Thank you for the opportunity to present today!

• The purpose of today's presentation is to address a DSPS interpretation involving the International Association of Plumbing and Mechanical Official's (IAPMO) Water Demand Calculator (WDC).

- Originally released in 2018
- DSPS adopted V2.1 as an alternate standard in 2022
- Updated adoption of v2.2 in 2023

Dean Petersen

- Wisconsin Licensed Master Plumber - #231001
- Wisconsin Licensed Plumbing Designer – #D-2053-P
- Lead instructor and Program Director of Plumbing Apprenticeship at Madison Area Technical College since 2005.
- Plumbing Heating and Cooling Contractors (PHCC) continuing education coordinator and presenter since 2018.
- Quarterly contributor to the Wisconsin PHCC magazine since 2015.
- Bachelors - Environmental Design – University of Wisconsin, Stevens Point

Most recent WDC alternate standard in October 2023.

The Alternate Standard approval is several pages of instructions on how to use the WDC, including the details the requirements for plan review and installation.

Department of Safety and Professional Services
Division of Industry Services
Plumbing Product Review
4822 Madison Yards Way
P.O. Box 7162
Madison, Wisconsin 53707-7162
Phone 608-266-2112
Web http://dsps.wi.gov
Email dsps@wisconsin.gov
TTY: Contact Through Relay

Governor Tony Evers **Dan Hereth, Secretary Designee**

October 11, 2023

Dept. of Safety and Professional Services
Bureau of Technical Services
Division of Industry Services
Michael McNally - Section Chief
4822 Madison Yards Way
Madison WI 53705

Re: Description: Alternate Standard, Sizing of Water Supply Piping
Manufacturer: Dept. of Safety and Professional Services
Product Name: IAPMO Water Demand Calculator (WDC)
Model Number(s): v. 2.2
eSLA PTO No.: PP-031603529-PTOAA

The department is in no way endorsing this alternate standard or any advertising, and is not responsible for any situation which may result from its use.

Sincerely,

Michael McNally – Section Chief
Department of Safety and Professional Services
Bureau of Technical Services
Division of industry Services
Phone: 608 228-4531
Email: MichaelD.McNally@wisconsin.gov

DSPS Mission Statement

- The mission of the Wisconsin Department of Safety and Professional Services (DSPS) is to protect Wisconsin citizens while promoting economic growth and stability:

The Water Demand Calculator (WDC)

Water Demand Calculator (WDC v2.2)

PROJECT NAME : - - - - -

Click for Drop-down Menu → Multi-Family Building

Total Number of Apartments in the Building → 0

Total Apartments in this Calculation → 0

Sunday, December 22, 2024

8:56 PM

FIXTURE GROUPS		FIXTURE	ENTER TOTAL NUMBER OF FIXTURES	PROBABILITY OF USE (%)	ENTER FIXTURE FLOW RATE (GPM)	MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1	Bathtub (no Shower)	0	1.00	5.5	5.5
	2	Bidet	0	1.00	2.0	2.0
	3	Combination Bath/Shower	0	5.50	5.5	5.5
	4	Faucet, Lavatory	0	2.00	1.5	1.5
	5	Shower, per head (no Bathtub)	0	4.50	2.0	2.0
	6	Water Closet, 1.28 GPF Gravity Tank	0	1.00	3.0	3.0
Kitchen Fixtures	7	Dishwasher	0	0.50	1.3	1.3
	8	Faucet, Kitchen Sink	0	2.00	2.2	2.2
Laundry Room Fixtures	9	Clothes Washer	0	5.50	3.5	3.5
	10	Faucet, Laundry	0	2.00	2.0	2.0
Bar/Prep Fixtures	11	Faucet, Bar Sink	0	2.00	1.5	1.5
Other Fixtures	12	Fixture 1	0	0.00	0.0	6.0
	13	Fixture 2	0	0.00	0.0	6.0
	14	Fixture 3	0	0.00	0.0	6.0

COMPUTED RESULTS FOR PEAK PERIOD CONDITIONS

Total No. of Fixtures in Calculation

99th Percentile Demand Flow

Hunter Number

Stagnation Probability

Method of Computation

DOWNLOAD RESULT

RESET WDC

↓ Select Units for Water Demand ↓

GPM | LPM | LPS

RUN WDC

← CLICK BUTTON →

The sole function of the WDC is to determine the simultaneity of two or more fixtures discharging at the exact same time and the peak flows those fixtures.

