2015 IPC® Design, Installation and Inspection Principles

Based on the 2015 International Plumbing Code® (IPC®)

Description
- The 2015 International Plumbing Code® (IPC®) continues to emphasize both prescriptive and performance-related provisions.
- The 2015 IPC encompass the initial design of the plumbing system, the installation and construction of plumbing systems and the maintenance of operating systems.
- All plumbing systems that are provided for utilization by and for the general safety and wellbeing of the occupants of a building are intended to be governed by the code.

Goal
- The goal of this seminar is to provide key information on the design, installation and inspection principles based on the 2015 IPC.

Objectives
- Upon completion, participants will be better able to:
  - Identify code enforcement issues and key code sections
  - Describe the application of the code to inspection, plan review and code enforcement
Marginal Markings within the codebook

- Solid vertical lines indicate a technical change from the requirements of the 2009 edition.
- Arrows indicate where a section, paragraph, item in a list, exception or table has been deleted.
- A single asterisk [*] indicates that text or a table has been relocated elsewhere in the code.
- A double asterisk [**] indicates that the section or table immediately following has been relocated here from a different section.

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- Module 1 – Administration, Definitions and General Regulations
- Module 2 – Fixtures,
- Module 3 – Water Systems, Sanitary Drainage and Venting

Part 1
Administration, Definitions and General Regulations

Chapter One
Administration
Chapter One — Administration

- Applies to the code official
- Establishes the rights and privileges of the design professional, contractor and building owner
- Establishes the responsibilities of various professionals

Scope 101.2

Code applies to:
- Erection
- Installation
- Alterations
- Repairs
- Relocation
- Replacement
- Addition to
- Use or maintenance

Code doesn’t apply to:
- fuel gas systems
- Residential buildings

Existing installations 102.2

- Existing installations that were installed per the code in effect during its construction do not need to be changed, provided it is maintained in good operating condition.

Inspector’s Challenge:
- Installations that did not meet code at the time of construction will need to be brought up to the current code.

Maintenance 102.3

- The owner or authorized agent shall maintain the system and all of its parts in a safe operating condition

Inspector’s challenge:
- The code official has the right to re-inspect the plumbing systems and may be called on to force compliance with the code when the plumbing systems are unsafe.
**Additions, alterations or repairs 102.4**

- The new work shall comply with the current code, the existing parts may continue unchanged if they are safe.

**Inspector’s challenge:**
Determining what has been altered or repaired, may require a preliminary inspection before new work commences.

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**Change of occupancy 102.5**

- A change of occupancy requires that all parts of the plumbing system meet the current code for that occupancy.

**Inspector’s challenge:**
Determining what plumbing elements, if any, can have their use continued is sometimes hampered by limited access to the systems involved. (buried in walls, underground)

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**Duties and Powers of the Code Official Section 104**

- The code official shall:
  - Receive applications, review plans and issue permits
  - Conduct inspections and record the results
  - Have the right of entry to inspect (within the law)
  - Carry identification
  - Issue the appropriate notices to ensure compliance
  - Keep and retain records of activities

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**Administration – Chapter 1**

- Section 105 – Approval
- Section 108 – Violations
- Section 109 – Means of Appeal
- Section 110 – Temporary Equipment, Systems and Uses
Chapter One — Administration

- Discuss the following questions:
  - What are the Duties and Power of the Code Official?
  - What are your challenges as a code official?

Branch intervals

Depth of Trap Seal

- Change from depth of water seal
- Allows other liquids to maintain the seal, such as in a waterless urinal
Grease Interceptor

- Fats, oils and grease (FOG) disposal systems
- Gravity
- Hydromechanical

Plumbing Appliance

- There is difference between a plumbing fixture and a plumbing appliance.
  - A dishwasher is a plumbing appliance.
  - Because a jetted whirlpool tub does not depend upon energized components to be a bathtub, it is a plumbing fixture.

Plumbing Fixture

- Plumbing fixture could have only a water supply connected to it, only a waste line connected to it, or both.

Toilet Facility

- A room or space that contains not less than one water closet and one lavatory.
Gravity GREASE INTERCEPTOR

**Waste Receptor**

- **Waste Receptor.** A floor sink, standpipe, hub drain or a floor drain that receives the discharge of one or more indirect waste pipes.

**Alternate Onsite Nonpotable Water**

- **Alternative Onsite Nonpotable Water.** A way to collect waste water for partial treatment and reuse for flushing toilets and urinals.

**Parts of a plumbing system**
Section 301.3 – Connections to drainage system

- An exception is included to allow gray-water-producing fixtures to be connected to a gray water collection.

Section 303.1 – Identification

- This requires all plumbing products and materials to be listed by a third-party certification agency such as the ICC-ES PMG Listing Program.

Section 303.4 – Third-party certification
Section 304.4 – Openings for pipes

- All spaces between pipes and the sides of the openings through walls, floors or ceilings shall be caulked or closed with appropriate material.

Section 305.3 – Pipes through foundation walls

- All pipes traveling through a foundation wall must be sleeved or have a relieving arch that supports the foundation.

Section 305.4 – Freezing

Section 305.6 – Protection against physical damage
Section 305.7 – Protection of plumbing system components

NOTE: Other methods of protection of plumbing components are possible, subject to approval by the code official.

Section 306 — Trenching, excavation and backfill

For St: 1 inch = 25.4 mm

Section 307 — Structural safety

For St: 1 inch = 25.4 mm

Section 307.2 – Cutting, notching or bored holes
Section 307.2 – Cutting, notching or bored holes

Section 307.3 – Penetration of floor/ceiling assemblies and fire-resistance-rated assemblies

Section 307.3 – Penetration of floor/ceiling assemblies and fire-resistance-rated assemblies
Section 307.5 Protection of footings

- Trenches installed parallel to footings must remain outside the bearing plane of the bottom of the footing.

Location of hangers

- 4" building drain
- Elastomeric couplings
- Braces
- Additional hanger to resist shear force

Piping support—Section 308

Table 308.5 – Hanger spacing

- The spacing of supports, listed in Table 308.5, is based on reducing the sag of the piping system.
Midway guides

- Midway guides shall be installed on a number of products when the size is 2 inches or less. Midway between the required vertical supports (5'). These guides should not be tight, vertical movement should be unimpeded.

Section 308.6 – Sway bracing

Section 308.7 – Anchorage

Section 308.7.1 – Location
Section 308.9 – Parallel water distribution systems

- Where hot water piping is bundled with other hot water piping or cold water piping, each individual hot water pipe must be insulated.

Section 309.2 – Flood hazard

- The code refers to an elevation as required by Section 1612 of the International Building Code as such required elevations may be above the actual design flood elevation.
- 309.3 restricts plumbing from penetrating or being mounted to walls that are designed to break away in flood conditions.

Washroom and toilet room requirements—Section 310

- Toilet room requirements are regulated by building and mechanical code.

Section 311 — Toilet facilities for workers

<table>
<thead>
<tr>
<th>Number of Employees</th>
<th>Minimum Number of Toilet Facilities</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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</tbody>
</table>

*Service* refers to the emptying of waste and the cleaning of the toilet facility. A camp equipped with flush toilets shall meet the standard for “Minimum number of toilet facilities if serviced more than once per week.”

(Source: ANSI Z4.3-96)
Section 312 – Tests and Inspections

- Section 312.1 – Required tests
- Section 312.2 – Drainage and vent water test
- Section 312.3 – Drainage and vent air test
- Section 312.4 – Drainage and vent final test
- Section 312.5 – Water supply system test
- Section 312.6 – Gravity sewer test
- Section 312.7 – Forced sewer test
- Section 312.8 – Storm drainage system test
- Section 312.9 – Shower liner test
- Section 312.10 – Inspection and testing of backflow prevention assemblies

Section 312.9 — Shower liner test

Section 314.2.2 – Drain pipe materials and sizes
**Section 315 – Penetrations**

- Brings the plumbing code into alignment with the energy code, by sealing openings in wall plates.
- Any penetration of fire-rated assemblies shall be sealed per the building code.

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**Module 1 — Administration, Definitions and General Regulations**

1. After final approval of a plumbing system, the code does not provide for any reinspection of the system.

   - True
   - False

   According to Section 102.3, the code official shall have the authority to require any plumbing system to be reinspected.

