Chapter 7

Plumbing Fixtures, Fixture Fittings and Plumbing Appliances

7.1 FIXTURE STANDARDS
Plumbing fixtures, plumbing fixture trim, and plumbing appliances shall comply with the standards listed in Table 3.1.3. Plumbing supply fittings covered under the scope of NSF 61 shall comply with the requirements of NSF 61.

7.2 FIXTURES FOR ACCESSIBLE USE
a. Plumbing fixtures for accessible use and their installation shall conform to the local accessibility code or regulations.

Comment: Requirements for accessible plumbing fixtures are in ADA Standards for Accessible Design and ICC ANSI A117.1. Refer to local codes and regulations.

b. Exposed waste and water supply piping for accessible sinks and lavatories shall be covered with protectors or insulators that comply with ASME A112.18.9.

c. The support and drain systems for adjustable sinks that facilitate accessible use shall comply with ASME A112.19.12.

7.3 INSTALLATION

7.3.1 General
Plumbing fixtures, fixture trim, and plumbing appliances shall be installed in accordance with the requirements of this Code and the manufacturer’s instructions and recommendations.

7.3.2 Minimum Clearances
For other than accessible applications, minimum clearances between plumbing fixtures and from fixtures to adjacent walls shall be in accordance with Figure 7.3.2.

7.3.3 Access for Cleaning
Plumbing fixtures shall be so installed as to provide access for cleaning the fixture and the surrounding area.

7.3.4 Securing Floor-Mounted Fixtures
Floor-mounted fixtures shall be securely supported by the floor or floor/wall structure. No strain shall be transmitted to the connecting piping. Fastening screws or bolts shall be corrosion-resisting.
Figure 7.3.2
MINIMUM Fixture CLEARANCES
(for other than accessible applications)
7.3.5 Supporting Wall-Hung Fixtures

a. Wall-hung water closets shall be supported by concealed metal carriers that transmit the entire weight of the fixture to the floor and place no strain on the wall or connecting piping. Supports of this design shall comply with ASME A112.6.1M.

b. Supports for off-the-floor water closets with concealed tanks shall comply with ASME A112.6.2.

c. Lavatories, urinals, and other wall-hung fixtures shall be supported by a concealed or exposed finished wall hanger plate or equivalent that transmits the weight of the fixture to the wall structure, if adequate, or to the floor without placing strain on the piping. Such supports shall comply with ASME A112.6.1M. In addition to the wall support brackets, pedestals or legs may provide additional support for pedestal lavatories. See Figure 7.3.5

![Figure 7.3.5](A CARRIER FOR A WALL HUNG WATER CLOSET)

**NOTES:**

1. Wall hung water closets are designed to be supported by carriers.
2. For fixtures other than water closets, such as lavatories and urinals, the carrier may be either floor or wall supported, depending on the strength of the wall.

7.3.6 Orientation and Operation of Faucets

Where fixtures are supplied with both hot and cold water, the faucet(s) and supply piping shall be installed so that the hot water is controlled from the left side of the fixture or faucet when facing the controls during fixture use.

EXCEPTION: Single handle and single control valves for showers and tub/shower combinations where the hot and cold temperature orientation is marked on the fitting surface.

7.3.7 Access to Concealed Connections

Where fixtures have drains with concealed slip joint connections or incorporate a cleanout plug, a means of access shall be provided for inspection and repair. Such access is not required for connections that are soldered, threaded, solvent cemented, or equivalently secured.

*Comment: Access to concealed slip joints and cleanouts can require the use of tools.*
7.3.8 Joints with Walls and Floors
Joints where fixtures contact walls and floors shall be caulked or otherwise made water-tight. See Figure 7.3.8

![Figure 7.3.8](image)

**NOTES:**
1. Openings or gaps between fixtures and walls or floors can collect dirt and moisture. They are unsanitary and can cause water damage to the building structure. These openings must be caulked or otherwise sealed.

7.4 WATER CLOSETS

7.4.1 Compliance
Vitreous china water closets shall comply with ASME A112.19.2/CSA B45.1. Plastic water closets shall comply with CSA B45.5/IAPMO Z124.

7.4.2 Water Conservation
Water closets, whether operated by flush tank, flushometer tank, or flushometer valve, shall be the low-consumption type having an average consumption of not more than 1.6 gallons per flush when tested in accordance with ASME A112.19.2/CSA B45.1 or CSA B45.5/IAPMO Z124.

EXCEPTION: Blow-out water closets and clinical sinks.
7.4.3 Type of Bowls and Seats
Water closets shall have elongated bowls with open-front seats.
EXCEPTIONS:
   1. Water closets having closed-front seats and either round or elongated bowls are permitted in single
dwelling units, apartments, condominiums, private office toilet rooms intended for the exclusive use of one
individual, and in pre-school and kindergarten facilities.
   2. Closed-front seats are permitted in hotel and motel guest rooms.
   3. Closed-front seats that have automatic seat cover protection are permitted in lieu of open-front seats.
See Figure 7.4.3

Figure 7.4.3
AN ADULT-HEIGHT ELONGATED WATER CLOSET BOWL
COMPARED TO A ROUND BOWL

7.4.4 Bowl Height
The height of water closet bowls shall be a minimum of 13-1/2" from the finished floor to the top of the rim.
EXCEPTION:
   Bowls intended for children's use (5 years and younger) are permitted to be 9-1/2" to 10-1/2" high to the
rim and juvenile use (6-12 years) are permitted to be 10-1/2" to 13-1/2" high to the rim.

