

REPORT ON COMMENTS

The Swimming Pool, Spa and Hot Tub
Technical Committee Report on Comments.



Information on IAPMO Codes and Standards Development

1. Applicable Regulations. The primary rules governing the processing of the *Uniform Solar, Hydronics and Geothermal Code and Uniform Swimming Pool, Spa and Hot Tub Code* are the *IAPMO Regulations Governing Consensus Development*. Other applicable rules include *Technical Meeting Convention Rules, and Guide for the Conduct of Participants in the IAPMO Codes and Standards Development Process*. For copies of these documents, contact the Code Development Department at IAPMO World Headquarters at 4755 E. Philadelphia Street, Ontario, CA 91761-2816 USA, or at 909-472-4100. These documents are also available at the IAPMO website at www.iapmo.org.

The following is general information on the IAPMO process. All participants, however, should refer to the actual rules and regulations for a full understanding of this process and for the criteria that govern participation.

2. Technical Committee Report (TCR). The Technical Committee Report is defined as the Report of the Technical Committee, consisting of the Report on Proposals (ROP), as modified by the Report on Comments (ROC), published by the Association.

3. Report on Proposals (ROP). The ROP is defined as “a report to the Association on the actions taken by Technical Committees, accompanied by a ballot statement and one or more proposals on text for a new Document or to amend an existing Document”. The ROP and the ROC together comprise the Technical Committee Report. Anyone who does not pursue an issue, either in person or by designated representative in accordance with Section 7.0 (Public review and Comment of the Regulations Governing Consensus Development), as a proposed amendment of the Report on Proposals will be considered as having their objection resolved.

4. Report on Comments (ROC). The ROC is defined as “a report to the Association on the actions taken by Technical Committees, accompanied by a ballot statement and one or more comments resulting from public review of the Report on Proposals (ROP).” The ROP and the ROC together constitute the Technical Committee Report. Anyone who does not pursue an issue, either in person or by designated representative in accordance with Section 8.0 (Public review and Comment of the Regulations Governing Consensus Development), as a proposed amendment of the Report on Comments will be considered as having their objection resolved.

5. Appeals. Anyone can appeal to the *Executive Committee* concerning procedural or substantive matters related to the development, content, or issuance of any Document of the Association or on matters within the purview of the authority of the Committee. Such appeals must be in written form and filed with the Secretariat (see 9.0 of the Regulations Governing Consensus Development). Time constraints for filing an appeal must be in accordance with Section 9.0. Objections are deemed to be resolved if not pursued at this level.

6. Document Issuance. The USHGC/USPSHTC Executive Committee is the issuer of the *Uniform Solar, Hydronics and Geothermal Code and Uniform Swimming Pool, Spa and Hot Tub Code*. The committee acts on the issuance of a Document within sixty days from the date of the recommendation from the ROC Technical Committee Meeting, unless this period is extended by the Executive Committee.



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Plumbing and Mechanical Officials**

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Hugo Aguilar, P.E.
Recording Secretary
IAPMO Executive
Committee

To: IAPMO Members and Other Interested Parties

Date: March 2018

Arnold Rodio
Chairman
Swimming Pool, Spa,
and Hot Tub Code TC

Enclosed is your 2018 Report on Comments (ROC). These comments were presented to the Swimming Pool, Spa and Hot Tub Technical Committee who met in Ontario, California on October 24, 2017.

Following the comments is a copy of how the 2018 edition of the Uniform Swimming Pool, Spa, and Hot Tub Code (pre-print) would appear if the Executive Committee accepts all committee actions.

This pre-print is provided to you as a courtesy. All changes are tentative and subject to revision. This document is not to be considered the final version of the 2018 Uniform Swimming Pool, Spa and Hot Tub Code. Specific authorization from IAPMO is required for republication or quotation.



2018 UNIFORM SWIMMING POOL, SPA & HOT TUB CODE COMMITTEE

(As of 11/01/16)

NAME	REPRESENTATION	CLASSIFICATION
Arnold Rodio, Chairman	Pace Setter Plumbing (Lancaster, CA)	Installer/Maintainer
Beth Hamil	Self (Pismo Beach, CA)	Special Expert
Alison Osinski, Ph.D	Aquatic Consulting Services (Avalon, CA)	Special Expert
Richard J. English	English Pool Consulting (San Diego, Ca)	Special Expert
Robert Holmer	Terracon Consultants, Inc. (Sacramento, CA)	Special Expert
John Taecker	Underwriters Laboratories (San Jose, CA)	Research/Standards/ Testing Laboratory
Sung Choe	NSF International (Ann Arbor, MI)	Research/Standards/ Testing Laboratory
Kenneth Lee Gregory	Pentair (Washington, UT)	Manufacturer
Martin Hurtado	City of Los Angeles (Lomita, CA)	Enforcing Authority
Michael Beatty	The Walt Disney Company (Buena Vista, FL)	Labor
Louis Sam Fruia	United Independent School District	Consumer
Roy R. Fielding	American Red Cross, University of North Carolina at Charlotte (Charlotte, NC)	User
Enrique Gonzalez	IAPMO Staff	

IAPMO Technical Committee Membership Application

IAPMO uses the information in this application to determine your qualifications and to assure that IAPMO technical committee appointments are made in a way that ensures that committees will contain a fair balance of interests. Please provide us with as much information as you feel will assist us in the selection process. Feel free to attach additional pages if necessary.

Name of Individual: _____ Title: _____
Employer: _____
Mailing Address: _____
UPS or Other Mailing Address: _____
City: _____ State: _____ Zip: _____
Telephone: _____ Fax: _____ E-Mail: _____

Please indicate committee for which you are applying:

- Plumbing Technical Committee Swimming Pool, Spa and Hot Tub Technical Committee
 Mechanical Technical Committee Solar, Hydronics and Geothermal Code Technical Committee

Member categories:

- Principal member
 Alternate member. If Alternate, to whom _____
 Non-voting member

Please indicate the interest category (see definitions on page 2) which you believe best suits your qualifications:

- Manufacturer Research/Standards/Testing Laboratory
 User Enforcing Authority
 Installer/Maintainer Consumer
 Labor Special Expert

1. QUALIFICATIONS OF APPLICANT

- a. Provide evidence of your general knowledge and competence in the scope (*work*) of the committee (*please attach résumé*)

- b. What is your specific relationship to one or more elements of the scope of the committee?

- c. Will you be able to actively participate in the work of the committee including responding to correspondence and attending committee meetings?

2. REPRESENTATION Indicate below the name of the entity you would be representing and include written authorization from that entity authorizing you to be their representative:

- _____

- a. Does the organization you would represent have a mechanism for instructing votes? If so, can the time constraints imposed by the Regulations Governing Committee Projects be met?

3. **FUNDING SOURCE(S) FOR YOUR PARTICIPATION**

- a. What person(s) or organization(s) would fund your participation as a committee member, either in whole or in part? (You should list your employer if your participation is funded by your employer or if your participation is part of your employment responsibilities or otherwise related to your employment.)

- b. Background and description of your employer and/or other person(s) or organization(s) funding participation:

4. **ADDITIONAL COMMENTS**

Languages other than English _____

COMPLETE A SEPARATE APPLICATION FORM FOR EACH COMMITTEE ON WHICH YOU DESIRE TO SERVE. IN ORDER TO ASSURE THE PROMPT PROCESSING OF YOUR REQUEST, PLEASE BE SURE TO COMPLETE ALL QUESTIONS AND SIGN THIS APPLICATION.

If appointed, I agree to abide by the rules and guidelines of IAPMO. In addition, I hereby agree to notify the Secretary of the IAPMO Standards Council of a change in status, including change of employment, organization represented, or funding source. I also agree that IAPMO shall have, and I hereby grant, all and full rights in copyright in any material that I author, either individually or with others, as a member of this committee, or that I submit for the proposed use of the committee in an IAPMO code or standard or other IAPMO document. I further acknowledge that I acquire no rights in any publication of IAPMO and that copyright and all rights in all materials produced by IAPMO technical committees are owned by IAPMO and that IAPMO may register copyright in its own name.

I do not now hold, and I do not intend to hold any patent, the use of which would be required for compliance with any material that I author – either individually or with others – as a member of this committee, or that I submit for the proposed use of the committee in an IAPMO code or standard or other IAPMO document.

I attest that all the information on this application is true and accurate.

By signing below, I attest to my ability to communicate with IAPMO staff and the members of the Technical Committee through electronic means, namely via email and the internet.

Signature _____ Date _____

INTEREST CATEGORIES

- (a) **Manufacturer.** A representative of a maker or marketer of a product, assembly or system, or portion thereof that is affected by the document.
- (b) **User.** A representative of an entity that is subject to the provisions of the Document or that voluntarily uses the Document.
- (c) **Installer/Maintainer.** A representative of an entity that is in the business of installing or maintaining a product, assembly, or system affected by the Document.
- (d) **Labor.** A labor representative or employee concerned with safety in the workplace within the scope of the Document.
- (e) **Research/Standards/Testing Laboratory.** A representative of an independent research organization; an organization that develops codes, standards and other similar documents; or an independent testing laboratory.
- (f) **Enforcing Authority.** A representative of an agency or an organization that promulgates or enforces the Document.
- (g) **Consumer.** A person who is or represents the ultimate purchaser of a product, system or service affected by the Document but who is not a User as defined in 3-2.5.1(b).
- (h) **Special Expert.** A person not representing 3-2.5.1(a) through (g) and who has special expertise in the scope of the Document or portion thereof.



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Technical Correlating Committee Report for USEHC/USPSHTC

Technical Correlating Committee Report for UPC/UMC/USEHC/USPSHTC

2018 Uniform Swimming Pool, Spa & Hot Tub Code Preprint

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By

International Association of Plumbing and Mechanical Officials

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Name:	Julius A Ballanco, PE
Representing:	JB Engineering and Code Consulting, P.C.
Recommendation:	Revise text
Section Number:	1001.1, Table 1001.1

CHAPTER 10 REFERENCED STANDARDS

1001.0 General.

1001.1 Standards. The standards listed in Table 1001.1 are referenced in various sections of this code and shall be considered part of the requirements of this document. The standards are listed herein by the standard number and effective date, the title, application and the section(s) of this code that reference the standard. The application of the referenced standard(s) shall be as specified in Section 301.2.2, intended for use in the design, testing, and installation of materials, devices, appliances, and equipment regulated by this code. These standards are mandatory where required by sections in this code. The promulgating agency acronyms Organization abbreviations referred to in Table 1001.1 are defined in a list found at the end of the table.

**TABLE 1001.1
REFERENCED STANDARDS**

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTIONS
ACCA 10 Manual SPS-2010	HVAC Design for Swimming Pools and Spas	Heating, Ventilating, and Air-Conditioning	301.2.2, 301.3
ACI 318-2011-2014	Building Code Requirements for Structural Concrete	Miscellaneous	402.3.1, 404.3.1
APSP 1-2014	Public Swimming Pools	Miscellaneous	301.2.2, 301.3
APSP 2-1999	Public Spas	Miscellaneous	301.2.2, 301.3
APSP 3-2014	Permanently Installed Residential Spas and Swim Spas	Miscellaneous	301.2.2, 301.3
APSP 4a-2013	Aboveground/Onground Residential Swimming Pools	Miscellaneous	301.2.2, 301.3
APSP 5-2011	Residential Inground Swimming Pools	Miscellaneous	301.2.2, 301.3
APSP 6-2013	Residential Portable Spas and Swim Spas	Miscellaneous	301.2.2, 301.3
APSP 7-2013	Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins	Safety Systems	301.2.2, 301.3
APSP 8-2005 (R2013)	Model Barrier Code for Residential Swimming Pools, Spas, and Hot Tubs	Miscellaneous	301.2.2, 301.3
APSP 16-2011	Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs	Fittings	511.1
ASCE 25-2006	Earthquake Actuated Automatic Gas Shutoff Devices	Fuel Gas	301.2.2, 301.3
ASHRAE 62.1-2013	Ventilation for Acceptable Indoor Air Quality	Heating, Ventilating, and Air-Conditioning	301.2.2, 301.3
ASHRAE 90.1-2013	Energy Standard for Buildings Except Low-Rise Residential Buildings	Miscellaneous	301.2.2, 301.3
ASME A112.1.2-2012	Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water Connected Receptors)	Fittings	301.2.2, 301.3
ASME A112.3.1-2007 (R2012)	Stainless Steel Drainage Systems for Sanitary DWV, Storm, and Vacuum Applications, Above-and Below-Ground	Piping, Ferrous	310.6.2, 413.1, Table 309.1
ASME A112.6.3-2001 (R2007)	Floor and Trench Drains	DWV Components	413.1
ASME A112.6.4-2003 (R2012)	Roof, Deck, and Balcony Drains	DWV Components	301.2.2, 301.3

Proposed Text:

ASME A112.14.1-2003 (R2012)	Backwater Valves	Valves	301.2.2, 301.3
ASME A112.18.1-2012/CSA B125.1-2012	Plumbing Supply Fittings	Fittings	409.2, 410.2, 410.3
ASME A112.18.2-2011/CSA B125.2-2011	Plumbing Waste Fittings	Fittings	301.2.2, 301.3
ASME A112.18.3-2002 (R2012)	Performance Requirements for Backflow Protection Devices and Systems in Plumbing Fixture Fittings	Backflow Protection	301.2.2, 301.3
ASME A112.18.6-2009/CSA B125.6-2009 (R2014)	Flexible Water Connectors	Piping	307.4
ASME A112.19.1-2013/CSA B45.2-2013	Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures	Fixtures	409.1, 410.1, 412.1
ASME A112.19.2-2013/CSA B45.1-2013	Ceramic Plumbing Fixtures	Fixtures	407.1, 407.2, 408.1, 409.1, 410.1, 412.1
ASME A112.19.3-2008/CSA B45.4-2008 (R2013)	Stainless Steel Plumbing Fixtures	Fixtures	407.1, 409.1, 410.1, 412.1
ASME A112.19.7-2012/CSA B45.10-2012	Hydromassage Bathtub Systems	Fixtures	301.2.2, 301.3
ASME A112.19.12-2006 (R2011)-2014	Wall Mounted, Pedestal Mounted, Adjustable, Elevating, Tilting, and Pivoting Lavatory, Sink, and Shampoo Bowl Carrier Systems and Drain Waste Systems	Fixtures	409.1
ASME A112.19.14-2013	Six-Liter Water Closets Equipped with a Dual Flushing Device	Fixtures	407.2.1
ASME A112.19.17-2010	Manufactured Safety Vacuum Release Systems (SVRS) for Residential and Commercial Swimming Pool, Spa, Hot Tub, and Wading Pool Suction Systems	Safety Systems	511.1.3
ASME A112.19.19-2006 (R2011)	Vitreous China Nonwater Urinals	Fixtures	408.1
ASME A112.36.2M-1991 (R2012)	Cleanouts	DWV Components	301.2.2, 301.3
ASME B1.20.1-2013	Pipe Threads, General Purpose (Inch)	Joints	308.1.5, 308.2.3, 308.5.2, 308.12.3, 310.1.3, 310.3.4, 310.4.2, 310.5.3
ASME B16.1-2010	Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250	Fittings	301.2.2, 301.3
ASME B16.3-2011	Malleable Iron Threaded Fittings: Classes 150 and 300	Fittings	Table 307.1, Table 309.1
ASME B16.4-2011	Gray Iron Threaded Fittings: Classes 125 and 250	Fittings	Table 307.1
ASME B16.5-2013	Pipe Flanges and Flanged Fittings: NPS $\frac{1}{2}$ through NPS 24 Metric/Inch	Fittings	301.2.2, 301.3
ASME B16.12-2009 (R2014)	Cast Iron Threaded Drainage Fittings	Fittings	Table 309.1
ASME B16.15-2013	Cast Copper Alloy Threaded Fittings: Classes 125 and 250	Fittings	Table 307.1
ASME B16.18-2012	Cast Copper Alloy Solder Joint Pressure Fittings	Fittings	Table 307.1
ASME B16.20-2012	Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral Wound, and Jacketed	Joints	301.2.2, 301.3
ASME B16.21-2011	Nonmetallic Flat Gaskets for Pipe Flanges	Joints	301.2.2, 301.3
ASME B16.22-2013	Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings	Fittings	Table 307.1
ASME B16.23-2011	Cast Copper Alloy Solder Joint Drainage Fittings: DWV	Fittings	Table 309.1
ASME B16.24-2011	Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 600, 900, 1500, and 2500	Fittings	301.2.2, 301.3

ASME B16.26-2013	Cast Copper Alloy Fittings for Flared Copper Tubes	Fittings	Table 307.1
ASME B16.29-2012	Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings - DWV	Fittings	Table 309.1
ASME B16.33-2012	Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 175 psi (Sizes NPS $\frac{1}{2}$ through NPS 2)	Valves	301.2.2, 301.3
ASME B16.34-2013	Valves—Flanged, Threaded, and Welding End	Valves	301.2.2, 301.3
ASME B16.39-2009	Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300	Fittings	301.2.2, 301.3
ASME B16.40-2013	Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems	Valves	301.2.2, 301.3
ASME B16.47-2011	Large Diameter Steel Flanges: NPS 26 through NPS 60 Metric/Inch	Fittings	301.2.2, 301.3
ASME B16.50-2013	Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings	Fittings	301.2.2, 301.3
ASME B16.51-2013	Copper and Copper Alloy Press-Connect Pressure Fittings	Fittings	Table 307.1
ASME B36.10M-2004 (R2010)	Welded and Seamless Wrought Steel Pipe	Piping, Ferrous	301.2.2, 301.3
ASME BPVC Section IV-2013	Rules for Construction of Heating Boilers	Appliances and Equipment	301.2.2, 301.3
ASME BPVC Section IX-2013	Welding, Brazing, and Fusing Qualifications	Certification	301.2.2, 301.3
ASSE 1001-2008	Atmospheric Type Vacuum Breakers	Backflow Protection	301.2.2, 301.3
ASSE 1003-2009	Water Pressure Reducing Valves for Domestic Water Distribution Systems	Valves	301.2.2, 301.3
ASSE 1011-2004	Hose Connection Vacuum Breakers	Backflow Protection	301.2.2, 301.3
ASSE 1012-2009	Backflow Preventers with an Intermediate Atmospheric Vent	Backflow Protection	301.2.2, 301.3
ASSE 1013-2011	Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers	Backflow Protection	301.2.2, 301.3
ASSE 1014-2005	Backflow Prevention Devices for Hand-Held Shower	Backflow Protection	301.2.2, 301.3
ASSE 1015-2011	Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies	Backflow Protection	301.2.2, 301.3
ASSE 1016-2011/ASME A112.1016-2011/CSA B125.16-2011	Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations	Valves	410.3
ASSE 1017-2009	Temperature Actuated Mixing Valves for Hot Water Distribution Systems	Valves	301.2.2, 301.3
ASSE 1018-2001	Trap Seal Primer Valves—Potable Water Supplied	Valves	301.2.2, 301.3
ASSE 1019-2011	Wall Hydrant with Backflow Protection and Freeze Resistance	Backflow Protection	414.1
ASSE 1020-2004	Pressure Vacuum Breaker Assembly	Backflow Protection	301.2.2, 301.3
ASSE 1024-2004	Dual Check Backflow Preventers	Backflow Protection	301.2.2, 301.3
ASSE 1044-2001	Trap Seal Primer Devices—Drainage Types and Electronic Design Types	DWV Components	301.2.2, 301.3
ASSE 1052-2004	Hose Connection Backflow Preventers	Backflow Protection	301.2.2, 301.3
ASSE 1055-2009	Chemical Dispensing Systems	Backflow Protection	301.2.2, 301.3
ASSE 1057-2012	Freeze Resistant Sanitary Yard Hydrants with Backflow Protection	Backflow Protection	301.2.2, 301.3
ASSE 1060-2006	Outdoor Enclosures for Fluid Conveying Components	Miscellaneous	301.2.2, 301.3
ASSE 1061-2011 2015	Push-Fit Fittings	Fittings	308.1.3.3, 308.2.1, Table 307.1
ASSE 1069-2005	Automatic Temperature Control Mixing Valves	Valves	410.3

ASSE 1070-2004 <u>ASSE 1070-2015/ASME A112.1070-2015/CSA B125.70-2015</u>	Water Temperature Limiting Devices	Valves	409.3
ASSE 1079-2012	Dielectric Pipe Unions	Joints	308.14, 308.15.1, 308.15.3
ASTM A53/A53M-2012	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	Piping, Ferrous	Table 307.1, Table 309.1
ASTM A74-2013a 2016	Cast Iron Soil Pipe and Fittings	Piping, Ferrous	Table 309.1
ASTM A106/A106M-2014	Seamless Carbon Steel Pipe for High-Temperature Service	Piping, Ferrous	301.2.2, 301.3
ASTM A126-2004 (R2014)	Gray Iron Castings for Valves, Flanges, and Pipe Fittings	Piping, Ferrous	301.2.2, 301.3
ASTM A254/A254M-2012	Copper Brazed Steel Tubing	Piping, Ferrous	301.2.2, 301.3
ASTM A269/A269M-2014 ^{et} 2015a	Seamless and Welded Austenitic Stainless Steel Tubing for General Service	Piping, Ferrous	Table 307.1
ASTM A312/A312M-2014-2016	Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes	Piping, Ferrous	Table 307.1
ASTM A377-2003 (R2008) ^{et}	Ductile Iron Pressure Pipe	Piping, Ferrous	301.2.2, 301.3
ASTM A518/A518M-1999 (R2012)	Corrosion-Resistant High-Silicon Iron Castings	Piping, Ferrous	301.2.2, 301.3
ASTM A653/A653M-2013	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process	Piping, Ferrous	301.2.2, 301.3
ASTM A733-2013	Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples	Piping, Ferrous	301.2.2, 301.3
ASTM A861-2004 (R2013)	High-Silicon Iron Pipe and Fittings	Piping, Ferrous	301.2.2, 301.3
ASTM A888-2013a 2015	Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications	Piping, Ferrous	Table 309.1
ASTM A1056-2012	Cast Iron Couplings Used for Joining Hubless Cast Iron Soil Pipe and Fittings	Piping, Ferrous	310.2.2
ASTM B32-2008 (R2014)	Solder Metal	Joints	308.1.4, 310.3.3
ASTM B42-2010-2015a	Seamless Copper Pipe, Standard Sizes	Piping, Copper Alloy	Table 307.1
ASTM B43-2014 2015	Seamless Red Brass Pipe, Standard Sizes	Piping, Copper Alloy	Table 309.1
ASTM B75/B75M-2011	Seamless Copper Tube	Piping, Copper Alloy	Table 307.1, Table 309.1
ASTM B88-2009-2014	Seamless Copper Water Tube	Piping, Copper Alloy	307.3, Table 307.1
ASTM B135-2010	Seamless Brass Tube	Piping, Copper Alloy	301.2.2, 301.3
ASTM B152/B152M-2013	Copper Sheet, Strip, Plate, and Rolled Bar	Miscellaneous	301.2.2, 301.3
ASTM B210-2012	Aluminum and Aluminum Alloy Drawn Seamless Tubes	Piping, Ferrous	301.2.2, 301.3
ASTM B241/B241M-2012 ^{et}	Aluminum and Aluminum Alloy Seamless Pipe and Seamless Extruded Tube	Piping, Ferrous	301.2.2, 301.3
ASTM B251-2010	General Requirements for Wrought Seamless Copper and Copper-Alloy Tube	Piping, Copper Alloy	Table 307.1, Table 309.1
ASTM B280-2013	Seamless Copper Tube for Air Conditioning and Refrigeration Field Service	Piping, Copper Alloy	301.2.2, 301.3
ASTM B302-2012	Threadless Copper Pipe, Standard Sizes	Piping, Copper Alloy	Table 307.1, Table 309.1
ASTM B306-2013	Copper Drainage Tube (DWV)	Piping, Copper Alloy	Table 309.1
ASTM B447-2012a	Welded Copper Tube	Piping, Copper Alloy	Table 307.1

ASTM B584-2014	Copper Alloy Sand Castings for General Applications	Piping, Copper Alloy	301.2.2, 301.3
ASTM B587-2012	Welded Brass Tube	Piping, Copper Alloy	301.2.2, 301.3
ASTM B687-1999 (R2011)	Brass, Copper, and Chromium Plated Pipe Nipples	Piping, Copper Alloy	301.2.2, 301.3
ASTM B813-2010	Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube	Joints	308.1.4, 310.3.3
ASTM B828-2002 (R2010)	Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings	Joints	308.1.4, 310.3.3
ASTM C14-2014	Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe	Piping, Non-Metallic	301.2.2, 301.3
ASTM C425-2004 (R2013)	Compression Joints for Vitrified Clay Pipe and Fittings	Joints	310.7.1
ASTM C428/C428M-2005 (R2011) ^{et}	Asbestos-Cement Nonpressure Sewer Pipe	Piping, Non-Metallic	301.2.2, 301.3
ASTM C443-2012	Joints for Concrete Pipe and Manholes, Using Rubber Gaskets	Joints	301.2.2, 301.3
ASTM C564-2014	Rubber Gaskets for Cast Iron Soil Pipe and Fittings	Joints	310.2.2
ASTM C700-2013	Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated	Piping, Non-Metallic	Table 309.1
ASTM C1053-2000 (R2010)	Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications	Piping, Non-Metallic	301.2.2, 301.3
ASTM C1173-2010 ^{et} (R2014)	Flexible Transition Couplings for Underground Piping Systems	Joints	310.8
ASTM C1277-2014 2015	Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	Joints	310.2.2
ASTM C1440-2008 (R2013) ^{et}	Thermoplastic Elastomeric (TPE) Gasket Materials for Drain, Waste, and Vent (DWV), Sewer, Sanitary and Storm Plumbing Systems	Joints	301.2.2, 301.3
ASTM C1460-2012	Shielded Transition Couplings for Use with Dissimilar DWV Pipe and Fittings Above Ground	Joints	310.8
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UL 1995-2011 2015	Heating and Cooling Equipment	Appliances and Equipment	702.3
UL 2017-2008	General-Purpose Signaling Devices and Systems (with revisions through January 27, 2016 May 4, 2011)	Miscellaneous	803.5
UL 2452-2006	Outline of Investigation for Electric Swimming Pool and Spa Cover Operators	Miscellaneous	806.1

ANSI designated as an American National Standard.

~~Italic/Bold referenced standards indicate where such standards are located in the narrative of the code.~~

Problem Statement:

I chaired the Standard Task Group for the 2018 UPC/UMC. The Task Group developed concepts for referencing standards in the UPC/UMC codes. The Standards Task Group was charged with the review of standards and to make recommendations to the appropriate Technical Committee. The task group started with the review of standards referenced in the narrative of the code by using the criteria as follows: - Does the standard meet the definition as stated in the Regulations Governing Committee Projects? Standard -a document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another

standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix, footnote, or fine-print note and are not to be considered a part of the requirements of a standard. - Are the requirements written in mandatory language? - Does the standard include a clear scope of application? - Is the measure of performance for which the test is conducted is clearly defined in either the test standard or in the code text? - Is the standard under the scoping provisions of the applicable code? The recommendation of the task group is stated in Item # 001 that list standards referenced in various sections of the code. Compliance with the referenced standard is necessary for compliance with this code. If a standard is intended to be a requirement for judging code compliance, the code must state its intent for use. Referenced standards in Item # 001 are referenced in the narrative of the code and are considered part of the requirements of this code to the prescribed extent of each such reference. Standards that are not referenced in the narrative of the code were reviewed by the same criteria outlined in Attachment 17. The recommendation of the task group is stated in Item # 002 that list standards, publications, practices and guides. Standards that are outside of the scope of the swimming pool, spa, and hot tub code and are not relevant have been removed. The asterisk and accompanying footnotes are being removed since they are no longer necessary as they were only there for informational purposes.

COMMITTEE ACTION: Accept as Submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 12

PUBLIC COMMENT 1:

Name:	Angel Guzman/Carlton Ramcharran			
Organization:	American Society of Mechanical Engineering (ASME)			
Representing:	American Society of Mechanical Engineering (ASME)			
Recommendation:	Accept as Modified			
Code:	2018 USPSHTC			
Section Number:	Table 1001.1			
Comment on Proposal Item Number:	001			
Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS			
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
	ASME A112.6.3- 2001 (R2007) <u>2016</u>	Floor and Trench Drains	DWV Components	413.1
	ASME A112.19.3- 2008 <u>2017</u> /CSA B45.4- 2008 (R2013) <u>2017</u>	Stainless Steel Plumbing Fixtures	Fixtures	407.1, 409.1, 410.1, 412.1
	ASME A112.19.19- 2006 (R2011) <u>2016</u>	Vitreous China Nonwater Urinals	Fixtures	408.1
	ASME B16.3- 2011 <u>2016</u>	Malleable Iron Threaded Fittings: Classes 150 and 300	Fittings	Table 307.1, Table 309.1
	ASME B16.4- 2011 <u>2016</u>	Gray Iron Threaded Fittings: Classes 125 and 250	Fittings	Table 307.1
	ASME B16.23- 2011 <u>2016</u>	Cast Copper Alloy Solder Joint Drainage Fittings: DWV	Fittings	Table 309.1
(portions of table not shown remain unchanged)				

Problem Statement:	The above revisions reflect the latest updates to the ASME standards that are referenced in Table 1001.1.
Referenced Standards:	ASME A112.6.3-2016, ASME A112.19.3-2017/CSA B45.4-2017, ASME A112.19.19-2016, ASME B16.3-2016, ASME B16.4-2016, and ASME B16.23-2016 (were provided)
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Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.

Note: The ASME standards meet the requirements for mandatory reference standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 9 **NOT RETURNED:** 3 Choe, Fielding, Taecker

PUBLIC COMMENT 2:

Name:	Conrad Jahrling			
Organization:	American Society of Sanitary Engineering (ASSE) International			
Representing:	American Society of Sanitary Engineering (ASSE) International			
Recommendation:	Accept as Modified			
Code:	2018 USPSHTC			
Section Number:	Table 1001.1			
Comment on Proposal Item Number:	001			
Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS			
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
	ASSE 1016- 2011 2017/ASME A112.1016- 2011 2017/CSA B125.16- 2011 2017	Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations	Valves	410.3
ASSE 1019- 2011(R2016)	Wall Hydrant with Backflow Protection and Freeze Resistance	Backflow Protection	414.1	
	(portions of table not shown remain unchanged)			
Problem Statement:	The above revisions reflect the latest updates to the ASSE standards that are referenced in Table 1001.1.			

Referenced Standards:	ASSE 1016/ASME A112.1016-2017/CSA B125.16-2017 and ASSE 1019-2011(R2016) (were provided)
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Note: The ASSE standards meet the requirements for mandatory reference standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 3:

Name:	Steve Mawn
Organization:	American Society of Testing and Materials (ASTM)
Representing:	American Society of Testing and Materials (ASTM)
Recommendation:	Accept as Modified
Code:	2018 UMC
Section Number:	Table 1001.1
Comment on Proposal Item Number:	001

Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS			
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
	ASTM A312/A312M- 2016 <u>2017</u>	Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes	Piping, Ferrous	Table 307.1
	ASTM B88- 2014 <u>2016</u>	Seamless Copper Water Tube	Piping, Copper Alloy	307.3, Table 307.1
	ASTM B828- 2002 <u>(R2010) 2016</u>	Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings	Joints	308.1.4, 310.3.3
	ASTM D2235-2004 (R2011) <u>(R2016)</u>	Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings	Joints	310.1.2
ASTM D3261- 2015 <u>2016</u>	Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing	Fittings	Table 307.1	

ASTM F891- 2010 <u>2016</u>	Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe with a Cellular Core	Piping, Plastic	Table 309.1
ASTM F1055- 2015 <u>2016a</u>	Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing	Fittings	Table 307.1
ASTM F1282- 2010 <u>2017</u>	Polyethylene/Aluminum/ Polyethylene (PE-AL-PE) Composite Pressure Pipe	Piping, Plastic	Table 307.1
ASTM F1807- 2015 <u>2017</u>	Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing	Fittings	Table 307.1
ASTM F2080- 2015a - <u>2016</u>	Cold-Expansion Fittings W with Metal Compression-Sleeves for Cross-linked <u>Crosslinked Polyethylene (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe</u>	Fittings	Table 307.1
ASTM F2389- 2015 <u>2017a</u>	Pressure-Rated Polypropylene (PP) Piping Systems	Piping, Plastic	308.11.1, Table 307.1
ASTM F2769- 2014 <u>2016</u>	Polyethylene of Raised Temperature (PE-RT) Plastic Hot and Cold-Water Tubing and Distribution Systems	Piping and Fittings, Plastic	Table 307.1

(portions of table not shown remain unchanged)

Problem Statement: The above revisions reflect the latest updates to the ASTM standards that are referenced in Table 1001.1.

Referenced Standards: ASTM A312/A312M-2017, ASTM B88-2016, ASTM B828-2016, ASTM D2235-2004 (R2016), ASTM D3261-2016, ASTM F891-2016, ASTM F1055-2016a, ASTM F1282-2017, ASTM F1807-2017, ASTM F2080-2016, ASTM F2389-2017a, and ASTM F2769-2016 (were provided)

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Note: The ASTM standards meet the requirements for mandatory reference standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 4:

Name:	Annette Alonso			
Organization:	American Welding Society (AWS)			
Representing:	American Welding Society (AWS)			
Recommendation:	Accept as Modified			
Code:	2018 UMC			
Section Number:	Table 1001.1			
Comment on Proposal Item Number:	001			
Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS			
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
	AWS A5.9/A5.9M-2012 2017 (ISO 14343:2009 MOD)	Bare Stainless Steel Welding Electrodes and Rods Welding Consumables—Wire Electrodes, Strip Electrodes, Wires, and Rods for Arc Welding of Stainless and Heat Resisting Steels— Classification	Joints	308.13.2
	(portions of table not shown remain unchanged)			
Problem Statement:	The above revisions reflect the latest updates to the AWS standards that are referenced in Table 1001.1.			
Referenced Standards:	AWS A5.9/A5.9M-2017 (was provided)			
Copyright Assignment:	This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used. I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.			
Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.			

Note: The AWS standard meets the requirements for mandatory reference standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 5:

Name:	Paul Olson			
Organization:	American Water Works Association (AWWA)			
Representing:	American Water Works Association (AWWA)			
Recommendation:	Accept as Modified			
Code:	2018 UMC			
Section Number:	Table 1001.1			
Comment on Proposal Item Number:	001			
Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS			
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
	AWWA C111- 2012 2017	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings	Joints	308.4.1, 308.4.2
	AWWA C151- 2009 2017	Ductile-Iron Pipe, Centrifugally Cast	Piping, Ferrous	Table 307.1
	AWWA C900- 2007 2016	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 42 60 in. (100 mm through 300 1,500 mm), for Water Transmission and Distribution	Piping, Plastic	Table 307.1
(portions of table not shown remain unchanged)				
Problem Statement:	The above revisions reflect the latest updates to the AWWA standards that are referenced in Table 1001.1.			
Referenced Standards:	AWWA C111-2017, AWWA C151-2017, and AWWA C900-2016 (were provided)			
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>			
Patent Policy:	<p>IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements. Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.</p>			

Note: The AWWA standards meet the requirements for mandatory reference standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 6:

Name:	Lauro Pilla, Nikki Kidd			
Organization:	Canadian Standards Association (CSA)			
Representing:	Canadian Standards Association (CSA)			
Recommendation :	Accept as Modified			
Code:	2018 UMC			
Section Number:	Table 1001.1			
Comment on Proposal Item Number:	001			
Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS			
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
	CSA B45.5- 2011 <u>2017/IAPMO Z124- 2011 2017</u>	Plastic Plumbing Fixtures	Fixtures	407.1, 408.1, 409.1, 410.1
	CSA B64.2.1.1- 2011 (<u>R2016</u>)	Hose Connection Dual Check Vacuum Breakers (HCDVB)	Backflow Protection	414.1
	CSA B137.1- 2013 <u>2017</u>	Polyethylene (PE) Pipe, Tubing, and Fittings for Cold-Water Pressure Services	Piping, Plastic	Table 307.1
	CSA B137.5- 2013 <u>2017</u>	Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications	Piping, Plastic	Table 307.1
	CSA B137.6- 2013 <u>2017</u>	Chlorinated Polyvinylchloride (CPVC) Pipe, Tubing, and Fittings for Hot- and Cold-Water Distribution Systems	Piping, Plastic	Table 307.1
	CSA B137.9- 2013 <u>2017</u>	Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure-Pipe Systems	Piping, Plastic	Table 307.1
	CSA B137.10- 2013 <u>2017</u>	Crosslinked Polyethylene/Aluminum/ Crosslinked Polyethylene (PEX-AL-PEX) Composite Pressure-Pipe Systems	Piping, Plastic	Table 307.1
	CSA B137.11- 2013 <u>2017</u>	Polypropylene (PP-R) Pipe and Fittings for Pressure Applications	Piping, Plastic	308.11.1, Table 307.1
	(portions of table not shown remain unchanged)			
Problem Statement:	The above revisions reflect the latest updates to the CSA standards that are referenced in Table 1001.1.			
Referenced Standards:	CSA B45.5- 2017/IAPMO Z124- 2017, CSA B64.2.1.1-2011 (R2016), CSA B137.1- 2017, CSA B137.5- 2017, CSA B137.6- 2017, CSA B137.9- 2017, CSA B137.10- 2017, and CSA B137.11- 2017 (were provided)			

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Note: The CSA standards meet the requirements for mandatory reference standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 7:

Name:	Laura Moreno														
Organization:	National Fire Protection Association (NFPA)														
Representing:	National Fire Protection Association (NFPA)														
Recommendation:	Accept as Modified														
Code:	2018 UMC														
Section Number:	Table 1001.1														
Comment on Proposal Item Number:	001														
Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">STANDARD NUMBER</th> <th style="text-align: center;">STANDARD TITLE</th> <th style="text-align: center;">APPLICATION</th> <th style="text-align: center;">REFERENCED SECTION</th> </tr> </thead> <tbody> <tr> <td>NFPA 70-2014 <u>2017</u></td> <td>National Electrical Code</td> <td>Miscellaneous</td> <td>401.3, 404.1, 418.1, 603.1, 804.1, 804.2, 804.3, 804.4, 804.5</td> </tr> <tr> <td>NFPA 780-2014 <u>2017</u></td> <td>Installation of Lightning Protection Systems</td> <td>Miscellaneous</td> <td>401.2</td> </tr> </tbody> </table>	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION	NFPA 70-2014 <u>2017</u>	National Electrical Code	Miscellaneous	401.3, 404.1, 418.1, 603.1, 804.1, 804.2, 804.3, 804.4, 804.5	NFPA 780-2014 <u>2017</u>	Installation of Lightning Protection Systems	Miscellaneous	401.2		
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION											
NFPA 70-2014 <u>2017</u>	National Electrical Code	Miscellaneous	401.3, 404.1, 418.1, 603.1, 804.1, 804.2, 804.3, 804.4, 804.5												
NFPA 780-2014 <u>2017</u>	Installation of Lightning Protection Systems	Miscellaneous	401.2												
(portions of table not shown remain unchanged)															
Problem Statement:	The above revisions reflect the latest updates to the NFPA standards that are referenced in Table 1001.1.														

Referenced Standards:	NFPA 70-2017 and NFPA 780-2017 (were provided)
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Note: The NFPA standards meet the requirements for mandatory reference standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 8:

Name:	Jeremy Brown			
Organization:	NSF International			
Representing:	NSF International			
Recommendation:	Accept as Modified			
Code:	2018 UMC			
Section Number:	Table 1001.1			
Comment on Proposal Item Number:	001			
Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS			
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
	NSF 14- 2015 <u>2016a</u>	Plastics Piping System Components and Related Materials	Piping, Plastic	301.2, 307.1
	NSF 50- 2015 <u>2016</u>	Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities	Appliances and Equipment	504.5, 506.1, 507.1, 507.1.3, 509.1, 509.3, 510.1, 604.1
	NSF 61- 2015 <u>2016</u>	Drinking Water System Components - Health Effects	Water Supply Components	307.1, 412.1, 504.6
(portions of table not shown remain unchanged)				

Problem Statement:	The above revisions reflect the latest updates to the NSF standards that are referenced in Table 1001.1.
Referenced Standards:	NSF 14-2016a, NSF 50-2016, and NSF 61-2016 (were provided)
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Note: The NSF standards meet the requirements for mandatory reference standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 9:

Name:	John Taecker/Maggie Carroll			
Organization:	Underwriters Laboratories (UL)			
Representing:	Underwriters Laboratories (UL)			
Recommendation:	Accept as Modified			
Code:	2018 USPSHTC			
Section Number:	Table 1001.1			
Comment on Proposal Item Number:	001			
Proposed Text:	TABLE 1001.1 REFERENCED STANDARDS			
	STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
	UL 399- 2008 2017	Drinking Water Coolers (with revisions through October 18, 2013 May 17, 2017)	Appliances	412.1
UL 1081- 2008 2016	Swimming Pool Pumps, Filters, and Chlorinators (with revisions through March 18, 2014 October 21, 2016)	Appliances and Equipment	507.2, 604.1	

	UL 1261- 2004 2016	Electric Water Heaters for Pools and Tubs (with revisions through April 22, 2014 <u>October 7, 2016</u>)	Appliances and Equipment	702.2
	UL 1563-2009	Electric Spas, Equipment Assemblies, and Associated Equipment (with revisions through March 27, 2015 <u>October 7, 2016</u>)	Appliances and Equipment	404.1, 404.4, 511.1, 604.1, 702.2
(portions of table not shown remain unchanged)				
Problem Statement:	The above revisions reflect the latest updates to the UL standards that are referenced in Table 1001.1.			
Referenced Standards:	UL 399-2017, UL 1081-2016, UL 1261-2016, and UL 1563-2009 (were provided)			
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>			
Patent Policy:	<p>IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements. Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.</p>			

Note: The UL standards meet the requirements for mandatory reference standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the 2018 Uniform Solar Energy & Hydronics and Swimming Pool, Spa & Hot Tub Codes.

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

Name:	Julius Ballanco, P.E.
Representing:	JB Engineering and Code Consulting, P.C.
Recommendation:	Add text
Section Number:	1001.2, Table 1001.2

1001.2 Standards, Publications, Practices, and Guides. The standards, publications, practices and guides listed in Table 1001.2 are not referenced in other sections of this code. The application of the referenced standards, publications, practices and guides shall be as specified in Section 302.1.2. The promulgating agency acronyms are found at the end of the table.

