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December 14, 2022

To: Gerald Smith, Appellant, representing Self
Patsy Root, Appellant, representing Self

CC: Daryn Cline, EVAPCO
Jeffrey Jones, Jones Day
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Dave Mann, Self
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Re: IAPMO Standards Council Decision Dockets #01-24 through #04-24
Date of Decision: December 14, 2022

Uniform Mechanical Code – Appendix F[2]; Appendix H; Appendix J, Table 1801.2[3]
Items 321 Public Comment 1[4],
323 Public Comment 10,
324 Public Comment 2,
325 Public Comment 1,
326 Public Comment 1,
327 Public Comment 1,
328 Public Comment 1,
329 Public Comment 1,
330, Public Comment 2

Uniform Plumbing Code – Appendix N; Appendix P; Table 1701.2
Item 305, Public Comment 2
Item 307, Public Comment 2

Dear Mr. Smith and Ms. Root:

At their meeting on November 16, 2022, the IAPMO Standards Council heard the appeal filed by Gerald Smith and Patsy Root, dockets 02-24 and 03-24, pertaining to the above referenced items, which also address the items at issue in Automatic Appeal dockets 01-24 and 04-24. This decision reflects the complete deliberation of the Council with respect to all of these items.

Summary of Technical Committee Actions
For a summary of actions taken, please refer to Exhibit A attached hereto.

[1] Interested party for automatic appeals 01-24 and 04-24.
[2] The proposed Appendix J was designated as new Appendix F.
[3] Table 1701.2 was renumbered to Table 1801.2 due to other accepted code changes.
[4]With regard to Item 321, the proponent of Public Comment 1 was advised by IAPMO Staff that the public comment should more appropriately be submitted to Items 324 through 329 as Item 321 was not relevant to the comment. However, the proponent opted to submit a public comment to Item 321. Therefore, this decision as it relates to Items 324 through 329 addresses Appellant's claim on Item 321.

Analysis of Appeal
This appeal relates to several items proposed to the Uniform Mechanical Code and Uniform Plumbing Code which address appendices in both codes related to cooling towers, the potential for scalding and Legionella growth, and the professional qualifications for Authorities Having Jurisdiction to consider for installers and inspectors of certain systems.

Proposals
Specifically, items proposed to the Uniform Mechanical Code would comprise a new Appendix F[5] "Operation, Closure, and Restarting of Cooling Towers," a new Appendix H "Impact of Water Temperature on the Potential for Legionella Growth," and a new Appendix J "Professional Qualifications." Additionally, two proposals to the Uniform Plumbing Code proposed to amend Appendix N "Impact of Water Temperature on the Potential for Scalding and Legionella Growth," and add a new Appendix P "Professional Qualifications."

With regard to a new UMC Appendix F[6] "Operation, Closure and Restarting of Cooling Towers," several proposals were submitted for the Mechanical Technical Committee to review, in parts. Those proposals were:

- Item 324 which proposed new sections F 101.0 "General" through F 201.0 "Definitions," including various subsections;
- Item 325 which proposed new sections F 301.0 "Normal Operation, Cooling Towers," new definitions in F 201.1, and proposed the inclusion of ASHRAE 188-2018 in Table 1801.2;
- Item 326 which proposed new sections F 301.3 through F 301.4.1.1, and two new tables – Table F 301.4(1) and Table F 301.4(2);
- Item 327 which proposed new section F 401.0 "Interruption to Normal Operation" and various subsections therein;
- Item 328 which proposed new section F 501.0 "System Shutdown" with various subsections, new definitions to F 201.0, and a new standard 29 CFR 1910.134 to Table 1801.2; and
- Item 329 which proposed new section F 601.0 "System Restart" which included a subsection on startup procedures.

At their meeting in 2021, the Mechanical Technical Committee (TC) discussed all the above referenced items with a majority in favor of approving all items as submitted. This was affirmed on written ballot. There was no opposition from membership to Items 324 through 329 during the 2021 Assembly Consideration Session.

Additionally, Item 323 proposed a new Appendix H to the Uniform Mechanical Code titled "Impact of Water Temperature on the Potential for Legionella Growth," as well as four new standards to Table 1801.2 – ASHRAE 188-2018, ASHRAE Guideline 12 – 2020, ASME A112.1.2-2012 (R2017), and ASSE Series 12000-2018. Item 323 for the UMC would correlate with a similar existing UPC Appendix N "Impact of Water Temperature on the Potential for Scalding and Legionella Growth." At their meeting in 2021, a majority of the Mechanical TC was in favor of approving the item with one minor modification to section H 203.8 "Ice Machines," seeking to strike "not used for human consumption." Upon being balloted, the Mechanical TC affirmed this position. There were no Assembly comments regarding Item 323 during the 2021 Assembly Consideration Session.

Further, the Plumbing Technical Committee, at their meeting in 2021, discussed Item 305 which included proposed amendments to UPC Appendix N that sought to improve the current text and correlate with the proposed new Appendix H to the Uniform Mechanical Code, addressing potential

[5] Appendix J was moved to Appendix F and the title was revised from "The Safe Operation, Closure, and Restarting of Cooling Towers" to "Operation, Closure, and Restarting of Cooling Towers" due to other accepted code changes.
[6] Appendix J was designated as Appendix F, and Table 1701.2 was renumbered to Table 1801.2.

for Legionella growth. At their meeting, a majority of the Plumbing TC was in favor of the item, and this was affirmed upon written ballot. There were no Assembly comments regarding Item 305 during the 2021 Assembly Consideration Session.

Item 330 proposed a new Appendix J to the Uniform Mechanical Code titled "Professional Qualifications," as well as numerous new standards to Table 1801.2. At their meeting in 2021, a majority of the Mechanical TC was in favor of approving the item. Upon being balloted, the Mechanical TC affirmed this position. During the 2021 Assembly Consideration Session, membership took no action with respect to this item.

The Plumbing Technical Committee, at their meeting in 2021, also discussed a proposal to include "Professional Qualifications" to a new Appendix P as well as numerous new standards to Table 1701.2 under Item 307. At their meeting, a majority of the Plumbing TC was in favor of the item, and this was affirmed upon written ballot. During the 2021 Assembly Consideration Session, the membership took no action with respect to this item.

Comments
Several comments were received on all items referenced in this appeal.

Public Comment 2 sought to reject Item 324, and Public Comment 1 sought to reject Items 325, 326, 327, 328, and 329. Essentially, all said comments sought to remove Appendix F "Operation, Closure and Restarting of Cooling Towers." At their meeting, a majority of the TC was in favor of rejecting all these comments (seeking to maintain the new Appendix F), which was affirmed unanimously on written ballot in each case.

Public Comment 10 to UMC Item 323 sought to amend the proposed new Appendix H "Impact of Water Temperature on the Potential for Legionella Growth" in the UMC as previously approved by the Mechanical TC. In effect, the Comment sought to revise the title of the appendix and strike a majority of the text, maintaining language related to applicability of the appendix, minimum requirements to address Legionella growth in mechanical systems with a reference to ASHRAE 188 and ASHRAE Guideline 12, as well as maintaining these two standards in Table 1801.2, and the removal of ASME A112.1.2 and ASSE Series 12000 in Table 1801.2. At their meeting, a majority of the TC was in favor of rejecting this comment which was affirmed unanimously upon written ballot.

Similarly, Public Comment 2 to Item 305 in the Uniform Plumbing Code (Appendix N "Impact of Water Temperature on the Potential for Scalding and Legionella Growth") sought to remove much of the text in this item as previously approved by the Plumbing TC. At their meeting, a majority of the TC was in favor of rejecting this comment, which was affirmed unanimously upon written ballot.

Public Comment 2 of Item 330 in the Uniform Mechanical Code sought to remove the proposed new Appendix J "Professional Qualifications" in the UMC as previously approved by the Mechanical TC. In effect, the proponent sought to strike the entire Appendix as well as the addition of numerous ASSE standards in Table 1801.2. At their meeting, a majority of the TC was in favor of accepting this comment. The motion failed ballot as it did not achieve the necessary two-thirds affirmative vote. In accordance with Section 4-4.6.4 of the Regulations Governing Committee Projects, the TC action was reported as rejected.

Similarly, Public Comment 2 to Item 307 in the Uniform Plumbing Code sought to remove the entire new Appendix P "Professional Qualifications" as well as numerous ASSE standards in Table 1701.2 as previously approved by the Plumbing TC. At their meeting, a majority of the TC was in favor of accepting this comment. The motion failed ballot as it did not achieve the

necessary two-thirds affirmative vote. In accordance with Section 4-4.6.4 of the Regulations Governing Committee Projects, the TC action was reported as rejected.

At the Association Technical Meeting in Charlotte in 2022, the membership considered UMC Item 324 Public Comment 2, and Public Comment 1 to Items 325 through 329, all of which addressed Appendix F "Operation, Closure and Restarting of Cooling Towers." The membership voted in favor of a motion to recommend that the TC accept the comments at issue. After the meeting in Charlotte, the membership recommendation was balloted through the Mechanical TC and the TC did not agree with the membership, resulting in a process-based recommendation to include the new Appendix F in the Uniform Mechanical Code as shown in Exhibit B.

In Charlotte, there were failed motions to accept both UMC Item 323 Public Comment 10 (Appendix H "Impact of Water Temperature on the Potential for Legionella Growth") and UPC Item 305 Public Comment 2 (Appendix N "Impact of Water Temperature on the Potential for Scalding and Legionella Growth"). The process-based recommendation on both these items is the final successful action of the committee as shown in Exhibit B.

Lastly, the membership addressed UMC Item 330 Public Comment 2 and UPC Item 307 Public Comment 2 during the Association Technical Meeting in Charlotte. Successful motions to accept these comments passed, sending a recommendation to the Technical Committees to remove Professional Qualifications from both codes.

On an appeal, the Standards Council accords great respect and deference to the development process prescribed in the ANSI-accredited IAPMO Regulations Governing Committee Projects. In conducting its review, the Council will overturn the result recommended through that process only where a clear and substantial basis for doing so is demonstrated.

Issues on Appeal
Mr. Smith and Ms. Root have filed a written appeal asking the Standards Council to place a hold on the items at issue or to simply reject the items as requested in the public comments, and other interested parties submitted support for the automatic appeals relating to these items.[7] Appellants and those in support of the automatic appeals claim there was no substantive effort made by the Technical Committees to hear, address and resolve all public commenters' objections during the May 2022 meeting. They raise allegations of conflict of interest, express concern about harmonization, and further argue that the complexity of the issues raised required additional time for discussion during this meeting and, since time was limited, the committee should have acted to hold the items until the next code cycle.

I. Procedural Issues
Those in support of the appeal raise contentions of procedural flaws on two fronts: (a) allegations that there were insufficient opportunities to be heard; and (b) allegations of conflict. The Council addresses the arguments on these matters in turn.

