



STANDARD

ANSI/ASHRAE Standard 188-2021
(Supersedes ANSI/ASHRAE Standard 188-2018)
Includes ANSI/ASHRAE addenda listed in Appendix D

Legionellosis: Risk Management for Building Water Systems

See Informative Appendix D for approval dates.

This Standard is under continuous maintenance 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>).

The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 180 Technology Parkway NW, Peachtree Corners, GA 30092. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

© 2021 ASHRAE ISSN 1041-2336



Understanding Water Safety During Construction - from Design to Occupancy

Presented by Mike Dawson, Phigenics

Phigenics' Bias Disclosure

Phigenics provides INDEPENDENT expert guidance for the development and implementation of water management programs to prevent building-associated injury and disease and to improve operational efficiency for facilities.

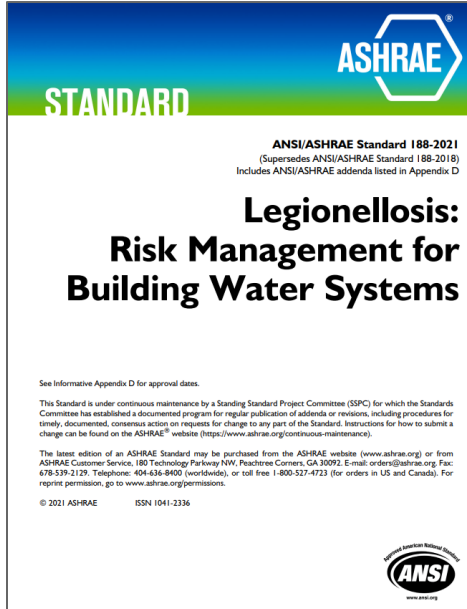
We provide real-time monitoring solutions, cloud-based data management, and environmental testing for all waterborne pathogens and analytical services for water chemistry.

Phigenics does not sell water treatment chemicals or disinfection products, nor do we have commercial affiliation or funding from suppliers or manufacturers of such products.

Learning Objectives

1. **Review** current industry guidance for key considerations
2. **Determine** how a Water Management Team can utilize guidance from ASHRAE Standard 188:2018 to address water management for construction for their program
3. **Review** lessons learned from other construction projects and Teams.

How to Align with Industry Requirements: Industry Leading Guidances for WMPs



ASHRAE
STANDARD

ANSI/ASHRAE Standard 188-2021
(Supersedes ANSI/ASHRAE Standard 188-2018)
Includes ANSI/ASHRAE addenda listed in Appendix D

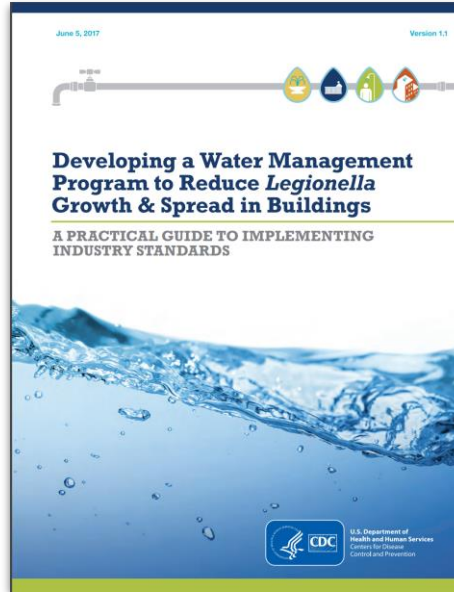

Legionellosis: Risk Management for Building Water Systems

See Informative Appendix D for approval dates.

This Standard is under continuous maintenance 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>).

The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 180 Technology Parkway NW, Peachtree Corners, GA 30092. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8900 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.



