



# ADDENDA

**ANSI/ASHRAE Addendum b to  
ANSI/ASHRAE Standard 188-2015**

# **Legionellosis: Risk Management for Building Water Systems**

Approved by the ASHRAE Standards Committee on June 23, 2017; by the ASHRAE Tech Council on June 28, 2017; and by the American National Standards Institute on June 29, 2017.

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## FOREWORD

*Addendum b adds the definition of “construction documents.” It also revises multiple portions of the standard to remove permissive language and replace it with mandatory code-enforceable language and removes a reference that is not used in the normative section.*

**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 b to Standard 188-2015

#### Modify Section 3 as shown (I-P and SI).

**construction documents:** drawings and specifications used to construct a building, building systems, or portions thereof.

**control limit:** a maximum value, a minimum value, or a range of values to which of a chemical or physical parameter associated with a *control* measure must be that are monitored and maintained in order to reduce the occurrence of a *hazardous condition* to an acceptable level.

**hazard:** *Legionella* bacteria in a *building water system* that, in the absence of *control*, can cause has the potential to cause harm to humans.

#### Modify Section 4.2.1 as shown (I-P and SI).

**4.2.1** The building owner shall survey each existing building, new building, and any renovation, addition, or modification to an existing building and its water systems as described in Section 5. The survey and conformance with the compliance requirements of Section 4 ~~must occur~~ shall be completed prior to occupancy of a new building and before construction begins on renovations, additions, or modifications to existing buildings. If the building and associated property has

- any of the *building water systems* listed in Section 5.1, then all of those *building water systems* shall comply with the requirements of Section 6 and all applicable requirements of Section 7 of this standard.
- any of the factors listed in Section 5.2, then all potable *building water systems* and all *building water systems* listed in Section 5.1 shall comply with the requirements of Sections 6 and all applicable requirements of Section 7 of this standard.

#### Modify Section 5.1 as shown (I-P and SI).

**5.1** The building shall be surveyed to determine whether ~~it~~ the building has one or more of the following:

- Open and closed-circuit cooling towers or evaporative condensers that provide cooling, ~~and/or~~ refrigeration, or both cooling and refrigeration for the *HVAC&R* system or other systems or devices in the building;
- Whirlpools or spas, either in the building or on the site; ~~or~~
- Ornamental fountains, misters, atomizers, air washes, humidifiers, or other *nonpotable* water systems or devices that release water aerosols in the building or on the site.

#### Modify Section 6.1.3 as shown (I-P and SI).

**6.1.3 Control Limits.** For each *control measure* at each *control location* established in Section 6.1.2, determine the control limits including ~~but not limited to~~ a maximum value, a minimum value, or a range of values within which of a chemical or physical parameter ~~must~~ that shall be monitored and maintained in order to reduce *hazardous conditions* ~~to an acceptable level~~.

#### Modify Section 6.2.1 as shown (I-P and SI).

**6.2.1 Program Team.** Identify the persons on the *Program Team* responsible for developing and implementing the *Program* and the *Program Team's* tasks ~~for which they are responsible~~. The *Program Team* shall include one or more individuals selected from the following: the building owner or *designee*, employees, suppliers, consultants, or other individual or individuals ~~to whom the building owner has delegated authority and responsibility that the building owner has delegated to have authority and responsibility~~ for the actions required by the *Program*. The *Program Team* ~~can~~ shall be permitted to delegate *Program* tasks to subgroups. The *Program Team* shall have knowledge of the *building water system* design and water management as ~~it relates related~~ to *legionellosis* ~~that can be obtained through informative documents, such as ASHRAE Guideline 12, Minimizing the Risk of Legionellosis Associated with Building Water Systems~~.

**Informative Note:** Knowledge related to legionellosis can be obtained through peer reviewed informative documents such as ASHRAE Guideline 12, *Minimizing the Risk of Legionellosis Associated with Building Water Systems*.