7.4.5 Water Closet Seats
Seats for water closets shall be of smooth, non-absorbent materials, be properly sized to fit the water closet
bowl. Plastic toilet seats shall comply with IAPMO/ANSI Z124.5.
EXCEPTION: Water closets in single dwelling units are not required to comply with IAPMO/ANSI Z124.5.

7.4.6 Hotels, Motels, Dormitories, and Boarding Houses
Water closets in hotels, motels, dormitories, boarding houses and similar occupancies shall be the elongated
type with open-front seats.
EXCEPTIONS:
   1. Closed-front seats shall be permitted in hotel and motel guest rooms.
   2. Closed-front seats that are provided with automatic seat cover protection.
7.4.7 Prohibited Water Closets
Water closets not having a visible trap seal or having either unventilated spaces or walls that are not washed at each discharge shall be prohibited.

7.4.8 Water Closets with Pumps
Water closets with pumps shall comply with ASME A112.3.4/CSA B45.9.

7.5 URINALS

7.5.1 Compliance
a. Water-fed vitreous china urinals shall comply with ASME A112.19.2/CSA B45.1.
b. Non-water vitreous china urinals shall comply with ASME A112.19.19.
c. Plastic urinals shall comply with CSA B45.5/IAPMO Z124.
d. Non-water urinals shall have a liquid trap seal as required by Section 5.3.2.
e. Water-fed urinals with liquid trap seals that are not visible in the bowl shall be supplied by an automatic flushing device.

7.5.2 Water Conservation
Water-fed urinals shall be the low-consumption type having an average water consumption of not more than 1.0 gallon per flush when tested in accordance with ASME A112.19.2/CSA B45.1 or CSA B45.5/IAPMO Z124.

7.5.3 Surrounding Surfaces
Urinals shall not be installed where wall and floor surfaces are not waterproof and do not have a smooth, readily cleanable, non-absorbent surface extending not less than four feet above the floor, one foot to each side of the urinal, and one foot in front of the lip of the urinal. See Figure 7.5.3

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Figure 7.5.3
PROTECTING SURROUNDING SURFACES AT URINALS
7.5.4 Prohibited Urinals
Trough urinals and urinals having walls that are not washed at each discharge shall be prohibited.
EXCEPTION: Non-water urinals.

7.5.5 Reserved

7.5.6 Non-water Urinals
   a. Non-water urinals shall not be installed in facilities that do not have provisions for necessary
      maintenance.
   b. Drain piping shall be sloped not less than 1/4 inch per foot to the point where it connects to piping with
      drainage from one or more water closets.
   c. Drain piping shall not be copper to the point where it connects to piping with drainage from one or
      more water closets.

7.6 LAVATORIES

7.6.1 Compliance
   a. Lavatories shall comply with the following standards:
      2. Enameled cast-iron; ASME A112.19.1/CSA B45.2.
      5. Stainless steel; ASME A112.19.3/CSA B45.4.
      6. Vitreous china; ASME A112.19.2/CSA B45.1

7.6.2 Water Conservation
   a. Except as required under Section 7.6.2.c, lavatory faucets shall be designed and manufactured so
      that they will not exceed a water flow rate of 2.2 gallons per minute when tested in accordance with ASME
      A112.18.1/CSA B125.1.
   b. Public lavatory faucets, other than the metering type, shall be designed and manufactured according to
      ASME A112.18.1/CSA B125.1.
   c. Self-closing or self-closing/metering faucets shall be installed on lavatories intended to serve the
      transient public, such as those in, but not limited to, service stations, train stations, airport terminals,
      restaurants, and convention halls. Metering faucets shall deliver not more than 0.25 gallon of water per
      use when tested in accordance with ASME A112.18.1/CSA B125.1. Self-closing faucets shall be designed
      and manufactured so that they will not exceed a water flow rate of 0.5 gallon per minute when tested in
      accordance with ASME A112.18.1/CSA B125.1.

7.6.3 Waste Outlet
   The waste outlet pipe on individual lavatories shall be not less than 1-1/4" nominal size. A strainer, pop-up
   stopper, crossbar grid, or other device shall be provided to protect the waste outlet.

7.6.4 Integral Overflow
   Where lavatories include an integral overflow drain, the waste fitting shall be designed and installed so that
   standing water in the bowl of the fixture cannot rise in the overflow channel when the drain is closed, nor
   shall any water remain in the overflow channel when the bowl is empty. The overflow shall drain to the inlet
   side of the fixture trap. See Figure 7.6.4

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Comment: Overflows are not provided in all lavatories. Lavatories with overflows are not used in hospitals because of the potentially unsanitary condition caused by inaccessible surfaces exposed to waste.

7.6.5 Wash Fountains and Wash Sinks
   a. Circular and semi-circular wash fountains and wall-mounted and free-standing wash sinks shall comply with the requirement of Section 7.6. Mixed water temperature control shall comply with Section 10.15.6.
   b. The water supply to wash fountains shall not exceed 0.75 gpm for each of the rated number of users. The rated number of users for wash fountains shall be as specified by the manufacturer but shall not be more than one person per 18-inches of usable length of the rim having an available water spray.
   c. The faucets for wash sinks shall comply with Section 7.6.2 for lavatories. The rated number of users for wash sinks shall equal the number of faucets.

7.6.6 Control of Mixed Water Temperature
   The control of mixed water temperature for public-use hand washing facilities shall comply with Section 10.15.6.

7.6.7 Lavatory Equivalents
   Where group-type wash fountains or wash sinks are used to satisfy the number of lavatories required by Section 7.21.1, each rated user shall be considered as the equivalent of one lavatory. See Figure 7.6.7
7.7 BIDETS

7.7.1 Compliance
Bidets shall comply with ASME A112.19.2/CSA B45.1. Bidet faucets shall comply to ASME A112.18.1/CSA B125.1. Bidet sprays shall comply with ASME A112.4.2.