**TABLE 1001.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
<u>ACCA 10 Manual SPS-2010</u>	<u>HVAC Design for Swimming Pools and Spas</u>	<u>Heating, Ventilating, and Air-Conditioning</u>
<u>APSP 1-2014</u>	<u>Public Swimming Pools</u>	<u>Miscellaneous</u>
<u>APSP 2-1999</u>	<u>Public Spas</u>	<u>Miscellaneous</u>
<u>APSP 3-2014</u>	<u>Permanently Installed Residential Spas and Swim Spas</u>	<u>Miscellaneous</u>
<u>APSP 4-2012</u>	<u>Aboveground/Onground Residential Swimming Pools includes Addenda A approved April 4, 2013)</u>	<u>Miscellaneous</u>
<u>APSP 5-2011</u>	<u>Residential Inground Swimming Pools (includes Addenda A approved June 28, 2012)</u>	<u>Miscellaneous</u>
<u>APSP 7-2013</u>	<u>Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins</u>	<u>Safety Systems</u>
<u>APSP 8-2005 (R2013)</u>	<u>Model Barrier Code for Residential Swimming Pools, Spas, and Hot Tubs</u>	<u>Miscellaneous</u>
<u>ASHRAE 62.1-2016</u>	<u>Ventilation for Acceptable Indoor Air Quality</u>	<u>Heating, Ventilating, and Air-Conditioning</u>
<u>ASHRAE 90.1-2013</u>	<u>Energy Standard for Buildings Except Low-Rise Residential Buildings</u>	<u>Miscellaneous</u>
<u>ASME A112.1.2-2012</u>	<u>Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors)</u>	<u>Fittings</u>
<u>ASME A112.18.3-2002 (R2012)</u>	<u>Performance Requirements for Backflow Protection Devices and Systems in Plumbing Fixture Fittings</u>	<u>Backflow Protection</u>
<u>ASME A112.19.7-2012/CSA B45.10-2012</u>	<u>Hydromassage Bathtub Systems</u>	<u>Fixtures</u>
<u>ASME B16.1-2015</u>	<u>Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250</u>	<u>Fittings</u>
<u>ASME B16.5-2013</u>	<u>Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch</u>	<u>Fittings</u>
<u>ASME B16.20-2012</u>	<u>Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral Wound, and Jacketed</u>	<u>Joints</u>
<u>ASME B16.21-2011</u>	<u>Nonmetallic Flat Gaskets for Pipe Flanges</u>	<u>Joints</u>
<u>ASME B16.34-2013</u>	<u>Valves - Flanged, Threaded, and Welding End</u>	<u>Valves</u>
<u>ASME B16.39-2014</u>	<u>Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300</u>	<u>Fittings</u>
<u>ASME B16.47-2011</u>	<u>Large Diameter Steel Flanges: NPS 26 through NPS 60 Metric/Inch</u>	<u>Fittings</u>
<u>ASME B16.50-2013</u>	<u>Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings</u>	<u>Fittings</u>
<u>ASME B36.10M-2004 (R2010)</u>	<u>Welded and Seamless Wrought Steel Pipe</u>	<u>Piping, Ferrous</u>
<u>ASSE 1001-2008</u>	<u>Atmospheric Type Vacuum Breakers</u>	<u>Backflow Protection</u>
<u>ASSE 1011-2004</u>	<u>Hose Connection Vacuum Breakers</u>	<u>Backflow Protection</u>
<u>ASSE 1012-2009</u>	<u>Backflow Preventers with an Intermediate Atmospheric Vent</u>	<u>Backflow Protection</u>

Proposed Text:

<u>ASSE 1013-2011</u>	<u>Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers</u>	<u>Backflow Protection</u>
<u>ASSE 1014-2005</u>	<u>Backflow Prevention Devices for Hand-Held Shower</u>	<u>Backflow Protection</u>
<u>ASSE 1015-2011</u>	<u>Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies</u>	<u>Backflow Protection</u>
<u>ASSE 1017-2009</u>	<u>Temperature Actuated Mixing Valves for Hot Water Distribution Systems</u>	<u>Valves</u>
<u>ASSE 1020-2004</u>	<u>Pressure Vacuum Breaker Assembly</u>	<u>Backflow Protection</u>
<u>ASSE 1024-2004</u>	<u>Dual Check Backflow Preventers</u>	<u>Backflow Protection</u>
<u>ASSE 1052-2004</u>	<u>Hose Connection Backflow Preventers</u>	<u>Backflow Protection</u>
<u>ASSE 1055-2009</u>	<u>Chemical Dispensing Systems</u>	<u>Backflow Protection</u>
<u>ASSE 1057-2012</u>	<u>Freeze Resistant Sanitary Yard Hydrants with Backflow Protection</u>	<u>Backflow Protection</u>
<u>ASSE 1060-2006</u>	<u>Outdoor Enclosures for Fluid Conveying Components</u>	<u>Miscellaneous</u>
<u>ASTM A106/A106M-2015</u>	<u>Seamless Carbon Steel Pipe for High-Temperature Service</u>	<u>Piping, Ferrous</u>
<u>ASTM A126-2004 (R2014)</u>	<u>Gray Iron Castings for Valves, Flanges, and Pipe Fittings</u>	<u>Piping, Ferrous</u>
<u>ASTM A254/A254M-2012</u>	<u>Copper-Brazed Steel Tubing</u>	<u>Piping, Ferrous</u>
<u>ASTM A377-2003 (R2014)</u>	<u>Ductile-Iron Pressure Pipe</u>	<u>Piping, Ferrous</u>
<u>ASTM A733-2015</u>	<u>Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples</u>	<u>Piping, Ferrous</u>
<u>ASTM A861-2004 (R2013)</u>	<u>High-Silicon Iron Pipe and Fittings</u>	<u>Piping, Ferrous</u>
<u>ASTM B135-2010</u>	<u>Seamless Brass Tube</u>	<u>Piping, Copper Alloy</u>
<u>ASTM B152/B152M-2013</u>	<u>Copper Sheet, Strip, Plate, and Rolled Bar</u>	<u>Miscellaneous</u>
<u>ASTM B587-2012</u>	<u>Welded Brass Tube</u>	<u>Piping, Copper Alloy</u>
<u>ASTM B687-1999 (R2016)</u>	<u>Brass, Copper, and Chromium-Plated Pipe Nipples</u>	<u>Piping, Copper Alloy</u>
<u>ASTM C1053-2000 (R2015)</u>	<u>Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications</u>	<u>Piping, Non-Metallic</u>
<u>ASTM C1440-2008 (R2013)^{e1}</u>	<u>Thermoplastic Elastomeric (TPE) Gasket Materials for Drain, Waste, and Vent (DWV), Sewer, Sanitary and Storm Plumbing Systems</u>	<u>Joints</u>
<u>ASTM D2657-2007(R2015)</u>	<u>Heat Fusion Joining of Polyolefin Pipe and Fittings</u>	<u>Joints</u>
<u>ASTM D2672-2014</u>	<u>Joints for IPS PVC Pipe Using Solvent Cement</u>	<u>Joints</u>
<u>ASTM D2855-2015</u>	<u>Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</u>	<u>Joints</u>
<u>ASTM D3311-2011(R2016)</u>	<u>Drain, Waste, and Vent (DWV) Plastic Fittings Patterns</u>	<u>Fittings</u>
<u>ASTM F402-2005 (R2012)</u>	<u>Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings</u>	<u>Joints</u>
<u>ASTM F405-2013</u>	<u>Corrugated Polyethylene (PE) Pipe and Fittings</u>	<u>Piping, Plastic</u>
<u>ASTM F409-2012</u>	<u>Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings</u>	<u>Piping, Plastic</u>
<u>ASTM F714-2013</u>	<u>Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter</u>	<u>Piping, Plastic</u>
<u>ASTM F1476-2007 (R2013)</u>	<u>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</u>	<u>Joints</u>
<u>ASTM F1673-2010</u>	<u>Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems</u>	<u>Piping, Plastic</u>
<u>ASTM F2165-2013</u>	<u>Flexible Pre-Insulated Piping</u>	<u>Piping, Plastic</u>
<u>ASTM F2509-2015</u>	<u>Field-Assembled Anodeless Riser Kits for Use on Outside Diameter Controlled Polyethylene and Polyamide-11(PA11) Gas Distribution Pipe and Tubing</u>	<u>Fuel Gas</u>
<u>AWS B2.2-2010</u>	<u>Brazing Procedure and Performance Qualification</u>	<u>Certification</u>

<u>AWS B2.4-2012</u>	<u>Welding Procedure and Performance Qualification for Thermoplastics</u>	<u>Joints, Certification</u>
<u>AWWA C203-2015</u>	<u>Coal-Tar Protective Coating and Linings for Steel Water and Fittings</u>	<u>Miscellaneous</u>
<u>AWWA C213-2015</u>	<u>Fusion-Bonded Epoxy Coating and Linings for Steel Water Pipelines</u>	<u>Miscellaneous</u>
<u>AWWA C500-2009</u>	<u>Metal-Seated Gate Valves for Water Supply Service</u>	<u>Valves</u>
<u>AWWA C507-2015</u>	<u>Ball Valves, 6 in. through 60 in. (150 mm through 1,500 mm)</u>	<u>Valves</u>
<u>CSA Z21.22-2015</u>	<u>Relief Valves for Hot Water Supply Systems (same as CSA 4.4)</u>	<u>Valves</u>
<u>IAF 9-2005</u>	<u>Aquatic Recreation Facilities</u>	<u>Miscellaneous</u>
<u>IAPMO PS 25-2002</u>	<u>Metallic Fittings for Joining Polyethylene Pipe for Water Service and Yard Piping</u>	<u>Joints</u>
<u>IAPMO PS 34-2003</u>	<u>Encasement Sleeve for Potable Water Pipe and Tubing</u>	<u>Piping</u>
<u>IAPMO PS 36-2014^{e1}</u>	<u>Lead Free Sealing Compounds for Threaded Joints</u>	<u>Joints</u>
<u>IAPMO PS 37-1990</u>	<u>Black Plastic PVC or PE Pressure-Sensitive Corrosion Preventive Tape</u>	<u>Miscellaneous</u>
<u>IAPMO PS 42-2013^{e1}</u>	<u>Pipe Alignment and Secondary Support Systems</u>	<u>Miscellaneous</u>
<u>IAPMO PS 51-2013</u>	<u>Expansion Joints for DWV Piping Systems</u>	<u>Joints</u>
<u>IAPMO PS 53-2013</u>	<u>Grooved Mechanical Pipe Couplings and Grooved Fittings</u>	<u>Joints</u>
<u>IAPMO PS 69-2006</u>	<u>Bathwaste and Overflow Assemblies with Tub Filler Spout</u>	<u>DWV Components</u>
<u>IAPMO PS 87-1995</u>	<u>Diverter and Shut-off Valves for Pool/Spas</u>	<u>Valves</u>
<u>IAPMO Z124.8-2013^{e2}</u>	<u>Plastic Liners for Bathtubs and Shower Receptors</u>	<u>Fixtures</u>
<u>MSS SP-6-2012</u>	<u>Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings</u>	<u>Fuel Gas</u>
<u>MSS SP-25-2013</u>	<u>Marking Systems for Valves, Fittings, Flanges, and Unions</u>	<u>Miscellaneous</u>
<u>MSS SP-58-2009</u>	<u>Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation</u>	<u>Fuel Gas</u>
<u>MSS SP-67-2011</u>	<u>Butterfly Valves</u>	<u>Valves</u>
<u>NFPA 31-2016</u>	<u>Installation of Oil-Burning Equipment</u>	<u>Fuel Gas, Appliances and Equipment</u>
<u>UL 296-2003</u>	<u>Oil Burners (with revisions through June 11, 2015)</u>	<u>Fuel Gas, Appliances and Equipment</u>
<u>UL 379-2013</u>	<u>Power Units for Fountain, Swimming Pool, and Spa Luminaires</u>	<u>Equipment</u>
<u>UL 676-2015</u>	<u>Underwater Luminaires and Submersible Junction Boxes</u>	<u>Miscellaneous</u>
<u>UL 676A-2003</u>	<u>Potting Compounds for Swimming Pool, Fountain, and Spa Equipment</u>	<u>Miscellaneous</u>
<u>UL 1241-2003</u>	<u>Junction Boxes for Swimming Pool Luminaires (with revisions through August 28, 2013)</u>	<u>Miscellaneous</u>

Problem Statement:

I chaired the Standard Task Group for the 2018 UPC/UMC. The Task Group developed concepts for referencing standards in the UPC/UMC codes. The Standards Task Group was charged with the review of standards and to make recommendations to the appropriate Technical Committee. The task group started with the review of standards referenced in the narrative of the code by using the criteria as follows: - Does the standard meet the definition as stated in the Regulations Governing Committee Projects? Standard -a document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix, footnote, or fine-print note and are not to be considered a part of the requirements of a standard. - Are the requirements written in mandatory language? - Does the standard include a clear scope of application? - Is the measure of performance for which the test is conducted is clearly defined in either the test standard or in the code text? - Is the standard under the scoping provisions of the applicable code? The recommendation of the task group is stated in Item # 001 that list standards referenced in various sections of the code. Compliance with the referenced standard is necessary for compliance with this code. If a standard is intended to be a requirement for judging code compliance, the code must state its intent for use. Referenced standards in Item # 001 are referenced in the narrative of the code and are considered part of the requirements of this code to the prescribed extent of

each such reference. Standards that are not referenced in the narrative of the code were reviewed by the same criteria. The recommendation of the task group is stated in Item # 002 that list standards, publications, practices and guides. Standards that are outside of the scope of the swimming pool, spa, and hot tub code and are not relevant have been removed as follows:

Standards Outside the Scope

APSP Publications

APSP 6, Residential Portable Spas and Swim Spas, 2013.

ASCE Publications

ASCE 25, Earthquake-Actuated Automatic Gas Shutoff Devices, 2006.

ASME Publications

ASME A112.6.4, Roof, Deck, and Balcony Drains, 2003 (R2012).

ASME A112.14.1, Backwater Valves, 2003 (R2012).

ASME A112.18.2/CSA B125.2, Plumbing Waste Fittings, 2011.

ASME A112.36.2M, Cleanouts, 1991 (R2012).

ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 600, 900, 1500, and 2500, 2011.

ASME B16.33, Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 175 psi (Sizes NPS 1/2 through NPS 2), 2012.

ASME B16.40, Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems, 2013.

ASME BPVC Section IV, Rules for Construction of Heating Boilers, 2013.

ASME BPVC Section IX, Welding, Brazing, and Fusing Qualifications, 2013.

ASSE Publications

ASSE 1003, Water Pressure Reducing Valves for Domestic Water Distribution Systems, 2009.

ASSE 1018, Trap Seal Primer Valves-Potable Water Supplied, 2001.

ASSE 1044, Trap Seal Primer Devices-Drainage Types and Electronic Design Types, 2001.

ASTM Publications

ASTM A518/A518M, Corrosion-Resistant High-Silicon Iron Castings, 1999 (R2012).

ASTM A653/A653M, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, 2013.

ASTM B210, Aluminum and Aluminum-Alloy Drawn Seamless Tubes, 2012.

ASTM B241/B241M, Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube, 2012e1.

ASTM B280, Seamless Copper Tube for Air Conditioning and Refrigeration Field Service, 2013.

ASTM B584, Copper Alloy Sand Castings for General Applications, 2014.

ASTM C14, Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe, 2014.

ASTM C428/C428M, Asbestos-Cement Nonpressure Sewer Pipe, 2005 (R2011)e1.

ASTM C443, Joints for Concrete Pipe and Manholes, Using Rubber Gaskets, 2012.

ASTM D2513, Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings, 2014e1.

ASTM D3034, Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, 2014.

ASTM F810, Smoothwall Polyethylene (PE) Pipe for Use in Drainage and Waste Disposal Absorption Fields, 2012.

ASTM F949, Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings, 2010.

ASTM F1924, Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing, 2012.

ASTM F1948, Metallic Mechanical Fittings for Use on Outside Diameter Controlled Thermoplastic Gas Distribution Pipe and Tubing, 2012.

ASTM F1973, Factory Assembled Anodeless Risers and Transition Fittings in Polyethylene (PE) and Polyamide 11 (PA11) and Polyamide 12 (PA12) Fuel Gas Distribution Systems, 2013e1.

CSA Publications

CSA LC 1, Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (same as CSA 6.26), 2014.
CSA LC 4a, Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems (same as CSA 6.32a), 2013.
CSA Z21.10.1, Gas Water Heaters – Volume I, Storage Water Heaters with Input Ratings of 75 000 Btu Per Hour or Less (same as CSA 4.1), 2013.
CSA Z21.10.3, Gas-Fired Water Heaters – Volume III, Storage Water Heaters with Input Ratings Above 75 000 Btu Per Hour, Circulating and Instantaneous (same as CSA 4.3), 2013.
CSA Z21.12b, Draft Hoods, 1994 (R2010).
CSA Z21.13, Gas-Fired Low Pressure Steam and Hot Water Boilers (same as CSA 4.9), 2014.
CSA Z21.15b, Manually Operated Gas Valves for Appliances, Appliance Connector Valves, and Hose End Valves (same as CSA 9.1b), 2013.
CSA Z21.24a, Connectors for Gas Appliances (same as CSA 6.10a), 2009 (R2011).
CSA Z21.41, Quick Disconnect Devices for Use with Gas Fuel Appliances (same as CSA 6.9), 2014.
CSA Z21.69a, Connectors for Movable Gas Appliances (same as CSA 6.16a), 2012.
CSA Z21.80a, Line Pressure Regulators (same as CSA 6.22a), 2012.
CSA Z21.81a, Cylinder Connection Devices (same as CSA 6.25a), 2007 (R2010).
CSA Z21.86, Vented Gas-Fired Space Heating Appliances (same as CSA 2.32), 2008 (R2014).
CSA Z21.90b, Gas Convenience Outlets and Optional Enclosures (same as CSA 6.24b), 2006 (R2011).

IAPMO Publications.

IAPMO PS 66, Dielectric Waterway Fittings, 2000.

NFPA Publications

NFPA 54/Z223.1, National Fuel Gas Code, 2012.
NFPA 58, Liquefied Petroleum Gas Code, 2014.
NFPA 85, Boiler and Combustion Systems Hazards Code, 2011.
NFPA 88A, Parking Structures, 2011.
NFPA 211, Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances, 2013.

UL Publications

UL 80, Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids (with revisions through January 16, 2014), 2007.
UL 103, Factory-Built Chimneys for Residential Type and Building Heating Appliances (with revisions through July 27, 2012), 2010.
UL 125, Flow Control Valves for Anhydrous Ammonia and LP-Gas, 2014.
UL 132, Safety Relief Valves for Anhydrous Ammonia and LP-Gas (with revisions through July 23, 2010), 2007.
UL 144, LP Gas Regulators (with revisions through April 11, 2014), 2012.
UL 252, Compressed Gas Regulators (with revisions through September 4, 2013), 2010.
UL 343, Pumps for Oil-Burning Appliances (with revisions through June 12, 2013), 2008.
UL 378, Draft Equipment (with revisions through September 17, 2013), 2006.
UL 441, Gas Vents (with revisions through June 12, 2014), 2010.
UL 443, Steel Auxiliary Tanks for Oil-Burner Fuel (with revisions through March 8, 2013), 2006.
UL 536, Flexible Metallic Hose (with revisions through June 9, 2003), 1997.
UL 569, Pigtails and Flexible Hose Connectors for LP-Gas, 2013.
UL 641, Type L Low-Temperature Venting Systems (with revisions through June 12, 2013), 2010.
UL 651, Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings (with revisions through May 2, 2014), 2011.
UL 726, Oil-Fired Boiler Assemblies (with revisions through October 9, 2013), 1995.
UL 732, Oil-Fired Storage Tank Water Heaters (with revisions through October 9, 2013), 1995.

	UL 778, Motor-Operated Water Pumps (with revisions through May 23, 2014), 2010. UL 834, Heating, Water Supply, and Power Boilers—Electric (with revisions through December 9, 2013), 2004. UL 1480, Speakers for Fire Alarm, Emergency, and Commercial and Professional Use (with revisions through October 17, 2012), 2003. UL 1738, Venting Systems for Gas-Burning Appliances, Categories II, III, and IV (with revisions through May 13, 2014), 2010.
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COMMITTEE ACTION: Accept as Submitted

COMMITTEE STATEMENT:

Any of the approved referenced standards will be placed into Table 1001.1.

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 12

PUBLIC COMMENT 1:

Name:	Steve Ferguson		
Organization:	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)		
Representing:	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)		
Recommendation:	Accept as Modified		
Code:	2018 USPSHTC		
Section Number:	Table 1001.2		
Comment on Proposal Item Number:	002		
Proposed Text:	TABLE 1001.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES		
	DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
	ASHRAE 90.1- 2013 2016	Energy Standard for Buildings Except Low-Rise Residential Buildings	Miscellaneous
	(portions of table not shown remain unchanged)		
Problem Statement:	This is a comment to update the reference to ASHRAE 90.1 in the USPSHTC to reflect the recently published version.		
Referenced Standards:	ASHRAE 90.1-2016 (was provided)		
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>		
Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which		

	is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.
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COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 2:

Name:	Angel Guzman/Carlton Ramcharran		
Organization:	American Society of Mechanical Engineering (ASME)		
Representing:	American Society of Mechanical Engineering (ASME)		
Recommendation:	Accept as Modified		
Code:	2018 USPSHTC		
Section Number:	Table 1001.2		
Comment on Proposal Item Number:	002		
Proposed Text:	TABLE 1001.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES		
	DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
	ASME B16.21- 2011 <u>2016</u>	Nonmetallic Flat Gaskets for Pipe Flanges	Joints
	(portions of table not shown remain unchanged)		
Problem Statement:	The above revisions reflect the latest updates to the ASME standards that are referenced in Table 1001.2.		
Referenced Standards:	ASME B16.21-2016 (was provided)		
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>		
Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.		

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 3:

Name:	Conrad Jahrling		
Organization:	ASSE International		
Representing:	American Society of Sanitary Engineering (ASSE) International		
Recommendation:	American Society of Sanitary Engineering (ASSE) International		
Code:	2018 USPSHTC		
Section Number:	Table 1001.2		
Comment on Proposal Item Number:	002		
Proposed Text:	TABLE 1001.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES		
	DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
	ASSE 1001- 2008 2017	Atmospheric Type Vacuum Breakers	Backflow Protection
	ASSE 1052- 2004 2016	Hose Connection Backflow Preventers	Backflow Protection
	ASSE 1055- 2009 2016	Chemical Dispensing Systems	Backflow Protection
	ASSE 1060- 2006 2017	Outdoor Enclosures for Fluid Conveying Components	Miscellaneous
	(portions of table not shown remain unchanged)		
Problem Statement:	The above revisions reflect the latest updates to the ASSE standards that are referenced in Table 1001.2.		
Referenced Standards:	ASSE 1001-2017, ASSE 1052-2016, ASSE 1055-2016 and ASSE 1060-2017 (were provided)		
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>		
Patent Policy:	<p>IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements. Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.</p>		

COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 4:

Name:	Steve Mawn		
Organization:	American Society of Testing and Materials (ASTM)		
Representing:	American Society of Testing and Materials (ASTM)		
Recommendation:	Accept as Modified		
Code:	2018 USPSHTC		
Section Number:	Table 1001.2		
Comment on Proposal Item Number:	002		
Proposed Text:	TABLE 1001.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES		
	DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
	ASTM A733- 2015 2016	Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples	Piping, Ferrous
	ASTM F405-2013	Corrugated Polyethylene (PE) Pipe and Fittings Withdrawn	Piping, Plastic
	ASTM F409- 2012 2017	Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings	Piping, Plastic
	ASTM F1673-2010 (R2016)	Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems	Piping, Plastic
	(portions of table not shown remain unchanged)		
Problem Statement:	The above revisions reflect the latest updates to the ASTM standards that are referenced in Table 1001.2.		
Referenced Standards:	ASTM A733-2016, ASTM F409-2017, and ASTM F1673-2010 (R2016) (were provided)		
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>		

Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.
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COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 5:

Name:	Lauro Pilla, Nikki Kidd		
Organization:	Canadian Standards Association (CSA)		
Representing:	Canadian Standards Association (CSA)		
Recommendation:	Accept as Modified		
Code:	2018 USPSHTC		
Section Number:	Table 1001.2		
Comment on Proposal Item Number:	002		
Proposed Text:	TABLE 1001.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES		
	DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
	ASME A112.19.7-2012/CSA B45.10-2012 (<u>R2017</u>)	Hydromassage Bathtub Systems	Fixtures
	(portions of table not shown remain unchanged)		
Problem Statement:	The above revisions reflect the latest updates to the ASME/CSA standards that are referenced in Table 1001.2.		
Referenced Standards:	ASME A112.19.7-2012/CSA B45.10-2012 (R2017) (was provided)		
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>		

Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.
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COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 6:

Name:	Kyle Thompson		
Organization:	International Association of Plumbing and Mechanical Officials (IAPMO)		
Representing:	International Association of Plumbing and Mechanical Officials (IAPMO)		
Recommendation:	Accept as Modified		
Code:	2018 USPSHTC		
Section Number:	Table 1001.2		
Comment on Proposal Item Number:	002		
Proposed Text:	TABLE 1001.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES		
	DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
	IAPMO PS 51- 2013 <u>2016</u>	Expansion Joints <u>and Flexible Expansion Joints</u> for DWV Piping Systems	Joints
	IAPMO PS 53- 2013 <u>2016</u>	Grooved Mechanical Pipe Couplings and Grooved Fittings	Joints
	(portions of table not shown remain unchanged)		
Problem Statement:	The above revisions reflect the latest updates to the IAPMO standards that are referenced in Table 1001.2.		
Referenced Standards:	IAPMO PS 51-2016 and IAPMO PS 53-2016 (were provided)		
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>		

Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.
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COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 7:

Name:	David Thompson		
Organization:	Manufacturers Standardization Society (MSS)		
Representing:	Manufacturers Standardization Society (MSS)		
Recommendation:	Accept as Modified		
Code:	2018 USPSHTC		
Section Number:	Table 1001.2		
Comment on Proposal Item Number:	002		
Proposed Text:	TABLE 1001.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES		
	DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
	MSS SP-6- 2012 2017	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings	Fuel Gas
	MSS SP-25-2013	Standard Marking Systems for Valves, Fittings, Flanges, and Unions	Miscellaneous
	MSS SP-67- 2014 2017	Butterfly Valves	Valves
	(portions of table not shown remain unchanged)		
Problem Statement:	The above revisions reflect the latest updates to the MSS standards that are referenced in Table 1001.2.		
Referenced Standards:	MSS SP-6-2017, MSS SP-25-2013, and MSS SP-67-2017 (were provided)		
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>		

Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.
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COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

PUBLIC COMMENT 8:

Name:	John Taecker/Maggie Carroll		
Organization:	Underwriters Laboratories (UL)		
Representing:	Underwriters Laboratories (UL)		
Recommendation:	Accept as Modified		
Code:	2018 USPSHTC		
Section Number:	Table 1001.2		
Comment on Proposal Item Number:	002		
Proposed Text:	TABLE 1001.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES		
	DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
	UL 296- 2003 2017	Oil Burners (with revisions through June 11, 2015)	Fuel Gas, Appliances and Equipment
	(portions of table not shown remain unchanged)		
Problem Statement:	The above revisions reflect the latest updates to the UL standards that are referenced in Table 1001.2.		
Referenced Standards:	UL 296-2017 (was provided)		
Copyright Assignment:	<p>This proposal is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used.</p> <p>I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>		
Patent Policy:	IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements . Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the		

	proposal that includes an essential patent claim is introduced into the code development process.
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COMMITTEE ACTION: Accept the public comment as submitted

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

Item # 006.01
 USPSHTC 2018 – (301.2)

Name:	USPSHTC Technical Committee Comment
Organization:	
Representing:	
Recommendation:	Accept as Modified
Code:	2018 USPSHTC
Section Number:	302.1
Comment on Proposal Item Number:	006
Proposed Text:	<p>301.2 Minimum Standards. Pipe, pipe fittings, traps, fixtures, material, and devices used in a swimming pool, spa, hot tub, or plumbing system shall be listed and labeled (third-party certified) by a listing agency (accredited conformity assessment body) and shall comply <u>as complying</u> with the approved applicable recognized standards referenced in this code, and shall be free from defects. Plastic pipe and the fittings used for plastic pipe, other than for gas, shall meet the requirements of NSF 14. Unless otherwise provided for in this code, materials, fixtures, or devices used or entering into the construction of a swimming pool, spa, or hot tub system, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.</p> <p>301.2.1 Marking. Each length of pipe and each pipe fitting, trap, fixture, material, and device used in a swimming pool, spa, or hot tub system shall have cast, stamped, or indelibly marked on it <u>any markings required by the applicable referenced standards and listing agency, and the manufacturer's mark or name,</u> which shall readily identify the manufacturer to the end user of the product. Where required by the approved standard that applies, the product shall be marked with the weight and the quality of the product. Materials and devices used or entering into the construction of swimming pools, spas, hot tubs, or parts thereof, shall be marked and identified in a manner satisfactory to the Authority Having Jurisdiction. Such marking shall be done by the manufacturer. Field markings shall not be acceptable.</p>
Problem Statement:	<p>The labeling requirements on a particular product depends on the corresponding listing standard. It is common for a product to have a listing on a material in accordance with the applicable standards and when it is found safe for use in a specific manner. Some products are not capable of bearing a label due to dimensions or size of the product. This will put burdens on manufacturers, AHJs and installers for no health and safety reason. There was no technical justification provided that indicates that the current language is not correct. The current language has existed in the UPC, UMC, USEHC and the USPSHTC with no issues reported in the field; not to mention other model codes that also use the similar language. Using “and” in Section 302.1 will create more harm than good. Furthermore, the modification will clarify the labeling requirements in the marking section. This Committee Comment pertains to the UPC/UMC/USPSHTC/USEHC Technical Correlating Committee report (TCC Item #001) and Item #006 of the USPSHTC ROP.</p>
Referenced Standards:	
Copyright Assignment:	<p>This comment is original material and is considered to be the submitter's own idea based on, or as a result of, research and experience, and is not copied from another source. I hereby irrevocably grant and assign to IAPMO all and full rights in copyright, in this proposal. I understand and intend that I acquire no rights, including rights as a joint author, in any publication of IAPMO in which this proposal in this or another similar or analogous form is used. I hereby warrant that I am the author of this proposal and that I have full power and authority to enter into this copyright assignment.</p>
Patent Policy:	<p>IAPMO's patent policy is to adhere fully to the ANSI patent policy. Every proponent of a code change proposal should familiarize him or herself with the ANSI patent policy which is available in its entirety at www.ansi.org/essentialrequirements. Upon receipt of a notice of an essential patent claim, IAPMO will coordinate with the claimant to ensure collection of the assurance(s) required by IAPMO's adherence to the ANSI patent policy before the proposal that includes an essential patent claim is introduced into the code development process.</p>

COMMITTEE ACTION: Accept the public comment as submitted.

TOTAL ELIGIBLE TO VOTE: 12

VOTING RESULTS: AFFIRMATIVE: 8 **NOT RETURNED:** 4 Choe, English, Fielding, Taecker

**Technical
Correlating
Committee
Report for
USEHC/USPSHTC**

2017 IAPMO USPSHTC/USEHC Technical Correlation Committee (TCC) Report

CORRELATION ITEMS BETWEEN THE USPSHTC and USEHC

TCC ITEM # 001

2015 USPSHTC	2015 USEHC
ITEM # 004	ITEM # 004
<p>RECOMMENDATION:</p> <p>214.0 Labeled. Equipment or materials bearing a label of a listing agency (accredited conformity assessment body). The manner in which the equipment or materials are labeled shall be in accordance with the listing agency system. See Listed (Third-Party Certified).</p>	<p>214.0 Labeled. Equipment or materials bearing a label of a listing agency (accredited conformity assessment body). See Listed (Third-Party Certified).</p>
<input checked="" type="checkbox"/> Accept recommendation as submitted.	<input type="checkbox"/> Reject the recommendation.
<p>Substantiation: Section 214.0 of the USPSHTC is being revised to correlate with Section 214.0 of the USEHC.</p>	

TCC ITEM # 002

2015 USPSHTC

ITEM # 006

RECOMMENDATION:

301.2 Minimum Standards. Pipe, pipe fittings, traps, fixtures, material, and devices **used in a swimming pool, spa, hot tub, or plumbing system** shall be listed and labeled (third-party certified) by a listing agency (accredited conformity assessment body) and shall comply with the approved applicable recognized standards referenced in this code, and shall be free from defects. Plastic pipe and the fittings used for plastic pipe, other than for gas, shall meet the requirements of NSF 14. Unless otherwise provided for in this code, materials, fixtures, or devices used or entering into the construction of a **swimming pool, spa, or hot tub** system, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.

2015 USEHC

ITEM # 006

302.1 Minimum Standards. Pipe, pipe fittings, appliances, appurtenances, equipment, material, and devices used shall be listed and labeled (third party certified) by a listing agency (accredited conformity assessment body) and shall comply with the approved applicable recognized standards referenced in this code, and shall be free from defects. Unless otherwise provided for in this code, materials, appurtenances, or devices used or entering into the construction of a system, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.

<input checked="" type="checkbox"/>	Accept recommendation as submitted.	<input type="checkbox"/>	Reject the recommendation.
Substantiation: No action is needed by the USPSHTC/USEHC TCC for Item # 006 of the USPSHTC or Item # 006 of the USEHC. The TCC agrees with the action taken by the USPSHTC TC to “accept as submitted” as this language clarifies the intent and unique application for swimming pools, spas, hot tubs or the plumbing system. The TCC agrees with the action taken on Item #006 “accept as submitted” and further clarification is not needed to enforce listing and labeling requirements in the USEHC.			

TCC ITEM # 003

2015 USPSHTC

ITEM # 003

RECOMMENDATION:

301.0 General.

301.2.2 Standards. Standards listed or referred to in this chapter or other chapters cover materials that will conform to the requirements of this code, where used in accordance with the limitations imposed in this or other chapters thereof and their listing. Where a standard covers materials of various grades, weights, quality, or configurations, the portion of the listed standard that is applicable shall be used. Design and materials for special conditions or materials not provided for herein shall be permitted to be used by special permission of the Authority Having Jurisdiction after the Authority Having Jurisdiction has been satisfied as to their adequacy. A list of **swimming pool, spa and hot tub** standards that appear in specific sections of this code **is** referenced in Table 1001.1. Standards referenced in Table 1001.1 shall be applied as indicated in the applicable referenced section. A list of additional standards, publications, practices and guides that are not referenced in specific sections of this code appear in Table 1001.2. The documents indicated in Table 1001.2 shall be permitted in accordance with Section 301.3.

2015 USEHC

ITEM # 003

302.0 Standards and Alternates.

302.1.2 Standards. Standards listed or referred to in this chapter or other chapters cover materials that will conform to the requirements of this code, where used in accordance with the limitations imposed in this or other chapters thereof and their listing. Where a standard covers materials of various grades, weights, quality, or configurations, the portion of the listed standard that is applicable shall be used. Design and materials for special conditions or materials not provided for herein shall be permitted to be used by special permission of the Authority Having Jurisdiction after the Authority Having Jurisdiction has been satisfied as to their adequacy. A list of standards that appear in specific sections of this code **are** referenced in Table 1001.1. Standards referenced in Table 1001.1 shall be applied as indicated in the applicable referenced section. A list of additional standards, publications, practices and guides that are not referenced in specific sections of this code appear in Table 1001.2. The documents indicated in Table 1001.2 shall be permitted in accordance with Section 302.2.

X	Accept recommendation as submitted.		Reject the recommendation.
<p>Substantiation: No action is needed by the USPSHTC/USEHC TCC for Item # 003 of the USPSHTC or Item # 003 of the USEHC. The TCC agrees with the action taken by the USPSHTC TC to “accept as submitted” as this language clarifies the intent and directs the user to a list of swimming pool, spa, and hot tub standards. The TCC agrees with the action taken on Item #003 “accept as modified” by the USEHC TC as the proposed modification clarifies that not all standards are relevant to solar and hydronic materials.</p>			

MEMORANDUM

TO: Technical Correlating Committee
FROM: Enrique Gonzalez, Staff Liaison
DATE: February 10, 2017
SUBJECT: Final Ballot Results for the TCC Report 2017

Dear Technical Correlating Committee Members:

Attached are the final ballot results for the committee recommendations as a result of the actions taken during your recent meeting.

- 6 Members Eligible to Vote
- 1 Ballot was not received by the final closing date of February 7, 2017.
(See voting results below for details)
- 0 Abstaining

There are two criteria necessary to pass the letter ballot for each item as follows:

- 1. The number of affirmative votes needed for each item to pass is 3/4 affirmative.
- 2. In all cases, an affirmative vote of at least a simple majority of the total members eligible to vote is required.

All of the committee actions for the Technical Correlating Committee Report achieved the necessary 3/4 affirmative votes of returned ballots.

Please contact me with any questions or comments you may have at (909) 230-5535 or by email at enrique.gonzalez@iapmo.org.

Thank you

Enrique Gonzalez

Ballot Name:	TCC Item # 001 January 2017	
Total Votes:	6	
Vote Summary		
Option	Count	Percent
AFFIRMATIVE	6	100%
NEGATIVE w/comment	0	0%
ABSTAIN w/comment	0	0%
Voter Name		
	Vote	
Osinski, Alison	AFFIRMATIVE	
Murray, Ed	AFFIRMATIVE	
MacNevin, P.Eng, Lance	AFFIRMATIVE	
Hamil, Beth	AFFIRMATIVE	
Hyde, Michael	AFFIRMATIVE	
Rodio, Arnold	AFFIRMATIVE	

Ballot Name:	TCC Item # 002 January 2017	
Total Votes:	5	
Vote Summary		
Option	Count	Percent
AFFIRMATIVE	5	100%
NEGATIVE w/comment	0	0%
ABSTAIN w/comment	0	0%
Voter Name		
	Vote	
Osinski, Alison	AFFIRMATIVE	
MacNevin, P.Eng, Lance	AFFIRMATIVE	
Hamil, Beth	AFFIRMATIVE	
Hyde, Michael	AFFIRMATIVE	
Rodio, Arnold	AFFIRMATIVE	
Murray, Ed	Did not vote	

Ballot Name:	TCC Item # 003 January 2017	
Total Votes:	5	
Vote Summary		
Option	Count	Percent
AFFIRMATIVE	5	100%
NEGATIVE w/comment	0	0%
ABSTAIN w/comment	0	0%
Voter Name		
	Vote	
Osinski, Alison	AFFIRMATIVE	
MacNevin, P.Eng, Lance	AFFIRMATIVE	
Hamil, Beth	AFFIRMATIVE	
Hyde, Michael	AFFIRMATIVE	
Rodio, Arnold	AFFIRMATIVE	
Murray, Ed	Did not vote	

**Technical
Correlating
Committee
Report for
UPC/UMC/
USEHC/USPSHTC**

2017 IAPMO Technical Correlation Committee (TCC) Report

CORRELATION ITEMS BETWEEN THE UPC/UMC/USPSHTC/USEHC

TCC ITEM # 001

2015 UNIFORM PLUMBING CODE
ITEM # 014 Public Comment 2

2015 UNIFORM SWIMMING POOL & HOT TUB CODE
ITEM # 006

RECOMMENDATION:

301.2 Minimum Standards. Pipe, pipe fittings, traps, fixtures, material, and devices used in a plumbing system shall be listed (third-party certified) by a listing agency (accredited conformity assessment body) as complying with the approved applicable recognized standards referenced in this code, and shall be free from defects. Unless otherwise provided for in this code, materials, fixtures, or devices used or entering into the construction of plumbing systems, or parts thereof shall be submitted to the Authority Having Jurisdiction for approval.

301.2 Minimum Standards. Pipe, pipe fittings, traps, fixtures, material, and devices used in a swimming pool, spa, hot tub, or plumbing system shall be listed ~~and labeled~~ (third-party certified) by a listing agency (accredited conformity assessment body) ~~and shall comply as complying~~ with the approved applicable recognized standards referenced in this code, and shall be free from defects. Plastic pipe and the fittings used for plastic pipe, other than for gas, shall meet the requirements of NSF 14. Unless otherwise provided for in this code, materials, fixtures, or devices used or entering into the construction of a swimming pool, spa, or hot tub system, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.

X	Accept recommendation as submitted.	Reject the recommendation.
<p>Substantiation:</p> <p>Section 301.2 of the USPSHTC is being revised to correlate with Section 301.2 of the UPC in regards to minimum standards.</p>		

TCC ITEM # 002

2015 UNIFORM MECHANICAL CODE
 ITEM # 013 Public Comment

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
 ITEM # 006

RECOMMENDATION:

302.0 Materials - Standards and Alternates.

302.1 Minimum Standards. Listed pipe, pipe fittings, appliances, appurtenances, equipment, materials, and devices used in a mechanical system shall be listed (third-party certified) by a listing agency (accredited conformity assessment body) as complying with the approved applicable recognized standards referenced in this code, and shall be free from defects. Unless otherwise provided for in this code, materials, appurtenances, or devices used or entering into the construction of mechanical systems, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.

302.1 Minimum Standards. Pipe, pipe fittings, appliances, appurtenances, equipment, material, and devices used shall be listed ~~and labeled~~ (third party certified) by a listing agency (accredited conformity assessment body) ~~and shall comply as complying~~ with the approved applicable recognized standards referenced in this code, and shall be free from defects. Unless otherwise provided for in this code, materials, appurtenances, or devices used or entering into the construction of a system, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 302.1 of the USEHC is being revised to correlate with Section 302.1 of the UMC in regards to minimum standards.		

TCC ITEM # 003

2015 UNIFORM MECHANICAL CODE
 ITEM # 171 Public Comment

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
 ITEM # 008 Public Comment 1

RECOMMENDATION:

1208.0 Circulators and Pumps.

1208.1 General. Circulators and pumps shall be selected for their intended use based on the heat transfer fluid, intended operating temperature range and pressure. Circulators and pumps shall be installed to allow for service and maintenance. The manufacturer's installation instructions shall be followed for correct orientation and installation. Motor Operated pumps rated 600V or less shall be listed and labeled in accordance with UL 778.

310.0 Circulators and Pumps.

310.1 General. Circulators and pumps shall be ~~listed~~ ~~selected~~ for their intended use based on the heat transfer fluid, intended operating temperature range and pressure. Circulators and pumps shall be installed to allow for service and maintenance. The manufacturer's installation instructions shall be followed for correct orientation and installation. ~~Motor Operated pumps rated 600V or less shall be listed and labeled in accordance with UL 778.~~

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 310.1 of the USEHC is being revised to correlate with Section 1208.1 of the UMC in regards to circulators and pumps.		

TCC ITEM # 004

2015 UNIFORM MECHANICAL CODE
ITEM # 172

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 009

RECOMMENDATION:

1208.2 Mounting. The circulator or pump shall be installed in such a way that strain from the piping is not transferred to the circulator or pump housing. The circulator ~~and~~ or pump shall be permitted to be directly connected to the piping, provided the piping is supported on each side of the circulator or pump. Where the installation of a circulator or pump will cause strain on the piping, the circulator or pump shall be installed on a mounting bracket or base plate. Where means for controlling vibration of a circulator or pump is required, an approved means for support and restraint shall be provided.

310.0 Circulators and Pumps.

310.2 Mounting. The circulator or pump shall be installed in such a way that strain from the piping is not transferred to the circulator or pump housing. The circulator or pump shall be permitted to be directly connected to the piping, provided the piping is supported on each side of the circulator or pump. Where the installation of a circulator or pump will cause strain on the piping, the circulator or pump shall be installed on a mounting bracket or base plate. Where means for controlling vibration of a circulator or pump is required, an approved means for support and restraint shall be provided.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 1208.2 of the UMC is being revised to correlate with Section 310.2 of the USEHC in regards to mounting circulators or pumps.		

TCC ITEM # 005

2015 UNIFORM MECHANICAL CODE
ITEM # 173

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 010

RECOMMENDATION:

1208.3 Sizing. The selection and sizing of a circulator or pump shall be based on all of the following:

- (1) Loop or system head pressure, feet of head (m)
- (2) Capacity, gallons per minute (L/s)
- (3) Maximum and minimum temperature, °F (°C)
- (4) Maximum working pressure, pounds per square inch (kPa)
- (5) Fluid type

310.0 Circulators and Pumps.

310.3 Sizing. The selection and sizing of a circulator or pump shall be based on all of the following:

- (1) Loop or system head pressure, feet of head (m)
- (2) Capacity, gallons per minute (L/s)
- ~~(3) Intended operating temperature, °F (°C) and pressure, psi (kPa) range~~
- ~~(4)~~ (3) Maximum and minimum temperature, °F (°C)
- ~~(5)~~ (4) Maximum working pressure, pounds-force per square inch (kPa)
- ~~(6)~~ (5) Fluid type

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 310.3 of the USEHC is being revised to correlate with Section 1208.3 of the UMC in regards to the selection and sizing of circulators or pumps.		

TCC ITEM # 006

2015 UNIFORM MECHANICAL CODE
ITEM # 162

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 019

RECOMMENDATION

1203.3 Tankless Water Heater. ~~The output performance on tankless water heaters shall be rated by the manufacturer for space- heating applications, and the output performance~~ shall be determined by the temperature rise and flow rate of water through the unit. The ratings shall be expressed by the water temperature rise at a given flow rate. Manufacturers flow rates shall not be exceeded.

403.0 Capacity of Heat Source.

403.3 Tankless Water Heater. ~~The output performance of tankless water heaters shall be rated by the manufacturer for space- heating applications, and the output performance shall be as rated by the manufacturer determined by the temperature rise and flow rate of water through the unit. The ratings shall be expressed by the water temperature rise at a given flow rate.~~ Manufacturers flow rates shall not be exceeded.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 1203.3 of the UMC is being revised to correlate with Section 403.3 of the USEHC. Furthermore, Section 403.3 of the USEHC is being revised to correlate with Section 1203.3 of the UMC in regards to tankless water heaters.			

TCC ITEM # 007

2015 UNIFORM MECHANICAL CODE
ITEM # 166

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 023

RECOMMENDATION:

1205.0 Installation, Testing, and Inspection

1205.3 Flushing. Heating and cooling sources, system piping and tubing shall be flushed after installation with water or a cleaning solution. ~~Cleaning and Flushing~~ of the heating and cooling sources shall comply with the manufacturer's instructions. The cleaning solution shall be compatible with all system components and shall be used in accordance with the manufacturer's instructions.