II. Opportunities to Be Heard
Providing opportunities for interested parties to participate in the code development process is paramount to the success of the Codes. IAPMO's process permits any interested party to

[7] To ensure that Appellants and all interested parties had an opportunity to express their concerns, the Council heard the appeals of Mr. Smith and Ms. Root, and separately the automatic appeals. The Council notes that, as there is significant overlap between the subject matter of these appeals, testimony with respect to one appeal was often germane to another. For that reason, the Council has considered all the arguments made at the hearings on all dockets referenced on page 1 of this decision and the Council's decision herein reflects their consideration of all such content.

participate and have their voice heard throughout the three-year code cycle on multiple occasions. Upon review of the record, the Council notes the actions taken on this subject matter throughout the process. A Legionella Task Group was established by the Chair of the Mechanical Technical Committee. Initially, outreach for participation on the Task Group was published in various media outlets in October 2019, and the group was formed in early 2020[8]. The Task Group met eight times in 2020 and provided a report to the Technical Committee which was included in the May 2021 monograph. The findings of the Task Group led to proposals made by the Task Group Chair[9] for the Technical Committee. During the May 2021 and May 2022 Technical Committee meetings, opportunities were provided to anyone who requested, in accordance with IAPMO's Regulations, the ability to address the Technical Committees on items on which they wished to speak. Not only were these items discussed, but some of the lengthiest debate occurred during the discussion of these items.

Further, participants had two additional opportunities, during IAPMO's annual membership meetings, to speak in support or opposition to these items. Once during the 2021 Assembly Consideration Session, and again during the 2022 Association Technical meeting. There was no opposition raised by the membership to any of the items addressed in this appeal during the 2021 Assembly Consideration Session. It was not until the second and final membership meeting – the Association Technical Meeting in 2022 – when the membership addressed these items.

III. Allegations of Conflict

During the appeals hearing, those in support of the appeal argued that Jay Egg should not have been selected to Chair the Task Group due to a 'conflict of interest' insofar as Jay Egg is active in the geothermal industry, which includes products that compete with cooling towers. Without opining on the extent to which Egg's professional interests might undermine his ability to make unbiased contributions to IAPMO's code development process through chairing a Task Group, the Council notes the following: IAPMO's ANSI-accredited code development process does not require that individual participants have no opinions on, or stake in the outcome of, the content of the codes. Rather, the process is structured so that each participant, regardless of their perspective, may participate, and so that final decisions on code content are made by a balanced consensus body.[10]

Similarly, a speaker in support of the appeal made a claim of restraint of trade, arguing that the inclusion of Professional Qualifications within the appendices in the UPC and UMC (Items 307 and 330, respectively), would list "just one qualification …at the exclusion of others…[and would be] a proprietary appendix listing for the ASSE certification." The Council notes the language at the beginning of the appendix, identical in both the UPC (Appendix P) and UMC (Appendix J) that states:

"*Where permits are required*, the Authority Having Jurisdiction *shall have the authority to require* contractors, installers, or service technicians to demonstrate competency… Professional qualifications shall be required for an individual to demonstrate the required level of competency." (emphasis added)

[8] In October 2019, a call for participants was distributed to the industry media and posted in IAPMO's membership magazine, newsletters, and website. The announcement called for "technical experts to participate on a task group relating to Legionella for mechanical systems" and noted the goal of the task group to provide recommendations to the Mechanical Technical Committee for consideration in the development of the 2024 edition of the UMC.

[9] The IAPMO Regulations at 3-1.3.4 note that "Task Group reports shall not be submitted in the name of the Task Group as proposals, comments, TIAs, or FIs." For this reason, the Chair submitted proposals in line with the report in his name.

[10] The Council further notes that a task group does not have authority to make changes to the codes, nor even to propose such changes (Regulations at 3-1.3.4). For these reasons, task groups need not be balanced committees, unlike the Technical Committees.

This language makes it clear that the Authority Having Jurisdiction *shall have the authority* to require a demonstration of competency through professional qualifications; however, no such qualification is mandated by the appendices.

IV. Demand to Hold

With regard to Appellants' claim that the complexity of the issues raised required additional time for discussion, it is clear to the Council that appropriate research was done, multiple meetings were held, and expertise was solicited by the Task Group, IAPMO staff, and the Technical Committees to address the items at issue in this appeal.

Appellants also suggest in their written appeal that IAPMO should form an advisory working group to review the comments received during the 2024 code cycle, the results of which could lead to proposals to the 2027 Codes. However, the Council points to the work of the Task Group formed in 2020, their report to the Technical Committee, and the various proposals acted upon during this three-year code cycle as noted above.

Regarding Appellants' request that the Standards Council hold the items until the next code cycle, the IAPMO Regulations at 4-4.6.2.2 note that the Technical Committee shall hold a comment that:

(a) Would introduce a concept that has not had public review by being included in a related proposal as published in the ROP;
(b) Would change the text proposed by the TC to the point that the TC would have to restudy the text of the ROP or other affected parts of the Document;
(c) Would propose something that could not be properly handled within the time frame for processing the report.

Further, section 4-4.6.2.3 states that the TC may consider any relevant factors, in determining whether to hold a comment, including, among other things, whether sufficient debate and public review has taken place. Considering the extensive work by the Task Group, the proper submittal of proposals and comments to all items at issue in this appeal, and the Technical Committees' appropriate actions on these items, the Standards Council sees nothing in the record to reflect that the TC was incorrect in acting on these items and not choosing to hold them until the next code cycle.

V. Harmonization

During oral testimony at the appeals hearing, those in support of the appeal shared their concern that the new language approved by the Technical Committees would not harmonize with existing technical documents and guidelines such as ASHRAE 188 and Guideline 12 which could create confusion and lead to public health and safety consequences. Appellants noted that substantial work went into the development of ASHRAE 188, which encompasses an entire building, suggesting that this made ASHRAE 188 more appropriate than the language accepted by the Mechanical Technical Committee, which focuses on cooling towers. The language, in the opinion of Appellants, should hew more closely to ASHRAE 188 and ASHRAE Guideline 12 specifically with respect to education, training and certification.

The Council takes note that an ASHRAE representative serves on the Mechanical Technical Committee. IAPMO's staff works with ASHRAE staff to address content from ASHRAE standards submitted to the IAPMO Technical Committees for inclusion in IAPMO's Codes. In fact, IAPMO's procedures which govern this process are the Extract Guidelines, which have been accredited and are on file with the American National Standards Institute. IAPMO staff, in 2018, invited ASHRAE 188 committee members to participate when an earlier Task Group formed to address language generated for the 2021 edition of the UPC – the code cycle prior to the one at issue. IAPMO's continuous outreach demonstrates its efforts to work with ASHRAE and its committee members towards harmonization.

Public Comment 1 to UPC Item 305 (Appendix N "Impact of Water Temperature on the Potential for Scalding and Legionella Growth"), Public Comment 1 to UMC Item 323 (Appendix H "Impact of Water Temperature on the Potential for Legionella Growth"), and Public Comment 1 to UMC Item 324 (Appendix F "Operation, Closure, and Restarting of Cooling Towers") all included additional amendments to their respective code sections, submitted in an effort to address accuracy of the language and ensure the provisions are enforceable. In the substantiation provided for each of these comments, the proponent stated that "[t]his appendix is not intended to supersede ASHRAE 188 and Guideline 12." In fact, the language in the modified appendices which was accepted by both the Plumbing and Mechanical Technical Committees, refers to ASHRAE 188 and ASHRAE Guideline 12 as a reference for Jurisdictions to utilize.

Council Reasoning

The Council has reviewed the entire record concerning this appeal and has considered all the arguments raised by it including what was shared during oral testimony. In the view of the Council, the evidence in the record supports the decision of the Technical Committee and does not provide any clear and substantial basis on which to overturn the results recommended by the IAPMO codes and standards development process.

No evidence was presented causing the Council to conclude that IAPMO's procedures were lacking, either with respect to the procedures themselves, or with respect to their application in this instance. At every juncture, IAPMO provided appropriate opportunities for interested parties to participate in the code development process, and the Council finds that IAPMO adhered to its accredited procedures. The Council further notes that a Task Group was established to further study Legionella provisions for possible inclusion in the 2027 edition of the codes.

The Council disagrees with the appellants that insufficient time and/or consideration was given to the items at issue, and for that reason declines Appellants' request to put the items on hold.

Finally, the Council concludes that no issues with harmonization are present as the record provides evidence of continuous and ongoing discussions with ASHRAE related to reference or inclusion of ASHRAE standards within IAPMO's Codes.

Final Decision

In consideration of the aforesaid, the Standards Council dismisses the appeal.

The effect of this decision is that the 2024 edition of the Uniform Mechanical Code and Uniform Plumbing Code will include the language approved by the Technical Committees, as set forth in Exhibit B.

Council members Doug Marian and Don Summers recused themselves from the deliberation and voting on the Items related to the inclusion of ASSE Professional Qualifications in the Codes.

Sincerely,

Gabriella Davis
Secretary, Standards Council

cc: Heather Koffman, Executive VP, General Counsel
Hugo Aguilar, Senior VP, Codes and Standards

Taylor Duran, Staff Liaison
Enrique Gonzalez, Staff Liaison
Plumbing and Mechanical Technical Committees
Standards Council

***NOTE**: Participants in IAPMO's codes and standards making process are advised that limited review of this decision may be sought from the IAPMO Board of Directors. For the rules describing the available review and the method for petitioning the IAPMO Board of Directors for review, please consult Section 1-7 of the *IAPMO Regulations Governing Committee Projects* and the *IAPMO Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council.* **Notice of the intent to file such a petition must be submitted to the Petitions Clerk of the Board of Directors within 15 calendar days of the Date of Decision noted in the subject line of this letter.** As the *Uniform Mechanical Code* and *Uniform Plumbing Code* are designated as an American National Standard (ANS), any persons who have directly and materially affected interests by this decision have the right to appeal to ANSI in accordance with ANSI procedures.

Exhibit A

Summary of Technical Committee Actions
Appeal Dockets 01-24 through 04-24
2024 Uniform Mechanical Code, Appendix F, H and J, Table 1801.2
And 2024 Uniform Plumbing Code Appendix N and P, Table 1701.2

The 2021 Report on Proposals (ROP) published the results of the first committee ballot on UMC Item #323 and UPC Item #305 code change proposals requesting to add a new UMC Appendix H "Impact of Water Temperature on the Potential for Legionella Growth" and revisions to existing UPC Appendix N "Impact of Water Temperature on the Potential for Scalding and Legionella Growth." The ROP also published the results of the first committee ballot on UMC Items #324, 325, 326, 327, 328, and 329 code change proposals requesting to add a new Appendix F[11] "The Safe Operation, Closure, and Restarting of Cooling Towers." Further, the ROP published the results of the first committee ballot on UMC Item #330 and UPC Item #307 code change proposals requesting to add a new UMC Appendix J and new UPC Appendix P for "Professional Qualifications."

First Technical Committee Meeting

At their meeting, a majority of the Mechanical TC members were in support of accepting UMC Item #323 for new Appendix H "Impact of Water Temperature on the Potential for Legionella Growth" with a slight modification, and a majority of the Plumbing TC members were in support of accepting UPC Item #305 for revisions to existing Appendix N as submitted. Upon written ballot of the Mechanical and Plumbing Technical Committees, they affirmed their decision.