7.7.2 Backflow Prevention
Bidets having integral flushing rims shall have a vacuum breaker assembly on the mixed water supply to the fixture. Bidets without flushing rims shall have an over-the-rim supply fitting providing the air gap required by Chapter 10.

7.7.3 Integral Overflow
Where bidets include an integral overflow drain, the waste fitting shall be designed and installed so that standing water in the bowl of the fixture cannot rise in the overflow channel when the drain is closed, nor shall any water remain in the overflow channel when the bowl is empty. The overflow shall drain to the inlet side of the fixture trap.

7.7.4 Control of Mixed Water Temperature
The control of mixed water temperature for bidets shall comply with Section 10.15.6.

7.8 BATHTUBS

7.8.1 Compliance
a. Bathtubs shall comply with the following standards:
1. Plastic, cultured marble and other synthetic products or finishes; CSA B45.5/IAPMO Z124
2. Enameled cast-iron; ASME A112.19.1/CSA B45.2
3. Enameled steel; ASME A112.19.1/CSA B45.2
4. Bathtubs with pressure sealed doors; ASME A112.19.15

7.8.2 Waste and Overflow
Bathtubs shall have waste outlet and overflow pipes not less than 1-1/2" nominal size. Waste outlets shall be equipped with a pop-up waste, chain and stopper, or other type of drain plug. See Figure 7.8.2

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Figure 7.8.2
A BATHTUB WASTE AND OVERFLOW
7.8.3 Combination Bath/Shower
Shower heads, including the hand-held type, shall be designed and manufactured so that they will not exceed a water supply flow rate of 2.5 gallons per minute when tested in accordance with ASME A112.18.1/CSA B125.1. The control of mixed water temperatures to bath/shower combinations shall comply with Section 10.15.6. Surrounding wall construction shall be in accordance with Section 7.10.5.e. Riser pipes to shower heads shall be secured in accordance with Section 7.10.7.

7.8.4 Backflow Prevention
Unless equipped with an ASSE 1001 atmospheric vacuum breaker, there shall be an air gap between the outlet of the bath spout and the flood level rim of the tub that complies with Section 10.5.2 and Table 10.5.2.

7.8.5 Control of Mixed Water Temperature
The control of mixed water temperature for bathtubs shall comply with Section 10.15.6.

7.9 WHIRLPOOL BATHS

7.9.1 General
The requirements of Section 7.8 for bathtubs shall also apply to whirlpool baths. The provisions for wet venting in Section 12.10 shall also apply to whirlpool baths.

7.9.2 Compliance
Whirlpool bathtubs and their suction fittings shall comply with ASME A112.19.7/CSA B45.10

7.9.3 Drainage
The arrangements of circulating piping and pumps shall not be altered in any way that would prevent the pump and associated piping from draining after each use of the fixture.

7.9.4 Access
One or more removable panels shall be provided where required for access to pumps, heaters, and controls, as recommended by the fixture manufacturer. See Figure 7.9.4

![Figure 7.9.4](image-url)

NOTES:
1. Access must be provided to electrical and plumbing components of whirlpool baths as recommended by the manufacturer. Refer to manufacturer’s installation instructions.

Figure 7.9.4
ACCESS REQUIREMENTS FOR A WHIRLPOOL BATH
7.9.5 Control of Mixed Water Temperature
The control of mixed water temperature for whirlpool baths shall comply with Section 10.15.6.

7.10 SHOWERS

7.10.1 Compliance
Plastic shower receptors and stalls shall comply with CSA B45.5/IAPMO Z124.

7.10.2 Water Conservation
Shower heads shall be designed and manufactured so that they will not exceed a water supply rate of 2.5 gallons per minute when tested in accordance with ASME A112.18.1/CSA B125.1.
EXCEPTION: Emergency safety showers.

7.10.3 Control of Mixed Water Temperature
a. The control of mixed water temperatures shall comply with Section 10.15.6.
b. Where shower heads are rated for maximum water flow rates of less than 2.5 gallons per minute, the mixed water temperature control valve that supplies the shower head shall be rated for the maximum flow rate of the shower head or less.

7.10.4 Shower Waste Outlets
a. For a shower with a single 2.5 gpm shower head, the waste outlet connection shall be sized for a drain not less than 1-1/2 inches nominal pipe size. Combination bath/showers with 1-1/2" drains can have two 2.5 gpm shower heads.
b. Showers with multiple shower heads shall have a 2" outlet pipe size for up to 10 gpm and a 3" outlet pipe size for up to 20 gpm.
c. In group showers where each shower is not provided with an individual waste outlet, the waste outlet(s) shall be located and the floor so pitched that waste from one shower does not flow over the area serving another shower.
d. Waste outlets shall be securely connected to the drainage piping system.
e. Outlet covers/strainers shall be removable and not less than 4 inches in diameter with 1/4" minimum openings.

7.10.5 Shower Compartments
a. The minimum outside rough-in dimension for shower bases and prefabricated shower compartments shall be 32 inches, except where a shower receptor has a minimum overall dimension of 30 inches (750 mm) in width and 60 inches (1500 mm) in length.
b. The minimum rough-in depth for prefabricated tub/shower combinations shall be 30 inches.
c. Where shower compartments have glass enclosures or field-constructed tile walls, the compartment shall provide clearance for a 30 inch diameter circle with the door closed.
d. The walls in shower compartments and above built-in bathtubs having installed shower heads shall be constructed of smooth non-corrosive, non-absorbent waterproof materials that extend to a height of not less than 68 inches above the fixture drain.
e. The joints between walls and with bathtubs and shower compartment floors shall be water-tight.

