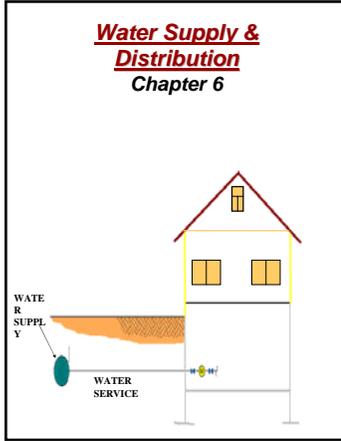


WATER SUPPLY AND DISTRIBUTION (Chapter 1, 1.1.4.6)	
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Water Supply vs Distribution

- Water Supply System**
 - The water service pipe, water distribution pipes, and the necessary connecting pipes, fittings, control valves and all appurtenances in or adjacent to the structure or premises
- Water Service Pipe**
 - The pipe from the water main or other source of potable water supply, or from the meter when the meter is at the public right of way, to the water distribution system of the building served
- Water Distribution Pipe**
 - A pipe within the structure or on the premises that conveys water from the water service pipe, or from the meter when the meter is at the structure, to the points of utilization



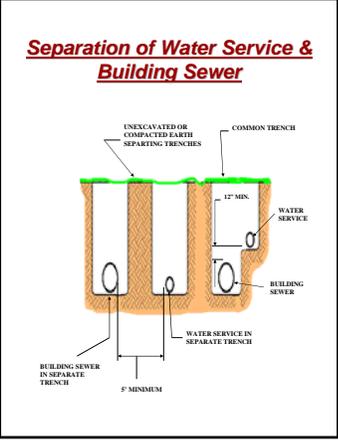
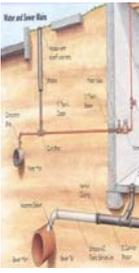
Protection & Trenching

- Section 305 Protection Of Pipes & Plumbing System Components**
 - Freezing & Sewer Depth subject to amendment
 - With present 48" deep for water servicing piping
 - To the top of the pipe



Water Service Separation

- Separation Of Water Service & Building Sewer – Section 603.2**
 - Two additions to the Exceptions
 - Material from Table 702.2
 - Water pipe crosses sewer and is sleeved
 - Five foot horizontally each side of sewer center line



Appendix E Sizing of Water Piping System

- **E101.1.1**
 - Two procedures for water piping sizing
 - E103.3 Segmented loss method
 - E201.1 Size of water-service mains, branch mains and risers
 - Procedures based upon
 - Minimum static pressure
 - System head charges
 - Friction & elevation
 - Necessary rate of flow



Definition

- **Fixture Unit, Water-Supply - w.s.f.u.**
 - A measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures used to size water-piping systems. The water-supply fixture-unit value for a particular fixture depends on its volume rate of supply on the time duration of a single supply operation and on the average time between successive operations.
 - From 2003 IRC definitions

TABLE E101.3(2)
LOAD VALUES ASSIGNED TO FIXTURES^a

FIXTURE	OCCUPANCY	TYPE OF SUPPLY CONTROL	LOAD VALUES IN WATER SUPPLY FIXTURE UNITS (w.s.f.u.)		
			Cold	Hot	Total
Bedroom group	Reside	Plug valve	27	15	55
Bathroom group	Reside	Plug valve	40	30	80
Child	Reside	Plug	10	10	14
Child	Public	Plug	10	10	40
Child	Reside	Plug	10	10	20
Combination fixture	Reside	Plug	20	20	50
Drinking fountain	Reside	Automatic	—	14	14
Drinking fountain	Public	"T" valve	60	—	60
Kitchen sink	Reside	Plug	10	10	14
Kitchen sink	Hotel, restaurant	Plug	10	10	40
Laundry (top-loading)	Reside	Plug	10	10	14
Laundry	Reside	Plug	65	65	67
Laundry	Public	Plug	15	15	20
Shower stall	Hotel, restaurant	Plug	20	20	50
Shower stall	Public	Plug	10	10	40
Shower stall	Reside	Plug	10	10	14
Sink	Public	"T" flush valve	60	—	60
Sink	Public	"T" flush valve	10	—	10
Sink	Public	Plug valve	10	—	10
Washbasin (1/2")	Reside	Automatic	10	10	14
Washbasin (1/2")	Public	Automatic	20	20	50
Washbasin (1/2")	Public	Automatic	10	10	40
Water closet	Reside	Plug valve	60	—	60
Water closet	Reside	Plug valve	20	—	20
Water closet	Public	Plug valve	60	—	60
Water closet	Public	Plug valve	10	—	10
Water closet	Public or private	Flushometer	20	—	20

See next page of Handout for actual Table

Definition

- **Drainage Fixture Unit – (dfu)**
 - A measure of the probable discharge into the drainage system by various types of plumbing fixtures. The drainage fixture-unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation and on the average time between successive operations.
 - From the 2003 IPC / Chapter 2 Definitions

TABLE F101.1
DRAINAGE FIXTURE UNITS FOR FIXTURES AND GROUPS

FIXTURE TYPE	DRAINAGE FIXTURE UNIT VALUE AND LOAD FACTORS	MINIMUM SIZE OF TRAP (inches)
Automatic clothes washers, commercial ^a	3	2
Automatic clothes washers, residential ^a	2	2
Bathroom group as defined in Section 201.1.1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 8.0, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 11.0, 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9, 12.0, 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8, 12.9, 13.0, 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.9, 14.0, 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9, 15.0, 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 16.0, 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9, 17.0, 17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.9, 18.0, 18.1, 18.2, 18.3, 18.4, 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TABLE 604.3
WATER DISTRIBUTION SYSTEM DESIGN CRITERIA
REQUIRED CAPACITY AT FIXTURE SUPPLY PIPE OUTLETS