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**Section 315.1 — Sealing of annular spaces**

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**Module 1 — Administration, Definitions and General Regulations**

2. Requirements needed for plumbing safety that are not in the code shall be determined by the _____________________.

   - Code Official
Module 1 — Administration, Definitions and General Regulations

3. Define the following words:

Conductor – A pipe inside the building that conveys storm water from the roof to a storm or combined building drain.

Gray water – Water waste discharged from lavatories, bathtubs, showers, clothes washers and laundry traps.

Plumbing fixtures – A receptacle or device that is connected to a water supply system or discharge to a drainage system or both.

Module 1 — Administration, Definitions and General Regulations

4. A pipe sleeve used for protection shall be two pipe sizes greater than the pipe passing through the wall.

True False

Module 1 — Administration, Definitions and General Regulations

5. Gravity sewer tests consist of filling the pipe with no less than a ______foot head of water.

3048 mm

Module 1 — Administration, Definitions and General Regulations

6. An air test may be used to test plastic plumbing systems.

True False
Module 1 — Administration, Definitions and General Regulations

7. A potable water system or a _____________ system may be used to flush water closets.

8. Penetrations of the building envelope that leave gaps between the sides of the opening and the pipe shall be _________________.

Module 1 — Administration, Definitions and General Regulations

9. An alternative engineered design for a plumbing system may be used if it provides the _____________ level of quality, strength, effectiveness, fire resistance, durability and safety.

Module 1 — Administration, Definitions and General Regulations

10. A shower liner test must be plugged below the flange clamping the liner and filled with water to the overflow point.

True    False
Module 2
Fixtures, Water Heaters, Indirect/Special Wastes and Separators

Chapter 4
Fixtures, Faucets and Fixture Fittings

Table 403.1 — Minimum Number of Plumbing Fixtures
- The number of fixtures provided shall be determined based on the actual use of the building
  - Ex. A gymnasium with a stage for assemblies at a school without permanent seating would be an A-3

Table 403.1 — Minimum Number of Plumbing Fixtures (portion)

<table>
<thead>
<tr>
<th>No.</th>
<th>Classification</th>
<th>Description</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Assembly</td>
<td>Antifreeze, ice box, storage, bulk receptacles</td>
<td>1 per 125</td>
<td>1 per 200</td>
<td>—</td>
<td>1 per 300</td>
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<tr>
<td></td>
<td></td>
<td>Kitchen sink, laundry sink, toilet</td>
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<td></td>
<td></td>
<td>Conventional or automatic dishwashers</td>
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<td></td>
<td>Meal preparation provisions</td>
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<td>Facilities for religious services</td>
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<td>Indoor recreation rooms</td>
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<td>Media rooms</td>
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<td>Other</td>
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</tbody>
</table>

d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.
### Table 403.1 — Minimum Number of Plumbing Fixtures (portion)

<table>
<thead>
<tr>
<th>NO.</th>
<th>CLASSIFICATION</th>
<th>OCCUPANCY</th>
<th>DESCRIPTION</th>
<th>MALE</th>
<th>FEMALE</th>
<th>LAUNDRY</th>
<th>BAL</th>
<th>SHOWER</th>
<th>SINK</th>
<th>BATHROOM</th>
<th>SHOWER</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Business</td>
<td>B</td>
<td>Building for the trans. of business, office, bank, post office, theater, hotel,hist. musea, and similar uses</td>
<td>3 per 35 for the first 50 and 1 per 50 for the remainder exceeding 20</td>
<td>1 per 50</td>
<td>1 per 50</td>
<td>1 per 100</td>
<td>—</td>
<td>1 per 100</td>
<td>American style</td>
<td></td>
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<tr>
<td>3</td>
<td>Educational</td>
<td>E</td>
<td>Educational facilities</td>
<td>1 per 50</td>
<td>1 per 50</td>
<td>—</td>
<td>1 per 100</td>
<td>—</td>
<td>—</td>
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</tbody>
</table>

*For business and mercantile occupancies with an occupant load of 15 or fewer, service sinks shall not be required.*

### Section 403.2 — Separate facilities

- Item 3 changed to allow a mercantile occupant load of up to 100 persons before separate sex facilities are required.
- This relaxes the burden on small retail spaces so that they do not require two accessible toilet rooms, which take up a disproportionate amount of space.

### Section 403.2.1 — Family or assisted-use toilet facilities serving as separate facilities.

- Added to allow two “no sex designated” family or assisted-use toilet rooms to serve a space that requires only one water closet per sex.
- Advantage is that because either toilet room can be used by either sex, there is more availability of facilities in smaller spaces without needing to offer multiple-user toilet facilities.

### Table 403.1 — Minimum Number of Plumbing Fixtures

- A mixed-use building with a Group E (education) occupant load of 538, Group A-3 (gymnasiums, halls, museums) occupant load of 115 and Group S-1 (storage) occupant load of 82.
- What are the minimum numbers of fixtures required for each sex? See previous slides.
Section 403.3 — Required public toilet facilities

Exceptions:
- To clarify that parking lots and parking garage buildings (without attendants) do not require public toilet facilities.
- Structures and tenant spaces intended for quick transactions, including take out, pick up and drop off, having a public access area less than or equal to 300 sq. ft. do not need to provide public facilities (employee restrooms still apply).

Section 403.3.6 — Door locking

- Doors of multiple-occupant toilet rooms must not be capable of being locked from the inside.

Section 403.5 — Drinking fountain location

- The code requires drinking fountains to be located within 500’ of the most remote tenant space.

Within a travel distance of 500 feet of the most remote location in the tenant space.
Section 405.3.1 — Fixture Clearances

Index

A. All fixtures shall not be closer than 15" from center to sidewall.
B. All fixtures shall not be closer than 30" center to center between adjacent fixtures.
C. All fixtures shall have at least 21" of clearance in front.
D. Water closet compartments shall not be less than 30" wide and 60" deep.
E. Urinal partitions shall extend at least 18" from sidewall or 6" out from the lip.

Section 405.3.5 — Urinal Partitions

- Each urinal utilized by the public or employees shall occupy a separate area with walls or partitions to provide privacy.

Section 405.3.5 — Urinal Partitions (cont.)

- Each urinal utilized by the public or employees shall occupy a separate area with walls or partitions to provide privacy.

Section 405.4 — Floor and wall drainage connections

- A new type of water closet drain connection is added to this section.
Section 406.2 — Waste Connections

Note: Where a connection is made to a fixture branch, horizontal branch drain or drainage stack, the minimum required size is 3 inches.

Section 407.2 — Bathtub waste outlets and overflows

- Overflows for bathtubs are required as a safeguard against the overfilling of bathtubs.

Section 410.1 — Approved drinking fountains

- Although the IPC indicates the minimum number of drinking fountains for an occupancy, the International Building Code required additional drinking fountains to comply with accessibility regulations.
- The International Building Code requirement was brought into the IPC for clarity.
Section 410.3 — Minimum number of drinking fountains

WHERE THE PLUMBING CODE REQUIRES THE NUMBER OF DRINKING FOUNTAINS

THE BUILDING CODE REQUIRES EITHER OF THESE CONFIGURATIONS

- Combo Half Unit
- Low Unit
- High Unit
- Combo Unit

Section 410.3 — Substitution for drinking fountains

- Restaurants where water is served with the meal may omit a drinking fountain.
- Water dispensers can be substituted for half the required drinking fountains.

Section 412.2 — Floor Drains

Section 412.3 — Size of Floor Drains
### Section 413.4 – Water supply required

![Diagram of water supply system]

- Cold water supply for food waste grinder
- Cold water supply for food waste grinder
- Cold water supply for food waste grinder

### Section 416.1 — Group Wash-up Fixture

Group wash up equipment shall conform to the requirements of Section 416.

![Plan and elevation of wash-up fixture]

- 20 inches of rim equals one lavatory

### Section 416.5 — Tempered water for public handwashing facilities

- This section was revised to clarify what is considered to be a public hand-washing facility.
- Tempered water is required for lavatories and group wash up fixtures in public toilet facilities provided for customer, patrons and visitors.
- Maximum temperature at the outlet: 110 degrees

### 417.2 — Water supply riser

- Riser must be fastened using screws or a device specifically designed for such purpose.