7.10.6 Shower Floors and Shower Pan Liners
a. Adequate structural support shall be provided under shower floors.
b. Finished shower floor surfaces shall be smooth and water-proof.
EXCEPTION: Grouted shower floor surfaces shall be smooth and water-resistant.
c. Manufactured shower pans, shower bases, and shower receptors shall be installed in accordance with this Code and the manufacturer’s instructions.

d. The edges of shower pans, bases, and receptors shall include flanges or other means of making a waterproof joint with the walls of the shower enclosure.

e. Shower pan liners shall be provided beneath shower floors that are water-resistant (not water-proof) and also if required by the manufacturer’s installation instructions for pre-fabricated or pre-finished shower pans, bases, or receptors.

   EXCEPTION: Shower pan liners shall not be required under water-resistant shower floors if they are installed on shower pans, bases, and receptors that provide for the drainage of water seepage through the floor finish.

f. Shower pan liners shall slope to the shower drain outlet and be sealed to the weep holes in the drain fitting. The liner shall provide a water-tight basin up to the overflow elevation of the shower floor.

g. Shower pan liners shall be tested for leakage. There shall be no leakage indicated on the floor surrounding the shower pan for a period of not less than 15 minutes.

   See Figure 7.10.6

![Figure 7.10.6](image)

7.10.7 Water Supply Riser

Whether exposed or concealed, the water supply riser pipe from the shower control valve(s) to the shower head outlet shall be secured to the wall structure. See Figure 7.10.7
7.11 SINKS

7.11.1 Compliance

a. Sinks shall comply with the following standards:
   1. Enameled cast-iron; ASME A112.19.1/CSA B45.2
   2. Enameled steel; ASME A112.19.1/CSA B45.2
   3. Stainless steel; ASME A112.19.3/CSA B45.4
   4. Plastic; CSA B45.5/IAPMO Z124
   5. Ceramic; ASME A112.19.2/CSA B45.1

b. Fixture supply fittings, including faucets and supply stops, shall comply with ASME A112.18.1/CSA B125.1.

c. Fixture waste outlet fittings shall comply with ASME A112.18.2/CSA B125.2.

7.11.2 Domestic Kitchen Sinks and Bar Sinks

a. Each compartment in a kitchen sink or bar sink shall have an outlet suitable for either a domestic food waste disposer or a basket strainer. The waste outlet pipe for each compartment shall be 1-1/2" nominal size. Outlet fittings shall have crossbars or other provisions for protecting the drain outlet and shall include a means of closing the drain outlet.

b. Faucets for kitchen sinks and bar sinks shall be designed and manufactured so that they will not exceed a water flow rate of 2.2 gallons per minute when tested in accordance with ASME A112.18.1/CSA B125.1. See Figure 7.11.2
7.11.3 Laundry Sinks
   a. Sinks for laundry use shall be not less than 12 inches deep with a strainer and waste outlet connection not less than 1-1/2" nominal size.
   b. Utility faucets for laundry sinks shall comply with ASME A112.18.1/CSA B125.1.

7.11.4 Service Sinks and Mop Receptors
   a. Service sinks and mop receptors shall have removable strainers and waste outlet connections not less than 2" nominal size.
   b. Service sinks and mop receptors shall not be installed where walls and floors are not waterproof and do not have a smooth, readily cleanable surface at least one foot in front of the sink or receptor, at least one foot on each side, and up to a point one foot above the faucet height.

7.11.5 Sanitary Floor Sinks
   Sanitary floor sinks shall comply with ASME A112.6.7.

7.11.6 Backflow Prevention
   a. Sink faucets having a hose thread or other means of attaching a hose to the outlet shall be protected from back siphonage by either an integral vacuum breaker, an atmospheric vacuum breaker attached to the outlet, or pressure type vacuum breakers on the fixture supply lines.
   b. Sink faucets without provisions for connecting hoses shall be protected from back siphonage by a fixed air gap complying with ASME A112.1.2 or Table 10.5.2.

7.12 DRINKING WATER FACILITIES

7.12.1 Compliance
   a. Drinking water facilities shall comply with the “lead-free” requirements of Section 3.4.6.
   b. Drinking water facilities for accessible use shall comply with Section 7.2.
   c. Drinking fountains shall comply with the following plumbing fixture standards:
      1) Enameled cast iron or steel: ASME A112.19.1/CSA B45.2
      2) Ceramic: ASME A112.19.2/CSA B45.1
      3) Stainless steel: ASME A112.19.3/CSA B45.4
d. Drinking water coolers with self-contained refrigeration units shall comply with UL 399 and ASHRAE Standard 18.

e. Water bottle filling stations shall comply with applicable standards. Stations with self-contained refrigeration units for chilled water shall comply with UL 399 and ASHRAE Standard 18.

7.12.2 Required Drinking Water Facilities
The required drinking water facilities shall be in accordance with Section 7.21.

7.12.3 Prohibited Locations
Drinking water facilities shall not be located in public toilet rooms. Convertible lavatory faucets that provide a discharge stream similar to a drinking fountain shall only be permitted in bathrooms in dwelling units.

7.12.4 Outdoor Drinking Fountain
Freeze-resistant drinking fountains shall be the sanitary type. Weep hole drains that form a cross connection between ground water and the potable water supply shall not be permitted.

7.13 AUTOMATIC CLOTHES WASHERS

7.13.1 Compliance
a. Automatic clothes washers for domestic use or use by the general public shall comply with AHAM HLW-1 or UL 2157 and shall have an air gap incorporated in the internal tub fill line.
b. Commercial electric clothes washers shall comply with UL 1200 and include backflow prevention.

