

**ICC 815 Sizing Water Distribution, Drainage and
Venting Standard Consensus Committee (IS-SWDDV)**

Meeting #7 - Minutes

September 21, 2023

Chair: Gary Klein

Vice Chair: Philip Parisi

Secretariat- Ramiro Mata

The seventh meeting of the ICC 815 Sizing Water Distribution, Drainage and Venting Standard Consensus Committee (IS-SWDDV) was held on September 21, 2023, in virtual format. The meeting was conducted in accordance with ICC’s Consensus Procedures. https://www.iccsafe.org/wp-content/uploads/ICC-Consensus-Procedures-ANSI-approved-8_2_21-BOD-apprvd-8_27_21.pdf

1. Welcome

Chairman, Gary Klein, convened the meeting and welcomed attendees at 2:04 pm EDT along with Staff Secretariat, Ramiro Mata. Mata reminded attendees about the ICC Code of Ethics and the Anti-Trust Policy, both of which can be found on the ICC 815 (IS-SWDDV) webpage. Mata also announced that the meeting will be recorded for internal reference only and that recording by anyone other than ICC staff is prohibited.

2. Roll Call – Klein called the meeting to order with a roll call of ICC 815 (IS-SWDDV) committee members – Symbol indicates present, indicates absent.

Committee Members

Regulator		User		Manufacturer		Builder	
<input checked="" type="checkbox"/>	Joseph Alexander	<input checked="" type="checkbox"/>	Esber Andiroglu PhD, PE	<input checked="" type="checkbox"/>	Marcus Elmer	<input checked="" type="checkbox"/>	Dan Buuck
<input checked="" type="checkbox"/>	Richard Grace	<input checked="" type="checkbox"/>	Gary Klein	<input type="checkbox"/>	Dave Parney	<input checked="" type="checkbox"/>	Joshua Trujillo
<input type="checkbox"/>	Terry Haughn	<input checked="" type="checkbox"/>	John Lansing	<input checked="" type="checkbox"/>	Lance MacNevin PE	Consumer	
<input checked="" type="checkbox"/>	Ross Wakefield	<input type="checkbox"/>	Juneseok Lee PhD, PE	<input type="checkbox"/>	Kyle Thompson PE	<input type="checkbox"/>	Tim Keane
		<input checked="" type="checkbox"/>	Philip Parisi Jr. PE			SDO/Test Lab	
		<input checked="" type="checkbox"/>	Tom Wise			<input checked="" type="checkbox"/>	Kathryn (Katie) Foster

ICC Staff – Mark Fasel

Interested Parties and Guests – Dan Cole, Drew Rich, David Nickelson, Rich Houle, Natascha Milesi-Ferretti, Frank Schmidt, Michael Gormley, Michael Cudahy, Mathias Riggerbach

1. Quorum and Membership Review - With 13 committee members in attendance, Mata indicated the threshold of 10 for quorum has been met.
2. Agenda Review and Approval – Agenda revised to move item 8, German Pipe Sizing of Drainage Systems, ahead of item 7, Research Update. Motion by Lansing to approve revised agenda, seconded by Grace. Motion approved.

3. Approval of Meeting #6 Minutes from August 21, 2023 – Motion by MacNevin to approve the minutes, seconded by Lansing. Motion approved.
4. German Drainage Pipe Sizing Presentation – Mathias Riggerbach
 - a. Gary Klein introduced Matthias Riggerbach, Head of Product Management Piping System at Geberit for the Middle East, and Africa, who presented on European standard EN12056 related to building drainage systems. He mentioned that different standards are available worldwide but suggested that the German version of EN12056 is more complete in their view.
 - b. Nineteen European countries came together to develop one standard for sanitary pipe work layout calculation called EN 12056-1: 2000 which defines five different systems allowing countries to refer to their own local standards based on their chosen system type.
 - c. There are three elements involved in drainage systems which include air, liquids, and solids and drainpipes must be appropriately sized and sloped to discharge properly.
 - d. Mathias Riggerbach mentioned that getting information from projects is the most difficult part, including data on devices used, floors, schematic drawings and building type for K factor. He also discussed frequency factors and defined values for drainage fixtures and single connections.
 - e. Tables of minimum internal pipe diameter (including conversion to US units) necessary to comply with standards EN 12056, 13 EN 15 and 19 were presented. Choosing the right system within tolerances based on capacity calculations for main pipes, single branch pipes or multiple connection branches were also discussed.
 - f. Five steps to planning a waste drain system were presented:
 - i. Basic Information – Number of fixtures, number of floors, Frequency Factor – K, Single Branch Pipe - Discharge Units, Single Connection DN, etc.
 - ii. Choosing the Right Drainage System:
 1. Single Stack
 2. Parallel Vented System - Direct
 3. Parallel Vented System – Indirect
 4. Sovent System
 - iii. Planning and Dimensioning of:
 1. Branch Discharge Pipes
 2. Stack Pipes
 3. Collector Pipes
 - g. A fundamental flaw in the calculation process was raised by Michael Gormley, where discharge units are dimensionless and based on probabilities rather than actual flow rates. The multiplication of discharge units with a K factor results in 12 liters per second, which is not consistent with other calculations.
 - h. Gary Klein questioned the methodology of the standard and whether drainage systems can handle high flow rates. Tom Wise shared data from a hospital that showed lower flow rates than what is assumed by the standard. Matthias Riggerbach explained that while it's possible to drain large amounts of water, it's unrealistic to achieve very high flow rates due to sequencing issues.
 - i. Michael Gormley discussed how height of the building makes a difference primarily because supply air determines the total losses in whole system which are much greater

in taller buildings than shorter ones due to physics behind it. Terminal velocity is a factor in tall buildings, but it doesn't develop in a short building.