Further, at their meeting, a majority of the Mechanical TC members were in support of accepting proposals to UMC Items #324, 325, 326, 327, 328, and 329 requesting to add a new Appendix F[12] "The Safe Operation, Closure, and Restarting of Cooling Towers." Upon written ballot of the Mechanical Technical Committee, they affirmed their decision to accept these proposals to include the above section.

Finally, at their meeting, a majority of the committee members were in support of accepting UMC Item #330 and UPC Item #307, requesting to add a new UMC Appendix J and new UPC Appendix P, both titled "Professional Qualifications." Upon written ballot of the Mechanical and Plumbing Technical Committees, they affirmed their decision to accept these proposals.

Assembly Consideration Session

No motions were raised by membership on any of the sections above.

Second Technical Committee Meeting

<u>UMC Item 323 (Public Comment 10) and UPC Item 305 (Public Comment 2)</u>

At their second meeting, the committee reviewed eleven public comments for UMC Item 323. Public Comment 1 sought to revise Appendix H to address concerns raised by the industry and was accepted as submitted by the committee. Public Comment 2 through Public Comment 9 sought to delete specific sections or language in Appendix H. Public Comments 4 and 5 were accepted with modifications by the TC to address concerns raised at the meeting. Public Comment 8 was accepted as submitted to delete section H 201.16 "Alternate Systems." Public Comment 11 sought to reject the entire proposal as submitted. Public Comment 10 sought to delete all the sections except for section H 101.1 "Applicability" where it was revised to limit the applicability, add new section H 101.2 "Minimum Requirements to

[11] The proposed Appendix J (The Safe Operation, Closure and Restart of Cooling Towers) was designated as Appendix F due to other accepted code changes.
[12] The proposed Appendix J (The Safe Operation, Closure and Restart of Cooling Towers) was designated as Appendix F due to other accepted code changes.

Address Legionella Growth in Mechanical Systems," update ASHRAE 188-2018 to ASHRAE 188-2021 in Table 1801.2, delete ASME A112.1.2-2012 (R2017) and ASSE Series 12000-2018 in Table 1801.2. A majority of the committee members were in favor of rejecting Public Comment 10. Upon written ballot of the Mechanical Technical Committees, they affirmed their decision to reject Public Comment 10.

At their second meeting, the committee reviewed four public comments for UPC Item 305. Public Comment 2 sought to divide Appendix N into two parts, revise section N101.1 "Applicability" and section N 103.1 "Design Documentation," delete various definitions as well as section N 104.1 "Legionella Growth Potential," section N 201.0 "Supply System Legionella Test Levels," and section 202.0 "Emergency Response Plan" along with all subsections, and replace section N 105.0 "Disinfection" in its entirety. Lastly, PC2 proposed deletion of NSF/ANSI/CAN 60-2020 from Table 1801.2. Public Comment was rejected on ballot. Public Comment 1 sought to revise Appendix N to address concerns raised by the industry and was accepted as submitted by the committee. Public Comment 3 sought to reject the entire proposal as submitted and Public Comment 4 proposed deletion of the entire appendix including language that was existing in the 2021 edition. Both comments were rejected on ballot.

Due to the number of public comments received and the amount of discussion, the UMC Technical Committee commissioned a new Legionella Task Group be formed to address exposure risk to the public from mechanical equipment.

UMC Items 324 (Public Comment 2) and 325-329 (Public Comment 1)

At their second meeting, the committee reviewed two public comments for UMC Item 324. Public Comment 1 sought to revise Appendix F[13] "Operation, Closure, and Restarting of Cooling Towers" to address concerns raised by the industry. Public Comment 2 sought to reject the entire proposal as submitted. A majority of the committee members were in favor of rejecting Public Comment 2 and accepting Public Comment 1. Upon written ballot of the Mechanical Technical Committee, they affirmed their decision to reject Public Comment 2 and accept Public Comment 1.

Further, the committee reviewed one public comment for UMC Items 325-329. Public Comment 1 to each of these items sought to delete all the sections, associated definitions, and referenced standards added to Table 1801.2. A majority of the committee members were in favor of rejecting Public Comment 1 for Items 325-329. Upon written ballot of the Mechanical Technical Committee, they affirmed their decision.

UMC Items 330 (Public Comment 2) and UPC Item 307 (Public Comment 2)

At their second meeting, the Mechanical TC reviewed two public comments for UMC Item 330. Public Comment 1 sought to revise Appendix J "Professional Qualifications" to delete section J 102.5 "Water Management and Infection Control Risk Assessment for Building Systems," all subsections, and associated standards from Table 1801.2 relating to water management and infection control. A majority of the committee members were in favor of rejecting Public Comment 1, which was affirmed upon written ballot. Public Comment 2 sought to reject the entire Appendix J. A majority of the Mechanical TC members were in favor of accepting Public Comment 2. However, upon written ballot, Public Comment 2 failed to achieve the necessary two-thirds affirmative vote. In accordance with Section 4-4.6.4 of the Regulations Governing Committee Projects, the TC action was reported in the ROC as rejected.

Further, the Plumbing TC reviewed two public comments for UPC Item 307. Public Comment 1 sought to revise Appendix P "Professional Qualifications" to delete section P 102.7 "Water Management and Infection Control Risk Assessment for Building Systems," all subsections, and associated standards from Table 1701.2 relating to water management and infection control. This was rejected on written ballot. Public Comment 2 sought to reject the entire appendix P.

[13] The proposed Appendix J (The Safe Operation, Closure and Restart of Cooling Towers) was designated as Appendix F due to other accepted code changes

During their meeting, a majority of the committee members were in favor of accepting Public Comment 2. However, upon written ballot of the Plumbing Technical Committee, Public Comment 2 failed to achieve the necessary two-thirds affirmative vote. In accordance with Section 4-4.6.4 of the Regulations Governing Committee Projects, the TC action was reported in the ROC as rejected.

The 2022 Report on Comments (ROC) published the results of the second committee ballot on all items noted above.

Association Technical Meeting Convention

UMC Item 323 (Public Comment 10) and UPC Item 305 (Public Comment 2)

At the Association Technical Meeting Convention, a motion was made to accept UMC Item 323 Public Comment 10 which sought to reject the proposal as submitted, and to accept UPC Item 305 Public Comment 2 which sought to revise Appendix N. Both motions failed as membership did not agree with the motions.

UMC Items 324 (Public Comment 2) and 325-329 (Public Comment 1)

At the Association Technical Meeting Convention, a motion was made to accept UMC Item 324 Public Comment 2 and Items 325-329 Public Comment 1 which sought to delete Appendix F “Operation, Closure, and Restarting of Cooling Towers." The motion passed resulting in a membership recommendation to the Technical Committee to accept Item 324 Public Comment 2 and Items 325-329 Public Comment 1. The effect of the membership recommendation was to delete the entire Appendix F “Operation, Closure, and Restarting of Cooling Towers.”

Following the Association Technical Meeting Convention, the Technical Committee was issued a ballot on whether they agreed with the membership’s recommendation. On this, their final ballot, the committee did not achieve the necessary two-thirds majority affirmative vote. The final ballot tally reported a vote of 5 agree and 23 disagree for Items 324-328 and 6 agree and 22 disagree for Item 329.

UMC Items 330 (Public Comment 2) and UPC Item 307 (Public Comment 2)

At the Association Technical Meeting Convention, a motion was made to accept UMC Item 330 Public Comment 2 which sought to delete the entire Appendix J “Professional Qualifications” and to accept UPC Item 307 Public Comment 2 which sought to delete the entire Appendix P “Professional Qualifications." Both motions passed resulting in a membership recommendation to the Mechanical and Plumbing Technical Committees to accept UMC Item 330 Public Comment 2 and UPC Item 307 Public Comment 2, respectively. The effect of the membership recommendation was to delete the entire Appendix from both the UMC and the UPC relating to professional qualifications.

Following the Association Technical Meeting Convention, the Technical Committees were issued a ballot on whether they agreed with the membership’s recommendation. On this, their final ballot, the committee did not achieve the necessary two-thirds majority affirmative vote. The final ballot tally reported a vote of 9 agree and 19 disagree for UMC Item 330 Public Comment 2 and 8 agree and 14 disagree for UPC Item 307 Public Comment 2.

The Regulations Governing Committee Projects at Section 4-6.1 states:

> **4-6.1 Recommended Amendments.**
> (c) If the Association recommended amendment is not approved by the TC…such action of the Committee shall be deemed to be a recommendation that the portion of the Report modified by the Association recommended amendment be returned to the TC; the remainder of the Report stands as recommended by the Association; and any existing

> text to which the returned portion pertains shall stand. The TC…shall be balloted on whether the resulting Document is suitable; and if it is determined that it is not suitable, the issue shall be automatically docketed as an appeal to the Standards Council who shall determine whether and in what form the document shall be issued…

These issues were docketed as an appeal for the Standards Council.

Exhibit B
Result for #01-24 through 04-24

The 2024 Uniform Mechanical Code Appendix F, H and J will read as shown in Attachments, 1, 2 and 3.

The 2024 Uniform Plumbing Code Appendix N and Appendix P will read as shown in Attachments 4 and 5.

IAPMO Regulations Governing Committee Projects
Section 1-7

1-7 Petitions to the Board of Directors.

1-7.1 General. The Standards Council has been delegated the responsibility for the administration of the codes and standards development process and the issuance of Documents. However, where extraordinary circumstances requiring the intervention of the Board of Directors exist, the Board of Directors may take any action necessary to fulfill its obligations to preserve the integrity of the standards development process. Anyone seeking such intervention of the Board of Directors may petition the Board of Directors concerning Standards Council action on any matters. Such petitions shall be filed and processed in accordance with the Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council.

1-7.2 Notice of Intent to File the Petition. Anyone wishing to petition the Board of Directors concerning a Standards Council action related to the issuance of a document, shall file a Notice of Intent to File a Petition within 15 days following the Standards Council action. A Standards Council action related to the issuance of a document includes any action of the Council that issues or returns a Document or that affects the text of a Document. Petitions concerning other Standards Council actions shall be filed within a reasonable period of time.

1-7.3 Effect of Filing. The filing of a Petition will not serve to stay the effective date of a Document or a Tentative Interim Amendment unless the Chief Executive Officer of the Association or the Board of Directors acts, pursuant to 4-7.2 or 5-6, to delay the effective date. Any Petition pending at the time a Document or Tentative Interim Amendment becomes effective will be treated as a Petition to withdraw the Document or Tentative Interim Amendment.

1-8 Use of Visual Aids and Demonstrations Before the Standards Council or Board of Directors. The policy for the use of visual aids and physical demonstrations to the Standards Council and Board of Directors shall be the same as that required for TCCs, TCs, and Task Groups, in accordance with 3-3.3.3(e) and 3-3.3.3(f).

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IAPMO Regulations Governing Petitions to the Board of Directors
from Decisions of the Standards Council

ADOPTED BY THE IAPMO BOARD OF DIRECTORS SEPTEMBER 4, 2000. Amended in January 2007.