Comment: Automatic clothes washers that comply with the referenced appliance standards include an internal air gap in the water fill line and do not require the installation of an external backflow prevention device.

7.14 FOOD WASTE DISPOSERS

7.14.1 Compliance
Domestic food waste disposer units shall comply with UL 430 and either AHAM FWD-1 or ASSE 1008.

7.14.2 Domestic Units
Domestic food waste disposer units shall have not less than a 1-1/2” nominal waste connection to the drainage system. Such units may connect to a kitchen sink drain outlet, as permitted under Section 7.11.2.a.

7.14.3 Commercial Units
Commercial food waste disposer units shall be connected to the drainage system and be separately trapped from any sink compartment or other fixture. The waste pipe size for such fixtures shall be of sufficient size to serve the fixture but shall be not less than 2-inch nominal size. See Figure 7.14.3
7.14.4 Water Supply
An adequate supply of water shall be provided for proper operation of food waste disposers.

7.15 DISHWASHER MACHINES

7.15.1 Compliance

a. Domestic dishwashing machines shall comply with UL 749 and AHAM DW-1. The water supply to domestic dishwashing machines shall be protected from back siphonage by an integral air gap, an other internal means, or a vacuum breaker. Air gap fittings for drain discharge shall comply with ASSE 1021. 


7.15.2 Residential Sink and Dishwasher
The discharge from a residential kitchen sink and dishwasher may discharge through a single 1-1/2” trap. The discharge line from the dishwasher shall be not less than the size recommended by the dishwasher manufacturer. It shall either be looped up and securely fastened to the underside of the counter or be connected to a deck-mounted dishwasher air gap fitting. The discharge shall then be connected to a branch inlet wye fitting between the sink waste outlet and the trap inlet. The discharge may also drain indirectly into a trapped standpipe, or receptor. See Figure 7.15.2
7.15.3 Residential Sink, Dishwasher, and Food Waste Disposer

The discharge from a residential kitchen sink, dishwasher, and food waste disposer may discharge through a single 1-1/2" trap. The discharge line from the dishwasher shall be not less than the size recommended by the dishwasher manufacturer. It shall either be looped up and securely fastened to the underside of the counter or be connected to a deck-mounted dishwasher air gap fitting. The discharge shall then be connected either to the chamber of the food waste disposer or to a branch inlet wye fitting between the food waste disposer outlet and the trap inlet. The discharge may also drain indirectly into a trapped standpipe or receptor.

See Figure 7.15.3
7.15.4 Commercial Dishwashing Machine

a. Commercial dishwashing machines shall be indirectly connected to the drainage system through either an air gap or an air break. When the machine is within 5 feet developed length of a trapped and vented floor drain, an indirect waste pipe from the dishwasher may be connected to the inlet side of the floor drain trap. See Figure 7.15.4

b. Commercial dishwashers shall be permitted to discharge through a grease interceptor in accordance with Section 6.2.6.a.

7.16 FLOOR DRAINS, AREA DRAINS, AND TRENCH DRAINS

7.16.1 Compliance

Floor drains, area drains, and trench drains shall comply with ASME A112.6.3 or, if stainless steel, ASME A112.3.1.

7.16.2 Grate Free Area and Strainer or Sediment Basket

a. The free area of the top grate for floor drains, area drains, and trench drains shall comply with ASME A112.6.3 based on their outlet connection size. Where floor drains and area drains receive other than clearwater waste, they shall include an internal outlet strainer or removable metal sediment basket to retain solids.

b. The trap seal for floor drains shall be not less than 2 inches deep.

c. Where infrequently used floor drains are subject to evaporation of their trap seals, they shall either 1) be provided with a 4-inch deep trap seal and have an accessible means to replenish, or 2) be fed from an automatic trap seal priming device complying with ASSE 1018 or ASSE 1044, or 3) be fitted with a barrier type floor drain trap seal protection device complying with ASSE 1072.
d. Where traps are automatically primed, the priming connection shall be above the weir of the trap.

See Figures 7.16.2-A through -C

7.16.3 Size of Floor Drains
  a. Floor drains and their discharge piping shall be sized in accordance with Section 11.4.4. Floor drains shall be not less than 2” pipe size.

7.16.4 Required Locations for Floor Drains
  a. Floor drains shall be provided in the following areas:
     1. Toilet rooms containing either one water closet and one wall hung urinal, two or more water closets, or two or more wall hung urinals, except in a dwelling unit.
     2. Commercial kitchens.
     3. Common laundry rooms.

7.16.5 Walk-in Coolers and Freezers
Floor drains located in walk-in coolers and walk-in freezers where food or other products for human consumption are stored shall be indirectly connected to the drainage system in accordance with Section 9.1.6.

7.16.6 Floor Slope
Where floor drains receive indirect waste or other drainage on a regular or frequent basis, the elevation of the floor drain shall be set so that the floor within a 2 foot radius can be sloped to the drain.
NOTE: The grate minimum free areas in ASME A112.6.3 are approximately 1.5 times the outlet area for floor drains and 2 times for area drains and trench drains.

Figure 7.16.2 - A
A FLOOR DRAIN TRAP AND STRAINER

Figure 7.16.2 - B
A DEEP SEAL TRAP

Figure 7.16.2 - C
A FLOOR DRAIN WITH TRAP PRIMER

NOTES:
1. A fixture branch type trap primer can prime more than one trap if it is fitted with a multi-outlet manifold.
7.17 GARBAGE CAN WASHERS
Garbage can washers shall include a removable basket or strainer to prevent large particles of garbage from entering the drainage system. The water supply connection shall be protected from back siphonage in accordance with Chapter 10. Garbage can washers shall be trapped and vented as required for floor drains. See Figure 7.17

![Figure 7.17: A Garbage Can Washer](image)

7.18 SPECIAL INSTALLATIONS

7.18.1 Protection of Water Supply
The water supply to special installations shall be protected from backflow in accordance with Sections 10.4.3 and 10.5. Examples of such special installations include decorative fountains, ornamental pools and waterfalls, swimming and wading pools, baptisteries, and similar custom-built equipment.

