



**BSR/ASHRAE/IES Addendum p
to ANSI/ASHRAE/IES Standard 90.1-2019**

Public Review Draft

Proposed Addendum p to Standard 90.1-2019, Energy Standard for Buildings Except Low-Rise Residential Buildings

**First Public Review (November 2020)
(Draft Shows Proposed Changes to Current Standard)**

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at www.ashrae.org/standards-research--technology/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

This standard is under continuous maintenance. To propose a change to the current standard, use the change submittal form available on the ASHRAE website, www.ashrae.org.

The appearance of any technical data or editorial material in this public review document does not constitute endorsement, warranty, or guaranty by ASHRAE of any product, service, process, procedure, or design, and ASHRAE expressly disclaims such.

© 2018 ASHRAE. This draft is covered under ASHRAE copyright. Permission to reproduce or redistribute all or any part of this document must be obtained from the ASHRAE Manager of Standards, 180 Technology Parkway NW, Peachtree Corners, GA 30092. Phone: 404-636-8400, Ext. 1125. Fax: 404-321-5478. E-mail: standards.section@ashrae.org.

ASHRAE, 180 Technology Parkway NW, Peachtree Corners, GA 30092

© 2020 ASHRAE

This draft is covered under ASHRAE copyright. The appearance of any technical data or editorial material in this publication document does not constitute endorsement, warranty, or guaranty by ASHRAE of any product, service, process, procedure, design or the like and ASHRAE expressly disclaims such. Permission to republish or redistribute must be obtained from the MOS.

(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

This addendum is proposed to capture additional energy savings by updating the requirements of 9.1.2 to close loopholes that allow alteration projects to comply without meeting all the requirements of Chapter 9. The unintended loophole in Exception 1 did not require energy savings.

The new language requires meeting current LPA requirements or meeting a minimum 50% energy savings.

An alteration is defined by 90.1 as “alteration: a replacement or addition to a building or its systems and equipment”. In 4.2.1.3 Alterations of Existing Buildings specifically states that the alteration meet Section 9, “Lighting” along with Section 4.2.2 Compliance Documentation (Section 9.7.3.2), Section 4.2.3 Labeling of Material and Equipment, Section 4.2.4 Inspections, and Section 4.2.5 Verification, Testing and Commissioning (Section 9.9.1 and 9.9.2)

Under the 90.1-2019 Standard, Section 9.1.2 Lighting Alterations, only requires meeting the interior or exterior LPD allowances and a subset of the mandatory controls therefore any alteration (complete or partial) would not have to comply with the following lighting Sections; 9.3 Simplified Building Method Compliance Path, 9.4.1.1(e) Automatic daylight responsive controls for sidelighting, 9.4.1.1(f) Automatic daylight responsive controls for toplighting, 9.6.2 Additional Interior Lighting Power, 9.6.3 Additional Interior Lighting Power Using Nonmandatory Controls, 9.6.4 Room Geometry Adjustment, and 9.7 Submittals (9.7.3.1 and 9.7.3.3).

The following proposal treats all alterations regardless of size the same in that, first they have to meet all of the requirements of Chapter 9 not the subset defined in Section 9.1.2 Alterations or Section 4.2.1.3 Alterations of Existing Buildings.

The limitations to the existing exceptions are below.

Existing exception 9.1.2.1 allows for an alteration of up to 20% of the connected load to happen without saving any energy.

Existing exception 9.1.2.2 allows for an alteration of one-for-one replacement, on an unlimited basis, if the interior or exterior LPD allowances are met.

For interior lighting alterations both exceptions are being replaced by a wattage threshold of 2000 watts. If the alteration is over 2000 watt the projects must meet all of Chapter 9 requirements. If the alteration is 2000 watts or less each space must meet a subset of the 9.4.1 controls and either the Space-by-Space LPA or result in at least a 50% reduction in wattage from the existing wattage.

For exterior lighting alterations both exceptions are being replaced by a threshold of 10 luminaires (or length of 20 feet for linear luminaires). Additionally, exterior alterations are not allowed to use the Base Site Allowance of Table 9.4.2-2 to eliminate double counting. If the alteration is over the threshold the projects must meet all of Chapter 9 requirements. If the alteration meets the threshold the alteration must meet a subset of the 9.4.1 controls and either meet the LPA of 9.4.2-2 or result in at least a 50% reduction in wattage from the existing wattage.

