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Subject: Understanding Code Requirements and Assemblies for Shower

Preface

The International Building Code (IBC) and International Residential Code (IRC) have replaced the former BOCA, Southern Building Code, and Uniform Building Code beginning in 2000. The International Code Council (ICC) has incorporated the previous organizations of the three previous codes into one organization. The reason the codes were changed was to incorporate a model building code to be used anywhere in the United States of America. In the current model code format, the International Building Code is written and governs for commercial, institutional, and industrial installations and the International Residential Code is written and governs for residential construction. State, county and city Building Departments adopt the respective codes with or without modifications.

Prior to 2000, the shower wall assemblies were in the Uniform Building Code and the shower receptors were in the Uniform Plumbing Code. In the former and current Uniform Plumbing Code (UPC), requirements for the shower receptors and plumbing fixtures are in the Uniform Plumbing Code and Installation Standards (IS). In the model code format shower walls and shower receptors are in both the International Building Code and the International Residential Code. No investigation was performed on the former BOCA and Southern Building Codes.

Components used in shower receptors and shower walls are specified in the code sections or standards for both the IBC and the IRC or are required to have an ICC Evaluation Report to approve the product as equal. ICC Evaluation Reports and ICC Acceptance Criteria are published by the International Code Council can be reached on line at www.iccsafe.org, with ICC Acceptance Criteria is available on line at www.iccsafees.org. Know or contact the building department which has jurisdiction on each construction project and which codes have been adopted by the building department.

Components used in shower receptors are specified in the code sections or standards of the Uniform Plumbing Code (UPC) or are required to have a product certification or approval through an Evaluation Report by the International Association of Plumbing and Mechanical Officials (IAPMO). Product Certification and Evaluation Services through IAPMO can be reached on line at www.iapmo.org with Evaluation Services at www.iapmoes.org.

An example of an ICC Acceptance Criteria (AC) is AC115 requires that where tile is directly bonded to a waterproof membrane, the waterproof membrane is required to meet ANSI A118.10 American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.

Code Requirements for Showers

The following attached code requirements include:

2009 International Building Code Interior Environment

Section 1210

2009 International Residential Code

Section R307,

Section P2708,

Section P2709

Section P2710

2009 Uniform Plumbing Code (taken from the Illustrated Training Manual)

Section 411,

Installation for Tile Lined Roman Bath Tubs IAPMO IS 2-2006

Installation Standard for Tile Lined Shower Receptors IAPMO IS 4-2006

Tile and Stone Tile Shower Requirements/Recommendations

The following are tile industry adopted requirements and recommendations:

2011 Tile Council of North America (TCNA) Handbook for Ceramic, Glass, and Stone
Tile Installation

American National Standard (ANSI) Specifications for the Installation of Ceramic Tile
ANSI A108, A118, A136 Version 2011.1 Published by the TCNA

American National Standard Specifications for Ceramic Tile ANSI A137.1-2008
Published by the TCNA

Marble Institute of America Design Manual most recent edition Published by the MIA
CTIOA Technical Bulletin 002 Flanges are required on all tubs used for shower receptors
CTIOA Technical Bulletin 003 Siliconized Latex Caulk

CTIOA Technical Bulletins are from the Ceramic Tile Institute of America

Tile Council of North America can be reached on line at www.tileusa.com with
purchasing of documents at literature@tileusa.com

Marble Institute of America (MIA) can be reached on line at [miainfo@marble-
institute.com](mailto:miainfo@marble-institute.com)

Ceramic Tile Institute of America can be reached at www.ctioa.org.

To obtain the above documents, contact the respective association.

**The use of tile industry standards is voluntary with the exception that when the tile
industry standards are specified, the requirements are mandatory!**

Shower Assemblies in the TCNA Handbook

2011 TCNA Handbook for Ceramic, Glass, and Stone Tile Installation includes:
Bathtub/Shower Walls - Assembly methods B411-11, B412-11, B419-11, B425-11,
B430-11 and for Stone Tile Assembly methods B411-11 Stone, B412-11 Stone, B419-11
Stone, B425-11 Stone, B430-11 Stone

Shower Receptors - Assembly methods B414-11, B415-11, B420-11, B426-11, B431-11,
B421-11, B422-11 and for Stone Tile Assembly methods B414-11 Stone, B415-11 Stone,
B420-11 Stone, B426-11 Stone, B421-11 Stone, B422-11 Stone

Common Shower Configurations

Shower Receptor Renovation – TR418-11, TR420-11

Steam Shower/Room over Masonry/Concrete SR613-11

Steam Shower/Room over Metal Studs SR614-11

Note: There is no assembly method for Stone tile in Steam Room

Prepared by Gregory I. Mowat FCSI CDT CTC CFC

INTERIOR ENVIRONMENT

square feet (9.3 m²) of floor area shall be provided for each occupant of such unit in excess of two.

2. The unit shall be provided with a separate closet.
3. The unit shall be provided with a kitchen sink, cooking appliance and refrigeration facilities, each having a clear working space of not less than 30 inches (762 mm) in front. Light and ventilation conforming to this code shall be provided.
4. The unit shall be provided with a separate bathroom containing a water closet, lavatory and bathtub or shower.

SECTION 1209 ACCESS TO UNOCCUPIED SPACES

1209.1 Crawl spaces. Crawl spaces shall be provided with a minimum of one access opening not less than 18 inches by 24 inches (457 mm by 610 mm).

1209.2 Attic spaces. An opening not less than 20 inches by 30 inches (508 mm by 762 mm) shall be provided to any *attic* area having a clear height of over 30 inches (762 mm). A 30-inch (762 mm) minimum clear headroom in the *attic* space shall be provided at or above the access opening.

1209.3 Mechanical appliances. Access to mechanical appliances installed in under-floor areas, in *attic* spaces and on roofs or elevated structures shall be in accordance with the *International Mechanical Code*.

SECTION 1210 SURROUNDING MATERIALS

1210.1 Floors and wall base finish materials. In other than *dwelling units*, toilet, bathing and shower room floor finish materials shall have a smooth, hard, nonabsorbent surface. The intersections of such floors with walls shall have a smooth, hard, nonabsorbent vertical base that extends upward onto the walls at least 4 inches (102 mm).

1210.2 Walls and partitions. Walls and partitions within 2 feet (610 mm) of urinals and water closets shall have a smooth, hard, nonabsorbent surface, to a height of 4 feet (1219 mm) above the floor, and except for structural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture.

Exceptions:

1. *Dwelling units* and *sleeping units*.
2. Toilet rooms that are not accessible to the public and which have not more than one water closet.

Accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls, shall be installed and sealed to protect structural elements from moisture. For walls and partitions also see Section 2903.

1210.3 Showers. Shower compartments and walls above bathtubs with installed shower heads shall be finished with a smooth, nonabsorbent surface to a height not less than 70 inches (1778 mm) above the drain inlet.

1210.4 Waterproof joints. Built-in tubs with showers shall have waterproof joints between the tub and adjacent wall.

1210.5 Toilet rooms. Toilet rooms shall not open directly into a room used for the preparation of food for service to the public.

R305.1.1 Basements. Portions of *basements* that do not contain *habitable space*, hallways, bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exception: Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

**SECTION R306
SANITATION**

R306.1 Toilet facilities. Every *dwelling* unit shall be provided with a water closet, lavatory, and a bathtub or shower.

R306.2 Kitchen. Each *dwelling* unit shall be provided with a kitchen area and every kitchen area shall be provided with a sink.

R306.3 Sewage disposal. All plumbing fixtures shall be connected to a sanitary sewer or to an *approved* private sewage disposal system.

R306.4 Water supply to fixtures. All plumbing fixtures shall be connected to an *approved* water supply. Kitchen sinks, lavatories, bathtubs, showers, bidets, laundry tubs and washing machine outlets shall be provided with hot and cold water.