![Diagram of water supply riser]
Section 417.4 — Shower compartments

Exception:

417.4.1 Floor and wall area

- Smooth, corrosion resistant, and non-absorbent materials shall extend to at least 6 feet above floor level and not less that 70 inches above the drain of the tub or shower joints made water tight

Section 417.4.2 — Access

- The shower compartment access and egress opening shall have a minimum clear and unobstructed finished width of 22 inches.
- Shower compartments required to be designed in conformance to accessibility provisions shall comply with Section 404.1.
Section 419.1 — Approval

- Urinals shall conform to ANSI Z124.9, ASME A112.19.2M, CSA B45.1 or CSA B45.5. Urinals shall conform to the water consumption requirements of Section 604.4.
- Water-supplied urinals shall conform to the hydraulic performance requirements of ASME A112.19.6, CSA B45.1 or CSA B45.5.

Section 420.1 — Approval

- Electro-hydraulic water closets (a water closet of the siphonic or washdown type that utilizes motors, pumps, and controllers to assist the flushing action)
- And dual flush water closets (two flushing actions, one using less water than 1.6 gal/flush) are addressed and the relevant standards are cited.

Section 421.5 — Access to Pump

- Access to pump installed in a wall or ceiling.

Section 421.5 — Access to Pump (cont.)

- Access to pump installed in a wall or ceiling.
- Installation and access to pump.
Section 424.3 – Individual shower valves

Maximum Temperatures Allowed At Use Locations

<table>
<thead>
<tr>
<th>Plumbing Fixture</th>
<th>Maximum Discharge Temperature</th>
<th>Reference Standard</th>
<th>IPC Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bidet</td>
<td>≤ 110°F (43.33°C)</td>
<td>ASSE 1070</td>
<td>408.3</td>
</tr>
<tr>
<td>2. Public hand-washing facilities</td>
<td>&gt; 85°F (29.44°C) and ≤ 110°F (43.33°C)</td>
<td>ASSE 1070 or CSA B125.3</td>
<td>416.5</td>
</tr>
<tr>
<td>3. Individual shower valves</td>
<td>≤ 120°F (48.89°C)</td>
<td>ASSE 1016 or ASME A112.18.1 / CSA B125</td>
<td>424.3</td>
</tr>
<tr>
<td>4. Multiple (gang) showers</td>
<td>≤ 120°F (48.89°C)</td>
<td>ASSE 1069 or CSA B125</td>
<td>424.3</td>
</tr>
<tr>
<td>5. Bathtub/whirlpool bathtubs</td>
<td>≤ 120°F (48.89°C)</td>
<td>ASSE 1070 or CSA B125.3 except as allowed by Section 424.3.</td>
<td>424.5</td>
</tr>
</tbody>
</table>

Section 424.4 – Multiple (gang) showers

Section 424.9 — Water closet personal hygiene devices

- ASME A112.4.2 was added to the code to cover specialized water closets or water closet seats having sprays for personal hygiene.
Section 501.2 – Water heater as space heater

502.1.1 Elevation and protection

- Elevation of water heater ignition sources and mechanical damage protection requirements for water heaters shall be in accordance with the International Mechanical Code and the International Fuel Gas Code.

502.5 Clearance for Maintenance and Replacement
Section 503.1 – Cold water line valve

Water Heater Valve

Section 504.4.1 - Installation of temperature and pressure relief valves

Section 504.4.1 - Installation of temperature and pressure relief valves

CORRECT INSTALLATION

PROHIBITED INSTALLATION

RELIEF VALVE WITHOUT DISCHARGE PIPING PRESENTS A DANGER TO PEOPLE IN THE IMMEDIATE AREA
Section 504.6 - Requirements for discharge piping

- The language states that where drain pans are required for water heaters, they are only required for storage tank-type water heaters or hot water storage tanks. Tank-less water heaters are exempt.

Section 504.7 - Required pan

- The language states that where drain pans are required for water heaters, they are only required for storage tank-type water heaters or hot water storage tanks. Tank-less water heaters are exempt.

Section 505.1 - Unfired vessel insulation

- Unfired hot water storage tanks shall be insulated to R-12.5 (h x ft² x °F)/Btu (R-2.2 m² x K/W).

Chapter 8
Indirect/Special Wastes
Section 801.1 - Scope

- Food-handling establishments
- Sterilizers
- Clear-water waste
- Swimming pools
- Methods of providing air breaks or air gaps
- Neutralizing devices for corrosive waste

Section 802.1 - Where required

- Floor drains in food storage areas
- Potable clear-water waste

Section 802.1.2 – Floor drains in food storage areas

Section 802.1.3 - Potable clear-water waste
Section 802.1.8 - Food utensils, dishes, pots and pans sinks

- Sinks used for the washing, rinsing or sanitizing of utensils, dishes, pots, pans or service ware used in the preparation, serving or eating of food must connect indirectly to the drainage system through an air gap or air break.

Section 802.2 – Installation

Section 802.2.1 – Air gap

Section 802.2.2 - Air Break
Section 802.3 - Waste receptors

- In addition to waste receptors prohibited from being in bathrooms or toilet rooms, they are now prohibited from being in plenums, crawl spaces, attics, interstitial spaces above ceilings and below floors.
- Waste receptors in those locations can dry out or overflow without knowledge of the occupants.

Section 802.4 - Standpipes

Chapter 10
Traps, Interceptors and Separators
Section 1002.1 - Fixture traps

- An exception for parking garage floors drains allows them to run without traps when they run to a storm sewer.
- Traps for individual floor drains are not required provided that the drains are connected to a main trap before discharge to a combined sewer.

Section 1002.3 - Prohibited traps

- "Drum Trap" Exception: When used as a solids interceptor
- "S" Trap tends to self-siphon
- "Old Style" Floor drain with interior partition (moving parts)
Section 1002.4 - Trap seals

- Minimum liquid seal is 2 inches (51 mm)
- Maximum liquid seal is 4 inches (102 mm)
- When evaporation threatens the trap seal, the seal shall be protected by one of four methods
- Trap seal protection shall conform to ASSE 1018, ASSE 1044, or ASSE 1072

Section 1002.4 - Trap seals

- Trap seal primer valve discharge piping must connect to the trap above the trap seal water line.

Section 1003.1 - Interceptors and separators

- Provided to prevent the discharge of:
  - Oil
  - Grease
  - Sand
  - Substances harmful to the system, e.g. acid, heavy metals
Section 1003.2 - Approval

Section - 1003.3.1

- Grease interceptors and automatic grease removal devices required
  - A list of equipment and fixtures that require their waste water be treated in commercial settings

- grease interceptors can be installed in series, instead of requiring the replacement of an existing grease interceptor that is too small.

Grease Interceptor In Series

Section 1003.3.1 - Grease interceptors and automatic grease removal device
Section 1003.3.2 - Food waste grinders

Outside Grease Interceptors

Section 1003.3.5 - Automatic grease removal devices

Gravity grease interceptors
Section 1003.4.2 - Oil separator design

- Oil separators not designed in accordance with Sections 1003.4.2.1 and 1003.4.2.2, must be listed and labeled.

Section 1003.6 – clothes washer discharge interceptor

- Applies to commercial and industrial clothes washers
- Applies to residential clothes washers when there is more than one in a laundry room

Section 1003.9 - Venting of grease interceptor

Venting of Interceptors and Separators
Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

1. There shall be at least 21 inches (533 mm) of clearance in front of a lavatory to any wall or fixture.

True  False

Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

2. The waste outlet of a pressure, temperature or other relief valve shall be indirectly connected to the __________ (Section 504.6).

Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

3. Standpipes shall extend a minimum of __________ inches (________ mm) and a maximum of __________ inches (________ mm) inches above a trap.

18 inches (457 mm)  42 inches (1067 mm)

Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

4. The vertical distance from the fixture outlet to the trap weir shall not exceed __________ inches (________ mm).

24 inches (610 mm)
Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

5. Bathtubs require a waste outlet and an __overflow__ outlet both connected to 1½ inch (38 mm) pipe.

Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

6. An indirect waste receptor installed below the floor in a crawl space is a code violation.

   True     False

Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

7. When a water heater is connected to an additional storage tank, both the water heater and the tank must have temperature and pressure relief valves.

   True     False

Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

8. When lack of space or capacity is a factor, an additional grease interceptor may be added upstream of the existing grease interceptor.