Existing exception 9.1.2.3 allows for routine maintenance or repair of existing lights. While this may seem straightforward, the “repair” definition in the Standard is “the reconstruction or renewal of any part of an existing building for the purpose of its maintenance”. This definition doesn’t clarify the intent.

This exception is replaced with “The maintenance of a lighting system to return it to working order shall not be considered an alteration.”

A new requirement for determining the wattage of a retrofitted luminaire is added.

Economic justification

If the exceptions cannot be used, the project must meet all requirements of Chapter 9 which will increase the cost of the project versus a similar project using the 2019 Standard. However, large scale alterations should be treated as new construction and meet all the requirements of Chapter 9 and not be excluded from meeting the daylighting requirements.

For projects that do meet the wattage threshold there is likely little if any additional cost. As an example, the current exception 2 would not allow for fewer lights to be replaced than removed even if it met the LPD allowance as this would not meet the one-for-one requirement. In this example the cost would be higher to install the required one-for-one versus the desired fewer lights. This is often true for warehouse and high ceiling spaces where fewer LED fixtures can be installed than were existing and still meet the lighting requirements. However, with the proposed language if the new wattage of the project is 2000 watts or less the installation of fewer lights would be allowed if it resulted in a 50% energy reduction or met the LPA of Table 9.6.1.

The alteration of a private office would unlikely be able to take the current exception #1 and would be required to meet all of the control requirements except the daylighting controls. The private office could be designed to meet the current exception #2. Using the proposed language, and if the total new wattage of the projects is 2000 watts or less, the installation would result in the same costs.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum p to 90.1-2019

Modify the standard as follows (IP and SI Units)

3.2 Definitions

...
lighting power allowance (LPA), exterior: the maximum lighting power in watts allowed for the exterior of a building.

lighting power allowance (LPA), interior: the maximum lighting power in watts allowed for the interior of a building.

3.3 Abbreviations and Acronyms

...
LPA the maximum lighting power allowed in watts

9.1.2 Lighting Alterations

For the *alteration* of any *lighting system* in an interior *space*, that *space* shall comply with the *lighting power density (LPD)* allowances of Section 9.5.1 or 9.6.1 and the *control* requirements of Section 9.4.1.1 (a), (b), (c), (d), (g), (h), and (i), as applicable to that *space*.

For the *alteration* of any *lighting system* for the exterior of a *building* application, that *lighting system* shall comply with the *lighting power density (LPD)* allowances of Section 9.4.2 applicable to the area illuminated by that *lighting system* and the applicable *control* requirements of Sections 9.4.1.4 and 9.4.2.

The alteration of a lighting system in an interior space shall comply with Section 9.1.2.1. The alteration of a lighting system in an exterior area shall comply with Section 9.1.2.2.

Exceptions to 9.1.2

1. *Alterations* that involve 20% or less of the connected lighting load in a *space* or area need not comply with these requirements, provided that such *alterations* do not increase the installed lighting power.
2. *Lighting alterations* that only involve replacement of *lamps plus ballasts/drivers* or only involve one for one *luminaire* replacement need only comply with *LPD* requirement and Section 9.4.1.1(h) or 9.4.1.1(i).
3. Routine maintenance or *repair* situations.

The maintenance of an existing lighting system to return it to working order shall not be considered an alteration. Retrofitting a luminaire for which the original lamps and ballast/driver are replaced with a new lamp/light source and driver/ballast that was not a component of the original luminaire shall be considered an alteration.

9.1.2.1 Lighting Alterations for Interior Building Spaces

The alteration of a lighting system in an interior space shall meet one of the following:

- a. The alteration shall comply with Section 9.2 when the total wattage of all new and retrofitted luminaires is greater than 2000 watts.
- b. When the total wattage of all new and retrofitted luminaires is 2000 watts or less, each altered space shall comply with the LPA of Table 9.6.1 and Section 9.6.2, or the alteration shall result in a new wattage at least 50% below the original wattage of each altered lighting system. Additionally, the new and retrofitted lighting shall comply with the control requirements of Sections 9.4.1.1(a), 9.4.1.1(h), 9.4.1.1(i) as applicable to each altered space as shown on Table 9.6.1 and Section 9.6.2.