7.18.2 Approval
Special installations requiring water supply and/or drainage shall be submitted to the Authority Having Jurisdiction for approval.

7.19 FLUSHING DEVICES FOR WATER CLOSETS AND URINALS

7.19.1 General
Appropriate flushing devices shall be provided for water closets, urinals, clinical sinks, and other fixtures that depend on trap siphonage to discharge the contents of the fixture.

7.19.2 Separate Devices
A separate flushing device shall be provided for each fixture.
EXCEPTION: A single device may be used to automatically flush two or more urinals.

   a. Flush tanks shall have ballcocks or other means to refill the tank after each discharge and to shut off the water supply when the tank reaches the proper operating level. Ballcocks shall be the anti-siphon type and comply with ASSE 1002.
b. Except in approved water closet and flush tank designs, the seat of the tank flush valve shall be at least 1 inch above the flood level rim of the fixture bowl.

c. The flush valve shall be designed so that it will close tightly if the tank is flushed when the fixture drain is clogged or partly restricted, so that water will not spill continuously over the rim of the bowl or backflow from the bowl to the flush tank.

d. Flush tanks shall include a means of overflow into the fixture served having sufficient capacity to prevent the tanks from overflowing with normal flow through the fill valve.

See Figure 7.19.3

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**Figure 7.19.3**

BALLCOCKS FOR WATER CLOSET FLUSH TANKS

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**7.19.4 Flushometer Tanks (Pressure Assisted)**

Flushometer tanks (pressure assisted) shall comply with ASSE 1037 or CSA B125.3 and shall include built-in pressure regulation and backflow prevention devices.

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**7.19.5 Flushometer Valves**

Flushometer valves shall comply with ASSE 1037 or CSA B125.3 and include a vacuum breaker assembly and means of flow adjustment. Flushometer valves shall be accessible for maintenance and repair.

See Figure 7.19.5

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**7.19.6 Required Water Pressure**

The available water supply pressure shall be adequate for proper operation of the particular flushing devices used, as recommended by the manufacturer.
NOTE: Some one-piece tank-type water closets require 30 psig flowing pressure and 1/2" supplies for proper operation.

7.20 FIXTURES FOR DETENTION AND CORRECTIONAL INSTITUTIONS
Special design fixtures for use in detention and correctional institutions shall comply with the requirements of this Code except that fixtures may be fabricated from welded seamless stainless steel and be equipped with necessary security devices. Water closets shall be the elongated type with integral or separate seats. Urinals shall have a continuous flushing rim that washes all four walls of the fixture.

7.21 MINIMUM NUMBER OF REQUIRED FIXTURES

7.21.1 Number of Fixtures
Plumbing fixtures shall be provided for the type of building occupancy and in the numbers not less than those shown in Table 7.21.1.

7.21.2 Occupant Load
a. The minimum number of plumbing fixtures shall be based on the number of persons to be served by the fixtures, as determined by the person responsible for the design of the plumbing system.

b. Where the occupant load is not established and is based on the egress requirements of a building code, the number of occupants for plumbing purposes shall be permitted to be reduced to two-thirds of that for fire or life safety purposes.

c. Wherever both sexes are present in approximately equal numbers, the total occupant load shall be multiplied by 50 percent to determine the number of persons of each sex to be provided for, unless specific information concerning the percentage of male and female occupants is available.

d. Plans for plumbing systems, where required, shall indicate the maximum number of persons to be served by the facilities.

e. In occupancies having established seating, such as auditoriums and restaurants, the number of occupants for plumbing purposes shall not be less than the number of seats.
7.21.3 Access to Fixtures
   a. In multi-story buildings, accessibility to the required fixtures shall not exceed one story.
   b. Fixtures accessible only to private offices shall not be counted to determine compliance with this section.
   c. The lavatories required by Tables 7.21.1 for employee and public toilet facilities shall be located within the same toilet facility as their associated water closets and urinals.

7.21.4 Separate Facilities
   a. Separate toilet facilities shall be provided for each sex.
   EXCEPTIONS:
      (1). Residential installations.
      (2). In occupancies serving 15 or fewer people, one toilet facility, designed for use by no more than one person at a time, shall be permitted for use by both sexes.
      (3). In business occupancies with a total floor area of 1500 square feet or less, one toilet facility, designed for use by no more than one person at a time, shall satisfy the requirements for serving customers and employees of both sexes.
      (4). In mercantile occupancies with a net occupiable floor area of 1500 square feet or less that is accessible to customers, one toilet facility designed for use by no more than one person at a time shall satisfy the requirements for serving customers and employees of both sexes.

7.21.5 Substitution and Omission of Fixtures
   a. Urinals: In male toilet rooms, urinals may be substituted for up to 50% of the required number of water closets.
   b. Drinking Water Facilities: A kitchen or bar sink shall be considered as meeting the requirements for drinking water facilities for employees who have access to the facilities.
   c. Provisions for Clothes Washers: Apartment buildings and condominiums without laundry rooms for their occupants shall not require provisions for centralized clothes washers for use by multiple occupants.
   d. Service Sinks: Service sinks may be omitted when the Authority Having Jurisdiction determines that they are not necessary for proper cleaning of the facility.

