

Public Review Draft

Proposed Addendum be to Standard 189.1-2017

Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

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

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Foreword

This addendum updates the lighting quality section to include new requirements for dimming controls, color rendition, and flicker. It also clarifies the applicability of the requirements and adds relevant normative references.

[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 be to 189.1-2017

Add the following definition to Section 3.2:

3.2 Definitions

general lighting: see ANSI/ASHRAE/IES Standard 90.1.

Revise Section 8.3.5 as follows:

~~8.3.5 Lighting Quality.~~ The interior lighting and lighting controls shall be installed to meet the requirements of Sections ~~8.3.5.1 and 8.3.5.2.~~

8.3.5 Indoor Lighting Quality. Lighting in *spaces* regularly occupied for more than an hour per day by at least one person shall comply with all the following requirements:

8.3.5.1 Enclosed Office Spaces. Lighting for at least 90% of enclosed office *spaces* with less than 250 ft² (23.3 m²) of floor area shall comply with at least one of the following:

- a. Provide ~~multilevel lighting control.~~
- b. Provide ~~bilevel lighting control and separate task lighting.~~

8.3.5.1 Controllability. *General lighting* shall be continuously dimmable to 10% or less of full light output and be controlled by a local control capable of manual dimming. Forward phase-cut *dimmers* shall comply with NEMA SSL 7A Section 3.

Exception. *General lighting* in the following *spaces*: manufacturing areas, workshops, laboratories, kitchens, loading docks and storage spaces.

8.3.5.2 Lighting Control Labelling for Multi-occupant Spaces. *General lighting* Lighting for conference rooms, meeting rooms, multipurpose rooms, gymnasiums, auditoriums, ballrooms, cafeterias, *classrooms*, and other training or lecture rooms shall be provided with ~~multilevel lighting control~~. ~~have~~ Lighting settings ~~of or the lighting controlled by~~ each manual control shall be labeled at the control devices. The lighting in gymnasiums, auditoriums, ballrooms, and cafeterias shall also consist of at least two separately controlled groups of luminaires.

8.3.5.3 Color Rendition. At least 95% of lighting power of nominally white lighting within each *enclosed space* shall be provided by luminaires that meet the following criteria at full light output in accordance with P2 and F3 in Annex E of IES-TM-30:

- a. R_f of at least 85,
- b. $R_{f,h1}$ of at least 85,
- c. R_g of at least 92, and
- d. $R_{cs,h1}$ of at least -7% but no greater than 19%.

Nominally white lighting is lighting which has chromaticity within the basic or extended nominal color correlated temperature (CCT) specifications of ANSI C78.377.

Where a lighting system is capable of changing its spectrum, it shall be capable of meeting the color rendition requirements within each nominal CCT of 2700 K, 3500 K, 4000 K, and 5000 K, as defined in ANSI C78.377, that the system is capable of delivering.

Lighting systems where spectrum changes through dimming alone shall meet the color rendition requirements at full light output.

8.3.5.4 Flicker. All *general lighting* shall comply with 8.3.5.4.1 or 8.3.5.4.2.

8.3.5.4.1 Percent Amplitude Modulation. *General lighting* shall be tested and calculated in accordance with CA Title 24, part 6, Appendix JA10. Non-dimmable sources shall be tested at full light output. Dimmable sources shall be tested at full light output and at a dimmed state that is the greater of 20% of full light output and minimum light output.

All lamps and light sources shall have percent amplitude modulation no greater than the values listed in Table 8.3.5.4.1 for all listed cut-off frequencies at full light output. Dimmable lamps and dimmable light sources shall also comply with the requirements in Table 8.3.5.4.1 at the dimmed state.

Table 8.3.5.4.1 Maximum Percent Modulation for light sources tested in accordance with California Title 24, JA10.

<u>T-24 JA10 Cut-off frequency (Hz)</u>	<u>Integrated lamps with the following ANSI standard base types: E26, E26d, E17, E11, E12, G4, G9, GU10, GU24, GU5.3, or GX5.3</u>		<u>All other lamps and light sources</u>	
	<u>Amplitude Modulation at full output</u>	<u>Amplitude Modulation at greater of 20% and min output</u>	<u>Amplitude Modulation at full output</u>	<u>Amplitude Modulation at greater of 20% and min output</u>
40	1.0%	1.0%	1.0%	1.0%
90	2.3%	3.2%	1.6%	1.6%
200	16.0%	22.4%	9.6%	9.6%
400	32.0%	32.0%	24.0%	24.0%
1000	80.0%	80.0%	56.0%	56.0%

8.3.5.4.2 Stroboscopic Visibility Measure (SVM) and Short-Term Flicker Indicator (Pst). The Stroboscopic Visibility Measure (SVM) and Short-Term Flicker Indicator (Pst) of *general lighting* shall be tested and calculated in accordance with NEMA 77. Non-dimmable sources shall be tested at full light output. Dimmable sources shall be tested at full light output and at a dimmed state that is the greater of 20% of full light output and minimum light output.

All light sources shall have a Stroboscopic Visibility Measure (SVM) of no greater than 0.4 and a Short-Term Flicker Indicator (Pst) of no greater than 1.0 at all required test conditions.

Add references to Section 11 as follows:

11. NORMATIVE REFERENCES

Section numbers indicate where the reference occurs in this document.

Reference	Title	Section
<p>American National Standards Institute (ANSI) 25 West 43rd Street New York, NY 20036, United States 1-212-642-4900; www.ansi.org</p> <p><u>ANSI C78.377-2017</u></p>	<p><u>American National Standard for Electric Lamps— Specifications for the Chromaticity of Solid State Lighting (SSL) Products</u></p>	<p><u>8.3.5.3</u></p>
<p>California Energy Commission 1516 Ninth St. Sacramento, CA 95814, United States 1-916-654-5106, www.energy.ca.gov</p> <p><u>2019 Title 24 Part 6, JA 10</u></p>	<p><u>Reference Appendices for the 2019 Building Energy Efficiency Standards. Joint Appendix JA10 Test Method for Measuring Flicker of Lighting Systems and Reporting Requirements</u></p>	<p><u>8.3.5.4</u></p>
<p>National Electrical Manufacturers Association (NEMA) 1300 North 17th Street, Suite 900 Rosslyn, VA 22209, United States 1-703-841-3200; www.nema.org</p> <p><u>NEMA SSL7A-2015</u></p> <p><u>NEMA 77-2017</u></p>	<p><u>Phase-Cut Dimming for Solid State Lighting – Basic Compatibility</u></p> <p><u>Standard for Temporal Light Artifacts: Test Methods and Guidance for Acceptance Criteria</u></p>	<p><u>8.3.5.1</u></p> <p><u>8.3.5.4</u></p>
<p>Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001, United States 1-212-248-5017, www.ies.org</p> <p><u>IDA/IES Model Lighting Ordinance TM-30-2018</u></p>	<p><u>Model Lighting Ordinance (MLO)</u></p> <p><u>IES Method for Evaluating Light Source Color Rendition</u></p>	<p><u>5.3.6</u></p> <p><u>8.3.5.3</u></p>