FIXTURE SUPPLY OUTLET SERVING	FLOW RATE* (gpm)	FLOW PRESSURE (psi)
Bathtub	4	8
Bidet	2	4
Combination fixture	4	8
Dishwasher, residential	2.75	8
Drinking fountain	0.75	8
Laundry tray	4	8
Lavatory	2	8
Shower	3	8
Shower, temperature controlled	3	20
Sitelock, hose bibb	5	8
Sink, residential	2.5	8
Sink, service	3	8
Urinal, valve	15	15
Water closet, blow out, flushometer valve	35	25
Water closet, flushometer tank	1.6	15
Water closet, siphonic, flushometer valve	25	15
Water closet, tank, close coupled	3	8
Water closet, tank, one piece	6	20

See next page of Handout for actual Table!

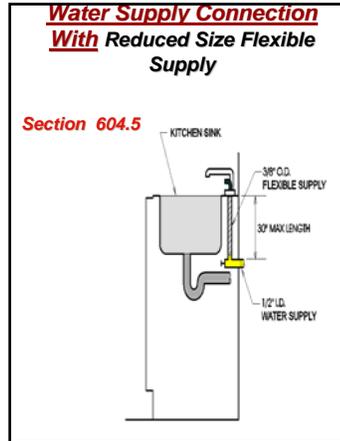


Table 604.5
Minimum Sizes Of Fixture Water Supply Pipes

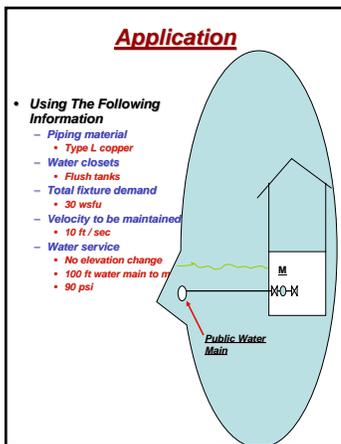
FIXTURE PIPE SIZE	MINIMUM
Bathtubs (larger than 60" x 32")	1/2"
Drinking fountain	3/8"
Sinks, flushing rim	3/4"
Water closet, flush valve	1"
Water closet, flushometer tank	3/8"

Note: Slide is a representation of Table 604.5

TABLE 604.5
MINIMUM SIZES OF FIXTURE WATER SUPPLY PIPES

FIXTURE	MINIMUM PIPE SIZE (inch)
Bathtubs* (60" x 32" and smaller)	1/2
Bathtubs* (larger than 60" x 32")	1/2
Bidet	1/2
Combination sink and trap	1/2
Dishwasher, domestic*	1/2
Drinking fountain	3/8
Hose bibbs	1/2
Kitchen sink*	1/2
Lavatory, 1, 2 or 3 compartments*	1/2
Lavatory	1/2
Shower, single head*	1/2
Sinks, flushing rim	3/4
Sinks, service	1/2
Urinal, flush tank	1/2
Urinal, flush valve	1/2
Wall hydrant	1/2
Water closet, flush tank	3/8
Water closet, flush valve	1
Water closet, flushometer tank	3/8
Water closet, one piece*	1/2

See next page of Handout for actual Table!



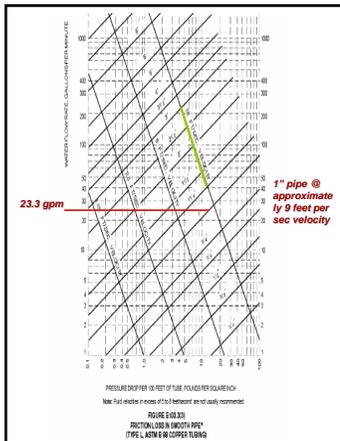
- Using Table E103.3(2)
 - For estimating demand
 - Convert total building demand to flow rate in gallons

TABLE E103.3(3)
TABLE FOR ESTIMATING DEMAND

SUPPLY SYSTEM PREDOMINANTLY FOR FLUSH TANKS			SUPPLY SYSTEM PREDOMINANTLY FOR FLUSH VALVES		
Load	Demand		Load	Demand	
Water supply fixture units	(Gallons per minute)	(GALs. feet per minute)	Water supply fixture units	(Gallons per minute)	(GALs. feet per minute)
1	3.0	0.0030	—	—	—
2	5.0	0.0050	—	—	—
3	6.7	0.0067	—	—	—
4	8.0	0.0080	—	—	—
5	9.4	0.0094	5	15.0	0.0150
6	10.7	0.0107	6	17.4	0.0174
7	11.9	0.0119	7	19.8	0.0198
8	12.9	0.0129	8	22.2	0.0222
9	13.8	0.0138	9	24.7	0.0247
10	14.6	0.0146	10	27.1	0.0271
15	18.8	0.0188	15	35.6	0.0356
20	23.0	0.0230	20	44.1	0.0441
25	27.1	0.0271	25	52.6	0.0526
30	31.2	0.0312	30	61.1	0.0611
35	35.3	0.0353	35	69.6	0.0696
40	39.4	0.0394	40	78.1	0.0781
45	43.5	0.0435	45	86.6	0.0866
50	47.6	0.0476	50	95.1	0.0951