© 2021 ASHRAE ISSN 1041-2336




June 5, 2017 Version 1.1

Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings

A PRACTICAL GUIDE TO IMPLEMENTING INDUSTRY STANDARDS



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention



DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850

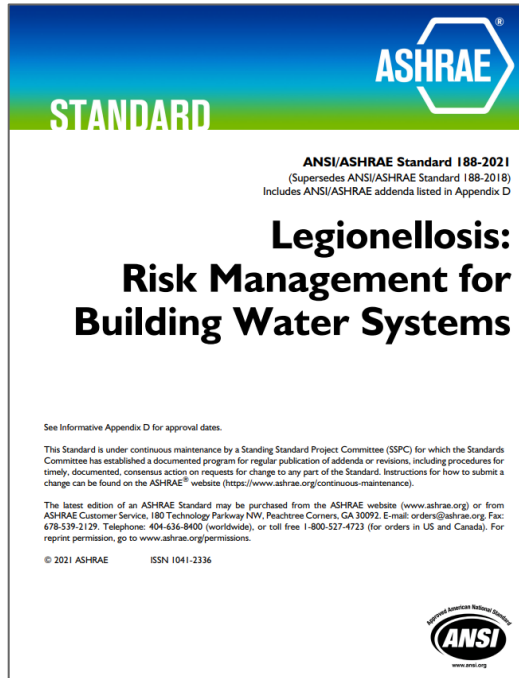
Center for Clinical Standards and Quality/Quality, Safety and Oversight Group

DATE: June 02, 2017
TO: State Survey Agency Directors
FROM: Director
Quality, Safety and Oversight Group (formerly Survey & Certification Group)
SUBJECT: Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)

Ref: QSO-17-30- Hospitals/CAHs/NHS
REVISED 07.06.2018

****Revised to Clarify Expectations for Providers, Accrediting Organizations, and Surveyors****

ASHRAE Standard 188 Compliance w/Construction Activities



Section 4.2 Building Owner Requirements

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 **prior to occupancy** of a new building and **before construction begins** on renovations, additions, or modifications to existing buildings.

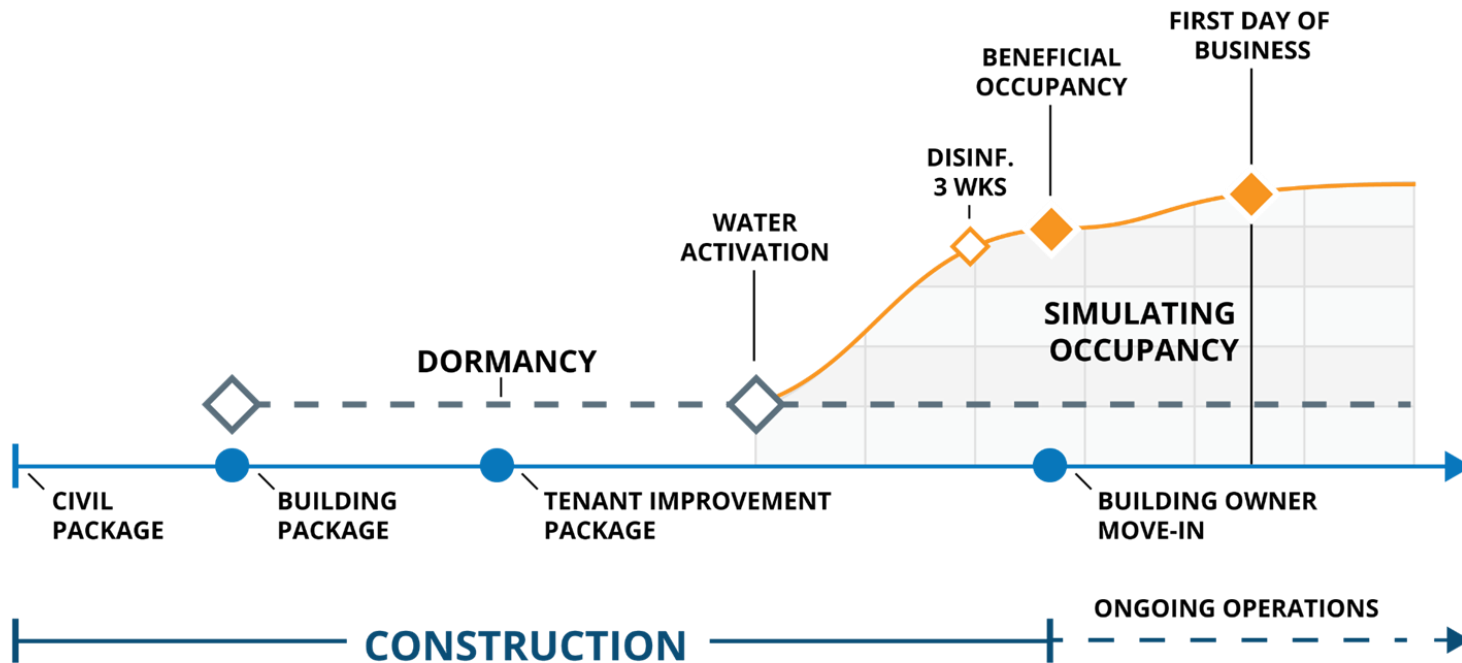
ASHRAE Standard 188 Compliance w/Construction Activities