#### Modify Section 6.2.2 as shown (I-P and SI).

**6.2.2 Describe the Building Water Systems.** The *Program Team* shall identify and describe the *potable* and *nonpotable water systems* within the building and on the building site, including ~~(at a minimum)~~

- the locations of end-point uses of potable and nonpotable water systems,
- the locations of water processing equipment and components, and
- how water is received and processed, including how water is (conditioned, stored, heated, cooled, recirculated, and delivered to end-point uses).

#### Modify Section 6.2.3 as shown (I-P and SI).

**6.2.3 Process Flow Diagrams.** The information from Section 6.2.2 ~~must~~ shall be graphically described in step-by-step

*process flow diagrams.* The *process flow diagrams* shall have ~~sufficient detail to that~~ enables the identification, analysis, and management of the risk of *legionellosis* throughout the *building water systems*. The *Program Team* shall confirm that the *process flow diagrams* are representative of the systems as built.

**Modify Section 6.2.4 as shown (I-P and SI).**

**6.2.4 Analysis of Building Water Systems.** The *Program Team* shall use the *process flow diagrams* in Section 6.2.3 to evaluate where *hazardous conditions* ~~may have the potential to occur~~ in the *building water systems* and determine where *control measures* ~~can~~ shall be applied to *control* potentially hazardous system conditions. The analysis shall consider also ~~take into consideration~~ the vulnerability of occupants and shall include the *building water systems* identified in Section 5.1. The analysis shall include provisions to respond to water service disruptions.

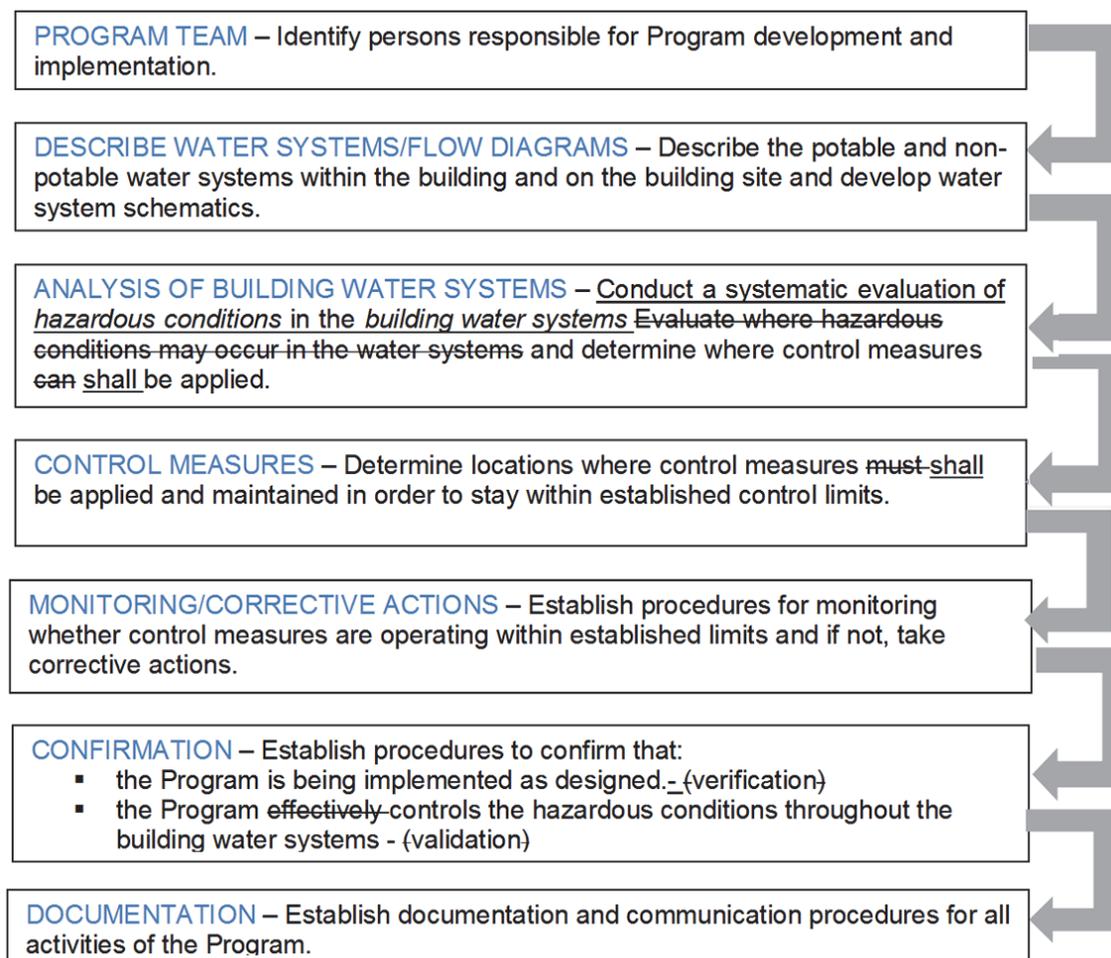
**Modify Section 6.2.8 as shown (I-P and SI).**