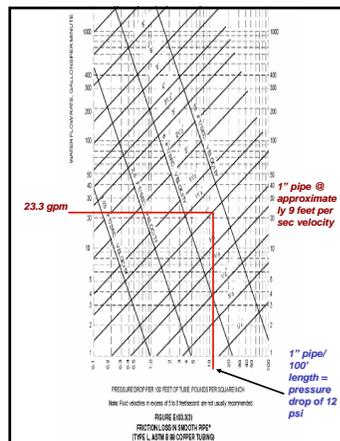
30 wfsu = 23.3 gpm

- ### Sizing Water Service Pipe
- Using Table E103.3(3)
 - For estimating demand
 - Convert total building demand to flow rate in gallons
 - 30 wfsu = 23.3 gpm
 - Using Figure E103.3(3)
 - Determine smallest pipe size to convey
 - 23.3 gpm/ velocity no greater than 10ft/sec



- ### Sizing Water Service Pipe
- Using Table E103.3(3)
 - For estimating demand
 - Convert total building demand to flow rate in gallons
 - 30 wfsu = 23.3 gpm
 - Using Figure E103.3(3)
 - Determine smallest pipe size to convey
 - 23.3 gpm/ velocity no greater than 10ft/sec
 - 1 inch diameter pipe / @ 23.3 gpm @ 9 feet/second

- ### Determining Pressure Loss
- Using Figure E 103.3(3)
 - At point of intersection with 1 inch Type L
 - Draw a vertical line and read/interpolate
 - Bottom horizontal reading



Determining Pressure Loss

- **Using Figure E 103.3(3)**
 - **At point of intersection with 1 inch Type L**
 - **Draw a vertical line and read/interpolate**
 - **Bottom horizontal reading**
 - **23.3 gpm / 10 ft/sec / 100 ft of 1 inch Type L Copper = pressure drop of 12 psi**
 - **Calculate pressure loss**
 - **90 psi - 12 psi = 78 psi**

Water Supply & Distribution

- **Tests – Section 601.4**
 - **Potable water system testing**
 - **As per**
 - **Section 312.5**
 - **Water Supply System Test – Section 312.5**
 - **Test under water pressure**
 - **No less than working pressure**
 - **Or air test, when other than plastic**
 - **Not less than 50 psi**



Water Distribution System Design

- **General - Section 604.1**
 - **Shall conform to accepted engineering practice**
- **System Interconnection - Section 604.2**
 - **Provisions shall be made to**
 - **Prevent flow between hot and cold water at fixtures and devices**



Table 604.4

Maximum Flow Rates & Consumption For Plumbing Fixtures & Fixture Fittings

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY
Lavatory, private 60 psi	2.2 gpm at 60 psi
Lavatory, public (metering) metering cycle	0.25 gallon per metering cycle
Lavatory, public (other than metering)	0.5 gpm at 60 psi

NOTE: 1. Slide is a representation of Table 604.4

**TABLE 604.4
MAXIMUM FLOW RATES AND CONSUMPTION FOR
PLUMBING FIXTURES AND FIXTURE FITTINGS**

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY ^a
Lavatory, private	2.2 gpm at 60 psi
Lavatory, public, (metering)	0.25 gallon per metering cycle
Lavatory, public (other than metering)	0.5 gpm at 60 psi
Shower head ^b	2.5 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Urinal	1.0 gallon per flushing cycle
Water closet	1.6 gallons per flushing cycle

See next page of Handout for actual Table!

Booster System:



- **Water Pressure Booster System Required - Section 606.5.1**
 - **Water pressure insufficient for minimum pressures**
 - **Supply shall be supplemented**
- **Support - Section 606.5.2**
 - **Water tanks shall be supported as per IBC**

TABLE 606.5.4
SIZES FOR OVERFLOW PIPES FOR WATER SUPPLY TANKS

MAXIMUM CAPACITY OF WATER SUPPLY LINE TO TANK (gpm)	DIAMETER OF OVERFLOW PIPE (inches)
0 - 50	2
50 - 150	2½
150 - 200	3
200 - 400	4
400 - 700	5
700 - 1,000	6
Over 1,000	8

For SI: 1 inch = 25.4 mm, 1 gallon per minute = 3.785 L/min

See next page of Handout for actual Table!

Pressure Control

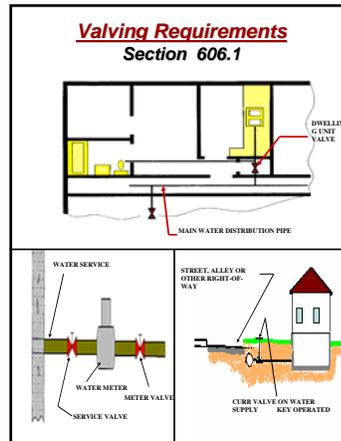
- **Low-Pressure Cutoff Required on Booster Pumps – Section 606.5.5**
 - Installed to prevent creation
 - Of a negative pressure on the suction
 - Prevents operation when
 - Supply pressure at inlet is less than 10psi

TABLE 606.7
SIZE OF DRAIN PIPES FOR WATER TANKS

TANK CAPACITY (gallons)	DRAIN PIPE (inches)
Up to 750	1
751 to 1,500	1½
1,501 to 3,000	2
3,001 to 5,000	2½
5,000 to 7,500	3
Over 7,500	4

For SI: 1 inch = 25.4 mm, 1 gallon = 3.785 L

See next page of Handout for actual Table!