An individual fixture cannot experience simultaneity with itself, we should never use the WDC to determine demand for fixture supplies.

Also, the WDC calculates “Total” load, rather than the hot or cold load for a fixture.

The interpretation!

- When using the WDC the Department insists we must assign 5.5 gpm to both fixture supplies of a bathtub.
- Depending on the building's water calculated "A" value or the piping materials used to serve the bathtub, the fixture supply would need to be ¾" in diameter.

Water Demand Calculator (WDC v2.2)

PROJECT NAME : - - - - -

Click for Drop-down Menu → Multi-Family Building

Total Number of Apartments in the Building→ 0

Total Apartments in this Calculation→ 0

Sunday, January 12, 2025
9:21 AM

FIXTURE GROUPS		FIXTURE	ENTER TOTAL NUMBER OF FIXTURES	PROBABILITY OF USE (%)	ENTER FIXTURE FLOW RATE (GPM)	MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
Bathroom Fixtures	1	Bathtub (no Shower)	0	1.00	5.5	5.5
	2	Bidet	0	1.00	2.0	2.0
	3	Combination Bath/Shower	0	5.50	5.5	5.5
	4	Faucet, Lavatory	0	2.00	1.5	1.5
	5	Shower, per head (no Bathtub)	0	4.50	2.0	2.0
	6	Water Closet, 1.28 GPF Gravity Tank	0	1.00	3.0	3.0
Kitchen Fixtures	7	Dishwasher	0	0.50	1.3	1.3
	8	Faucet, Kitchen Sink	0	2.00	2.2	2.2
Laundry Room Fixtures	9	Clothes Washer	0	5.50	3.5	3.5
	10	Faucet, Laundry	0	2.00	2.0	2.0
Bar/Prep Fixtures	11	Faucet, Bar Sink	0	2.00	1.5	1.5
Other Fixtures	12	Fixture 1	0	0.00	0.0	6.0
	13	Fixture 2	0	0.00	0.0	6.0
	14	Fixture 3	0	0.00	0.0	6.0