**SECTION R307
TOILET, BATH AND SHOWER SPACES**

R307.1 Space required. Fixtures shall be spaced in accordance with Figure R307.1, and in accordance with the requirements of Section P2705.1.

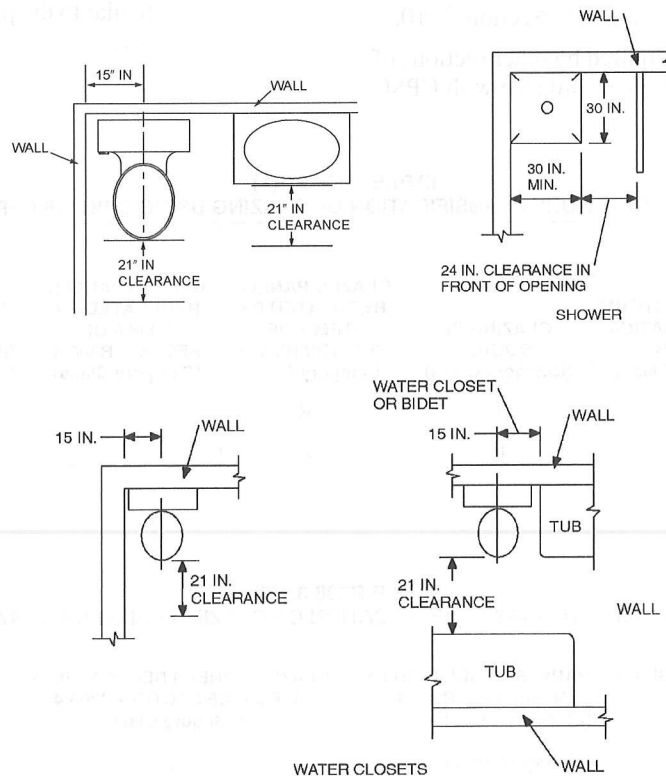
R307.2 Bathtub and shower spaces. Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet (1829 mm) above the floor.

**SECTION R308
GLAZING**

R308.1 Identification. Except as indicated in Section R308.1.1 each pane of glazing installed in hazardous locations as defined in Section R308.4 shall be provided with a manufacturer's designation specifying who applied the designation, designating the type of glass and the safety glazing standard with which it complies, which is visible in the final installation. The designation shall be acid etched, sandblasted, ceramic-fired, laser etched, embossed, or be of a type which once applied cannot be removed without being destroyed. A *label* shall be permitted in lieu of the manufacturer's designation.

Exceptions:

1. For other than tempered glass, manufacturer's designations are not required provided the *building official*



**FIGURE R307.1
MINIMUM FIXTURE CLEARANCES**

For SI: 1 inch = 25.4 mm.

P2706.3 Prohibited waste receptors. Plumbing fixtures that are used for washing or bathing shall not be used to receive the discharge of indirect waste piping.

Exceptions:

1. A kitchen sink trap is acceptable for use as a receptor for a dishwasher.
2. A laundry tray is acceptable for use as a receptor for a clothes washing machine.

SECTION P2707 DIRECTIONAL FITTINGS

P2707.1 Directional fitting required. *Approved* directional-type branch fittings shall be installed in fixture tailpieces receiving the discharge from food waste disposal units or dishwashers.

SECTION P2708 SHOWERS

P2708.1 General. Shower compartments shall have at least 900 square inches (0.6 m²) of interior cross-sectional area. Shower compartments shall be not less than 30 inches (762 mm) in minimum dimension measured from the finished interior dimension of the shower compartment, exclusive of fixture valves, shower heads, soap dishes, and safety grab bars or rails. The minimum required area and dimension shall be measured from the finished interior dimension at a height equal to the top of the threshold and at a point tangent to its centerline and shall be continued to a height of not less than 70 inches (1778 mm) above the shower drain outlet. Hinged shower doors shall open outward. The wall area above built-in tubs having installed shower heads and in shower compartments shall be constructed in accordance with Section R702.4. Such walls shall form a water-tight joint with each other and with either the tub, receptor or shower floor.

Exceptions:

1. Fold-down seats shall be permitted in the shower, provided the required 900-square-inch (0.6 m²) dimension is maintained when the seat is in the folded-up position.
2. Shower compartments having not less than 25 inches (635 mm) in minimum dimension measured from the finished interior dimension of the compartment provided that the shower compartment has a minimum of 1,300 square inches (0.838 m²) of cross-sectional area.

P2708.1.1 Access. The shower compartment access and egress opening shall have a minimum clear and unobstructed finished width of 22 inches (559 mm).

P2708.2 Water supply riser. Water supply risers from the shower valve to the shower head outlet, whether exposed or concealed, shall be attached to the structure using support devices designed for use with the specific piping material or fittings anchored with screws.

P2708.3 Shower control valves. Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016 or CSA B125. The high limit stop shall be set to limit water temperature to a maximum of 120°F (49°C). In-line thermostatic valves shall not be used for compliance with this section.

P2708.4 Hand showers. Hand-held showers shall conform to ASME A112.18.1 or CSA B125.1. Hand-held showers shall be provide backflow protection in accordance with ASME A112.18.1 or CSA B125.1 or shall be protected against backflow by a device complying with ASME A112.18.3.

SECTION P2709 SHOWER RECEPTORS

P2709.1 Construction. Shower receptors shall have a finished curb threshold not less than 1 inch (25 mm) below the sides and back of the receptor. The curb shall be not less than 2 inches (51 mm) and not more than 9 inches (229 mm) deep when measured from the top of the curb to the top of the drain. The finished floor shall slope uniformly toward the drain not less than 1/4 unit vertical in 12 units horizontal (2-percent slope) nor more than 1/2 inch (13 mm), and floor drains shall be flanged to provide a water-tight joint in the floor.

P2709.2 Lining required. The adjoining walls and floor framing enclosing on-site built-up shower receptors shall be lined with one of the following materials:

1. Sheet lead,
2. Sheet copper,
3. Plastic liner material that complies with ASTM D 4068 or ASTM D 4551,
4. Hot mopping in accordance with Section P2709.2.3 or
5. Sheet-applied load-bearing, bonded waterproof membranes that comply with ANSI A118.10.

The lining material shall extend not less than 3 inches (76 mm) beyond or around the rough jambs and not less than 3 inches (76 mm) above finished thresholds. Sheet-applied load bearing, bonded waterproof membranes shall be applied in accordance with the manufacturer's installation instructions.

P2709.2.1 PVC sheets. Plasticized polyvinyl chloride (PVC) sheets shall be a minimum of 0.040 inch (1 mm) thick, and shall meet the requirements of ASTM D 4551. Sheets shall be joined by solvent welding in accordance with the manufacturer's installation instructions.

P2709.2.2 Chlorinated polyethylene (CPE) sheets. Non-plasticized chlorinated polyethylene sheet shall be a minimum of 0.040 inch (1 mm) thick, and shall meet the requirements of ASTM D 4068. The liner shall be joined in accordance with the manufacturer's installation instructions.

P2709.2.3 Hot-mopping. Shower receptors lined by hot mopping shall be built-up with not less than three layers of standard grade Type 15 asphalt-impregnated roofing felt. The bottom layer shall be fitted to the formed subbase and each succeeding layer thoroughly hot-mopped to that

below. All corners shall be carefully fitted and shall be made strong and water tight by folding or lapping, and each corner shall be reinforced with suitable webbing hot-mopped in place. All folds, laps and reinforcing webbing shall extend at least 4 inches (102 mm) in all directions from the corner and all webbing shall be of *approved* type and mesh, producing a tensile strength of not less than 50 pounds per inch (893 kg/m) in either direction.