Section 8.1-8.3 Design, Documents and Balancing

Section 8.4 Commissioning

- **Instructions for Commissioning shall be provided to the building owner.**
- **Procedures for disinfection follow AWWA Standard C651 & C652**
- **Procedures for disinfection and flushing**
 - Complete within **3 weeks** prior to whole or partial beneficial occupancy
 - If beneficial occupancy delayed 2 weeks but not more than 4 weeks after disinfection, flushing of **all fixtures** shall again be completed
 - If beneficial occupancy of any part of the building is delayed **4 weeks or more** after disinfection, the need for disinfection, flushing, or both disinfection and flushing of unoccupied areas shall be determined by the (Water Management) Program Team

Water Activation Larger Building Project Schedule



Water Management for Construction



Policy Review

- assess the organization's ICRA and construction policies for the inclusion of water safety.

During Construction Activities

- develop a project specific water management for construction using the 7-steps of water management per ASHRAE Standard 188



During Commissioning Activities

- develop a project specific water management for commissioning plan for all water systems (potable and utility)

Overlaying WMP + ICRA

Water Management Program with Infection Control Risk Assessment

**Complex or Large Projects
with WMC Risk Management Process
Typical > 30-day duration**

7 STEPS OF THE SUSTAINABLE COMPREHENSIVE WATER MANAGEMENT PROGRAM



**Small to Medium Projects
with Prescriptive Hazard Controls
Typical ≤ 30-day duration**

	Type A	Type B	Type C	Type D
Low Risk Group	I	II	II	III/IV
Medium Risk Group	I	II	III	IV
High Risk Group	I	II	III/IV	IV
Highest Risk Group	II	III/IV	III/IV	IV

Lessons Learned - Findings

- **Initial project schedule** - not addressing water commissioning
- **Lack of routine and adequate flushing protocols** - leading to high bacteria and waterborne pathogens
- **Temperature settings** – mixing valves, water heaters, pumps
- **Defective Equipment** – pumps, mixing valves
- **Substitutions** - on products without building owner approval
- **Lack of disinfectant residual** – pre-planning, during & post-construction
- **Premature installation** - of equipment with water reservoirs
- **Sediment invasion** - into the water system from on or off-site construction
- **Lack of WMP Standards & Awareness** – training or understanding of water management terminology in facilities or construction teams
- **Post-construction unoccupied building spaces** - building dormancy

