reduce~~ing~~ exhaust and makeup airflow rates and/or incorporate a heat recovery system to precondition makeup air from laboratory exhaust that shall meet the following: $A + B \times (E/M) \geq 50\%$
b. VAV laboratory exhaust and room supply systems that are required to have minimum circulation rates to comply with code or accreditation standards shall be capable of and configured to reduce~~ing~~ zone exhaust and makeup airflow rates to the regulated minimum circulation values or the minimum required to maintain pressurization relationship requirements. Systems serving ~~N~~nonregulated zones shall be capable of and configured to reduce~~ing~~ exhaust and makeup airflow rates to 50% of the zone design values or the minimum required to maintain pressurization relationship requirements.

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.

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