   Yes     No
Module 2 - Fixtures, Water Heaters, Indirect/Special Waste and Separators

9. A tankless water heater (does or does not) require a water heater pan.

Does  Does Not

Module 3
Water Systems, Sanitary Drainage and Venting

601.5 Rehabilitation

- Existing water piping systems may be rehabilitated using an epoxy liner system that complies with ASTM F 2831.
Section 602.2 – Potable Water Required

- Only potable water shall be supplied to plumbing fixtures that provide water for drinking, bathing or culinary purposes, or for the processing of food, medical or pharmaceutical products.
- Unless otherwise provided in this code, potable water shall be supplied to all plumbing fixtures.

Section 603.1 - Size of Water Service Pipe

Section 603.2 - Separation of Water Supply and Building Sewer

602.3.4 Disinfection of system

- All newly constructed water supply systems shall be disinfected as outlined in this code.
Section 603.2 - Separation of Water Service and Building Sewer

Exception

Sewer pipe not listed in Table 702.2

Section 603.2.1 - Water Service Near Sources of Pollution

- Potable water service pipes shall not be located in, under or above:
  - Cesspools
  - Septic tanks
  - Septic tank drainage fields or seepage pits

Section 604 - Design of Building Water Distribution System

- Shall conform to accepted engineering practice.

- Appendix E describes two methods of sizing a water supply system.
  - Section E103.3 (Segmented loss method)
  - Section E 201.1 (Based on water fixture units or old method)

Example of E201.1 (Residential Method)

The following example utilizes Appendix E (Residential Method).

- A building with 15’ elevation difference to the highest water supply outlet.
- Available Pressure = 65 psi low, 70 psi high.
- Developed length of 40’.
- Combined fixture unit value of 27.5.
Step | Task
---|---
1 | Obtain the minimum service pressure (psig) available from the local water authority.
2 | Adjust for elevation conditions (Subtract 0.5 psi for each foot of height. If the highest water supply outlet is below the meter, add .5 psi for each foot of difference. Take in consideration the pressure reducing valve.)
3 | Deduct for all pressure losses caused by special equipment, such as backflow preventers, water softeners, filters, etc. The loss is determined in accordance with the manufacturer’s specifications. Table 604.3
4 | Determine if fixture water controls require more than 8 psig minimum to operate. (Note the resulting figure). Temperature-controlled shower valve deduct in excess of 8 psi (12).
5 | Note the resulting figure.
6 | Determine the approximate length of piping from the water main to the most remote fixture in house. The hot water circuit may be the longest length.
7 | Using the “Combined” column of Table 603.3(2) and the water system fixture units (wsfu) of all fixtures that are a part of the system, and note the resulting figure.
8 | In the appropriate pressure range (from step 5) of the Table E201.1, find the maximum developed length through water heater or cold water branches and multiply by 1.2 to account for fittings. Read down this column until you find the (wsfu) that is equal to or greater than the total (wsfu) obtained in Step 7.
9 | Read across this row to obtain the minimum meter and service pipe size from column one.
10 | Determine required size of each branch, by starting at the most remote outlet and work back to the main distribution pipe. Determine the (wsfu) on a given section of piping and using the same pressure range and maximum developed length column as in Step 8, locate the (wsfu) and read across that row to obtain the pipe size for that section.

Example of E201.1 (Residential Method) cont.

<table>
<thead>
<tr>
<th>Step</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1.</td>
<td>65</td>
</tr>
<tr>
<td>Step 2.</td>
<td>-7.5</td>
</tr>
<tr>
<td>Step 3.</td>
<td>-3</td>
</tr>
<tr>
<td>Step 4.</td>
<td>-12</td>
</tr>
<tr>
<td>Step 5.</td>
<td>42.5</td>
</tr>
<tr>
<td>Step 6.</td>
<td>48</td>
</tr>
</tbody>
</table>

Table E103.3(2) (Private) WATER SUPPLY FIXTURE UNIT VALUES FOR VARIOUS PLUMBING FIXTURES AND FITURE GROUPS

<table>
<thead>
<tr>
<th>TYPE OF FIXTURES OR GROUP OF FIXTURES</th>
<th>WATER SUPPLY FIXTURE UNIT VALUE (w.s.f.u.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HOT</td>
</tr>
<tr>
<td>Bathtub (with/without overhead shower head) (Private)</td>
<td>1.0</td>
</tr>
<tr>
<td>Clothes washer (Private)</td>
<td>1.0</td>
</tr>
<tr>
<td>Dishwasher (Private)</td>
<td>1.4</td>
</tr>
<tr>
<td>Bathroom group (Private). (Flush tank) with bathtub or shower stall</td>
<td>1.5</td>
</tr>
<tr>
<td>Half-bath group (water closet and lavatory)</td>
<td>0.5</td>
</tr>
<tr>
<td>Hose bibb (Silcock)*</td>
<td>—</td>
</tr>
<tr>
<td>Kitchen group (dishwasher and sink with/without garbage grinder)</td>
<td>1.8</td>
</tr>
<tr>
<td>Kitchen sink (private)</td>
<td>1.0</td>
</tr>
<tr>
<td>Laundry group (clothes washer standpipe and laundry tub)</td>
<td>1.8</td>
</tr>
<tr>
<td>Laundry tub (private)</td>
<td>1.0</td>
</tr>
<tr>
<td>Lavatory (private)</td>
<td>0.5</td>
</tr>
<tr>
<td>Shower stall (private)</td>
<td>1.0</td>
</tr>
<tr>
<td>Water closed (tank type), (private)</td>
<td>2.3</td>
</tr>
</tbody>
</table>
Example of E201.1 (Residential Method) cont

- Step 8. From the “Pressure Range 40-49 psi” (from step 5) column, read down the 60’ column.
  
  Table E201.1

- Step 9. The meter size from column one is ¾” and the main distribution pipe shall be 1 inch.

Section 604.5 - Size of Fixture Supply

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Table 604.5

Minimum Sizes of Fixture Water Supply Pipes

---

Table E201.1

Minimum Size of Water Meters, Mains and Distribution Piping Based on Water Supply Fixture Unit Values (w.s.f.u.)

<table>
<thead>
<tr>
<th>Pressure Range 40-49</th>
<th>METER AND SERVICE PIPE (INCHES)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>400</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DISTRIBUTION PIPE (INCHES)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>¾</td>
<td></td>
<td>31</td>
<td>2.5</td>
<td>2.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>½</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>¾</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<tr>
<td>1</td>
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<td>3</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1½</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1½</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1½</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1½</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Section 604.9 – Water Hammer

Chapter 6 – Water Supply and Distribution

<table>
<thead>
<tr>
<th>2015</th>
<th>Section Title</th>
<th>Description of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Table 605.3</td>
<td>Water Service Pipe</td>
</tr>
<tr>
<td></td>
<td>Table 605.4</td>
<td>Water Distribution Pipe</td>
</tr>
<tr>
<td></td>
<td>Table 605.7</td>
<td>Valves</td>
</tr>
</tbody>
</table>

Valves

- Valves must be compatible with the type of piping being used
- Valves shall meet the standards in Table 605.7
- Valve shall comply with NSF 61

605.2.1 Lead content of drinking water pipe and fittings

- Everything used in a water supply shall comply with NSF 372 which stipulates no more than .25 of a percent of lead content
Section 605.24.1 – Copper or copper-alloy tubing to galvanized steel pipe

COPPER SOLDER JOINT CONNECTOR

STEEL NUT

DIELECTRIC (INSULATORS)

INSULATING GASKET

STEEL BODY

TAPERED PIPE THREADS

Section 606 - Installation of the Building Water Distribution System

Section 606.1 Location of Full Open Valves
- Full-open valves shall be installed in the following locations:
  - Curb Valve

Section 606.2 - Location of Shutoff Valves
- Shutoff valves shall be installed in the following locations:
  - On the fixture supply to each plumbing fixture other than bathtubs and showers in one- and two-family residential occupancies, and other than in individual sleeping units that are provided with unit shutoff valves in hotels, motels, boarding houses and similar occupancies.
  - On the water supply pipe to each sillcock.
  - On the water supply pipe to each appliance or mechanical equipment.

Section 606.2 - Location of Shutoff Valves Shutoff Valves For Each Fixture

For SI: 1 inch = 25.4 mm.
Valve at Entrance to Building and on Discharge Side of Meter

Dwelling Unit Valve

Valves for Each Riser & Down Feed

Section 606.4 - Valve Identification

Section 606.4 requires valve to be identified
Section 606.7 – Labeling of water distribution pipes in bundles

- This new section requires that water distribution piping that is in bundles have labels to identify the direction of flow and contents.

