

# Public Review Draft

Proposed Addendum i to Standard 189.1-2017

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

First Public Review (September 2018)  
(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](http://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](http://www.ashrae.org/bookstore) or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

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, 1791 Tullie Circle, NE, Atlanta, GA 30329. Phone: 404-636-8400, Ext. 1125. Fax: 404-321-5478. E-mail: [standards.section@ashrae.org](mailto:standards.section@ashrae.org).

ASHRAE, 1791 Tullie Circle, NE, Atlanta GA 30329-2305



© 2018 ASHRAE This is a working draft document intended for review only by the cognizant ASHRAE groups and other designated reviewers and is not for distribution to any private interests, individuals or third parties that are not designated as ASHRAE reviewers for this document. This document may not be distributed in whole or in part in either paper or electronic form outside of the PC without the express permission of the MOS and shall include a statement indicating such. The appearance of any technical data or editorial material in this draft 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.

**(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 proposes to update the cooling tower requirements by specifying different maximum concentrations of contaminants for different cooling tower materials and simplifying the calculations for meeting the requirements.

This addendum also proposes to move the prescriptive cooling tower requirements in 6.4.2.1 with a set of revised mandatory requirements in section 6.3. A previous addendum (designated as s), moved these requirements from section 6.4 to section 6.3 but did not revise them. The intent is to replace the current cooling tower requirements with those shown below in 6.3.2.3.

*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. Only these changes 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 substantive changes.*

## Addendum i to 189.1-2017

---

*Add to section 3.3*

*Modify section 3 as follows:*

Langelier Saturation Index (LSI): a measure of a solution's ability to dissolve or deposit calcium carbonate that is often used as an indicator of the corrosivity of water, calculated using the following formula:

$$\text{LSI} = \text{pH} - \text{pH}_s$$

where

pH is the measured water pH

pH<sub>s</sub> is the pH at saturation in calcium carbonate

*Modify Section 6.3.2.3 as follows:*

### 6.3.2.3 HVAC Systems and Equipment

© 2018 ASHRAE This is a working draft document intended for review only by the cognizant ASHRAE groups and other designated reviewers and is not for distribution to any private interests, individuals or third parties that are not designated as ASHRAE reviewers for this document. This document may not be distributed in whole or in part in either paper or electronic form outside of the PC without the express permission of the MOS and shall include a statement indicating such. The appearance of any technical data or editorial material in this draft 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.

- a. *Once-through cooling with potable water is prohibited.*
- b. ~~The water being discharged from cooling towers for air conditioning systems such as chilled water systems shall be limited in accordance with method (1) or (2):~~
  - 1. ~~For makeup waters having less than 200 ppm (200 mg/L) of total hardness expressed as calcium carbonate, by achieving a minimum of 5 cycles of concentration.~~
  - 2. ~~For makeup waters with more than 200 ppm (200 mg/L) of total hardness expressed as calcium carbonate, by achieving a minimum of 3.5 cycles of concentration.~~

**Exception to 6.3.2.3(b):** Where the total dissolved solids concentration of the discharge water exceeds 1500 mg (1500 ppm/L) or the silica exceeds 150 ppm (150 mg/L) measured as silicon dioxide before the above *cycles of concentration* are reached.

b. The design of open circuit cooling towers for air conditioning systems, including the materials used to construct them and their water treatment systems shall not allow water exchange (blowdown) until one or more of the parameters in Table 6.3.2.3 reaches 90% or more of the maximum value specified in Table 6.3.2.3. The system shall be tolerant of pH levels between 7.0 and 9.2.

**Table 6.3.2.3 Recirculating Water Properties for Open Circuit Cooling Tower Construction**

<u>Recirculating Water Parameters</u>	<u>Maximum Value</u>
<u>Conductivity (micro-ohms)</u>	<u>3,300</u>
<u>Total Dissolved Solids (ppm)</u>	<u>2,050</u>
<u>Total Alkalinity as CaCO3 (ppm) excluding Galvanized Steel</u>	<u>600</u>
<u>Total Alkalinity as CaCO3 (ppm) Galvanized Steel (passivated)</u>	<u>500</u>
<u>Calcium Hardness as CaCO3 (ppm)</u>	<u>600</u>
<u>Chlorides as Cl (ppm)</u>	<u>300</u>
<u>Sulfates (ppm)</u>	<u>250</u>
<u>Silica (ppm)</u>	<u>150</u>
<u>LSI (Langelier Saturation Index)</u>	<u>+2.8</u>

c. The materials of construction for the water cooling system that comes in contact with cooling tower water shall be of the type that can operate and be maintained within the limits set in Table 6.3.2.3.

© 2018 ASHRAE This is a working draft document intended for review only by the cognizant ASHRAE groups and other designated reviewers and is not for distribution to any private interests, individuals or third parties that are not designated as ASHRAE reviewers for this document. This document may not be distributed in whole or in part in either paper or electronic form outside of the PC without the express permission of the MOS and shall include a statement indicating such. The appearance of any technical data or editorial material in this draft 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.

e. ~~d.~~ Open circuit ~~C~~cooling towers, closed circuit cooling towers, and evaporative condensers ~~coolers~~ shall be equipped with makeup ~~and blowdown~~ water meters, conductivity controllers, and overflow alarms in accordance with the thresholds listed in Table 6.3.4.1b. Cooling towers shall be equipped with ~~efficient~~ drift eliminators that ~~achieve~~ reduce drift to a ~~maximum of~~ 0.002% or less of the recirculated water ~~volume~~ flow for counterflow towers and 0.005% or less of the recirculated water flow for cross-flow towers.

~~d.~~ e. *Building projects* located in regions where the ambient mean coincident wet-bulb temperature at 1% design cooling conditions is greater than or equal to 72°F (22°C) shall have a system for collecting condensate from air-conditioning units with a capacity greater than 65,000 Btu/h (19 kW), and the condensate shall be recovered for reuse.