Section 1 Scope of and Authority for these Regulations.

(a) These regulations have been issued by the Board of Directors pursuant to its authority under Article 5, 6 and 8 of the IAPMO Bylaws.

(b) These regulations set forth the procedures to be used for the filing and processing of all petitions to the Board of Directors filed pursuant to 1-7 of the Regulations Governing Committee Projects.

(c) The Board of Directors can amend these regulations from time to time and waive or supplement, in whole or in part, at any time or times at its discretion.

(d) For the purposes of these regulations, the Standards Council Secretary, or such other person as the Chair of the Board of Directors may appoint, shall act as a petitions clerk.

Section 2 Subcommittees of the Board of Directors. Unless the Board of Directors otherwise orders, the authority to consider and make recommendations on the disposition of a petition by the Board of Directors shall be delegated to a subcommittee of the Board of Directors, which shall be appointed, in accordance with 2.1 of these regulations. Subcommittees shall be appointed by the Chair of the Board of Directors.

2-1 Composition of Subcommittees. Subcommittees shall consist of three or more members of the Board of Directors. The criteria for selection and appointment of subcommittee members shall be as follows:

(a) A subcommittee member shall be a person who can decide the petition on the merits in an impartial manner.

(b) A subcommittee member shall not have any conflict of interest. (A conflict of interest is defined as any situation in which a decision on a petition could substantially and materially affect the member's financial or business interest.)

(c) Each subcommittee member shall, to the extent practicable, represent diverse interests within the association.

In making a decision of whether or not to serve on a subcommittee, the member may consult with the IAPMO general counsel.

Section 3 The Scope of Review. The petitioner shall generally confine the argument in the petition to matters that were presented below and shall not raise any new matters that could have but were not presented within the standards development process. A petition to the Board of Directors shall not be regarded as simply another opportunity to reargue a position that was rejected by the Standards Council. In considering a petition, the subcommittee shall give due deference to the judgment of the Standards Council and shall not intervene unless it can be demonstrated that extraordinary circumstances exist requiring the Board of Director's intervention to protect the integrity of the standards development process.

Section 4 The Record. In its consideration of the petition, the subcommittee shall have before it the entire record that was before the Standards Council, as well as all proceedings and decisions of the Standards Council on the issue. In addition, the subcommittee may consult any other records of the association that it deems pertinent to the issue, and the subcommittee may seek technical assistance from staff, the technical committee, or any other source or persons that it deems appropriate.

Section 5 Notice of Intent to File the Petition. Anyone wishing to petition the Board of Directors concerning a Standards Council action related to the issuance of a document, shall file a Notice of Intent to File a Petition within 15 days following the Standards Council action. A Standards Council action related to the issuance of a document includes any action of the Council that issues or returns a document or that affects the text of a document. Petitions concerning other Standards Council actions shall be filed within a reasonable period of time.

Section 6 Filing and Contents of the Petition.

(a) Within 15 days following the receipt of the notice of intent to file, or within such other time as the petitions clerk may allow, the petitioner shall file the petition together with 20 copies. The petition shall be no more than 10 pages in length and shall contain, in separately denominated sections, the following:

(1) Name, affiliation, and address of the petitioner;

(2) Statement identifying the particular Standards Council action to which the petition relates;

(3) Argument setting forth the grounds for the petition and, in particular, addressing why there exist extraordinary circumstances requiring the intervention of the Board of Directors (see the preceding Section 3 and 1-7 of the Regulations Governing Committee Projects); and

(4) Statement of the precise relief requested.

(b) Any part of the record related to the standards development process that is referenced or discussed in the petition should be clearly cited in the petition using available markings such as the title, author, date, and page of the record. Since the full record will be available to the subcommittee during its review, attachments and appendices shall not accompany the petition, unless express permission has been obtained from the petitions clerk.

Section 7 Consideration of the Petition.

7-1 Initial Review. The petitions clerk may, at his or her discretion, arrange for initial review of the petition by meeting, correspondence, or telephone conference. If upon such initial review of the petition and any relevant portions of the record, the subcommittee determines that the petition has no merit, it may dismiss the petition.

7-2 Full Review. If initial review is not conducted, or, if upon such review, the subcommittee determines that further review is warranted, it shall afford the opportunity for responses to be filed by interested parties. Responses, together with 20 copies, shall be filed within 15 days or within such other time as the petitions clerk may allow.

(a) Responses shall be no more than 10 pages in length and shall contain, in separately denominated sections, the following:

(1) Name, affiliation, and address of the respondent;

(2) Statement identifying the petition to which the response relates and stating whether the respondent supports or opposes the petition; and

(3) Argument setting forth the grounds for opposing or supporting the petition and, in particular, addressing why there does or does not exist extraordinary circumstances requiring the intervention of the Board of Directors (see the preceding Section 3 and 1-7 of the Regulations Governing Committee Projects).

(b) Any part of the record related to the standards development process that is referenced or discussed in a response should be clearly cited in the response using available markings such as the title, author, date, and page of the record. Since the full record will be available to the subcommittee during its review, attachments and appendices shall not accompany the response, unless express permission has been obtained from the petitions clerk.

(c) So as to avoid unnecessary repetition and duplication of effort, parties are encouraged to file joint responses where possible and appropriate.

(d) Unless a hearing has been requested and granted by the subcommittee (see Section 8), the subcommittee shall, either by meeting or telephone conference, review and render a decision on the petition based on the written submissions of the parties and the record before it.

Section 8 Requests for Hearings. If the petitioner requests a hearing on the petition and that hearing is granted, the petitioner shall be assessed a filing fee of $2,500 to be posted following the granting of the request. This fee may be reduced or waived by the Chief Executive Officer upon application of the petitioner if good cause for reducing or waiving the fee is presented. If a hearing is granted, the Procedures for Hearings shall be followed.

Section 9 Waiver of Regulations. Any of the deadlines or requirements set forth in these regulations may be waived by the subcommittee upon application of the petitioner or any other party for good cause shown, or in the discretion of the subcommittee.

Section 10 Subcommittee Report to the Board of Directors. The subcommittee shall file with the Board of Directors a written report concerning each petition that it has determined.

Attachment 1

APPENDIX F
OPERATION, CLOSURE, AND RESTARTING OF COOLING TOWERS

F 101.0 General.

F 101.1 Applicability. The provisions of this appendix address risk management practices of mechanical systems for the normal operation, interruption to normal operation (system shutdown), and restarting of cooling towers.

F 101.2 Building Water Systems. This appendix shall be applicable to building water systems for cooling towers.

F 101.3 Building Types. This appendix shall be applicable to the following building types:

(1) Non-residential (low- and high-rise)
   (a) Office buildings
   (b) Mercantile (seasonal retail)
   (c) Schools/dormitories
   (d) Hotels/motels
   (e) Assemblies
   (f) Healthcare facilities
(2) Residential
   (a) All except single and two-family occupancies

F 201.0 Definitions.

F 201.1 General. For the purpose of this appendix, the following definitions shall apply:

Building Water. Water collected, conveyed, circulated, stored, drained, or discharged by building plumbing systems for use in and around buildings.

Building Water Systems. Hot and cold potable water system and non-potable water system in the building, or on-site. [ASHRAE 188:3]

Disinfectant. Chemical agent or physical treatments used to kill or inactivate microorganisms. [ASHRAE 188:3]

Disinfection. The process of killing or inactivating microorganisms. [ASHRAE 188.3]

Legionella. The name of the genus of bacteria that can cause a pneumonia called Legionnaires' disease or a flu-like illness called Pontiac fever when inhaled, aspirated or directly introduced into the lungs of susceptible individuals. It is a common aquatic bacteria found in natural and building water systems, as well as in some soils.

Legionellosis. The term used to describe Legionnaires' disease, Pontiac fever, and any illness caused by exposure to Legionella bacteria. [ASHRAE 188:3]

Monitoring. Conducting a planned sequence of observations or measurements of the physical and chemical characteristics of control measures. [ASHRAE 188:3]

Normal Operation. The state of a building water system when the building is open and being used as intended. This includes the normal hours of operation and the number of people that occupy the building.

Risk. The potential for harm to humans resulting from exposure to Legionella. [ASHRAE 188:3]

Risk Management. Systematic activities to reduce risk. [ASHRAE 188:3]

System Reopening. The set of actions that should be taken to ready a building for normal operations after an extended period of no or limited operations.

System Restarting. The set of actions that should be taken to ready a mechanical system for normal operations after an extended period of no or limited operations.

Water Management Plan (WMP). A plan to reduce the risk of Legionella growth and spread.

F 301.0 Normal Operation, Cooling Towers.

F 301.1 General. The normal operation of cooling towers shall be in accordance with Appendix H of this code.

F 301.2 Water Quality Monitoring. The water management plan shall include water quality monitoring as follows:

(1) Water quality parameters, including but not limited to pH, temperature, conductivity and biocidal indicators, shall be measured and recorded as specified in the water management plan as follows:

(a) Manual measurements as required by the manufacturer's recommendation and the Authority Having Jurisdiction.

(b) When continuous, automated and/or remote measurements and recordings are used, the water management plan shall show how effective measurements of system process control are being monitored.

(2) A bacteriological indicator to estimate microbial content of recirculating water shall be collected and interpreted in accordance with Table F 301.2(2) at least once each week while the cooling tower system is operating. Indicators shall be taken at times and from water sampling points, as detailed in the water management plan, that will be representative of water microbial content. Indicators may be taken at any time from constant chemical treatment systems. Indicators from systems that use intermittent biocide applications shall be taken before biocide application and reflect normal cooling tower operating conditions.

(3) Legionella culture testing shall be conducted not less than every 90 days during cooling tower system operation. A Legionella sample shall be analyzed by an accredited laboratory where Legionella appears on the laboratory's scope of accreditation, or other laboratory approved by the Authority Having Jurisdiction.

(4) System monitoring and sampling locations shall be representative of the entire cooling tower system. The system shall be operating with water circulating in the system for at least one hour prior to water quality measurements or collection of samples.

(5) The water management plan shall identify the procedures, responsible parties, required response time(s) and notification protocol for corrective actions and shall include, at a minimum, corrective actions that shall be implemented according to the result levels in Table F 301.2(1).

TABLE F 301.2(1)
LEGIONELLA REMEDIATION ACTIONS FOR COOLING TOWERS

LEGIONELLA CONCENTRATIONS IN COLONY FORMING UNITS (CFU/mL)	REMEDIATION ACTIONS
<10	Maintain the established water treatment plan.
≥10 and <100	Review water treatment plan, institute immediate online disinfection, and retest water 3 days to 7 days after disinfection.
≥100 and <1000	Review water treatment plan, institute immediate online disinfection, and retest water 3 days to 7 days after disinfection.
≥1000	Review water treatment plan, institute immediate online disinfection, and retest water 3 days to 7 days after disinfection. If the results of a retest are still ≥1000 CFU/mL, carry out system decontamination.

