Developing Codes and Standards for Rainwater Harvesting Systems—
with a Preview of CSA-B805/ICC 805

2017 ARCSA Conference
Wednesday, October 18, 2017
1. Introduce the International Code Council
2. Overview of Rainwater in the I-Codes
3. Rainwater Standards
4. ICC/CSA 805 Rainwater Harvesting Systems
5. What’s Next?
Myths and Misperceptions

- ICC staff members decide what content will appear in ICC codes and standards.
- ICC standards are automatically included in ICC codes.
- ICC codes become law as soon as they are released.
- ANSI develops standards.
- Standards used in codes must ANSI-approved.
- The developer of a standard is the only one who can certify products to it.
Introduction to the ICC

Who we are and what we do.
ICC’s VISION:
To protect the health, safety and welfare of people by creating better buildings and safer communities
ICC by the Numbers

- 60,000+ members
- 357 chapters
- 260 staff in 4 regional offices
- 15 model codes used in 50 states
- 62k code interpretations
- 1000 days of training
ICC’s Goals

 Safeguard public health, safety, and welfare

 Enhance economic development Streamline regulatory system

 One set of nationwide building codes with consistent technical support
ICC’s Products and Services

- Laboratory Accreditation
- Standards
- Education & Certification
- Code Development
- Product Certification & Testing
Core Expertise in Family of 15 Model Codes

- Adopted in every state in U.S. and several countries
- Covers all aspects of building construction
- Developed by ICC through consensus process every three years
**IPC 303.4 Third-party certification.** All plumbing products and materials shall be listed by a third-party certification agency as complying with the referenced standards.

- Code compliance is an added feature.
- Expedient options to manufacturers to get their products to market.
- Works with a wide range of accredited laboratories around the world – no preference for in-house facility.
Rainwater in the I-Codes
What are Codes?

- Collection of requirements that pertain to a specific subject and regulate specific practices.
  - Model Code: Regulations that provide the means for exercising reasonable control over construction, and available for adoption by cities, counties, states, or countries.
  - Building codes largely administered at the state level and below in the U.S.
  - Divided by system (building, plumbing, mechanical) & scope (residential, commercial)

- Objectives
  - Primary: Protection of life, health, and safety
  - Secondary: Durability, protection of building contents, energy efficiency, sustainability
Move from Regional to National

- ICC was formed in 1994 as a non-profit organization.
- Brought together regional code developers
  - More than two centuries of collective experience
  - A history of support for public safety
- Widespread recognition and reliance throughout the U.S. and the world.
ICC’s Code Development Process

I-Code Development Cycle

1. PUBLIC COMMENTS SOUGHT ON PUBLIC HEARING RESULTS
2. FINAL ACTION HEARING
3. FINAL ACTION HEARING RESULTS POSTED
4. CODE CHANGES SUBMITTED
5. CODE CHANGES POSTED
6. PUBLIC HEARINGS
7. PUBLIC COMMENTS POSTED

NEW
Rainwater in Model Codes

Until 2012, rainwater systems were not explicitly addressed in ICC’s national model codes.

This left jurisdictions with limited options:

- Limited number of jurisdictions retained old “cistern laws” that governed rainwater harvesting (e.g. OH)
- Some used IPC Appendix C, Gray Water Recycling Systems and adapted it to rainwater
- Several jurisdictions who had repealed their cistern laws long ago moved to develop their own modern RWH requirements (NC, GA, TX, etc.)
- BUT – most had no specific codes for RWH and Alternate Means and Methods was used.
RWH: Intersection of Codes

But – existing code provisions did pertain to RWH systems.

- Building Codes: Gutters, roofing, structural, penetrations
- Fire Code: Fire access, cisterns, permissible materials
- Electrical Code: Wiring for pumps, controls, sensors
- Plumbing Code: Indoor piping, backflow preventers, meters, filters, valving, tanks, overflows, etc.
- Zoning Codes: Tank locations, cross-boundary rainwater sharing
- Health Codes: Water quality, maintenance requirements
Strong interest in sustainability led to the development of several “Green Codes” in the years after the turn of the century – at ICC it was the IgCC.

- First draft developed by Sustainable Building Technology Committee

- Two subsequent rounds of public comment
- Dedicated working groups for rainwater harvesting, graywater reuse.
- Participating by several ARCSA members.

- 2012 International Green Construction Code (IgCC) released in March, 2012
  - Chapter 4: Site Development & Land Use
  - Chapter 7: Water Resource Conservation, Quality & Efficiency
### Pros
- First wide-ranging set of health and safety codes relating to RWH systems.
- Correlated with the other 2012 I-Codes.
- Addressed non-potable and potable applications.

### Challenges
- Limited number of experienced RWH practitioners participating code hearings.
- Disagreement among practitioners over design issues such as first flush diverters and dye injectors.
- Lack of standards for components and systems.
- Controversy and confusion over ASTM E2727.
Third-Party Certification

IPC 303.4 Third-party certification. Plumbing products and materials required by the code to be in compliance with a referenced standard shall be listed by a third-party certification agency as complying with the referenced standards.