**6.2.8 Program Confirmation.** The *Program Team* shall establish procedures to confirm, both initially and on an

ongoing basis, that the *Program* is being implemented as designed. ~~The resulting process is (verification).~~ The *Program Team* shall establish procedures to confirm, both initially and on an ongoing basis, that the *Program*, when implemented as designed, ~~effectively~~ controls the *hazardous conditions* throughout the *building water systems*. The resulting process is (validation). The *Program Team* shall determine whether *testing* for *Legionella* shall be performed and if so how test results will be used to validate the *Program*. If the *Program Team* determines that *testing* is to be performed, the *testing* approach, including sampling frequency, number of samples, locations, sampling methods, and test methods, shall be specified and documented. The *Program Team* shall consider include ~~consideration of~~ the following as part of the determination of whether to test for *Legionella*:

- a. *Program control limits* are not maintained in *building water systems*, including in water systems with supplemental *disinfection*.
- b. A health care facility provides in-patient services to at-risk or immunocompromised populations.
- c. A prior history of *legionellosis* is associated with the *building water system*.

**Revise Figure 1 as shown.**



**FIGURE 1** Elements of a water management program.

**Modify Section 7.1.2 as shown (I-P and SI).**

**7.1.2 System Maintenance.** The *Program* documents shall include procedures for

- a. inspection of, and inspection schedule for, water-containing vessels and system components;
- b. flushing or mixing of stagnant or low-flow areas;
- c. maintenance and *monitoring* procedures based on equipment manufacturers' ~~recommendations~~ instructions for cleaning, *disinfection*, replacement of system components, and other treatments that the *Program Team* decides are necessary for the following:
  1. Hot-water and cold-water storage tanks
  2. Ice machines
  3. Water-hammer arrestors
  4. Expansion tanks
  5. Water filters
  6. Shower heads and hoses
  7. Electronic faucets
  8. Aerators
  9. Faucet flow restrictors
  10. Nonsteam aerosol-generating humidifiers
  11. Water heaters
  12. Infrequently used equipment, including eyewash stations and showers

[ . . . ]

**Modify Section 7.1.4 as shown (I-P and SI).**

**7.1.4 Contingency Response Plan.** For both hot water and cold water systems, the *Program* documents shall include

- a. procedures to be followed if there are known or suspected cases of *legionellosis* associated with the use of *potable* water from the *building water systems*;
- b. directives issued by national, regional, and local health department authorities;
- c. if the *Program Team* determines testing for *Legionella* shall be performed, the procedures shall include criteria for when and where the tests shall be performed;
- d. procedures for emergency *disinfection*; and
- e. procedures for other actions ~~identified as necessary as determined~~ by the *Program Team* to prevent exposure to contaminated water.