TABLE F 301.2(2)
CORRECTIVE ACTIONS REQUIRED FOR BACTERIOLOGICAL INDICATOR RESULTS[1, 3]

LEVEL	HETEROTROPHIC PLATE COUNT AND DIP SLIDE RESULT (CFU/mL)	PROCESS TRIGGERED BY TEST RESULTS
1	<10 000	Maintain water chemistry and biocide levels.
2	≥10 000 to <100 000	Initiate immediate disinfection by increasing biocide concentration or using a different biocide within 24 hours, review treatment plan, retest water within 3 days to 7 days. Subsequent test results shall be interpreted in accordance with this table until level 1 is reached.
3	≥100 000 to <1 000 000	Initiate immediate disinfection by increasing biocide concentration or using a different biocide within 24 hours, reviewing treatment plan, performing visual inspection to evaluate need to perform cleaning and further disinfection. Retest water within 3 days to 7 days. Subsequent test results shall be interpreted in accordance with this Table until level 1 is reached.
4	≥1 000 000	Initiate immediate disinfection by increasing biocides within 24 hours. Within 48 hours perform remediation of the tower by hyperhalogenating[2], cleaning, and flushing. Review treatment plan, retest water within 3 days to 7 days. Subsequent test results shall be interpreted in accordance with this Table until level 1 is reached.

Notes:

[1] Performed by an accredited laboratory.

[2] At a minimum, dose the cooling water system with 5 ppm to 10 ppm free halogen residual for at least 1 hour; pH 7.0 to 7.6.

[3] There is no evidence that HPC values alone directly relate to human health risk, based on epidemiological studies and a lack of correlation with the occurrence of waterborne pathogens. Threshold concentrations of HPC were selected based on interference with the coliform test and not health-related considerations. HPC is an analytic method used to measure the variety of heterotrophic bacteria that are common in water. Legionella require specialized culture media for isolation and detection, do not grow on the media used for HPC testing, and their presence is not correlated with HPC values. HPC is a useful tool for monitoring the efficiency of the water treatment process, measuring bacterial regrowth, and evaluating the function of disinfection systems.

F 401.0 Interruption of Operation.

F 401.1 Shutdown. Where shutdown of the cooling tower is required, the requirements of Section F 401.1.1 and Section F 401.1.2 shall be completed.

F 401.1.1 Reducing Solids and Disinfecting the System. The water management plan shall include procedures for the shutdown and disinfection of cooling towers.

F 401.1.2 Drain, Inspect and Clean the System. The water management plan shall include procedures for draining, inspection and cleaning of the system.

F 401.1.3 Records. Records of all procedures and actions performed shall be kept.

F 501.0 System Shutdown.

F 501.1 General. The water management plan shall include shutdown procedures in accordance Section F 501.2 and Legionella in accordance with Section F 501.3.

F 501.2 Shutdown Procedures. System start-up and shutdown procedures shall include, but not be limited to, the following:

(1) Management of hazardous conditions associated with untreated water, including the following:
   (a) Shutdown that includes all chemical pretreatment steps, pump cycling protocols, and procedures for system drainage for shutdown periods longer than five days, or the duration specified by the water management plan.
   (b) Start-up from a drained system shall be in accordance with manufacturer's recommendations.

(c) Start-up from an undrained or stagnant system that exceeds five days, or the number of idle days specified by the water management plan or the manufacturer's recommendations.

F 501.3 Maintenance Personnel. When required, personal protective equipment (PPE) shall be provided for maintenance personnel. Personal protective equipment shall be used in accordance with all local state and Federal requirements.

F 601.0 System Restart.

F 601.1 Startup Procedures. When a cooling tower has been shut down or left untreated for five or more days, a full startup procedure shall be completed before startup or continuing operation in accordance with the water management plan and shall include the following minimum requirements:

(1) The required inspection shall be as follows:
   (a) Inspecting all components for the presence of contaminants and other adverse conditions.
   (b) Checking that the water treatment equipment is working properly.
   (c) Records of the procedure shall be completed.

(2) Once disinfected, the cooling tower system shall be filled with water and begin circulating biocides and chemicals, as specified in the water management plan.

(3) Collect and analyze a water sample for the presence of Legionella. The sample shall be analyzed by a laboratory as approved by the Authority Having Jurisdiction. Prior to startup, the water quality requirements shall meet the requirements in Section F 301.2.

(4) Startup records of all procedures and actions performed shall be kept on file. Startup records shall include, but not be limited to, the following:
   (a) Cooling tower system ID
   (b) System startup date
   (c) Individual cooling tower startup date (if different than the system startup date)
   (d) Dates and procedures for startup cleaning and disinfection
   (e) Service provider
   (f) Pre-startup inspection
   (g) Legionella sampling and test results
   (h) Disinfection dose and circulation time
   (i) Water monitoring
   (j) Treatment logs

Attachment 2

APPENDIX H

IMPACT OF WATER TEMPERATURE ON THE POTENTIAL FOR LEGIONELLA GROWTH

Part I – General

H 101.0 General.

H 101.1 Applicability. Part I of this appendix provides guidelines on the impact of water temperature in minimizing Legionella growth potential associated with occupiable commercial, institutional, multi-unit residential, and industrial building mechanical systems. Legionella control for plumbing systems shall be in accordance with the plumbing code.

This appendix shall not include single-family residential buildings. This appendix shall not be considered a risk management guidance document for scalding or Legionella. Where required by the Authority Having Jurisdiction, Legionella risk management shall be in accordance with ASHRAE 188 and ASHRAE Guideline 12.

Note: Published documents which address professional qualifications for Legionella risk assessment include ASSE/IAPMO/ANSI Series 12000.

There are additional factors associated with the potential for scalding and Legionella growth other than temperature.

For scalding potential, other factors include, but are not limited to, user age, health, body part, length of contact time, and water source.

For Legionella growth potential other factors include, but are not limited to, water source and plumbing system: size, design, circulation rate, water age, disinfectant residual, piping material and component complexity.

H 102.0 Definitions.

H 102.1 General. For the purpose of this appendix, the following definitions shall apply.

Biofilm. Microorganisms and the slime they secrete that grow on any continually moist surface.

Control. To manage the conditions of an operation in order to maintain compliance with established criteria. [ASHRAE 188:3]

Disinfection. The process of killing or inactivating microorganism. [ASHRAE 188:3]

Disinfection, Offline. The procedure while the equipment is not in operation.

Disinfection, Online. The procedure while the equipment is in operation.

Halogenation. A chemical reaction that involves the addition of one or more halogens, including, but not limited to, chlorine, bromine, or iodine, commonly used to disinfect water systems.

Hazard. See Risk.

Legionella Concentrations. The extent of colonization of Legionella measured in Colony Forming Units per milliliter (CFU/mL).

Legionella Growth Potential. The likelihood that Legionella bacteria will reproduce.

Monitor. Observing and checking the progress or quality of (something) or measuring the physical and chemical characteristics of control measures.

Nutrient. Any element or compound essential as a raw material for an organism's growth and development.

Risk. The potential for harm to humans resulting from exposure to Legionella. [ASHRAE 188:3]

Test. The measurement of the physical, chemical, or microbial characteristics or quality of water.

Water Management Plan. A plan to reduce the risk of Legionella growth and spread.

H 103.0 Building Water Systems and System Equipment Documentation.

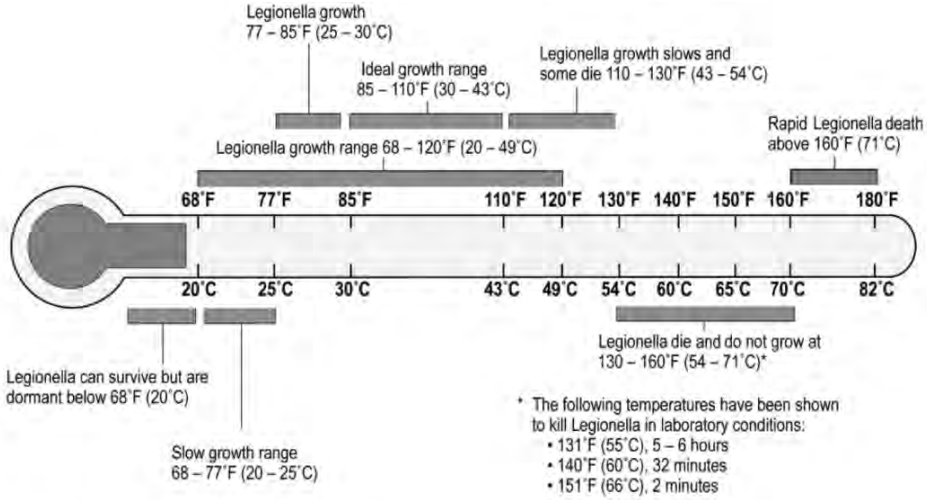
H 103.1 Design Documentation. Construction documents shall be required for new construction, renovation, refurbishment, replacement, or repurposing of an occupiable building water system, including a water management plan, and shall be submitted to the Authority Having Jurisdiction.

H 103.2 Onsite Documentation. Documentation shall be maintained onsite and shall be readily accessible to the Authority Having Jurisdiction.

H 104.0 Potential Exposure.

H 104.1 Legionella Growth Potential. The Authority Having Jurisdiction shall have the authority to require documentation to address Legionella growth potential, where water temperatures in the building water supply or a building water system are within ranges shown in Figure H 104.1 that pose a Legionella growth potential.

H 104.2 Scald Potential. Where the water system's temperature(s) range pose(s) a scald potential, protection shall be provided in accordance with the plumbing code.



For SI units: °C = (°F-32)/1.8

* Temperature ranges reported are experimentally determined in a laboratory setting in the absence of a realistic microbial community. Legionella can survive for longer periods of time at temperatures higher and lower than the growth temperature ranges indicated due to changes in their metabolic state and/or protection from thermal disinfection within biofilm or amoeba host organisms.

FIGURE H 104.1
WATER TEMPERATURE RANGES AND LEGIONELLA GROWTH POTENTIAL*

H 105.0 Disinfection.

H 105.1 Disinfection Documentation. Where required by the Authority Having Jurisdiction, documentation for disinfection of building mechanical systems shall be provided by the registered design professional in the construction documents.

H 105.1.1 Copper-Silver Ionization. Copper-silver ionization methods and procedures shall include the following documentation.

(1) Copper and silver ionization concentrations.

(2) Methods and documentation for monitoring ion levels.

(3) Electrode cleaning cycles and methods.

H 105.1.2 Ultraviolet Light. Ultraviolet light methods shall include the following documentation:

(1) Locations of ultraviolet light units.

(2) Cleaning cycles and methods of the quartz sleeves and housing.

H 105.2 Chemical Disinfection. Chemical biocide treatment shall be permitted to be used in accordance with the following:

(1) Oxidizing biocides in accordance with manufacturer's guidelines, or as required by the Authority Having Jurisdiction.

(2) Non-oxidizing biocides in accordance with manufacturer's guidelines.

(3) Alternating the use of different types of biocides, dose, and frequency is recommended.

(4) These treatment methods can be used for continuous, online disinfection or shock treatment online or offline.

H 105.3 Non-Chemical Treatment. Non-chemical treatment devices shall be permitted to be used in accordance with the manufacturer's guidelines.