405.0 Installation, Testing, and Inspection.

405.3 Flushing. Heating and cooling sources, system piping and tubing shall be flushed after installation with water or a cleaning solution. Cleaning and flushing of the heating and cooling sources shall comply with the manufacturer's instructions. The cleaning solution shall be compatible with all system components and shall be used in accordance with the manufacturer's instructions.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 1205.3 of the UMC is being revised to correlate with Section 405.3 of the USEHC in regards to cleaning and flushing of the heating and cooling sources, system piping and tubing.			

TCC ITEM # 008

2015 UNIFORM MECHANICAL CODE
ITEM # 170 Public Comment

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 025

RECOMMENDATION:

1207.0 Heating Appliances and Equipment.

1207.3 Dual-Purpose Water Heaters. Water heaters used for combined space- and water-heating applications shall be in accordance with the standards referenced in Table 1203.2, and shall be installed in accordance with the manufacturer's installation instructions. ~~The total heating capacity of a dual purpose water heater shall be based on the sum of the potable hot water requirements and the space heating design requirements corrected for hot water first hour draw recovery. Water used as the heat transfer fluid in the hydronic heating system shall be isolated from the potable water supply and distribution in accordance with Section 312.1, Section 1202.0, and Section 1218.0.~~

406.0 Heating Appliances and Equipment.

406.3 Dual-Purpose Water Heaters. Water heaters used for combined space- and water-heating applications shall be in accordance with the standards referenced in Table 403.2, and shall be installed in accordance with the manufacturer's installation instructions. Water used as the heat transfer fluid in the hydronic heating system shall be isolated from the potable water supply and distribution in accordance with Section 313.0, Section 314.0, and Section 402.2.

<input checked="" type="checkbox"/> Accept recommendation as submitted.	<input type="checkbox"/> Reject the recommendation.
Substantiation: Section 1207.3 of the UMC is being revised to correlate with Section 406.3 of the USEHC in regards to dual purpose water heaters.	

TCC ITEM # 009

2015 UNIFORM MECHANICAL CODE
ITEM # 174

RECOMMENDATION:

1209.0 Expansion Tanks.

1209.1 General. An expansion tank shall be installed in each closed hydronic system to control system pressure due to thermal expansion. Expansion tanks shall be of the closed or open type. Tanks shall be rated for the pressure of the system.

1209.2 Installation. Expansion tanks shall be accessible for maintenance and shall be installed in accordance with the manufacturer's installation instructions. Each tank shall be equipped with a shutoff device that will remain open during operation of the heating system. Valve handles shall be locked open or removed to prevent from being inadvertently shut off. Provisions shall be made for draining the tank without emptying the system. Expansion tanks shall be securely fastened to the structure. Supports shall be capable of carrying twice the weight of the tank filled with water without placing a strain on connecting piping. Hot-water-heating systems incorporating hot water tanks or fluid relief columns shall be installed to prevent freezing under normal operating conditions.

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 027

407.0 Expansion Tanks.

407.1 General. An expansion tank shall be installed in each closed hydronic system to control system pressure due to thermal expansion and contraction. Expansion tanks shall be of the closed or open type. Expansion tanks shall be rated for the pressure of the system.

~~**Exception:** Drainback type solar thermal systems shall not require a hydronic expansion tank.~~

407.2 Installation. Expansion tanks shall be accessible for maintenance and shall be installed in accordance with the manufacturer's installation instructions. Each expansion tank shall be equipped with a shutoff device that will remain open during operation of the hydronic system. Valve handles shall be locked open or removed to prevent from being inadvertently shut off. Provisions shall be made for draining the tank without emptying the system. Expansion tanks shall be securely fastened to the structure. Supports shall be capable of carrying twice the weight of the tank filled with water without placing a strain on connecting piping. Hot-water-heating systems incorporating hot water tanks or fluid relief columns shall be installed to prevent freezing under normal operating conditions.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
<ol style="list-style-type: none"> 1. Section 407.1 and of the USEHC is being revised to correlate with Section 1209.1 of the UMC in regards to expansion tanks. 2. Section 407.2 of the USEHC is being revised to correlate with Section 1209.2 of the UMC in regards to expansion tanks. 			

TCC ITEM # 010

2015 UNIFORM MECHANICAL CODE
ITEM # 174

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 028

RECOMMENDATION:

1209.4 Closed-Type Tanks. Closed-type expansion tanks shall be designed for a hydrostatic test pressure of two and one half times the allowable working pressure of the system. Expansion tanks for systems designed to operate at more than 30 pounds-force per square inch (psi) (207 kPa) shall comply with ASME BPVC Section VIII.

407.3 Closed-type Expansion Tanks. Closed-type expansion tanks shall be designed for a hydrostatic test pressure of two and one-half times the allowable working pressure of the system. Expansion tanks for systems designed to operate at more than ~~40~~ 30 pounds-force per square inch (psi) (~~276~~ 207 kPa) shall comply with ASME BPVC Section VIII.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 407.3 of the USEHC is being revised to correlate with Section 1209.4 of the UMC in regards to closed type expansion tanks.			

TCC ITEM # 011

2015 UNIFORM MECHANICAL CODE
ITEM # 178.01 Public Comment

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 035.01

RECOMMENDATION:

**TABLE 1210.1
MATERIALS FOR HYDRONIC SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Polyethylene (PE)	ASTM D1693, ASTM D2513, ASTM D2683, ASTM D2737, ASTM D3035, ASTM D3350, ASTM F714, AWWA C901, CSA B137.1 , NSF 358-1	ASTM D2609, ASTM D2683, ASTM D3261, ASTM F1055, CSA B137.1, NSF 358-1

(portions of table not shown remain unchanged)

**TABLE 408.1
MATERIALS FOR HYDRONICS AND SOLAR THERMAL SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Polyethylene (PE)	ASTM D1693, ASTM D2513, ASTM D2683, ASTM D2837 , ASTM D2737 , ASTM D3035, ASTM D3350, ASTM F714 , AWWA C901 , CSA B137.1, NSF 358-1	ASTM D2609, ASTM D2683, ASTM 3261, ASTM F1055, CSA B137.1, NSF 358-1

(portions of table not shown remain unchanged)

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Table 1210.1 of the UMC is being revised to correlate with Table 408.1 of the USEHC. Furthermore, Table 408.1 of the USEHC is being revised to correlate with Table 1210.1 of the UMC in regards to standards for materials for hydronic system piping, tubing and fittings.			

TCC ITEM # 012

2015 UNIFORM MECHANICAL CODE
ITEM # 178.06 Public Comment

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 035.01

RECOMMENDATION:

**TABLE 1210.1
MATERIALS FOR HYDRONIC SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Polyvinyl Chloride (PVC)	ASTM D1785, ASTM D2241, CSA B137.3	ASTM D2464, ASTM D2466, ASTM D2467, ASTM F1970, CSA B137.2, CSA B137.3

(portions of table not shown remain unchanged)

**TABLE 408.1
MATERIALS FOR HYDRONICS AND SOLAR THERMAL SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Polyvinyl Chloride (PVC)	ASTM D1785, ASTM D2241, <u>CSA B137.3</u>	ASTM D2464, ASTM D2466, ASTM D2467, ASTM F1970, <u>CSA B137.2</u> , <u>CSA B137.3</u>

(portions of table not shown remain unchanged)

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Table 408.1 of the USEHC is being revised to correlate with Table 1210.1 of the UMC in regards to standards for materials for hydronic system piping, tubing and fittings.		

TCC ITEM # 013

2015 UNIFORM MECHANICAL CODE
ITEM # 178.08 Public Comment 1

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 035.01

RECOMMENDATION:

**TABLE 1210.1
MATERIALS FOR HYDRONIC SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Polypropylene (PP)	ASTM F2389, NSF 358-2	<u>ASTM F2389</u> , NSF 358-2

(portions of table not shown remain unchanged)

**TABLE 408.1
MATERIALS FOR HYDRONICS AND SOLAR THERMAL SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Polypropylene (PP)	ASTM F2389, <u>NSF 358-2</u>	ASTM F2389, <u>NSF 358-2</u>

(portions of table not shown remain unchanged)

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Table 1210.1 of the UMC is being revised to correlate with Table 408.1 of the USEHC. Furthermore, Table 408.1 of the USEHC is being revised to correlate with Table 1210.1 of the UMC in regards to standards for materials for hydronic system piping, tubing and fittings.		

TCC ITEM # 014

2015 UNIFORM MECHANICAL CODE
ITEM # 181 Public Comment

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 035.01

RECOMMENDATION:

**TABLE 1210.1
MATERIALS FOR HYDRONIC SYSTEM PIPING,
TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Cross-Linked Polyethylene (PEX)	ASTM F876, <u>CSA B137.5</u> , NSF 358-3	ASSE 1061, ASTM F877, ASTM F1807, ASTM F1960, ASTM F1961, ASTM F2080, ASTM F2098, ASTM F2159, <u>ASTM F2735</u> , CSA B137.5, NSF 358-3
Chlorinated Polyvinyl Chloride (CPVC)	ASTM D2846, ASTM F441, ASTM F442	ASSE 1061, ASTM D2846, ASTM F437, ASTM F438, ASTM F439, ASTM F1970
Raised Temperature Polyethylene (PE-RT)	ASTM F2623, ASTM F2769	ASSE 1061, ASTM F1807, ASTM F2159, ASTM F2735, ASTM F2769

(portions of table not shown remain unchanged)

**TABLE 408.1
MATERIALS FOR HYDRONICS AND SOLAR THERMAL
SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Cross-Linked Polyethylene (PEX)	ASTM F876, CSA B137.5, <u>NSF 358-3</u>	ASSE 1061, ASTM F877, ASTM F1807, ASTM F1960, ASTM F1961, ASTM F2080, <u>ASTM F2098</u> , ASTM F2159, ASTM F2735, CSA B137.5, <u>NSF 358-3</u>
Chlorinated Polyvinyl Chloride (CPVC)	ASTM D2846, ASTM F441, ASTM F442	<u>ASSE 1061</u> , ASTM D2846, ASTM F437, ASTM F438, ASTM F439, ASTM F1970
Raised Temperature Polyethylene (PE-RT)	ASTM F2623, ASTM F2769	<u>ASSE 1061</u> , ASTM F1807, ASTM F2159, ASTM F2735, ASTM F2769

(portions of table not shown remain unchanged)

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Table 1210.1 of the UMC is being revised to correlate with Table 408.1 of the USEHC. Furthermore, Table 408.1 of the USEHC is being revised to correlate with Table 1210.1 of the UMC in regards to standards for materials for hydronic system piping, tubing and fittings.		

TCC ITEM # 015

2015 UNIFORM MECHANICAL CODE
 ITEM # 181.01 Public Comment 1

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
 ITEM # 035.01

RECOMMENDATION:

**TABLE 1210.1
 MATERIALS FOR HYDRONIC SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Chlorinated Polyvinyl Chloride (CPVC)	ASTM D2846, ASTM F441, ASTM F442, CSA B137.6	ASSE 1061, ASTM D2846, ASTM F437, ASTM F438, ASTM F439, ASTM F1970, CSA B137.6

(portions of table not shown remain unchanged)

**TABLE 408.1
 MATERIALS FOR HYDRONICS AND SOLAR THERMAL SYSTEM PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/TUBING	FITTINGS
Chlorinated Polyvinyl Chloride (CPVC)	ASTM D2846, ASTM F441, ASTM F442, <u>CSA B137.6</u>	<u>ASSE 1061</u> , ASTM D2846, ASTM F437, ASTM F438, ASTM F439, ASTM F1970, <u>CSA B137.6</u>

(portions of table not shown remain unchanged)

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Table 408.1 of the USEHC is being revised to correlate with Table 1210.1 of the UMC in regards to standards for materials for hydronic system piping, tubing and fittings.		

TCC ITEM # 016

2015 UNIFORM MECHANICAL CODE
ITEM # 182 PUBLIC COMMENT

RECOMMENDATION:

**TABLE 1210.1
MATERIALS FOR HYDRONIC SYSTEM PIPING, TUBING,
AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/ TUBING	FITTINGS
Ductile Iron	AWWA C115, AWWA C151	AWWA C110, AWWA C153

Notes:

¹ Ductile and gray iron.

(portions of table not shown remain unchanged)

~~**1211.6 Ductile Iron Pipe.** Joints between ductile iron pipe or fittings shall be installed in accordance with one of the following methods:~~

- ~~(1) Mechanical joints for ductile iron pipe or fittings shall consist of a bell that is cast integrally with the pipe or fitting and provided with an exterior flange having bolt holes and a socket with annular recesses for the sealing gasket and the plain end of the pipe or fitting. The elastomeric gasket shall comply with AWWA C111. Lubricant recommended for the application by the pipe manufacturer shall be applied to the gasket and plain end of the pipe.~~
- ~~(2) Push on joints for ductile iron pipe or fittings shall consist of a single elastomeric gasket that shall be assembled by positioning the elastomeric gasket in an annular recess in the pipe or fitting socket and forcing the plain end of the pipe or fitting into the socket. The plain end shall compress the elastomeric gasket to form a positive seal and shall be designed so that the elastomeric gasket shall be locked in place against displacement. The elastomeric gasket shall comply with AWWA C111. Lubricant recommended for the application by the pipe manufacturer shall be applied to the gasket and plain end of the pipe.~~

(renumber remaining sections)

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 039

**TABLE 408.1
MATERIALS FOR HYDRONICS AND SOLAR THERMAL SYSTEM
PIPING, TUBING, AND FITTINGS**

MATERIAL	STANDARDS	
	PIPING/ TUBING	FITTINGS
Ductile Iron	AWWA C115, AWWA C151	AWWA C110 ¹ , AWWA C153

Notes:

¹ Ductile and gray iron.

² Only Type K, L, or M shall be permitted to be installed.

(portions of table not shown remain unchanged)

409.0 Joints and Connections.

~~**409.6 Ductile Iron Pipe.** Joints between ductile iron pipe and fittings shall be installed in accordance with one of the following methods:~~

- ~~(1) Mechanical joints for ductile iron pipe or fittings shall consist of a bell that is cast integrally with the pipe or fitting and provided with an exterior flange having bolt holes and a socket with annular recesses for the sealing gasket and the plain end of the pipe or fitting. The elastomeric gasket shall comply with AWWA C111. Lubricant recommended for the application by the pipe manufacturer shall be applied to the gasket and plain end of the pipe.~~
- ~~(2) Push on joints for ductile iron pipe or fittings shall consist of a single elastomeric gasket that shall be assembled by positioning the elastomeric gasket in an annular recess in the pipe or fitting socket and forcing the plain end of the pipe or fitting into the socket. The plain end shall compress the elastomeric gasket to form a positive seal and shall be designed so that the elastomeric gasket shall be locked in place against displacement. The elastomeric gasket shall comply with AWWA C111. Lubricant recommended for the application by the pipe manufacturer shall be applied to the gasket and plain end of the pipe.~~

(renumber remaining sections)

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Ductile iron in Table 1210.1 of the UMC is being stricken to correlate with the actions taken by the USEHC TC to remove ductile iron from Table 408.1 of the USEHC.		

TCC ITEM # 017

2015 UNIFORM MECHANICAL CODE
ITEM # 199

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 044

RECOMMENDATION:

1214.4 Automatic Makeup Water Fluid. Where an automatic makeup ~~water fluid~~ supply fill device is used to maintain the water content of the heat-source unit, or any closed loop in the system, the makeup supply shall be located at the expansion tank connection or other approved location.

A pressure-reducing valve shall be installed on ~~the a~~ makeup water feed line. The pressure of the feed line shall be set ~~as specified in the design of the system in accordance with the design of the system, and connections to potable water shall be in accordance with Section 1202.0 to prevent contamination due to backflow.~~

411.0 Pressure and Flow Controls.

411.4 Automatic Makeup Fluid. Where an automatic makeup fluid supply fill device is used to maintain the fluid content of the heat-source unit, or any closed loop in the system, the makeup supply shall be located at the expansion tank connection or other approved location.

A pressure-reducing valve shall be installed on a makeup water feed line. The pressure of the feed line shall be set in accordance with the design of the system, and connections to potable water shall be in accordance with Section 402.0 to prevent contamination due to backflow.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 1214.4 of the UMC is being revised to correlate with Section 411.4 of the USEHC. Furthermore, Section 411.4 of the USEHC is being revised to correlate with Section 1214.4 of the UMC in regards to automatic makeup water.			

TCC ITEM # 018

2015 UNIFORM MECHANICAL CODE
ITEM # 200 Public Comment

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 047

RECOMMENDATION:

1214.5.1 Differential Pressure Bypass Valve. Where a differential pressure bypass valve is used for the purpose specified in Section 1214.5, it shall be installed and adjusted to provide bypass of the distribution system ~~where when~~ most or all of the zones are closed.

411.0 Pressure and Flow Controls.

411.5.1 Differential Pressure Bypass Valve. Where a differential pressure bypass valve is used for the purpose in Section 411.5, it shall be installed and adjusted to provide bypass of the distribution system when most or all of the zones are closed.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 1214.5.1 of the UMC is being revised to correlate with Section 411.5.1 of the USEHC in regards to differential pressure bypass valves.			

TCC ITEM # 019

2015 UNIFORM MECHANICAL CODE
ITEM # 201

RECOMMENDATION:

1214.6 Air-Removal Device. Provision shall be made for the removal of air in the heat-distribution piping system. The air-removal device shall be located in the area of the ~~heat-distribution~~ hydronic piping system where air is likely to accumulate. Air-removal devices shall be installed to facilitate their removal for examination, repair, or replacement.

Exception: Drainback type solar thermal systems shall not require an air-removal device.

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 048

411.0 Pressure and Flow Controls.

411.6 Air-Removal Device. Provision shall be made for the removal of air from fluid in hydronic systems. Air-removal devices shall be located in the areas of the hydronic piping system where air is likely to accumulate. Air-removal devices shall be installed to facilitate their removal for examination, repair, or replacement.

Exception: Drainback type solar thermal systems shall not require an air-removal device.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 1214.6 of the UMC is being revised to correlate with Section 411.6 of the USEHC in regards to air removal devices.		

TCC ITEM # 020

2015 UNIFORM MECHANICAL CODE
ITEM # 201

RECOMMENDATION:

1214.7 Air-Separation Device. To assist with the removal of entrained air. ~~An~~ air-separation device shall be installed ~~on a closed heat-distribution system in hydronic systems.~~ The device shall be located in accordance with the manufacturer's installation instructions or at the point in the heat- of no mechanically-induced pressure change within the distribution system ~~where there is no pressure change and the water in the heat-distribution system is at the highest temperature.~~

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 049

411.0 Pressure and Flow Controls.

411.7 Air-Separation Device. To assist with the removal of entrained air, an air-separation device shall be installed in hydronic systems. The device shall be located in accordance with the manufacturer's installation instructions or at the point of no mechanically-induced pressure change within the distribution system.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 1214.7 of the UMC is being revised to correlate with Section 411.7 of the USEHC in regards to air separation devices.		

TCC ITEM # 021

2015 UNIFORM MECHANICAL CODE
ITEM # 201

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 050

RECOMMENDATION:

1214.8 Secondary Loops. Secondary loops that are isolated from the primary heat-distribution loop by a heat exchanger are closed-loop hydronic systems and shall have an expansion tank in accordance with Section 1209.0, an air-removal device ~~or in accordance with Section 1214.6, and~~ an air-separation device in accordance with ~~Section 1214.6 or~~ Section 1214.7.

411.0 Pressure and Flow Controls.

411.8 Secondary Loops. Secondary loops that are isolated from the primary heat-distribution loop by a heat exchanger are closed-loop hydronic systems and shall have an expansion tank in accordance with Section 407.0, an air-removal device in accordance with Section 411.6, and an air-separation device in accordance with Section 411.7.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 1214.8 of the UMC is being revised to correlate with Section 411.8 of the USEHC in regards to secondary loops.			

TCC ITEM # 022

2015 UNIFORM MECHANICAL CODE
ITEM # 202

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 051.01

RECOMMENDATION:

1215.3 Freeze Protection. Hydronic ~~heat distribution units or other~~ systems and components shall be designed, installed, and protected from freezing.

412.0 Hydronic Space Heating.

401.8 Freeze Protection. Hydronic systems and components shall be designed, installed, and protected from freezing.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 1215.3 of the UMC is being revised to correlate with Section 401.8 of the USEHC in regards to hydronic system freeze protection.			

TCC ITEM # 023

2015 UNIFORM MECHANICAL CODE
ITEM # 203

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 052

RECOMMENDATION:

1215.5 Heat Transfer Fluid. The ignitable flash point of a ~~heat~~ transfer fluid in a hydronic piping system shall be a minimum of 50°F (28°C) above the maximum system operating temperature. The ~~heat~~ transfer fluid shall be compatible with the makeup ~~water~~ fluid supplied to the system.

412.0 Hydronic Space Heating.

412.5 Heat Transfer Fluid. The ignitable flash point of heat transfer fluid in a hydronic piping system shall be a minimum of 50°F (28°C) above the maximum system operating temperature. The heat transfer fluid shall be compatible with the makeup fluid supplied to the system.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 1215.5 of the UMC is being revised to correlate with Section 412.5 of the USEHC in regard heat transfer fluid.		

TCC ITEM # 024

2015 UNIFORM MECHANICAL CODE
ITEM # 204

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 053

RECOMMENDATION:

1216.0 Steam Systems.

1216.2 Sloping for Two-Pipe System. Two-pipe steam system piping and heat-distribution units shall be sloped down at not less than 1/8 inch per foot (10.4 mm/m) in the direction of the steam flow.

1216.3 Sloping for One-Pipe System. One-pipe steam system piping and heat-distribution units shall be sloped down at not less than 1/8 inch per foot (10.4 mm/m) towards the steam boiler, without trapping.

413.0 Steam Systems.

413.2 Sloping for Two-Pipe System. Two-pipe steam system piping and heat-distribution units shall be sloped down at ~~a minimum not less than~~ 1/8 inch per foot (10.4 mm/m) in the direction of the steam flow.

413.3 Sloping for One-Pipe System. One-pipe steam system piping and heat-distribution units shall be sloped down at ~~a minimum not less than~~ 1/8 inch per foot (10.4 mm/m) towards the steam boiler, without trapping.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
<ol style="list-style-type: none"> 1. Section 413.2 of the USEHC is being revised to correlate with Section 1216.2 of the UMC in regards to sloping of two-pipe systems. 2. Section 413.3 of the USEHC is being revised to correlate with Section 1216.3 of the UMC in regards to sloping of one-pipe systems. 		

TCC ITEM # 025

2015 UNIFORM MECHANICAL CODE
ITEM # 209

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 057

RECOMMENDATION:

1217.0 Radiant Heating and Cooling.

1217.2 Radiant Floor Heating. Floor finished surface temperatures shall not exceed the following temperatures for space heating applications:

- (1) 85°F (29°C) in general occupied applications.
- (2) 90°F (32°C) in bathrooms, foyers, distribution areas such as hallways and indoor swimming pools.
- (3) 88°F (31°C) in industrial spaces
- (4) 95°F (35°C) in radiant panel perimeter areas, i.e., up to 2.5 feet (762 mm) from outside walls.

The radiant heating system temperature shall not exceed the maximum temperature rating of the materials used in ~~the~~ its construction ~~of the radiant heating system.~~

414.0 Radiant Heating and Cooling.

414.2 Radiant Floor Heating. Floor finished surface temperatures shall not exceed the following temperatures for space heating applications:

- (1) 85°F (29°C) in general occupied applications.
- (2) 90°F (32°C) in bathrooms, foyers, distribution areas such as hallways and indoor swimming pools.
- (3) 88°F (31°C) in industrial spaces
- (4) 95°F (35°C) in radiant panel perimeter areas, i.e., up to 2.5 feet (762 mm) from outside walls.

The radiant heating system temperature shall not exceed the maximum temperature rating of the materials used in its construction.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 1217.2 of the UMC is being revised to correlate with Section 414.2 of the USEHC in regards to radiant floor heating.		

TCC ITEM # 026

2015 UNIFORM MECHANICAL CODE
ITEM # 211

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 058

RECOMMENDATION:

1217.3 Radiant Cooling Systems. Radiant cooling systems shall be designed to minimize the potential for condensation. To prevent condensation on any cooled radiant surface, the supply water temperature for a radiant cooling system shall be not less than 3°F (2°C) above the anticipated space dew point temperature, or in accordance with the manufacturer's recommendation. Chilled water piping, valves, and fittings shall be insulated and vapor sealed to prevent surface condensation.

414.0 Radiant Heating and Cooling.

414.3 Radiant Cooling Systems. Radiant cooling systems shall be designed to minimize the potential for condensation. ~~Chilled water piping, valves, and fittings shall be insulated and vapor sealed to prevent surface condensation.~~

To prevent condensation on any cooled radiant surface, the supply water temperature for a radiant cooling system shall be not less than 3°F (2°C) above the anticipated space dew point temperature, or in accordance with the manufacturer's recommendation. Chilled water piping, valves, and fittings shall be insulated and vapor sealed to prevent surface condensation.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation:		
Section 414.3 of the USEHC is being revised to correlate with Section 1217.3 of the UMC in regards to radiant cooling systems.		

TCC ITEM # 027

2015 UNIFORM MECHANICAL CODE
ITEM # 214

RECOMMENDATION:

1217.5 Poured Floor Structural Concrete Slab Systems. Where tubing is embedded in a structural concrete slab such tubes shall not be larger in outside dimension than one-third of the overall thickness of the slab and shall be spaced not less than three diameters on center except within 10 feet (3048 mm) of the distribution manifold. The top of the tubing shall be embedded in the slab not less than 2 inches (51 mm) below the surface.

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 061

414.0 Radiant Heating and Cooling.

414.6 Poured Floor Structural Concrete Slab Systems. Where tubing is embedded in a structural concrete slab, such tubes shall not be larger in outside dimension than one-third of the overall thickness of the slab and shall be spaced not less than ~~six~~ three diameters on center except within 10 feet (3048 mm) of the distribution manifold. The top of the tubing shall be embedded in the slab not less than 2 inches (51 mm) below the surface ~~of the finished concrete slab.~~

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 414.6 of the USEHC is being revised to correlate with Section 1217.5 of the UMC in regards to poured floor structural concrete slab systems.			

TCC ITEM # 028

2015 UNIFORM MECHANICAL CODE
ITEM # 224

RECOMMENDATION:

1217.5.1 Slab Penetration Tube and Joint Protection. Where embedded in or installed under a concrete slab, tubing shall be protected from damage at penetrations of the slab with ~~a~~ protective ~~pipe-sleeve~~ sleeving approved by the tubing manufacturer. The space between the tubing and sleeve shall be sealed with an approved sealant compatible with the tubing. The tubing at the location of an expansion joint in a concrete slab shall be encased in ~~a~~ protective pipe ~~sleeve-sleeving~~ that covers the tubing not less than 12 inches (305 mm) on either side of the expansion joint or the tubing shall be installed below the slab.

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 062

414.0 Radiant Heating and Cooling.

414.6.1 Slab Penetration Tube and Joint Protection. Where embedded in or installed under a concrete slab, tubing shall be protected from damage at penetrations of the slab with protective sleeving approved by the tubing manufacturer. The space between the tubing and sleeve shall be sealed with an approved sealant compatible with the tubing. The tubing at the location of an expansion joint in a concrete slab shall be encased in protective pipe sleeving that covers the tubing not less than 12 inches (305 mm) on either side of the expansion joint or the tubing shall be installed below the slab.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 1217.5.1 of the UMC is being revised to correlate with Section 414.6.1 of the USEHC in regards to slab penetration tube and joint protection.			

TCC ITEM # 029

2015 UNIFORM MECHANICAL CODE
ITEM # 215

RECOMMENDATION:

1217.5.2 Insulation. Where a poured concrete radiant floor system is installed in contact with the soil, ~~not less than R-5 insulation~~ insulation approved for such an application with a minimum R-value of 5 shall be ~~installed and shall be~~ placed between the soil and the concrete; extend to the outside edges of the concrete; and be placed on all slab edges.

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 063

414.0 Radiant Heating and Cooling.

414.6.2 Insulation. Where a poured concrete radiant floor system is installed in contact with the soil, insulation approved for such an application with a minimum R-value of 5 shall be placed between the ~~compacted~~ soil and the concrete; extend to the outside edges of the concrete; and be placed on all slab edges.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation: Section 1217.5.2 of the UMC is being revised to correlate with Section 414.6.2 of the USEHC. Furthermore, Section 414.6.2 of the USEHC is being revised to correlate with Section 1217.5.2 of the UMC in regards to insulation of a radiant heating and cooling system.		

TCC ITEM # 030

**2015 UNIFORM MECHANICAL CODE
ITEM # 216**

RECOMMENDATION:

1217.5.3 Joist Systems and Subfloors. Where tubing is installed below a subfloor, the tube spacing shall be in accordance with the system design and joist space limitations.

Where tubing is installed above or in the subfloor, the tube spacing shall not exceed 12 inches (305 mm) center-to-center for living areas.

Where tubing is installed in the joist cavity, the cavity shall be insulated with not less than R-12 material below the heated space.

An air space of not less than 1 inch (25.4 mm) and not more than 3 inches (76 mm) shall be maintained between the top of the insulation and the underside of the floor unless a conductive plate is installed in accordance with manufacturer's instructions.

Where tubing is installed in panels above or in the subfloor and not embedded in concrete, the floor assembly shall be insulated with not less than ~~R-12~~ R-5 material below the tubing when installed over habitable space.

**2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 066**

414.0 Radiant Heating and Cooling.

414.7 Joist Systems and Subfloors. Where tubing is installed below a subfloor, the tube spacing shall be in accordance with the system design and joist space limitations.

Where tubing is installed above or in the subfloor, the tube spacing shall not exceed 12 inches (305 mm) center-to-center for living areas.

Where tubing is installed in the joist cavity, the cavity shall be insulated with not less than R-12 material below the heated space.

An air space of not less than 1 inch (25.4 mm) and not more than 3 inches (76 mm) shall be maintained between the top of the insulation and the underside of the floor unless a conductive plate is installed in accordance with manufacturer's instructions.

Where tubing is installed in panels above or in the subfloor and not embedded in concrete, the floor assembly shall be insulated with not less than R-5 material below the tubing when installed over habitable space.

X	Accept recommendation as submitted.	Reject the recommendation.
<p>Substantiation:</p> <p>Section 1217.5.3 of the UMC is being revised to correlate with Section 414.7 of the USEHC. Furthermore, Section 414.7 of the USEHC is being revised to correlate with Section 1217.5.3 of the UMC in regards to joist systems and subfloors of radiant heating and cooling systems.</p>		

TCC ITEM # 031

2015 UNIFORM MECHANICAL CODE
ITEM # 216

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 067

RECOMMENDATION:

1217.5.4 Wall and Ceiling Panels. Where piping is installed in the stud wall cavity or the ceiling joist cavity, the cavity shall be insulated with not less than R-12 material. The insulation shall be installed in such a manner as to prevent heating or cooling loss from the space intended to be controlled.

An air space of not less than 1 inch (25.4 mm) and not more than 3 inches (76 mm) shall be maintained between the insulation and the interior surface of the panel unless a conductive plate is installed.

414.0 Radiant Heating and Cooling.

414.8 Wall and Ceiling Panels. Where piping is installed in the wall stud cavity or the ceiling joist cavity, the cavity shall be insulated with material having an R-value of not less than ~~R-5~~ R-12 material. The insulation shall be installed in such a manner as to prevent heating or cooling loss from the space intended to be controlled.

An air space of not less than 1 inch (25.4 mm) and not more than 3 inches (76 mm) shall be maintained between the insulation and the interior surface of the panel unless a conductive plate is installed.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 414.8 of the USEHC is being revised to correlate with Section 1217.5.4 of the UMC in regards to wall and ceiling panels of radiant heating and cooling systems.			

TCC ITEM # 032

2015 UNIFORM MECHANICAL CODE
ITEM # 217

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 070

RECOMMENDATION:

1217.6.1 Electric Heating Panel Systems. Clearances for electric heating panels or between outlets, junction boxes, mounting luminaries, ventilating, or other openings shall comply with NFPA 70.

414.0 Radiant Heating and Cooling.

~~**414.9.1 Electric Heating Panel Systems.** Clearances for electric heating panels or between outlets, junction boxes, mounting luminaries, ventilating, or other openings shall comply with NFPA 70.~~

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
No action is needed by the TCC for UMC Item # 217 or for USEHC Item # 070. The TCC agrees with the actions taken by the UMC TC to "reject" Item # 217 as indicated in the UMC Technical Committee Statement below. Furthermore, the TCC agrees with the USEHC TC action to "accept as submitted" USEHC Item # 070 as indicated in the substantiation below.			
Committee Statement provided for rejecting proposal Item # 217 by the UMC TC is as follows: "The proposed language is needed for the installation of heating panels and directs the installer to the appropriate referenced standard for clearances."			
The substantiation provided for proposal Item # 070 of the USEHC is as follows: "Electric Heating Panel Systems are electrical resistance heating systems constructed of grids of wires. This chapter is about hydronic systems. Electrical systems are not in the scope, so this section should be deleted."			

TCC ITEM # 033

2015 UNIFORM MECHANICAL CODE
ITEM # 218

RECOMMENDATION:

1217.6.2 Radiant Wall and Ceiling Panels. Radiant panels attached to wood, steel, masonry, or concrete framing members shall be fastened by means of anchors, bolts, or approved ~~expansion~~ screws of sufficient size and anchorage to support the loads applied. Panels shall be installed with corrosion-resistant fasteners. Piping systems shall be designed for thermal expansion to prevent the load being transmitted to the panel.

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 071

414.0 Radiant Heating and Cooling.

414.9.2 Radiant Wall and Ceiling Panels. Radiant panels attached to wood, steel, masonry, or concrete framing members shall be fastened by means of anchors, bolts, or approved screws of sufficient size and anchorage to support the loads applied. Panels shall be installed with corrosion-resistant fasteners. Piping systems shall be designed for thermal expansion to prevent the load being transmitted to the panel.

X	Accept recommendation as submitted.	Reject the recommendation.
Substantiation: Section 1217.6.2 of the UMC is being revised to correlate with Section 414.9.2 of the USEHC in regards to radiant wall and ceiling panels.		

TCC ITEM # 034

2015 UNIFORM MECHANICAL CODE
ITEM # 221

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 074

RECOMMENDATION:

1220.2 Snow and Ice Melt Controls. An automatic thermostatically operating control device that controls the supply hydronic solution temperature to the snow and ice melt area shall be installed in the system. Snow and ice melt systems shall be protected from freezing with a mixture of propylene glycol or ethylene glycol, and water or other approved fluid. Automotive antifreeze shall not be used.

416.0 Snow and Ice Melt Systems.

416.3 Snow and Ice Melt. An automatic operating control device that controls the supply hydronic fluid temperature to the snow and ice melt area shall be installed in the system. A means shall be provided to prevent low return hydronic solution temperature in accordance with Section 410.5. Snow and ice melt systems shall be protected from freezing with a mixture of propylene glycol and water, or other approved fluid.

X	Accept recommendation as submitted.		Reject the recommendation.
<p>Substantiation:</p> <p>No action is needed by the TCC for UMC Item # 221 or for USEHC Item # 074. The TCC agrees with the UMC TC action to “accept as amended” Item # 221 as indicated in the Technical Committee statement below. Furthermore, the TCC agrees with the USEHC TC to “accept as amended” USEHC Item # 074 as indicated in the Technical Committee statement below.</p> <p>Committee Statement provided for amending proposal Item # 221 by the UMC TC is as follows: <i>“The modification combines two sections as they address the same topic.”</i></p> <p>Committee Statement provided for amending proposal Item # 074 by the USEHC TC is as follows: <i>“The proposed modification clarifies the intent of an auxiliary system for snow and ice melt systems. Furthermore, the reference to ethylene glycol is being removed as the use of ethylene glycol is highly regulated by local jurisdictions for health and safety reasons.”</i></p>			

TCC ITEM # 035

2015 UNIFORM MECHANICAL CODE
ITEM # 222 Public Comment 1

RECOMMENDATION:

1220.0 Auxiliary Systems.

1220.3.1 Tube Placement. Snow and ice melt tubing shall be installed in accordance with the manufacturer's installation instructions and with the tube layout and spacing in accordance with the system design. Except for distribution mains, tube and the individual loop lengths shall be installed with a variance of not more than ±10 percent from the design.

The maximum loop length of continuous tubing from a supply-and-return manifold arrangement shall not exceed the lengths specified by the manufacturer's ~~installation instructions and system design~~ or, in the absence of manufacturer's specifications, the lengths specified in Table 1220.3.1. Actual loop lengths shall be determined by spacing, flow rate, and pressure drop in accordance with the system design.

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 075

416.0 Auxiliary Systems.

416.3.1 Tube Placement. Snow and ice melt tubing shall be installed in accordance with the manufacturer's installation instructions and with the tube layout and spacing in accordance with the system design. Except for distribution mains, tube and the individual loop lengths shall be installed with a variance of not more than ±10 percent from the design.

The maximum loop length of continuous tubing from a supply-and-return manifold arrangement shall not exceed the lengths specified by the manufacturer or, in the absence of manufacturer's specifications, the lengths specified in Table 416.3.1. Actual loop lengths shall be determined by spacing, flow rate, and pressure drop in accordance with the system design.

x	Accept recommendation as submitted.	Reject the recommendation.
Substantiation: Section 1220.3.1 of the UMC is being revised to correlate with Section 416.3.1 of the USEHC in regards to tube placement of auxiliary systems.		

TCC ITEM # 036

2015 UNIFORM MECHANICAL CODE
ITEM # 224

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 078

RECOMMENDATION:

1220.0 Auxiliary Systems.

1220.2.3 Slab Penetration Tube and Joint Protection.

Where embedded in or installed under a concrete slab, tubing shall be protected from damage at penetrations of the slab with a protective ~~pipe sleeve~~ sleeving approved by the tubing manufacturer. The space between the tubing and sleeve shall be sealed with an approved sealant compatible with the tubing. The tubing at the location of an expansion joint in a concrete slab shall be encased in a protective pipe sleeve that covers the tubing not less than 12 inches (305 mm) on either side of the joint or the tubing shall be installed below the slab.

416.0 Auxiliary Systems.

416.3.3 Slab Penetration Tube and Joint Protection.

Where embedded in or installed under a concrete slab, tubing shall be protected from damage at penetrations of the slab with protective sleeving approved by the tubing manufacturer. The space between the tubing and sleeve shall be sealed with an approved sealant compatible with the tubing. The tubing at the location of an expansion joint in a concrete slab shall be encased in a protective pipe sleeve that covers the tubing not less than 12 inches (305 mm) on either side of the joint or the tubing shall be installed below the slab.

x	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
Section 1220.2.3 of the UMC is being revised to correlate with Section 416.3.3 of the USEHC in regards to slab penetration tube and joint protection in auxiliary systems.			

TCC ITEM # 037

2015 UNIFORM MECHANICAL CODE
ITEM # 225

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 081

RECOMMENDATION:

1220.0 Auxiliary Systems.

1220.3.6 Testing and Flushing. Testing and flushing of auxiliary systems shall be in accordance with Section 1205.0.

416.0 Auxiliary Systems.

416.3.6 Testing and Flushing. Testing of snow and ice melt systems shall be in accordance with Section 405.2 and flushing shall be in accordance with Section 405.3.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
No action is needed by the TCC for UMC Item # 225 or for USEHC Item # 081. The TCC agrees with the actions taken by the UMC TC to "accept as submitted" UMC Item # 225 as indicated in the substantiation below. Furthermore, the TCC agrees with the actions taken by the USEHC TC to "accept as submitted" USEHC Item # 081 as indicated in the substantiation below.			
The substantiation provided for Item # 225 of the UMC is as follows: "Section 1220.3.6 should be revised to expand to provisions to include flushing. Furthermore, the reference section should be revised to Section 1205.0 to include testing and flushing."			
The substantiation provided for proposal Item # 078 of the USEHC is as follows: "Propose to add flushing to this section as a reminder that flushing should be part of the process for every hydronic system."			

TCC ITEM # 038

2015 UNIFORM MECHANICAL CODE
ITEM # 226

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 082

RECOMMENDATION:

1220.0 Auxiliary Systems.

1220.4 Hydronic Makeup Air Units. Hydronic makeup air units that are affected by freezing shall be protected against freezing by a hydronic solution or a method approved by the Authority Having Jurisdiction.

416.0 Auxiliary Systems.

~~**416.4 Hydronic Makeup Air Units.** Hydronic makeup air units that are affected by freezing shall be protected against freezing by a hydronic solution or a method approved by the Authority Having Jurisdiction.~~

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
<p>No action is needed by the TCC for UMC Item # 226 or for USEHC Item # 082. The TCC agrees with the actions taken by the UMC TC to “accept as amended” UMC Item # 225 as indicated by the UMC Committee statement below. Furthermore, the TCC agrees with the actions taken by the USEHC TC to “accept as amended” Item # 082 as indicated in the USEHC Committee statement below.</p> <p>Committee Statement provided for amending proposal Item # 226 by the UMC TC is as follows: <i>“The modification retains the language in Section 1220.4 for freeze protection and guidance to the installer and deletes language requiring approval by the AHJ.”</i></p> <p>Committee Statement provided for amending proposal Item # 082 by the USEHC TC is as follows: <i>“Section 416.4 is being deleted as it is not appropriate under Auxiliary Systems.”</i></p>			

TCC ITEM # 039

2015 UNIFORM MECHANICAL CODE
ITEM # 228

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE
ITEM # 086

RECOMMENDATION:

1221.2 Embedded Piping Materials and Joints. Piping embedded in concrete shall be steel pipe, Type L copper tubing or plastic pipe or tubing rated at not less than 100 psi at 180°F (689 kPa at 82°C). Joints of pipe or tubing that are embedded in a portion of the building, such as concrete or plaster shall be installed in accordance with the requirements of Section 1221.2.1 through Section 1221.2.3.

417.0 Piping Installation.

417.2 Embedded Piping Materials and Joints. Piping ~~for hydronic systems which is~~ embedded in concrete shall be steel pipe, Type L copper tubing or plastic pipe or tubing rated at not less than 100 psi at 180°F (689 kPa at 82°C). Joints of pipe or tubing that are embedded in a portion of the building, such as concrete or plaster, shall be installed in accordance with Section 417.2.1 through Section 417.2.3.

X	Accept recommendation as submitted.		Reject the recommendation.
Substantiation:			
<p>Section 417.2 of the USEHC is being revised to correlate with Section 1221.2 of the UMC in regards to embedded piping materials and joints.</p>			

TCC ITEM # 040

2015 UNIFORM MECHANICAL CODE

ITEM # 229 Public Comment 2

2015 UNIFORM SOLAR ENERGY & HYDRONICS CODE

ITEM # 088

RECOMMENDATION:

1221.2.3 Plastics. Plastic pipe and tubing shall be installed in continuous lengths or shall be joined by heat fusion method.

417.0 Piping Installation.

417.2.3 Plastics. Plastic pipe and tubing shall be installed in continuous lengths or shall be joined by heat fusion methods, solvent cement joints, or other approved fittings in accordance with Table 408.1 and the manufacturer's installation instructions.

X	Accept recommendation as submitted.	Reject the recommendation.
<p>Substantiation:</p> <p>No action is needed by the TCC for UMC Item # 229 or for USEHC Item # 088. The TCC agrees with the actions taken by the UMC TC to “reject the public comment,” UMC Item # 229, comment 2 as indicated by the UMC Technical Committee statement below. Furthermore, the TCC agrees with the actions of the USEHC TC to “accept as submitted” USEHC Item # 088 as indicated in the substantiation below.</p> <p>Committee Statement provided for rejecting Item # 229 public comment 2 by the UMC TC is as follows: <i>“The proposed language is vague. This section may imply that solvent cement joints are allowed to be embedded. More study is needed to merit such change. No technical justification was given in the substantiation to warrant such change.”</i></p> <p>The substantiation provided for proposal Item # 088 of the USEHC is as follows: <i>“Heat fusion is applicable only to certain materials such as PP or PE. For common hydronic materials such as CPVC, PEX and PE-RT, the ability to use embedded fittings when necessary is important, as fittings might be required to repair pipe that was damaged during construction. Many fittings for plastic tubing have been approved for use in other codes for years, and have been successfully installed in embedded applications for decades. Manufacturers of CPVC, PEX and PE-RT tubing and fittings systems want the ability to recommend use of their fittings in limited embedded applications when necessary. Examples of such fittings are those covered by existing ASTM standards D2846, F877, F1807, F1960, F2080, F2159, F2434, and F2735. In fact, each of these fitting systems are already included in Table 408.1. When manufacturers approve the use of such fittings for embedded applications, this code should not prohibit that use. The added reference to Table 408.1 ensures that only approved fittings for each type of pipe or tubing are eligible for this type of installation. Please see PPI Position Paper on Installation of PEX Fittings Within and Under Concrete Slabs at this link: http://www.plasticpipe.org/pdf/postion-paper-pex-fitting-locations.pdf”</i></p>		

MEMORANDUM

TO: Technical Correlating Committee

FROM: Enrique Gonzalez, Staff Liaison

DATE: August 10, 2017

SUBJECT: Final Ballot Results for the TCC Report (All 4 Codes)

Dear Technical Correlating Committee Members:

Attached are the final ballot results for the committee recommendations as a result of the actions taken during your recent meeting.