- j. The committee agreed that additional discussion is needed to determine the best approach.
5. NIST Plumbing Fitting Pressure Loss Research – Natascha Milesi-Ferretti
- a. NIST has established a new lab facility that would allow them to take good measurements of pressure loss and fittings to provide benchmark data for common modern fittings and extract through their experience what would be a good test method that would be suitable for use by industries. They are using a multi-tapping method where they are putting a number of pressure taps upstream and then also downstream, so they can collect data and establish curves.
 - b. The laboratory uses a variety of different pressure sensors, mostly differential pressure transducers with a range of 0.1 to 10 psi, and one absolute pressure transducer. The impulse lines were selected as polyurethane tubing instead of copper to avoid trapping air or producing capillary effects or dampening the pressure signal.
 - c. Automated Switching System: The automated switching system is intended to scan the pressure at each point along both upstream and downstream pipes. Based on that data, it automatically controls valves in order to switch on appropriate pressure transducers for finer measurement.
 - d. Institute Calibration: After relying originally on factory calibration and having some issues since they had redundancy in their sensors, they did an institute calibration using variations of water column height and measuring with both test sensor and reference sensor which allowed them to establish calibration curves.
 - e. Phase Two Design: They are interested in testing other materials for phase two including identifying what components need testing while considering different water sources.
 - f. Collaboration Efforts: They have been looking for ways throughout this project to collaborate with industry and academia while documenting lessons learned from development/use of this facility towards drafting a test method for consideration.
 - g. Tom Wise talked about using K factor for determining pressure loss across valves on a test rig or fitting device, which is required by regulation in Germany. He also mentioned having generic K factors available for all fittings including those used by Sharkbite type coupling as shown by Natasha earlier.
 - h. Gary Klein discussed his preference for measuring pressure loss at different velocities and how the numbers he gathered compared reasonably well to the square equation. He suggested reaching out to various representatives to get a better handle on it and work with Natasha on it as well. The group also discussed the zeta value, which is dimensioned depending on actual fitting size, and how friction loss varies with temperature.

- i. Minimum Operating Pressure for Flush Tank Toilet: The group discussed the minimum operating pressure for a flush tank toilet. They mentioned that in Australia 50 Kpa is the standard but questioned whether this was just someone pulling a number out of thin air or if there were good reasons behind it.
6. University of Miami Research Update – Rich/Andiroglu
 - a. Drew Rich presented information about Surreal Group's work developing software tools that can help optimize building design processes using data analytics techniques such as machine learning algorithms. He also discussed the project goals, which include creating a global product, maintaining a living document that stays updated, adapting to communities' public health and safety needs with a holistic approach. The focus is on ensuring safe and healthy delivery of water while properly disposing of it.
 - b. Residential Scope: Rich raised two questions regarding the definition of residential scope. First, whether human consumption patterns in different building types are similar enough to justify representing them as residential occupancy. Second, whether the probability of simultaneous use at selected design flow performed comparably with statistical significance across different occupancies.
 - c. Demand Estimation Methods: Various demand estimation methods were discussed classified by their type (probabilistic, empirical or stochastic) and method used for calculation and that there is no uniform approach for calculating design flow rate from country to country.
 - d. Finding a balance between underfitting (an inaccurate unresponsive system or framework due to insufficient data) and overfitting (including too many variables leading to useless predictions) is needed. Ideally it will be the simplest possible solution with high responsiveness and accuracy while being specific enough not become antiquated over time.
 - e. Rich explained that most research is trending towards stochastic methodologies as they provide the most realistic results and are highly customizable. The model sensitivity is not a significant problem with Stochastic methodology as compared to the other two models.
 - f. Data collection is critical in developing a framework for predicting peak water demand. High-resolution data at building level with one-second frequency needs to be collected from around the world. The university is developing a framework for data collection based on identifying failure criteria and understanding what they want to know about the system in terms of those failure criteria.
 - g. Rich mentioned obtaining grants for equipment development and implementation to help with the cost of monitoring water consumption patterns effectively.

- h. Committee Involvement: Rich highlighted how committee members could contribute by helping identify existing high-resolution datasets, providing buildings or connections where equipment can be implemented, collecting billing data sets from different regions worldwide, or assisting in designing experiments surrounding impacts on piping systems' performance due to various factors like occupant age or household income levels.
 - i. The team discussed acquiring data sets from different sources to standardize and normalize them for analysis. Gary Klein mentioned reaching out to potential donors in Seattle who have access to 50-100 buildings, mostly affordable multifamily units.
 - j. Andiroglu acknowledged that student housing may not correlate with single-family duplex or apartment condo types. However, it is still important to collect this data for future use. The committee agreed with his recommendation.
 - k. The group briefly touched on the topic of office buildings as a potential area for future focus. They noted that while residential buildings have been extensively studied, there may be value in exploring data related to office building construction rates.
 - l. The committee discussed their progress towards defining what they will be asking building owners for in terms of data collection. They also emphasized the importance of accessing existing data from sources such as California's Property Council.
 - m. There was discussion around creating temporary working groups after each presentation to digest takeaways and feed them back to the committee. It was suggested that these groups could change based on each presentation's focus.
7. Agenda Items Postponed: Due to lack of time, several agenda items were postponed until the next meeting including review action items, measurement working group update, CIB 062 trip discussion, and old business topics.
8. Next Meeting – October 30, 2023, at 1pm-5pm Central (2pm-6pm Eastern)
9. Meeting Adjourned at 5:53pm EDT.