Shutoff Valves

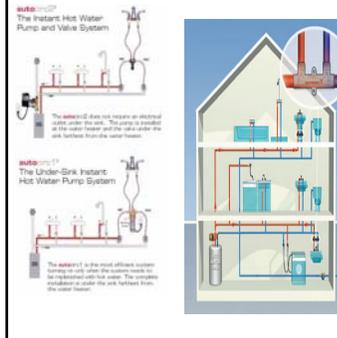
- **Location Of Shutoff Valves - Section 606.2**
 - To be installed
 - Fixture supply to each plumbing fixture
 - Not bathtub & shower
 - Water supply to each
 - Sillcock & appliance
- **Access To Valves - Section 606.3**
 - To be provided to all
 - Full open and shutoff valves



Stop Valves With Threaded Ends



Temperature Maintenance



Access & Identification

- **Access To Valves - Section 606.3**
 - Shall be provided to all required valving
- **Valve Identification - Section 606.4**
 - Service & hose bibb valves
 - Shall be identified
 - Identification of valves in locations
 - Not adjacent to fixture



Hot Water Supply System

- **Where Required – Section 607.1**
 - **Residential Occupancies**
 - Hot water to be supplied to all fixtures
 - Bathing, washing, culinary, cleansing, laundry & building maintenance
 - **Non-Residential Occupancies**
 - Hot water to be supplied to all fixtures for culinary, cleansing, laundry, building maintenance
 - Hot or tempered water for bathing & washing



Thermal Expansion & Pressure Control

- **Pressure Reducing Valve - Section 607.3.1**
 - **Systems up to 2 inch**
 - When thermal expansion causes pressure increase downstream
 - Pressure reducing valve
 - Will ensure system longevity



Fixture Flow

- **Flow Of Hot Water To Fixtures - Section 607.4**
 - **Fixtures, faucets & diverters to be**
 - Installed and adjusted for flow of hot water
 - To correspond to the left-hand side of the fixture fitting
 - Exception
 - Shower & tub mixing valves
 - » With hot water flow markings on the device



Water Heaters

- **Water Heater Labeling - Section 501.5**
 - Shall be third party certified
- **Water Temperature Control In Piping From Tankless Heaters - Section 501.6**
 - Maximum temperature of 140 degrees F.
 - When used for domestic purposes



Relief Valves

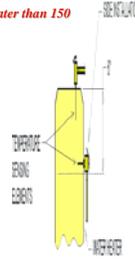
ANSI Z21.22

Temperature rating of not more than 210 degrees F.

Pressure setting not to exceed tank rating

Rating not greater than 150 psi

Installed within shell of water heater and located within the top 6 inches of the tank



What do you mean that I am defeating its purpose?????



Relief Valve Discharge

- **Discharge - Section 504.6.1**
 - Full size to safe place
 - Outlet no
 - Threads, Valves, Tees
- **Required Pan - Section 504.7**
 - If leakage can cause damage
 - Install in a galvanized steel pan
 - Or other approved pan



Potable & Nonpotable Water

- **Identification Of Potable & Nonpotable Water - Section 608.8**
 - Buildings with potable & nonpotable systems
 - Each system shall be identified
- **Information - Section 608.8.1**
 - Piping identification shall include
 - Contents, Direction of flow, Hazard
 - » Identification to repeat at intervals of every 25 feet

Color & Sizing

- **Color - Section 608.8.2**
 - Color for piping identification
 - To be discernable and consistent
- **Size - Section 608.8.3**
 - Color field and lettering
 - To comply with Table 608.8.3

TABLE 608.3
SIZE OF PIPING IDENTIFICATION

PIPE DIAMETER (Inches)	LENGTH BACKGROUND COLOR FIELD (Inches)	SIZE OF LETTERS (Inches)
1/2 to 1 1/2	6	0.5
1 1/2 to 2	6	0.75
2 to 4	12	1.25
4 to 10	24	2.5
over 10	32	3.5

FIG. 10: 1 inch = 25 mm

See next page for copy of Table

Table 608.1
Application Of Backflow Preventers

DEVICE APPLICABLE STANDARDS	DEGREE OF HAZARD	APPLICATION HAZARD	APPLICABLE STANDARDS
Air gap fittings for use with plumbing fixtures, appliances & appliances	High or Low Hazard	Backsiphonage or backpressure	ASME A112.1.3
Antisiphon-type fill valves for gravity water closet flush tanks	High hazard	Backsiphonage only	ASME 1002, CSA-B125
Backflow preventer for carbonated beverage machines	Low hazard	Backpressure or backsiphonage Sizes 1/4-1 inch	ASSE 1022

NOTE: 1. Table shows some of the areas and applications
2. Slide is representative of Table 608.1

TABLE 608.1
APPLICATION OF BACKFLOW PREVENTERS

DEVICE	DEGREE OF HAZARD	APPLICATION*	APPLICABLE STANDARDS
Air gap	High or low hazard	Backsiphonage or backpressure	ASME A112.1.3
Air gap fittings for use with plumbing fixtures, appliances and appliances	High or low hazard	Backsiphonage or backpressure	ASME A112.1.3
Antisiphon-type fill valves for gravity water closet flush tanks	High hazard	Backsiphonage only	ASSE 1002, CSA-B125
Barometric loop	High or low hazard	Backsiphonage only	See Section 608.13.6
Reduced pressure principle backflow preventer and reduced pressure principle fire protection backflow preventer	High or low hazard	Backsiphonage or backpressure Sizes 1/2", 3/4"	ASSE 1013, AWWA C701, CANCSA B44.4
Reduced pressure device fire protection backflow preventer assemblies	High or low hazard	Backsiphonage or backpressure (Fire sprinkler systems)	ASSE 1047
Double check backflow preventer assembly and double check fire protection backflow preventer assembly	Low hazard	Backsiphonage or backsiphonage Sizes 1/2" - 10"	ASSE 1015, AWWA C700
Double check device fire protection backflow preventer assemblies	Low hazard	Backsiphonage or backpressure (Fire sprinkler systems) Sizes 2" - 10"	ASSE 1048
Dual check valve-type backflow preventer	Low hazard	Backsiphonage or backpressure Sizes 1/2" - 1"	ASSE 1026
Backflow preventer with intermediate atmospheric vent	Low hazard	Backsiphonage or backpressure Sizes 1/2" - 1 1/2"	ASSE 1012, CANCSA-B44.3

See next page of Handout for actual Table!