P2709.3 Installation. Lining materials shall be pitched one-fourth unit vertical in 12 units horizontal (2-percent slope) to weep holes in the subdrain by means of a smooth, solidly formed subbase, shall be properly recessed and fastened to *approved* backing so as not to occupy the space required for the wall covering, and shall not be nailed or perforated at any point less than 1 inch (25.4 mm) above the finished threshold.

P2709.3.1 Materials. Lead and copper linings shall be insulated from conducting substances other than the connecting drain by 15-pound (6.80 kg) asphalt felt or its equivalent. Sheet lead liners shall weigh not less than 4 pounds per square foot (19.5 kg/m²). Sheet copper liners shall weigh not less than 12 ounces per square foot (3.7 kg/m²). Joints in lead and copper pans or liners shall be burned or silver brazed, respectively. Joints in plastic liner materials shall be jointed per the manufacturer's recommendations.

P2709.4 Receptor drains. An *approved* flanged drain shall be installed with shower subpans or linings. The flange shall be placed flush with the subbase and be equipped with a clamping ring or other device to make a water-tight connection between the lining and the drain. The flange shall have weep holes into the drain.

SECTION P2710 SHOWER WALLS

P2710.1 Bathtub and shower spaces. Shower walls shall be finished in accordance with Section R307.2.

SECTION P2711 LAVATORIES

P2711.1 Approval. Lavatories shall conform to ANSI Z124.3, ASME A112.19.1, ASME A112.19.2, ASME A112.19.3, ASME A112.19.4, ASME A112.19.9, CSA B45.1, CSA B45.2, CSA B45.3 or CSA B45.4.

P2711.2 Cultured marble lavatories. Cultured marble vanity tops with an integral lavatory shall conform to ANSI Z124.3 or CSA B45.5.

P2711.3 Lavatory waste outlets. Lavatories shall have waste outlets not less than 1¹/₄ inch (32 mm) in diameter. A strainer, pop-up stopper, crossbar or other device shall be provided to restrict the clear opening of the waste outlet.

P2711.4 Movable lavatory systems. Movable lavatory systems shall comply with ASME A112.19.12.

SECTION P2712 WATER CLOSETS

P2712.1 Approval. Water closets shall conform to the water consumption requirements of Section P2903.2 and shall conform to ANSI Z124.4, ASME A112.19.2, CSA B45.1, CSA B45.4 or CSA B45.5. Water closets shall conform to the hydraulic performance requirements of ASME A112.19.6. Water closets tanks shall conform to ANSI Z124.4, ASME A112.19.2, ASME A112.19.9, CSA B45.1, CSA B45.4 or CSA B45.5. Water closets that have an invisible seal and unventilated space or walls that are not thoroughly washed at each discharge shall be prohibited. Water closets that permit backflow of the contents of the bowl into the flush tank shall be prohibited.

P2712.2 Flushing devices required. Water closets shall be provided with a flush tank, flushometer tank or flushometer valve designed and installed to supply water in sufficient quantity and flow to flush the contents of the fixture, to cleanse the fixture and refill the fixture trap in accordance with ASME A112.19.2 and ASME A112.19.6.

P2712.3 Water supply for flushing devices. An adequate quantity of water shall be provided to flush and clean the fixture served. The water supply to flushing devices equipped for manual flushing shall be controlled by a float valve or other automatic device designed to refill the tank after each discharge and to completely shut off the water flow to the tank when the tank is filled to operational capacity. Provision shall be made to automatically supply water to the fixture so as to refill the trap after each flushing.

P2712.4 Flush valves in flush tanks. Flush valve seats in tanks for flushing water closets shall be at least 1 inch (25 mm) above the flood-level rim of the bowl connected thereto, except an *approved* water closet and flush tank combination designed so that when the tank is flushed and the fixture is clogged or partially clogged, the flush valve will close tightly so that water will not spill continuously over the rim of the bowl or backflow from the bowl to the tank.

P2712.5 Overflows in flush tanks. Flush tanks shall be provided with overflows discharging to the water closet connected thereto and such overflow shall be of sufficient size to prevent flooding the tank at the maximum rate at which the tanks are supplied with water according to the manufacturer's design conditions.

P2712.6 Access. All parts in a flush tank shall be accessible for repair and replacement.

P2712.7 Water closet seats. Water closets shall be equipped with seats of smooth, nonabsorbent material and shall be properly sized for the water closet bowl type.

P2712.8 Flush tank lining. Sheet copper used for flush tank linings shall have a minimum weight of 10 ounces per square foot (3 kg/m²).

P2712.9 Electro-hydraulic water closets. Electro-hydraulic water closets shall conform to ASME A112.19.13.

the necessary volume to flush and properly cleanse urinals simultaneously. Automatically controlled flushometer valves shall be permitted to be substituted for flush tanks.

410.3 Flushometer Valves. No manually controlled flushometer valve shall be used to flush more than one (1) urinal, and each such urinal flushometer valve shall be an approved, self-closing type discharging a predetermined quantity of water. Flushometers shall be installed so that they will be accessible for repair. Flushometer valves shall not be used where the water pressure is insufficient to properly operate them. When the valve is operated, it shall complete the cycle of operation automatically, opening fully and closing positively under the line water pressure. Each flushometer shall be provided with a means for regulating the flow through it.

410.4 Water Supply for Flush Tanks. An adequate quantity of water shall be provided to flush and clean the fixture served. The water supply for flushing tanks and flushometer tanks equipped for manual flushing shall be controlled by a float valve or other automatic device designed to refill the tank after each discharge and to completely shut off the water flow to the tank when the tank is filled to operational capacity. Provision shall be made to automatically supply water to the fixture so as to refill the trap seal after each flushing. The water supply to flush tanks equipped for automatic flushing shall be controlled by a suitable timing device.

410.5 Overflows in Flush Tanks. Flush tanks shall be provided with overflows discharging into the water closet or urinal connected thereto. Overflows supplied as original parts with the fixture shall be of sufficient size to prevent tank flooding at the maximum rate at which the tank is supplied with water under normal operating conditions and when installed per manufacturer's instructions.

411.0 Floor Drains and Shower Stalls.

411.1 Floor drains shall be considered plumbing fixtures, and each such drain shall be provided with an approved-type strainer having a waterway equivalent to the area of the tailpiece. Floor drains, floor receptors, and shower drains shall be of an approved type, suitably flanged to provide a watertight joint in the floor.

Floor drains are plumbing fixtures and are intended to collect accidental spills, overflows or water utilized for washing the floor surface. They are not intended as secondary fixtures that receive waste from primary fixtures that require either an airgap or an airbreak. That fixture is the floor receptor or floor sink. Each has a strainer and a flange to provide for the collection of leakage, which passes by the strainer and may cause damage to the floor below.

411.2 Location of Floor Drains. Floor drains shall be installed in the following areas:

411.2.1 Toilet rooms containing two (2) or more water closets or a combination of one (1) water closet and one (1) urinal, except in a dwelling unit.

411.2.2 Commercial kitchens and in accordance with Section 704.3.

411.2.3 Laundry rooms in commercial buildings and common laundry facilities in multi-family dwelling buildings.

As stated above, the floor drain is intended for emergency use. Each area, public toilet rooms, commercial kitchens and laundry rooms, are susceptible to overflow of the fixtures in the room and require a floor drain to contain that spillage. Single-dwelling units (homes, apartments or condos) are not required to have a floor drain.

411.3 Food Storage Areas. If drains are provided in storerooms, walk-in freezers, walk-in coolers, refrigerated equipment, or other locations where food is stored, such drains shall have indirect waste piping. Separate waste pipes shall be run from each food storage area, each with an indirect connection to the building sanitary drainage system. Traps shall be provided if required under Section 801.2.2 of this code and shall be vented.