COMPUTED RESULTS FOR PEAK PERIOD CONDITIONS

Total No. of Fixtures in Calculation

99th Percentile Demand Flow

Hunter Number

Stagnation Probability

Method of Computation

DOWNLOAD RESULT

RESET WDC

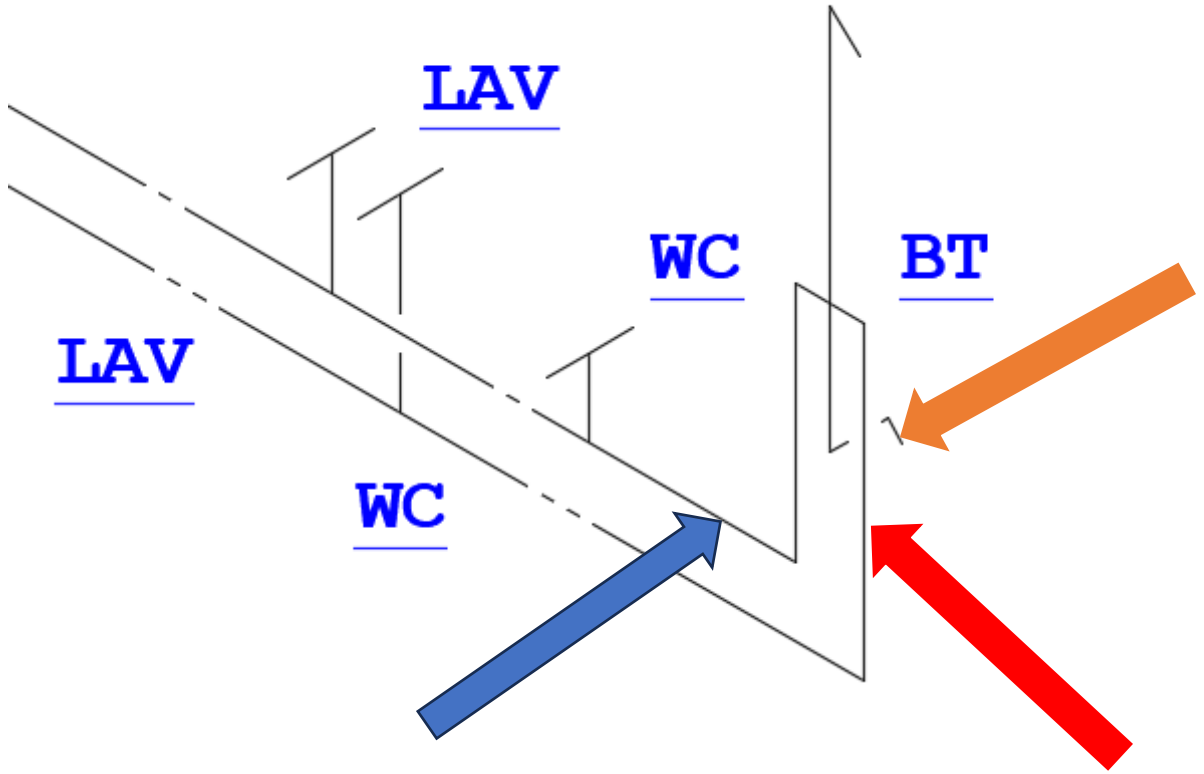
↓ Select Units for Water Demand ↓

GPM | LPM | LPS

RUN WDC

← CLICK BUTTON ←

Tub and shower Unit – DSPS interpretation



For a total of 9 gpm?

Assign 5.5 gpm to each side (hot and cold)

= ¾” fixture supplies (hot and cold)

Sizing fixture supplies is one of the simplest lessons we teach.

(g) *Minimum sizes for fixture supplies.* Except as provided in subds. 1. to 3., the fixture supplies serving all plumbing fixtures, appliances and pieces of equipment shall be at least 1/2" in diameter.

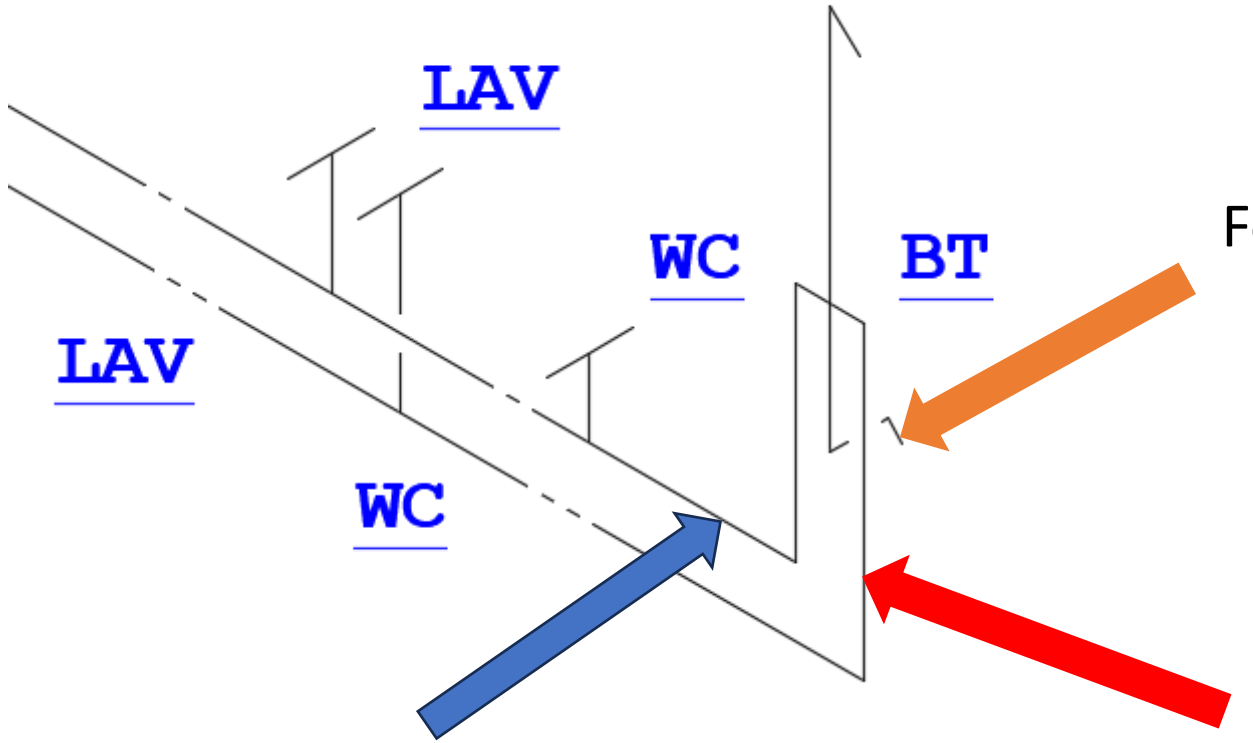
1. Fixture supplies serving syphon jet type urinals shall be at least 3/4" in diameter.