Section 607.1 – Where required

- This section was added to prohibit a water heater thermostat from being used as the temperature limiting device where the code requires a limit for hot or tempered water.

Section 607.1.1 - Temperature limiting means

- The threshold for where a hot water temperature maintenance system is required was lowered from 100 feet to 50 feet (30 480 mm to 15 240 mm).
Section 607.2 – Hot or Tempered Water Supply to Fixture

607.2.1 maintaining heated water temperature

- Residential occupancies shall comply with the energy code section R403.5.1
- Commercial occupancies shall comply with the energy code section C404.6

Section 607.3 - Example of Thermal Expansion Control

Example of closed system

Pressure Reducing Valve with Thermal Expansion Bypass
607.5 [E] - Pipe insulation

- The International Energy Conservation Code regulates pipe insulation, which is sometimes installed by the plumbing contractor.

Section 607.5 - Pipe insulation

Section 608.7 – Stop-and-waste valves prohibited

- Wherever nonpotable water systems are installed the piping must be identified.
- Signage is required at outlets
- Color of piping, letters and letter size is addressed in this section
- Identification tape is allowed
- Potable water used for cooling equipment can not be returned to the potable water system

Section 608.8 - Identification of nonpotable water
Air Gap for a Faucet

Air Gap in Piping System

Section 608.13.2 – Reduced pressure principle backflow prevention assemblies

Section 608.13.3 – Backflow preventer with intermediate atmospheric vent
Section 608.13.6 – Atmospheric-type vacuum breakers

Section 608.14.2 – Protection of backflow preventers

Table 608.15.1 - Minimum Required Air Gaps

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Minimum Air Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAVATORIES AND OTHER FIXTURES WITH EFFECTIVE OPENINGS NOT GREATER THAN 1/2 INCH IN DIAMETER</td>
<td>1 INCH</td>
</tr>
<tr>
<td>SINKS, LAUNDRY TRAYS, GOOSENECK BACK FAUCETS AND OTHER FIXTURES WITH EFFECTIVE OPENINGS NOT GREATER THAN 1/4 INCH IN DIAMETER</td>
<td>1.5 INCH</td>
</tr>
<tr>
<td>OVER-RIM BATH FILTERS AND OTHER FIXTURES WITH EFFECTIVE OPENINGS NOT GREATER THAN 1 INCH IN DIAMETER</td>
<td>2 INCH</td>
</tr>
<tr>
<td>DRINKING WATER FOUNTAINS, SINGLE ORIFICE NOT GREATER THAN 7/16 INCH IN DIAMETER OR MULTIPLE ORIFICES WITH A TOTAL AREA OF 0.150 SQUARE INCH (AREA OF CIRCLE 7/16 INCH IN DIAMETER)</td>
<td>1 INCH</td>
</tr>
<tr>
<td>EFFECTIVE OPENINGS GREATER THAN 1 INCH</td>
<td>TWO TIMES THE DIAMETER OF THE EFFECTIVE OPENING</td>
</tr>
</tbody>
</table>

For SI: 1 INCH = 25.4 MM

a. Applicable where walls or obstructions are spaced from the nearest inside-edge of the spout 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.
Section 608.15.4.1 – Deck-mounted and integral vacuum breakers

- Lavatory and kitchen sink faucets with the primary outlet attached to a flexible hose must be protected by an integral vacuum breaker or be provided with a dedicated vacuum breaker.

Section 608.15.4.2 – Hose connections

- These devices consist of two check valves with an atmospheric vent located between the check valves.
Section 608.16.1 – Beverage dispensers

Section 608.16.3 – Heat exchangers

Section 608.16.4 – Connections to automatic fire sprinkler systems and standpipe systems
Section 608.16.5 – Connections to lawn irrigation systems

Section 609.2 – Water service

Section 701 - Sanitary Drainage
Branch Interval Review

Common Building Sewer Location within an Approved Public Sewer Easement
Section 701.4 - Sewage Treatment

- Sewage or other waste from a plumbing system that is deleterious to surface or subsurface waters shall not be discharged into the ground or into any waterway unless it has first been rendered innocuous through subjection to an approved form of treatment.

Section 701.7 - Connections

- No direct connection of a steam exhaust, blow-off or drip pipe to the building drain.
- Waste water discharge shall not be higher than 140°F (60°C).
- When higher temperatures exist, approved cooling methods shall be provided.

Section 701.9 – Drainage Piping In Food Service Areas

- Exposed soil or waste piping shall not be installed above any working, storage or eating surfaces in food service establishments.
Above-ground Drainage & Vent Pipe

- Table 702.1 identifies the materials that are approved and the standards with which these materials must comply.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylonitrile butadiene styrene (ABS) plastic pipe in IPS diameters, including Schedule 40, DR 22 (PS 150) and DR 34 (PS 180): with a solid, cellular core or composite wall</td>
<td>ASTM D 2513, ASTM F 628, ASTM F 1458, CSA B 151.1</td>
</tr>
<tr>
<td>Brass pipe</td>
<td>ASTM B 63</td>
</tr>
<tr>
<td>Copper or copper-alloy pipe</td>
<td>ASTM B 72, ASTM B 362</td>
</tr>
<tr>
<td>Copper or copper alloy tubing (Type K, L, M, DWV)</td>
<td>ASTM B 280, ASTM B 135, ASTM B 156</td>
</tr>
<tr>
<td>Galvanized steel pipe</td>
<td>ASTM A 53</td>
</tr>
<tr>
<td>Galvanized steel flare</td>
<td>ASTM B 387, ASTM C 1527</td>
</tr>
<tr>
<td>Polyethylene (PE) pipe</td>
<td>ASTM D 2513, CSA B 151.1</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC) plastic pipe with a 3.28-nach OD: and a solid, cellular core or composite wall</td>
<td>ASTM D 2840, ASTM D 1353, ASTM F 1008, ASTM B 387, CSA B 151.1</td>
</tr>
<tr>
<td>Stainless steel drainage systems, Types 304 and 316L</td>
<td>ASTM A 182, A 316, A 312</td>
</tr>
</tbody>
</table>

Underground Drainage & Vent Pipe

- The materials listed in this table are for underground use within a building. The materials not allowed underground that were allowed above ground in Table 702.1 are the following:

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylonitrile butadiene styrene (ABS) plastic pipe in IPS diameters, including Schedule 40, DR 22 (PS 150) and DR 34 (PS 180): with a solid, cellular core or composite wall</td>
<td>ASTM D 2513, ASTM F 628, ASTM F 1458, CSA B 151.1</td>
</tr>
<tr>
<td>Cast-iron pipe</td>
<td>ASTM A 74, ASTM A 888, ASME A 126.1</td>
</tr>
<tr>
<td>Copper or copper-alloy tubing (Type K, L, M, DWV)</td>
<td>ASTM B 71, ASTM B 362, ASTM B 135, ASTM B 156</td>
</tr>
<tr>
<td>Polyethylene (PE) pipe</td>
<td>ASTM D 2513, ASTM F 1008, ASTM B 387, CSA B 151.1</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC) plastic pipe with a 3.28-nach OD: and a solid, cellular core or composite wall</td>
<td>ASTM D 2513, ASTM F 1008, ASTM B 387, CSA B 151.1</td>
</tr>
<tr>
<td>Stainless steel drainage systems, Type 316L</td>
<td>ASTM A 182, A 316, A 312</td>
</tr>
</tbody>
</table>

Building Sewer Pipe

- Table 702.3 identifies the materials that are permitted and the standards with which these materials must comply.

702.5 Temperature rating

- Where wastewater is more than 140°, the drainage piping material shall be rated for the higher temperature.
- If the drainage system piping is properly chosen for the high temperatures that will be encountered, the need for cooling is eliminated.
703.6 combined sanitary and storm public sewer

- The storm water and the sanitary sewer from the building must enter the public sewer independently when the public sewer conveys both storm water and sewage.

Section 704.1 - Slope of Horizontal Drainage Piping

- Horizontal drainage piping shall be installed in uniform alignment at uniform slopes. The minimum slope of a horizontal drainage pipe shall be in accordance with Table 704.1.

<table>
<thead>
<tr>
<th>Size (Inches)</th>
<th>Minimum Slope (Inches per Foot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 1/4 or less</td>
<td>1/8</td>
</tr>
<tr>
<td>3 to 6</td>
<td>1/8</td>
</tr>
<tr>
<td>8 or larger</td>
<td>2/20</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 inch per foot = 0.0833 m/m.