Plumbing Fixtures and Fixture Fittings

Indirect drains shall be permitted to be located in freezers or other spaces where freezing temperatures are maintained, provided that traps, when supplied, are located where the seal will not freeze. Otherwise, the floor of the freezer shall be sloped to a floor drain located outside of the storage compartment.

The floor drain located in food storage areas is required to drain to the drainage system by means of an indirect drain. This ensures that if there is backflow in the system, it will not enter the food storage area and contaminate the food. See Chapter 8 for further requirements.

411.4 Floor Slope. Floors shall be sloped to floor drains.

An important part of plumbing system installation is the protection of the system while the concrete slab is poured. A floor drain is installed with grade in mind and the strainer top should not be raised level to the floor. Care should be taken to ensure that the floor drain maintains proper elevation for drainage of the floor area.

411.5 Shower receptors are plumbing fixtures and shall conform to the general requirements contained in Section 401.0. Each such shower receptor shall be constructed of vitrified china or earthenware, ceramic tile, porcelain-enameled metal, or of such other material acceptable to the Authority Having Jurisdiction. No shower receptor shall be installed unless it conforms to acceptable standards as referenced in Table 14-1 or until a specification or a prototype or both of such receptor has first been submitted to and approval obtained from the Authority Having Jurisdiction.

The shower, whether a one-piece stall or one built up on the site, is a plumbing fixture. It will be the responsibility of the plumber to ensure the shower is tested and is watertight. Install the manufactured shower per the manufacturer's instructions. Recommended standards for the installation of tile-lined shower receptors are contained in IAPMO IS-4. In either case, the receptors must meet all the requirements set forth in Chapter 4.

411.6 Each shower receptor shall be an approved type and be so constructed as to have a finished dam, curb, or threshold that is not less than one (1) inch (25.4 mm) lower than the sides and back of such receptor. In no case shall any dam or threshold be less than two (2) inches (51 mm) or exceeding nine (9) inches (229 mm) in depth when measured from the top of the dam or threshold to the top of the drain. Each such receptor shall be provided with an integral nailing flange to be located where the receptor meets the vertical surface of the finished interior of the shower compartment. The flange shall be water-tight and extend vertically not less than one (1) inch (25.4 mm) above the top of the sides of the receptor. The finished floor of the receptor shall slope uniformly from the sides toward the drain not less than one-quarter (1/4) inch per foot (20.9 mm/m), nor more than one-half (1/2) inch per foot (41.8 mm/m). Thresholds shall be of sufficient width to accommodate a minimum twenty-two (22) inch (559 mm) door. Shower doors shall open so as to maintain not less than a twenty-two (22) inch (559 mm) unobstructed opening for egress.

Exception: Showers that are designed to comply with the accessibility standards listed in Table 14-1.

The shower receptor is the floor or bottom of the shower. This section refers mainly to manufactured receptors (see **Figure 4-18**). The requirements of the receptor provide protection from leakage. If installed correctly, it will provide a solid ground for the shower and protect the floor below from leakage. The exception is for handicap access, which allows a shower with no threshold so a wheelchair can roll into the shower.

411.7 Shower compartments, regardless of shape, shall have a minimum

finished interior of one thousand and twenty-four (1,024) square inches (0.66 m²) and shall also be capable of encompassing a thirty (30) inch (750 mm) circle. The minimum required area and dimensions shall be measured at a height equal to the top of the threshold and at a point tangent to its centerline. The area and dimensions shall be maintained to a point of not less than seventy (70) inches (1,778 mm) above the shower drain outlet with no protrusions other than the fixture valve or valves, shower head, soap dishes, shelves, and safety grab bars or rails. Fold-down seats in accessible shower stalls shall be permitted to protrude into the thirty (30) inch (750 mm) circle.

Exception No. 1: Showers that are designed to comply with ICC A117.1.

Exception No. 2: The minimum required area and dimension shall not apply for a shower receptor having overall dimension of not less than thirty (30) inches (750 mm) in width and sixty (60) inches (1,500 mm) in length.

Figure 4-19 illustrates how to size the area of the shower. The dimensions must be maintained to a height of 70 inches in the shower. Exception 1 to the requirements is for showers that meet ICC/ANSI A117.1, *Standard on Accessible and Usable Buildings and Facilities*. Exception 2 is for the retrofit of a bathtub to a shower. This will allow the tub to be replaced with a shower in the same dimensions.

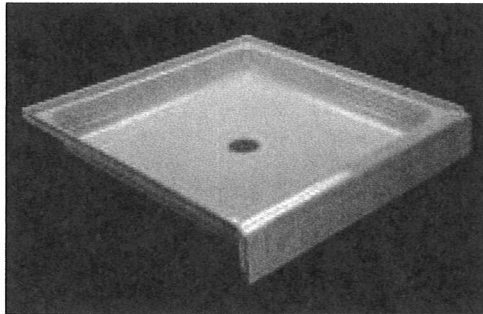


Figure 4-18
Manufactured Shower Receptor

411.8 When the construction of on-site built-up shower receptors is permitted by the Authority Having Jurisdiction, receptors built directly on the ground shall be water-tight and shall be constructed from approved-type dense, nonabsorbent and noncorrosive materials. Each such receptor shall be adequately reinforced, shall be provided with an approved flanged floor drain designed to make a water-tight joint in the floor, and shall have smooth, impervious, and durable surfaces.

Shower receptors shall have the subfloor and rough side of walls to a height of not less than three (3) inches (76 mm) above the top of the finished dam or threshold shall be first lined with sheet plastic,* lead,* or copper,* or shall be lined with other durable and water-tight

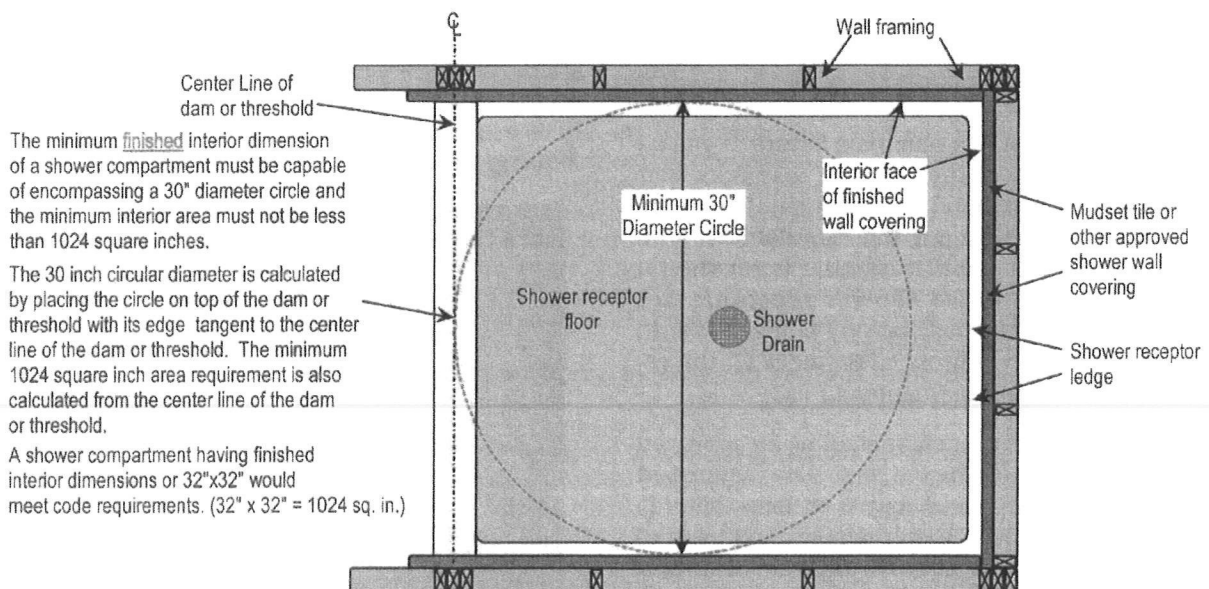


Figure 4-19
Shower Receptor Area

materials. Showers that are provided with a built in place, permanent seat or seating area that is located within the shower enclosure, shall be first lined with sheet plastic,* lead,* copper,* or shall be lined with other durable and water-tight materials that extend not less than three (3) inches (76 mm) above horizontal surfaces of the seat or the seating area.