2. Fixture supplies serving flushometer type water closets shall be at least one inch in diameter.

3. Fixture supplies serving emergency eye wash or shower outlets shall be not less than recommended by the manufacturer.

4. Water distribution piping less than 1/2 inch diameter shall have a minimum 1/4 inch diameter, serve one plumbing fixture, the served fixture shall have a maximum load factor of .5 water supply fixture units, and the developed length shall be 25 feet or less.

Tub and shower Unit – current and past practice



For a total of 2 wsfu

Assign 1.5 wsfu (1.5 gpm) to each side = ½” diameter piping for each fixture supply

First few items of the alternate standard

The specifications and/or plans for this alternate standard have been reviewed and determined to comply with chapters SPS 382 through 384, Wisconsin Administrative Code, and Chapters 145 and 160, Wisconsin Statutes.

The Department hereby issues an alternate standard approval to s. SPS 382.40(7)(a) based on the Wisconsin Statutes and the Wisconsin Administrative Code. This approval is valid until the end of September 2028. This alternate standard approval is contingent upon compliance with the following stipulation(s):

1. Water supply piping shall be sized and installed in strict accordance with WDC v. 2.2, Chapters 381-386 Wis. Adm. Code and this alternate standard approval. If there is a conflict between the alternate standard and the Wis. Adm. Code or this Alternate Standard Approval, then the Wis. Adm. Code and this Alternate Standard Approval shall take precedence.

2. A copy of this approval letter shall be submitted with all plans using the IAPMO Water Demand Calculator (WDC) v. 2.2.

   Plans submitted without a copy of this approval letter may be denied.

3. This alternate standard provides a method for estimating the demand load for the building water supply and principal branches for one- and two-family dwellings as specified in s. SPS 320.02(1)(a), (ce), (cm), or (cs) Wis. Adm. Code and nonpublic multiple dwellings, as defined by s. SPS 381.01(155) and (162) Wis. Adm. Code, with water conserving plumbing fixtures, fixture fittings and appliances.

ANOTHER PORTION OF THE ALTERNATE STANDARD

6. All plans submitted to the department using this alternate standard shall conform to s. SPS 382.20(4) Wis. Adm. Code and:

   a. All piping sized using this alternative standard shall display bold, underlined and italicized GPM loads on the plan sheets.
   b. Water distribution piping ½-in. in diameter serving two or more plumbing fixtures shall not have a load greater than those assessed per pressure available for uniform loss ("A" value) in Tables SPS 382.40 4-11 Wis. Adm. Code and tables for ASTM D1785 and ASTM F441 in the appendix.
   c. Each point of reference for pipe sizing shall include a completed WDC calculation sheet. See attached

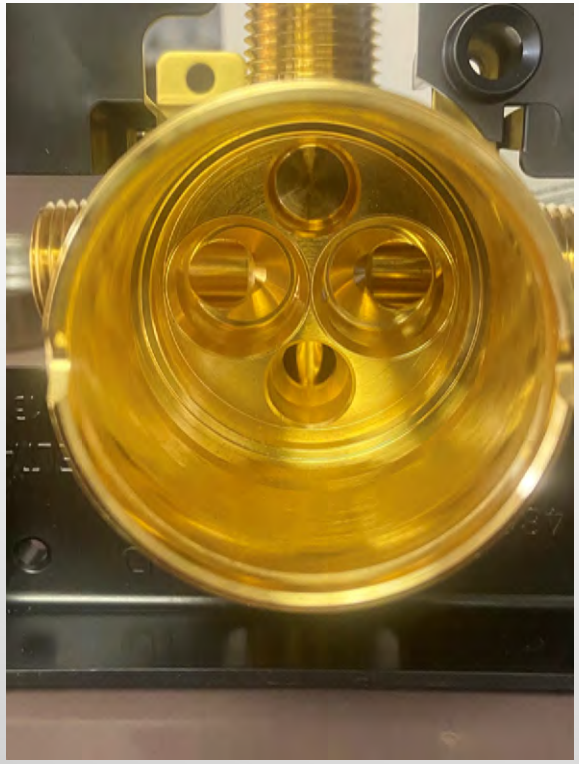
- The DSPS did not adopt UPC's appendix "M".