- Most plumbing codes require products and materials to be third-party certified to referenced standards for the intended use.

- This has created challenges for:
  - Dual-use components (gutters, roofing materials)
  - Components with no reference standards (diverters, debris excluders)
Many recognized that most 2012 IgCC RWH material addressed HOW to install safely not WHEN to use.

Code change proposals were introduced for 2015 IPC to move most RWH material to new Chapter 13.
- Approved - but only addressed non-potable.
- 2015 IgCC referenced IPC and kept potable rainwater
- ARCSA members again participated at the hearings.
Refinements to the code include:

- Eliminates requirement for first-flush diverters
- Adds reference to IFC where used for fire protection
- Removes prohibition of clear water waste introduction
- Reintroduced reference to ASTM E2727
Rainwater in Standards
What issues can standards address?

- Quality, Performance, Durability
- Safety
- Interoperability
- Comparability
- Market acceptance
- Uniformity
- Testing Methods

Example: Electrical Power Plugs

ANSI/NEMA WD 6-2002 (R2008)
Building Code Context: A published technical document that represents a stakeholder consensus on how a material, product or assembly is to be designed, manufactured, tested or installed to meet criteria established in the standard or code.

- Enforcement commonly through third-party certification
- Referenced standards become part of the code.
- Wide range of consensus standard developers
ICC as an ANSI Standard Developer

Start

ANSI PINS Submission

Call for Technical Committee Applications

Technical Committee Appointment

Draft Standard Development

Public Comments

Development of Comment Resolutions

Changes Made?

Yes

No

Conduct Final Ballot of Standard with TC

Approved?

No

Yes

Submit to ANSI & SCC for Approval

End

Publish Completed Standard

Yes

No

Submit to ANSI & SCC for Approval

Approved?

No

Yes

Submit to ANSI & SCC for Approval

Approved?

No

Yes

Submit to ANSI & SCC for Approval

Approved?

No
Need for a standard identified in 2011 to meet needs in regulatory arena.

Discussions with CSA to seek a way to develop a joint US/Canadian standard (seeking ANSI and SCC approval).

Technical committee appointed late 2013

Work to date:
- 9 Technical Committee meetings
- 3 Public Comment periods
- 4 Task Groups
ICC/CSA 805 Draft Standard - Approach

- Prescriptive and Performance risk-based approach to water quality.
  - Uses Water Safety Plan to identify specific site and application risks.
  - Differentiation between commercial and residential scale and risk

- Allow for innovation – encompass wide range of technologies, techniques.
  - Permits use of broad range of source waters
  - Includes both potable and non-potable applications

- Coordination with building systems
  - Coordinated with building codes and national water quality laws

- Use of informative appendices to address best practice and recommendations.

NOTE: THE ICC 805/CSA B805 DOCUMENT HAS NOT BEEN FINALIZED AND REMAINS SUBJECT TO CHANGE.
ICC/CSA 805 Draft Standard - Scope

- Residential, multi-residential and commercial applications
- Potable and nonpotable end uses, except:
  - Process water systems for industrial or manufacturing purposes;
  - Water distribution systems for commercial agricultural processes
- Rooftop and ground-level collection
  - Excludes surface water collection (rivers, lakes, streams)
  - All forms of water from natural precipitation

NOTE: THE ICC 805/CSA B805 DOCUMENT HAS NOT BEEN FINALIZED AND REMAINS SUBJECT TO CHANGE.
# End Use Tiers and Exposure - Draft

*Typical representative outcomes are gastrointestinal illness from ingestion, Legionellosis from inhalation, and bacterial wound infection from skin contact.\(^\ddagger\) The WSP shall establish whether a given application has restricted or unrestricted access or exposure.*

## End Use Tier

<table>
<thead>
<tr>
<th>End Use Tier</th>
<th>Category</th>
<th>End Uses</th>
<th>Likelihood of Exposure*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non-Potable</td>
<td>• Trap primers • Spray irrigation (restricted access or exposure)(^\ddagger) • Surface and subsurface irrigation (drip, bubbler) • Fire protection • Ice rinks</td>
<td>Rare</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Unlikely</td>
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<td></td>
<td></td>
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<td>Unlikely</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Unlikely</td>
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<tr>
<td>2</td>
<td>Non-Potable</td>
<td>• Toilet and urinal flushing • Clothes washing • HVAC evaporative cooling (e.g., cooling tower, evaporative condenser, spray cooler, direct and indirect evaporative cooling) • Rooftop thermal cooling</td>
<td>Rare</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Possible</td>
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<td></td>
<td></td>
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<td>Possible</td>
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<td></td>
<td></td>
<td></td>
<td>Possible</td>
</tr>
<tr>
<td>3</td>
<td>Non-Potable</td>
<td>• Hose bibbs • Pressure washing • Decorative fountains • Vehicle washing • Spray irrigation (non-restricted access or exposure)(^\ddagger)</td>
<td>Possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Likely</td>
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<td></td>
<td></td>
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<td>Likely</td>
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<td></td>
<td></td>
<td></td>
<td>Likely</td>
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<tr>
<td>4</td>
<td>Potable</td>
<td>• Human consumption • Oral care • Food preparation • Dishwashing • Bathing, showering, and hand washing • Pools, hot tubs, spas, and splash pads • Misting stations • Swamp coolers</td>
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<td>Certain</td>
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</table>