Section 704.3 - Connections to offsets and bases of stacks

Horizontal Branch Connections
**Section 706.3 - Installation of fittings**

<table>
<thead>
<tr>
<th>TYPE OF FITTING</th>
<th>CHANGE IN DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Horizontal to vertical</td>
</tr>
<tr>
<td>Eight bend</td>
<td>X</td>
</tr>
<tr>
<td>Sixth bend</td>
<td>X</td>
</tr>
<tr>
<td>Quarter bend</td>
<td>X</td>
</tr>
<tr>
<td>Short sweep</td>
<td>X</td>
</tr>
<tr>
<td>Long sweep</td>
<td>X</td>
</tr>
<tr>
<td>Wye</td>
<td>X</td>
</tr>
<tr>
<td>Combination tee and eighth bend</td>
<td>X</td>
</tr>
</tbody>
</table>

For 3/4 inch 75 mm:

- The fittings shall not be permitted for a 3/4 inch smaller fixture drain.
- Three inlets or larger.
- For a limitation on double sanitary tees, see Section 706.5.

---

**Back-to-Back Fixtures**

![Double Sanitary Tee Permitted Where Developed Length Between Outlet of Water Closet and Connection Is 18 Inches or Greater](image)

---

**706.4 Heel- or Side-Inlet Quarter Bends**

- Not allowed for water closet drains.
- A. Not allowed for water closet drains and
- B. Low-head inlet not allowed for connection of a water closet drain.
706.4 Heel- or Side-Inlet Quarter Bends

Section 708.1.1 - Cleanouts for Horizontal Drains

Section 708.1.3 - Cleanouts at Sewer Junction

Section 708.1.4 - Change of Direction
Section 708.1.9 - Clearances

Minimum clearance:
- X = minimum 18" for 6" and smaller pipes
- X = minimum 36" for 8" and larger pipes

Table 709.1 - Drainage Fixture Units For Fixtures and Groups

| Fixture Type | Drainage Fixture Unit Size | Minimum Size of Trap
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic siphon washbasin, commercial</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Automatic siphon washbasin, Institutional</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Ballcocks group as defined in Section 702</td>
<td>3</td>
<td>—</td>
</tr>
<tr>
<td>Ballcocks group as defined in Section 702, cross-over flushing greater than 1.6 gpf</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td>Bath</td>
<td>1</td>
<td>1/4</td>
</tr>
<tr>
<td>Combination sink and tub</td>
<td>3</td>
<td>1/4</td>
</tr>
<tr>
<td>Drain and scullery</td>
<td>1</td>
<td>1/4</td>
</tr>
<tr>
<td>Drilled sink or vessel</td>
<td>1</td>
<td>1/4</td>
</tr>
<tr>
<td>Dishwashing machine, automatic</td>
<td>1</td>
<td>1/4</td>
</tr>
<tr>
<td>Drinking fountain</td>
<td>1/2</td>
<td>1/4</td>
</tr>
<tr>
<td>Emergency flush</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Floor flush</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Floor units</td>
<td>New b</td>
<td>2</td>
</tr>
<tr>
<td>Kitchen sink</td>
<td>2</td>
<td>1/4</td>
</tr>
<tr>
<td>Kitchen sink, domestic with food waste disposer and strainer</td>
<td>2</td>
<td>1/4</td>
</tr>
<tr>
<td>Lavatory (1 or 2 compartments)</td>
<td>2</td>
<td>1/4</td>
</tr>
<tr>
<td>Lavatory</td>
<td>1</td>
<td>1/4</td>
</tr>
</tbody>
</table>

Table 709.2 - Drainage Fixture Units For Fixtures or Traps

<table>
<thead>
<tr>
<th>Fixture Drain or Trap Size (Inches)</th>
<th>Drainage Fixture Unit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/4</td>
<td>1</td>
</tr>
<tr>
<td>1 1/2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2 1/4</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

For SD: 1 inch = 25.4 mm.
### Table 710.1(2) – Horizontal Fixture Branch and Stacks

<table>
<thead>
<tr>
<th>Diameter of Pipe (Inches)</th>
<th>Total For Horizontal Branch</th>
<th>Total Discharge into One Branch Interval</th>
<th>Total for Stack Three Branch Intervals or Less</th>
<th>Total for Stack Greater Than Three Branch Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>6</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>2 1/2</td>
<td>12</td>
<td>9</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>20</td>
<td>48</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>760</td>
<td>90</td>
<td>240</td>
<td>500</td>
</tr>
<tr>
<td>5</td>
<td>360</td>
<td>200</td>
<td>540</td>
<td>1,100</td>
</tr>
<tr>
<td>6</td>
<td>620</td>
<td>350</td>
<td>960</td>
<td>1,100</td>
</tr>
<tr>
<td>8</td>
<td>1,400</td>
<td>600</td>
<td>2,200</td>
<td>3,600</td>
</tr>
<tr>
<td>10</td>
<td>2,500</td>
<td>1,000</td>
<td>3,800</td>
<td>5,600</td>
</tr>
<tr>
<td>12</td>
<td>3,500</td>
<td>1,500</td>
<td>6,000</td>
<td>9,400</td>
</tr>
<tr>
<td>15</td>
<td>7,000</td>
<td>Note C</td>
<td>Note C</td>
<td>Note C</td>
</tr>
</tbody>
</table>

#### Sizing Example: Branch Interval 710.1(2)

---

### Table 710.1(1) Building Drains and Sewers

<table>
<thead>
<tr>
<th>Diameter of Pipe (Inches)</th>
<th>Maximum Number of Drainage Fixture Units Connected To Any Portion of The Building Drain or the Building Sewer, Including Branches of The Building Drain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/16 inch</td>
</tr>
<tr>
<td>1/16 inch</td>
<td>1</td>
</tr>
<tr>
<td>1/8 inch</td>
<td>2</td>
</tr>
<tr>
<td>1/4 inch</td>
<td>3</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>4</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>5</td>
</tr>
<tr>
<td>1 inch</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Stack Sizing 710.1(2)

---

### For Example

STACK

FLOOR

THE TOTAL D.F.U. OF HORIZONTAL BRANCHES A, B & C CANNOT EXCEED THE TOTAL LISTED IN THE THIRD COLUMN OF TABLE 710.1(2)

ONE BRANCH INTERVAL

STACK Interval

EXAMPLE 1

EXAMPLE 2

3", 15 dfu

4", 110 dfu

5", 15 dfu

6", 110 dfu

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Sizing of Stack Greater Than Three Branch Intervals 710.1(2)

Sizing of Stack Three Branch Intervals or Less 710.1(2)

Offsets in Drainage Piping (Buildings of 5 Stories or More)

Offsets in Drainage Piping (Buildings of 5 Stories or More)
Section 711.1.1 - Omission of vents for horizontal stack offsets

- Horizontal branches can now connect at any point in a stack above or below a horizontal offset. Horizontal branches can connect to a horizontal offset provided that the connection point is 10 stack diameters downstream of the upper stack.

Section 712.3.5 - Pump connection to the drainage system

- Pumps connected to the drainage system can now connect to a building sewer, building drain, soil stack, waste stack or horizontal branch drain.
- For a connection near the base of a stack, the distance has been reduced from 10 feet (3048 mm) to 10 stack diameters.

Sewer Ejector Installation

Section 715.1 - Sewage backflow

- This section changed to require a backwater valve where the floor elevation of the plumbing fixtures is at or below the level for the next upstream manhole cover.
Section 715 – Backwater Valves

716 Vacuum Drainage Systems
- Drain fixtures by vacuum
- Installed per the manufacturer’s installation instructions
- Fixtures are accorded the same DFU, as the chapter specifies, counted where they discharge from the vacuum system
- A vacuum test is required to demonstrate a tight system

Section 715.1 - Sewage backflow

717 Pipe bursting existing sewers

Pipe-bursting pipe installation. HDPE, high-density polyethylene
Vents – Chapter Nine

- Venting protects the trap seal by reducing differential pressures within the drainage system.
- Only plumbing systems with traps require vents, example: rainwater systems

Distance from Trap to Vent

- Individual Vents
- Circuit Vented Branch
- Wet Vent for Shower and Water Closet
- Combination Drain and Vent

Separation of Vent Terminal

- 10' Minimum
- 2' Minimum Air Intake
- Rooftop Unit with Outdoor Air Intake
Frost closure

- Increase to 3” min.
- Must be increased one foot below the thermal envelope

Section 903.4 - Prohibited use of vent terminals

- Vent terminals are prohibited from being used for any purpose other than venting.
- Condensate drains included.