Backflow Prevention

- The following slides are applications of backflow prevention
 - With everyday application

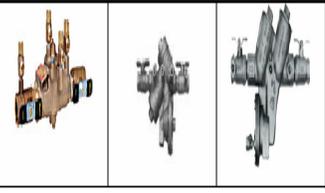
- Protection Against Backflow**
- Backflow Protection – Section 608.13**
 - A means of protection from backflow
 - Shall be provided
 - Air Gap – Section 608.13.1**
 - Minimum to be measured vertically
 - From lowest end of a potable water outlet
 - To the flood level rim
 - Table 608.15.1
 - Minimum Required Air Gaps



Backflow Protection

- **Reduced Pressure Principle Backflow Preventers - Section 608.13.2**

Reduced Pressure Vacuum Breaker (RPBP, RPZ)



Backflow Preventers : Reduced Pressure Principle



Backflow Protection

- **Pressure Type Vacuum Breaker - Section 608.13.5**

Pressure Vacuum Breaker (PVB)



Backflow Prevention

- **Atmospheric Type Vacuum Breakers - Section 608.13.6**

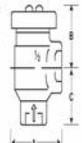
Atmospheric Vacuum Breaker (AVB)



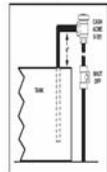
V-101 and V-101C Atmospheric Type Vacuum Breakers

TYPICAL INSTALLATION

An atmospheric type vacuum breaker must be installed to prevent back siphoning of contaminated water. The valve shall be bronze with a silicon rubber seal. Vacuum breakers should always be installed on the discharge with clean clean water of the condition of supply water, as far from the water as water pressure (WSP) valve the device is protecting is in use. The preventer is built up of parts such as brass, valve or bit around the seal when it is in the closed position. Such a build-up could eventually cause the valve to freeze and to operate as a check valve preventer. The Cast Bronze PVB atmospheric type vacuum breaker valve shall be installed in an upright position as shown below with the side of the breaker at least 1" above the maximum height of the equipment.



Dimension	A	B	C
V-101 (1/2")	1 1/2"	1 1/2"	1 1/2"
V-101 (3/4")	1 3/4"	1 3/4"	1 3/4"
V-101 (1")	1 7/8"	1 7/8"	1 7/8"
V-101 (1 1/2")	2 1/8"	2 1/8"	2 1/8"



SPECIFICATION DATA

Performance:
 Maximum temperature 212°F (100°C)
 Maximum inlet pressure 125 psi (8.6 bar)
 Service Potable water

Backflow Prevention

- **Double Check Valve Assemblies - Section 608.13.7**



Vented Double Check Valve (Intermediate Atmospheric Vent) (VDCV)



Backflow Preventers : Double Check Valves



Double Check Detector Assembly



Backflow Protection

- **Spillproof Vacuum Breakers - Section 608.13.8**

Spill Proof Vacuum Breaker (SVB)



TABLE 608.13.1
MINIMUM REQUIRED AIR GAPS

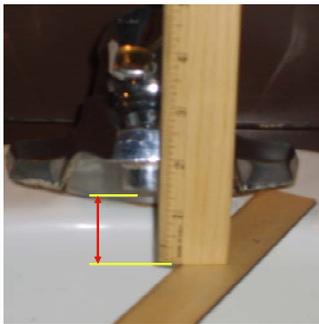
FITTING	MINIMUM AIR GAP	
	Away from a wall (inches)	Close to a wall (inches)
Lavatories and other fixtures with effective opening not greater than 1/2 inch in diameter	1	1 1/2
Sink, laundry trays, general hot, domestic and other fixtures with effective openings not greater than 3/4 inch in diameter	1 1/2	2 1/2
Over-the-sink fillers and other fixtures with effective openings not greater than 1 inch in diameter	2	3
Drinking water fountains, single outlets not greater than 1/2 inch in diameter or multiple outlets with a total area of 0.125 square inch (area of circle 1/2 inch in diameter)	1	1 1/2
Effective openings greater than 1 inch	Two times the diameter of the effective opening	Three times the diameter of the effective opening

For 1/2, 1 inch or 2 1/4 inch.

a. Applicable when walls or obstructions are spaced from the nearest back-edge of the open opening a distance greater than three times the diameter of the effective opening for a single wall, or a distance greater than four times the diameter of the effective opening for two intersecting walls.

See next page for actual copy of Table!

Measurement From Flood Level Rim To Effective Opening



Backflow Protection

- **Protection By Vacuum Breaker - Section 608.15.4**

– When protection is by atmospheric or pressure type vacuum breaker

- **Critical level is to be set minimum of 6" above**

– The flood level rim

- **Deck-Mounted & Integral Vacuum Breakers – Section 608.15.4.1**

– Install per MFG Installation Instructions



Backflow Preventers : Vacuum Breakers :



Silcocks, Hose Bibbs

Hose Connections – Section 608.15.4.2

Openings with hose connections

Protection to be by

- Atmospheric or pressure type vacuum breaker or permanently attached
 - » Hose connection vacuum breaker



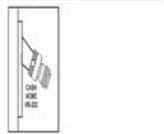
Exceptions

- Does not apply to water heater & boiler drains
- With hose threads
- Does not apply to water valves for clothes washing machines

VB-222 Freeze Proof Self-Draining Hose Bibb Backflow Preventer



SPECIFICATION DATA



SPECIFICATION DATA

Performance:
Service: Water

V-3 and V-3C Hose Bibb Atmospheric Backflow Preventers

TYPICAL INSTALLATION

The Cash Acme V-3 Backflow Preventer features a breakaway top section, just tighten with the hand straps off, and the installation is virtually damage proof.