Fact - we have hybrid water supply systems for decades.

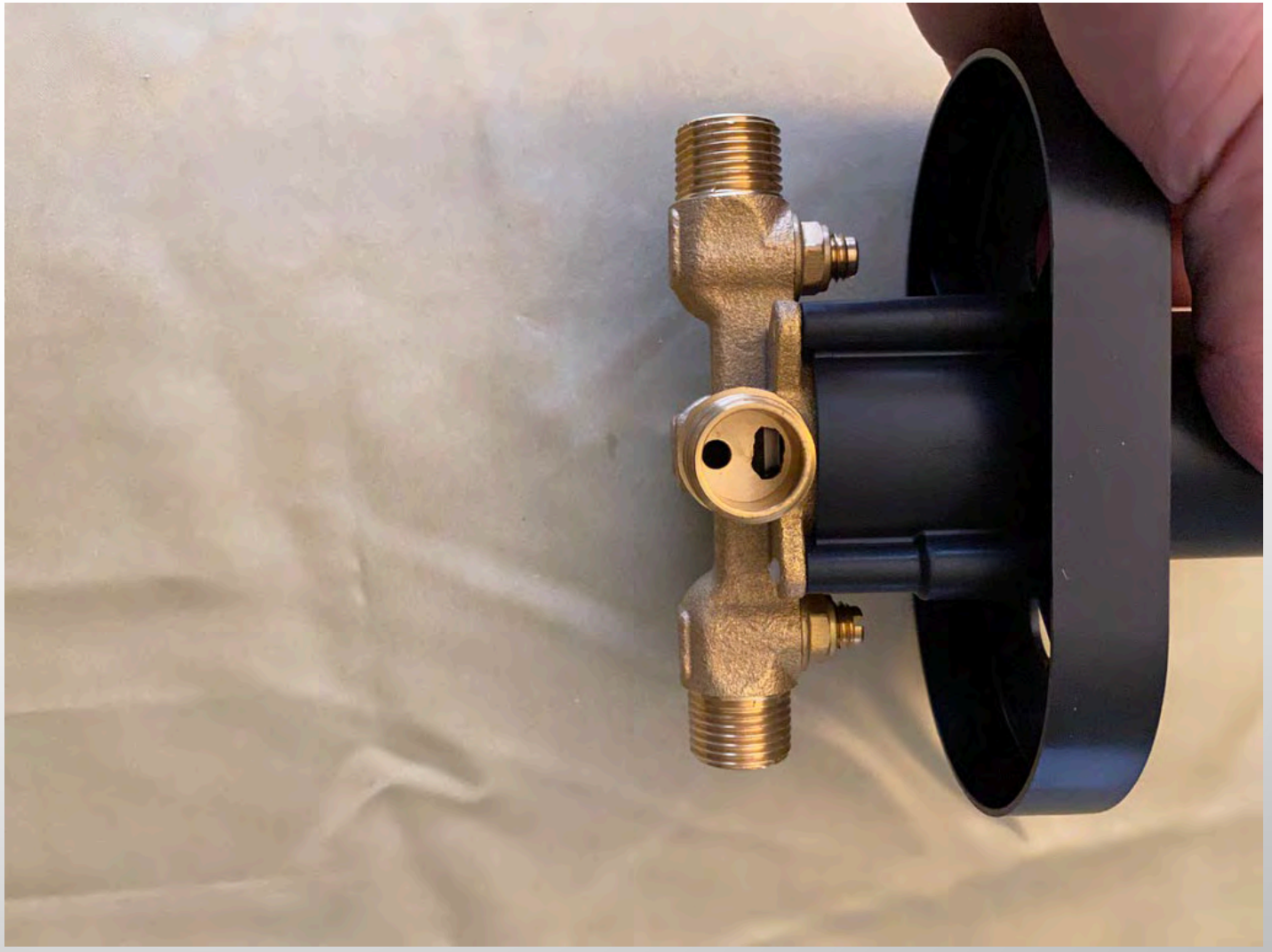
- Any building that has flush-o-meter fixtures is a hybrid system. (FM & FT wsfu)
- Any building that has a commercial dishwasher is a hybrid system. (gpm & wsfu)
- The empirical method (WSFU) and the WDC are both Department approved systems, no reason they cannot function together.
- To suggest that we cannot hybrid water supply systems is a contradiction to past practice, approval letter and plumbing theory.
- Note: There is an DSPS approved CEU class that details the hybrid method of determining load for fixture supplies, and secondary branches using the WSFU method and the use of the WDC to determine the gpm load on mains and primary branches.