H 105.3.1 Thermal Shock. Thermal treatment using heat shock at 158°F (70°C) for 30 minutes shall be permitted in accordance with applicable guidelines.

H 105.3.2 Physical Cleaning. When implemented, physical cleaning shall only be performed as an offline method and shall be performed before the chemical disinfection methods in Section H 105.2 have been performed. Building outdoor air intakes shall be closed during physical cleaning prior to commencing. Physical cleaning shall be in accordance with the manufacturer's instructions.

H 105.4 Frequency of Cleaning and Disinfection. Where a water management plan is implemented, the frequency of cleaning and disinfection logs shall be readily accessible to the water management team and the Authority Having Jurisdiction.

Part II – Minimizing Legionella Growth Potential in Cooling Towers and Other Mechanical Systems.

H 201.0 General.

H 201.1 Applicability. Part II of this appendix applies to water sources that frequently provide optimal conditions for growth of Legionella organisms in accordance with Figure H 104.1, including, but not limited to, cooling towers, evaporative condensers, decorative water features, filters, ice makers, evaporative air coolers, fluid coolers that use evaporation to reject heat, industrial processes that use water to remove excess heat, industrial and municipal waste treatment plants, and other mechanical systems.

H 201.2 Water Management Plan, Where Required. A water management plan shall be established when required by the criteria of the Authority Having Jurisdiction.

H 201.3 Water Management Plan, Where Implemented. Where a water management plan is implemented, the plan shall be in accordance with the following:

(1) Determine a water management plan team.

(2) Provide description of the building's water system.

(3) Identify areas of Legionella growth potential in accordance with temperature ranges as shown in Figure H 104.1.

(4) Determine applicable control measures and monitoring procedures.

(5) Ensure the water management plan is effective and operating as designed.

(6) Document and communicate all the activities of the water management plan.

H 201.4 Water Sampling. An analysis of water samples from a useable source capable of being contaminated with Legionella bacteria shall be performed as required by the Authority Having Jurisdiction to determine the number of organisms present in Colony Forming Units per milliliter (CFU/mL) or other acceptable measurement of Legionella in the water sample. The minimum remediation action shall be in accordance with Table H 201.5 or other acceptable remediation action(s).

H 201.5 Legionella Test Levels. A means of controlling Legionella shall be established in accordance with applicable levels as stated in Section H 201.5.1 through Section H 201.5.4.

H 201.5.1 Levels Less than 10 CFU/ML. Water samples containing Legionella levels less than 10 CFU/mL shall be permitted to maintain the established water treatment plan in accordance with Table H 201.5.

H 201.5.2 Levels Between 10 CFU/ML and 100 CFU/ML. Water samples containing Legionella levels greater than 10 CFU/mL but less than 100 CFU/mL shall require the water treatment plan to be reviewed, institute immediate online decontamination, and retesting of water 3 to 7 days after decontamination in accordance with Table H 201.5.

H 201.5.3 Levels Between 100 CFU/ML and 1000 CFU/ML. Water samples containing Legionella levels greater than 100 CFU/mL but less than 1000 CFU/mL shall require the water treatment plan to be reviewed, institute immediate online decontamination, and retesting of water 3 to 7 days after decontamination in accordance with Table H 201.5. Prepare to execute emergency response plan in case Legionella levels reach over 1000 CFU/mL in accordance with Section H 202.13.

H 201.5.4 Levels Greater than 1000 CFU/ML. Water samples containing Legionella levels greater than 1000 CFU/mL shall require the water treatment plan to be reviewed, notify Authority Having Jurisdiction, institute immediate online disinfection, and retesting of water 3 to 7 days after decontamination in accordance with Table H 201.5.

TABLE H 201.5
LEGIONELLA REMEDIATION ACTIONS

LEGIONELLA CONCENTRATIONS IN COLONY FORMING UNITS (CFU/mL)	REMEDIATION ACTIONS
<10	Maintain the established water treatment plan.
≥10 and <100	Review water treatment plan, institute immediate online decontamination, and retest water 3 days to 7 days after disinfection.
≥100 and <1000	Review water treatment plan, institute immediate online decontamination, and retest water 3 days to 7 days after disinfection.
≥1000	Review water treatment plan, institute immediate online disinfection, and retest water 3 days to 7 days after disinfection. If the results of a retest are still ≥1000 CFU/mL, carry out system decontamination.

H 201.6 Air Sampling. Air sampling for Legionella shall not be used as a means of measuring potential Legionella exposure.

H 202.0 Cooling Towers.

H 202.1 General. Cooling towers shall be installed, maintained, and tested as required by this Appendix, this code, and the Authority Having Jurisdiction.

H 202.2 Risk Factors. The following risk factors shall be identified, assessed, controlled, and monitored:

(1) Stagnant water due to dead legs, intermittent operation, or seasonal usage.

(2) The presence of nutrients or biofilm.

(3) Water temperature within a range that supports microbial growth as specified in Figure H 104.1.

(4) Water exposed to direct sunlight which promotes algae growth.

(5) Water quality, including, but not limited to, the following factors:

  (a) System cleanliness

  (b) pH levels

  (c) Presence of corrosion

  (d) Presence of scale and biofouling

  (e) Conductivity levels

  (f) Dissolved and suspended solids

  (g) Control of water treatment chemicals

  (h) Control of bleed-off or blowdown

(6) System size

(7) Physical condition of system

(8) Aerosol generation, dispersion, and drift elimination

(9) System site location

(10) Access for inspection, cleaning, and maintenance

(11) Concentration of Legionella as specified in Table H 201.5.

H 202.3 Drift Eliminators. Drift eliminators shall be accessible to allow inspection, maintenance, and cleaning of internal components.

H 202.4 Side Stream Filtration. When suspended solids are visible in the cooling tower water system, side stream filtration shall be permitted to be used to control suspended solids in cooling tower circulating water. Makeup water quality, design of cooling tower fill, recirculation rate, and total system volume shall be included in the design of such equipment.

H 202.5 Equipment Site Location. The site location of new or replacement open- or closed-circuit cooling towers or evaporative condensers shall be in accordance with the following:

(1) Shall not be located where contamination from building systems or facility processes can be drawn into the equipment. Equipment shall be installed not less than 25 feet (7620 mm) away from building exhaust or plumbing vents.

(2) Shall not be located where equipment discharges into occupied spaces, roadways, walkways, outdoor air intakes, and building openings. Equipment shall be installed not less than 25 feet (7620 mm) away from building intakes or plumbing vents.

H 202.6 System Commissioning. System commissioning shall include procedures for cleaning of the cooling system. Ongoing water treatment in accordance with Section H 201.5 and shall be initiated once the system is charged with water.

H 202.7 System Start-Up and Shutdown (Interruption to Normal Operation). System start-up and shutdown procedures shall include, but not be limited to the following:

(1) Management of hazardous conditions associated with untreated water, including the following:

  (a) Shutdown that includes all chemical pretreatment steps, pump cycling protocols, and procedures for system drainage for shutdown periods longer than 5 days, or the duration specified by the water management plan.

  (b) Start-up from a drained system shall be in accordance with manufacturer's recommendations.

  (c) Start-up from an undrained or stagnant system that exceeds 5 days, or the number of idle days specified by the water management plan or the manufacturer's recommendations.

H 202.8 System Maintenance and Inspection. System components requiring maintenance and inspection shall be accessible. A schedule for maintenance and inspection of system shall be included in the water management plan documents. Cooling tower maintenance and inspection shall include, but not be limited to, the following areas:

(1) Water treatment system
(2) Louvers
(3) Piping dead legs
(4) Cold water basins
(5) Crossflow hot water basin
(6) Counterflow spray system
(7) Drift eliminators
(8) Fill material and fill air entrance and exit surfaces
(9) Purging of stagnant water or low-flow zones within the basin

H 202.9 Water Treatment. Water treatment shall control microbiological activity, scale, corrosion, sediment, and solids in the system, and shall be in accordance with the following:

(1) All equipment and chemicals used shall be specified for the purpose of treating the open recirculating loop.
(2) The minimum required schedule for inspection, maintenance, cleaning, and monitoring, and a corrective action plan.
(3) The minimum requirements for documenting system water treatment.
(4) When an oxidant is used to control microbiological activity, it shall maintain a continuous free residual of 0.5 to 1.0 ppm.

H 202.10 Disinfection. Methods for disinfection of cooling towers shall include, but not be limited to, the halogenation methods and procedures for flushing and disinfection in accordance with Section 1122.0.

The disinfection process shall be identified in the water management plan and shall include the following:

(1) Online disinfection.
(2) Emergency disinfection.

H 202.11 Water Treatment Chemicals. Water treatment chemicals shall be applied using a dosing system in accordance with the water management plan.

H 202.12 Makeup Valves. The location of cooling tower makeup valves shall be in accordance with the registered design professional construction documents and approved by the Authority Having Jurisdiction. Makeup valves shall be provided with air gaps or backflow preventers in accordance with the plumbing code.

H 202.13 Emergency Disinfection Procedure. An emergency disinfection procedure shall be provided and shall include, but not be limited to, the following:

(1) Procedures to be followed if there are cases of Legionellosis associated with the use of cooling towers or evaporative condensers.
(2) Procedures to be followed if cooling towers or evaporative condensers reach Legionella levels of 1000 CFU/mL or greater.
(3) Testing for Legionella shall be performed. Procedures shall include the type of tests to be performed, sampling, and the interpretation of test results.

H 202.14 Control of Bleed-Off. An automated bleed-off, or blowdown, system shall be used to remove water from the system and replace with makeup water to limit the concentration of dissolved and suspended solids. The water for bleed-off shall be taken from the return line of the cooling water system to the cooling tower. The water management plan shall require that bleed-off only occur while chemical dosing is turned off. Manual bleed-off shall be permitted to be used to control scale or biofouling.

H 203.0 Other Mechanical Systems.

H 203.1 General. Other mechanical systems and portions thereof shall be installed, maintained, and tested as required by this section and the Authority Having Jurisdiction.

H 203.2 Misters, Atomizers, Air Washers, and Humidifiers. Misters, atomizers, air washers, nebulizers, and humidifiers shall be maintained and disinfected in accordance with ASHRAE 188.

H 203.3 Evaporative Air Coolers. Evaporative air coolers shall be completely drained and cleaned in accordance with the manufacturer's instructions. When not in use, evaporative air coolers shall be completely drained.

H 203.4 Decorative Water Features. Decorative water features shall be maintained in accordance with ASHRAE 188. Decorative water features shall be drained, cleaned, and disinfected in accordance with the manufacturer's instructions and the Authority Having Jurisdiction.

H 203.5 Water Supply Systems. The minimum remediation action for water supply systems shall be in accordance with the plumbing code.

Attachment 3

APPENDIX J
PROFESSIONAL QUALIFICATIONS

J 101.0 General.

J 101.1 Scope. The provisions of this appendix address minimum qualifications for installers, inspectors, or employers for systems covered within the scope of this code.

J 102.0 Qualifications.