12 Members Eligible to Vote

1 Ballot was not received by the final closing date of August 9, 2017.

0 Abstaining

(See voting results below for details)

There are two criteria necessary to pass the letter ballot for each item as follows:

1. The number of affirmative votes needed for each item to pass is 3/4 affirmative.
2. In all cases, an affirmative vote of at least a simple majority of the total members eligible to vote is required.

All of the committee actions for the Technical Correlating Committee Report achieved the necessary 3/4 affirmative votes of returned ballots.

Please contact me with any questions or comments you may have at (909) 230-5535 or by email at enrique.gonzalez@iapmo.org.

Thank you,
Enrique Gonzalez
Staff Liaison

Ballot Name:	TCC (all 4 codes) Item # 001 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 002 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 003 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 004 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 005 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 006 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 007 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	9	81.8%	
Negative w/comment	2	18.2%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Levanger, Dave	Affirmative
Trafton, April	Affirmative	Hyde, Michael	Affirmative
Kreitenberg, Harvey	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Mann, David	Negative w/comment
Cudahy, Michael	Affirmative	Dias, David	Negative w/comment
MacNevin, P.Eng, Lance	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 008 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	9	81.8%	
Negative w/comment	2	18.2%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Levanger, Dave	Affirmative
Trafton, April	Affirmative	Hyde, Michael	Affirmative
Kreitenberg, Harvey	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Mann, David	Negative w/comment
Cudahy, Michael	Affirmative	Dias, David	Negative w/comment
MacNevin, P.Eng, Lance	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 009 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 010 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 011 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 012 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 013 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 014 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 015 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 016 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	9	81.8%	
Negative w/comment	2	18.2%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Levanger, Dave	Affirmative
Trafton, April	Affirmative	Hyde, Michael	Affirmative
Kreitenberg, Harvey	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Mann, David	Negative w/comment
Cudahy, Michael	Affirmative	Dias, David	Negative w/comment
MacNevin, P.Eng, Lance	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 017 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 018 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 019 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 020 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 021 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	9	81.8%	
Negative w/comment	2	18.2%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Levanger, Dave	Affirmative
Trafton, April	Affirmative	Hyde, Michael	Affirmative
Kreitenberg, Harvey	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Mann, David	Negative w/comment
Cudahy, Michael	Affirmative	Dias, David	Negative w/comment
MacNevin, P.Eng, Lance	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 022 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 023 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 024 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 025 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 026 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 027 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 028 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 029 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 030 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 031 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 032 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 033 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 034 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 035 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 036 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 037 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 038 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name			
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 039 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	11	100%	
Negative w/comment	0	0%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Cudahy, Michael	Affirmative
Mann, David	Affirmative	MacNevin, P.Eng, Lance	Affirmative
Trafton, April	Affirmative	Levanger, Dave	Affirmative
Kreitenberg, Harvey	Affirmative	Hyde, Michael	Affirmative
Dias, David	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Osinski, Alison	Did not Vote

Ballot Name:	TCC (all 4 codes) Item # 040 July 2017		
Total Votes:	11		
Vote Summary			
Option	Count	Percent	
Affirmative	9	81.8%	
Negative w/comment	2	18.2%	
Abstain w/comment	0		
Voter Name	Vote	Voter Name	Vote
Murray, Ed	Affirmative	Levanger, Dave	Affirmative
Trafton, April	Affirmative	Hyde, Michael	Affirmative
Kreitenberg, Harvey	Affirmative	Hamil, Beth	Affirmative
Rodio, Arnold	Affirmative	Mann, David	Negative w/comment
Cudahy, Michael	Affirmative	Dias, David	Negative w/comment
MacNevin, P.Eng, Lance	Affirmative	Osinski, Alison	Did not Vote

Uniform Swimming Pool,
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PRE-PRINT

CHAPTER 1

ADMINISTRATION

101.0 General.

101.1 Title. This document shall be known as the “Uniform Swimming Pool, Spa, and Hot Tub Code,” may be cited as such, and will be referred to herein as “this code.”

101.2 Scope. The provisions of this code shall apply to the erection, installation, alteration, repair, relocation, replacement, addition to, use, and maintenance of swimming pools, spas, or hot tub systems within this jurisdiction.

101.3 Purpose. This code is an ordinance providing minimum requirements and standards for the protection of the public health, safety, and welfare.

101.4 Unconstitutional. Where a section, subsection, sentence, clause, or phrase of this code is, for a reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this code. The legislative body hereby declares that it would have passed this code, and each section, subsection, sentence, clause, or phrase thereof, irrespective of the fact that one or more sections, subsections, sentences, clauses, and phrases be declared unconstitutional.

101.5 Validity. Where a provision of this code, or the application thereof to a person or circumstance, is held invalid, the remainder of the code, or the application of such provision to other persons or circumstances, shall not be affected thereby.

102.0 Applicability.

102.1 Conflicts Between Codes. Where the requirements within the jurisdiction of this code conflict with the requirements of the plumbing or mechanical code, this code shall prevail. In instances where the code, applicable standards, or the manufacturer’s installation instructions conflict, the more stringent provisions shall prevail. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall prevail.

102.2 Existing Installations. Swimming pools, spas, or hot tub systems lawfully in existence at the time of the adoption of this code shall be permitted to have their use, maintenance, or repair continued where the use, maintenance, or repair is in accordance with the original design and location and no hazard to life, health, or property has been created by such system.

102.3 Maintenance. Swimming pools, spas or hot tub systems of premises under the Authority Having Jurisdiction shall be maintained in a sanitary and safe operating condition. Swimming pools, spas, or hot tub systems, materials, equipment, structures, signage, safety devices, fencing, appurtenances and other associated components both existing and new, and parts thereof shall be maintained in operating condition. Devices or safeguards required by this code shall be maintained in accordance with the code edition under which it was installed.

The owner or the owner’s designated agent shall be responsible for the maintenance of swimming pools, spas, or hot tub systems. To determine compliance with this subsection, the Authority Having Jurisdiction shall be permitted to cause a swimming pool, spa, or hot tub system to be reinspected.

102.4 Additions, Alterations, Renovations, or Repairs. Additions, alterations, renovations, or repairs shall conform to that required for a new system without requiring the existing swimming pool, spa, or hot tub system to comply with the requirements of this code. Additions, alterations, renovations, or repairs shall not cause an existing system to become unsafe, insanitary, or overloaded.

Additions, alterations, renovations, or repairs to existing swimming pools, spas, or hot tubs shall comply with the provisions for new construction unless such deviations are found to be necessary and are first approved by the Authority Having Jurisdiction.

102.5 Health and Safety. Where compliance with the provisions of this code fail to eliminate or alleviate a nuisance, or other dangerous or insanitary condition that involves health or safety hazards, the owner or the owner’s agent shall install such additional swimming pool, spa, or hot tub facilities or shall make such repairs or alterations as ordered by the Authority Having Jurisdiction.

102.6 Changes in Building Occupancy. Swimming pool, spa, or hot tub systems that are a part of a building or structure undergoing a change in use or occupancy, as defined in the building code, shall be in accordance with the requirements of this code that are applicable to the new use or occupancy.

102.7 Moved Structures. Parts of the swimming pool, spa, or hot tub systems, of a building or part thereof that is moved from one foundation to another, or from one location to another, shall be in accordance with the provisions of this code for new installations and completely tested as prescribed elsewhere in this section for new work, except that walls or floors need not be removed during such test where other equivalent means of inspection acceptable to the Authority Having Jurisdiction are provided.

102.8 Appendices. The provisions in the appendices are intended to supplement the requirements of this code and shall not be considered part of this code unless formally adopted as such.

103.0 Duties and Powers of the Authority Having Jurisdiction.

103.1 General. The Authority Having Jurisdiction shall be the authority duly appointed to enforce this code. For such purposes, the Authority Having Jurisdiction shall have the powers of a law enforcement officer. The Authority Having Jurisdiction shall have the power to render interpretations of this code and to adopt and enforce rules and regulations sup-

plemental to this code as deemed necessary in order to clarify the application of the provisions of this code. Such interpretations, rules, and regulations shall comply with the intent and purpose of this code.

In accordance with the prescribed procedures and with the approval of the appointing authority, the Authority Having Jurisdiction shall be permitted to appoint such number of technical officers, inspectors, and other employees as shall be authorized from time to time. The Authority Having Jurisdiction shall be permitted to deputize such inspectors or employees as necessary to carry out the functions of the code enforcement agency.

The Authority Having Jurisdiction shall be permitted to request the assistance and cooperation of other officials of this jurisdiction so far as required in the discharge of the duties in accordance with this code or other pertinent law or ordinance.

103.2 Liability. The Authority Having Jurisdiction charged with the enforcement of this code, acting in good faith and without malice in the discharge of the Authority Having Jurisdiction's duties, shall not thereby be rendered personally liable for damage that accrues to persons or property as a result of an act or by reason of an act or omission in the discharge of duties. A suit brought against the Authority Having Jurisdiction or employee because of such act or omission performed in the enforcement of provisions of this code shall be defended by legal counsel provided by this jurisdiction until final termination of such proceedings.

103.3 Applications and Permits. The Authority Having Jurisdiction shall be permitted to require the submission of plans, specifications, drawings, and such other information as required by the Authority Having Jurisdiction, prior to the commencement of, and at a time during the progress of, work regulated by this code.

The issuance of a permit upon construction documents shall not prevent the Authority Having Jurisdiction from thereafter requiring the correction of errors in said construction documents or from preventing construction operations being carried on thereunder where in violation of this code or of other pertinent ordinance or from revoking a certificate of approval where issued in error.

103.3.1 Licensing. Provision for licensing shall be determined by the Authority Having Jurisdiction.

103.4 Right of Entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the Authority Having Jurisdiction has reasonable cause to believe that there exists in a building or upon premises a condition or violation of this code that makes the swimming pool, spa, or hot tub unsafe, insanitary, dangerous, or hazardous, the Authority Having Jurisdiction shall be permitted to enter the building or premises at reasonable times to inspect or to perform the duties imposed by the Authority Having Jurisdiction by this code, provided that where such building or premises is occupied, the Authority Having Jurisdiction shall present credentials to the occupant and request entry. Where such building or premises is unoccupied, the Authority Having Jurisdiction shall first make a reasonable effort to locate the owner or other person having charge or control of the build-

ing or premises and request entry. Where entry is refused, the Authority Having Jurisdiction has recourse to every remedy provided by law to secure entry.

Where the Authority Having Jurisdiction shall have first obtained an inspection warrant or other remedy provided by law to secure entry, no owner, occupant, or person having charge, care, or control of a building or premises shall fail or neglect, after a request is made as herein provided, to promptly permit entry therein by the Authority Having Jurisdiction for the purpose of inspection and examination pursuant to this code.

104.0 Permits.

104.1 Permits Required. It shall be unlawful for a person, firm, or corporation to erect, construct, enlarge, move, improve, remove, convert, demolish, equip, make an installation, alteration, repair, replace, or remodel swimming pool, spa or hot tub, or drainage piping work; swimming pool equipment, appurtenances, and other associated components; or treating equipment regulated by this code except as permitted in Section 104.2, or to cause the same to be done without first obtaining a separate permit for each separate building, structure or swimming pool, spa, or hot tub.

104.2 Exempt Work. A permit shall not be required for the following:

- (1) The stopping of leaks in drains, soil, waste, or vent pipe, provided, however, that a trap, drainpipe, soil, waste, or vent pipe become defective, and it becomes necessary to remove and replace the same with new material, the same shall be considered as new work and a permit shall be procured and inspection made as provided in this code.
- (2) The clearing of stoppages, or the repairing of leaks in pipes, valves, or fixtures, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes, or fixtures.

Exemption from the permit requirements of this code shall not be deemed to grant authorization for work to be done in violation of the provisions of the code or other laws or ordinances of this jurisdiction.

104.3 Application for Permit. To obtain a permit, the applicant shall first file an application therefore in writing on a form furnished by the Authority Having Jurisdiction for that purpose. Such application shall:

- (1) Identify and describe the work to be covered by the permit for which application is made.
- (2) Describe the land upon which the proposed work is to be done by legal description, street address, or similar description that will readily identify and definitely locate the proposed building or work.
- (3) Indicate the use or occupancy for which the proposed work is intended.
- (4) Be accompanied by construction documents in accordance with Section 104.3.1.
- (5) Be signed by the permittee or the permittee's authorized agent. The Authority Having Jurisdiction shall be permitted to require evidence to indicate such authority.

- (6) Give such other data and information in accordance with the Authority Having Jurisdiction.

104.3.1 Construction Documents. Construction documents, engineering calculations, diagrams, and other data shall be submitted in two or more sets with each application for a permit. The construction documents, computations, and specifications shall be prepared by, and designed by, a registered design professional. Construction documents shall be drawn to scale with clarity to identify that the intended work to be performed is in accordance with the code.

Construction documents for indoor installations of public or private swimming pool, spa, hot tub, bathing, aquatic play, or wading facilities shall be submitted to the Authority Having Jurisdiction for approval prior to the commencement of work, piping, equipment, or combination thereof. Construction shall be equal to the types prescribed in the installation requirements of the plumbing code.

Exception: The Authority Having Jurisdiction shall be permitted to waive the submission of construction documents, calculations, or other data where the Authority Having Jurisdiction finds that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with the code.

104.3.2 Plan Review Fees. Where a plan or other data is required to be submitted in accordance with Section 104.3.1, a plan review fee shall be paid at the time of submitting construction documents for review.

The plan review fees for work to install, alter, or repair a swimming pool, spa, hot tub system, or part thereof shall be determined and adopted by this jurisdiction.

The plan review fees specified in this subsection are separate fees from the permit fees specified in Section 104.5.

Where plans are incomplete or changed so as to require additional review, a fee shall be charged at the rate shown in Table 104.5.

104.3.3 Time Limitation of Application. Applications for which no permit is issued within 180 days following the date of application shall expire by limitation, plans and other data submitted for review thereafter, shall be returned to the applicant or destroyed by the Authority Having Jurisdiction. The Authority Having Jurisdiction shall be permitted to exceed the time for action by the applicant for a period not to exceed 180 days upon request by the applicant showing that circumstances beyond the control of the applicant have prevented the action from being taken. No application shall be extended more than once. In order to renew action on an application after expiration, the applicant shall resubmit plans and pay a new plan review fee.

104.4 Permit Issuance. The application, construction documents, and other data filed by an applicant for a permit shall be reviewed by the Authority Having Jurisdiction. Such plans

shall be permitted to be reviewed by other departments of this jurisdiction to verify compliance with applicable laws under their jurisdiction. Where the Authority Having Jurisdiction finds that the work described in an application for permit and the plans, specifications, and other data filed therewith are in accordance with the requirements of the code and other pertinent laws and ordinances and that the fees specified in Section 104.5 have been paid, the Authority Having Jurisdiction shall issue a permit therefore to the applicant.

104.4.1 Approved Plans or Construction Documents. Where the Authority Having Jurisdiction issues the permit where plans are required, the Authority Having Jurisdiction shall endorse in writing or stamp the construction documents "APPROVED." Such approved construction documents shall not be changed, modified, or altered without authorization from the Authority Having Jurisdiction, and the work shall be done in accordance with approved plans.

The Authority Having Jurisdiction shall be permitted to issue a permit for the construction of a part of a swimming pool, spa or hot tub system before the entire construction documents for the whole system have been submitted or approved, provided adequate information and detailed statements have been filed in accordance with the pertinent requirements of this code. The holder of such permit shall be permitted to proceed at the holder's risk without assurance that the permit for the entire building, structure, or swimming pool, spa or hot tub system will be granted.

104.4.2 Validity of Permit. The issuance of a permit or approval of construction documents shall not be construed to be a permit for, or an approval of, a violation of the provisions of this code or other ordinance of the jurisdiction. No permit presuming to give authority to violate or cancel the provisions of this code shall be valid.

The issuance of a permit based upon plans, specifications, or other data shall not prevent the Authority Having Jurisdiction from thereafter requiring the correction of errors in said plans, specifications, and other data or from preventing building operations being carried on thereunder where in violation of this code or of other ordinances of this jurisdiction.

104.4.3 Expiration. A permit issued by the Authority Having Jurisdiction under the provisions of this code shall expire by limitation and become null and void where the work authorized by such permit is not commenced within 180 days from the date of such permit, or where the work authorized by such permit is suspended or abandoned at a time after the work is commenced for a period of 180 days. Before such work is recommenced, a new permit shall first be obtained to do so, and the fee, therefore, shall be one-half the amount required for a new permit for such work, provided no changes have been made or will be made in the original construction documents for such work, and provided further that such suspensions or abandonment has not exceeded 1 year.

104.4.4 Extensions. A permittee holding an unexpired permit shall be permitted to apply for an extension of the

time within which work shall be permitted to commence under that permit where the permittee is unable to commence work within the time required by this section. The Authority Having Jurisdiction shall be permitted to extend the time for action by the permittee for a period not exceeding 180 days upon written request by the permittee showing that circumstances beyond the control of the permittee have prevented the action from being taken. No permit shall be extended more than once. In order to renew action on a permit after expiration, the permittee shall pay a new full permit fee.

104.4.5 Suspension or Revocation. The Authority Having Jurisdiction shall be permitted to, in writing, suspend or revoke a permit issued under the provisions of this code where the permit is issued in error or on the basis of incorrect information supplied or in violation of an ordinance or regulation of the jurisdiction.

104.4.6 Retention of Plans. One set of approved construction documents and computations shall be retained by the Authority Having Jurisdiction until final approval of the work covered therein.

One set of approved construction documents, computations, and manufacturer's installation instructions shall be returned to the applicant and said set shall be kept on the site of the building or work at times during which the work authorized thereby is in progress.

104.5 Fees. Fees shall be assessed in accordance with the provisions of this section and as set forth in the fee schedule Table 104.5. The fees are to be determined and adopted by this jurisdiction.

104.5.1 Work Commencing Before Permit Issuance. Where work for which a permit is required by this code has been commenced without first obtaining said permit, a special investigation shall be made before a permit is issued for such work.

104.5.2 Investigation Fees. An investigation fee, in addition to the permit fee, shall be collected whether or not a permit is then or subsequently issued. The investigation fee shall be equal to the amount of the permit fee that is required by this code if a permit were to be issued. The payment of such investigation fee shall not exempt a person from compliance with other provisions of this code, nor from a penalty prescribed by law.

104.5.3 Fee Refunds. The Authority Having Jurisdiction shall be permitted to authorize the refunding of a fee as follows:

- (1) The amount paid hereunder that was erroneously paid or collected.
- (2) Refunding of not more than a percentage, as determined by this jurisdiction where no work has been done under a permit issued in accordance with this code.

The Authority Having Jurisdiction shall not authorize the refunding of a fee paid except upon written application filed by the original permittee not to exceed 180 days after the date of fee payment.

105.0 Inspections and Testing.

105.1 General. Swimming pools, spas, or hot tub systems, for which a permit is required by this code shall be inspected by the Authority Having Jurisdiction.

No swimming pool, spa, or hot tub system, or portion thereof, shall be covered, concealed, or put into use until inspected and approved as prescribed in this code. Neither the Authority Having Jurisdiction nor the jurisdiction shall be liable for expense entailed in the removal or replacement of material required to permit inspection. Swimming pools, spas, or hot tub systems regulated by this code shall not be connected to the water, the energy fuel supply, or the sewer system until authorized by the Authority Having Jurisdiction.

105.2 Required Inspection. New swimming pool, spa, or hot tub work, and such portions of existing systems as affected by new work, or changes, shall be inspected by the Authority Having Jurisdiction to ensure compliance with the requirements of this code and to ensure that the installation and construction of a swimming pool, spa or hot tub system are in accordance with approved plans. The Authority Having Jurisdiction shall make the following inspections and other such inspections as necessary. The permittee or the permittee's authorized agent shall be responsible for the scheduling of such inspections as follows:

- (1) Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place.
- (2) Rough-in inspection shall be made prior to the installation of wall or ceiling membranes.
- (3) Final inspection shall be made upon completion of the installation.

105.2.1 Uncovering. Where a swimming pool, spa or hot tub system, or part thereof, which is installed, altered, or repaired, is covered or concealed before being inspected, tested, and approved as prescribed in this code, it shall be uncovered for inspection after notice to uncover the work has been issued to the responsible person by the Authority Having Jurisdiction. The requirements of this section shall not be considered to prohibit the operation of the swimming pool, spa or hot tub system installed to replace existing equipment serving an occupied portion of the building in the event a request for inspection of such equipment has been filed with the Authority Having Jurisdiction not more than 72 hours after such replacement work is completed, and before a portion of such swimming pool, spa or hot tub system is concealed by a permanent portion of the building.

105.2.2 Other Inspections. In addition to the inspections required by this code, the Authority Having Jurisdiction shall be permitted to require other inspections to ascertain compliance with the provisions of this code and other laws that are enforced by the Authority Having Jurisdiction.

105.2.3 Inspection Requests. It shall be the duty of the person doing the work authorized by a permit to notify the Authority Having Jurisdiction that such work is ready for inspection. The Authority Having Jurisdiction shall be permitted to require that a request for

inspection be filed not less than 1 working day before such inspection is desired. Such request shall be permitted to be made in writing or by telephone, at the option of the Authority Having Jurisdiction. It shall be the duty of the person requesting inspections in accordance with this code to provide access to and means for inspection of such work.

105.2.4 Advance Notice. It shall be the duty of the person doing the work authorized by the permit to notify the Authority Having Jurisdiction, orally or in writing, that said work is ready for inspection. Such notification shall be given not less than 24 hours before the work is to be inspected.

105.2.5 Responsibility. It shall be the duty of the holder of a permit to make sure that the work will stand the test prescribed before giving the notification. The equipment, material, and labor necessary for inspection or tests shall be furnished by the person to whom the permit is issued or by whom inspection is requested.

105.2.6 Reinspections. A reinspection fee shall be permitted to be assessed for each inspection or reinspection where such portion of work for which inspection is called is not complete or where required corrections have not been made.

This provision shall not be interpreted as requiring reinspection fees the first time a job is rejected for failure to be in accordance with the requirements of this code, but as controlling the practice of calling for inspections before the job is ready for inspection or reinspection.

Reinspection fees shall be permitted to be assessed where the approved plans are not readily available to the inspector, for failure to provide access on the date for which the inspection is requested, or for deviating from plans requiring the approval of the Authority Having Jurisdiction.

To obtain reinspection, the applicant shall file an application therefore in writing upon a form furnished for that purpose and pay the reinspection fee in accordance with Table 104.5. In instances where reinspection fees have been assessed, no additional inspection of the work will be performed until the required fees have been paid.

105.3 Testing of Systems. Swimming pool, spa, or hot tub systems shall be tested and approved in accordance with this code or the Authority Having Jurisdiction. Tests shall be conducted in the presence of the Authority Having Jurisdiction or the Authority Having Jurisdiction's duly appointed representative.

No test or inspection shall be required where a swimming pool, spa or hot tub system, or part thereof, is set up for exhibition purposes and has no connection with water or drainage system. In cases where it would be impractical to provide the required water or air tests, or for minor installations and repairs, the Authority Having Jurisdiction shall be permitted to make such inspection as deemed advisable in order to be assured that the work has been performed in accordance with the intent of this code. Joints and connections in the swim-

ming pool, spa or hot tub system shall be airtight, gastight and watertight for the pressures required by the test.

105.3.1 Defective Systems. In buildings or premises condemned by the Authority Having Jurisdiction because of an insanitary condition of a swimming pool, spa or hot tub system, or part thereof, the alterations in such system shall be in accordance with the requirements of this code.

105.3.2 Retesting. Where the Authority Having Jurisdiction finds that the work will not pass the test, necessary corrections shall be made, and the work shall be resubmitted for test or inspection.

105.3.3 Approval. Where prescribed tests and inspections indicate that the work is in accordance with this code, a certificate of approval shall be issued by the Authority Having Jurisdiction to the permittee on demand.

105.4 Connection to Service Utilities. No person shall make connections from a source of energy or fuel to a swimming pool, spa or hot tub system or equipment regulated by this code and for which a permit is required until approved by the Authority Having Jurisdiction. No person shall make the connection from a water-supply line nor shall connect to a sewer system regulated by this code and for which a permit is required until approved by the Authority Having Jurisdiction. The Authority Having Jurisdiction shall be permitted to authorize temporary connection of a swimming pool, spa or hot tub equipment to the source of energy or fuel for the purpose of testing the equipment.

106.0 Violations and Penalties.

106.1 General. It shall be unlawful for a person, firm, or corporation to erect, construct, enlarge, alter, repair, move, improve, remove, convert, demolish, equip, use, or maintain a swimming pool, spa, or hot tub system, materials, equipment, appurtenances, and other associated components or permit the same to be done in violation of this code.

106.2 Notice of Correction or Violation. Notices of correction or violation shall be written by the Authority Having Jurisdiction and shall be permitted to be posted at the site of the work, mailed, or delivered to the permittee or their authorized representative.

Refusal, failure, or neglect to comply with such notice or order within 10 days of receipt thereof, shall be considered a violation of this code and shall be subject to the penalties set forth by the governing laws of the jurisdiction.

106.3 Penalties. A person, firm, or corporation violating a provision of this code shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be punishable by a fine, imprisonment, or both set forth by the governing laws of the jurisdiction. Each separate day or portion thereof, during which a violation of this code occurs or continues, shall be deemed to constitute a separate offense.

106.4 Stop Orders. Where work is being done contrary to the provisions of this code, the Authority Having Jurisdiction shall be permitted to order the work stopped by notice in writing served on persons engaged in the doing or causing work

to be done, and such persons shall forthwith stop work until authorized by the Authority Having Jurisdiction to proceed with the work.

106.5 Authority to Disconnect Utilities in Emergencies. The Authority Having Jurisdiction shall have the authority to disconnect a swimming pool, spa, or hot tub system and other utilities serving a building, structure, or equipment regulated by this code in case of an emergency where necessary to eliminate an immediate hazard to life or property.

106.6 Authority to Condemn. Where the Authority Having Jurisdiction ascertains that a swimming pool, spa, or hot tub system or portion thereof, regulated by this code, has become hazardous to life, health, or property, or has become insanitary, the Authority Having Jurisdiction shall order in writing that such swimming pool, spa, or hot tub system, either be removed or placed in a safe or sanitary condition. The order shall fix a reasonable time limit for compliance. No person shall use or maintain a defective swimming pool, spa, or hot tub system after receiving such notice.

Where such swimming pool, spa, or hot tub system is to be disconnected, written notice shall be given. In cases of immediate danger to life or property, such disconnection shall be permitted to be made immediately without such notice.

107.0 Board of Appeals.

107.1 General. In order to hear and decide appeals of orders, decisions, or determinations made by the Authority Having Jurisdiction relative to the application and interpretations of this code, there shall be and is hereby created a Board of Appeals consisting of members who are qualified by experience and training to pass upon matters pertaining to swimming pool, spa, or hot tub design, construction, and maintenance and the public health aspects of such systems and who are not employees of the jurisdiction. The Authority Having Jurisdiction shall be an ex-officio member and shall act as secretary to said board but shall have no vote upon a matter before the board. The Board of Appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business and shall render decisions and findings in writing to the appellant with a duplicate copy to the Authority Having Jurisdiction.

107.2 Limitations of Authority. The Board of Appeals shall have no authority relative to interpretation of the administrative provisions of this code, nor shall the board be empowered to waive requirements of this code.

**TABLE 104.5
SWIMMING POOL, SPA, AND HOT TUB PERMIT FEES**

Permit Issuance

- 1. For issuing each permit.....*
- 2. For issuing each supplemental permit

Unit Fee Schedule (in addition to Items 1 and 2 above)

- 1. For each swimming pool, spa, or hot tub:
 - Public
 - Private
- 2. For each pool filling system including backflow protection:
 - Two inches (50 mm) in diameter and smaller
 - Over 2 inches (50 mm) in diameter
- 3. For each water heating equipment, vent, or both
- 4. For each gas piping system of one to five outlets
- 5. For each additional gas piping system outlet, per outlet
- 6. For each replacing of filter, water treating equipment, or both
- 7. For each installation, alteration, or repair of water piping
- 8. For each repair or alteration of drainage or vent piping
- 9. For atmospheric-type vacuum breakers not referenced in Item 2:
 - 1 to 5
 - over 5, each
- 10. For each backflow protective device other than atmospheric-type vacuum breakers not included in Item 2:
 - Two inches (50 mm) in diameter and smaller
 - Over 2 inches (50 mm) in diameter
- 11. For each repair or alteration of a backwash receptor.....*
- 12. For each miscellaneous repair or alteration not covered in Items 1 through 11

Other Inspections and Fees

- 1. Inspections outside of normal business hours
- 2. Reinspection fee.....*
- 3. Inspections for which no fee is specifically indicated
- 4. Additional plan review required by changes, additions, or revisions to approved plans (minimum charge – ½ hour)

For SI units: 1 inch = 25 mm

* Jurisdiction will indicate their fees here.

PRE-PRINT

CHAPTER 2

DEFINITIONS

201.0 General.

201.1 Applicability. For the purpose of this code, the following terms have the meanings indicated in this chapter.

No attempt is made to define ordinary words, which are used in accordance with their established dictionary meanings, except where a word has been used loosely, and it is necessary to define its meaning as used in this code to avoid misunderstanding.

202.0 Definition of Terms.

202.1 General. The definitions of terms are arranged alphabetically according to the first word of the term.

203.0

– A –

Abrasion Hazard. A sharp or rough surface that may cause injury under normal use.

ABS. Acrylonitrile-butadiene-styrene.

Accepted Engineering Practice. That which conforms to technical or scientific-based principles, tests, or standards that are accepted by the engineering profession.

Accessible. Where applied to a fixture, connection, appliance, or equipment, “accessible” means having access thereto, but which first may require the removal of an access panel, door, or similar obstruction.

Accessible, Readily. Having a direct access without the necessity of removing a panel, door, or similar obstruction.

Acid. A chemical that lowers pH by increasing the percentage of hydrogen ions (H⁺) in the solution. An acid is the opposite of a base.

Acid Wash. A procedure using an acid solution to clean or prepare the interior surface of a pool with subsequent neutralization of the acid.

Air Blower. An air blower, otherwise known as a bubbler or an air pump that introduces air into the spa through a series of injectors.

Air Break. A physical separation which may be a low inlet into the indirect waste receptor from the fixture, appliance, or device indirectly connected.

Air Channel. A system where air is introduced by an air blower to force air into a molded channel in the spa floor, seats or other location.

Air Gap, Drainage. The unobstructed vertical distance through the free atmosphere between the lowest opening from a pipe, plumbing fixture, appliance, or appurtenance conveying waste to the flood-level rim of the receptor.

Air Gap, Water Distribution. The unobstructed vertical distance through the free atmosphere between the lowest opening from a pipe or faucet conveying potable water to the flood-level rim of a tank, vat, or fixture.

Air Switch System. A device in which compressed air travels through tubing to engage remotely located electrical equipment.

Algistat. A chemical able to inhibit the growth of algae.

Alkaline. A chemical having a pH between 7 and 14.

Amphoteric. A chemical compound having the capacity to act as both an acid and a base depending on their environment.

Ancillary Facility. Area used in conjunction with a pool, spa or hot tub such as dressing rooms, locker, and shower area, bathroom area, equipment area, pool deck area or building space intended to be served by pool, spa or hot tub users.

Appliance. A device that utilizes an energy source to produce light, heat, power, refrigeration, or air conditioning.

Approved. Acceptable to the Authority Having Jurisdiction.

Approved Testing Agency. An organization primarily established for the purpose of testing to approved standards and approved by the Authority Having Jurisdiction.

Aquatic Facility. A public facility that contains one or more aquatic venues and support infrastructure under a single management structure.

Aquatic Venue. An artificially constructed or modified natural structure where the general public is exposed to water intended for recreational or therapeutic purposes.

Area Drain. A receptor designed to collect surface or storm water from an open area.

Authority Having Jurisdiction. The organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, installations, or procedures. The Authority Having Jurisdiction shall be a federal, state, local, or other regional department or an individual such as a plumbing official, mechanical official, labor department official, health department official, building official, or others having statutory authority. In the absence of statutory authority, the Authority Having Jurisdiction may be some other responsible party. This definition shall include the Authority Having Jurisdiction’s duly authorized representative.

Automatic External Defibrillator (AED). A Class II medical device used under the supervision of a medical doctor to analyze heart rhythms, and detect ventricular fibrillations and ventricular tachycardia that delivers three stacked shocks to a victim to restore proper heart function.

204.0

– B –

Backboard. A piece of rescue equipment that is constructed of coated marine plywood, lightweight plastic with a foam core, or aluminum. The board is not less than 6 feet (1829 mm) in length and not less than 18 inches (457 mm) in width. Holes are generally spaced every 3 inches (76 mm) along the

length of the board, on both sides, to provide handholds and a place to secure restraining straps. Runners are attached to the bottom of the board to make sliding a victim out of a pool easier on the rescuers.

Backflow. The flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from sources other than its intended source. See Back-siphonage and Backpressure Backflow.

Backflow Connection. An arrangement whereby backflow can occur.

Backflow Preventer. A backflow prevention device, an assembly, or other method to prevent backflow into the potable water system.

Backpressure Backflow. Backflow due to an increased pressure above the supply pressure, which may be due to pumps, boilers, gravity, or other sources of pressure.

Backsiphonage. The flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel into a water supply pipe due to a pressure less than atmospheric in such pipe. See Backflow.

Backwash. The process of cleaning the filter medium, elements, or both by the reverse flow of water through the filter.

Backwash Cycle. The time required to backwash the filter medium, elements, or both and to remove debris in the filter vessel.

Backwash Pipe. See Filter Waste Discharge Piping.

Barrier. A fence, wall, building wall, or combination thereof which completely surrounds, and obstructs access to, a swimming pool, spa, hot tub, or combination thereof.

Base. A chemical that raises pH by increasing the percentage of hydroxyl ions (OH⁻) in the solution. A base is the opposite of an acid.

Bather Load. The number of permitted bathers in a public pool, spa, or hot tub at a specific period of time.

Beginner's Area. An area or portion of a pool with a water depth of 36 inches (914 mm) or less.

Body Feed. The continuous addition of small amounts of filter aid during the operation of a diatomaceous earth filter.

Break In Grade. Transition point where the bottom of the pool surface changes in slope.

Bromine. A halogen, used in combination with chlorine to form a chemical compound [(bromochloro-dimethylhydantoin (BCDMH), dichloro-dimethylhydantoin (DCDMH), or dichloro-ethylmethylhydantoin (DCEMH); or as bromine alone bound to an organic carrier molecule: dibromo-dimethylhydantoin (DBDMH)]. The chemical compound is usually sold in tablet form and used as an alternative disinfectant to chlorine in swimming pools, spas, or hot tubs.

Building Drain. That part of the lowest piping of a drainage system that receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer beginning 2 feet (610 mm) outside the building wall.

Building Drain (Sanitary). A building drain that conveys sewage only.

Building Drain (Storm). A building drain that conveys storm water or other drainage, but no sewage.

Building Sewer. That part of the horizontal piping of a drainage system that extends from the end of the building drain and that receives the discharge of the building drain and conveys it to a public sewer, private sewer, private sewage disposal system, or other point of disposal.

205.0

– C –

Caissons. A structure located within a wave pool, typically at the deepest portion, where wave generation is mechanically produced.

Calcium Hardness. A measure of dissolved calcium compounds and mineral content of water. It is measured as calcium carbonate (CaCO₃).

Cartridge Filter. A filter that operates through a disposable cartridge. There are two general types:

- (1) The surface or area type where the suspended matter is removed from the surface; and
- (2) The depth type in which the interstices vary from large to small in depth.

Cavitation. The formation of partial vacuums causing air bubbles where the pump capacity exceeds water replacement supply.

Certified Backflow Assembly Tester. A person who has shown competence to test and maintain backflow assemblies to the satisfaction of the Authority Having Jurisdiction.

Chemical Piping. Piping that conveys concentrated chemical solutions from a feeding apparatus to the circulation piping.

Chlorinator. A device used to add or deliver a chlorine sanitizer at a controllable rate.

Circulation Piping System. The piping between a pool, spa, or hot tub structure and the mechanical equipment which usually includes suction piping, face piping and return piping.

Clarifier. A chemical compound used to collect or clump together suspended particles so they may be removed by vacuuming or filtration.

Coastal High Hazard Areas. An area within the flood hazard area that is subject to high-velocity wave action, and shown on a Flood Insurance Rate Map or other flood hazard map as Zone V, VO, VE or V1-30.

Code. A standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes or standards.

Combination Temperature and Pressure-Relief Valve. A relief valve that actuates when a set temperature, pressure, or both is reached. Also known as a T&P Valve.

Combined Chlorine (Chloramines). The incomplete oxidation of organic or inorganic contaminants that form where chlorine combines with ammonia and other bather waste and nitrogen-containing organic products in the water.

Condensate. The liquid phase produced by condensation of a particular gas or vapor.

Construction Documents. Plans, specifications, written, graphic, and pictorial documents prepared or assembled for describing the design, location, and physical characteristics of the elements of a project necessary for obtaining a permit.

Coping. The cap on the swimming pool, spa, or hot tub wall that provides a finishing edge around the swimming pool, spa, or hot tub. Can be formed, cast in place, precast, brick, stone, ceramic tile, or pre-fabricated from metal or plastic materials. It may be used as part of the system that secures a vinyl liner to the top of the swimming pool, spa, or hot tub wall.

Copper Alloy. A homogenous mixture of two or more metals in which copper is the primary component, such as brass and bronze.

Cove. The radius that joins the floor and wall of a swimming pool, spa, or hot tub.

CPVC. Chlorinated Polyvinyl Chloride.

Critical Level. The critical level (C-L or C/L) marking on a backflow prevention device or vacuum breaker is a point conforming to approved standards and established by the testing laboratory (usually stamped on the device by the manufacturer) that determines the minimum elevation above the flood-level rim of the fixture or receptor served at which the device may be installed. Where a backflow prevention device does not bear a critical level marking, the bottom of the vacuum breaker, combination valve, or the bottom of such approved device shall constitute the critical level.

Cross-Connection. A connection or arrangement, physical or otherwise, between a potable water supply system and a plumbing fixture or tank, receptor, equipment, or device, through which it may be possible for nonpotable, used, unclean, polluted and contaminated water or other substances to enter into a part of such potable water system under any condition.

Cyanuric Acid. A chemical ($C_3N_3O_3H_3$) that is added to pool, spa, or hot tub water directly, or to chlorine compounds (to form isocyanurates), in order to reduce the loss of chlorine into the air from exposure to ultraviolet rays from the sun. Cyanuric acid is known as a stabilizer or a conditioner. Cyanuric acid significantly slows down chlorine's ability to inactivate pathogenic organisms.

206.0 – D –

Deep Area. Water depth areas exceeding 5 feet (1524 mm).

Department Having Jurisdiction. The Authority Having Jurisdiction, including any other law enforcement agency affected by a provision of this code, whether such agency is specifically named or not.

Design Flood Elevation. The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation is the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number is taken as being equal to 2 feet (610 mm).

Design Head. The total head requirement of the circulation system at the design rate of flow.

Design Rate of Flow (Design Filter Rate). The rate of flow in a system that is used for design calculation. (The volume of the pool, spa, or hot tub in gallons (L) divided by the number of minutes in the turnover time.)

Developed Length. The length along the centerline of a pipe and fittings.

Diameter. Unless specifically stated, "diameter" is the nominal diameter.

Diatomite Filter. A filter designed to filter water through a thin layer of filter aid such as diatomaceous earth or volcanic ash. Diatomite filters may be of the pressure or vacuum type.

Disinfectant. A sanitizer or chemical used in the process of disinfection.

Disinfection. The process of killing pathogenic microorganisms.

Diving Area. The area of a swimming pool that is designed to be used for diving.

Diving Board. A flexible board secured at one end used for diving.

Diving Platform. Stationary platform designed for diving.

Diving Stand. A supporting device for a springboard or diving board.

Drain. A pipe that carries waste or water-borne wastes in a building drainage system.

Drainage System. Includes all the piping within public or private premises that conveys sewage or other liquid wastes to a legal point of disposal, but does not include the mains of a public sewer system or a public sewage treatment or disposal plant.

207.0 – E –

Effective Opening. The minimum cross-sectional area at the point of water supply discharge measured or expressed in terms of (1) diameter of a circle or (2) where the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable also to air gap.)

Existing Work. A swimming pool, spa or hot tub system or any part thereof that has been installed prior to the effective date of this code.

Extension Pole. A piece of rescue equipment that measures 12 feet (3658 mm) to 16 feet (4877 mm) in length, and not less than 1¼ inches (32 mm) in diameter. The pole is made of anodized aluminum or fiberglass and is either fixed or adjustable. The pole is used to extend the rescuer's reach to a struggling, distressed (but not drowning) victim who is pulled to safety.

208.0 – F –

Filter, Sand. A type of filter media composed of hard, sharp silica, quartz, or similar particles with proper grading for size and uniformity.

Filter Aid. A type of finely divided media used to coat a septum-type filter, usually diatomaceous earth or volcanic ash. (Note: Alum, as used on the bed of a sand filter, is also referred to as a filter aid.)

Filter Element. That part of a filter that supports the surface upon which the filter aid is deposited (usually in diatomite filters).

Filter Media. The finely graded material that entraps suspended particles (sand, anthracite, etc.).

Filter Rate. The rate of application of water to a filter expressed in gallons per minute per square foot [(L/min)/m²] of effective filter area.

Filter Rock. Graded, rounded rock, gravel, or a combination thereof not subject to degradation by common pool chemical used to support filter media.

Filter Waste Discharge Piping. Piping that conducts wastewater from a filter to a drainage system. Connection to drainage system is made through an air gap or other approved methods.

Flood Hazard Area. The greater of the following two areas:

- (1) The area within a floodplain subject to a 1 percent or greater chance of flooding in any given year.
- (2) The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

Flood Level. See Flooded.

Flood-Level Rim. The top edge of a receptor from which water overflows.

Flooded. A fixture is flooded where the liquid therein rises to the flood-level rim.

Floodway. The channel of a river, creek, or other watercourse and the adjacent land areas that shall be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Floodways shall be permitted to be delineated on flood hazard maps.

Free Chlorine. The part of total chlorine that is present in the water that serves as a disinfectant. Free chlorine, in the form of hypochlorous acid, provides the residual sanitizer-oxidizer which is immediately and readily available to destroy bacteria, viruses, protozoa, algae, and other pathogenic (disease causing) organisms entering the water.

Fresh Water. Those waters having a specific conductivity less than a solution containing 6000 parts per million (ppm) of sodium chloride.

Fuel Gas. Natural, manufactured, liquefied petroleum, or a mixture of these.

Fuel Gas Vent. A listed factory-made vent pipe and vent fittings for conveying flue gases to the outdoors.

209.0 – G –

Grade. The slope or fall of a line of pipe in reference to a horizontal plane. In drainage, it is usually expressed as the fall in a fraction of an inch (mm) or percentage slope per foot (meter) length of pipe.

210.0 – H –

Handhold. A piece of equipment or appurtenance that is slip-resistant and is intended to be used for an individual to grasp when in distress, steady as they enter or exit, or situate oneself within a swimming pool, spa, or hot tub.

Head Immobilizer. A piece of rescue equipment used to prevent movement of a victim's head and cervical spine column while secured to a backboard. Such equipment is made of thick foam that includes velcro attachments and straps.