7.21.6 Fixture Requirements for Special Occupancies
   a. Additional fixtures may be required when unusual environmental conditions or special activities are encountered.
   b. In food preparation areas of commercial food establishments, fixture requirements may be dictated by the health and/or sanitary codes. Fixtures, fixture compartments and appliances used for rinsing or sanitizing equipment or utensils, processing or preparing food for sale or serving, shall be installed in accordance with Section 9.1.1 to ensure the required protection from backflow and flooding.
   c. Types of occupancies not shown in Table 7.21.1 shall be considered individually by the Authority Having Jurisdiction.
   d. Where swimming pools operated by an apartment building, condominium, or similar multi-family dwelling unit are restricted to the use of residents and guests of residents of dwelling units in the immediate vicinity of the pool, the minimum required toilet facilities for bathers within the pool compound shall be one (1) male toilet room and one (1) female toilet room, each consisting of a water closet and lavatory as a minimum.
   e. Hand washing facilities shall be provided in each examination room in a doctor's office or medical office, dental treatment room, massage treatment room, tattoo parlor or any other facility where skin to skin contact is necessary for performing a service and if required by the use and occupancy regulations for a facility.

7.21.7 Facilities in Mercantile and Business Occupancies Serving Customers
   a. Within a single establishment, facilities for customers and employees shall be permitted to be met with a single set of restrooms accessible to both groups. The required number of fixtures shall be based on the total number of customers and employees.
b. Fixtures for customer and employee use shall be permitted to be met by providing centrally located facilities accessible to multiple establishments. The maximum distance of entry to these facilities shall not exceed 500 feet from the entrance of any establishment served.

c. Drinking water facilities shall not be required for customers where normal occupancy is short term as defined in Section 1.2.

d. For establishments less than 1500 square feet in total floor area, one water closet and one lavatory in a restroom shall be permitted to provide the requirements for serving the both customers and employees.

7.21.8 Food Service Establishments

a. Restaurants and other food service establishments with a seated occupant load exceeding 100 customers shall be provided with separate toilet facilities for employees and customers. Customer and employee toilet facilities may be combined for seated customer loads of 100 or less and fixtures shall be provided for the total number of customers and employees. For employees of 15 or less, one employee toilet facility, designed for use by no more than one person at a time, shall be permitted for use by both sexes.

b. Where food service establishments and food courts are open to public areas in malls and transportation terminals, toilet facilities that serve both customers and employees may be centrally located and serve multiple establishments. The maximum distance of entry to central toilet facilities shall be 500 feet from any establishment or food court served.

c. Drinking water facilities shall not be required in restaurants or other food service establishments if drinking water service is provided or available on request.

7.21.9 Family and Assisted-Use Toilet Rooms

a. Accessible family or assisted-use toilet rooms containing one water closet and one lavatory shall be provided as required by the applicable building code.

b. In assembly and mercantile occupancies, the plumbing fixtures within family and assisted-use toilet rooms may be counted as part of the minimum required fixtures for males or for females.

7.21.10 Fractions of the Minimum Number of Required Plumbing Fixtures

a. In Table 7.21.1, where the number of persons of each sex is less than 100% of a particular group, the number of fixtures required for that group may be reduced by the fraction of the persons in that group. The fraction of the required fixtures shall be rounded up to the next whole number.

b. Where a facility includes two or more different occupancy classifications with access to the same installed plumbing fixtures, the fraction of the required fixtures for each classification may be added and the total combined fraction of the required fixtures shall be rounded up to the next whole number.

7.22 WATER TREATMENT SYSTEMS

Water softeners, reverse osmosis water treatment units, and other drinking water treatment systems shall meet the requirements of the appropriate standards referenced in Section 10.18.1. Waste discharge from such equipment shall enter the drainage system through an air gap. Discharge piping shall be of a material approved for potable water, sanitary drainage, or storm drainage.

7.23 SAFETY FEATURES FOR SPAS AND HOT TUBS

7.23.1 Spas and Hot Tubs
Spas and hot tubs shall comply with the requirements of subsections 7.23.2, 7.23.3, and 7.23.4.

7.23.2 Entrapment Avoidance
There shall be nothing in the spa or hot tub that can cause the user to become entrapped underwater. Types of entrapment can include, but not be limited to, rigid, non-giving protrusions, wedge-shaped openings, and any arrangement of components that could pinch and entrap the user.
7.23.3 Outlets Per Pump
There shall be a minimum of two (2) suction inlets for each pump in the suction inlet system, separated by at least 3 feet or located on two (2) different planes, such as one on the bottom and one on a vertical wall, or one on each of two vertical walls. The suction inlets shall be piped so that water is drawn through the inlets simultaneously by a common suction line to the pump. Blocking one suction inlet shall not create excessive suction at other suction inlets.

7.23.4 Obstructions and Entrapment Avoidance
Where vacuum cleaning fittings are provided, they shall be located outside of the spa or hot tub and shall not be accessible to the spa or hot tub user.

7.24 PLUMBED EMERGENCY EYEWASH AND SHOWER EQUIPMENT
a. Emergency eyewash, eye/face wash, and shower equipment shall comply with the requirements of ANSI/ISEA Z358.1
b. The installer shall assemble and install the equipment in accordance with the manufacturer’s instructions.
c. The location of the emergency equipment shall be determined by the facility designer to provide the required access for protection from the specific hazards within the facility.
d. The emergency equipment shall be designed and manufactured to provide the discharge patterns and flow rates required by ANSI/ISEA Z358.1 for the hazard(s) for which protection is being provided.
e. The temperature of the flushing fluid shall be from 60°F to 100°F unless the facility designer has indicated that other specific temperatures are required to provide protection from a particular hazard.
f. Temperature actuated mixing valves for plumbed emergency equipment shall comply with ASSE 1071.
g. The minimum required water supply shall be 0.4 gpm for eyewashes, 3.0 gpm for eye/face washes, and 20 gpm for showers in accordance with ANSI/ISEA Z358.1.
h. Water shutoff valves shall have provisions to prevent unauthorized closure.
i. Equipment with waste pipe connections shall be connected to the building drain piping. Floor drains shall be provided for showers and equipment without waste connections.
j. Where necessary for the hazards that the emergency equipment is being provided for, the drainage shall be neutralized or otherwise treated before discharge into the building drainage system. Acid waste shall be connected to an acid waste disposal system if available.