Lining materials shall be pitched one-quarter (1/4) inch per foot (20.8 mm/m) to weep holes in the subdrain of a smooth and solidly formed subbase. Such lining materials shall extend upward on the rough jambs of the shower opening to a point not less than three (3) inches (76 mm) above the horizontal surfaces of the seat or the seating area, the top of the finished dam or threshold and shall extend outward over the top of the permanent seat, permanent seating area, or rough threshold and be turned over and fastened on the outside face of both the permanent seat, permanent seating area, or rough threshold and the jambs.

Nonmetallic shower subpans or linings shall be permitted to be built up on the job site of not less than three (3) layers of standard, grade fifteen (15) pound (6.8 kg) asphalt-impregnated roofing felt. The bottom layer shall be fitted to the formed subbase and each succeeding layer thoroughly hot-mopped to that below. Corners shall be carefully fitted and shall be made strong and water-tight by folding or lapping, and each corner shall be reinforced with suitable webbing hot-mopped in place.

Folds, laps, and reinforcing webbing shall extend not less than four (4) inches (102 mm) in all directions from the corner, and webbing shall be of approved type and mesh, producing a tensile strength of not less than fifty (50) psi (344.5 kPa) in either direction. Nonmetallic shower subpans or linings shall be permitted to consist of multilayers of other approved equivalent materials suitably reinforced and carefully fitted in place on the job site as elsewhere required in this section.

Linings shall be properly recessed and fastened to approved backing so as not to occupy the space required for the wall covering and shall not be nailed or perforated at any point that is less than one (1) inch (25.4mm) above the finished dam or threshold. An approved-type subdrain shall be installed with every shower subpan or lining. Each such sub-drain shall be of the type that sets flush with the subbase and shall be equipped with a clamping ring or other device to make a tight connection between the lining and the drain. The subdrain shall have weep holes into the waste line. The weep holes located in the subdrain clamping ring shall be protected from clogging.

Shower lining materials shall conform to approved standards acceptable to the Authority Having Jurisdiction.

*Lead and copper subpans or linings shall be insulated from conducting substances other than their connecting drain by fifteen (15) pound (6.8 kg) asphalt felt or its equivalent, and no lead pan or liner shall be constructed of material weighing less than four (4) pounds per square foot (19.5 kg/m²). Copper pans or liners shall be at least No. 24 B & S Gauge (0.02 inches) (0.5 mm). Joints in lead pans or liners shall be burned. Joints in copper pans or liners shall be soldered or brazed. Plastic pans shall not be coated with asphalt-based materials.

This "receptor built directly on the ground" means a qualifying monolithic poured-in-place or equivalent receptor complete with integral threshold, sides and back directly supported by the underlying ground (see **Figure 4-20**). The sides and back must extend at least 3 inches (76 mm) above the finished threshold before any wood superstructure or wall covering may be added. Not many of these receptors are built any more; however, the following receptor is far more prevalent.

The above instructions for constructing a built-up shower receptor are quite specific. The plumber often subcontracts out the installation of this type of shower to a tile company; however, the inspection is still the responsibility of the plumber because the shower is a plumbing fixture and is contained in the plumbing permit. The liability for the integrity of the shower will remain with the plumber even if he or she does not install the receptor. If a

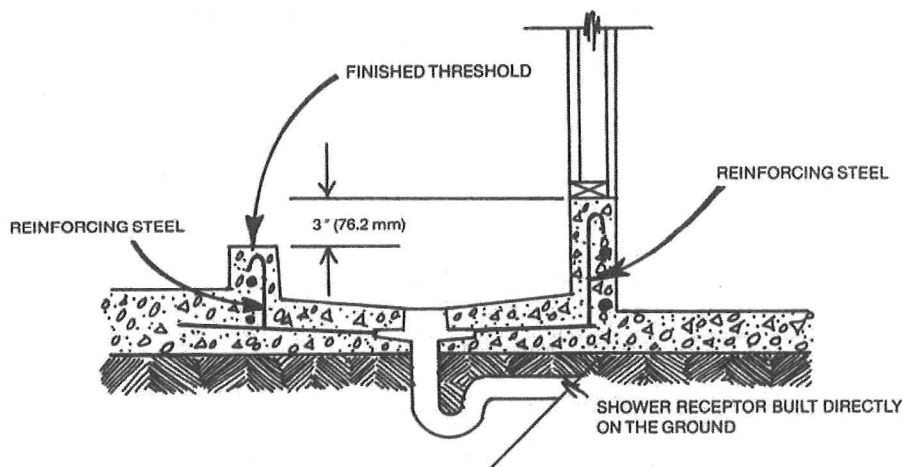


Figure 4-20
Shower Receptor Built Upon the Ground

homeowner has a plumbing leak, he or she calls the plumbing contractor not, the tile contractor. It is important to ensure that the receptor is installed per the above parameters even if someone else does the installation. Further information is contained in IAPMO IS 4-2003 and Figure 4-21.

411.8.1 Tests for Shower Receptors. Shower receptors shall be tested for water-tightness by filling with water to the level of the rough threshold. The test plug shall be so placed that both upper and under sides of the subpan shall be subjected to the test at the point where it is clamped to the drain.

The test for the shower lining and receptor is a minimum of 24 hours without water loss. The lining should be tested before the concrete base is poured. See IAPMO IS 4-2003 and Figure 4-22.

411.9.1 Floors of public shower rooms shall have a nonskid surface and shall be drained in such a manner that wastewater from one bather will not pass over areas occupied by other bathers. Gutters in public or gang shower rooms shall have rounded corners for easy cleaning and shall be sloped not less than two (2) percent toward drains. Drains in gutters shall be spaced not more than eight (8) feet (2,438 mm) from sidewalls nor more than sixteen (16) feet (4,879 mm) apart.

Public shower rooms typically have several showerheads that must be spaced with enough separation to prevent unintended splashing from one bather to another. Showerheads may be placed on one or more walls. They may also be arranged around a pedestal or column to provide for more shower stations centered on a centrally located water source. In all cases, water must flow away from the feet of each bather in a way that does not flow over the other bathers. Sloping the shower floor to one or more troughs is a common means of directing water away from each bather (see Figure 4-23).

411.10 Location of Valves and Heads. Control valves and showerheads shall be located on the sidewall of shower compartments or be otherwise arranged so that the showerhead does not discharge directly at the entrance to the compartment and the bather can adjust the valves prior to stepping into the shower spray.

The location of the control valve on the side wall of the shower not only keeps the water inside the shower as it should but allows the bather to turn on the water and adjust the temperature of the water

Plumbing Fixtures and Fixture Fittings

without getting wet. This protects the bather from scalding or from a sudden reaction to cold water, which could cause a slip or fall.

411.11 Water Supply Riser. Every water supply riser from the shower valve to the showerhead outlet, whether exposed or not, shall be securely attached to the structure.

The riser must be secured to the structure. An unsecured riser will cause vibration and possible water hammer in the line. It must also be secured to allow the attachment of the shower head to the riser without damaging the riser, fitting or stubout.

412.0 Minimum Number of Required Fixtures.

412.1 Fixture Count. Plumbing fixtures shall be provided for the type of building occupancy and in the minimum number shown in Table 4-1.