Heat-Fusion Weld Joints. A joint used in some thermoplastic systems to connect the pipe to fittings or pipe lengths directly to one another (butt-fusion). This method of joining pipe to fittings includes socket-fusion, electro-fusion, and saddle-fusion. This method of welding involves the application of heat and pressure to the components, allowing them to fuse together forming a bond between the pipe and fitting.

High-Rate Sand Filter. A sand filter designed for flows in excess of 5 gallons per minute (gpm) per square foot [204 (L/min)/m²], and not in excess of 20 gpm per square foot [815 (L/min)/m²].

Hot Tub. Refers specifically to a hydrotherapy unit normally constructed of wood designed and assembled in the traditional manner of tubs or casks, with side and bottoms formed of separate boards and the whole shaped to join together by pressure of the surrounding hoops, bands, or rods as distinct from spa units formed of plastic, concrete, metal, or other materials.

Hot Water. Water at a temperature exceeding or equal to 120°F (49°C).

Hydrojet Booster Pump System. A system whereby one or more hydrojets are activated by the use of a pump that is completely independent of the filtration and heating system of the spa or hot tub.

Hydrojets. A fitting that blends air and water creating a high-velocity, turbulent stream of air-enriched water.

211.0 – I –

Indirect Waste Pipe. A pipe that does not connect directly to the drainage system but conveys liquid wastes by discharging into a plumbing fixture, interceptor, or receptacle that is directly connected to the drainage system.

Insanitary. A condition that is contrary to sanitary principles or is injurious to health.

Conditions to which "insanitary" shall apply include the following:

- (1) A trap that does not maintain a proper trap seal.
- (2) An opening in a drainage system, except where lawful that is not provided with an approved liquid-sealed trap.
- (3) A plumbing fixture or other waste discharging receptor or device that is not supplied with water sufficient to flush and maintain the fixture or receptor in a clean condition.
- (4) A defective fixture, trap, pipe, or fitting.
- (5) A trap, except where in this code exempted, directly connected to a drainage system, the seal of which is not protected against siphonage and backpressure by a vent pipe.

- (2) Where work regulated by this code is dangerous to human life or is detrimental to health and property.
- (3) Inadequate or unsafe water supply or sewage disposal system.

217.0 – O –

Offset. A combination of elbows or bends in a line of piping that brings one section of the pipe out of line but into a line parallel with the other section.

Oxidation Reduction Potential (ORP). A standard method of measuring a disinfectant's ability to oxidize and sanitize water. It is a qualitative measure of sanitizer-oxidizer effectiveness. ORP takes into consideration all water constituents, including pH, TDS, cyanurates, and organic contaminants. It is a true, qualitative measure of water cleanliness. ORP is sometimes referred to as Redox.

Oxidizer. Chemicals or products used to destroy and remove organic and inorganic contaminants in water.

Ozone. Activated oxygen (O₃). A gaseous disinfectant-oxidant (generated on-site by ultraviolet or corona discharge methods) used in combination with a disinfectant that produces a residual in the water.

218.0 – P –

PE. Polyethylene.

PE-AL-PE. Polyethylene-aluminum-polyethylene.

PE-RT. Polyethylene of raised temperature.

Perimeter Overflow System. A continuous channel formed into the sidewall entirely around the perimeter of the pool, unless interrupted by steps, into which surface pool water is continuously drawn during normal operation to provide a skimming action.

Person. A natural person, his heirs, executor, administrators, or assigns and shall also include a firm, corporation, municipal or quasi-municipal corporation, or governmental agency. Singular includes plural; male includes female.

PEX. Cross-linked polyethylene.

PEX-AL-PEX. Cross-linked polyethylene-aluminum-cross-linked polyethylene.

pH. The log of the reciprocal of the hydrogen ion concentration of a solution, and a measure of the acidity or alkalinity of the water. It is determined by the concentration of hydrogen ions in a specific volume of water.

PHMB (Poly Hexamethylene Biguanide). A stable, odor-free, non-halogen sanitizer used in conjunction with a specially formulated and compatible clarifier, algacide and hydrogen peroxide oxidizer to treat water. The chlorine free liquid works by penetrating bacteria cell walls then bursting the cells from within.

Phosphates. Salt of phosphoric acid. Nutrients that help plants grow, and in pools, spas, or hot tubs increases algae growth. Introduced to pool, spa, or hot tub water by source water (from polyphosphates added by municipal drinking water systems to reduce pipe corrosion), fertilizers, dirt and

debris, plant matter, bather waste, and specialty chemicals used to inhibit calcium scale formation which contains phosphoric acid.

Pipe. A cylindrical conduit or conductor conforming to the particular dimensions commonly known as "pipe size."

Plumbing. The business, trade, or work having to do with the installation, removal, alteration, or repair of plumbing systems or parts thereof.

Plumbing Code. The Uniform Plumbing Code promulgated by the International Association of Plumbing and Mechanical Officials, as adopted by this jurisdiction.

Plumbing Official. See Authority Having Jurisdiction.

Plumbing System. Includes all potable water, building supply, and distribution pipes; all plumbing fixtures and traps; all drainage and vent pipes; and all building drains and building sewers, including their respective joints and connections, devices, receptors, and appurtenances within the property lines of the premises and shall include potable water piping, potable water treating or using equipment, liquid and fuel gas piping, and water heaters and vents for same.

Plumbing Vent. A pipe provided to ventilate a plumbing system, to prevent trap siphonage and backpressure, or to equalize the air pressure within the drainage system.

Plumbing Vent System. A pipe or pipes installed to provide a flow of air to or from a drainage system or to provide a circulation of air within such system to protect trap seals from siphonage and backpressure.

Pool. See Swimming Pool.

Pool Depths. The distance between the floor of the pool and the maximum operating water level.

Pool Heater. An appliance designed for heating nonpotable water stored at atmospheric pressure, such as water in swimming pools, spas, hot tubs and similar applications.

Pool Plumbing. Includes chemical, circulation, filter waste discharge piping, deck drainage, and water filling systems.

Potable Water. Water that is satisfactory for drinking, culinary, and domestic purposes and that meets the requirements of the Health Authority Having Jurisdiction.

PP. Polypropylene.

Precoat. The precoat or initial coating of filter aid on the septum of a diatomaceous earth filter.

Pressed Fitting. A mechanical connection for joining copper tubing that uses a crimping tool to affix the o-ring seal to copper or copper alloy fitting to the tubing. The tubing shall be inserted into the fitting, and the crimp shall be made using the tool recommended by the manufacturer.

Pressure. The normal force exerted by a homogeneous liquid or gas, per unit of area, on the wall of the container.

Pressure, Residual. The pressure available at the fixture or water outlet after allowance is made for pressure drop due to friction loss, head, meter, and other losses in the system during maximum demand periods.

Pressure, Static. The pressure existing without any flow.

Purging. The process of introducing outdoor air, and exhausting an equal volume of inside air, to reduce the effects on indoor air quality caused by chloramines and other air contaminants.

Push Fit Fitting. A mechanical fitting where the connection is assembled by pushing the tube or pipe into the fitting and is sealed with an o-ring.

PVC. Polyvinyl Chloride.

PVC Hose. Flexible polyvinyl chloride.

219.0 – Q –

No definitions.

220.0 – R –

Rapid Sand Filter. A sand-type filter designed for flows, not in excess of 5 gpm per square foot [204 (L/min)/m²].

Receptor. An approved plumbing fixture or device of such material, shape, and capacity as to adequately receive the discharge from indirect waste piping, so constructed and located as to be readily cleaned.

Recirculation System. The interconnected system traversed by the recirculated water from the pool until it is returned to the pool.

Registered Design Professional. An individual who is registered or licensed by the laws of the state to perform such design work in the jurisdiction.

Regulating Equipment. Includes valves and controls used in a plumbing system that is required to be accessible or readily accessible.

Rescue Tube. A piece of rescue equipment that is made of flexible foam covered with a vinyl skin that is red, yellow, or international orange in color. The tube measures 3 inches (76 mm) to 6 inches (152 mm) in thickness, and 40 inches (1016 mm) to 48 inches (1219 mm) in length. A polypropylene line or webbed material towline and nylon shoulder strap are attached to the tube at one end. On some tubes, brass or plastic fittings are attached to the end of the tube opposite the towline so that the tube can be secured around a victim or rescuer, or thrown like a ring buoy. A rescue tube can also be used to retrieve a submerged victim from the bottom of a pool.

Return Inlet. A fitting or fixture through which circulated or hydrojetted water enters the pool, spa, or hot tub.

Return Piping. That part of the piping between the filter and the pool, spa, or hot tub through which passes the filtered water.

Ring Buoy. A buoyant, donut-shaped piece of rescue equipment that is 18 inches (457 mm) to 36 inches (914 mm) in diameter. The equipment is white or international orange in color and constructed of foam or other approved material that will not rot or become waterlogged. A floating polypropylene line, $\frac{3}{8}$ of an inch (9.5 mm) to $\frac{1}{2}$ of an inch (12.7 mm) thick, and of a length not less than the maximum width of the pool shall be attached to the ring buoy. A ring buoy is only effective where thrown at a conscious, distressed victim who is

able to hold on to the ring while being pulled a short distance to safety.

Ryznar Stability Index. A formula used to determine carbonate equilibrium or water balance. The formula is $RSI = 2 \times \text{pH}_s - \text{pH}$ (where pH_s is saturation pH). Total dissolved solids, pH, calcium ion, bicarbonate, and water temperature are entered into the formula to calculate the scaling and corrosion potential of water.

221.0 – S –

Salinity. The dissolved salt content of pool, spa, or hot tub water.

Salt (Saline) Water. Those waters having a specific conductivity in excess of a solution containing 6000 parts per million (ppm) of sodium chloride.

SDR. An abbreviation for “standard dimensional ratio,” which is the specific ratio of the average specified outside diameter to the minimum wall thickness for outside controlled diameter plastic pipe.

Seam, Welded. See Joint, Welded.

Separation Tank. A device used to clarify filter rinse or wastewater (sometimes called a reclamation tank).

Septum. That part of the filter element consisting of cloth, wire screen, or other porous material on which the filter cake is deposited.

Sewage. Liquid waste containing animal or vegetable matter in suspension or solution and that may include liquids containing chemicals in solution.

Shall. Indicates a mandatory requirement.

Shepherd’s Crook. A blunt or rounded hook added to one end of an extension pole used to grasp a conscious or an unconscious victim floating on or below the surface of the water by wrapping around the victim’s upper body and using an arm over arm motion on the pole to pull the victim to safety.

Should. Indicates a recommendation or that which is advised but not required.

Skim Filter. A surface skimmer combined with a vacuum filter.

Slope. See Grade.

Solar Energy and Hydronics Code. For the purpose of this code, a reference to the Solar Energy and Hydronics Code shall mean the Uniform Solar Energy and Hydronics Code as promulgated by the International Association of Plumbing and Mechanical Officials (IAPMO).

Spa. A unit primarily designed for therapeutic use that is not drained, cleaned, or refilled for each individual. It shall be permitted to include but is not limited to, hydrojet circulation, hot water, cold water, mineral baths, air induction bubbles, or a combination thereof. Industry terminology for a spa includes but is not limited to, therapeutic pool, hydrotherapy pool, whirlpool, hot spa, etc.

Spa Pool. Pool, not under medical supervision that incorporates water jets, aeration system, or both used for hydro-massage.

Stackless Vents. A factory-supplied venting system that is an integral part of a listed pool heater intended for outdoor installations.

Standard. A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix, footnote, or fine print note and are not to be considered a part of the requirements of a standard.

Suction Outlet. An aperture or fitting through which the water under negative pressure is drawn from the pool, spa, or hot tub.

Suction Piping. That portion of the circulation piping located between the pool structure and the inlet side of the pump and that usually includes the following:

- (1) Main outlet piping
- (2) Skimmer piping
- (3) Vacuum piping
- (4) Surge tank piping

Suctioning Equipment. Rescue equipment that is used to create a partial vacuum and assists in the removal of secretions, mucous, foamy discharge, or regurgitated matter from the mouth, throat, or airway which is interfering with the ventilation of a victim.

Supplemental Oxygen Equipment. Rescue equipment that consists of a face mask, BVM (bag valve mask) resuscitator, oxygen reservoir bag, oxygen cylinder with pressure regulator, and flow meter. This equipment is used to provide mechanical ventilation to victims who are suffering from respiratory distress or respiratory arrest. Such equipment eliminates the need to perform mouth-to-mouth resuscitation.

Surface Skimmer. A device designed to continuously remove surface film, water and return it through the filter as part of the recirculation system, usually incorporating a self-adjusting weir, a collection tank and a means to prevent air lock of the pump (sometimes referred to as a “recirculating overflow,” or a “mechanical” or “automatic skimmer”).

Swimming Pool. A constructed or prefabricated pool used for swimming or bathing, exceeding 18 inches (457 mm) in depth.

Swimming Pool (Private). Constructed or fabricated pool that is used as a swimming pool in connection with a single-family residence and available only to the family of the householder and their private guests.

Swimming Pool (Public). A constructed or prefabricated pool other than a private swimming pool.

Swimming Pool Slide. A piece of equipment that is similar in construction to a playground slide that permits a user to slide from an elevated height to a swimming pool.

222.0 – T –

Therapy Pools. A pool of water that is specifically designed for physical therapy or rehabilitation purposes.

Total Alkalinity. The sum of all alkaline minerals in the water that is primarily in bicarbonate form, but also as sodium, calcium, magnesium, potassium carbonates, and hydroxides. It is a measure of the water’s ability to resist changes in pH.

Total Bromine. The quantitative sum of the free and combined bromine that is present in the water.

Total Chlorine. The quantitative sum of free and combined chlorine that is present in the water.

Total Dissolved Solids (TDS). A measure (by electrical conductivity) of the amount of soluble matter that is present in the water.

Total Hardness. The sum of calcium and magnesium hardness that is present in the water.

Trap. A fitting device so designed and constructed as to provide, where properly vented, a liquid seal that will prevent the back passage of air without materially affecting the flow of sewage or wastewater through it.

Trap Seal. The vertical distance between the crown weir and the top dip of the trap.

Crown Weir (Trap Weir). The lowest point in the cross-section of the horizontal waterway at the exit of the trap.

Top Dip (of trap). The highest point in the internal cross-section of the trap at the lowest part of the bend (inverted siphon). By contrast, the bottom dip is the lowest point in the internal cross-section.

Turbidity. A measure of the clarity of a clear liquid such as water. It is measured in Nephelometric Turbidity Units (NTUs).

Turbidity Meter. A device used to measure water clarity or turbidity.

Turnover Time. The time in hours and minutes required for the circulation system to filter and recirculate a volume of water equal to the aquatic venue volume.

223.0 – U –

Ultraviolet Light. The light that is located on the electromagnetic spectrum between visible light and X-rays. Ultraviolet light is emitted by the sun or created artificially by a light bulb and is used in pool, spa, or hot tub water as a disinfectant to inactivate pathogenic organisms and destroy chloramines. Also used as a method of producing ozone.

Underwater Ledge. A continuous step that is recessed or protrudes from a pool wall, and allows a swimmer to rest while standing without treading water. Also known as a toe ledge.

224.0 – V –

Vacuum. Pressure is less than that exerted by the atmosphere.

Vacuum Breaker. See Backflow Preventer.

Vacuum Piping. The pipe from the suction side of a pump connected to a vacuum fitting located at the pool and below the water level to which underwater cleaning equipment shall be permitted to be attached.

PRE-PRINT

CHAPTER 3 GENERAL REGULATIONS

301.0 General.

301.1 Applicability. This chapter shall govern general and piping material requirements for swimming pools, spas, and hot tubs.

301.2 Minimum Standards. Pipe, pipe fittings, traps, fixtures, material, and devices used in a swimming pool, spa, hot tub, or plumbing system shall be listed ~~and labeled~~ (third-party certified) by a listing agency (accredited conformity assessment body) ~~and shall comply as complying~~ with the approved applicable recognized standards referenced in this code, and shall be free from defects. Plastic pipe and the fittings used for plastic pipe, other than for gas, shall meet the requirements of NSF 14. Unless otherwise provided for in this code, materials, fixtures, or devices used or entering into the construction of a swimming pool, spa, or hot tub system, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.

301.2.1 Marking. Each length of pipe and each pipe fitting, trap, fixture, material, and device used in a swimming pool, spa, or hot tub system shall have cast, stamped, or indelibly marked on it any markings required by the applicable referenced standards and listing agency, and the manufacturer's mark or name, which shall readily identify the manufacturer to the end user of the product. Where required by the approved standard that applies, the product shall be marked with the weight and the quality of the product. Materials and devices used or entering into the construction of swimming pools, spas, hot tubs, or parts thereof, shall be marked and identified in a manner satisfactory to the Authority Having Jurisdiction. Such marking shall be done by the manufacturer. Field markings shall not be acceptable.

Exception: Markings shall not be required on nipples created from cutting and threading of approved pipe.

301.2.2 Standards. Standards listed or referred to in this chapter or other chapters cover materials that will conform to the requirements of this code, where used in accordance with the limitations imposed in this or other chapters thereof and their listing. Where a standard covers materials of various grades, weights, quality, or configurations, the portion of the listed standard that is applicable shall be used. Design and materials for special conditions or materials not provided for herein shall be permitted to be used by special permission of the Authority Having Jurisdiction after the Authority Having Jurisdiction has been satisfied as to their adequacy. A list of swimming pool, spa and hot tub standards that appear in specific sections of this code is referenced in Table 1001.1. Standards referenced in Table 1001.1 shall be applied as indicated in the applicable referenced section. A list of additional standards, publications, practices and guides that are not referenced in specific sections of this code appear in Table 1001.2. The documents indicated in Table 1001.2 shall be permitted in accordance

with Section 301.3.

301.2.3 Equipment. A swimming pool, spa, or hot tub shall be equipped complete with approved mechanical equipment consisting of filter, pump, piping valves, and component parts.

Exception: Pools with a supply of fresh water equivalent to the volume of the pool in the specified turnover time shall be allowed.

301.2.4 Fuel Gas Piping. Fuel gas piping installations shall comply with the mechanical code.

301.2.5 Existing Buildings. In existing buildings or premises in which swimming pool, spa, or hot tub installations are to be altered, repaired, or renovated, the Authority Having Jurisdiction has discretionary powers to permit deviation from the provisions of this code, provided that such a proposal to deviate is first submitted for proper determination in order that health and safety requirements, as they pertain to swimming pools, spas or hot tubs, shall be observed.

301.3 Alternate Materials and Methods of Construction Equivalency. Nothing in this code is intended to prevent the use of systems, methods, devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this code. Technical documentation shall be submitted to the Authority Having Jurisdiction to demonstrate equivalency. The Authority Having Jurisdiction shall have the authority to approve or disapprove the system, method, or device for the intended purpose.

However, the exercise of this discretionary approval by the Authority Having Jurisdiction shall have no effect beyond the jurisdictional boundaries of said Authority Having Jurisdiction. An alternate material or method of construction so approved shall not be considered as in accordance with the requirements, intent, or both of this code for a purpose other than that granted by the Authority Having Jurisdiction where the submitted data does not prove equivalency.

301.3.1 Testing. The Authority Having Jurisdiction shall have the authority to require tests, as proof of equivalency.

301.3.1.1 Tests. Tests shall be made in accordance with approved or applicable standards, by an approved testing agency at the expense of the applicant. In the absence of such standards, the Authority Having Jurisdiction shall have the authority to specify the test procedure.

301.3.1.2 Request by Authority Having Jurisdiction. The Authority Having Jurisdiction shall have the authority to require tests to be made or repeated where, at any time, there is a reason to believe that material or device no longer is in accordance with the requirements on which its approval was based.

301.4 Swimming Pools in Flood Hazard Areas. Where located in flood hazard areas, aboveground swimming pools, inground swimming pools that involve the placement of earthen fill, and onground swimming pools shall comply with this section.

301.4.1 Controls, Equipment, Appurtenances, and Associated Components. Where swimming pools are located in flood hazard areas:

- (1) Pool controls shall be inside an elevated building or, where located in a non-elevated accessory structure, the controls shall be elevated to or above the design flood elevation.
- (2) Pool equipment, appurtenances, and other associated components shall either:
 - (a) Be elevated and securely anchored to a platform; the height of the platform shall either be at or above the design flood elevation or as high as practical, given limitations on the owner's access.
 - (b) Where not elevated, be anchored to prevent flotation and protected to prevent water from entering or accumulating within the components during flooding.
- (3) Tanks shall either be elevated or anchored to resist anticipated flood loads during conditions of the design flood.

301.4.2 Swimming Pools Located in Floodways. Where swimming pools are located in floodways designated on flood hazard maps, documentation shall be submitted to the Authority Having Jurisdiction that demonstrates that the proposed swimming pool will not increase the design flood elevation at any point within the jurisdiction.

301.4.3 Swimming Pools Located where Floodways have not been Designated. Where swimming pools are located in flood hazard areas where design flood elevations are specified, but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed swimming pool will not increase the design flood elevation more than 1 foot (305 mm) at a point within the jurisdiction.

301.4.4 Swimming Pools Located in Coastal High Hazard Areas. Where pools are located in coastal high hazard areas, swimming pools shall:

- (1) Be elevated so that the lowest horizontal structural member is elevated to or above the design flood elevation.
- (2) Be designed and constructed to break away during design flood conditions without producing debris capable of causing significant damage to any structure.
- (3) Be sited to remain in the ground during design flood conditions without obstructing flow that results in damage to adjacent structures.

301.5 Alternative Engineered Design. An alternative

engineered design shall comply with the intent of the provisions of this code and shall provide an equivalent level of quality, strength, effectiveness, fire resistance, durability, and safety. Material, equipment, or components shall be designed and installed in accordance with the manufacturer's installation instructions.

301.5.1 Permit Application. The registered design professional shall indicate on the design documents that the swimming pool, spa, hot tub, or parts thereof, is an alternative engineered design so that it is noted on the construction permit application. The permit and permanent permit records shall indicate that an alternative engineered design was part of the approved installation.

301.5.2 Technical Data. The registered design professional shall submit sufficient technical data to substantiate the proposed alternative engineered design and to prove that the performance meets the intent of this code.

301.5.3 Design Documents. The registered design professional shall provide two complete sets of signed and sealed design documents for the alternative engineered design for submittal to the Authority Having Jurisdiction. The design documents shall include floor plans and a riser diagram of the work. Where appropriate, the design documents shall indicate the direction of flow, pipe sizes, grade of horizontal piping, loading, and location of appliances.

301.5.4 Design Approval. An approval of an alternative engineered design shall be at the discretion of the Authority Having Jurisdiction. The exercise of this discretionary approval by the Authority Having Jurisdiction shall have no effect beyond the jurisdictional boundaries of said Authority Having Jurisdiction. An alternative engineered design so approved shall not be considered as in accordance with the requirements, intent, or both of this code for a purpose other than that granted by the Authority Having Jurisdiction.

301.5.5 Design Review. The Authority Having Jurisdiction shall have the authority to require testing of the alternative engineered design in accordance with Section 301.3.1, including the authority to require an independent review of the design documents by a registered design professional selected by the Authority Having Jurisdiction and at the expense of the applicant.

301.5.6 Inspection and Testing. The alternative engineered design shall be tested and inspected in accordance with the submitted testing and inspection plan and the requirements of this code.

302.0 Workmanship and Installation Practices.

302.1 Non-Threaded Plastic Piping. Listed plastic circulating piping and fittings for non-threaded applications between mechanical equipment and pools, spas, or hot tubs shall be not less than Schedule 40.

302.2 Threaded Plastic Piping. Listed plastic threaded circulating pipe between mechanical equipment and pools, spas, and hot tubs shall be not less than Schedule 80. Thread-

ing of plastic pipe in the field is prohibited. Threads shall be molded.

302.3 Bends in Plastic Piping. Plastic piping shall be permitted to be cold bent for sizes 2 inches (50 mm) or less with a radius of not less than 5 feet (1524 mm) without the application of heat. Bends of small radii and exceeding 2 inches (50 mm) shall be manufactured with the use of thermostatically controlled equipment and shall be listed.

302.4 Bends in Copper or Copper Alloy Tubing. Changes in direction in copper or copper alloy tubing shall be permitted to be made with bends, provided that such bends are made with bending equipment that does not deform or create a loss in the cross-sectional area of the tubing.

302.5 Protection of Circulating Piping. Circulating piping shall be protected from excessive high water temperature.

302.6 Burred Ends. Burred ends of pipe and tubing shall be reamed to the full bore of the pipe or tube, and chips shall be removed.

302.7 Increases and Reducers. Where different sizes of pipes or pipes and fittings are to be connected, the proper size increasers or reducers or reducing fittings shall be used between the two sizes. Copper alloy or cast-iron body cleanouts shall not be used as a reducer or adapter from cast-iron drainage pipe to iron pipe size (IPS) pipe.

303.0 Prohibited Fittings and Practices.

303.1 Drainage and Vent Piping. No drainage or vent piping shall be drilled and tapped for the purpose of making connections thereto, and no cast-iron soil pipe shall be threaded.

303.2 Dissimilar Metals. Except for necessary valves, where intermembering or mixing of dissimilar metals occurs, the point of connection shall be confined to exposed or accessible locations.

303.3 Direction of Flow. Valves, pipes, and fittings shall be installed in correct relationship to the direction of flow.

304.0 Protection of Piping, Materials, and Structures.

304.1 Installation. Piping in connection with a swimming pool, spa or hot tub system shall be so installed that piping or connections will not be subject to undue strains or stresses, and provisions shall be made for expansion, contraction, and structural settlement. No piping shall be directly embedded in concrete or masonry. No structural member shall be seriously weakened or impaired by cutting, notching, or otherwise, as defined in the building code.

304.2 Building Sewer and Drainage Piping. No building sewer or other drainage piping or part thereof, constructed of materials other than those approved for use under or within a building, shall be installed under or within 2 feet (610 mm) of a building or structure, or less than 1 foot (305 mm) below the surface of the ground.

304.3 Corrosion, Erosion, and Mechanical Damage. Piping subject to corrosion, erosion, or mechanical damage shall be protected in an approved manner.

304.4 Protectively Coated Pipe. Protectively coated pipe or tubing shall be inspected and tested, and a visible void,

damage, or imperfection to the pipe coating shall be repaired in an approved manner.

304.5 Freezing Protection. No water, soil, or waste pipe shall be installed or permitted outside of a building, in attics or crawl spaces, or in an exterior wall unless, where necessary, adequate provision is made to protect such pipe from freezing.

304.6 Fire-Resistant Construction. Piping penetrations of fire-resistance-rated walls, partitions, floors, floor/ceiling assemblies, roof/ceiling assemblies, or shaft enclosures shall be protected in accordance with the requirements of the building code.

304.7 Waterproofing of Openings. Joints at the roof around pipes, ducts, or other appurtenances shall be made watertight by the use of lead, copper, galvanized iron, or other approved flashings or flashing material. Exterior wall openings shall be made watertight. Counterflashing shall not restrict the required internal cross-sectional area of the vent.

304.8 Steel Nail Plates. Plastic and copper or copper alloy piping penetrating framing members to within 1 inch (25.4 mm) of the exposed framing shall be protected by steel nail plates not less than 18 gauge (0.0478 inches) (1.21 mm) in thickness. The steel nail plate shall extend along the framing member not less than 1½ inches (38 mm) beyond the outside diameter of the pipe or tubing.

304.9 Sleeves. Sleeves shall be provided to protect piping through concrete, masonry walls, and concrete floors.

Exception: Sleeves shall not be required where openings are drilled or bored.

304.9.1 Building Loads. Piping through concrete or masonry walls shall not be subject to a load from building construction.

304.9.2 Exterior Walls. In exterior walls, an annular space between sleeves and pipes shall be sealed and made watertight, as approved by the Authority Having Jurisdiction. A penetration through fire-resistive construction shall be in accordance with Section 304.6.

304.9.3 Firewalls. A pipe sleeve through a firewall shall have the space around the pipe completely sealed with an approved fire-resistive material in accordance with other codes.

304.10 Structural Members. A structural member weakened or impaired by cutting, notching, or otherwise shall be reinforced, repaired, or replaced so as to be left in a safe structural condition in accordance with the requirements of the building code.

304.11 Rodentproofing. Strainer plates on drain inlets shall be designed and installed so that no opening exceeds ½ inch (12.7 mm) in the least dimension.

304.11.1 Metal Collars. In or on buildings where openings have been made in walls, floors, or ceilings for the passage of pipes, such openings shall be closed and protected by the installation of approved metal collars securely fastened to the adjoining structure.

304.12 Exposed PVC Piping. PVC piping shall not be exposed to direct sunlight.

Exceptions:

- (1) PVC piping exposed to sunlight that is protected by water-based synthetic latex paints.
- (2) PVC piping wrapped with not less than 0.04 inch (1.02 mm) thick tape or otherwise protected from UV degradation.

305.0 Trenching, Excavation, and Backfill.

305.1 Trenches. Trenches deeper than the footing of a building or structure, and paralleling the same, shall be located not less than 45 degrees (0.79 rad) from the bottom exterior edge of the footing, or as approved in accordance with Section 301.2.

305.2 Tunneling and Driving. Tunneling and driving shall be permitted to be done in yards, courts, or driveways of a building site. Where an approved depth is available to permit, tunnels shall be permitted to be used between open-cut trenches. Tunnels shall have a clear height of 2 feet (610 mm) above the pipe and shall be limited in length to one-half the depth of the trench, with a maximum length of 8 feet (2438 mm). Where pipes are driven, the drive pipe shall be not less than one size larger than the pipe to be laid.

305.3 Open Trenches. Excavations required to be made for the installation of a swimming pool, spa, hot tub, or related piping system or part thereof, shall be open trench work and shall be kept open until the piping has been inspected, tested, and accepted.

305.4 Excavations. Excavations shall be completely backfilled as soon after inspection as practicable. Precaution shall be taken to ensure compactness of backfill around piping without damage to such piping. Trenches shall be backfilled in thin layers to 12 inches (305 mm) above the top of the piping with clean earth, which shall not contain stones, boulders, cinderfill, frozen earth, construction debris, or other materials that will damage or break the piping or cause corrosive action. Mechanical devices such as bulldozers, graders, etc., shall be permitted to be then used to complete backfill to grade. Fill shall be properly compacted. Precautions shall be taken to ensure permanent stability for pipe laid in filled or made ground.

306.0 Energy Consumption for Pools, Spas, and Hot Tubs.

306.1 General. Energy consumption for pools, spas and hot tubs shall be in accordance with Section 306.1.1 through Section 306.1.3.

306.1.1 Heaters. Pool, spa, and hot tub heaters shall be equipped with a readily accessible on and off switch to allow shutting off the heaters without adjusting the thermostat setting. Gas-fired heaters shall not be equipped with continuously burning pilot lights.

306.1.2 Covers. Heated pools, including spas and hot tubs, shall be equipped with a vapor retardant pool cover on or at the water surface. Pools heated to more than 90°F (32°C) shall have a pool cover with an insulation value of not less than R-12.

Exception: Pools deriving over 60 percent of the energy for heating from site-recovered energy or solar energy.

306.1.3 Time Switches. Time switches shall be installed on swimming pool, spa, and hot tub heaters and pumps.

Exceptions:

- (1) Where public health standards require 24-hour pump operation.
- (2) Where pumps are required to operate solar and waste heat recovery pool heating systems.

307.0 Water Supply and Circulating System Pipe and Fitting Materials.

307.1 Materials. Pipe, tube, fittings, solvent cement, thread sealants, solders, and flux used in potable water systems intended to supply drinking water shall be in accordance with the requirements of NSF 61. Where fittings and valves are made from copper alloys containing more than 15 percent zinc by weight and are used in plastic piping systems, they shall be resistant to dezincification and stress corrosion cracking in accordance with NSF 14.

Materials used in the water supply or circulating system, except valves and similar devices, shall be of a like material, except where otherwise approved by the Authority Having Jurisdiction.

Materials for building water piping, building supply piping, and water used in circulating systems for swimming pools, spas, or hot tubs shall be in accordance with the applicable standards referenced in Table 307.1.

307.2 Copper or Copper Alloy Tube. Copper or copper alloy tube for water piping shall have a weight of not less than Type L.

Exception: Type M copper or copper alloy tubing shall be permitted to be used for water piping where piping is above-ground in, or on, a building or underground outside of structures.

307.3 Hard-Drawn Copper or Copper Alloy Tubing. Hard-drawn copper or copper alloy tubing for water supply and distribution in addition to the required incised marking shall be marked in accordance with ASTM B88. The colors shall be Type K, green; Type L, blue; and Type M, red.

307.4 Flexible Connectors. Flexible water connectors shall be installed in readily accessible locations, and where under continuous pressure shall be in accordance with ASME A112.18.6/CSA B125.6.

307.5 Cast-Iron Fittings. Cast-iron fittings up to and including 2 inches (50 mm) in size, where used in connection with potable water piping, shall be galvanized.

307.6 Malleable Iron. Malleable iron water fittings shall be galvanized.

307.7 Previously Used Piping and Tubing. Piping and tubing that has previously been used for a purpose other than for potable water systems shall not be used.

307.8 Plastic Materials. Approved plastic materials shall

be permitted to be used in water service piping, provided that where metal piping is used for electrical grounding purposes, replacement piping, therefore, shall be of like materials.

Exception: Where a grounding system acceptable to the Authority Having Jurisdiction is installed, inspected, and approved, metallic pipe shall be permitted to be replaced with nonmetallic pipe.

3078.1 Tracer Wire. Plastic materials for water service piping outside underground shall have a blue insulated copper tracer wire, or other approved conductor installed adjacent to the piping. Access shall be provided to the tracer wire, or the tracer wire shall terminate aboveground at each end of the nonmetallic piping. The tracer wire size shall be not less than 18 AWG, and the insulation type shall be approved for direct burial.

3079 Lead Content. The maximum allowable lead content in pipes, pipe fittings, plumbing fittings and fixtures intended to convey or dispense water for human consumption shall be not more than a weighted average of 0.25 percent with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings,

and fixtures. For solder and flux, the lead content shall be not more than 0.2 percent where used in piping systems that convey or dispense water for human consumption.

Exceptions:

- (1) Pipes, pipe fittings, plumbing fittings, fixtures, or back-flow preventers used for nonpotable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not used for human consumption.
- (2) Flush valves, fill valves, flushometer valves, tub fillers, shower valves, service saddles, or water distribution main gate valves that are 2 inches (50 mm) in diameter or larger.

3079.1 Lead Content of Water Supply Pipe and Fittings. Pipes, pipe fittings, valves, and faucets utilized in the water supply system for non-drinking water applications shall have a maximum of 8 percent lead content.

3079.2 Structures and Equipment. Structures,

**TABLE 307.1
MATERIALS FOR BUILDING SUPPLY, WATER DISTRIBUTION, AND CIRCULATION SYSTEM PIPING AND FITTINGS**

MATERIAL	BUILDING SUPPLY PIPE AND FITTINGS	WATER DISTRIBUTION PIPE AND FITTINGS	REFERENCED STANDARD(S) PIPE	REFERENCED STANDARD(S) FITTINGS
Copper and Copper Alloys	X	X	ASTM B42, ASTM B75, ASTM B88, ASTM B251, ASTM B302, ASTM B447	ASME B16.15, ASME B16.18, ASME B16.22, ASME B16.26, ASME B16.51
CPVC	X	X	ASTM D2846, ASTM F441, ASTM F442, CSA B137.6	ASTM D2846, ASTM F437, ASTM F438, ASTM F439, ASTM F1970, CSA B137.6
CPVC-AL-CPVC	X	X	ASTM F2855	ASTM D2846
Ductile-Iron	X	X	AWWA C151	ASME B16.4, AWWA C110, AWWA C153
Galvanized Steel	X	X	ASTM A53	—
Malleable Iron	X	X	—	ASME B16.3
PE	X*	—	ASTM D2239, ASTM D2737, ASTM D3035, AWWA C901, CSA B137.1	ASTM D2609, ASTM D2683, ASTM D3261, ASTM F1055, CSA B137.1
PE-AL-PE	X	X	ASTM F1282, CSA B137.9	ASTM F1282, ASTM F1974, CSA B137.9
PE-RT	X	X	ASTM F2769	ASTM F1807, ASTM F2098, ASTM F2159, ASTM F2735, ASTM F2769
PEX	X	X	ASTM F876, ASTM F877, CSA B137.5, AWWA C904*	ASSE 1061, ASTM F877, ASTM F1807, ASTM F1960, ASTM F1961, ASTM F2080, ASTM F2159, ASTM F2735, CSA B137.5
PEX-AL-PEX	X	X	ASTM F1281, ASTM F2262, CSA B137.10	ASTM F1281, ASTM F1974, ASTM F2434, CSA B137.10
PP	X	X	ASTM F2389, CSA B137.11	ASTM F2389, CSA B137.11
PVC	X*	—	ASTM D1785, ASTM D2241, AWWA C900	ASTM D2464, ASTM D2466, ASTM D2467, ASTM F1970
Stainless Steel	X	X	ASTM A269, ASTM A312	—

* For building supply or cold-water applications.

equipment, or both that are immersed in water that are capable of being consumed shall not have a lead content exceeding 8 percent.

307.10 Flexible PVC Hoses and Tubing. Flexible PVC hoses and tubing intended to be used for swimming pool, spa, or hot tub water circulation systems or pneumatic systems shall be in accordance with IAPMO Z1033.

307.11 Pool, Spa, and Hot Tub Fittings. Pool, spa or hot tub fittings shall be of an approved-type design for the specific application.

308.0 Water Supply and Circulating System Pipe Joints and Connections.

308.1 Copper or Copper Alloy Pipe, Tubing, and Joints. Joining methods for copper or copper alloy pipe, tubing, and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.1.1 through Section 308.1.5.

308.1.1 Brazed Joints. Brazed joints between copper or copper alloy pipe or tubing and fittings shall be made with brazing alloys having a liquid temperature above 1000°F (538°C). The joint surfaces to be brazed shall be cleaned bright by either manual or mechanical means. Tubing shall be cut square and reamed to full inside diameter. Brazing flux shall be applied to the joint surfaces where required by manufacturer's recommendation. Brazing filler metal in accordance with AWS A5.8 shall be applied at the point where the pipe or tubing enters the socket of the fitting.

308.1.2 Flared Joints. Flared joints for soft copper or copper alloy water tubing shall be made with fittings that are in accordance with the applicable standards referenced in Table 307.1. Pipe or tubing shall be cut square using an appropriate tubing cutter. The tubing shall be reamed to full inside diameter, resized to round, and expanded with a proper flaring tool.

308.1.3 Mechanical Joints. Mechanical joints shall include, but are not limited to, compression, flanged, grooved, pressed, and push fit fittings.

308.1.3.1 Mechanically Formed Tee Fittings. Mechanically formed tee fittings shall have extracted collars that shall be formed in a continuous operation consisting of drilling a pilot hole and drawing out the pipe or tube surface to form a collar having a height not less than three times the thickness of the branch tube wall. The branch pipe or tube shall be notched to conform to the inner curve of the run pipe or tube and shall have two dimple depth stops to ensure that penetration of the branch pipe or tube into the collar is of a depth for brazing and that the branch pipe or tube does not obstruct the flow in the main line pipe or tube. Dimple depth stops shall be in line with the run of the pipe or tube. The second dimple shall be ¼ of an inch (6.4 mm) above the first and shall serve as a visual point of inspection. Fittings and joints shall be made by brazing. Soldered joints shall not be permitted.

308.1.3.2 Pressed Fittings. Pressed fittings for copper or copper alloy pipe or tubing shall have an elastomeric o-ring that forms the joint. The pipe or tubing shall be fully inserted into the fitting, and the pipe or tubing marked at the shoulder of the fitting. Pipe or tubing shall be cut square, chamfered, and reamed to full inside diameter. The fitting alignment shall be checked against the mark on the pipe or tubing to ensure the pipe or tubing is inserted into the fitting. The joint shall be pressed using the tool recommended by the manufacturer.

308.1.3.3 Push Fit Fittings. Removable and non-removable push fit fittings for copper or copper alloy tubing or pipe that employ quick assembly push fit connectors shall be in accordance with ASSE 1061. Push fit fittings for copper or copper alloy pipe or tubing shall have an approved elastomeric o-ring that forms the joint. Pipe or tubing shall be cut square, chamfered, and reamed to full inside diameter. The tubing shall be fully inserted into the fitting, and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to ensure the tubing is inserted into the fitting and gripping mechanism has engaged on the pipe.

308.1.4 Soldered Joints. Soldered joints between copper or copper alloy pipe or tubing and fittings shall be made in accordance with ASTM B828 with the following sequence of joint preparation and operation as follows: measuring and cutting, reaming, cleaning, fluxing, assembly and support, heating, applying the solder, cooling and cleaning. Pipe or tubing shall be cut square and reamed to the full inside diameter including the removal of burrs on the outside of the pipe or tubing. Surfaces to be joined shall be cleaned bright by manual or mechanical means. Flux shall be applied to pipe or tubing and fittings and shall be in accordance with ASTM B813, and shall become noncorrosive and nontoxic after soldering. Insert pipe or tubing into the base of the fitting and remove excess flux. Pipe or tubing and fitting shall be supported to ensure a uniform capillary space around the joint. Heat shall be applied using an air or fuel torch with the flame perpendicular to the pipe or tubing using acetylene or an LP gas. Preheating shall depend on the size of the joint. The flame shall be moved to the fitting cup and alternate between the pipe or tubing and fitting. Solder in accordance with ASTM B32 shall be applied to the joint surfaces until capillary action draws the molten solder into the cup. Solder and fluxes with a lead content that exceeds 0.2 percent shall be prohibited in piping systems conveying potable water. Joint surfaces shall not be disturbed until cool and any remaining flux residue shall be cleaned.

308.1.5 Threaded Joints. Threaded joints for copper or copper alloy pipe shall be made with pipe threads in accordance with ASME B1.20.1. Thread sealant tape or compound shall be applied only to male threads, and such material shall be of approved types, insoluble in water, and nontoxic.

308.2 CPVC Plastic Pipe and Joints. CPVC plastic pipe and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.2.1 through Section 308.2.3.

308.2.1 Mechanical Joints. Removable and nonremovable push fit fittings that employ a quick assembly push fit connector shall be in accordance with ASSE 1061.

308.2.2 Solvent Cement Joints. Solvent cement joints for CPVC pipe and fittings shall be clean from dirt and moisture. Solvent cements in accordance with ASTM F493, requiring the use of a primer shall be orange in color. The primer shall be colored and be in accordance with ASTM F656. Listed solvent cement in accordance with ASTM F493 that does not require the use of primers, yellow or red in color, shall be permitted for pipe and fittings manufactured in accordance with ASTM D2846, ½ of an inch (15 mm) through 2 inches (50 mm) in diameter or ASTM F442, ½ of an inch (15 mm) through 3 inches (80 mm) in diameter. Apply primer where required inside the fitting and to the depth of the fitting on pipe. Apply liberal coat of cement to the outside surface of pipe to depth of fitting and inside of fitting. Place pipe inside fitting to forcefully bottom the pipe in the socket and hold together until joint is set.

308.2.3 Threaded Joints. Threads shall comply with ASME B1.20.1. A minimum of Schedule 80 shall be permitted to be threaded; however, the pressure rating shall be reduced by 50 percent. The use of molded fittings shall not result in a 50 percent reduction in the pressure rating of the pipe provided that the molded fittings shall be fabricated so that the wall thickness of the material is maintained at the threads. Thread sealant compound that is compatible with the pipe and fitting, insoluble in water, and nontoxic shall be applied to male threads. Caution shall be used during assembly to prevent over tightening of the CPVC components once the thread sealant has been applied. Female CPVC threaded fittings shall be used with plastic male threads only.

308.3 CPVC/AL/CPVC Plastic Pipe and Joints. Chlorinated polyvinyl chloride/aluminum/chlorinated polyvinyl chloride (CPVC/AL/CPVC) plastic pipe and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.3.1.

308.3.1 Solvent Cement Joints. Solvent cement joints for CPVC/AL/CPVC pipe and fittings shall be clean from dirt and moisture. Solvent cements in accordance with ASTM F493, requiring the use of a primer shall be orange in color. The primer shall be colored and be in accordance with ASTM F656. Listed solvent cement in accordance with ASTM F493 that does not require the use of primers, yellow in color, shall be permitted to join pipe manufactured in accordance with ASTM F2855 and fittings manufactured in accordance with ASTM D2846, ½ of an inch (15 mm) through 2 inches (50 mm) in diameter. Apply primer where

required inside the fitting and to the depth of the fitting on pipe. Apply liberal coat of cement to the outside surface of pipe to depth of fitting and inside of fitting. Place pipe inside fitting to forcefully bottom the pipe in the socket and hold together until joint is set.