7.25 COMMERCIAL DISHWASHING PRE-RINSE SPRAY VALVES
Commercial dishwashing pre-rinse spray valves shall have a maximum flow rate of 1.6 gallons per minute at 60 psi.
### Table 7.21.1 see (1)

**MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES - Page 1**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Occupancy Group see (14)</th>
<th>No. of Persons of Each Sex see (4), (16)</th>
<th>Water Closets see (5) for urinals</th>
<th>Lavatories or Shower</th>
<th>Drinking Water Facilities</th>
<th>Other</th>
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# Table 7.21.1 see (1)
## MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES - Page 3

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<th>Classification</th>
<th>Occupancy Group see (14)</th>
<th>No. of Persons of Each Sex see (4), (16)</th>
<th>Water Closets see (5) for urinals</th>
<th>Lavatories</th>
<th>Bath or Shower</th>
<th>Drinking Water Facilities</th>
<th>Other</th>
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<td>Lavatories see (4), (16)</td>
<td>Bath or Shower</td>
<td>Drinking Water Facilities</td>
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<td>Residential (R)</td>
<td>R-1: Hotels, motels, boarding houses (transient)</td>
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<td>1 lavatory per guest room</td>
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<td>1 service sink per floor (21)</td>
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<td>R-2: Apartment houses, condominiums.</td>
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<td>1 water closet per unit</td>
<td>1 lavatory per unit</td>
<td>1 per unit</td>
<td>1 kitchen sink per unit provisions for 1 clothes washer per 20 units (10)</td>
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<td>R-2: One- and two-family dwellings.</td>
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<td>R-4: Residential care, assisted living facilities.</td>
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<td>Storage (S)</td>
<td>S-1 &amp; S-2: Structures for the storage of goods, warehouses, storehouses, and freight depots.</td>
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**Table 7.21.1** see (1)  
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES - Page 4
Notes for Table 7.21.1 (where indicated in the Table):

(1) Plumbing fixtures shall be provided in numbers not less than those shown in this Table for the type of building occupancy (7.21.1). For accessible requirements, see local, state, and national codes. Additional fixtures may be required where environmental conditions or special activities may be encountered.

(2) Drinking water facilities for customers are not required in restaurants or other food service establishments if drinking water service is available (7.21.8.c). Drinking water facilities are not required for customers in mercantile or business establishments where normal occupancy is short term (7.21.7.c). Kitchen sinks and bar sinks may be used for employee drinking water facilities (7.21.5.b).

(3) In food preparation areas, fixture requirements may be dictated by local Health Codes (7.21.6.b).

(4) Wherever both sexes are present in approximately equal numbers, multiply the total census by 50% to determine the number of persons of each sex to be provided for (7.21.2.c). This regulation applies only where specific information that would otherwise affect the fixture count is not provided.

(5) Not more than 50% of the required number of water closets for males may be urinals (7.21.5.a).

(6) In buildings with multiple floors, access to fixtures shall not exceed one vertical story (7.21.3.a).

(7) Fixtures for customers and employees as required by this Table may be met by providing centrally located facilities accessible to several stores (7.21.7.b). The maximum distance from the entry for any store to these facilities shall not exceed 500 feet (7.21.7.b).

(8) Where food service establishments and food courts are open to public areas in malls and transportation terminals, toilet facilities for both customers and employees may be centrally located and serve multiple establishments (7.21.8.b).

(9) Fixtures accessible only to private offices shall not be counted to determine compliance with this Table (7.21.3.b).

(10) Facilities without laundry rooms for their occupants shall not require provisions for clothes washers.

(11) In residential care facilities where water closets and lavatories are provided in individual patient rooms, the minimum number of fixtures for employees and visitors shall be as required for hospitals.

(12) Requirements for employees and customers may be met with a single set of restrooms (7.21.7.a).

(13) If the design number of customers in food handling establishments exceeds 100, separate facilities for employees and customers are required (7.21.8.a).

(14) Occupancy groups shall be as described in the local building code.

(15) See 7.21.4 and 7.21.7 for toilet facilities for occupancies with a total floor area of 1500 square feet or less.

(16) In determining the number of required fixtures for numbers of persons that fall in the “each additional (xx) over (xx)” listings, the requirement applies to fractions of the listed group (7.21.10).

(17) Laboratories in higher education facilities shall have safety showers if required by ANSI/ISEA Z358.1 and the facility design.

(18) Warehouse storage area requirements shall be permitted to be met by providing a facility centrally located within the storage area. The maximum travel distance to the facility shall not exceed 500 feet.

(19) The requirements for multiple individual self-storage areas shall be permitted to be met by fixtures located in the facility’s administration building. The administration office must be accessible during normal business hours.

(20) Showers may be omitted in recreational facilities without locker rooms when approved by the Authority Having Jurisdiction.

(21) Service sinks may not be required on floor levels if the AHJ determines that housekeeping is not required (7.21.5.d). Service sinks shall be permitted to serve two adjacent floors (one above and one below) where there is service elevator access.