Section 903.5 - Location of vent terminal

- The vertical distance increased from 2 feet to 3 feet (610 mm to 914 mm) to coordinate with similar requirements for IMC vent terminal requirements.

Section 903.6 – Extension through the wall
**Vent Terminal**

- **VENT TERMINAL**
- **DETERMINED BY LOCAL JURISDICTION**
- **ROOF**
- **VENT**
- **ROOF SUN DECK**

For SI: 1 ft = 304.8 mm.

**Stack Vent**

- **BUILDING DRAIN**
- **4" DRAINAGE STACK**
- **STACK VENT (MAIN VENT)**
- **VTR**

**Vent Stack 903.2**

- **VENT STACK SIZED PER TABLE 916.1**
- **TOTAL DFU**
- **SIZE OF DRAIN STACK**
- **LENGTH OF VENT STACK**

- **VENT STACK MUST CONNECT WITHIN THIS PORTION OF DRAINAGE SYSTEM**
- **BUILDING DRAIN**
- **10 X PIPE DIAMETER**

**Grade of Vents**

- **ACCEPTABLE**
- **NOT ACCEPTABLE**

**VENT SIZE MUST BE CONNECTED BY DRAINAGE TO THE DRAINAGE SYSTEM TO BE DISCHARGED**

---

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Vent Connections

Vertical Rise of Vent

Improperly Connected Vent Serving a Drain

Properly Connected Vent Serving a Drain
**Horizontal Offset of Branch Vent**

![Diagram showing horizontal offset of branch vent](image)

**Vent Sizing**

![Diagram showing vent sizing](image)

**Section 907 — Vents for Stack Offsets**

![Diagram showing vents for stack offsets](image)
Section 908 - Relief Vent Connection

Section 909.1 – Distance of Trap from Vent

Violation: Shower Drain Does Not Connect Independently to Wet Valve
Section 909.2 – Maximum Fall of Fixture Drain Between Trap and Vent

Individual Fixture as Dry Vent for Horizontal Wet Vent

Dry Vent for Vertical Wet Vent of Two Bathroom Groups

Vent Connection

Copyright 2015 International Code Council
Crown Vent

Individual Vents

Improperly Installed Individual Vents

Common Vents with Fixture Drains Connecting at Same Level
Common Vents with Fixture Drains Connecting at Different Level

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MINIMUM SIZE</th>
<th>DFUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAV FIXTURE DRAIN</td>
<td>1 1/4&quot;</td>
<td>1</td>
</tr>
<tr>
<td>SH FIXTURE DRAIN</td>
<td>2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>WC FIXTURE DRAIN</td>
<td>3&quot;</td>
<td>3</td>
</tr>
<tr>
<td>A-B&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1 1/4&quot;</td>
<td>1</td>
</tr>
<tr>
<td>B-C&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>C-D&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3&quot;</td>
<td>6</td>
</tr>
<tr>
<td>A-X</td>
<td>1 1/2&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<sup>a</sup> = from Table 909.2

N/A = Not Applicable

Single Bathroom Group Wet Vent

<table>
<thead>
<tr>
<th>DRAIN COMPONENT</th>
<th>MINIMUM SIZE</th>
<th>DFUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAV DRAIN</td>
<td>1 1/4&quot;</td>
<td>1</td>
</tr>
<tr>
<td>BT DRAIN</td>
<td>1 1/4&quot;</td>
<td>2</td>
</tr>
<tr>
<td>WC DRAIN</td>
<td>3&quot;</td>
<td>3</td>
</tr>
<tr>
<td>A-B&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>B-C&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>C-D&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2 1/2&quot;</td>
<td>6</td>
</tr>
<tr>
<td>D-E&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3&quot;</td>
<td>9</td>
</tr>
<tr>
<td>A-X</td>
<td>1 1/2&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<sup>a</sup> = from Table 909.2

N/A = Not Applicable

Double Bathroom Group (Private) Wet Vent

<table>
<thead>
<tr>
<th>DRAIN COMPONENT</th>
<th>MINIMUM SIZE</th>
<th>DFUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAV DRAIN</td>
<td>1 1/4&quot;</td>
<td>1</td>
</tr>
<tr>
<td>BT DRAIN</td>
<td>1 1/4&quot;</td>
<td>2</td>
</tr>
<tr>
<td>WC DRAIN</td>
<td>3&quot;</td>
<td>3</td>
</tr>
<tr>
<td>A-B&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>B-C&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>C-D&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2 1/2&quot;</td>
<td>6</td>
</tr>
<tr>
<td>D-E&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3&quot;</td>
<td>9</td>
</tr>
<tr>
<td>A-X</td>
<td>1 1/2&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<sup>a</sup> = from Table 909.2

N/A = Not Applicable

Section 913 - Waste Stack Vent

<table>
<thead>
<tr>
<th>DRAIN COMPONENT</th>
<th>MINIMUM SIZE</th>
<th>DFUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAV DRAIN</td>
<td>1 1/4&quot;</td>
<td>1</td>
</tr>
<tr>
<td>BT DRAIN</td>
<td>1 1/4&quot;</td>
<td>2</td>
</tr>
<tr>
<td>WC DRAIN</td>
<td>3&quot;</td>
<td>3</td>
</tr>
<tr>
<td>A-B&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>B-C&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2&quot;</td>
<td>2</td>
</tr>
<tr>
<td>C-D&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2 1/2&quot;</td>
<td>6</td>
</tr>
<tr>
<td>D-E&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3&quot;</td>
<td>9</td>
</tr>
<tr>
<td>A-X</td>
<td>1 1/2&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<sup>a</sup> = from Table 909.2

N/A = Not Applicable
Section 911 Circuit Venting (Back-To-Back Water Closets Circuit Vented)

Sizing a Circuit Vent System

Each separate circuit-vented horizontal branch that is interconnected shall be sized independently in accordance with Section 911.3.

Multiple Circuit Venting

The downstream circuit-vented horizontal branch shall be sized for the total discharge into the branch, including the upstream branches and the fixtures within the branch.

A maximum of eight fixtures are permitted to be circuit vented.

The vent shall connect between the two most upper stream fixture drains.

Each fixture drain shall connect horizontally to the horizontal branch being circuit vented.

Each fixture drain shall connect horizontally to the horizontal branch being circuit vented.
Multiple Circuit Venting In Parallel

Each separate circuit-vented horizontal branch that is interconnected shall be sized independently in accordance with Section 911.3.

Entire length of vent section is uniformly sized based on total d.f.u. load on branch.

Circuit Vent with Relief Vent Connection

The relief vent shall connect to the horizontal branch drain between the stack and the most downstream fixture drain of the circuit vent.

A relief vent shall be provided for circuit-vented horizontal branches receiving the discharge of four or more water closets and connecting to a drainage stack that receives the discharge of soil or waste from upper horizontal branches.

Circuit-vented Branch with Additional Fixture Connections

Section 915 – Combination Waste and Vent System
Section 915 – Vertical Fixture Drain Component in Combination Waste and Vent System

Section 915 – Combination Waste and Vent System

- In a combination waste and vent system, the drain also serves as the vent for the fixture.
- The system is commonly used when floor drains are installed.
- It is also practical to use in laboratories equipped with island sinks.
Section 915.2.4 – Combination Waste and Vent

Section 916 – Island Fixture Vent

Section 917

- Single Stack Vent System
  - Single-stack venting was added to the code.
  - This type of venting is similar to the Philadelphia-stack drainage system that has been used in the Philadelphia, PA area for more than a century.

Module 3

1. All water supply pipe installed underground and outside of the structure shall have a working pressure rating of not less than 160 psi.

