ADDENDA

ANSI/ASHRAE/IES Addendum d to
ANSI/ASHRAE/IES Standard 90.1-2019

Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by ASHRAE and the American National Standards Institute on December 30, 2020, and by the Illuminating Engineering Society on December 16, 2020.

This addendum was approved 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. Instructions for how to submit a change can be found on the ASHRAE® website (https://www.ashrae.org/continuous-maintenance).

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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 Senior 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, or
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. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

The current requirements for garage ventilation are lenient:

- *Fan systems are only required to reduce exhaust rates down to 50%. Thus a large garage could meet the requirement with two fans or one two-speed fan. Currently Standard 62.1 (and model codes based on this standard) require 0.75 cfm/ft^2, which is much higher than is needed to meet ventilation requirements even under peak conditions for modern garages with a typical mix of gasoline, hybrid, and electric vehicles. Moreover, these peak conditions seldom if ever occur—generally only when many vehicles simultaneously experience cold starts, e.g., at around 6 pm for an office building garage. So improved low-capacity operation is readily justified.*
- *Provided the system does not have mechanical cooling or heating capability, the exceptions exempt garages smaller than 30,000 ft^2, which would require a 22,500 cfm exhaust system, a relatively large system to run constant volume for the long periods a garage may be open and operational.*
- *Similarly, systems with more than 1500 ft^2/hp is exempted. This roughly equates to a static pressure of 2.5 in., which is very high for garage exhaust systems. This exception exempts all garage exhaust systems.*

This addendum proposes the following changes:

- *Garages that have separate sections separated by solid walls must have separate exhaust systems and controls. This is so that vehicle activity in one section does not result in unnecessary exhaust is other sections, and it improves safety by ensuring controls are provided in each section. There is no limit to the size of a section; many very large garages have only one section—e.g., all floors of a multistory garage are often open to one another. Mandating separate systems and controls for each floor or for a certain maximum floor area may not be justified depending on the ventilation system design. For example, unducted sweep garage exhaust systems (per Taylor in* ASHRAE Journal, *July 2016) can very efficiently serve a large garage. With sweep systems, ventilation in one section also ventilates the upstream sections at no added cost. Requiring small sections would disallow the system and essentially mandate much less efficient ducted systems.*
- *Controls must be able to reduce airflow down to 20% or less, reduced from 50% in the current standard. This minimum is readily provided by multiple-stage fans or fans with variable-speed drives. The 20% value matches the requirements of California's Title 24 requirement of 0.15 cfm/ft^2 (20% of the 0.75 cfm/ft^2 design airflow requirement).*
- *The system must include variable-speed drives or equivalent to reduce power as airflow is reduced. The language "30% of design wattage at 50% of the design airflow" is used throughout the standard to infer this performance. The 50% value may appear to conflict with the 20% value in the previous bullet, but it does not; it is simply a rating point. Note that systems that include some low-power constant-volume destratification fans (aka "jet fans") can still meet this requirement provided the main exhaust fans are variable speed. These fans can also be readily made to be variable speed, e.g., with electronically commutated motors.*
- *The first exception is revised to address motor size, not garage size, since the cost of variable-speed drives is directly a function of motor size. The size of the garage is indirectly addressed, because motor size is tied to airflow rate, which in turn is tied to garage size. The 5 hp limit is the same as that used for fan power in other sections and previously shown to be life-cycle cost effective.*
- *The second exception is eliminated because, as noted above, it exempts too many systems and is not relevant given the 5 hp limit is included.*
- *The last exception is eliminated because safety codes and authorities having jurisdiction always supersede Standard 90.1 requirements per Section 2.4 and need not be repeated here.*

Note that, consistent with the current Standard 90.1 requirements for demand-control ventilation in garages (as well as densely occupied spaces and kitchen exhaust hoods), the contaminants required to be monitored and their set points are not addressed. These must be addressed by the designer based on their application (e.g. vehicle engine type) and health codes and standards.

Costs will increase for pollutant sensors and fan variable-speed drives. Cost effectiveness is assured by the LCCA done for VAV systems, variable-flow chilled-water pumps, and cooling tower fans, which have the same 5 hp threshold yet operate fewer hours and/or much less turndown than garage ventilation fans.

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 d to Standard 90.1-2019

Add new definition to Section 3.2 as shown (I-P and SI units).

3.2 Definitions

[. . .]

parking garage section: a part of a parking garage where airflow is restricted from other parts of the garage by solid walls.

[. . .]

Modify Section 6.4.3.4.5 as shown (I-P and SI units).

6.4.3.4.5 ~~Enclosed~~ Parking Garage Ventilation Systems. ~~Enclosed p~~Parking garage *ventilation systems* shall meet all of the following:

a. Separate *ventilation systems* and *control systems* shall be provided for each *parking garage section*.

b. *Control systems* for each *parking garage section* shall *automatically* detect and control contaminant levels and ~~stage fans or modulate~~ shall be capable of and configured to reduce fan airflow ~~rates~~ to ~~50%~~ 20% or less of *design capacity*~~, provided acceptable contaminant levels are maintained~~.

c. The *ventilation system* for each *parking garage section* shall have *controls* and devices that result in fan motor *demand* of no more than 30% of design wattage at 50% of the design airflow.

Exceptions to 6.4.3.4.5:

~~1.~~ Garage~~s~~ *ventilation systems* serving a single *parking garage section* having a total *ventilation system motor nameplate horsepower* (*ventilation system motor nameplate kilowatt*) not exceeding 5 hp (3.7 kW) at *fan system design conditions* ~~less than 30,000 ft2 (2800 m^2) with *ventilation systems that do not use*~~ and where the *parking garage section* has no *mechanical cooling* or *mechanical heating*.

~~2. Garages that have a garage area to *ventilation system motor nameplate horsepower* ratio that exceeds 1500 ft2/hp and do not utilize *mechanical cooling* or mechanical heating.~~

~~3. Where not permitted by the authority having jurisdiction.~~

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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