308.4 Ductile Iron Pipe and Joints. Ductile iron pipe and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.4.1 or Section 308.4.2.

308.4.1 Mechanical Joints. Mechanical joints for ductile iron pipe and fittings shall consist of a bell that is cast integrally with the pipe or fitting and provided with an exterior flange having bolt holes and a socket with annular recesses for the sealing gasket and the plain end of the pipe or fitting. The elastomeric gasket shall comply with AWWA C111. Lubricant recommended for potable water application by the pipe manufacturer shall be applied to the gasket and plain end of the pipe.

308.4.2 Push-On Joints. Push-on joints for ductile iron pipe and fittings shall consist of a single elastomeric gasket that shall be assembled by positioning the elastomeric gasket in an annular recess in the pipe or fitting socket and forcing the plain end of the pipe or fitting into the socket. The plain end shall compress the elastomeric gasket to form a positive seal and shall be designed so that the elastomeric gasket shall be locked in place against displacement. The elastomeric gasket shall comply with AWWA C111. Lubricant recommended for potable water application by the pipe manufacturer shall be applied to the gasket and plain end of the pipe.

308.5 Galvanized Steel Pipe and Joints. Galvanized steel pipe and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.5.1 or Section 308.5.2.

308.5.1 Mechanical Joints. Mechanical joints shall be made with an approved and listed elastomeric gasket.

308.5.2 Threaded Joints. Threaded joints shall be made with pipe threads that are in accordance with ASME B1.20.1. Thread sealant tape or compound shall be applied only to male threads, and such material shall be of approved types, insoluble in water, and nontoxic.

308.6 PE Plastic Pipe/Tubing and Joints. PE plastic pipe or tubing and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.6.1 or Section 308.6.2.

308.6.1 Heat-Fusion Joints. Heat-fusion joints between PE pipe or tubing and fittings shall be assembled in accordance with Section 308.6.1.1 through Section 308.6.1.3 using butt, socket, and electro-fusion heat methods.

308.6.1.1 Butt-Fusion Joints. Butt-fusion joints shall be installed in accordance with ASTM F2620 and shall be made by heating the squared ends of two pipes, pipe and fitting, or two fittings by holding ends against a heated element. The heated element shall be removed where the proper melt is obtained and joined ends shall be placed together

with applied force.

308.6.1.2 Electro-Fusion Joints. Electro-fusion joints shall be heated internally by a conductor at the interface of the joint. Align and restrain fitting to pipe to prevent movement and apply electric current to the fitting. Turn off the current when the proper time has elapsed to heat the joint. The joint shall fuse together and remain undisturbed until cool.

308.6.1.3 Socket-Fusion Joints. Socket-fusion joints shall be installed in accordance with ASTM F2620 and shall be made by simultaneously heating the outside surface of a pipe end and the inside of a fitting socket. Where the proper melt is obtained, the pipe and fitting shall be joined by inserting one into the other with applied force. The joint shall fuse together and remain undisturbed until cool.

308.6.2 Mechanical Joints. Mechanical joints between PE pipe or tubing and fittings shall include insert and mechanical compression fittings that provide a pressure seal resistance to pullout. Joints for insert fittings shall be made by cutting the pipe square, using a cutter designed for plastic piping, and removal of sharp edges. Two stainless steel clamps shall be placed over the end of the pipe. Fittings shall be checked for proper size based on the diameter of the pipe. The end of pipe shall be placed over the barbed insert fitting, making contact with the fitting shoulder. Clamps shall be positioned equal to 180 degrees (3.14 rad) apart and shall be tightened to provide a leak tight joint. Compression type couplings and fittings shall be permitted for use in joining PE piping and tubing. Stiffeners that extend beyond the clamp or nut shall be prohibited. Bends shall be not less than 30 pipe diameters, or the coil radius where bending with the coil. Bends shall not be permitted closer than 10 pipe diameters of any fitting or valve. Mechanical joints shall be designed for their intended use.

308.7 PE-AL-PE Plastic Pipe/Tubing and Joints. PE-AL-PE plastic pipe or tubing and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.7.1 and Section 308.7.1.1.

308.7.1 Mechanical Joints. Mechanical joints for PE-AL-PE pipe or tubing and fittings shall be either of the metal insert fittings with a split ring and compression nut or metal insert fittings with copper crimp rings. Metal insert fittings shall comply with ASTM F1974. Crimp insert fittings shall be joined to the pipe by placing the copper crimp ring around the outer circumference of the pipe, forcing the pipe material into the space formed by the ribs on the fitting until the pipe contacts the shoulder of the fitting. The crimp ring shall then be positioned on the pipe so the edge of the crimp ring is $\frac{1}{8}$ of an inch (3.2 mm) to $\frac{1}{4}$ of an inch (6.4 mm) from the end of the pipe. The jaws of the crimping tool shall be centered over the crimp ring and tool perpendicular to the barb. The jaws shall be closed around the crimp ring and shall not be crimped more than once.

308.7.1.1 Compression Joints. Compression joints for PE-AL-PE pipe or tubing and fittings shall be joined through the compression of a split ring, by a compression nut around the circumference of the pipe. The compression nut and split ring shall be placed around the pipe. The ribbed end of the fitting shall be inserted onto the pipe until the pipe contacts the shoulder of the fitting. Position and compress the split ring by tightening the compression nut onto the insert fitting.

308.8 PE-RT. Polyethylene of raised temperature (PE-RT) tubing shall be marked with the appropriate standard designation(s) listed in Table 307.1 for which the tubing has been approved. PE-RT tubing shall be installed in accordance with the manufacturer's installation instructions.

308.8.1 Fittings. Metal insert fittings, metal compression fittings, and plastic fittings shall be manufactured to and marked in accordance with the standards for fittings in Table 307.1.

308.9 PEX Plastic Tubing and Joints. PEX plastic tubing and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.9.1 and Section 308.9.2.

308.9.1 Fittings. Fittings for PEX tubing shall comply with the applicable standards referenced in Table 307.1. PEX tubing in accordance with ASTM F876 shall be marked with the applicable standard designation for the fittings specified by the tubing manufacturer for use with the tubing.

308.9.2 Mechanical Joints. Mechanical joints shall be installed in accordance with the manufacturer's installation instructions.

308.10 PEX-AL-PEX Plastic Tubing and Joints. PEX-AL-PEX plastic pipe or tubing and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.10.1 and Section 308.10.1.1.

308.10.1 Mechanical Joints. Mechanical joints between PEX-AL-PEX tubing and fittings shall include mechanical and compression type fittings and insert fittings with a crimping ring. Insert fittings utilizing a crimping ring shall be in accordance with ASTM F1974 or ASTM F2434. Crimp joints for crimp insert fittings shall be joined to PEX-AL-PEX pipe by the compression of a crimp ring around the outer circumference of the pipe, forcing the pipe material into annular spaces formed by ribs on the fitting.

308.10.1.1 Compression Joints. Compression joints shall include compression insert fittings and shall be joined to PEX-AL-PEX pipe through the compression of a split ring or compression nut around the outer circumference of the pipe, forcing the pipe material into the annular space formed by the ribs on the fitting.

308.11 Polypropylene (PP) Piping and Joints. PP pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.11.1 through Section 308.11.3.

308.11.1 Heat-Fusion Joints. Heat-fusion joints for polypropylene (PP) pipe and fitting joints shall be installed with socket-type heat-fused polypropylene fittings, fusion outlets, butt-fusion polypropylene fittings or pipe, or electro-fusion polypropylene fittings. Joint surfaces shall be clean and free from moisture. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM F2389 or CSA B137.11.

308.11.2 Mechanical and Compression Sleeve Joints. Mechanical and compression sleeve joints shall be installed in accordance with the manufacturer's installation instructions.

308.11.3 Threaded Joints. PP pipe shall not be threaded. PP transition fittings for connection to other piping materials shall only be threaded by use of copper alloy or stainless steel inserts molded into the fitting.

308.12 PVC Plastic Pipe and Joints. PVC plastic pipe and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.12.1 through Section 308.12.3.

308.12.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint. The mechanical joint shall include a pipe spigot that has a wall thickness to withstand without deformation or collapse; the compressive force exerted where the fitting is tightened. The push-on joint shall have a minimum wall thickness of the bell at any point between the ring and the pipe barrel. The elastomeric gasket shall comply with ASTM D3139, and be of such size and shape as to provide a compressive force against the spigot and socket after assembly to provide a positive seal.

308.12.2 Solvent Cement Joints. Solvent cement joints for PVC pipe and fittings shall be clean from dirt and moisture. Pipe shall be cut square and pipe shall be deburred. Where surfaces to be joined are cleaned and free of dirt, moisture, oil, and other foreign material, apply primer purple in color in accordance with ASTM F656. Primer shall be applied until the surface of the pipe and fitting is softened. Solvent cements in accordance with ASTM D2564 shall be applied to all joint surfaces. Joints shall be made while both the inside socket surface and outside surface of pipe are wet with solvent cement. Hold joint in place and undisturbed for 1 minute after assembly.

308.12.3 Threaded Joints. Threads shall comply with ASME B1.20.1. A minimum of Schedule 80 shall be permitted to be threaded; however, the pressure rating shall be reduced by 50 percent. The use of molded fittings shall not result in a 50 percent reduction in the pressure rating of the pipe provided that the molded fittings shall be fabricated so that the wall thickness of the material is maintained at the threads. Thread sealant compound that is compatible with the pipe and fitting, insoluble in water, and nontoxic shall be applied to male threads. Caution shall be used during assembly to prevent over tightening of the PVC components once the thread sealant has been

applied. Female PVC threaded fittings shall be used with plastic male threads only.

308.13 Stainless Steel Pipe and Joints. Joining methods for stainless steel pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.13.1 or Section 308.13.2.

308.13.1 Mechanical Joints. Mechanical joints shall be designed for their intended use. Such joints shall include compression, flanged, grooved, pressed, and threaded.

308.13.2 Welded Joints. Welded joints shall be either fusion or resistance welded based on the selection of the base metal. Chemical composition of the filler metal shall comply with AWS A5.9 based on the alloy content of the piping material.

308.14 Dielectric Unions. Dielectric unions where installed at points of connection where there is a dissimilarity of metals shall be in accordance with ASSE 1079.

308.15 Joints Between Various Materials. Joints between various materials shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 308.15.1 through Section 308.15.3.

308.15.1 Copper or Copper Alloy Pipe or Tubing to Threaded Pipe Joints. Joints from copper or copper alloy pipe or tubing to threaded pipe shall be made by the use of copper alloy adapter, copper alloy nipple [minimum 6 inches (152 mm)], dielectric fitting, or dielectric union in accordance with ASSE 1079. The joint between the copper or copper alloy pipe or tubing and the fitting shall be a soldered, brazed, flared, or pressed joint and the connection between the threaded pipe and the fitting shall be made with a standard pipe size threaded joint.

308.15.2 Plastic Pipe to Other Materials. Where connecting plastic pipe to other types of piping, approved types of adapter or transition fittings designed for the specific transition intended shall be used.

308.15.3 Stainless Steel to Other Materials. Where connecting stainless steel pipe to other types of piping, mechanical joints of the compression type, dielectric fitting, or dielectric union in accordance with ASSE 1079 and designed for the specific transition intended shall be used.

309.0 Drainage Pipe and Fitting Materials.

309.1 Materials. Materials for drainage pipe and fittings shall comply with the applicable standards referenced in Table 309.1 except that:

- (1) No galvanized wrought-iron or galvanized steel pipe shall be used underground and shall be kept not less than 6 inches (152 mm) aboveground.
- (2) No vitrified clay pipe or fittings shall be used aboveground or where pressurized by a pump or ejector. They shall be kept not less than 12 inches (305 mm) belowground.
- (3) Copper or copper alloy tube for drainage and vent piping shall have a weight of not less than that of copper or copper alloy drainage tube type DWV.

**TABLE 309.1
MATERIALS FOR DRAIN, WASTE, VENT PIPE AND FITTINGS**

MATERIAL	UNDERGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS	ABOVEGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS	BUILDING SEWER PIPE AND FITTINGS	REFERENCED STANDARD(S) PIPE	REFERENCED STANDARD(S) FITTINGS
ABS (Schedule 40)	X	X	X	ASTM D2661, ASTM D2680*	ASTM D2661, ASTM D2680*
Cast-Iron	X	X	X	ASTM A74, ASTM A888, CISPI 301	ASME B16.12, ASTM A74, ASTM A888, CISPI 301
Co-Extruded ABS (Schedule 40)	X	X	X	ASTM F628	ASTM D2661, ASTM D2680*
Co-Extruded Composite (Schedule 40)	X	X	X	ASTM F1488	ASTM D2661, ASTM D2665, ASTM F794*, ASTM F1866
Co-Extruded PVC (Schedule 40)	X	X	X	ASTM F891	ASTM D2665, ASTM F794*, ASTM F1866
Copper and Copper Alloys (Type DWV)	X	X	X	ASTM B43, ASTM B75, ASTM B251, ASTM B302, ASTM B306	ASME B16.23, ASME B16.29
Galvanized Malleable Iron	—	X	—	—	ASME B16.3
Galvanized Steel	—	X	—	ASTM A53	—
PVC (Schedule 40)	X	X	X	ASTM D1785, ASTM D2665, ASTM F794*	ASTM D2665, ASTM F794*, ASTM F1866
Stainless Steel 304	—	X	—	ASME A112.3.1	ASME A112.3.1
Stainless Steel 316L	X	X	X	ASME A112.3.1	ASME A112.3.1
Vitrified Clay (Extra strength)	—	—	X	ASTM C700	ASTM C700

* For building sewer applications.

- (4) Stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6 inches (152 mm) aboveground.
- (5) Cast-iron soil pipe and fittings shall be marked with the country of origin and identification of the original manufacturer in addition to markings required by the referenced standards.

309.2 Fittings. Materials for drainage fittings shall be in accordance with the applicable standards referenced in Table 309.1 of the same diameter as the piping served, and such fittings shall be compatible with the type of pipe used.

309.2.1 Type. Fittings used for drainage shall be of the drainage type, have a smooth interior water-way, and be constructed so as to allow ¼ inch per foot (20.8 mm/m) grade.

309.3 Drainage Piping. Drainage piping to waste-serving gravity overflow gutter drains and deck drains shall be installed to provide a continuous grade to the point of discharge.

310.0 Drainage Pipe Joints and Connections.

310.1 ABS and ABS Co-Extruded Plastic Pipe and Joints. Joining methods for ABS plastic pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 310.1.1 through Section 310.1.3.

310.1.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint. The push-on joint shall include an elastomeric gasket in accordance with ASTM D3212 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

310.1.2 Solvent Cement Joints. Solvent cement joints for ABS pipe and fittings shall be clean from dirt and moisture. Pipe shall be cut square and shall be deburred. Where surfaces to be joined are cleaned and free of dirt, moisture, oil, and other foreign material, sol-

vent cement in accordance with ASTM D2235 shall be applied to all joint surfaces. Joints shall be made while both the inside socket surface and outside surface of pipe are wet with solvent cement. Hold joint in place and undisturbed for 1 minute after assembly.

310.1.3 Threaded Joints. Threads shall comply with ASME B1.20.1. A minimum of Schedule 80 shall be permitted to be threaded. Molded threads on adapter fittings for the transition to threaded joints shall be permitted. Thread sealant compound shall be applied to male threads, insoluble in water, and nontoxic. The joint between the pipe and transition fitting shall be of the solvent cement type. Caution shall be used during assembly to prevent over tightening of the ABS components once the thread sealant compound has been applied.

310.2 Cast-Iron Pipe and Joints. Joining methods for cast-iron pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 310.2.1 or Section 310.2.2.

310.2.1 Caulked Joints. Caulked joints shall be firmly packed with oakum or hemp and filled with molten lead to a depth of not less than 1 inch (25.4 mm) in one continuous pour. The lead shall be caulked thoroughly at the inside and outside edges of the joint. After caulking, the finished joint shall not exceed $\frac{1}{8}$ of an inch (3.2 mm) below the rim of the hub. No paint, varnish, or other coatings shall be permitted on the joining material until after the joint has been tested and approved.

310.2.2 Mechanical Joints and Compression Joints. Mechanical joints for cast iron pipe and fittings shall be of the elastomeric compression type or mechanical joint couplings. Compression type joints with an elastomeric gasket for cast-iron hub and spigot pipe shall comply with ASTM C564 and be tested in accordance with ASTM C1563. Hub and spigot shall be clean and free of dirt, mud, sand, and foreign materials. Cut pipe shall be free from sharp edges. Fold and insert gasket into the hub. Lubricate the joint following manufacturer's instructions. Insert spigot into hub until the spigot end of the pipe bottom out in the hub. Use the same procedure for the installation of fittings.

A mechanical joint shielded coupling type for hubless cast-iron pipe and fittings shall have a metallic shield in accordance with ASTM A1056, ASTM C1277, ASTM C1540, or CISPI 310. The elastomeric gasket shall comply with ASTM C564. Hubless cast-iron pipe and fittings shall be clean and free of dirt, mud, sand, and foreign materials. Cut pipe shall be free from sharp edges. Gasket shall be placed on the end of the pipe or fitting and the stainless steel shield and clamp assembly on the end of the other pipe or fitting. Pipe or fittings shall be seated against the center stop inside the elastomeric sleeve. Slide the stainless steel shield and clamp assembly into position centered over the gasket and tighten. Bands shall be tightened using an approved calibrated torque wrench specifically set by the manufacturer of the couplings.

310.3 Copper or Copper Alloy Pipe (DWV) and Joints. Joining methods for copper or copper alloy pipe and

fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 310.3.1 through Section 310.3.4.

310.3.1 Brazed Joints. Brazed joints between copper or copper alloy pipe and fittings shall be made with brazing alloys having a liquid temperature above 1000°F (538°C). The joint surfaces to be brazed shall be cleaned bright by either manual or mechanical means. Piping shall be cut square and reamed to full inside diameter. Brazing flux shall be applied to the joint surfaces where required by manufacturer's recommendation. Brazing filler metal in accordance with AWS A5.8 shall be applied at the point where the pipe or tubing enters the socket of the fitting.

310.3.2 Mechanical Joints. Mechanical joints in copper or copper alloy piping shall be made with a mechanical coupling with grooved end piping or approved joint designed for the specific application.

310.3.3 Soldered Joints. Soldered joints between copper or copper alloy pipe and fittings shall be made in accordance with ASTM B828 with the following sequence of joint preparation and operation as follows: measuring and cutting, reaming, cleaning, fluxing, assembly and support, heating, applying the solder, cooling, and cleaning. Pipe shall be cut square and reamed to the full inside diameter including the removal of burrs on the outside of the pipe. Surfaces to be joined shall be cleaned bright by manual or mechanical means. Flux shall be applied to pipe and fittings and shall be in accordance with ASTM B813, and shall become noncorrosive and nontoxic after soldering. Insert pipe into the base of the fitting and remove excess flux. Pipe and fitting shall be supported to ensure a uniform capillary space around the joint. Heat shall be applied using an air or fuel torch with the flame perpendicular to the pipe using acetylene or an LP gas. Preheating shall depend on the size of the joint. The flame shall be moved to the fitting cup and alternate between the pipe and fitting. Solder in accordance with ASTM B32 shall be applied to the joint surfaces until capillary action draws the molten solder into the cup. Joint surfaces shall not be disturbed until cool and any remaining flux residue shall be cleaned.

310.3.4 Threaded Joints. Threaded joints for copper or copper alloy pipe shall be made with pipe threads in accordance with ASME B1.20.1. Thread sealant tape or compound shall be applied only to male threads, and such material shall be approved types, insoluble in water, and nontoxic.

310.4 Galvanized Steel Pipe and Joints. Joining methods for galvanized steel pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 310.4.1 or Section 310.4.2.

310.4.1 Mechanical Joints. Mechanical joints shall be made with an elastomeric gasket.

310.4.2 Threaded Joints. Threaded joints shall be made with pipe threads in accordance with ASME B1.20.1. Thread sealant tape or compound shall be applied only to male threads, and such material shall be

of approved types, insoluble in water, and nontoxic.

310.5 PVC and PVC Co-Extruded Plastic Pipe and Joining Methods. Joining methods for PVC plastic pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 310.5.1 through Section 310.5.3.

310.5.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket in accordance with ASTM D3212 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

310.5.2 Solvent Cement Joints. Solvent cement joints for PVC pipe and fittings shall be clean from dirt and moisture. Pipe shall be cut square and pipe shall be deburred. Where surfaces to be joined are cleaned and free of dirt, moisture, oil, and other foreign material, apply primer purple in color in accordance with ASTM F656. Primer shall be applied until the surface of the pipe and fitting is softened. Solvent cements in accordance with ASTM D2564 shall be applied to all joint surfaces. Joints shall be made while both the inside socket surface and outside surface of pipe are wet with solvent cement. Hold joint in place and undisturbed for 1 minute after assembly.

310.5.3 Threaded Joints. Threads shall comply with ASME B1.20.1. A minimum of Schedule 80 shall be permitted to be threaded. Molded threads on adapter fittings for transition to threaded joints shall be permitted. Thread sealant compound that is compatible with the pipe and fitting, insoluble in water, and nontoxic shall be applied to male threads. The joint between the pipe and transition fitting shall be of the solvent cement type. Caution shall be used during assembly to prevent over tightening of the PVC components once the thread sealant has been applied. Female PVC threaded fittings shall be used with plastic male threads only.

310.6 Stainless Steel Pipe and Joints. Joining methods for stainless steel pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 310.6.1 or Section 310.6.2.

310.6.1 Mechanical Joints. Mechanical joints between stainless steel pipe and fittings shall be of the compression, grooved coupling, hydraulic pressed fittings, or flanged.

310.6.2 Welded Joints. Welded joints between stainless steel pipe and fittings shall comply with ASME A112.3.1 and shall be welded autogenously. Pipe shall be cleaned, free of scale and contaminating particles. Pipe shall be cut with a combination cutting and beveling tool that provides a square cut, and free of burrs. Mineral oil lubricant shall be used during the cutting and beveling process.

310.7 Vitrified Clay Pipe and Joints. Joining methods for vitrified clay pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 310.7.1.

310.7.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket in accordance with ASTM C425 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

310.8 Joints Between Various Materials. Joints between various materials shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 310.8.1 through Section 310.8.4. Mechanical couplings used to join different materials shall be in accordance with ASTM C1173 for belowground use, ASTM C1460 for aboveground use, or ASTM C1461 for aboveground and belowground use.

310.8.1 Copper or Copper Alloy Pipe to Cast-Iron Pipe. Joints from copper or copper alloy pipe or tubing to cast-iron pipe shall be made with a listed compression-type joint or copper alloy ferrule. The copper or copper alloy pipe or tubing shall be soldered or brazed to the ferrule, and the ferrule shall be joined to the cast-iron hub by a compression or caulked joint.

310.8.2 Copper or Copper Alloy Pipe to Threaded Pipe Joints. Joints from copper or copper alloy pipe or tubing to threaded pipe shall be made by the use of a listed copper alloy adapter or dielectric fitting. The joint between the copper or copper alloy pipe and the fitting shall be a soldered or brazed, and the connection between the threaded and the fittings shall be made with a standard pipe size threaded joint.

310.8.3 Plastic Pipe to other Materials. Where connecting plastic pipe to other types of plastic or other types of piping material; approved listed adapter or transition fittings and listed for the specific transition intended shall be used.

310.8.4 Stainless Steel Pipe to other Materials. Where connecting stainless steel pipe to other types of piping, listed mechanical joints of the compression type and listed for the specific transition intended shall be used.

311.0 Tests and Test Gauges.

311.1 Approval of Swimming Pool, Spa, and Hot Tub Piping. Pool, spa, or hot tub piping shall be inspected and approved before being covered or concealed. It shall be tested and proved tight under a static water or air pressure test of not less than 35 pounds-force per square inch (psi) (241 kPa) for 15 minutes and shall be approved by the Authority Having Jurisdiction.

Exception: Exposed equipment shall be tested as required by the Authority Having Jurisdiction, the manufacturer's instructions, or both.

311.2 Approval of Drainage and Vent Piping. Drainage and vent piping, except outside deck drains, shall be inspected and approved before being covered or concealed. They shall be tested by plugging all outlets, filling with water, and joints shall be tight.

311.3 Dial Gauges. Tests in accordance with this code,

which are performed utilizing dial gauges, shall be limited to gauges having the following pressure graduations or incrementations.

311.4 Pressure Tests (10 psi or less). Required pressure tests of 10 psi (69 kPa) or less shall be performed with gauges of 0.10 psi (0.69 kPa) incrementation or less.

311.5 Pressure Tests (greater than 10 psi to 100 psi). Required pressure tests exceeding 10 psi (69 kPa) but less than or equal to 100 psi (689 kPa) shall be performed with gauges of 1 psi (7 kPa) incrementation or less.

311.6 Pressure Tests (exceeding 100 psi). Required pressure tests exceeding 100 psi (689 kPa) shall be performed with gauges incremented for 2 percent or less of the required test pressure.

311.7 Pressure Range. Test gauges shall have a pressure range not exceeding twice the test pressure applied.

312.0 Final Inspection.

312.1 General. Swimming pool, spa, or hot tub installations shall be completed. The pool shall be completely filled with water and in operation before final inspection.

313.0 Accessibility.

313.1 General. An accessible route shall be provided to public swimming pools, spas, and hot tubs in accordance with the Building Code. Accessibility within the public swimming pools, spas, and hot tubs shall be provided in accordance with the Building Code. Pool lifts used to provide accessibility shall be listed and labeled for the purpose and installed in accordance with ICC A117.1.

PRE-PRINT

CHAPTER 4

DESIGN, MATERIALS, AND METHODS OF CONSTRUCTION

401.0 General.

401.1 Applicability. This chapter shall govern the general requirements for design, materials, methods of construction, facilities, and decks as they pertain to swimming pools, spas, and hot tubs.

401.2 Lightning Protection Systems. Public facilities that contain indoor or outdoor swimming pools, spas, hot tubs, or combination thereof shall be equipped with an approved lightning protection system in accordance with NFPA 780.

401.2.1 Testing. Lightning protection systems shall be tested periodically in accordance with the manufacturer's instructions.

401.3 Lighting. Artificial lighting shall be provided at public aquatic venues used at night or at public aquatic venues that do not provide, while in use, natural lighting at levels that are in accordance with Section 401.3.1. Lighting shall illuminate all parts of the aquatic venue including water surface area, main drains, depth markings, signage, entrances, safety equipment, decks, and walkways in accordance with the Authority Having Jurisdiction. Artificial lighting systems shall be installed in accordance with the manufacturer's installation instructions and NFPA 70.

401.3.1 Lighting Levels. Lighting levels for the water surface and deck of an aquatic venue shall be not less than the following:

- (1) Indoor water surface - 60 horizontal footcandles (646 lx)
- (2) Outdoor water surface - 10 horizontal footcandles (108 lx)
- (3) Deck - 10 horizontal footcandles (108 lx)

401.3.2 Underwater Lighting. Underwater lighting shall be provided for an aquatic venue at not less than 8 initial rated lumens per square foot (86 lx) of water surface area except where surface lighting levels are not less than 15 horizontal footcandles (161 lx) for all portions of the aquatic venue. Underwater lighting shall be grounded in accordance with Section 804.2.

401.3.3 Emergency Egress Lighting. Emergency egress lighting shall be provided in accordance with the building code, but not less than 0.5 footcandles (5.4 lx).

401.3.4 Glare. Windows, skylights, and overhead lighting shall be located to avoid glare on the water surface area of an aquatic venue in accordance with the Authority Having Jurisdiction.

401.3.5 Listed Equipment. Underwater luminaires shall be listed and labeled for use in swimming pools and spas in accordance with UL 676. Potting compounds used to protect bonding connections from the possible deteriorating effect of swimming pool or spa water shall be listed and labeled in accordance with UL 676A. Transformers and power supplies used for the supply of low voltage underwater luminaires shall be listed and labeled

in accordance with UL 379. Junction boxes used with underwater swimming pool and spa luminaires shall be listed and labeled in accordance with UL 1241. Equipment shall be installed in accordance with the manufacturer's installation instructions.

402.0 Swimming Pools.

402.1 Public and Private Swimming Pools. Public and private swimming pools shall be installed in accordance with this code and the manufacturer's installation instructions. The location of the pool shall in no way hinder the operation for which it is designed nor adversely affect bather's safety or water quality.

402.2 Construction Material. A pool shall be constructed of reinforced concrete or other approved materials that are impervious and provide a watertight structure.

402.2.1 Dissimilar Material. Where a pool structure is to be lined with dissimilar material, the two materials shall be continually and permanently bonded so not to separate at any time or place.

402.2.2 Freeze Protection. Where located in areas subject to freezing, pools and appurtenances shall be protected and designed from damage due to freezing.

402.3 Structural Design. Swimming pools shall be designed to withstand anticipated stresses under both full and empty conditions, taking into consideration climatic, hydrostatic, seismic, geotechnical, and the integration of the pool with other structural conditions.

402.3.1 Concrete. Concrete used in swimming pools shall be designed to have minimum compressive strength and concrete cover for reinforcement in accordance with ACI 318.

402.4 Testing. Pools and hydraulic systems shall be tested for water tightness before being approved by the Authority Having Jurisdiction. For inground pools, a hydrostatic relief valve shall be provided where the water table exerts hydrostatic pressure to uplift the pool where empty or drained. Materials used in the manufacturing of vinyl liners for above-ground swimming pools shall be tested in accordance with ASTM D1593 and ASTM D1790.

402.5 Floor Slopes. Public and private swimming pool floor slopes shall be uniform and slope toward the main drains.

402.5.1 Public Swimming Pools. Where the water depth is less than 5 feet (1524 mm), the floor slope shall not exceed 1 foot (305 mm) in 12 feet (3658 mm) to the point of the first slope change. Where the water depth exceeds 5 feet (1524 mm), the floor slope shall not exceed 1 foot (305 mm) in 3 feet (914 mm).

Exception: Pools designed for competitive diving, therapy, military, or other special use.

402.5.2 Private Swimming Pools. Where the water depth is less than 2 feet (610 mm), the floor slope shall

not exceed 1 foot (305 mm) in 7 feet (2134 mm). The floor slope shall not exceed 1 foot (305 mm) in 3 feet (914 mm) from the first slope change to the deepest point of the swimming pool.

402.6 Wall Slopes. Walls of the pool shall be vertical or not exceed 11 degrees (0.19 rad) from vertical for water depths, not less than 6 feet (1829 mm), or vertical for a distance not less than 3 feet (914 mm) below the water level and curved to join the wall and floor.

402.7 Finishes and Surfaces. The interior finish of a swimming pool shall be nonabrasive and slip-resistant. The interior floor of pools shall be such to facilitate the identification of objects and markers within such area. A non-slip white or light colored waterproof finish which withstands repeated brushing, scrubbing, and cleaning shall line the pool. Paint, fiberglass, or epoxy coated finishes shall be nontoxic, water resistant, of one single light color, and shall continually and permanently bond so as not to separate. Corners and edges shall be rounded and smooth to prevent abrasions, and shall be rounded with a minimum 6 inch (152 mm) radius.

402.8 Markings. The various depths of the pool shall be visible and marked in accordance with the following:

- (1) At or above the water surface on the vertical pool wall.
- (2) On the edge of the deck at points of change in floor slope.
- (3) Spaced at not more than 25 foot (7620 mm) intervals.
- (4) On both sides and ends of the pool.
- (5) Numerals shall be not less than 4 inches (102 mm) in height.
- (6) Numerals shall contrast with the background they are placed, and be of a durable material that is both weather-resistant and slip resistant where located on the pool deck.

402.8.1 No Diving. For public swimming pools, where water depths are 5 feet (1524 mm) or less, the universal symbol for "No Diving" and lettering that states: "NO DIVING" shall be marked adjacent to the depth markings in accordance with Section 402.8. The symbol and lettering shall be not less than 4 inches (102 mm) in height; shall contrast with the background it is placed; shall be weather-resistant and shall be slip-resistant where located on the deck.

402.9 Maximum Bather Capacity. The maximum bather capacity shall not exceed one bather for each 5 gallons per minute (gpm) (0.3 L/s) of water circulated for a public swimming pool.

402.10 Handholds. Handholds shall be provided for swimming pools where the water depth exceeds 24 inches (610 mm). Handholds shall be located not more than 6 inches (152 mm) above the water surface and spaced not more than 4 feet (1219 mm) apart. Handholds shall consist of ladders, steps, gutters, railing, coping, or combination thereof of not more than 2 inches (51 mm) in size.

Exceptions:

- (1) Where an underwater seat or bench is installed
- (2) Wading pools
- (3) Wave pools

402.11 Underwater Benches or Seats. For public swimming pools, underwater benches or seats, where installed, shall be constructed of slip-resistant materials and shall be outlined with a color contrasting stripe or other permanent marking of not less than $\frac{3}{4}$ of an inch (19.1 mm) or more than 2 inches (51 mm) in width. Underwater benches and seats shall not be located in water depths that exceed 5 feet (1524 mm). The submerged depth of a bench or seat shall not exceed 20 inches (508 mm) measured from the waterline.

402.12 Underwater Ledges. For public swimming pools, underwater ledges, where installed, shall be constructed of slip-resistant materials; shall be outlined with a color contrasting stripe or other permanent marking of not less than $\frac{3}{4}$ of an inch (19.1 mm) or more than 2 inches (51 mm) in width; and have a horizontal tread depth of not more than 4 inches (102 mm). Underwater ledges shall be installed in water depths of not less than 5 feet (1524 mm).

403.0 Wading Pools.

403.1 General. Wading pools shall be physically separated from the swimming pool area by not less than 7 feet (2134 mm), and a barrier shall be installed to separate the two areas with a height of not less than 4 feet (1219 mm) measured from the pool water surface to the top of the barrier.

403.2 Gates. Gates used for ingress or egress of the wading pool shall be self-closing, self-latching, lockable, open outward away from the pool, and not less than the height of the surrounding fence.

403.3 Water Depth. Wading pools and the perimeter water depth shall not exceed 18 inches (457 mm).

403.4 Walls. Walls of the pool shall be vertical or not exceed 11 degrees (0.19 rad) from vertical, and such walls shall slope to the floor. Walls shall not exceed 6 inches (152 mm) above the waterline at any point. This section shall not apply to a zero depth entry.

403.5 Markers. Wading pools shall have not less than two depth markers indicating the maximum depth.

403.6 Floor Slope. Floor slope shall be uniform and slope toward the main drain.

404.0 Spas and Hot Tubs.

404.1 Public and Private. Public and private spas and hot tubs shall be installed in accordance with Section 404.2 through Section 404.12. Self-contained spas shall be listed and labeled in accordance with UL 1563 and installed in accordance with the manufacturer's installation instructions and NFPA 70.

404.2 Hydrostatic Relief. An approved hydrostatic relief shall be installed on spas and hot tubs built in areas of anticipated high water table.

404.3 Structural Design. Spas and hot tubs shall be designed to withstand anticipated stresses caused by normal usage, climatic, hydrostatic, seismic, geotechnical, and structural conditions.

404.3.1 Concrete. Where concrete is used for the construction of a spa, it shall be designed in accordance with ACI 318.

404.3.2 Fiberglass Reinforced Plastic. Where fiberglass reinforced plastic is used in the construction of a spa, it shall be designed in accordance with IAPMO Z124.7.

404.4 Maximum Water Temperature. The water temperature in a spa or a hot tub shall not exceed 104°F (40°C). Devices used to regulate water temperature for electric spas, and hot tubs shall be in accordance with UL 1563. For gas-fired spas and hot tubs such devices shall comply with CSA Z21.56.

404.5 Water Depth. The water depth of a spa or a hot tub shall not exceed 4 feet (1219 mm).

Exception: Specialty spas as approved.

404.6 Maximum Bather Load. The bather load for a public spa or a hot tub shall not exceed 1 bather per 10 square feet (0.93 m²) of water surface area.

404.7 Floor Slope. Spa and hot tub floors shall be uniform and slope towards the main drains where present. The floor slope shall not exceed 1 foot (305 mm) in 12 feet (3658 mm).

404.8 Depth of Seating. The depth of spa or hot tub seating below the water line shall not exceed 26 inches (660 mm).

404.9 Finishes and Surfaces. Finishes including colors, textures, or patterns shall not prevent an individual from clearly seeing the bottom of a spa or hot tub, or other surfaces or objects located below the water surface. Floor or seat surfaces or other surfaces shall be non-abrasive and slip-resistant. Corners and edges shall be rounded and smooth to prevent abrasions and shall be rounded with a minimum 6 inch (152 mm) radius.

404.10 Handholds. Handholds shall be provided for spas and hot tubs. Handholds shall be located not more than 6 inches (152 mm) above the water surface, and spaced not more than 4 feet (1219 mm) apart. Handholds shall consist of ladders, steps, gutters, railing, coping, or combination thereof of not more than 2 inches (51 mm) in size.

404.11 Markings. There shall be not less than two depth markings at or above the water surface on the vertical wall located on opposite sides of the deck of a public spa. Markings shall be readable from the deck facing the spa, and contrast the surface upon which they are placed. The size of the markings shall not be less than 4 inches (102 mm) in height, and shall be of a durable, weather and slip-resistant material, and indicate the unit of measurements.

404.12 Wooden Hot Tubs. Wooden hot tubs, installed below grade, shall have not less than 12 inches (305 mm) of clearance between the outside walls of the tub and the interior wall of a supported sump or pit.

405.0 Public Aquatic Facilities.

405.1 General. Public facilities for swimming pools, spas, hot tubs, or combination thereof shall comply with Section 406.2 through Section 414.1. Decks shall comply with Section 415.0.

405.2 Accessible Facilities. Where accessible facilities are required in applicable building regulations, such facilities shall be installed in accordance with those regulations.

405.3 Toilet Facilities. Public aquatic facilities shall be provided with sanitary facilities, including provisions for persons with disabilities as prescribed by the Authority Having Jurisdiction.

405.4 Occupant Load. Plumbing fixtures shall be provided in accordance with Table 405.4 based on the occupant load. The total occupant load shall be determined in accordance with the building code. Table 405.4 applies to new pools, additions to the pool, and changes of occupancy or type in an existing pool resulting in increased occupant load. Separate toilet facilities shall be provided for each sex.

**TABLE 405.4
MINIMUM NUMBER OF PLUMBING FIXTURES¹**

WATER CLOSETS (FIXTURES PER PERSON) ⁵		URINALS (FIXTURES PER PERSON) ^{4,5}	LAVATORIES (FIXTURES PER PERSON)		SHOWERS (FIXTURES PER PERSON)		DRINKING FOUNTAINS (FIXTURES PER PERSON) ^{2,3}
Male 1: 1-100 2: 101-200 3: 201-400	Female 2: 1-100 4: 101-200 6: 201-300 8: 301-400	1: 1-200 2: 201-400 3: 401-600	Male 1: 1-100 2: 101-200 3: 201-400 4: 401-750	Female 1: 1-100 2: 101-200 3: 201-300 4: 301-500 5: 501-750	Male 1: 1-50 2: 51-100 3: 101-150 4: 151-200	Female 1: 1-50 2: 51-100 3: 101-150 4: 151-200	1: 1-250 2: 251-500 3: 501-750
Over 400, add 1 fixture for each additional 500 males and 1 for each additional 250 females.		Over 600, add 1 fixture for each additional 500 males.	Over 750, add 1 fixture for each additional 500 males and 1 fixture for each additional 250 females.		Over 200, add 1 fixture for each additional 100 persons.		Over 750, add 1 fixture for each additional 250 persons.

Notes:

- ¹ Minimum number of fixtures shall be calculated as 50 percent male and 50 percent female. Where information submitted indicates a difference in distribution of the sexes, such information shall be used in order to determine the number of fixtures for each sex.
- ² Water stations at no cost shall be permitted to be substituted for drinking fountains where drinking water is available at an adjacent building such as bath house, club house, or recreational facility and located within 500 feet (152 m) of the pool.
- ³ Drinking fountains shall not be installed in toilet rooms.
- ⁴ For each urinal added in excess of the minimum required, one water closet shall be permitted to be deducted. The number of water closets shall be not reduced to less than two-thirds of the minimum required.
- ⁵ Surrounding materials, wall, and floor space to a point 2 feet (610 mm) in front of a water closet or urinal and 4 feet (1219 mm) above the floor, and not less than 2 feet (610 mm) to each side shall be lined with nonabsorbent material.

405.4.1 Family or Assisted-Use Toilet Facilities.

Where a separate toilet facility is required for each sex, and each toilet facility is required to have only one water closet, two family or assisted-use toilet facilities shall be permitted in place of the required separate toilet facilities.

405.5 Privacy. Each water closet utilized by the public and employees shall be enclosed by a separate compartment with walls or partitions and a door enclosing the fixture to ensure privacy.

Exception: Water closet compartments shall not be required in a single-occupant toilet room with a lockable door.

405.6 Floors. Floors shall be constructed of a non-absorbent and slip-resistant material and sloped not less ¼ inch per foot (20.8 mm/m) to the floor drains, trench drains, or other approved surface water disposal area.

405.7 Walls. Walls and surrounding areas shall be smooth, moisture resistant finishes throughout.

405.8 Hardware. Single approved soap dispensers (liquid or powder) shall be provided at each lavatory and shower. Paper towel dispensers or air blowers shall be provided at lavatories. Toilet paper dispensers shall be provided at toilets. Diaper changing stations shall be provided in accordance with the Authority Having Jurisdiction.

406.0 Access to Fixtures.

406.1 Public and Employee Use. Fixtures for the public and employees shall be located such that the maximum travel distance shall not exceed 500 feet (152 m) from the pool. Restrooms shall not be required where available in adjacent living quarters or adjacent building and shall not exceed 500 feet (152 m) in travel distance.

406.2 Installation. Fixtures shall be set level and in proper alignment with reference to adjacent walls. No water closet or bidet shall be set closer than 15 inches (381 mm) from its center to a side wall or obstruction, or closer than 30 inches (762 mm) center to center to a similar fixture. The clear space in front of a water closet, lavatory, or bidet shall be not less than 24 inches (610 mm). No urinal shall be set closer than 12 inches (305 mm) from its center to a side wall or partition, and not closer than 24 inches (610 mm) center to center. Installations not covered shall be in accordance with the plumbing code.

Exception: The installation of paper dispensers or accessibility grab bars shall not be considered obstructions.

407.0 Water Closets.

407.1 Application. Water closets shall comply with ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4, or CSA B45.5/IAPMO Z124. Water closet bowls for public use shall be of the elongated type.

407.2 Water Consumption. Water closets shall have a maximum consumption not to exceed 1.6 gallons of water per flush (6.0 Lpf) in accordance with ASME A112.19.2/CSA B45.1.

407.2.1 Dual Flush Water Closets. Dual flush water closets shall comply with ASME A112.19.14. The effec-

tive flush volume for dual flush water closets shall be defined as the composite, average flush volume of two reduced flushes and one full flush.

407.2.2 Flushometer Valve Activated Water Closets. Flushometer valve activated water closets shall have a maximum flush volume of 1.6 gallons of water per flush (6.0 Lpf) in accordance with ASME A112.19.2/CSA B45.1.

407.3 Water Closet Seats. Water closet seats shall be properly sized for the water closet bowl type and shall be of smooth, nonabsorbent material. Seats, for public use, shall be of the elongated type and either of the open front type or have an automatic seat cover dispenser. Plastic seats shall comply with IAPMO Z124.5.

408.0 Urinals.

408.1 Application. Urinals shall comply with ASME A112.19.2/CSA B45.1, ASME A112.19.19, or CSA B45.5/IAPMO Z124. Urinals shall have an average water consumption not to exceed 1 gallon of water per flush (3.8 Lpf).

408.2 Nonwater Urinals. Nonwater urinals shall have a barrier liquid sealant to maintain a trap seal. Nonwater urinals shall permit the uninhibited flow of waste through the urinal to the sanitary drainage system. Nonwater urinals shall be cleaned and maintained in accordance with the manufacturer's instructions after installation. Where nonwater urinals are installed, not less than one water supplied fixture rated at not less than 1 water supply fixture unit (WSFU) shall be installed upstream on the same drain line to facilitate drain line flow and rinsing. Where nonwater urinals are installed, they shall have a water distribution line rough-in to the urinal location to allow for the installation of an approved backflow prevention device in the event of a retrofit.