   True  False
2. A sanitary tee may be used for a horizontal-to-horizontal change in direction.
   True  False

3. What is the minimum size of a building drain with a total of 36 dfu connected thereto with a 1/8-inch slope? 3 inches

4. A waste stack must not receive the discharge of water closets and urinals.

5. Polyethylene of raised temperature plastic may be joined by flared or mechanical joints.
Module 3

6. Bundles of PEX must be **labeled** to indicate direction of flow.

Module 3

7. The water heater thermostat may be used to temper the water at the shower.

   True    False

Module 3

8. What code regulates the installation of solar heating systems?
   ____________ **IMC**

Module 3

9. On a single stack vent system, if there were three water closets on the stack, the minimum size of the stack would be ____________ **4 inches** diameter.
Module 3

10. A plumbing system utilizing air admittance valves does not need to have a vent to the outdoors.

   True    False

Section 1105.1

- Roof drains are to be installed in accordance with the manufacturer’s installation instructions and that roofing membrane materials must not block the opening of the drain.
Section 1105.2
- The flow rate of the specific roof drain must be provided by the manufacturer
- This rate determines the storm drain piping that can be connected to it
- Flow rate is determined at specific head elevations above the inlet
- More head - greater flow rate

Size of storm drain piping
- Based on:
  - The size of the roof and contributing areas
  - The rainfall rate per hour for the specific area
  - Slope of horizontal piping connected to the drain
  - The flow rate or the specific roof drain at the established head over the inlet
  - The GPM of the roof is plugged into Table 1106.2 to determined vertical and horizontal piping diameters

How to calculate GPM for the roof
- A = roof and contributory area (vertical walls and parapets) leading to the drain
- 0.623 gal. = 1 inch of water over 1 square foot
- HR = rain delivered by 100 year event in inches per hour as determined by this chapter or appendix B
- \[ A \times \left\{ \left( \frac{HR}{60} \right) \times 0.623 \right\} = \text{GPM load on roof drain and piping} \]

Sizing the drain and piping
- Determine the GPM of the roof
- Pick a roof drain with a flow rate equal to or greater than the GPM of the roof
- Determine if horizontal piping is present and the slope of that piping
- Use the table to determine the diameter of the storm piping, the pipe rated GPM must be at least as great as the roof drain
Chapter 12
Special Piping and Storage Systems

What's in the section

Medical Gases—Section 1202
- This section refers to NFPA 99 for medical gas systems, inhalation anesthetic systems and vacuum piping systems.

Oxygen Systems—Section 1203
- This section refers to NFPA 55 and NFPA 51 for nonmedical oxygen system requirements.

Chapter 13
Nonpotable Water Systems

Section 1301.1 through 1303.11
- Gray water, nonpotable rainwater and reclaimed water systems requirements such as:
  - Water quality
  - Materials
  - Storage
  - Permit
  - Connection
  - Disinfection and treatment
  - Water testing
  - Manuals for operation and maintenance
Section 1302 – Systems for Flushing Water Closets and Urinals

- This section is about the specific details for on-site nonpotable water reuse systems. Refer to the definition of “On-site nonpotable water reuse system” in Chapter 2.

Section 1303 – Subsurface Landscape Irrigation

Design based on:
- Amount of nonpotable water available daily
- The percolation rate of the specific soil

Installation covers:
- Trench width, depth and spacing
- Aggregate and backfill
- Distribution piping

Module 4

1. A vertical leader with a diameter of 3 inches in an area with a rainfall rate of 2 inches (51 mm) per hour is capable of draining a projected roof area of 2,930 square feet (272 m²).

True False
Module 4

2. A 40 by 80 foot (102 by 203 mm) roof is attached to a building on the 80 foot side of the wall which rises another 30 feet (762 mm) above the lower roof. The adjusted area (leaving out other parapets) for the roof would now be __4,400 (409)___ square feet (m²).

Module 4

3. The water from a nonpotable water system used to flush a urinal will be blue or green

   True    False

Module 4

4. A nonpotable water system could be used for an irrigation system that includes sprinklers.

   True    False

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Table 608.1 Application of Backflow Preventers

<table>
<thead>
<tr>
<th>Device</th>
<th>Pressure Drop</th>
<th>Application</th>
<th>Applicable Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air gap</td>
<td>High or Low Head</td>
<td>Backflow or backpressure</td>
<td>ASME A15.1.2</td>
</tr>
<tr>
<td>Air gap - Obtains for use with deep water or deep well high volume</td>
<td>High or Low Head</td>
<td>Backflow or backpressure</td>
<td>ASME A15.1.3</td>
</tr>
<tr>
<td>Affixation- 30 psi for gravity</td>
<td>High Head</td>
<td>Backflow or backpressure</td>
<td>ASME A15.1.2, CSA B45.3</td>
</tr>
<tr>
<td>Backflow preventer for municipal</td>
<td>Low Head</td>
<td>Backflow or backpressure</td>
<td>ANSI A152.2, CSA B44.3.1</td>
</tr>
<tr>
<td>Backflow preventer for commercial beverage systems</td>
<td>Low Head</td>
<td>Backflow or backpressure</td>
<td>ANSI A152.2, CSA B44.3.1</td>
</tr>
<tr>
<td>Recovery valve</td>
<td>High or Low Head</td>
<td>Backflow or backpressure</td>
<td>ANSI A152.2, CSA B44.3</td>
</tr>
<tr>
<td>Double check backflow prevention assembly</td>
<td>Low Head</td>
<td>Backflow or backpressure</td>
<td>ANSI A153.1, ASWA C130.1, CSA B45.3, CSA B45.1</td>
</tr>
<tr>
<td>Double check backflow prevention assembly</td>
<td>Low Head</td>
<td>Backflow or backpressure</td>
<td>ANSI A153.1, ASWA C130.1, CSA B45.3, CSA B45.1</td>
</tr>
<tr>
<td>Double check valves</td>
<td>Low Head</td>
<td>Backflow or backpressure</td>
<td>ANSI A153.1, ASWA C130.1, CSA B45.3, CSA B45.1</td>
</tr>
<tr>
<td>Hose connection backflow preventer</td>
<td>High or Low Head</td>
<td>Low head backflow or backpressure</td>
<td>ANSI A152.2, CSA B44.2.1,11</td>
</tr>
<tr>
<td>Hose connection vacuum breaker</td>
<td>High or Low Head</td>
<td>Low head backflow or backpressure</td>
<td>ANSI A152.2, CSA B44.2,11</td>
</tr>
</tbody>
</table>

Thank you for participating

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Table 608.8.3 Size of Pipe Identification

<table>
<thead>
<tr>
<th>Pipe Diameter (inches)</th>
<th>Length Background Color Field (inches)</th>
<th>Size of Letters (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>¾ to 1 1/4</td>
<td>8</td>
<td>0.5</td>
</tr>
<tr>
<td>1 ½ to 2</td>
<td>8</td>
<td>0.75</td>
</tr>
<tr>
<td>2 ½ to 6</td>
<td>12</td>
<td>1.25</td>
</tr>
<tr>
<td>8 to 10</td>
<td>24</td>
<td>2.5</td>
</tr>
<tr>
<td>Over 10</td>
<td>32</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Table 906.1 (1-1/4” thru 5”only)

<table>
<thead>
<tr>
<th>Diameter of Soil or Waste Stack (inches)</th>
<th>Total Fixture Units During Penetration</th>
<th>Max. Developed Length of Vent (feet) Diameter of Vent (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>1-1/4</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>1-1/2</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>2-1/2</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>3-1/2</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>4-1/2</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>5-1/2</td>
<td>12</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 916. (1 1-1/4” thru 5”only)

<table>
<thead>
<tr>
<th>Diameter of Soil or Waste Stack (inches)</th>
<th>Total Fixture Units During Penetration</th>
<th>Max. Developed Length of Vent (feet) Diameter of Vent (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/4</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>1-1/2</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>1-1/2</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>2-1/2</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>3-1/2</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>4-1/2</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>5-1/2</td>
<td>12</td>
<td>30</td>
</tr>
</tbody>
</table>
### Table 909.3 Wet Vent Size

<table>
<thead>
<tr>
<th>Wet Vent Pipe Size (inches)</th>
<th>Drainage Fixture Unit Load (dfu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2-1/2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>

### Table 910.4 Waste Stack Vent Size

<table>
<thead>
<tr>
<th>Stack Size (inches)</th>
<th>Maximum Number of Drainage Fixture Units (dfu)</th>
<th>Total Discharge into One Branch Interval</th>
<th>Total Discharge for stack</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1/2</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2-1/2</td>
<td></td>
<td>No limit</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>No limit</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>No limit</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>No limit</td>
<td>75</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>No limit</td>
<td>100</td>
</tr>
</tbody>
</table>

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