Q & A

Reference Listing

1. ASHRAE (American Society of Heating Refrigeration Air Conditioning Engineers). (2015) Standard 188-2015 – Legionellosis: Risk Management for Building Water Systems (ANSI Approved), Product Code: 86603, 1-16. Available at: <https://www.ashrae.org/resources--publications/bookstore/ansi-ashrae-standard-188-2015-legionellosis-risk-management-for-building-water-systems>
2. Bartley, J. (2009) Infection Control Risk Assessment Matrix of Precautions for Construction and Renovation. Available at: http://www.ashae.org/resources/tools/pdfs/assessment_icra.pdf
3. Bartley, J. M., Olmsted, R. N., & Haas, J. (2010). Current views of health care design and construction: Practical implications for safer, cleaner environments. *AJIC: American Journal of Infection Control*, 38(5), S1-S12. 10.1016/j.ajic.2010.04.19
4. Clark, C. (2000) Lax controls at Scripps cited after infections | Inspectors say La Jolla hospital failed to stop exposure to fungus. *San Diego Union Tribune*. 29-March-2000, page A-1. Available at: <http://www.mmjglobal.com/uploads/1297290259.pdf>
5. CDC (Center for Disease Control and Prevention). (2016) Vital Signs: Legionnaires' Disease Use water management programs in buildings to prevent outbreaks. Available at: <https://www.cdc.gov/vitalsigns/pdf/2016-06-vitalsigns.pdf>
6. CDC (Center for Disease Control and Prevention). (2018). *Legionella*: Health Water Management Programs Frequently Asked Questions. Available at: <https://www.cdc.gov/legionella/water-system-maintenance/healthcare-wmp-faq.html>
7. CDC. Guidelines for Environmental Infection Control in Health-Care Facilities: recommendations of CDC and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR* 2003;52(No. RR-10);1-42.
8. CDC (Center for Disease Control and Prevention). (2016). Vital Signs: Deficiencies in Environmental Control Identified in Outbreaks of Legionnaires' Disease – North America, 2000-2014. *MMWR* 2016; 65(No. 22); 576-584.
9. CMS (Center for Medicare and Medicaid Services) Memo (2017). Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD). S&C 17-30 Available at: <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-17-30.pdf>
10. Francois-Watkins, L., Toews, K., Harris, A., Davidson, S., Ayers-Millsap, S., Lucas, C., . . . Kutty, P. (2017). Lessons From an Outbreak of Legionnaires' Disease on a Hematology-Oncology Unit. *Infection Control and Hospital Epidemiology*, 38(3), 306-313.
11. Health Canada. (2001). Construction-related nosocomial infections in Patients in Health Care Facilities: Decreasing the Risk of *Aspergillus*, *Legionella*, and Other Infections. ISSN 1188-4169, *CCDR* (2752), 1-55.
12. Knox, N. C., Weedmark, K. A., Conly, J., Ensminger, A. W., Hosein, F. S., Drews, S. J., & and the *Legionella* Outbreak Investigative Team. (2017). Unusual Legionnaires' outbreak in cool, dry Western Canada: an investigation using genomic epidemiology. *Epidemiology and Infection*, 145(2), 254–265. <http://doi.org/10.1017/S0950268816001965>
13. Krøjgaard, L. H., Krogfelt, K. A., Albrechtsen, H. J., & Uldum, S. A. (2011). Cluster of legionnaires disease in a newly built block of flats, Denmark, December 2008 - January 2009. *Euro Surveillance: Bulletin European Sur Les Maladies Transmissibles = European Communicable Disease Bulletin*, 16(1), 11.
14. Mermel, L. A., Josephson, S. L., Giorgio, C. H., Dempsey, J., & Parenteau, S. (1995). Association of legionnaires' disease with construction: Contamination of potable water? *Infection Control and Hospital Epidemiology*, 16(2), 76.
15. Riley D, Freihaut J, Bahnfleth WP, Karapatyan Z. (2004). Indoor Air Quality Management and Infection Control in Health Care Facility Construction. IAQ T3S1 Innovative techniques in IAQ 2004. Available at: www.engr.psu.edu/iec/publications/papers/indoor_air_quality.pdf.
16. Srivastava, S., Colville, A., Odgers, M., Laskey, L., & Mann, T. (2011). Controlling *legionella* risk in a newly commissioned hospital building. *Journal of Infection Prevention*, 12(1), 11-16. 10.1177/1757177410376984
17. Stout, J. E., Brennen, C., & Muder, R. R. (2000). Legionnaires' disease in a newly constructed long-term care facility. *Journal of the American Geriatrics Society*, 48(12), 1589-1592.
18. Taylor, E. (2013) Designing for Safety. *FGI Guidelines Update Series*, (Update #1), 1-7. Available at: <https://www.fgiguideelines.org/resource/designing-for-safety>
19. CDC. (Center for Disease Control and Prevention). (2019). Preventing Legionnaires' Disease: A Training on Legionella Water Management Programs (Prevent LD). Available at: <https://www.cdc.gov/nceh/ehs/learn/prevent-LD-training.html>
20. Johnson, R., Deming, C., Conlan, S., Zellmer, C., Michelin, A., Lee-Lin, S., . . . Segre, J. (2018). Investigation of a Cluster of *Sphingomonas koreensis* Infections. *The New England Journal of Medicine*, 379(26), 2529-2539.
21. Thacker, S., Bennett, J., Tsai, T., Fraser, D., Mcdade, J., Shepard, C., . . . Eickhoff, T. (1978). An Outbreak in 1965 of Severe Respiratory Illness Caused by the Legionnaires' Disease Bacterium. *The Journal of Infectious Diseases*, 138(4), 512-519.
22. Parry, M., Stampleman, L., Hutchinson, J., Folta, D., Steinberg, M., & Krasnogor, L. (1985). Waterborne *Legionella bozemanii* and nosocomial pneumonia in immunosuppressed patients. *Annals of Internal Medicine*, 103(2), 205-10.
23. Garbe, P., Davis, B., Weisfeld, J., Markowitz, L., Miner, P., Garrity, F., . . . Reingold, A. (1985). Nosocomial Legionnaires' Disease: Epidemiologic Demonstration of Cooling Towers as a Source. *JAMA*, 254(4), 521-524.
24. Sautour, Edel-Hermann, Steinberg, Sixt, Laurent, Dalle, . . . Bonnin. (2012). *Fusarium* species recovered from the water distribution system of a French university hospital. *International Journal of Hygiene and Environmental Health*, 215(3), 286-292.