409.0 Lavatories.

409.1 Application. Lavatories shall comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4, ASME A112.19.12, CSA B45.5/IAPMO Z124, or CSA B45.11/IAPMO Z401. Group lavatories 24 lineal inches (610 mm) of wash sink or 18 inches (457 mm) of a circular basin, where provided with water outlets for such space, shall be considered equivalent to one lavatory.

409.2 Maximum Flow Rate. The maximum flow rate for public lavatory faucets shall not exceed 0.5 gallons per minute (gpm) at 60 pounds-force per square inch (psi) (1.9 L/m at 414 kPa) in accordance with ASME A112.18.1/CSA B125.1.

The maximum flow rate for public metering lavatory faucets shall deliver a maximum of 0.25 gallons (1.0 L) per metering cycle in accordance with ASME A112.18.1/CSA B125.1.

409.3 Limitation of Hot Water Temperature for Public Lavatories. Hot water delivered from public-use lavatories shall be limited to a maximum temperature of 120°F (49°C)

by a device that is in accordance with ASSE 1070 or CSA B125.3. Water heater thermostats shall not be considered a control for meeting this provision.

409.4 Transient Public Lavatories. Self-closing or metering faucets shall be installed on lavatories intended to serve the transient public.

410.0 Showers.

410.1 Application. Manufactured shower receptors and shower bases shall comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4, or CSA B45.5/IAPMO Z124.

410.2 Water Consumption. Showerheads shall have a maximum flow rate of not more than 2.5 gpm at 80 psi (9.5 L/m at 552 kPa), in accordance with ASME A112.18.1/CSA B125.1.

410.3 Individual Shower and Tub-Shower Combination Control Valves. Showers and tub-shower combinations in buildings shall be provided with individual control valves of the pressure balance, thermostatic, or combination pressure balance/thermostatic mixing valve type that provide scald and thermal shock protection for the rated flow rate of the installed showerhead. These valves shall be installed at the point of use and in accordance with ASSE 1016 or ASME A112.18.1/CSA B125.1. Gang showers, where supplied with a single temperature-controlled water supply pipe, shall be controlled by a mixing valve that is in accordance with ASSE 1069. Handle position stops shall be provided on such valves and shall be adjusted in accordance with the manufacturer's instructions to deliver maximum mixed water setting of 120°F (49°C). The water heater thermostats shall not be considered an approved control for meeting this provision.

410.4 Shower Compartments. Shower compartments, regardless of shape, shall have a finished interior of not less than 1024 square inches (0.6606 m²) and shall be capable of encompassing a 30 inch (762 mm) circle. The minimum required area and dimensions shall be measured at a height equal to the top of the threshold and at a point tangent to its centerline. The area and dimensions shall be maintained to a point of not less than 70 inches (1778 mm) above the shower drain outlet with no protrusions other than the fixture valve or valves, shower head, soap dishes, shelves, and safety grab bars or rails. Fold-down seats in accessible shower stalls shall be permitted to protrude into the 30 inch (762 mm) circle.

Exception: Showers that are designed in accordance with ICC A117.1.

410.5 Public Shower Floors. Floors of public shower rooms shall have a nonskid surface and shall be drained in such a manner that wastewater from one bather shall not pass over areas occupied by other bathers. Gutters in public or gang shower rooms shall have rounded corners for easy cleaning and shall be sloped not less than 2 percent toward drains. Drains in gutters shall be spaced not more than 8 feet (2438 mm) from sidewalls and not more than 16 feet (4877 mm) apart.

410.6 Location of Valves and Heads. Control valves and showerheads shall be located on the sidewall of shower com-

partments, or otherwise arranged so that the showerhead does not discharge directly at the entrance to the compartment so that the bather can adjust the valve prior to stepping into the shower spray.

410.7 Water Supply Riser. A water supply riser from the shower valve to the showerhead outlet, whether exposed or not, shall be securely attached to the structure.

411.0 Female Hygiene Products.

411.1 General. In public toilet facilities for females, sanitary napkin and tampon dispensers, and receptacles shall be provided in accordance with the Authority Having Jurisdiction. Where the Authority Having Jurisdiction does not provide such requirements, not less than one dispenser of sanitary napkins and tampons shall be provided within the toilet facility. A sanitary napkin receptacle, tampon receptacle, or combination of both shall be located in each water closet compartment.

412.0 Drinking Fountains.

412.1 General. Drinking fountains shall be self-closing and comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, or ASME A112.19.3/CSA B45.4, and NSF 61. Permanently installed electric water coolers shall also comply with UL 399.

412.2 Location. Drinking fountains shall not be installed in toilet rooms.

413.0 Floor Drains.

413.1 General. Floor drains shall comply with ASME A112.3.1, ASME A112.6.3, or CSA B79 and provide a watertight joint in the floor. Floor drains shall be installed in toilet facilities containing two or more water closets or a combination of one water closet and one urinal. Floor drains shall be provided with an approved type strainer having a waterway equivalent to the area of the tailpiece and floors shall be sloped to floor drains.

414.0 Hose Bibbs.

414.1 General. Hose bibbs shall be provided at not less than 100 foot (30 480 mm) intervals for flushing down the entire pool area and toilet facilities for cleaning purposes and located such that where hoses are attached shall not constitute a safety hazard. Hose bibbs shall be protected against backflow by an approved vacuum breaker that is in accordance with ASSE 1019 or CSA B64.2.1.1.

415.0 Decks.

415.1 General. Decks shall be constructed of corrosion-resistant material and designed for the anticipated loads. Surfaces shall be non-abrasive, slip-resistant, not subject to microbial growth or deterioration. Where deck boards are used, a gap between boards shall be present and shall not exceed ¼ of an inch (6.4 mm) for non-wood products and ⅛ of an inch (3.2 mm) for wood. The elevation difference

between decks and other walking surfaces shall not exceed ¼ of an inch (6.4 mm). Change in vertical elevation shall be considered an edge condition. Deck edges shall be beveled, rounded, or otherwise relieved to eliminate sharp corners. Decks for public swimming pools shall extend continuously around the pool’s perimeter including the coping, shall be not less than 4 feet (1219 mm) in unobstructed width, shall be in accordance with Section 405.2, and shall be provided flush with the top of the pool shell wall. Decks shall be provided on the sides and rear of diving equipment at public pools and shall be not less than 12 feet (3658 mm) in width. The deck width shall be measured from the poolside edge of the coping lip.

415.2 Public Spas and Hot Tubs. Decks shall be not less than 4 feet (1219 mm) in unobstructed width, shall comply with Section 405.2, and shall be flush with the top of the spa or hot tub wall. The deck shall encompass not less than 50 percent of the total perimeter of the spa or hot tub in a continuous manner.

415.3 Deck Drainage. Pool, spa, and hot tub decks shall be constructed to provide drainage from the deck and to prevent standing water. The deck surface shall be sloped not less than ¼ of an inch per foot (20.8 mm/m) to deck drains or other approved surface disposal areas. The deck surface shall not be drained into the pool, spa, or hot tub, including the perimeter overflow channel or connected to the recirculation system.

416.0 Natatoriums.

416.1 Building Envelope. The building envelope of a natatorium shall incorporate an approved vapor retarder that is sealed around doors, windows, and skylights, and installed in accordance with the building code.

416.2 Interior Finish. The interior finish of a natatorium shall be designed for an indoor relative humidity of not less than 80 percent.

416.2.1 Doors and Glazing. Doors, windows, and skylights shall be constructed of corrosion- and mold-resistant materials. Doors shall be sealed or gasketed and equipped with self-closing door closers.

416.2.2 Ducts. Ducts located on the inside of a natatorium shall be corrosion-resistant. Ducts shall be insulated on the exterior of the duct with a mold-resistant material where the surface temperature of the duct is capable of being less than the airstream temperature within the duct.

416.3 Spectator Areas. A spectator area shall be separated from an aquatic venue by a deck of not less than 8 feet (2438 mm) wide. An approved barrier installed in accordance with Section 803.0, or a demarcation line that is permanently marked on the deck, shall separate the areas of the deck intended for bather and spectator use.

417.0 Ventilation.

417.1 General. Ventilation shall be provided to an indoor aquatic facility through mechanical ventilation. Aquatic facility ventilation system design, construction, and installation shall comply with the mechanical code. For an aquatic venue, deck, or spectator area located in an aquatic facility, the design outdoor air requirements shall be in accordance with Table 417.1 and Equation 417.1 during times when the facility is occupied. Where more than one aquatic venue type, deck, or spectator area is located in an aquatic facility, the outdoor airflow (V_{bz}) shall be determined for each aquatic venue, deck, or spectator area and added together to obtain the total outdoor airflow (V_{bz}) required for the facility.

$$V_{bz} = A_z \cdot [R_a + (R_p/d)] \quad \text{(Equation 417.1)}$$

Where:

A_z = Area of an aquatic venue, deck, or spectator area, square feet (m²)

d = Average density, square feet (m²) per person in accordance with Table 417.1

R_a = Outdoor airflow rate required per aquatic venue, deck, or spectator area in accordance with Table 417.1

R_p = Outdoor airflow rate required per person in accordance with Table 417.1

V_{bz} = Total outdoor airflow

**TABLE 417.1
OUTDOOR AIR REQUIREMENTS FOR AQUATIC FACILITIES**

FACTORS	AQUATIC VENUE TYPE			DECK	SPECTATOR AREA
	FLAT WATER ¹	AGITATED WATER ²	HOT WATER ³		
R_a (cfm/ft ²)	0.48	0.48	0.48	0.48	0.06
R_p (cfm/person)	10	25	60	10	7.5
d (ft ² /person)	20	15	10	50	6.6

For SI Units: 1 cubic foot per minute = 0.0283 m³/min, 1 square foot = 0.0929 m²

Notes:

¹ “Flat Water” is an aquatic venue in which the water line is static except for movement made by users (i.e. swimming pools).

² “Agitated Water” is an aquatic venue with mechanical means to discharge, spray, or move the water’s surface above or below the static water line of the aquatic venue (i.e. leisure rivers and wave pools).

³ “Hot Water” is an aquatic venue with a water temperature more than 90°F (32°C) (i.e. spas and hot tubs).

417.2 Design Parameters. The ventilation system shall be designed to maintain the surface temperature of exterior windows and skylights, in the area where an aquatic venue is located, to not less than 5°F (3°C) above the dew point of the area. The ventilation system shall be capable of purging the aquatic facility.

417.3 Exhaust Air. Areas, where aquatic venues are located, shall be provided with a means of exhaust air to maintain a negative pressure of not less than 0.05 inch water column (0.01 kPa), and not more than 0.15 water column (0.04 kPa).

417.4 Humidity Control. The ventilation system of an indoor aquatic facility shall be designed to maintain a relative humidity of not more than 65 percent when the facility is occupied. The ventilation system shall be designed to maintain air temperatures at not less than 2°F (1°C), and not more than 4°F (2°C), above the water temperature of the aquatic venue, not including aquatic venues that exceed 90°F (32°C).

417.5 Equipment. Ventilation system equipment shall be located in accordance with Section 602.1. A permanent data plate or label shall be placed in a readily accessible location upon the equipment which indicates the amount of outdoor air supplied by the equipment.

418.0 Underwater Audio Equipment.

418.1 General. Where installed, underwater audio equipment shall be listed and labeled in accordance with UL 1480 and installed in accordance with the manufacturer's installation instructions and NFPA 70.

PRE-PRINT

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CHAPTER 5

WATER QUALITY

501.0 General.

501.1 Applicability. This chapter shall govern the general requirements for water quality, filtration, drainage, overflow systems, and wastewater disposal as they pertain to swimming pools, spas, and hot tubs.

502.0 Sizing for Velocity.

502.1 General. Water piping systems shall not exceed the maximum velocities listed in Section 502.2 through Section 502.2.2 or the plumbing code.

502.2 Circulating Piping System. The circulating piping system shall be designed so that the velocity shall not exceed 10 feet per second (ft/s) (3.05 m/s), and the suction pipe system shall not exceed the velocity of 8 ft/s (2.4 m/s). Water velocity in branch suction piping shall not exceed 6 ft/s (1.8 m/s) where one of a pair is blocked. In normal operation, the branch suction piping velocity shall be 3 ft/s (0.9 m/s). Other suction piping velocities shall be 6 ft/s (1.8 m/s) for public pools or 8 ft/s (2.4 m/s) for private pools.

502.2.1 Copper and Copper Alloy Tube Systems.

Velocities in copper and copper alloy tube and fitting systems shall not exceed 8 ft/s (2.4 m/s) in cold water and 5 ft/s (1.5 m/s) in hot water.

502.2.2 Tubing Systems Using Copper Fittings.

Velocities through copper fittings in tubing other than copper shall not exceed 8 ft/s (2.4 m/s) in cold water and 5 ft/s (1.5 m/s) in hot water. Jet inlet fittings shall be excluded from this requirement.

503.0 Turnover Time.

503.1 General. The entire design of matched components shall have a capacity to provide a complete turnover of water in accordance with local and state codes or regulations, and the manufacturer's instructions. Minimum turnover time shall be required as follows:

- (1) Private pools – 8 hours
- (2) Public pools – 6 hours
- (3) Wading pools – 1 hour
- (4) Private spas and hot tubs – 1 hour
- (5) Public spas and hot tubs – ½ hour
- (6) Water slides and landing pools – 2 hours
- (7) Wave pools – 3 hours
- (8) Leisure rivers – 3 hours
- (9) Spray grounds – ½ hour

504.0 Valves.

504.1 Fullway Valves. Fullway valves shall be installed to ensure functioning of the filtration and piping system in accordance with the approved design, manufacturer's installation instructions, or both.

504.2 Below the Overflow Rim. Where equipment is located below the overflow rim of the pool or spa, valves shall be placed in the circulation piping system to isolate the equipment from the pool or spa.

504.3 Grade. Valves shall not be located below the surrounding grade unless first approved by the Authority Having Jurisdiction. Valves located below the surrounding grade shall be set in a pit with a removable cover approved by the Authority Having Jurisdiction.

504.4 Check Valves. Where check valves are installed, they shall be of the swing or vertical check patterns.

504.5 Multiport Valves. Where multiport valves are installed, they shall comply with NSF 50.

504.6 Size. Valves up to and including 2 inches (50 mm) in size shall be copper alloy or other approved material. Sizes exceeding 2 inches (50 mm) shall be permitted to have cast-iron or copper alloy bodies. Each gate or ball valve shall be a fullway-type with working parts of non-corrosive material. Valves carrying water used in potable water systems intended to supply drinking water shall be in accordance with the requirements of NSF 61.

505.0 Water Supply Inlets and Connections.

505.1 Water Supply Inlets. Water supply inlets to swimming pools, spas, or hot tubs shall be protected by one of the following means:

- (1) An approved air gap.
- (2) A vacuum breaker installed on the discharge side of the last valve with the critical level not less than 6 inches (152 mm) or in accordance with its listing.
- (3) A backflow preventer suitable for the degree of hazard, and installed in accordance with the manufacturer's installation instructions and the plumbing code.

505.2 Manual Override. Automatic fresh water makeup control valves shall be provided with manual override.

505.3 Water Supply Connections. Water supply connections to equipment, appliances, or appurtenances shall be protected as provided for in the plumbing code.

506.0 Filters.

506.1 General. Filters and filter media shall be installed in accordance with the manufacturer's installation instructions and shall comply with NSF 50. The maximum design flow rate for filter operation, with alternate media, shall comply with Section 506.2 through Section 506.5, or the filter media manufacturer's instructions.

506.2 Rapid Sand Filters. Rapid sand filters shall have a flow rate not to exceed 5 gallons per minute (gpm) per square foot [204 (L/min)/m²] for private applications and 3 gpm per square foot [122 (L/min)/m²] for public applications. The circulation system and backwash piping shall be provided for

backwashing of sand filter and backwash flow rates of not less than 15 gpm per square foot [611 (L/min)/m²].

506.3 High-Rate Sand Filters. High rate sand filters shall have a flow rate not to exceed 20 gpm per square foot [815 (L/min)/m²] for private applications and 15 gpm per square foot [611 (L/min)/m²] for public applications, or the filter media manufacturer's instructions. The circulation system and backwash piping shall be provided for backwashing of sand filter and backwash flow rates of not less than 15 gpm per square foot [611 (L/min)/m²].

506.4 Diatomite Type Filters. Diatomite type filters shall be designed for operation under pressure or vacuum. The design flow rate shall not exceed 2.5 gpm per square foot [102 (L/min)/m²] for private applications and 2 gpm per square foot [81 (L/min)/m²] for public applications of effective filter area.

Provision shall be provided to introduce filter aid into pressure filters through the skimmer or precoat pot.

506.5 Cartridge Filters. Cartridge filters shall be designed for pressure or vacuum applications. The designed flow rate for surface-type cartridge filters shall not exceed 1 gpm per square foot [41 (L/min)/m²] for private applications and 0.375 gpm per square foot [15 (L/min)/m²] for public applications. The designed flow rate for depth-type cartridge filters shall not exceed 8 gpm per square foot [326 (L/min)/m²] for private applications and 3 gpm per square foot [122 (L/min)/m²] for public applications.

506.6 Operating Instructions. Filter systems shall be provided with written operating instructions.

506.7 Pressure Filter System. The pressure filter system shall be equipped with the following:

- (1) An influent pressure gauge.
- (2) An effluent pressure gauge for public use.
- (3) A means for air relief at the top of each filter.
- (4) A backwash sight glass shall be installed adjacent to the backwash discharge outlet to the receptor where not visible from the backwash control valve.
- (5) A means to drain the tank.

Exception: A backwash sight glass for cartridge filters.

507.0 Chemical Feed Equipment.

507.1 General. An aquatic facility shall be equipped with chemical feed equipment that is in accordance with NSF 50. Such equipment shall be sized and installed in accordance with the manufacturer's installation instructions, and shall comply with Section 507.1.1 through Section 507.1.4.

507.1.1 Equipment Design. Chemical feed equipment shall be capable of withstanding wear without developing leaks. Chemical feed equipment shall be designed to supply disinfectant and pH control chemicals to an aquatic venue at the levels required in accordance with this code. Chemicals shall be introduced into an aquatic venue downstream of the filtration system, and the equipment shall not permit backflow into the chemical feed equipment or components.

507.1.2 Interlocked. Chemical feed equipment shall be disabled when the pump is turned off, loses prime, or filters are backwash. Where not specified elsewhere in this code, chemical feed equipment shall be interlocked electrically with not less than two of the following:

- (1) Recirculation pump
- (2) Flow meter and switch in the return line
- (3) Chemical controller and paddle wheel
- (4) Flow cell on the chemical controller

507.1.3 System Control. Chemical feed equipment shall be provided with an automatic controller to power on and off the equipment. Chemical controllers shall comply with NSF 50, and be installed in accordance with the manufacturer's installation instructions.

507.1.4 Ventilation. A separate ventilation system shall be provided for each enclosed room or space where chemical feed equipment is located at not less than 60 air changes per hour of outdoor air. The exhaust intake of the ventilation system shall be taken within 6 inches (152 mm) of the floor, and located on the opposite side of the room or space from the outdoor air intake. Exhaust air shall be discharged above grade level to the outdoors, and shall discharge not less than 10 feet (3048 mm) from an operable opening or adjacent building. Outdoor air intake shall be provided within 6 inches (152 mm) of the ceiling.

507.2 Gas Chlorinators. Chlorine and chlorinating equipment shall be located in a separate well-ventilated room located at or above ground level. Electric motor operated chlorinators shall comply with UL 1081 and be installed in accordance with the manufacturer's installation instructions.

507.2.1 Storage. Chlorine cylinders, including empty cylinders, shall be stored and secured in an upright position.

507.2.2 Shut Off. A valve wrench shall be installed on the chlorine cylinder valve so the supply can be shut off in the case of an emergency. Valve protection hoods shall be in place except where the cylinder is connected.

507.2.3 Chlorine Feeding Device Design. The chlorine feeding device shall be designed so that, during accidents or interruptions of the chlorinator booster pump, leaking chlorine gas shall be conducted to the outdoors.

507.2.4 Type of Feeding Device. The feeding device shall be a solution feed type, capable of delivering chlorine at its maximum rate without releasing chlorine gas to the atmosphere.

507.2.5 Interlocked. Gas-type chlorinators shall have protection against siphoning of gas into the recirculation system.

The recirculating pump and chlorine booster pump motor controls shall be interlocked electrically so that the booster pump shall not operate where the recirculating pump is off, or during the backwash cycle. Connections shall not be made to an external water supply for chlorinator operation.

507.2.6 Scale. A scale for determining weight of chlorine shall be provided.

508.0 Primary Disinfection.

508.1 General. Chemicals for a swimming pool, spa, or hot tub shall be dispensed in accordance with the chemical manufacturer’s instructions, Material Safety Data Sheets (MSDS), and applicable standards and regulations. Parameters for chemicals used within a swimming pool, spa, and hot tub shall be in accordance with Table 508.1.

509.0 Secondary Disinfection Systems.

509.1 General. Secondary disinfection systems shall comply with NSF 50, and shall be installed in accordance with the manufacturer’s installation instructions.

509.2 Where Required. A secondary disinfection system shall be provided for the following:

- (1) Aquatic venues designed for children, such as wading pools, and recirculating interactive water play venues
- (2) Therapy pools
- (3) Sensory deprivation tanks

509.3 System Design. Secondary disinfection systems shall be designed to achieve not less than a 3-log (99.9 percent) reduction in the number of infective cryptosporidium parvum oocysts per pass through the system in accordance with NSF 50.

509.4 Approved Systems. Secondary disinfection shall be provided by an ultraviolet light (UV) system or ozone system.

509.4.1 Ultraviolet Light (UV) Systems. Where used, ultraviolet light (UV) systems shall be installed in the recirculation system downstream of the filters and water heating equipment, and upstream of the halogen feed location and pH chemical feed equipment.

509.4.1.1 Maintenance. A bypass pipe that is valved on both ends shall be installed on the UV equipment to permit servicing while the aquatic venue is in operation.

509.4.1.2 Interlocked. The UV system shall be interlocked electrically with the recirculation pump, and the UV equipment shall be provided with calibrated sensors in accordance with the manufacturer’s installation instructions.

509.4.1.3 Strainer. An inline strainer shall be installed downstream of the UV system.

**TABLE 508.1
WATER CHEMISTRY**

PARAMETER	ACCEPTABLE RANGE
Calcium hardness	200 – 400 parts per million (ppm)
Combined chlorine	0 - 0.3 ppm
Cyanuric acid	0 ppm (indoors) 10 – 30 ppm (outdoors)
Free chlorine	1.0 - 5.0 ppm (pools) or as needed to maintain a 750 millivolt (mV) ORP 3.0 – 10.0 ppm (spas and hot tubs) or as needed to maintain a 750 mV ORP
Hydrogen peroxide	30 – 40 ppm or as needed to maintain a 750 mV ORP
Langelier saturation index	0 (+ or - 0.3 acceptable)
Metals (iron, copper, and manganese)	0 – 0.2 ppm
Nitrates	< 10 ppm
ORP	650 mV (private) 750 - 900 mV (public)
Ozone	Generator output shall equal 4 – 6 percent ozone by weight concentration Slip stream shall be 25 – 33 percent. ORP shall be > 850 mV
pH	7.2 – 7.8
PHMB	30 – 50 ppm
Phosphates	0.125 – 0.5 ppm
Salinity (electrolytic cells)	2500 – 6000 ppm
Ryznar stability index	6.3 – 6.7
Sulfates	< 250 ppm
TDS	< 1500 ppm
Total alkalinity	80 – 120 ppm
Total bromine	4.5 – 6.5 ppm or as needed to maintain a 750 mV ORP (2.25 times the equivalent amount of chlorine)
Total chlorine	Not more than 0.2 ppm higher than free chlorine
Turnover time	1400 gallons per day (gal/d) for each anticipated bather per day
Ultraviolet light	0.39 – 0.65 watt seconds per square inches (W*s/in ²)

For SI Units: 1 millivolt = 0.001 V, 1 gallon per day = 0.0000438 L/s, 1 watt second per square inches = 0.155 J/cm²

509.4.1.4 Alarm Required. When the UV system shuts down, an approved visual alarm shall be installed to alert facility staff.

509.4.2 Ozone Systems. When used, ozone system side-stream loop shall be installed in the recirculation system downstream of the filters and the water heating equipment, and upstream of the halogen feed location and pH chemical feed equipment.

509.4.2.1 Oxidation Reduction Potential.

Ozone generating equipment shall be equipped with an approved oxidation reduction potential (ORP) monitor/controller. The ORP of the ozone system shall be not less than 600 mV, and not more than 900 mV where measured after the ozone side-stream remixes into the recirculation system and upstream of the halogen feed location and pH chemical feed equipment.

509.4.2.2 Gas Leak. An ambient ozone gas monitor/controller shall be installed in the equipment room where the ozone system is located.

509.4.2.3 Interlocked. The ozone system shall be interlocked electrically with the recirculation pump or automated feature supply valves.

509.4.2.4 Alarm Required. When the ORP reading for the ozone system drops below 600 mV, approved audible and visual alarms shall be installed to alert facility staff.

510.0 Surface Skimmers and Perimeter Overflow Systems.

510.1 General. Swimming pools, spas, or hot tubs shall be provided with a surface skimmer(s) in accordance with NSF 50 or a perimeter overflow system, or a combination thereof.

Exception: Spas constructed with a circulation piping system that is common to a swimming pool, and having a design that provides for skimming of the spa into the swimming pool, shall be permitted as meeting this requirement without an additional skimmer required.

510.2 Surface Skimmers. Surface skimmers, where used in lieu of a perimeter overflow system, shall be installed in accordance with the manufacturer's installation instructions. For public pools, there shall be not less than one skimmer for each 500 square feet (46.45 m²) of surface area, or fraction thereof. For private pools, there shall be not less than one skimmer for each 800 square feet (74.32 m²) of surface area or fraction thereof. For public and private spas and hot tubs, there shall be not less than one skimmer for each 100 square feet (9.29 m²) of surface area or fraction thereof. In public pools, not less than 75 percent of the turnover rate through the surface skimmers shall be provided.

510.3 Perimeter Overflow Systems. A perimeter overflow system shall comply with Section 510.3.1 through Section 510.3.10.

510.3.1 Overflow System. The overflow system shall be built into the walls and extend around the pool except where steps require interruption.

510.3.2 Overflow Channel and Opening. The overflow channel shall be not less than 3 inches (76 mm) deep; the section shall not diverge with depth, and the width of the bottom shall be not less than 3 inches (76 mm). The opening into the overflow system shall be not less than 4 inches (102 mm) beneath the coping in a direction measured radially from the inner edge of the overflow channel lip.

510.3.3 Channel Lip. The overflow channel lip shall not exceed 12 inches (305 mm) below the level of the deck. The lip edge shall be rounded and shall not be thicker than 2½ inches (64 mm) nor thinner than 1 inch (25.4 mm) from the top 2 inches (51 mm).

510.3.4 Channel Covering. Covered overflow channels shall be permitted, provided a bather is not capable of entering or get his arms or legs caught in the cover.

510.3.5 Channel Outlets. Overflow channel outlets shall be not less than 1½ inches (38 mm) in diameter, spaced not more than 15 feet (4572 mm) apart, and the channel bottom slope to the drain shall be not less than ¼ inch per foot (20.8 mm/m).

Other drain spacing or channel bottom slope shall be permitted where hydraulically designed in accordance with acceptable engineering principles.

510.3.6 Opening Area. Overflow channel outlets shall be provided with a clear opening area in the grating not less than 1/5 times the cross-sectional area of the outlet required in Section 510.3.5.

510.3.7 Overflow Drain Piping. Overflow drain piping shall provide drainage of the overflow system, carry overflow water to a surge storage chamber, and establish hydraulic equilibrium in the pool and return to skimming not less than 10 minutes after being flooded by a sudden large use of the pool by bathers.

510.3.8 Surge Storage Capacity. A perimeter overflow system shall be provided with a surge storage of not less than 1 gallon per square foot (41 L/m²) of pool water surface area. Surge storage shall be permitted in the perimeter overflow channel, the overflow water drain piping returning to the surge chamber, and in the surge chamber.

510.3.9 Surge Flow Control. Automatic water flow controls with a manual override provision shall be provided to maintain the approved operating pool water level.

The top of the channel lip shall not exceed ¼ inch (6.4 mm) from the lowest point to the highest point.

510.3.10 Overflow Drains. Where overflow drains are provided, they shall be installed in accordance with the requirements of the Authority Having Jurisdiction.

511.0 Pool, Spa, and Hot Tub Suction Outlets.

511.1 General. Pool, spa, or hot tub suction outlets shall comply with APSP 16.

Exception: Self-contained spas that are in accordance with UL 1563.

511.1.1 Skimmer. A skimmer with a bottom outlet shall be installed on the filtration suction line. The filtration suction line shall be connected to a second outlet to relieve suction in the event blockage occurs.

511.1.2 Suction Cleaner Device Outlets. Suction cleaner device outlets shall remain covered where not in use so as not to pose an entrapment hazard.

511.1.3 Safety Vacuum Release Systems. Swimming pool, spa, or hot tub vacuum release systems shall comply with ASME A112.19.17, and shall be installed in accordance with the manufacturer's installation instructions.

511.2 Return Inlets. Return inlets shall be installed in accordance with the manufacturer's installation instructions. Return inlets shall not have sharp edges or present a hazard to bathers. Swimming pool, spa, and hot tub return inlets shall be sized based on the required turnover rates in accordance with Section 503.1 and shall be located in accordance with Section 511.2.1 and Section 511.2.2.

511.2.1 Swimming Pools. Where floor return inlets are used, the distance between inlets shall be not more than 20 feet (6096 mm). Floor return inlets shall be located not more than 15 feet (4572 mm) from adjacent walls. Floor return inlets shall be installed flush. Where wall return inlets are used, the distance between inlets shall be not more than 20 feet (6096 mm). A wall return inlet shall be located not more than 5 feet (1524 mm) from each corner of a pool. Where a swimming pool is more than 50 feet (15 240 mm) wide, a combination of floor and wall return inlets shall be installed.

511.2.2 Spas and Hot Tubs. Not less than two equally spaced return inlets shall be installed in a spa or hot tub. The circulation system shall be separate from the hydro-jet booster pump system.

512.0 Wastewater Disposal.

512.1 General. Waste shall be disposed of as set forth in this section, and the type of disposal proposed shall be approved by the Authority Having Jurisdiction, prior to the commencement of work. A means of disposal of the total contents of the pool (periodic emptying) without surface runoff shall be established to the approval of the Authority Having Jurisdiction.

512.2 Direct Connection. No direct connection shall be made between a storm drain, sewer, drainage system, seepage pit, underground leaching pit, or subsoil drainage line, and a line connected to a swimming pool, spa, or hot tub.

512.3 Traps. Where the wastewater is to be disposed of through a public sewer, not less than a 3 inch (80 mm) P-trap shall be installed. Such drains shall be not installed in patios, floors, or sidewalks. The tailpiece from the trap shall extend not less than 3 inches (76 mm) above finished grade and below finished floor grade. Traps need not be vented where located on the exterior of the building. The connection between the filter waste discharge piping and the P-trap shall be made by means of an air gap.

Plans and specifications for a deviation from the above manner of installation shall first be approved by the Author-

ity Having Jurisdiction before a portion of such system is installed. Where wastewater is discharged to a seepage pit installation, it shall be installed in accordance with the approval granted by the Authority Having Jurisdiction.

512.4 Availability of a Public Sewer or Storm Drain.

Except as provided in Section 512.5, where a public sewer or storm drain of adequate capacity is available for use, wastewater shall be discharged thereto and permission shall be obtained in writing from the Authority Having Jurisdiction to do so. A copy of such permission stating the maximum size of the waste line between the receptor and the sewer, and other specific requirements shall accompany the application for a permit made to the Authority Having Jurisdiction.

512.5 Used for Irrigation. Where space and conditions are such that no hazard, nuisance, or insanitary condition is evidenced, wastewater shall be permitted to be used for irrigation by surface or subsurface spreading.

512.6 Drywells. Where no other means of wastewater disposal is available, a drywell shall be permitted to be installed. Each such drywell shall be constructed in the manner prescribed for cesspools in the plumbing code, and drywells receiving only filter backwash shall have a capacity of not less than twice the amount of effluent discharged during one normal backwash operation, but shall in no case have less than a 5 foot (1524 mm) vertical sidewall. The size and leaching capacity of such dry well shall be proportionately increased to the satisfaction of the Authority Having Jurisdiction. No wastewater, other than that from a swimming pool, spa, or hot tub, shall discharge into such drywell, and no wastewater from a swimming pool, spa, or hot tub shall discharge into a private sewage disposal system.

512.7 Separation Tank. A separation tank of an approved type shall be permitted to be used in lieu of the aforementioned means of wastewater disposal where connected as a reclamation system. A relief valve shall be installed on each such separation tank to relieve pressure where the filters are serviced.

513.0 Deck Drain Piping.

513.1 Within the Interior of a Building. Deck drain piping placed within the interior of a building shall be in accordance with the applicable standards referenced in Table 309.1, or other approved materials.

513.2 Located at the Exterior of a Building. Deck drain piping commencing 2 feet (610 mm) from the exterior of a building shall be permitted to be of any approved material.

513.3 Protection from Damage. Deck drain piping installed in locations where subjected to damage shall be protected.

513.4 Concealed Locations. Deck drains and overflow drains where concealed within the construction of the building shall be tested in accordance with the provisions of this code for testing drain, waste, and vent systems.

513.5 Strainers. Deck strainers shall be of an approved flat-surface type that is level with the deck. Such drains shall have an inlet area not less than two times the area of the pipe to which the drain is connected.

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CHAPTER 6 EQUIPMENT

601.0 General.

601.1 Applicability. This chapter shall govern the general requirements for equipment, pumps, diving equipment and slides as they pertain to swimming pools, spas, and hot tubs.

602.0 Installation Requirements.

602.1 General. Equipment shall be installed in accordance with the manufacturer's installation instructions. Equipment shall be installed within the space it is located so as to provide ready accessibility for cleaning, operating, maintenance, and servicing. The equipment controls shall not be capable of being accessed by unauthorized personnel. Equipment, unless designed for outdoor installation, shall be protected against the weather in an approved manner or installed within an enclosed room in accordance with Section 602.2. Equipment installed outdoors shall be supported on a level concrete or other approved base designed to handle the anticipated loads, and such base shall be not less than 3 inches (76 mm) above the adjoining ground level.

602.1.1 Marking. Equipment, piping, valves, and system components shall be marked in an approved manner to identify their function. System piping shall indicate the direction of flow.

602.2 Equipment Rooms or Enclosures. Floors shall be constructed of concrete or other nonabsorbent material in accordance with the building code, and shall be provided with an approved means of drainage in accordance with the plumbing code. Enclosed equipment rooms shall be ventilated in accordance with the mechanical code. Combustion, HVAC, and electrical equipment shall not be located in the same room used for chemical storage or exposed to chemical fumes or vapors.

602.2.1 Indoor Access. Where access to an equipment room is made through an aquatic facility, a door shall be installed. The door shall be equipped with an automatic closer and lock, and a gasket or other approved means to prevent passage of air, fumes, or vapors. The floor of the equipment room shall be sloped away from the door to the aquatic facility.

603.0 Electrical Systems.

603.1 General. The design, installation, alteration, modification, construction, maintenance, and testing of electrical systems and equipment associated with a swimming pool, spa, or hot tub shall comply with NFPA 70.

604.0 Pumps.

604.1 General. Electrically operated pumps shall comply with NSF 50 and UL 1081. Strainers shall comply with NSF 50. Pumps and strainers shall be installed in accordance with the manufacturer's installation instructions.

Exception: Self-contained spas that comply with UL 1563.

604.2 Strainers. Circulating pumps shall be equipped with an approved-type hair and lint strainer on the inlet side where used in conjunction with pressure filters. Pumps used with vacuum filters do not require strainers except where filter elements are removed for cleaning.

604.3 Base. Pumps shall be mounted on a substantial base in a manner that will eliminate strain on piping and isolate pump vibration.

604.4 Design Capacity. Pumps shall have design capacity at the following heads:

- (1) Pressure diatomite type - not less than 60 feet (18 288 mm)
- (2) Vacuum diatomite type - 20 inches (508 mm) vacuum on the suction side and 40 feet (12 192 mm) total head
- (3) Rapid sand - not less than 45 feet (13 716 mm)
- (4) High-rate sand - not less than 60 feet (18 288 mm)
- (5) Cartridge - not less than 50 feet (15 240 mm)

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CHAPTER 7 HEATERS

701.0 General.

701.1 Applicability. The regulations of this chapter shall govern the construction, location, and installation of heaters specifically designed and listed for swimming pools, spas, or hot tubs. Design, construction, and workmanship shall comply with accepted engineering practices, manufacturer's instructions, and applicable standards and shall be of such character as to secure the results sought to be obtained by this code.

701.2 Permits. It shall be unlawful for a person to install, remove, or replace or cause to be installed, removed, or replaced a swimming pool, spa, or hot tub heater without first obtaining a permit from the Authority Having Jurisdiction to do so.

701.3 Final Inspection. This inspection shall be made after the work authorized by the permit has been installed. The Authority Having Jurisdiction will make such inspection as deemed necessary to be assured that the work has been installed in accordance with the intent of this code. No heater or part thereof shall be covered or concealed until the same has been inspected and approved by the Authority Having Jurisdiction.

702.0 Heaters.

702.1 Gas Fired Heaters. Gas-fired heaters for pools, spas, or hot tubs shall comply with CSA Z21.56.

702.2 Electric Heaters. Electric heaters for pools, spas, or hot tubs shall comply with UL 1261.

Exception: Electric heaters for self-contained spas that comply with UL 1563.

702.3 Heat Pumps. Heat pumps for pools, spas, or hot tubs shall comply with UL 1995.

702.4 Solar Pool, Spa, and Hot Tub Heaters. Where solar technology is used to heat a swimming pool, spa, or hot tub, it shall be installed in accordance with the Uniform Solar Energy and Hydronics Code and the manufacturer's installation instructions.

702.5 Sizing. Heaters shall be sized in accordance with the manufacturer's instructions.

702.6 Installation. Heaters shall be installed in accordance with the manufacturer's installation instructions and the mechanical code.

702.6.1 Temperature. A means shall be provided to monitor water temperature.

702.6.2 Pump Delay. Where required by the manufacturer, heaters shall be installed with an automatic device that will ensure that the pump continues to run after the heater shuts off for the time period specified by the manufacturer.

702.6.3 Ground Support. Heaters supported from the ground shall rest on level concrete or other approved base extending not less than 3 inches (76 mm) above the adjoining ground level.

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CHAPTER 8

SAFETY

801.0 General.

801.1 Applicability. This chapter shall govern general safety requirements (e.g. means of entry and exit, barriers, signage, etc.) as they pertain to swimming pools, spas, and hot tubs.

802.0 Means of Entry and Exit Including Steps, Ladders, and Stairs.

802.1 Swimming Pools. Swimming pools shall have not less than two means of entry/exit located to serve both ends of the pool by means of steps, recessed steps, ladders, stairs, zero-depth entry, or combination thereof. One entry/exit shall be provided in the shallow area of the pool where the vertical distance from the bottom of the pool to the deck exceeds 2 feet (610 mm). A second means of entry/exit shall be provided in the deep area of a pool having a depth that exceeds 54 inches (1372 mm). Where the width of the pool exceeds 30 feet (9144 mm), such means of entry/exit shall be provided at each side not more than 100 feet (30 480 mm) apart. Wading pools shall have not less than one means of entry/exit by means of steps, stairs, zero-depth entry, or combination thereof.

Exception: Private swimming pools shall be permitted to have one entry/exit where the pool depth does not exceed 54 inches (1372 mm) and the width of the pool does not exceed 30 feet (9144 mm).

802.2 Spas and Hot Tubs. Spas and hot tubs shall have not less than one entry/exit by means of steps, ladders, stairs, seats, or combination thereof. No point within a spa or a hot tub shall be located more than 16 feet (4877 mm) from the required entry/exit. Where the distance exceeds 16 feet (4877 mm), an additional entry/exit shall be required.

802.3 Wave Pools. Bathers shall gain access to a wave pool at a zero-depth entry. Ladders shall be utilized for exit purposes. Ladders shall be installed flush with the pool wall and designed, so that body extremities will not become entangled.

802.4 Ladder, Step, and Stair Construction. Ladders shall be constructed of corrosion-resistant material and shall be equipped with slip-resistant tread surfaces. Ladder treads shall be spaced not more than 12 inches (305 mm) vertically apart. Ladder shall be permanently affixed and shall provide a clearance of not less than 3 inches (76 mm) or not more than 5 inches (127 mm) between any part of the ladder and the pool, spa, or hot tub wall. Recessed steps shall have a depth of not less than 6 inches (152 mm), a width of not less than 12 inches (305 mm), and spaced not more than 12 inches (305 mm) vertically apart. Recessed treads shall be slip-resistant, and designed to drain into the spa. Stairs shall be constructed of corrosion-resistant material and shall be equipped with slip-resistant tread surfaces. Each stair shall have a tread depth of not less than 10 inches (254 mm), risers shall have a uniform height of not more than 7 inches (178 mm), and treads shall have a width of not less than 24 inches (610 mm).

The front edge of each step shall be marked with a color contrasting stripe of not less than 2 inches (51 mm) wide for the entire width of the step.

Exception: Portable ladders or stairs for aboveground or onground pools, spas, or hot tubs shall be permitted where approved by the Authority Having Jurisdiction and used in accordance with the ladder or stair manufacturer's instructions. Such ladders or stairs shall be removed or secured where the pool, spa, or hot tub is not in use.

802.5 Hand Railings. Hand railings shall be constructed of corrosion-resistant material. Hand railings shall be provided at the top and both sides and shall extend over the coping for all ladders, steps, and stairs.

802.6 Zero-Depth Entry. Where zero-depth entries are provided for public aquatic venues, they shall be slip-resistant. The slope of a zero-depth entry shall not exceed 1 foot (305 mm) in 20 feet (6096 mm) to a water depth of 3 feet (914 mm).

803.0 Barrier Requirements.

803.1 General. An outdoor swimming pool (including an inground, aboveground, or onground pool), spa, or hot tub shall be provided with a barrier in accordance with Section 803.2 through Section 803.7 and enclosed on all sides.

803.2 Barrier Location. Barriers shall be not less than 48 inches (1219 mm) above a permanent object that is within 48 inches (1219 mm) of the outside of the barrier. Measurement shall be taken perpendicular from the height of the barrier.

803.3 Barrier Height. The top of the barrier shall be not less than 48 inches (1219 mm) above grade measured on the side of the barrier that faces away from the swimming pool, spa, or hot tub. The maximum vertical clearance between grade and the bottom of the barrier shall not exceed 4 inches (102 mm) measured on the side of the barrier that faces away from the swimming pool, spa, or hot tub. Where the top of the pool, spa, or hot tub structure is above grade, the barrier shall be permitted to be at ground level or mounted on top of the pool structure only where permitted by the manufacturer. Where the barrier is mounted on top of the pool structure, the maximum vertical clearance between the top of the structure and the bottom of the barrier shall not exceed 4 inches (102 mm).

803.3.1 Openings in Barrier. Openings in the barrier shall not allow passage of a 4 inch (102 mm) diameter sphere.

803.3.2 Solid Barrier. Solid barriers that do not have openings shall not contain indentations or protrusions except for normal construction tolerances and tooled masonry joints.

803.3.3 Horizontal and Vertical Members for Barrier. Where the barrier is composed of horizontal and vertical members and the distance between the tops of

the horizontal members is less than 45 inches (1143 mm), the horizontal members shall be located on the pool, spa, or hot tub side of the fence. The spacing between vertical members shall not exceed 1³/₄ inches (44 mm) in width.

Where the barrier is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches (1143 mm) or more, the spacing between vertical members shall not exceed 4 inches (102 mm).

Where there are decorative cutouts, the spacing with the cutouts shall not exceed 1³/₄ inches (44 mm) in width.

803.3.4 Chain Link Barrier. Maximum mesh size for chain link barriers shall not exceed 1³/₄ inches (44 mm) square.

803.3.5 Diagonal Members. Where the barrier is composed of diagonal members such as a lattice, the maximum opening formed by the diagonal members shall not exceed 13³/₄ inches (349 mm).