V-3



V-3C

SPECIFICATION DATA



SPECIFICATION DATA

Performance:
Maximum temperature: 185 F
Maximum pressure: 125 psi
Service: Water

Problem we are trying to avoid!!!



Connection To Potable Water System

Beverage Dispensers - Section 608.16.1

Connection to carbonated beverage dispenser

- Protection to be by a backflow preventer or air gap



Carbon dioxide gas

- Is not to affect
 - Piping downstream of the backflow preventer



Backflow Preventers : Miscellaneous Products



Dual Check Vacuum Breakers for Vending Machine Water Supply Lines



Boilers & Heat Exchangers

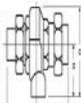
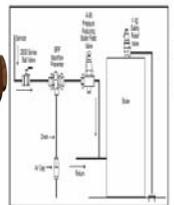
- **Connection To Boilers – Section 608.16.2**
 - To be equipped with
 - Backflow preventer / intermediate atmospheric vent
 - System with conditioning chemicals
 - Connection by air gap or reduced pressure principle backflow
- **Heat Exchangers – Section 608.16.3**
 - Essentially Toxic transfer fluid
 - Separation to be by double-wall construction
 - With air gap open to atmosphere between walls
 - Nontoxic transfer fluid
 - Single wall construction may be used

Dual Controls (Regulator and Relief Valve)



TYPICAL INSTALLATION

The Cash Acme BFP is designed to discharge water under certain conditions. To prevent the possibility of water damage it is recommended that a pipe be fitted with a stop valve. Always install the Cash Acme Type BFP at an easily accessible location for maintenance purposes and so that it can be frequently cleaned. The BFP should be located on a rise or parallel to the floor or ceiling being served. However, it should be located on the upstream side of any boiler feed water pressure regulator for supply pressure considerations.

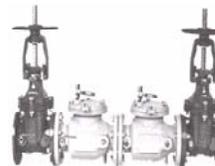


Dimension	A	B	C	D
1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/4"
3/4"	1 3/4"	1 3/4"	1 3/4"	2 3/4"
1"	1 7/8"	1 7/8"	1 7/8"	2 7/8"

SPECIFICATION DATA

Performance
 Maximum temperature 167 F
 Maximum inlet pressure 175 psi
 Service Water

Fire Sprinkler Systems



- **Connections To Automatic Fire Sprinkler Systems & Standpipe Systems - Section 608.16.4**
 - Protection to be obtained from
 - Double check-valve assembly or reduced principle backflow preventer

Fire Sprinkler Systems

- **Additives Or Nonpotable Source**
– Section 608.16.4.1



- Systems under continuous pressure containing

- Chemical additives or antifreeze
- To be protected by
- » Reduced pressure principle backflow preventer



Wall Hydrant With Anti-Siphon, Vacuum Breaker, Automatic Draining

Double Check Valve Assemblies, Cast Iron



Reduced Pressure Detector Assemblies, Stainless Steel



Reduced Pressure Zone Assemblies, Bronze



Automatic Washers

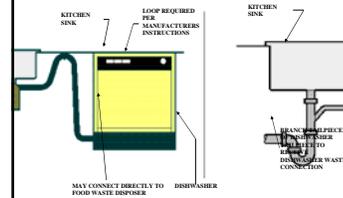
- **Water Connection - Section 406.2**

- Water supply to be protected from backflow

- Air gap is to be integral with the machine as per ASSE 1007
- If installation of backflow preventer is necessary
- To be installed as per section 608 of this code



Dishwasher Connections



Flushing Devices

- **Flushing Devices Required - Section 425.1**
 - Water closet, urinal & trap type plumbing fixture
 - To be designed & installed to supply water
- **Fill Valves – Section 425.3.1**
 - Flush tanks to be equipped with
 - Antisiphon fill valve
 - Minimum 1" above overflow



Bidets

- **Water Connection - Section 408.2**
 - Water supply to be protected
 - By an air gap or backflow preventer
 - Installation to be in accordance with
 - Section 608.13



Water Supplies

- **Individual Water Supplies - Section 602.3**
 - To be used when a public water supply is not available
 - Sources - Section 602.3.1
 - Wells
 - Springs
 - Streams or Cisterns
 - **NOTE**
 - » For Protection of Individual Water Supplies
 - » See Public Health Code / CGS 19a-36

Individual Water Supplies

- **Protection Of Individual Water Supplies - Section 608.17 (as amended)**
 - An individual water supply shall be located and constructed so as to be safeguarded against contamination in accordance with the **Public Health Code of the State of Connecticut adopted pursuant to Section 19a-36 of the Connecticut General Statutes**

Water Quality

- **Individual Water Supplies**
 - Quality to be approved by AHJ
- **Disinfection of System - Section 602.3.4**
 - To be done after construction or major repair
 - As per section 610 or as prescribed by the Health Authority
- **Pumps - Section 602.3.5**
 - To be rated for Potable Water transfer



System Disinfection

- **When Does A System Need To Be Disinfected?**
 - General – Section 610.1
 - New or repaired potable water systems shall be purged of deleterious matter and disinfected prior to utilization.
 - Method of disinfection to be as prescribed by
 - » The Health Authority or Water Purveyor having jurisdiction