412.2 Access to Fixtures.

412.2.1 In multi-story buildings, accessibility to the required fixtures shall not exceed one (1) vertical story.

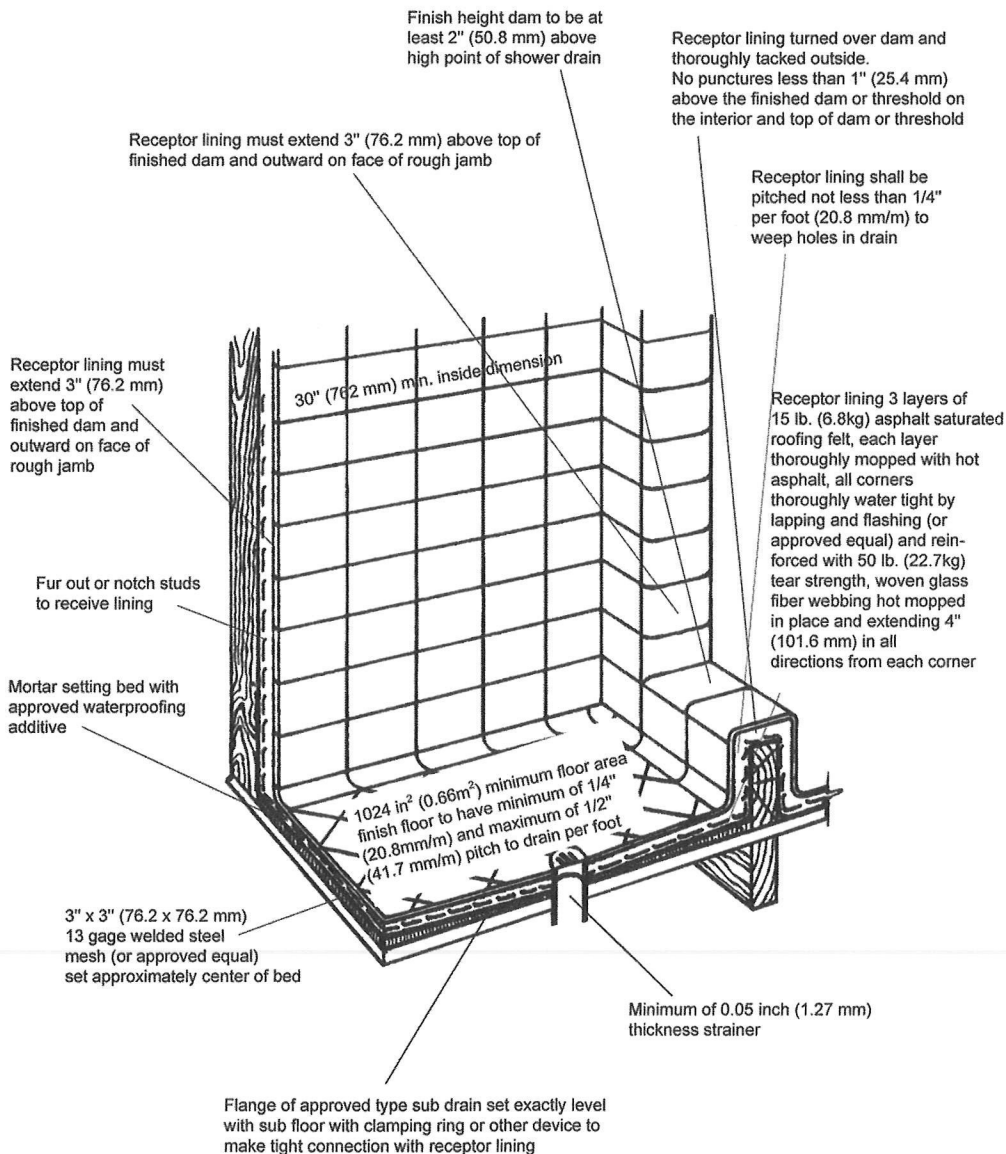


Figure 4-21
Shower Receptor Built Above Ground

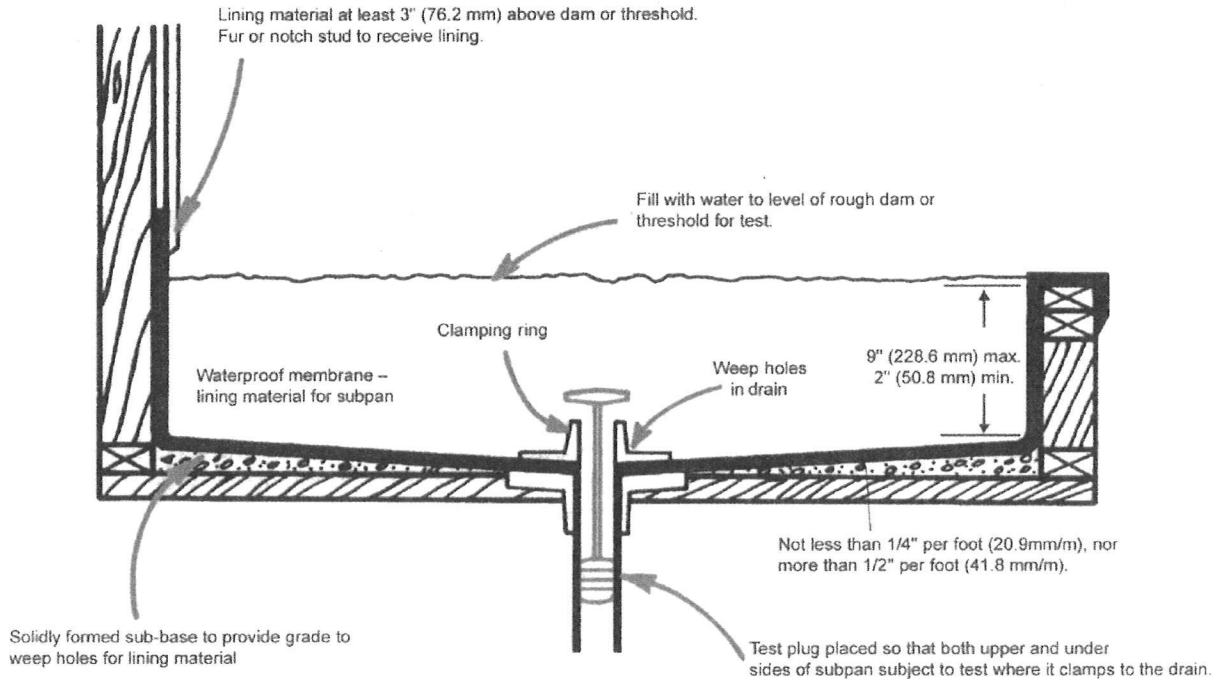


Figure 4-22
Shower Receptor Water Test

412.2.2 Fixtures accessible only to private offices shall not be counted to determine compliance with this section.

412.3 Separate Facilities.

Separate toilet facilities shall be provided for each sex.

Exceptions:

- (1) Residential installations.
- (2) In occupancies serving ten (10) or fewer people, one (1) toilet facility, designed for use by no more than one (1) person at a time, shall be permitted for use by both sexes.
- (3) In business and mercantile occupancies with a total floor area of fifteen-hundred (1,500) square feet (139.5 m²) or less, one (1) toilet facility, designed for use by no more than one (1) person at a time, shall satisfy the requirements for serving customers and employees of both sexes.