J 102.1 General. Where permits are required, the Authority Having Jurisdiction shall have the authority to require contractors, installers, or service technicians to demonstrate competency. Where determined by the Authority Having Jurisdiction, the contractor or technician shall be licensed or certified to perform such work. Professional qualifications shall be required for an individual to demonstrate the required level of competency.

J 102.2 Inspectors and Plans Examiners. Professional qualification for mechanical system inspectors and mechanical plans examiners shall be in accordance with ASSE/IAPMO/ANSI Series 16000.

J 102.2.1 Qualification for Mechanical Inspector. Professional qualification for mechanical inspectors shall be in accordance with ASSE/IAPMO/ANSI 16020.

J 102.2.2 Qualification for Mechanical Plan Examiner. Professional qualification for mechanical plan examiners shall be in accordance with ASSE/IAPMO/ANSI 16050.

J 102.3 Residential Mechanical Service Technician. Professional qualification for residential mechanical service technicians shall be in accordance with ASSE/IAPMO/ANSI Series 13000.

J 102.3.1 Qualification for Residential Mechanical Service Technician. Professional qualification for residential mechanical service technicians shall be with accordance ASSE/IAPMO/ANSI 13020.

J 102.4 Hydronic Systems. Personnel qualification for installers and designers of hydronic heating and cooling systems, as well as installers of solar water heaters shall be in accordance with ASSE/IAPMO/ANSI Series 19000.

J 102.4.1 Qualification for Solar Water Heating System Installer. Professional qualification for solar water heating system installers shall be in accordance with ASSE/IAPMO/ANSI 19110.

J 102.4.2 Qualification for Hydronic Heating and Cooling System Installer. Professional qualification for hydronic heating and cooling system installers shall be in accordance with ASSE/IAPMO/ANSI 19210.

J 102.4.3 Qualification for Hydronic Heating and Cooling System Designer. Professional qualification for hydronic heating and cooling system designers shall be in accordance with ASSE/IAPMO/ANSI 19220.

J 102.5 Water Management and Infection Control Risk Assessment for Building Systems. Professional qualification for construction and maintenance personnel and employers to identify and manage potentially hazardous exposure to bloodborne, waterborne and airborne pathogens. Also includes qualifications for members of a water safety team involved in the development of a risk assessment analysis, and water management and sampling plan, for protection from Legionella and other waterborne pathogens and persons who conduct a facility risk assessment and implement a water safety and management program to reduce the risk of infections due to Legionella. Qualifications are in accordance with ASSE/IAPMO/ANSI Series 12000.

J 102.5.1 Qualification for Environment of Care, Infection Control and Construction Risk Assessment. Professional qualification for general knowledge of the environment of care, infection control and construction risk assessment procedures to protect facility operations, occupants, workers or any individual who has the potential for harm caused by construction activities shall be in accordance with ASSE 12010.

J 102.5.2 Qualification for Environment of Care, Infection Control and Construction Risk Assessment Professional Qualification Standard for Construction and Maintenance Employers. Professional qualification for general knowledge of the environment of care, infection control and construction risk assessment requirements and procedures to protect facility operations, occupants, workers, or any individual who has the potential for harm caused by construction activities shall be in accordance with ASSE 12020. It also provides general knowledge of employer responsibilities to the worker and to the facility.

J 102.5.3 Qualification for Water Quality Program, Pipefitters and HVAC Technicians. Professional qualification for water quality program for pipe fitters and HVAC technicians shall be in accordance with ASSE 12062.

J 102.5.4 Legionella Water Safety and Management Personnel. Professional qualification of persons who conduct a facility risk assessment and implement a water safety and management program to reduce the risk of infections due to Legionella shall be in accordance with ASSE 12080.

Attachment 4

APPENDIX N
IMPACT OF WATER TEMPERATURE ON THE POTENTIAL FOR SCALDING AND LEGIONELLA GROWTH

N 101.0 General.

N 101.1 Applicability. This appendix provides guidelines on the impact of water temperature in minimizing both scalding and Legionella growth potential associated with occupiable commercial, institutional, multi-unit residential, and industrial building plumbing systems.

This appendix shall not include single-family residential buildings. This appendix shall not be considered a risk management guidance document for scalding or Legionella. Where required by the Authority Having Jurisdiction, Legionella risk management shall be in accordance with ASHRAE 188 and ASHRAE Guideline 12.

Note: There are additional factors associated with the potential for scalding and Legionella growth other than temperature.

For scalding potential, other factors include, but are not limited to, user age, health, body part, length of contact time, and water source.

For Legionella growth potential other factors include, but are not limited to, water source and plumbing system: size, design, circulation rate, water age, disinfectant residual, piping material and component complexity.

N 102.0 Definitions.

N 102.1 General. For the purpose of this appendix, the following definitions shall apply:

Biofilm. Microorganisms and the slime they secrete that grow on any continually moist surface.

Cold Water. Water at a temperature less than 77°F (25°C).

Control. The management of the operating conditions to maintain compliance with established criteria. {ASHRAE 188:3}

Disinfecting Hot Water. Water at a temperature not less than 160°F (71°C).

Disinfection. The process of killing or inactivating microorganism. [ASHRAE 188:3]

Halogenation. A chemical reaction that involves the addition of one or more halogens, including, but not limited to, chlorine, bromine, or iodine, commonly used to disinfect water systems.

Hazard. See Risk.

Hot Water. Water at a temperature not less than 130°F (54°C) and less than 140°F (60°C).

Legionella Growth Potential. The likelihood that Legionella bacteria will reproduce.

Monitor. Observing and checking the progress or quality of (something) or measuring the physical and chemical characteristics of control measures.

Risk. The potential for harm to humans resulting from exposure to Legionella. [ASHRAE 188:3].

Scald Potential. The likelihood of burning the skin.

Tempered Hot Water. Water at a temperature not less than 120°F (49°C) and less than 130°F (54°C).

Tepid Cold Water. Water at a temperature not less than 77°F (25°C) and less than 85°F (29°C).

Tepid Water. Water at a temperature not less than 85°F (29°C) and less than 110°F (43°C).

Test. The measurement of the physical, chemical, or microbial characteristics or quality of water.

Very Hot Water. Water at a temperature not less than 140°F (60°C) and less than 160°F (71°C).

Warm Water. Water at a temperature not less than 110°F (43°C) and less than 120°F (49°C).

Water Management Plan. A plan to reduce the risk of Legionella growth and spread.

N 103.0 Building Water System Design Documentation.

N 103.1 Design Documentation. Construction documents shall be required for new construction, renovation, refurbishment, replacement, or repurposing of an occupiable building water system, including a water management plan, and shall be submitted to the Authority Having Jurisdiction.

N 103.2 Onsite Documentation. Documentation shall be maintained onsite and shall be readily accessible to the Authority Having Jurisdiction.

N 104.0 Potential Exposure.

N 104.1 Legionella Growth Potential. The Authority Having Jurisdiction shall have the authority to require documentation to address Legionella growth potential, where water temperatures in a water distribution system are within ranges shown in Figure N 104.1 that pose a Legionella growth potential.

N 104.2 Scald Potential. Where the water distribution system's water temperature(s) range poses a scald potential in accordance with Table N 104.2, protection shall be provided in accordance with Chapter 4.

N 105.0 Disinfection.

N 105.1 Disinfection Documentation. Where required by the Authority Having Jurisdiction, documentation for disinfection of all building water systems shall be provided by the registered design professional in the construction documents.

N 105.1.1 Copper-Silver Ionization. Copper-silver ionization methods and procedures, shall include the following documentation:

(1) Copper and silver ionization concentrations.
(2) Methods and documentation for monitoring ion levels.
(3) Electrode cleaning cycles and methods.

N 105.1.2 Ultraviolet Light. Ultraviolet light methods shall include the following documentation:

(1) Locations of ultraviolet light units.
(2) Cleaning cycles and methods of the quartz sleeves and housing.

N 105.2 Chemical Disinfection. Chemical biocide treatment shall be permitted to be used in accordance with the following:

(1) Oxidizing biocides in accordance with manufacturer's guidelines, or as required by the Authority Having Jurisdiction.
(2) Non-oxidizing biocides in accordance with manufacturer's guidelines.
(3) Alternating the use of different types of biocides, dose, and frequency is recommended.
(4) These treatment methods can be used for continuous, online disinfection or shock treatment online or offline.
(5) Biocides intended for potable water applications shall listed in accordance with NSF/ANSI/CAN 60 and approved by the Authority Having Jurisdiction.

N 105.3 Non-Chemical Treatment. Non-chemical treatment devices shall be permitted to be used in accordance with manufacturer's guidelines.

N 105.3.1 Thermal Shock. Thermal treatment using heat shock at 158°F (70°C) for 30 minutes shall be permitted in accordance with applicable guidelines.

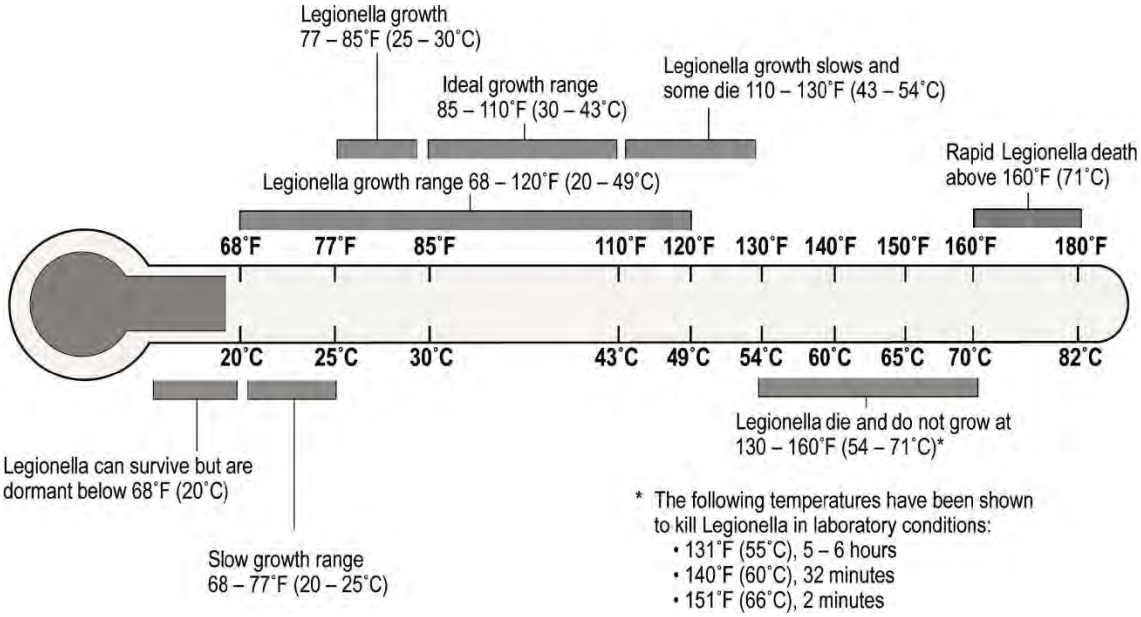
N 105.4 Frequency of Cleaning and Disinfection. Where a water management plan is implemented, the frequency of cleaning and disinfection logs shall be readily accessible to the water management team and the Authority Having Jurisdiction.