System Disinfection

- **Procedure For Disinfection**
 - **When no prescribed method exists**
 - Procedure described in
 - AWWA C651 or AWWA C652
 - **Or as described in this section**
 - Pipe to be flushed with clean potable water
 - Water chlorine solution / let stand 24 hr
 - 50 parts per million minimum
 - Or (200 parts per million for 3 hr)
 - Flush to remove chlorine
 - Repeat if contamination remains

Piping Material

- **Water Service Pipe – Section 605.3**
 - To conform to
 - NSF 61 & Table 605.3
 - **Underground piping standards**
 - To have a minimum pressure rating
 - Of 160 psi @ 73.4 degrees F
 - Plastic pipe to terminate within 5 feet
 - Inside of exterior wall or slab penetration



Table 605.3
Water Service Pipe

MATERIAL	STANDARD
Stainless steel pipe (Type 304/304L)	ASTM A 312; ASTM A 778
Stainless steel pipe (Type 316/316L)	ASTM A 312; ASTM A 778

- NOTE:**
1. Table is only representative of the two areas within this table
 2. Slide is representative of Table 605.3

TABLE 605.3
WATER SERVICE PIPE

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D 157; ASTM D 2242
Adhesive cement pipe	ASTM C 508
Brass pipe	ASTM B 41
Chlorinated polyvinyl chloride (CPVC) plastic pipe	ASTM D 2466; ASTM F 441; ASTM F 442; CSA B137.6
Copper or copper-alloy pipe	ASTM B 42; ASTM B 302
Copper or copper-alloy tubing (Type K, WL, L, WL, M or WM)	ASTM B 37; ASTM B 88; ASTM B 291; ASTM B 447
Cross-linked polyethylene (PEX) plastic tubing	ASTM F 877; CSA B137.5
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	ASTM F 1391; CANCSA-B137.6M
Ductile iron water pipe	AWWA C151; AWWA C115
Galvanized steel pipe	ASTM A 53
High-density polyethylene (HDPE) plastic pipe and tubing	ASTM D 2608; ASTM D 2608; ASTM D 2608; CANCSA-B137.6M
High-density polyethylene (HDPE) plastic pipe	ASTM D 2773; CSA B137.1
High-density polyethylene (HDPE) plastic tubing	ASTM D 2773; CSA B137.1
High-density polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	ASTM F 1391; CANCSA-B137.6
High-density polyethylene (PEX) plastic pipe	ASTM D 2773; ASTM F 2441; ASTM D 2608; CSA B137.5
Stainless steel pipe (Type 304/304L)	ASTM A 312; ASTM A 778
Stainless steel pipe (Type 316/316L)	ASTM A 312; ASTM A 778

See page of Handout for actual Table!

Table 605.4
Water Distribution Pipe

MATERIAL STANDARD	
Polyethylene/ Aluminum/ Polyethylene (PE-AL-PE) composite pipe	ASTM F 1282
Stainless steel pipe (Type 304/304L)	ASTM A 312; ASTM A 778
Stainless steel pipe (Type 316/ 316L)	ASTM A 312; ASTM A 778

- NOTE:**
1. Table is only representative of the three areas within this table
 2. Slide is representative of Table 605.4

TABLE 605.4
WATER DISTRIBUTION PIPE

MATERIAL	STANDARD
Brass pipe	ASTM B 41
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D 2466; ASTM F 441; ASTM F 442; CSA B137.6
Copper or copper-alloy pipe	ASTM B 42; ASTM B 302
Copper or copper-alloy tubing (Type K, WL, L, WL, M or WM)	ASTM B 37; ASTM B 88; ASTM B 291; ASTM B 447
Cross-linked polyethylene (PEX) plastic tubing	ASTM F 877; CSA B137.5
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	ASTM F 1391; CANCSA-B137.6M
Ductile iron water pipe	AWWA C151
Galvanized steel pipe	ASTM A 53
High-density polyethylene (HDPE) plastic pipe and tubing	ASTM D 2608; CANCSA-B137.6M
High-density polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) composite pipe	ASTM F 1282
Stainless steel pipe (Type 304/304L)	ASTM A 312; ASTM A 778
Stainless steel pipe (Type 316/316L)	ASTM A 312; ASTM A 778

See next page of Handout for actual Table!

Soil & Ground Water



Table 605.5
Pipe Fittings

MATERIAL STANDARD	
Fittings for cross-linked polyethylene (PEX) plastic tubing 1966, ASTM F 2080	ASTM F 1807, ASTM F
Metal (brass) insert fittings for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) & Cross-linked Polyethylene/Aluminum/Polyethylene (PEX-AL-PEX)	ASTM F 1974
Stainless steel (Type 304/304L)	ASTM A 312; ASTM A 778
Stainless steel (Type 316/316L)	ASTM A 312; ASTM A 778

NOTE: 1. Table shows four areas of this code
2. Slide is representative of Table 605.5

TABLE 605.5
PIPE FITTINGS

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic	ASTM D 2466
Cast iron	ASTM B 14, ASTM B 14.1
Chlorinated polyvinyl chloride (CPVC) plastic	ASTM F 437, ASTM F 438, ASTM F 439
Copper or copper alloy	ASTM B 16, ASTM B 16.1, ASTM B 16.2, ASTM B 16.3, ASTM B 16.4, ASTM B 16.5
Fittings for cross-linked polyethylene (PEX) plastic tubing	ASTM F 1807, ASTM F 1808, ASTM F 2080
Gray iron and ductile iron	ASTM A 119, ASTM A 119.1
Lead	ASTM B 1
Malleable iron	ASTM B 1
Metal (brass) insert fittings for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) and Cross-linked Polyethylene/Aluminum/Polyethylene (PEX-AL-PEX)	ASTM F 1974
Polyethylene (PE) plastic	ASTM D 2466
Polyvinyl chloride (PVC) plastic	ASTM D 2466, ASTM D 2467, ASTM D 2467, CSA-B117.2
Stainless steel (Type 304/304L)	ASTM A 312, ASTM A 778
Stainless steel (Type 316/316L)	ASTM A 312, ASTM A 778
Steel	ASTM B 14, ASTM B 14.1, ASTM B 14.2

See next page of Handout for actual Table!