\(^\ddagger\) The WSP shall establish whether a given application has restricted or unrestricted access or exposure.
### OUTPUT WATER QUALITY REQUIREMENT FOR APPLICATIONS USING WATER SOURCED FROM ROOF COLLECTION SURFACES

<table>
<thead>
<tr>
<th>End Use Tier</th>
<th>Parameter</th>
<th>Turbidity (NTU)</th>
<th>HPC (CFU/100 mL)</th>
<th>Enterococci (CFU/100 mL)</th>
<th>pH‡</th>
<th>Chlorine§</th>
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<tbody>
<tr>
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<td>SFR</td>
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<tr>
<td>1</td>
<td>Median</td>
<td>NT</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Maximum</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2*</td>
<td>Median</td>
<td>&lt;1</td>
<td>&lt;500§</td>
<td>≤5</td>
<td></td>
<td>0.5 – 2.0</td>
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<tr>
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<td>Maximum</td>
<td>5</td>
<td></td>
<td>&lt;15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2†</td>
<td>Median</td>
<td>-</td>
<td>&lt;500§</td>
<td>NT</td>
<td>7.0-8.2</td>
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</tr>
<tr>
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<td>Maximum</td>
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<td></td>
<td>&lt;15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Median</td>
<td>≤1</td>
<td>&lt;500§</td>
<td>&lt;5</td>
<td></td>
<td>0.5 – 2.0</td>
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<tr>
<td></td>
<td>Maximum</td>
<td>5</td>
<td></td>
<td>&lt;15</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>-</td>
<td>Refer to applicable drinking water standards and guidelines from the authority having jurisdiction</td>
<td></td>
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</tr>
</tbody>
</table>

* Excluding evaporative cooling.
† Evaporative cooling only.
‡ A pH of less than 7 can be a concern for piping, fittings, and other equipment but a required value is not set for most uses.
§ For systems supplying water to less than 25 people, UV disinfection can be used instead of chlorine.

**Notes:**
1. For systems serving a single-family dwelling, there is no requirement to undertake microbiological testing, however the system must be physically examined upon installation and periodically thereafter.

**NOTE:** THE ICC 805/CSA B805 DOCUMENT HAS NOT BEEN FINALIZED AND REMAINS SUBJECT TO CHANGE.
Unique Features

- rooftop and surface-level sources in a single document
- Inclusion of wide range of tank types incl. wood, matrix, precast concrete, flexible
- Addresses rainwater use with fire protection, stormwater management, vegetated roof systems
- Sets water quality criteria for specific end uses based on risk
- Uses Water Safety Plans to address variable site and systems considerations
Next Steps

2021 I-Code Development
ICC/CSA 805 Standard
Submit code changes for your code of interest.

- 2021 I-Code Development will take place in the calendar years 2018 & 2019
  - Group A Code change proposals due on January 8, 2018 via cdpACCESS
  - Group B Code change proposals due on January 7, 2019
- Review the ICC website for information on the development schedule and forms. [http://www.iccsafe.org/cs/codes](http://www.iccsafe.org/cs/codes)
- Attend a hearing to see code development first-hand or watch the LIVE webcast online!

- Sign up for ICC eNews, or follow ICC on Facebook or Twitter to have the get the latest information. [http://www.iccsafe.org/eNews](http://www.iccsafe.org/eNews)
Phase 1: Code Changes Proposed

Phase 2: Public Hearings on Code Changes Proposed

Phase 3: Public Comments on Public Hearings

Phase 4: Final Action Hearing

2021 Code Change Timeline
Standard Completion Steps

- Complete third public comment by 11/20/2017.
- Resolve any comments received.
- Conduct both ICC and CSA ballots with the Technical Committee to finalize the document.
- Submit to ANSI and CSA for approval/accreditation of development process.
- Edit and publish completed document.
ICC staff decide what content will appear in the ICC codes and standards. **No.** Staff is not permitted to make substantive changes. Content is submitted by stakeholders and approved by technical committee members per the development process.

ICC standards are automatically included in ICC codes. **No.** Standards are only referenced in codes when a code change proposal is submitted and approved by a stakeholder (not staff).

ICC codes become law as soon as they are released. **No.** Each jurisdiction using an I-Code must adopt it officially with any local amendments. Each state has a different process and timeline.

ANSI develops standards. **No.** ANSI accredits the standard development procedures of the SDO. They review completed standards for adherence to the approved standard development procedures, not the technical content.

Standards used in codes must ANSI-approved. **No.** I-Codes requires that reference standards be developed through an open, transparent, consensus-based process.

The developer of a standard is the only one who can certify products to it. **False.** Any certification body accredited to certify to a particular standard may offer the service.
Conclusion

Thank you!

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