MODERN TUB/SHOWER VALVES ARE THE MOST CRITICAL LIMITING FACTOR.

KOHLER - K8304

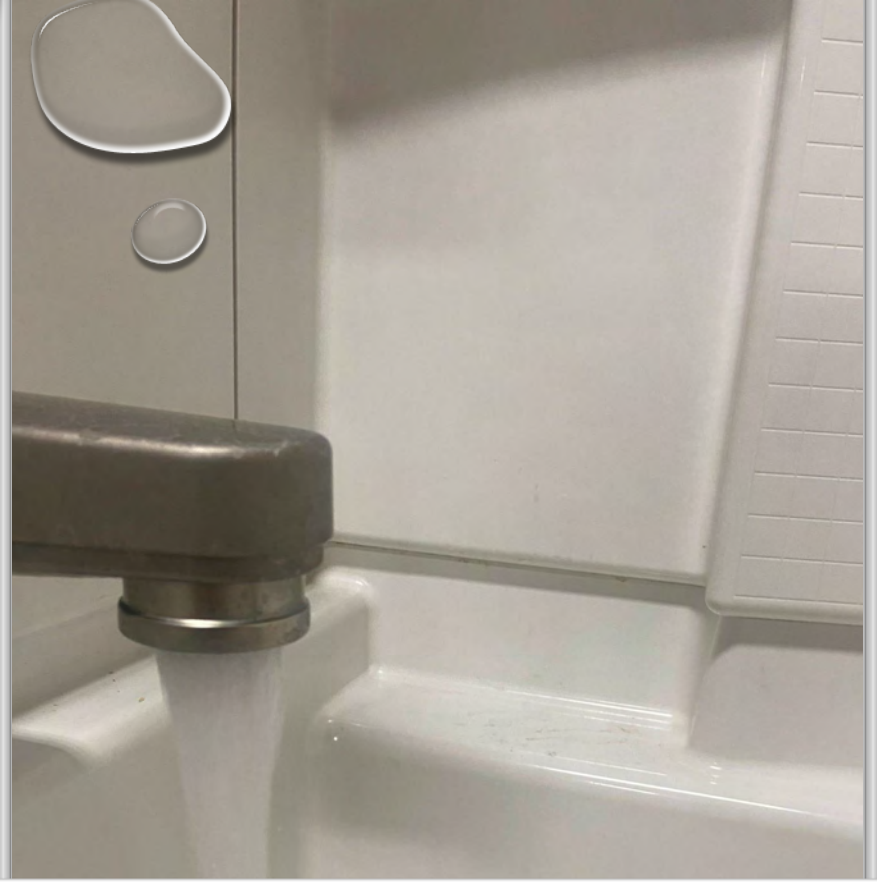



deltafaucet.com
1.800.345.3358
DELTA
FOUNDATIONS®
SHOWER ONLY
SÓLO PARA REGADERAS
ROBINET POUR DOUCHE SEULEMENT




TUB
C

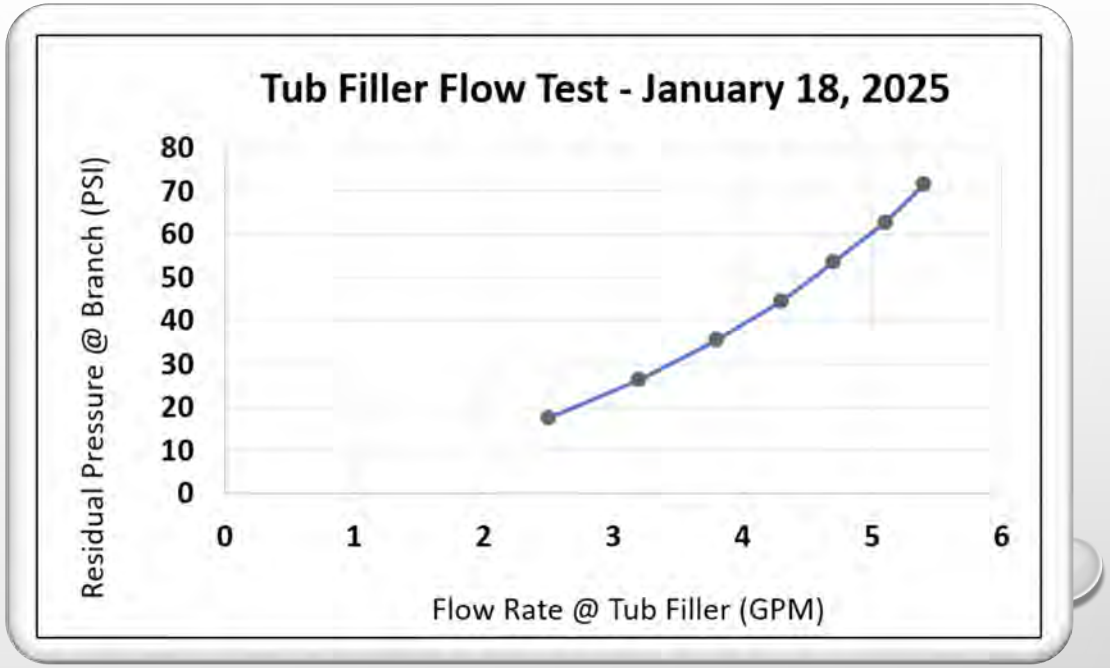

H
SHR
CUPC



WE WENT INTO THE LAB!

WE WENT INTO THE LAB!

	Tub Filler Flow Test - January 18, 2025			
Pressure @ meter (PSI)	Starting Pressure (PSI)	Pressure Loss (PSI)	Residual Pressure at the Branch (PSI)	Flow Rate @ Tub Filler (GPM)
94	80	8.3	71.7	5.4
90	70	7.4	62.6	5.1
78	60	6.5	53.5	4.7
70	50	5.6	44.4	4.3
55	40	4.4	35.6	3.8
42	30	3.5	26.5	3.2
28	20	2.5	17.5	2.5



Note:

- This is "total" load, both hot & cold.
- This is also with nothing else running in the building.
- Each fixture supply would be between 1.5 to 2.0 gpm, which is very close to our code.

TARGET FLOW RATES

Target Flow Rates for 0.375 Inch Pipe					
Flow Velocity (ft/s)	2	4	6	8	10
	Flow Rate Target (gpm)				
0.375 inch PEX	0.60	1.20	1.80	2.40	3.00
0.375 inch CPVC	0.63	1.27	1.90	2.54	3.17
0.375 inch Copper	0.91	1.81	2.72	3.62	4.53

Target Flow Rates for 0.5 Inch Pipe					
Flow Velocity (ft/s)	2	4	6	8	10
	Flow Rate Target (gpm)				
0.5 inch PEX	1.10	2.21	3.31	4.42	5.52
0.5 inch CPVC	1.15	2.30	3.45	4.61	5.76
0.5 inch Copper	1.45	2.91	4.36	5.82	7.27

* Seattle, Washington, they are allowing 3/8” fixture supplies for tub & shower valves.

The Department's interpretation does not align with their alternate standard, our code, past practice, plumbing theory, or their own mission statement.

So now what?

1. This can be resolved today. All the Department needs to do is concede to our logic.
2. We do not need to create any code language to move forward.
3. Unfortunately, we would require an official bulletin that we can bring back to the industry through, CEU classes, PHCC magazine and the apprenticeship classrooms.
4. If the Department's does not agree than they should present they rational.

Thank you again!

- Questions?