N 201.0 Supply System Legionella Test Levels.

N 201.1 General. The minimum remediation action for water supply systems shall be in accordance with Table N 201.1.

N 202.0 Emergency Disinfection Procedure.

N 202.1 General. An emergency disinfection procedure shall be provided in accordance with Table N 201.1.



For SI units: °C = (°F-32)/1.8

* Temperature ranges reported are experimentally determined in a laboratory setting in the absence of a realistic microbial community. Legionella can survive for longer periods of time at temperatures higher and lower than the growth temperature ranges indicated due to changes in their metabolic state and/or protection from thermal disinfection within biofilm or amoeba host organisms.

FIGURE N 104.1
WATER TEMPERATURE RANGES AND LEGIONELLA GROWTH POTENTIAL*

TABLE N 104.2
WATER TEMPERATURE RANGES AND SCALD POTENTIAL

WATER DESCRIPTION	TEMPERATURE (°F)	SCALD POTENTIAL*
Cold	<77	None
Tepid Cold	≥77 and <85	None
Tepid	≥85 and <110	None Hyperthermia is possible after long exposure in a bathtub or whirlpool tub.
Warm	≥110 and <120	Minimal At 111°F, greater than 220 minutes for second-degree burn.
Tempered Hot	≥120 and <130	Low At 120°F, greater than 5 minutes for second-degree burn, and 10 minutes to third-degree burn; At 124°F, 2 minutes for second-degree burn, and 4 minutes, 10 seconds for third-degree burn.
Hot	≥130 and <140	Moderate to High At 130°F, 18 seconds for second-degree burn, and 30 seconds for third-degree burn.
Very Hot	≥140 and <160	High At 140°F, 3 seconds for second-degree burn, and 5 seconds for third-degree burn; At 150°F, instant for second-degree burn, and less than 2 seconds for third-degree burn; At 158°F, instant for second-degree burn, and less than 1 second for third-degree burn.
Disinfecting Hot	≥160	Immediate

For SI units: °C = (°F-32)/1.8

* The infant, elderly, and infirmed have a higher potential for scalding at temperatures lower than listed.

TABLE N 201.1
LEGIONELLA REMEDIATION ACTIONS DOMESTIC WATER SYSTEMS

PERCENTAGE OF POSITIVE LEGIONELLA TEST SITES	REMEDIATION ACTION[1]
< 30	• Maintain environmental assessment and Legionella monitoring in accordance with the water management plan.
≥ 30	• Immediately institute short-term control measures in accordance with the direction of a qualified professional,[2] and notify the Authority Having Jurisdiction, if required. • The water system shall be re-sampled no sooner than 7 days and no later than 4 weeks after disinfection to determine the efficacy of the treatment. • For persistent results, as determined by the Authority Having Jurisdiction, showing = 30 percent positive sites, long-term control measures shall be implemented in accordance with the direction of a qualified professional[2] and the Authority Having Jurisdiction. • Retreat and retest. If retest is = 30 percent positive, repeat short-term control measures. • With receipt of results < 30 percent positive, resume monitoring in accordance with the water management plan. • For persistent results, as determined by the Authority Having Jurisdiction, showing = 30 percent positive sites, long-term control measures shall be implemented in accordance with the direction of a qualified professional[2] and the Authority Having Jurisdiction.

Notes:

[1] In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the Authority Having Jurisdiction.

[2] Control measures shall be included in the water management plan.

Attachment 5

APPENDIX P
PROFESSIONAL QUALIFICATIONS

P 101.0 General.

P 101.1 Scope. The provisions of this appendix address minimum qualifications for installers, inspectors, or employers for systems covered within the scope of this code.

P 102.0 Qualifications.

P 102.1 General. Where permits are required, the Authority Having Jurisdiction shall have the authority to require contractors, installers, or service technicians to demonstrate competency. Where determined by the Authority Having Jurisdiction, the contractor or technicians shall be licensed or certified to perform such work. Professional qualifications shall be required for an individual to demonstrate the required level of competency.

P 102.2 Inspectors and Plans Examiners. Professional qualification for plumbing inspectors and plumbing plans examiners shall be qualified in accordance with ASSE/IAPMO/ANSI Series 16000.

P 102.2.1 Qualification for Plumbing Inspector. Professional qualification for plumbing inspectors shall be in accordance with ASSE/IAPMO/ANSI 16010.

P 102.2.2 Qualification for Plumbing Plan Examiner. Professional qualification for plumbing plans examiners shall be in accordance with ASSE/IAPMO/ANSI 16040.

P 102.3 Service Plumber Technician. Professional qualification for plumbing service technicians shall be qualified to ASSE/IAPMO/ANSI Series 13000.

P 102.3.1 Qualification for Service Plumbers. Professional qualification for service plumbers shall be in accordance ASSE/IAPMO/ANSI 13010.

P 102.4 Cross-Connection Control. Professional qualification for cross-connection control professionals shall be in accordance with ASSE/IAPMO/ANSI Series 5000.

P 102.4.1 Qualification for Backflow Testers. Professional qualification for backflow assembly testers shall be in accordance with ASSE/IAPMO/ANSI 5110.

P 102.4.2 Qualification for Surveyors. Professional qualification for cross-connection assembly surveyors shall be qualified in accordance with ASSE/IAPMO/ANSI 5120.

P 102.4.3 Qualification for Repairers. Professional qualification for backflow prevention assembly repairers shall be in accordance with ASSE/IAPMO/ANSI 5130.

P 102.4.4 Qualification for Fire Protection Systems. Professional qualification for backflow assembly testers of fire protection systems shall be in accordance with ASSE/IAPMO/ANSI 5140.

P 102.4.5 Qualification for Program Administrator. Professional qualification for backflow prevention administrator shall be in accordance with ASSE/IAPMO/ANSI 5150.

P 102.5 Medical Gas Systems. Professional qualification for medical gas systems personnel shall be in accordance with ASSE/IAPMO/ANSI Series 6000.

P 102.5.1 Qualification for Medical Gas Installers. Professional qualification for medical gas system installers shall be in accordance with ASSE/IAPMO/ANSI 6010.

P 102.5.2 Qualification for Bulk Medical Gas/Cryogenic Fluid Installers. Professional qualification for bulk medical gas/cryogenic fluid installers shall be in accordance ASSE/IAPMO/ANSI 6015.

P 102.5.3 Qualification for Medical Gas Systems Inspectors. Professional qualification for medical gas systems inspectors shall be in accordance with ASSE/IAPMO/ANSI 6020.

P 102.5.4 Qualification for Medical Gas System Verifiers. Professional qualification for medical gas system verifiers shall be in accordance with ASSE/IAPMO/ANSI 6030.

P 102.5.5 Qualification for Bulk Medical Gas/Cryogenic Fluid Central Supply System Verifiers. Professional qualification for bulk medical gas/cryogenic fluid central supply system verifiers shall be in accordance with ASSE/IAPMO/ANSI 6035.

P 102.5.6 Qualification for Medical Gas Systems Maintenance. Professional qualification for medical gas systems maintenance personnel shall be in accordance with ASSE/IAPMO/ANSI 6040.

P 102.6 Residential Potable Water Fire Sprinkler System Installers and Inspectors for One- and Two-Family Dwellings. Professional qualification for residential potable water fire protection system installers and inspectors for one- and two-family dwellings shall be in accordance with ASSE/IAPMO/ANSI Series 7000.

P 102.6.1 Qualification for Installers. Professional qualification for persons who provide layout, detail and calculations for residential potable water fire protection systems for one- and two-family dwellings and install such systems shall be in accordance with ASSE/IAPMO/ANSI 7010.

P 102.6.2 Qualification for Inspectors. Professional qualification for inspectors of residential potable water fire protection systems for one- and two-family dwelling shall be in accordance with ASSE/IAPMO/ANSI 7020.

P 102.7 Water Management and Infection Control Risk Assessment for Building Systems. Professional qualification for construction and maintenance personnel and employers to identify and manage potentially hazardous exposure to bloodborne, waterborne and airborne pathogens. Also includes qualifications for members of a water safety team involved in the development of a risk assessment analysis, and water management and sampling plan, for protection from Legionella and other waterborne pathogens and persons who conduct a facility risk assessment and implement a water safety and management program to reduce the risk of infections due to Legionella. Qualifications are in accordance with ASSE/IAPMO/ANSI Series 12000.

P 102.7.1 Environment of Care, Infection Control and Construction Risk Assessment Professional Qualification Standard. Professional qualification for general knowledge of the environment of care, infection control and construction risk assessment procedures to protect facility operations, occupants, workers or any individual who has the potential for harm caused by construction activities shall be in accordance with ASSE/IAPMO/ANSI 12010.

P 102.7.2 Environment of Care, Infection Control and Construction Risk Assessment Professional Qualification Standard for Construction and Maintenance Employers. Professional qualification for general knowledge of the environment of care, infection control and construction risk assessment requirements and procedures to protect facility operations, occupants, workers, or any individual who has the potential for harm caused by construction activities shall be in accordance with ASSE/IAPMO/ANSI 12020. It also provides general knowledge of employer responsibilities to the worker and to the facility.

P 102.7.3 Water Quality Program Professional Qualifications Standard for Employers and Designated Representatives. Professional qualification for employers and designated representatives implementing water quality programs shall be in accordance with ASSE/IAPMO/ANSI 12060.

P 102.7.4 Qualification for Water Quality Program, Plumbers. Professional qualification for plumbers implementing a water quality program shall be in accordance with ASSE/IAPMO/ANSI 12061.

P 102.7.5 Qualification for Water Quality Program and Pipefitters. Professional qualification for pipefitters implementing a water quality program shall be in accordance with ASSE/IAPMO/ANSI 12062.

P 102.7.6 Qualification for Water Quality Program, Sprinkler Fitters. Professional qualification for sprinkler fitters implementing a water quality program shall be in accordance with ASSE/IAPMO/ANSI 12063.

P 102.7.7 Legionella Water Safety and Management Specialist. Professional qualification for persons who conduct a facility risk assessment and implement a water safety and management program to reduce the risk of infections due to Legionella shall be in accordance with ASSE/IAPMO/ANSI 12080.

P 102.8 Rainwater Catchment System Personnel. Professional qualification for designers and installers of rainwater catchment systems, and inspectors of rainwater/stormwater catchment systems shall be in accordance with ASSE/ARCSA/IAPMO/ANSI Series 21000.

P 102.8.1 Qualification for Installer. Professional qualification for rainwater catchment systems installers shall be in accordance with ASSE/IAPMO/ANSI 21110.

P 102.8.2 Qualification for Designer. Professional qualification for rainwater catchment system designers shall be in accordance with ASSE/IAPMO/ANSI 21120.

P 102.8.3 Qualification for Inspectors. Professional qualification for rainwater and stormwater catchment systems inspectors shall be in accordance with ASSE/IAPMO/ANSI 21130.