9.1.2.2 Lighting Alterations for Exterior Building Areas

The alteration of a lighting system for an exterior area shall use only the area specific allowances in Table 9.4.2-2 and shall not use the Base Site Allowances to determine the LPA. Additionally, the exterior alteration shall meet one of the following:

- a. The alteration shall comply with Section 9.2 when the total number of new and retrofitted luminaires is greater than 10, or where the combined length of new and retrofitted linear luminaires is greater than 20 linear feet (6.1 linear meters).
- b. Where the total number of new and retrofitted luminaires is not greater than 10 or where the combined length of new and retrofitted linear luminaires is not greater than 20 linear feet (6.1 linear meters) of linear luminaires, the total wattage of the alteration shall be no greater than the maximum LPA permitted by Table 9.4.2-2, or the total new wattage shall be at least 50% below the total original wattage of that lighting system. Additionally, the new and retrofitted lighting shall comply with the control requirements of Section 9.4.1.4(a).

9.1.4 Interior and Exterior Luminaire Wattage

...

- f. The wattage of a retrofitted luminaire shall be the manufacturer's labeled input power of the new light source plus driver.
- fg. The wattage of all other miscellaneous lighting equipment shall be the specified wattage of the lighting equipment.

REFERNCE ONLY: Additional information not part of the addendum

EXAMPLE 1 – an existing building built to meet the 90.1-2010 Standard

When designed in 2010, the LPD for open office was 0.98W/sf and 1.11 for private office. A typical design for office was one 2-lamp T8 luminaire every 64 square feet (8ft by 8ft spacing) at 58 watts each. A 25 to 28 watt LED troffer can replace the fluorescent luminaire on the same spacing. $28W/58W = 48\%$ of the original lighting load.

Using the existing language, the designer could ignore the Exceptions and meet the LPD of either 9.5 or 9.6 and the controls requirements except daylighting control requirements.

Alternately the designer could look at the Exceptions. Exception 1 is not allowed as they are altering more than 20% of the lighting load. Exception 2 would be allowed as this is a one-for-one replacement, only automatic or scheduled shutoff controls would be required.

Using the proposed language, if the proposed new/alterd wattage is over 2000 watts, 9.1.2.1.a is required to be followed and the designer would be required to meet all of Chapter 9 (this is similar to not being able to use either existing exception except daylighting controls would be required). If the proposed new/alterd wattage is 2000 watts or less, 9.1.2.1.b is used and the designer can either meet the LPA of 9.6 or reduce the lighting load by at least 50%, and meet the local control, the automatic or scheduled shutoff controls. If the designer uses a 28 watts luminaire the 2,000 watt threshold would allow 70 luminaires which would permit a 4,500 square foot project alteration, putting a limit on the scale of projects using the exception.

For exterior the 10 luminaire threshold would only allow for a small parking lot, minimal façade lighting, or the entry lighting to be altered before the full requirements would need to be met.

EXAMPLE 2

School classroom of 1,200 square feet (30 foot by 40 foot). Existing lighting of 16, 3-lamp T8 fluorescent luminaires.

Using the existing Alterations language.

Option – do not take any of the exceptions. Meet lighting power density (LPD) allowances of Section 9.5.1 or 9.6.1 and the control requirements of Section 9.4.1.1 (a), (b), (c), (d), (g), (h), and (i), as applicable to that space.

Option – Take Exception #1. If all of the luminaires are altered, the altered load is over the 20% threshold and the exception can't be used.

Option – Take Exception #2. If all of the luminaires are replaced on a one-for-one basis or the lamps/ballasts are replaced, then must meet the 2019 LPA and Section 9.4.1.1(h) or 9.4.1.1(i). If all lights are removed and only 12 new lights are installed then the exception can't be used as it is not a one-for-one alteration.

Using the proposed language.

Option – do not take the exception. Meet lighting power density (LPD) allowances of Section 9.6.1 and the control requirements of Section 9.4.1.1 (a), (b), (c), (d), (e), (f), (g), (h), and (i), as applicable to that space. (Additionally, control (e) and (f) – daylighting controls would be required)

Option – take the interior exception. Sixteen 3-lamp T8 luminaires at 88 watts = 1,408 existing watts. Replaced with 16 LED luminaires at 35 watts = 560 watts. New watts are under the 2,000 watt threshold so the exception can be taken. The control requirements of Section 9.4.1.1(a), 9.4.1.1(h), 9.4.1.1(i) as applicable to each altered space. The new wattage is 40% of the existing so the wattage threshold is met. Luminaires could be 44 watts each at meet the 50% reduction or twelve luminaires at 58 watts each could be installed. Three classrooms could be altered ($3 \times 560 = 1,680$ new watt). (Additionally, control (a) – local controls would be required)