Additional Elements

- **Flexible Water Connectors - Section 605.6**
 - When exposed to continuous pressure
 - Shall conform to ASME A112.18.6
- **Valves - Section 605.7**
 - Valves to be of an approved type
 - Compatible with system piping
- **Manufactured Pipe Nipples - Section 605.8**
 - To conform to the standards of
 - Table 605.8

TABLE 605.8
MANUFACTURED PIPE NIPPLES

MATERIAL	STANDARD
Brass, copper, chromium-plated	ASTM B 687
Steel	ASTM A 733

See next page of Handout for actual Table!

Prohibited Joints & Connections

- **Cement or Concrete Joints**
 - Do not effectively seal
- **Fittings Not Approved For The Installation**
 - May cause premature failure
- **Solvent Cement Between Different Types of Plastic**
 - Chemical composition is different
 - Improper bonding
- **Saddle Type Fittings**
 - Flow reduction
 - Possible shifting if subject to impact

Backflow Protection

- **Devices, Appurtenances, Appliances & Apparatus - Section 608.3**
 - *Serving special functions*
 - *Shall be provided with backflow protection*
- **Special Equipment, Water Supply Protection - Section 608.3.1**
 - *Hospital fixtures*
 - *Shall be protected against backflow*

Inspection And Testing Of Backflow Prevention Assemblies
Section 312.9

- **Inspection As Per**
 - *Sections 312.9.1 & 312.9.2*
 - *312.9.1 Inspections / IS DELETED BY*
 - *05 CT Supplement*
 - *Section 312.9.2 Testing / IS AMENDED BY*
 - *05 CT Supplement*
 - *Test at time of installation*
 - *Owners responsibility to have tests performed*
 - *By properly qualified individuals or agencies*

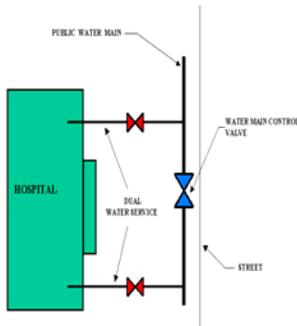
Chemicals & Cross Connection

- **Chemicals & Other Substances - Section 608.5**
 - *Substances that produce toxic conditions*
 - *Shall not be introduced into the system*
- **Cross-Connection Control - Section 608.6**
 - *Cross connection is prohibited*
 - *Except where approved backflow protective means are installed*
- **Private Water Supplies - Section 608.6.1**
 - *Cross connection of*
 - *Private to public water supply is prohibited*

Reutilization

- **Reutilization Prohibited - Section 608.9**
 - *Cooling and process water*
 - *Shall not be returned to the potable water system*
- **Reuse Of Piping - Section 608.10**
 - *Piping previously utilized for any purpose*
 - *Other than potable water*
 - *Not to be used for potable water*

Hospital Water Service
Section 609.2



Health Care

- **Hot Water - Section 609.3**
 - *To be supplied to all equipment*
 - *Temperature shall be as specified by equipment manufacturer*
- **Prohibited Water Closet & Clinical Sink Supply - Section 609.5**
 - *Jet or water supplied orifices*
 - *Not to be connected with water closet or clinical sink*

Additional Chapter Sections

- **Drinking Water Treatment - Section 611**
 - Design – Section 611.1
 - To meet requirements of
 - NSF 42, 44, 53 or 62
- **Solar Systems – Section 612**
 - All construction, installation, alteration & repair
 - To be in accordance with IMC
 - To comply with ASSE 1017



Water Supply & Distribution

- **Additional Areas Of Concern**
 - Solar
 - Water Service Grounding
 - Pressure Reducing Valves
 - Manifold Systems

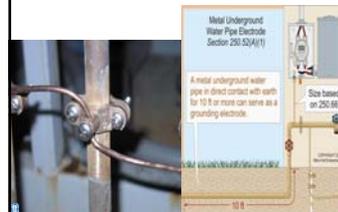
Solar

- **Solar Energy Utilization Section 601.2**
 - When used to heat potable water or
 - Using an independent medium
 - It shall not compromise
 - Cross connection requirements
 - Potable water supply



Water Service For Grounding

- **Existing Piping Used For Grounding Section 601.3**
 - No replacement of existing with nonmetallic pipe
 - Until approved means of grounding is provided



Reducing Valve or Regulator

- **Water Pressure Reducing Valve or Regulator - Section 604.8**
 - For water pressure exceeding
 - 80 psi static
 - Installation to reduce pressure in building water distribution
 - To 80 psi or less



Water Hammer

- **Water Hammer - Section 604.9**
 - To be installed
 - Where quick closing valves are utilized
 - Install per MFG installation instructions



Wiring Problems

- **Continuation Of Prior Slide**
 - **Failure to bond the well casing**
 - **Section 250.4(A)(4)**
 - **Of the 05 NEC**
 - **Use of single sleeve to well shaft from building that includes both wires and water pipe**
 - **Sections 300.8 and 300.10**
 - **Of the 05 NEC**