**Modify Section 7.2 as shown (I-P and SI).**

**7.2 Cooling Towers and Evaporative Condensers.** This section describes the preventive measures required for cooling towers and evaporative condensers that provide cooling, ~~and/or refrigeration,~~ or both cooling and refrigeration for the *HVAC&R* system or for other devices or systems in the building. The *Program* documents shall include identification of the responsible persons for every step of each *Program* requirement.

**Modify Section 7.3.5.1 as shown (I-P and SI).**

**7.3.5.1 Microbiological Testing.** The *Program* documents shall include procedures for

- a. a minimum of monthly ~~or more frequent~~ *testing* of spa water for indicator organisms and pathogens identified by the *Program* microbiological standards;
- b. maintaining the total heterotrophic aerobic bacteria colony count at or below the maximum level specified by local, regional, and national codes and regulations or  $\leq 200$  CFU/mL if ~~no~~ codes or regulations do not apply;
- c. maintaining the levels of indicator organisms at or below the standard threshold;
- d. when and where tests shall be performed, proper sampling procedures, and the interpretation of test results ~~should~~ when the *Program Team* determines that *testing* for *Legionella* or other pathogens is required;
- e. responding to ~~unsatisfactory~~ test results including *disinfection* record review and repetition of microbiological tests.

**Modify Section 7.5.1 as shown (I-P and SI).**

**7.5.1 Equipment Siting.** Prior to beginning construction for installation of new or replacement aerosol-generating misters, atomizers, air washers, or humidifiers, drawings shall be reviewed and the following items addressed:

- a. Potential contamination from sources that can be drawn into the system
- b. ~~Inadequate~~ Access to pumps, filters, and treatment equipment for maintenance and inspection
- c. External heat sources and ~~inadequate~~ restricted airflow that increases the temperature and thereby the *risk* of amplification ~~of exposure to~~ of *Legionella*.

**Modify Section 8.1 as shown (I-P and SI).**

**8.1 General.** When designing for new construction, renovations, refurbishment, replacement, or repurposing of a facility, the following shall be documented:

- a. A system overview and intended mode of system operation
- b. ~~Documentation and~~ Design compliance ~~to that addresses~~ hazardous conditions for each of the following:
  1. Schematic diagrams of water systems
  2. *Monitoring* and control diagrams of water systems
  3. Local, regional, and national code compliance
  4. Locations of the following points: makeup, flush, sampling, temperature monitoring, and drain
  5. Locations of outdoor air intakes
  6. Building water equipment
  7. Commissioning
  8. Operating instructions and procedures
  9. Maintenance schedules, frequencies, and procedures
  10. No-flow and low-flow portions of the piping and *building water systems*
  11. Impact of heat loss from hot water or heat gain by cold water in piping and water system components
  12. ~~Possible~~ Cross connections between potable and *nonpotable* water

13. ~~Inadequate~~ Access to water expansion tanks, water hammer arrestors, water storage tanks, water heaters, and other equipment and components ~~containing that~~ contain water

**Modify Section 9 as shown (I-P and SI).**

## 9. REFERENCES

1. ASME. 2012. ASME/ANSI A112.1.2-2012, *Air Gaps in Plumbing Systems (for Plumbing Fixtures and Water-Connected Receptors)*. New York, New York: The American Society of Mechanical Engineers.
2. AWWA. 2014. AWWA/ANSI C651-14, *Disinfecting Water Mains*. Denver, Colorado: American Water Works Association.
3. AWWA. 2011. AWWA/ANSI C652-11, *Disinfection of Water Storage Facilities*. Denver, Colorado: American Water Works Association.
4. EPA. 1979. ~~Pesticides: Science and Policy. Swimming Pool Water Disinfectants. DIS/TCC-12, U.S. Environmental Protection Agency, Washington, DC. [http://www.epa.gov/oppad001/dis\\_tss\\_does/dis-12.htm](http://www.epa.gov/oppad001/dis_tss_does/dis-12.htm).~~

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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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