412.4 Fixture Requirements for Special Occupancies.

412.4.1 Additional fixtures may be required when unusual environmental conditions or special activities are encountered.

412.4.2 In food preparation areas, fixture requirements may be dictated by health codes.

412.4.3 Types of occupancy not shown in Table 4-1 shall be considered individually by the Authority Having Jurisdiction.

412.5 Facilities in Mercantile and Business Occupancies Serving Customers.

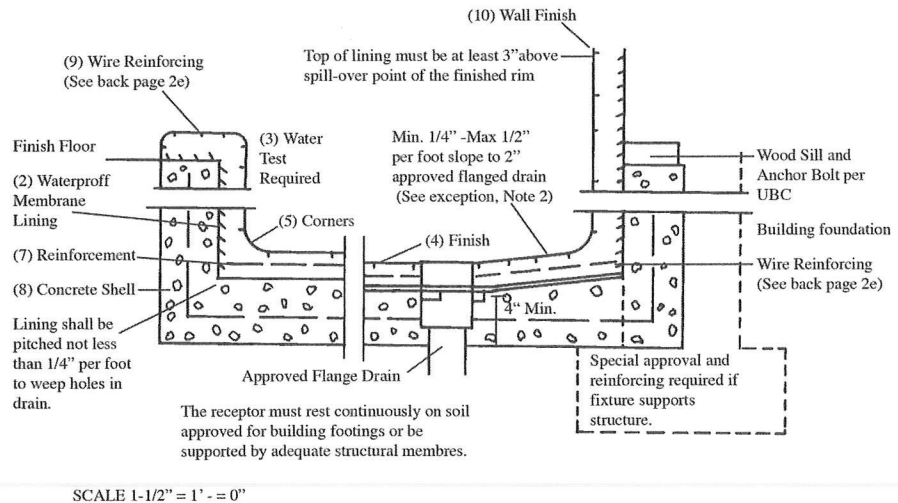
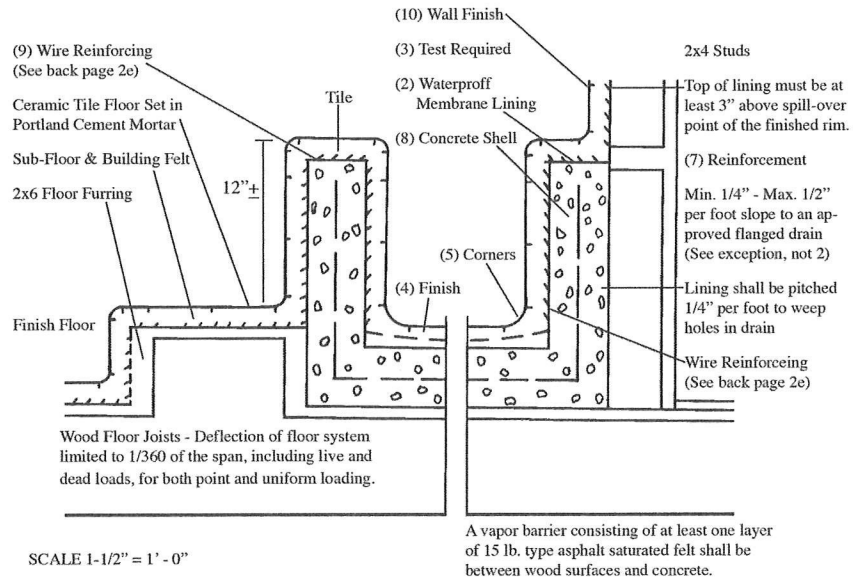
412.5.1 Requirements for customers and employees shall be permitted to be met with a single set of restrooms accessible to both groups. The required number of fixtures shall be the greater of the required number for employees or the required number for customers.

412.5.2 Fixtures for customer use shall be permitted to be met by providing a centrally located facility accessible to several stores. The maximum distance from entry to any store to this facility shall not exceed five hundred (500) feet (152.4 m).

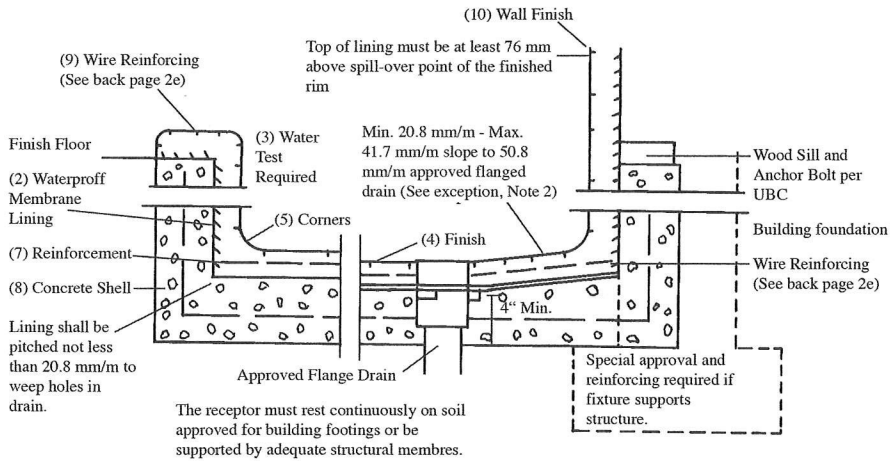
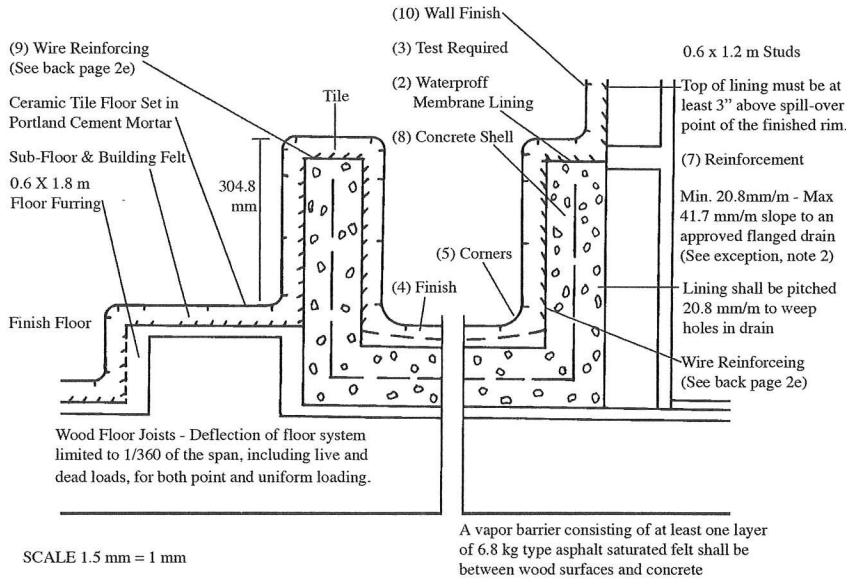
412.5.3 In stores with a floor area of one-hundred and fifty (150) square feet (13.9 m²) or less, the requirement to provide facilities for employees shall be permitted to be met by providing a centrally located facility

**Installation Standard
For
TILE-LINED ROMAN BATH TUBS**

IAPMO IS 2-2006



METRIC



2009 UPC Illustrated Training Manual

IS 2

1.0 GENERAL REQUIREMENTS

1.1 **Inspection of Work** – All surfaces prepared by others shall be inspected by the tile installer before starting tile work and all unsatisfactory conditions reported to the Administrative Authority. Starting tile work by the tile installer shall be considered as acceptance of surfaces prepared by others.

1.2 **Surfaces** – All surfaces to receive tile work shall be clean, structurally sound, and conform in every way to the local Building Code.

(Note: No tile work shall proceed until the pan and drain construction has been inspected and approved by the Administrative Authority, where required.)

2.0 MATERIALS

2.1 **Tile Quality and Grade** – Tile shall comply with American National Standard Specification for Ceramic Tile, A137.1 (equivalent to and incorporating U.S. Dept. of Commerce Simplified Practice Recommendation, R61-61 and Federal Specification SS-T-308b, Tile, Floor, Wall, and Trim Units, Ceramic).