803.4 Access Gates or Doors. Pedestrian access gates or doors shall comply with Section 803.1 through Section 803.3.5 and shall be equipped with a self-closing and self-latching device. Gates or doors shall open outward or away from the pool, spa, or hot tub area. Gates or doors other than pedestrian access gates or doors shall have a self-latching device. Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from the bottom of the gate or door, the release mechanism shall be located on the pool, spa, or hot tub side of the gate at not less than 3 inches (76 mm) below the top of the gate and the gate/door, and the barrier shall have no opening greater than 1/2 inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.

803.5 Barrier Wall. Where a wall of a building or structure serves as part of the barrier, one of the following conditions shall apply:

- (1) The pool, spa, or hot tub shall be equipped with a powered safety cover in accordance with ASTM F1346.
- (2) Doors, windows or any other openings providing direct access to the pool, spa, or hot tub through such wall shall be equipped with an alarm listed for the purpose in accordance with UL 2017 that produces an audible warning where the door and its screen, where present, are opened. The alarm shall be installed in accordance with the manufacturer's installation instructions, and the deactivation touch pads, or switches shall be located not less than 54 inches (1372 mm) above the threshold of the door.
- (3) Other means of protection, such as self-closing doors with self-latching devices shall be permitted where the degree of protection is not less than the protection in Section 803.5(1) or Section 803.5(2).

803.6 Aboveground Barrier. Where an aboveground pool structure is used as a barrier or where the barrier is mounted on the top of the structure, and the means of access is a ladder or steps, then the ladder or steps shall be capable of being secured, locked, or removed to prevent access or the ladder or steps shall be surrounded by a barrier that is in accordance

with Section 803.1 through Section 803.5. Where the ladder or steps are secured, locked, or removed, any opening created shall not permit the passage of a 4 inch (102 mm) diameter sphere.

803.7 Indoor Swimming Pool. Walls surrounding an indoor swimming pool, spa, or hot tub shall comply with Section 803.5.

804.0 Electrical Safety.

804.1 General. Swimming pools, spas, and hot tubs shall comply with the electrical safety requirements of Section 804.2 through Section 804.5, and NFPA 70.

804.2 Grounding. The following devices and equipment associated with a swimming pool, spa, or hot tub shall be grounded in accordance with NFPA 70, Article 680:

- (1) Underwater lighting
- (2) Electrical equipment and panelboards
- (3) Ground-fault circuit interrupters

804.3 Bonding. The following devices, parts and equipment associated with a swimming pool, spa, or hot tub shall be bonded in accordance with NFPA 70, Article 680:

- (1) Metal parts within or attached to a pool, spa, or hot tub
- (2) Electrical equipment that is part of the circulation system
- (3) Electrical equipment that is part of a pool cover assembly
- (4) Metal piping
- (5) Metal surfaces
- (6) Electrical devices and controls that are not part of a pool, spa, or hot tub

804.4 GFCI Protection. The following devices and equipment associated with a swimming pool, spa, or hot tub shall be GFCI protected in accordance with NFPA 70, Article 680:

- (1) Receptacles located within the general area of a pool, spa, or hot tub
- (2) Receptacles used for power generation for pools, spas, and hot tubs
- (3) Electrical equipment

804.5 Emergency Shutoff. An emergency shutoff device that stops power to all systems and equipment of a public swimming pool, spa, or hot tub shall be marked and located in accordance with NFPA 70, Article 680.

805.0 Signage.

805.1 General. Instructional, operational, and safety signage shall comply with the Authority Having Jurisdiction. Signage shall be clearly visible at all entrances and at specific locations where applicable. The following signage shall be provided, but not limited to:

- (1) Maximum occupant load
- (2) Warning signs
- (3) Stair and ladder markings
- (4) Operation of pool

- (5) User sanitation and safety rules
- (6) Transitional markings for pool slope
- (7) Depth of pool markings
- (8) No diving markings
- (9) Notices on the dangers of diving and jumping from boards
- (10) No lifeguard on duty
- (11) The maximum water depth at the entrance of water slides wave pools, leisure rivers, and other types of aquatic recreational attractions.

806.0 Safety Covers.

806.1 General. Safety covers for swimming pools, spas, and hot tubs shall be installed in accordance with ASTM F1346. A cover shall not be installed where a swimming pool, spa, or hot tub is in use. Operators for electrically operated swimming pool and spa covers shall comply with UL 2452.

807.0 Chemicals.

807.1 General. Chemicals for a swimming pool, spa, or hot tub shall be handled in accordance with Section 807.2 and stored in accordance with Section 807.3.

807.2 Handling. Chemicals shall be handled in accordance with the following provisions:

- (1) Chemical containers shall be labeled.
- (2) Chemicals shall be handled in accordance with the manufacturer's instructions and Material Safety Data Sheets (MSDS).
- (3) Protective gear shall be worn in accordance with the manufacturer's instructions and Material Safety Data Sheets (MSDS).
- (4) A separate measuring device shall be used for each chemical.
- (5) The mixing of chemicals that will violate the manufacturer's instructions shall be prohibited.
- (6) Water shall not be added to a chemical located within its container.

807.3 Storage. Chemicals used in the treatment of a public swimming pool, spa, or hot tub shall be stored in accordance with NFPA 400. Chemicals used in the treatment of a private swimming pool, spa, or hot tub shall be stored in accordance with the following provisions:

- (1) Federal, state and local requirements shall be followed.
- (2) Chemicals shall be stored and stacked in accordance with the manufacturer's instructions and Material Safety Data Sheets (MSDS).
- (3) Liquid chemicals shall be stored below solid, powdered, or granular products. Chemicals shall be stored on pallets or shelves, not on the floor. Secondary containment for all liquid chemicals shall be provided.
- (4) Chemicals shall be stored in a clean, cool, dry, uncluttered, well-lit, and well-ventilated area that is out of the reach of children and unauthorized personnel.

- (5) Chemical containers shall be sealed with the original label affixed.
- (6) Chemicals shall be stored away from flammable products. Smoking shall be prohibited in the presence of chemicals.
- (7) Chemicals shall not be stored in the same area as other chemicals or substances; this includes dissimilar or non-compatible chemicals, that are not used for the treatment of a pool, spa, or hot tub.
- (8) Chemical containers shall regularly be inspected for signs of moisture, corrosion, or damage.
- (9) Chemicals shall be used on a first in, first out basis.

808.0 Water Clarity.

808.1 General. The provisions for measuring water clarity in a public swimming pool, spa, or hot tub shall be in accordance with Section 808.2.

808.2 Parameters. Water clarity shall be checked and measured on a daily basis before use in accordance with local and state codes or regulations. Where such codes or regulations do not exist, one of the following methods shall be used to measure water clarity:

- (1) A 2 inch (51 mm) disk, with alternating black and red quadrants, placed in the deepest portion of the water that is capable of being seen clearly. This method is only permitted for a swimming pool.
- (2) A measuring device such as an approved turbidity meter used in accordance with the manufacturer's instructions and shall not exceed a reading of 0.25 Nephelometric Turbidity Units (NTUs).
- (3) Clearly distinguish the main drain from the background.
- (4) A 6 inch (152 mm) black disk, placed in the deepest portion of the water that is capable of being seen clearly. This method is only permitted for a swimming pool.

809.0 Life Safety and Rescue Equipment.

809.1 General. Approved life safety and rescue equipment shall be present at a public facility that incorporates a swimming pool, spa, hot tub, or combination thereof in accordance with Section 809.2.

809.2 Equipment. Life safety and rescue equipment shall be provided in accordance with Section 809.2.1 and Section 809.2.2. The equipment manufacturer's instructions for maintenance shall be followed. Such equipment shall not be used for purposes for which it was not designed or intended, and shall be inspected daily for wear or breakage.

809.2.1 Guarded Facilities. For each 2000 square feet (185.8 m²) of water surface area and where a life-guard is present, the following life safety and rescue equipment shall be present at all times in a visible, readily accessible location:

- (1) Ring buoy
- (2) Rescue tube
- (3) Extension pole
- (4) Shepherd's crook

- (5) Backboard with not less than six straps and a head immobilizer
- (6) Lifeguard chair
- (7) First-aid kit
- (8) Biohazard kit
- (9) Supplemental oxygen equipment
- (10) Suctioning equipment
- (11) Automatic External Defibrillator (AED)
- (12) Emergency telephone
- (13) Fire extinguisher

809.2.2 Unguarded Facilities. For each 2000 square feet (185.8 m²) of water surface area and where a life-guard is not present, the following life safety and rescue equipment shall be present at all times in a visible, readily accessible location:

- (1) Ring buoy
- (2) Rescue tube
- (3) Extension pole
- (4) Shepherd's crook
- (5) Backboard with not less than six straps and a head immobilizer
- (6) First-aid kit
- (7) Biohazard kit
- (8) Emergency telephone
- (9) Fire extinguisher

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CHAPTER 9 AQUATIC RECREATIONAL ATTRACTIONS

901.0 General.

901.1 Applicability. This chapter shall govern the general requirements for design, materials, and methods of construction for diving facilities and equipment, swimming pool slides, water slides, wave pools, leisure rivers, and spray grounds.

902.0 Diving Equipment.

902.1 General. Diving facilities including location and placement of diving equipment, minimum dimensions, depth, slope, size of envelope shall comply with Section 301.2 and FINA standards, and shall be installed in accordance with the manufacturer's installation instructions. Minimum dimensions shall comply with FINA FR 5 (Diving Facilities).

902.2 Diving Boards. Springboards and jumpboards including their supports and platforms shall be designed and of structural strength to carry the maximum anticipated loads. Where diving equipment is installed, it shall be located in a separate diving area of the pool segregated from swimming areas.

902.3 Diving Stands, Stairs, and Ladders. Diving stands, stairs, and ladders for diving equipment shall be of approved construction and of structural strength to carry anticipated loads. Stairs and ladders shall be of corrosion resistant material and treads shall be slip-resistant design. Diving stands exceeding 24 inches (610 mm) measured from the deck to the top end of the board shall be provided with stairs or ladders.

902.4 Guardrails. Guardrails shall be provided for diving equipment that exceeds 39 inches (991 mm) in height measured from the deck to the top end of the board. Guardrails shall be not less than 30 inches (762 mm) above the diving board and extending to not less than 6 inches (152 mm) past the edge of the pool wall.

903.0 Swimming Pool Slides.

903.1 General. Swimming pool slides shall comply with 16 C.F.R. part 1207 (Safety Standard for Swimming Pool Slides) or equivalent standards.

903.2 Installation. Swimming pool slides shall be installed in accordance with the manufacturer's installation instructions. Swimming pool slides shall not exceed 10 feet (3048 mm) in height, and shall terminate at or below the normal operating water level of the pool. Where water is used, the flow rate shall not exceed 100 gallons per minute (gpm) (6.31 L/s).

904.0 Water Slides and Landing Pools.

904.1 General. The design, construction, and operation of a water slides and landing pools shall comply with ASTM F2376, and shall be installed in accordance with Section

904.2 through Section 904.11.1 and the manufacturer's installation instructions.

904.2 Handholds. Handholds consisting of railings, or other approved methods, not more than 2 inches (51 mm) in size shall be installed at the entrance of a water slide.

904.3 Structural Design. The structural design of a water slide and the materials used in its construction shall sustain all the dead loads, live loads, and hydrostatic pressures.

904.4 Flumes. Flume surfaces shall be inert, nontoxic, and smooth.

904.4.1 Curves and Turns. Curves and turns in a flume shall comply with the following:

- (1) Impact between the bather and the flume walls shall not present a hazard, cause injury, or cause the bather to become inverted in the flume.
- (2) Flumes shall be banked so that the forces on the bathers will keep them inside the flume.
- (3) Unless designed for such use, bathers shall not become airborne.

904.4.2 Valleys and Dips. Flume valleys and dips shall be capable of being drained, be designed to contain the rider inside the flume under operating conditions, and shall have a means of egress.

904.5 Flume Exits. Flume exits shall be designed to ensure that the bathers enter the landing pool or slide runout at a safe speed and angle of entry.

904.6 Water Slide Termination. Waterslides shall terminate at or below water level.

Exceptions:

- (1) Drop slides.
- (2) Where permitted by the water slide manufacturer.

904.6.1 Perpendicular. Water slide exits shall be perpendicular to the wall of the aquatic venue at the point of exit.

904.7 Landing Pools. Where steps are provided instead of exit ladders or recessed steps with grab rails, a handrail shall be provided at the steps opposite to the point of exit from each flume.

904.7.1 Landing Area. Where the water slide flume ends in a swimming pool, the landing area shall be divided from the rest of the aquatic venue by a float line or in accordance with the Authority Having Jurisdiction.

904.8 Decks. A perimeter deck shall be provided along the exit side of the landing.

904.9 Means of Access. A walkway, steps, stairway or ramp shall be provided between the landing pools and the top of the flume.

904.10 Slide Run-Outs. Waterslide run-outs shall have a means of egress unless one or both of the walls of the run-out are not more than 12 inches (305 mm) in height.

904.11 Drop Slides. A slide landing area shall be provided in accordance with the slide manufacturer's instructions.

904.11.1 Landing Area. The slide landing area shall not infringe on the landing area for other water slides, diving equipment, or other minimum aquatic venue clearance requirements. Steps shall not infringe on the slide landing area.

905.0 Wave Pools.

905.1 General. Wave pools shall have a means of entry and exit in accordance with Section 802.3. The floor slope of a wave pool shall not exceed 1 foot (305 mm) in 12 feet (3658 mm). Caissons shall be separated from areas used by bathers with a float line in accordance with the Authority Having Jurisdiction. Openings in a caisson shall be designed to prevent the passage of a 4 inch (102 mm) diameter sphere. Not less than two emergency shut-off switches (one on each side) shall be provided to disable the wave action, and shall be located such that the switches or wave generation equipment are not capable of being accessed by unauthorized personnel. An automatic audible warning system shall be provided to indicate the beginning of wave generation. Approved "NO DIVING" signage shall be provided around the perimeter of the pool, except in areas not accessible by bathers or at zero-depth entries, at intervals of not less than 25 feet (7620 mm). A perimeter deck shall be provided at the shallow or beach end where bathers are capable of accessing the wave pool, and in locations where access is required for lifeguards. The sides of the wave pool shall be protected from unauthorized entry into the wave pool by the use of a fence or other approved barrier.

906.0 Interactive Water Play Venues.

906.1 General. An interactive water play venue shall have a nonabrasive, slip-resistant surface that will withstand repeated cleanings. Interactive water play venues shall be sloped uniformly not less than ¼ inch per foot (20.8 mm/m) towards the drains or as required by the Authority Having Jurisdiction to prevent the accumulation of water. Drainage flow to the spray ground treatment tank shall be by gravity. Openings in drain covers shall not exceed ½ of an inch (12.7 mm) in size. Interactive water play venues shall be kept free of landscape debris in accordance with one of the following:

- (1) Eight feet (2438 mm) of deck area
- (2) Raised curbs
- (3) Raised planters

A barrier of not less than 4 feet (1219 mm) in height shall be installed between an interactive water play venue and another body of water located within the same aquatic facility unless there is a separation distance of not less than 15 feet (4572 mm). The nozzle velocity of an interactive water play venue shall not exceed 20 feet per second (ft/s) (6.1 m/s).

CHAPTER 10 REFERENCED STANDARDS

1001.0 General.

1001.1 Standards. The standards listed in Table 1001.1 are referenced in various sections of this code and shall be considered part of the requirements of this document. The standards are listed herein by the standard number and effective

date, the title, application and the section(s) of this code that reference the standard. The application of the referenced standard(s) shall be as specified in Section 301.2.2. The promulgating agency acronyms referred to in Table 1001.1 are defined in a list found at the end of the chapter.

**TABLE 1001.1
REFERENCED STANDARDS**

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTIONS
ACI 318-2014	Building Code Requirements for Structural Concrete	Miscellaneous	402.3.1, 404.3.1
APSP 16-2011	Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs	Fittings	511.1
ASME A112.3.1-2007 (R2012)	Stainless Steel Drainage Systems for Sanitary DWV, Storm, and Vacuum Applications, Above- and Below-Ground	Piping, Ferrous	310.6.2, 413.1, Table 309.1
ASME A112.6.3- 2004 (R2007) 2016	Floor and Trench Drains	DWV Components	413.1
ASME A112.18.1- 2012/CSA B125.1-2012	Plumbing Supply Fittings	Fittings	409.2, 410.2, 410.3
ASME A112.18.6-2009 /CSA B125.6-2009 (R2014)	Flexible Water Connectors	Piping	307.4
ASME A112.19.1-2013/CSA B45.2-2013	Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures	Fixtures	409.1, 410.1, 412.1
ASME A112.19.2-2013/CSA B45.1-2013	Ceramic Plumbing Fixtures	Fixtures	407.1, 407.2, 407.2.2, 408.1, 409.1, 410.1, 412.1
ASME A112.19.3- 2008 2017/CSA B45.4- 2008 (R2013) 2017	Stainless Steel Plumbing Fixtures	Fixtures	407.1, 409.1, 410.1, 412.1
ASME A112.19.12-2014	Wall Mounted, Pedestal Mounted, Adjustable, Elevating, Tilting, and Pivoting Lavatory, Sink, and Shampoo Bowl Carrier Systems and Drain Waste Systems	Fixtures	409.1
ASME A112.19.14-2013	Six-Liter Water Closets Equipped with a Dual Flushing Device	Fixtures	407.2.1
ASME A112.19.17-2010	Manufactured Safety Vacuum Release Systems (SVRS) for Residential and Commercial Swimming Pool, Spa, Hot Tub, and Wading Pool Suction Systems	Safety Systems	511.1.3
ASME A112.19.19- 2006 (R2011) 2016	Vitreous China Nonwater Urinals	Fixtures	408.1
ASME B1.20.1-2013	Pipe Threads, General Purpose (Inch)	Joints	308.1.5, 308.2.3, 308.5.2, 308.12.3, 310.1.3, 310.3.4, 310.4.2, 310.5.3
ASME B16.3- 2011 2016	Malleable Iron Threaded Fittings: Classes 150 and 300	Fittings	Table 307.1, Table 309.1
ASME B16.4- 2011 2016	Gray Iron Threaded Fittings: Classes 125 and 250	Fittings	Table 307.1
ASME B16.12-2009 (R2014)	Cast Iron Threaded Drainage Fittings	Fittings	Table 309.1
ASME B16.15-2013	Cast Copper Alloy Threaded Fittings: Classes 125 and 250	Fittings	Table 307.1
ASME B16.18-2012	Cast Copper Alloy Solder Joint Pressure Fittings	Fittings	Table 307.1

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTIONS
ASME B16.22-2013	Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings	Fittings	Table 307.1
ASME B16.23- 2011 2016	Cast Copper Alloy Solder Joint Drainage Fittings: DWV	Fittings	Table 309.1
ASME B16.26-2013	Cast Copper Alloy Fittings for Flared Copper Tubes	Fittings	Table 307.1
ASME B16.29-2012	Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings - DWV	Fittings	Table 309.1
ASME B16.51-2013	Copper and Copper Alloy Press-Connect Pressure Fittings	Fittings	Table 307.1
ASSE 1016- 2011 2017/ASME A112.1016- 2011 2017/CSA B125.16- 2011 20- 17	Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations	Valves	410.3
ASSE 1019-2011 (R2016)	Wall Hydrant with Backflow Protection and Freeze Resistance	Backflow Protection	414.1
ASSE 1061-2015	Push-Fit Fittings	Fittings	308.1.3.3, 308.2.1, Table 307.1
ASSE 1069-2005	Automatic Temperature Control Mixing Valves	Valves	410.3
ASSE 1070-2015/ASME A112.1070-2015/CSA B125.70-2015	Water Temperature Limiting Devices	Valves	409.3
ASSE 1079-2012	Dielectric Pipe Unions	Joints	308.14, 308.15.1, 308.15.3
ASTM A53/A53M-2012	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	Piping, Ferrous	Table 307.1, Table 309.1
ASTM A74-2016	Cast Iron Soil Pipe and Fittings	Piping, Ferrous	Table 309.1
ASTM A269/A269M-2015a	Seamless and Welded Austenitic Stainless Steel Tubing for General Service	Piping, Ferrous	Table 307.1
ASTM A312/A312M- 2016 2017	Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes	Piping, Ferrous	Table 307.1
ASTM A888-2015	Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications	Piping, Ferrous	Table 309.1
ASTM A1056-2012	Cast Iron Couplings Used for Joining Hubless Cast Iron Soil Pipe and Fittings	Piping, Ferrous	310.2.2
ASTM B32-2008 (R2014)	Solder Metal	Joints	308.1.4, 310.3.3
ASTM B42-2015a	Seamless Copper Pipe, Standard Sizes	Piping, Copper Alloy	Table 307.1
ASTM B43-2015	Seamless Red Brass Pipe, Standard Sizes	Piping, Copper Alloy	Table 309.1
ASTM B75/B75M-2011	Seamless Copper Tube	Piping, Copper Alloy	Table 307.1, Table 309.1
ASTM B88- 2014 2016	Seamless Copper Water Tube	Piping, Copper Alloy	307.3, Table 307.1
ASTM B251-2010	General Requirements for Wrought Seamless Copper and Copper-Alloy Tube	Piping, Copper Alloy	Table 307.1, Table 309.1
ASTM B302-2012	Threadless Copper Pipe, Standard Sizes	Piping, Copper Alloy	Table 307.1, Table 309.1
ASTM B306-2013	Copper Drainage Tube (DWV)	Piping, Copper Alloy	Table 309.1
ASTM B447-2012a	Welded Copper Tube	Piping, Copper Alloy	Table 307.1
ASTM B813-2010	Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube	Joints	308.1.4, 310.3.3
ASTM B828- 2002 (R2010) 2016	Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings	Joints	308.1.4, 310.3.3
ASTM C425-2004 (R2013)	Compression Joints for Vitrified Clay Pipe and Fittings	Joints	310.7.1
ASTM C564-2014	Rubber Gaskets for Cast Iron Soil Pipe and Fittings	Joints	310.2.2

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTIONS
ASTM C700-2013	Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated	Piping, Non-Metallic	Table 309.1
ASTM C1173-2010 (R2014)	Flexible Transition Couplings for Underground Piping Systems	Joints	310.8
ASTM C1277-2015	Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	Joints	310.2.2
ASTM C1460-2012	Shielded Transition Couplings for Use with Dissimilar DWV Pipe and Fittings Above Ground	Joints	310.8
ASTM C1461-2008 (R2013)	Mechanical Couplings Using Thermoplastic Elastomeric (TPE) Gaskets for Joining Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems for Above and Below Ground Use	Joints	310.8
ASTM C1540-2015	Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	Joints	310.2.2
ASTM C1563-2008 (R2013)	Gaskets for Use in Connection with Hub and Spigot Cast Iron Soil Pipe and Fittings for Sanitary Drain, Waste, Vent, and Storm Piping Applications	Joints	310.2.2
ASTM D1593-2013	Nonrigid Vinyl Chloride Plastic Film and Sheeting	Testing	402.4
ASTM D1785-2015	Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120	Piping, Plastic	Table 307.1, Table 309.1
ASTM D1790-2014	Brittleness Temperature of Plastic Sheeting by Impact	Testing	402.4
ASTM D2235-2004 (R2011) (R2016)	Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings	Joints	310.1.2
ASTM D2239-2012a	Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter	Piping, Plastic	Table 307.1
ASTM D2241-2015	Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)	Piping, Plastic	Table 307.1
ASTM D2464-2015	Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80	Fittings	Table 307.1
ASTM D2466-2015	Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40	Fittings	Table 307.1
ASTM D2467-2015	Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80	Fittings	Table 307.1
ASTM D2564-2012	Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems	Joints	308.12.2, 310.5.2
ASTM D2609-2015	Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe	Fittings	Table 307.1
ASTM D2661-2014	Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings	Piping, Plastic	Table 309.1
ASTM D2665-2014	Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings	Piping, Plastic	Table 309.1
ASTM D2680-2001 (R2014)	Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping	Piping, Plastic	Table 309.1
ASTM D2683-2014	Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing	Fittings	Table 307.1
ASTM D2737-2012a	Polyethylene (PE) Plastic Tubing	Piping, Plastic	Table 307.1
ASTM D2846/D2846M-2014	Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems	Piping, Plastic	308.2.2, 308.3.1, Table 307.1
ASTM D3035-2015	Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter	Piping, Plastic	Table 307.1
ASTM D3139-1998 (R2011)	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	Joints	308.12.1
ASTM D3212-2007 (R2013)	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals	Joints	310.1.1, 310.5.1
ASTM D3261-2015 2016	Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing	Fittings	Table 307.1

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTIONS
ASTM F437-2015	Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80	Fittings	Table 307.1
ASTM F438-2015	Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40	Fittings	Table 307.1
ASTM F439-2013	Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80	Fittings	Table 307.1
ASTM F441/F441M-2015	Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80	Piping, Plastic	Table 307.1
ASTM F442/F442M-2013 ^{e1}	Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)	Piping, Plastic	308.2.2, Table 307.1
ASTM F493-2014	Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings	Joints	308.2.2, 308.3.1
ASTM F628-2012 ^{e2}	Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core	Piping, Plastic	Table 309.1
ASTM F656-2015	Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings	Joints	308.2.2, 308.3.1, 308.12.2, 310.5.2
ASTM F794-2003 (R2014)	Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter	Piping, Plastic	Table 309.1
ASTM F876-2015a	Crosslinked Polyethylene (PEX) Tubing	Piping, Plastic	308.9.1, Table 307.1
ASTM F877-2011a	Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems	Piping, Plastic	Table 307.1
ASTM F891- 2010 2016	Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe with a Cellular Core	Piping, Plastic	Table 309.1
ASTM F1055- 2015 2016a	Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing	Fittings	Table 307.1
ASTM F1281-2011	Crosslinked Polyethylene/Aluminum/ Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe	Piping, Plastic	Table 307.1
ASTM F1282- 2010 2017	Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe	Piping, Plastic	Table 307.1
ASTM F1346-1991 (R2010)	Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas, and Hot Tubs	Miscellaneous	803.5, 806.1
ASTM F1488-2014	Coextruded Composite Pipe	Piping, Plastic	Table 309.1
ASTM F1807- 2015 2017	Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing	Fittings	Table 307.1
ASTM F1866-2013	Poly (Vinyl Chloride) (PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings	Fittings	Table 309.1
ASTM F1960-2015	Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing	Fittings	Table 307.1
ASTM F1961-2009	Metal Mechanical Cold Flare Compression Fittings with Disc Spring for Crosslinked Polyethylene (PEX) Tubing	Fittings	Table 307.1
ASTM F1970-2012 ^{e1}	Special Engineered Fittings, Appurtenances or Valves for Use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems	Piping, Plastic	Table 307.1
ASTM F1974-2009 (R2015)	Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure Pipe	Fittings	308.7.1, 308.10.1, Table 307.1
ASTM F2080- 2015a 2016	Cold-Expansion Fittings W with Metal Compression-Sleeves for Cross-linked Crosslinked Polyethylene (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe	Fittings	Table 307.1

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTIONS
ASTM F2098-2015	Stainless Steel Clamps for Securing SDR9 Cross-linked Polyethylene (PEX) Tubing to Metal Insert and Plastic Insert Fittings	Joints	Table 307.1
ASTM F2159-2014	Plastic Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing	Joints	Table 307.1
ASTM F2262-2009	Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Tubing OD Controlled SDR9	Piping, Plastic	Table 307.1
ASTM F2376-2013	Classification, Design, Manufacture, Construction, and Operation of Water Slide Systems	Water Slides	904.1
ASTM F2389- 2015 2017a	Pressure-Rated Polypropylene (PP) Piping Systems	Piping, Plastic	308.11.1, Table 307.1
ASTM F2434-2014	Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene (PEX-AL-PEX) Tubing	Fittings	308.10.1, Table 307.1
ASTM F2620-2013	Heat Fusion Joining of Polyethylene Pipe and Fittings	Joints	308.6.1.1, 308.6.1.3
ASTM F2735-2009 (R2016)	Plastic Insert Fittings for SDR9 Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing	Fittings	Table 307.1
ASTM F2769- 2014 2016	Polyethylene of Raised Temperature (PE-RT) Plastic Hot and Cold-Water Tubing and Distribution Systems	Piping and Fittings, Plastic	Table 307.1
ASTM F2855-2012	Chlorinated Poly(Vinyl Chloride)/Aluminum/ Chlorinated Poly(Vinyl Chloride) (CPVC-AL-CPVC) Composite Pressure Tubing	Piping, Plastic	308.3.1, Table 307.1
AWS A5.8M/A5.8-2011	Filler Metals for Brazing and Braze Welding	Joints	308.1.1, 310.3.1
AWS A5.9/A5.9M- 2012 2017 (ISO 14343:2009 MOD)	Bare Stainless Steel Welding Electrodes and Rods Welding Consumables—Wire Electrodes, Strip Electrodes, Wires, and Rods for Arc Welding of Stainless and Heat Resisting Steels—Classification	Joints	308.13.2
AWWA C110-2012	Ductile-Iron and Gray-Iron Fittings	Fittings	Table 307.1
AWWA C111- 2012 2017	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings	Joints	308.4.1, 308.4.2
AWWA C151- 2009 2017	Ductile-Iron Pipe, Centrifugally Cast	Piping, Ferrous	Table 307.1
AWWA C153-2011	Ductile-Iron Compact Fittings	Fittings	Table 307.1
AWWA C900 2007 2016	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 42 60 in. (100 mm through 300 1,500 mm); for Water Transmission and Distribution	Piping, Plastic	Table 307.1
AWWA C901-2008	Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. (13 mm) through 3 in. (76 mm), for Water Service	Piping, Plastic	Table 307.1
AWWA C904-2016	Crosslinked Polyethylene (PEX) Pressure Tubing, 1/2 in.(13 mm) through 3 in. (76 mm), for Water Service	Piping, Plastic	Table 307.1
CISPI 301-2012	Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications	Piping, Ferrous	Table 309.1
CISPI 310-2012	Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications	Joints	310.2.2
CSA B45.5- 2014 2017 /IAPMO Z124- 2014 2017	Plastic Plumbing Fixtures	Fixtures	407.1, 408.1, 409.1, 410.1
CSA B45.11-2011/IAPMO Z401-2011	Glass Plumbing Fixtures	Fixtures	409.1
CSA B64.2.1.1-2011 (R2016)	Hose Connection Dual Check Vacuum Breakers (HCDVB)	Backflow Protection	414.1
CSA B79-2008 (R2013)	Commercial and Residential Drains and Cleanouts	DWV Components	413.1
CSA B125.3-2012	Plumbing Fittings	Fittings	409.3
CSA B137.1- 2013 2017	Polyethylene (PE) Pipe, Tubing, and Fittings for Cold-Water Pressure Services	Piping, Plastic	Table 307.1

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTIONS
CSA B137.5- 2013 2017	Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications	Piping, Plastic	Table 307.1
CSA B137.6- 2013 2017	Chlorinated Polyvinylchloride (CPVC) Pipe, Tubing, and Fittings for Hot- and Cold-Water Distribution Systems	Piping, Plastic	Table 307.1
CSA B137.9- 2013 2017	Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure-Pipe Systems	Piping, Plastic	Table 307.1
CSA B137.10- 2013 2017	Crosslinked Polyethylene/Aluminum/ Crosslinked Polyethylene (PEX-AL-PEX) Composite Pressure-Pipe Systems	Piping, Plastic	Table 307.1
CSA B137.11- 2013 2017	Polypropylene (PP-R) Pipe and Fittings for Pressure Applications	Piping, Plastic	308.11.1, Table 307.1
CSA Z21.56-2014	Gas-Fired Pool Heaters (same as CSA 4.7)	Fuel Gas, Appliances and Equipment	404.4, 702.1
IAPMO Z124.5-2013 ^{e1}	Plastic Toilet Seats	Fixtures	407.3
IAPMO Z124.7-2013	Prefabricated Plastic Spa Shells	Fixtures	404.3.2
IAPMO Z1033-2015	Flexible PVC Hoses and Tubing for Pools, Hot Tubs, Spas, and Jetted Bathtubs	Miscellaneous	307.10
ICC A117.1-2009	Accessible and Usable Buildings and Facilities	Miscellaneous	313.1, 410.4
NFPA 70- 2014 2017	National Electrical Code	Miscellaneous	401.3, 404.1, 418.1, 603.1, 804.1, 804.2, 804.3, 804.4, 804.5
NFPA 400-2016	Hazardous Material Code	Miscellaneous	807.3
NFPA 780- 2014 2017	Installation of Lightning Protection Systems	Miscellaneous	401.2
NSF 14- 2015 2016a	Plastics Piping System Components and Related Materials	Piping, Plastic	301.2, 307.1
NSF 50- 2015 2016	Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities	Appliances and Equipment	504.5, 506.1, 507.1, 507.1.3, 509.1, 509.3, 510.1, 604.1
NSF 61- 2015 2016	Drinking Water System Components - Health Effects	Water Supply Components	307.1, 412.1, 504.6
UL 379-2013	Power Units for Fountain, Swimming Pool, and Spa Luminaires	Equipment	401.3.5
UL 399- 2008 2017	Drinking Water Coolers (with revisions through October 18, 2013 May 17, 2017)	Appliances	412.1
UL 676-2015	Underwater Luminaires and Submersible Junction Boxes	Miscellaneous	401.3.5
UL 676A-2003	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment	Miscellaneous	401.3.5
UL 1081- 2008 2016	Swimming Pool Pumps, Filters, and Chlorinators (with revisions through March 18, 2014 October 21, 2016)	Appliances and Equipment	507.2, 604.1
UL 1241-2003	Junction Boxes for Swimming Pool Luminaires (with revisions through August 28, 2013)	Miscellaneous	401.3.5
UL 1261- 2004 2016	Electric Water Heaters for Pools and Tubs (with revisions through April 22, 2014 October 7, 2016)	Appliances and Equipment	702.2
UL 1480-2016	Speakers for Fire Alarm and Signaling Systems, Including Accessories	Miscellaneous	418.1
UL 1563-2009	Electric Spas, Equipment Assemblies, and Associated Equipment (with revisions through March 27, 2015 October 7, 2016)	Appliances and Equipment	404.1, 404.4, 511.1, 604.1, 702.2
UL 1995-2015	Heating and Cooling Equipment	Appliances and Equipment	702.3
UL 2017-2008	General-Purpose Signaling Devices and Systems (with revisions through January 27, 2016)	Miscellaneous	803.5
UL 2452-2006	Outline of Investigation for Electric Swimming Pool and Spa Cover Operators	Miscellaneous	806.1

1001.2 Standards, Publications, Practices, and Guides.

The standards, publications, practices and guides listed in Table 1001.2 are not referenced in other sections of this code. The application of the referenced standards, publications, practices and guides shall be as specified in Section 302.1.2. The promulgating agency acronyms are found at the end of the table.

**TABLE 1001.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
ACCA 10 Manual SPS-2010	HVAC Design for Swimming Pools and Spas	Heating, Ventilating, and Air-Conditioning
APSP 1-2014	Public Swimming Pools	Miscellaneous
APSP 2-1999	Public Spas	Miscellaneous
APSP 3-2014	Permanently Installed Residential Spas and Swim Spas	Miscellaneous
APSP 4-2012	Aboveground/Onground Residential Swimming Pools includes Addenda A approved April 4, 2013)	Miscellaneous
APSP 5-2011	Residential Inground Swimming Pools (includes Addenda A approved June 28, 2012)	Miscellaneous
APSP 7-2013	Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins	Safety Systems
APSP 8-2005 (R2013)	Model Barrier Code for Residential Swimming Pools, Spas, and Hot Tubs	Miscellaneous
ASHRAE 62.1-2016	Ventilation for Acceptable Indoor Air Quality	Heating, Ventilating, and Air-Conditioning
ASHRAE 90.1- 2013 2016	Energy Standard for Buildings Except Low-Rise Residential Buildings	Miscellaneous
ASME A112.1.2-2012	Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors)	Fittings
ASME A112.18.3-2002 (R2012)	Performance Requirements for Backflow Protection Devices and Systems in Plumbing Fixture Fittings	Backflow Protection
ASME A112.19.7-2012/CSA B45.10-2012 (R2017)	Hydromassage Bathtub Systems	Fixtures
ASME B16.1-2015	Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250	Fittings
ASME B16.5-2013	Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch	Fittings
ASME B16.20-2012	Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral Wound, and Jacketed	Joints
ASME B16.21- 2014 2016	Nonmetallic Flat Gaskets for Pipe Flanges	Joints
ASME B16.34-2013	Valves - Flanged, Threaded, and Welding End	Valves
ASME B16.39-2014	Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300	Fittings
ASME B16.47-2011	Large Diameter Steel Flanges: NPS 26 through NPS 60 Metric/Inch	Fittings
ASME B16.50-2013	Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings	Fittings
ASME B36.10M-2004 (R2010)	Welded and Seamless Wrought Steel Pipe	Piping, Ferrous
ASSE 1001- 2008 2017	Atmospheric Type Vacuum Breakers	Backflow Protection
ASSE 1011-2004	Hose Connection Vacuum Breakers	Backflow Protection
ASSE 1012-2009	Backflow Preventers with an Intermediate Atmospheric Vent	Backflow Protection
ASSE 1013-2011	Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers	Backflow Protection
ASSE 1014-2005	Backflow Prevention Devices for Hand-Held Shower	Backflow Protection
ASSE 1015-2011	Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies	Backflow Protection

DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
ASSE 1017-2009	Temperature Actuated Mixing Valves for Hot Water Distribution Systems	Valves
ASSE 1020-2004	Pressure Vacuum Breaker Assembly	Backflow Protection
ASSE 1024-2004	Dual Check Backflow Preventers	Backflow Protection
ASSE 1052- 2004 2016	Hose Connection Backflow Preventers	Backflow Protection
ASSE 1055- 2009 2016	Chemical Dispensing Systems	Backflow Protection
ASSE 1057-2012	Freeze Resistant Sanitary Yard Hydrants with Backflow Protection	Backflow Protection
ASSE 1060- 2006 2017	Outdoor Enclosures for Fluid Conveying Components	Miscellaneous
ASTM A106/A106M-2015	Seamless Carbon Steel Pipe for High-Temperature Service	Piping, Ferrous
ASTM A126-2004 (R2014)	Gray Iron Castings for Valves, Flanges, and Pipe Fittings	Piping, Ferrous
ASTM A254/A254M-2012	Copper-Brazed Steel Tubing	Piping, Ferrous
ASTM A377-2003 (R2014)	Ductile-Iron Pressure Pipe	Piping, Ferrous
ASTM A733- 2015 2016	Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples	Piping, Ferrous
ASTM A861-2004 (R2013)	High-Silicon Iron Pipe and Fittings	Piping, Ferrous
ASTM B135-2010	Seamless Brass Tube	Piping, Copper Alloy
ASTM B152/B152M-2013	Copper Sheet, Strip, Plate, and Rolled Bar	Miscellaneous
ASTM B587-2012	Welded Brass Tube	Piping, Copper Alloy
ASTM B687-1999 (R2016)	Brass, Copper, and Chromium-Plated Pipe Nipples	Piping, Copper Alloy
ASTM C1053-2000 (R2015)	Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications	Piping, Non-Metallic
ASTM C1440-2008 (R2013) ^{cl}	Thermoplastic Elastomeric (TPE) Gasket Materials for Drain, Waste, and Vent (DWV), Sewer, Sanitary and Storm Plumbing Systems	Joints
ASTM D2657-2007(R2015)	Heat Fusion Joining of Polyolefin Pipe and Fittings	Joints
ASTM D2672-2014	Joints for IPS PVC Pipe Using Solvent Cement	Joints
ASTM D2855-2015	Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets	Joints
ASTM D3311-2011 (R2016)	Drain, Waste, and Vent (DWV) Plastic Fittings Patterns	Fittings
ASTM F402-2005 (R2012)	Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings	Joints
ASTM F405-2013	Corrugated Polyethylene (PE) Pipe and Fittings Withdrawn	Piping, Plastic
ASTM F409- 2012 2017	Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings	Piping, Plastic
ASTM F714-2013	Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter	Piping, Plastic
ASTM F1476-2007 (R2013)	Performance of Gasketed Mechanical Couplings for Use in Piping Applications	Joints
ASTM F1673-2010 (R2016)	Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems	Piping, Plastic
ASTM F2165-2013	Flexible Pre-Insulated Piping	Piping, Plastic
ASTM F2509-2015	Field-Assembled Anodeless Riser Kits for Use on Outside Diameter Controlled Polyethylene and Polyamide-11 (PA11) Gas Distribution Pipe and Tubing	Fuel Gas
AWS B2.2-2010	Brazing Procedure and Performance Qualification	Certification
AWS B2.4-2012	Welding Procedure and Performance Qualification for Thermoplastics	Joints, Certification
AWWA C203-2015	Coal-Tar Protective Coatings and Linings for Steel Water Pipe	Miscellaneous
AWWA C213-2015	Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings	Miscellaneous
AWWA C500-2009	Metal-Seated Gate Valves for Water Supply Service	Valves

DOCUMENT NUMBER	DOCUMENT TITLE	APPLICATION
AWWA C507-2015	Ball Valves, 6 in. through 60 in. (150 mm through 1,500 mm)	Valves
CSA Z21.22-2015	Relief Valves for Hot Water Supply Systems (same as CSA 4.4)	Valves
IAF 9-2005	Aquatic Recreation Facilities	Miscellaneous
IAPMO PS 25-2002	Metallic Fittings for Joining Polyethylene Pipe for Water Service and Yard Piping	Joints
IAPMO PS 34-2003	Encasement Sleeve for Potable Water Pipe and Tubing	Piping
IAPMO PS 36-2014 ^{e1}	Lead-Free Sealing Compounds for Threaded Joints	Joints
IAPMO PS 37-1990	Black Plastic PVC or PE Pressure-Sensitive Corrosion Preventive Tape	Miscellaneous
IAPMO PS 42-2013 ^{e1}	Pipe Alignment and Secondary Support Systems	Miscellaneous
IAPMO PS 51- 2013 2016	Expansion Joints <u>and Flexible Expansion Joints</u> for DWV Piping Systems	Joints
IAPMO PS 53- 2013 2016	Grooved Mechanical Pipe Couplings and Grooved Fittings	Joints
IAPMO PS 69-2006	Bathwaste and Overflow Assemblies with Tub Filler Spout	DWV Components
IAPMO PS 87-1995	Diverter and Shut-off Valves for Pool/Spas	Valves
IAPMO Z124.8-2013 ^{e2}	Plastic Liners for Bathtubs and Shower Receptors	Fixtures
MSS SP-6- 2012 2017	<u>Standard</u> Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings	Fuel Gas
MSS SP-25-2013	<u>Standard</u> Marking System for Valves, Fittings, Flanges, and Unions	Miscellaneous
MSS SP-58-2009	Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation	Fuel Gas
MSS SP-67- 2011 2017	Butterfly Valves	Valves
NFPA 31-2016	Installation of Oil-Burning Equipment	Fuel Gas, Appliances and Equipment
UL 296- 2003 2017	Oil Burners (with revisions through June 11, 2015)	Fuel Gas, Appliances and Equipment

ABBREVIATIONS IN TABLE 1001.1 AND TABLE 1001.2

ACCA	Air Conditioning Contractors of America Association, Inc., 2800 Shirlington Road, Suite 300, Arlington, VA 22206.
ACI	American Concrete Institute, 38800 Country Club Drive, Farmington Hills, MI 48331-3439.
ANSI	American National Standards Institute, Inc., 25 W. 43rd Street, 4th Floor, New York, NY 10036.
APSP	Association of Pool and Spa Professionals, 2111 Eisenhower Avenue, Suite 500, Alexandria, VA 22314-4679.
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., 1791 Tullie Circle, N.E., Atlanta, GA 30329-2305.
ASME	American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.
ASSE	American Society of Sanitary Engineering, 18927 Hickory Creek Drive, Suite 220, Mokena, IL 60448.
ASTM	ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.
AWS	American Welding Society, 8669 NW 36th Street, #130, Miami, FL 33166-6672.
AWWA	American Water Works Association, 6666 W. Quincy Avenue, Denver, CO 80235.
CISPI	Cast-Iron Soil Pipe Institute, 2401 Fieldcrest Drive, Mundelein, IL 60060.
CSA	Canadian Standards Association, 178 Rexdale Blvd., Toronto, ON, Canada M9W 1R3.
e1	An editorial change since the last revision or reapproval.
IAF	International Aquatic Foundation, P.O. Box 4038, Alexandria, VA 22303.
IAPMO	International Association of Plumbing and Mechanical Officials, 4755 E. Philadelphia Street, Ontario, CA 91761.
ICC	International Code Council, 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001.
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street, NE, Vienna, VA 22180.
NFPA	National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.
NSF	NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48105.
UL	Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062.

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