2.2 **Cement** – Cement shall be portland cement type I or type II, conforming to ASTM C150.

2.3 **Sand** – Sand shall be damp, clean and graded ASTM C778.

2.4 **Water** – Water shall be potable.

2.5 **Reinforcing** shall be 3 inch x 3 inch (76 mm x 76 mm), 13 x 13 gage or 1-1/2 x 2 (38 mm x 51 mm) mesh, 16 x 13 gage steel wire, conforming to ASTM A82 and A185.

2.6 **Asphalt** shall conform to Federal Specification A-A-50694 or ASTM D1227.

2.7 **Plastic Roof Cement** shall conform to Federal Specification SS-C153.

2.8 **Waterproof Felt Membrane** – The waterproof felt membrane shall be at least 15 lb. (6.8 kg) asphalt saturated felt, conforming to ASTM D2626.

2.9 **Plastic Membrane** shall comply with ANSI A118.10.

2.10 **Other Membranes** – Where the Administrative Authority approves their use, non-metallic sub-pans or linings of lead sheets weighing not less than 4 lbs. per sq. foot (191.5 Pa) and copper pans of at least No. 24 B & S gage may be used.

2.11 **Waterproofing Admixture** – The mortar bed of the receptor shall be mixed with a waterproof admixture, approved by the Administrative Authority in the amounts allowed by such approval.

2.11.1 Currently Approved Mortar Additives

Anti-Hydro – 1 qt. (0.95 l) per sack of cement.

Plastiment – 1 lb. (0.5 kg) of powder per sack of cement.

Plastiment – 2 oz. (56.7 g) of fluid per sack of cement.

Sika 3A – 1 qt. (0.95 l) per sack of cement

Suconem (Red Label) – 1 pint (0.47 l) per sack of cement.

3.0 INSTALLATION

3.1 **Drains** – An approved type drain with sub-drain shall be installed with every such shower membrane. Flange of each sub-drain shall be accurately set exactly level with sloping sub-floor and shall be equipped with a clamping ring or other approved device to make a tight connection between the membrane and the sub-drain. The sub-drain shall have weep holes into the waste line. The drain shall be of such design that there will be not less than 2 inch (51 mm) depth from the top of the sub-drain flange to top of the strainer. A ring of absorbent material must be placed around the weep holes to keep them open when the finish materials are installed. [UPC 412.0]

3.2 **Sloping Sub-Floor and Membrane** – All lining materials shall be pitched not less than one quarter (1/4) inch per foot (20.8 mm/m) to weep holes in the sub-drain by means of a smooth and solidly formed sloping sub-base. All such lining materials shall extend upward on the side walls of the tub to a point not less than four (4) inches (102 mm) above the top of the finished dam or threshold and

shall extend outward over the top of the rough threshold and be turned over and fastened on the outside face of the rough threshold. All ledge tops within four (4) inches (102 mm) above the rough threshold shall be covered with the lining material. Non-metallic sub-pans or linings shall be built-up on the job site and shall consist of not less than three (3) layers of standard grade fifteen (15) pound (6.8 kg) asphalt impregnated roofing felt. The bottom layer shall be mopped to the formed sub-base with hot asphalt and each succeeding layer thoroughly hot-mopped to that below, on the basis of twenty (20) pounds (9.1 kg) of asphalt per layer per square. All corners shall be carefully fitted and shall be made strong and watertight by folding or lapping, and each corner shall be reinforced with suitable woven glass fiber webbing hot-mopped in place. All folds, laps, and reinforcing webbing shall extend at least four (4) inches (102 mm) in all directions from the corner and all glass fiber webbing shall be of approved type and mesh, producing a tear strength of not less than fifty (50) pounds per square inch (344.5 kPa) in either direction. Non-metallic shower sub-pans or linings may also consist of multi-layers of other approved equivalent materials suitably reinforced with glass fibers and having each layer carefully fitted and hot mopped in place on the job site as elsewhere required in this section, according to manufacturer's recommended installation procedures.

Linings shall not be nailed or perforated at any point which will be less than one (1) inch (25.4 mm) above the finished dam or threshold.

Where flexible plastic sheet membranes are used, corners shall be carefully constructed by folding or bonding of pre-fabricated reinforcing corner. Joints in flexible plastic sheeting shall be constructed with the appropriate solvent bonding liquid, bodied solvent cement, or thermal welding.

Where lead and copper pans are used as membranes, the installation shall be made in similar manner as required for felt membranes, except the asphalt moppings, and, in addition, the pans shall be insulated from all concrete and mortar surfaces and from all conducting substances, other than their connecting drain, by 15 lb. (6.8 kg) asphalt saturated felt or an approved equivalent, hot-mopped to the lead or copper pans. Joints in lead and copper pans shall not be soldered, but shall be burned or silver brazed, respectively.

3.3 Tests – Upon installation, all concrete tub shells shall be tested for water tightness by being filled to the top of the rough threshold with water for 24-hours to establish their water tightness.

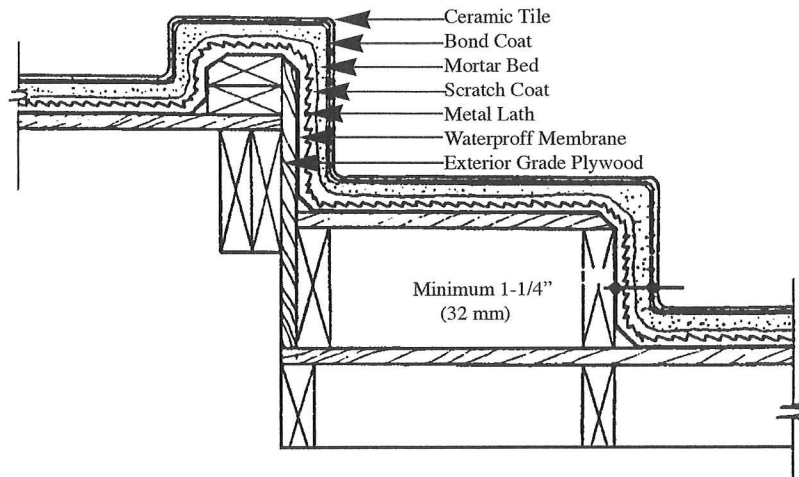
3.4 Roman Bath Tub – Floor shall be of ceramic tile set in portland cement mortar, mixed in the proportion of one (1) part portland cement to four (4) parts of mortar sand by volume and shall be provided with an approved shower drain designed to make a water-tight joint at the floor. The mortar mixture shall be of such consistency that a troweled surface readily assumes a smooth, slickened surface. All concrete mortar bases shall be mixed with an approved waterproofing admixture and properly reinforced with 3 inch x 3 inch (76 mm x 76 mm) mesh, 13 x 13 gage or 1-1/2 inch x 2 inch (38 mm x 51 mm) mesh, 16 x 13 gage cold drawn welded steel wire fabric located in the approximate center of the mortar bed and extending up the side walls but, in no case, less than 1 inch (25.4 mm) above the finished threshold. Corners shall be lapped and the reinforcing shall extend over the threshold and ledges.

The total thickness of the floor mortar shall not be less than 1-1/4 inch (32 mm) at any point. The tile floor shall have a minimum of 1/8 inch (3.2 mm/m) pitch and a maximum of 1/2 inch (12.7 mm/m) pitch toward the drain per foot. Bath tub walls to a minimum height to 3 inch (76 mm) and not less than 1 inch (25.4 mm) above the finished dam shall be lined with ceramic tile set in portland cement mortar, mixed with an approved waterproofing admixture.

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All wood framed bases shall be designed with a maximum deflection of 1/240 of the span, including live and dead loads.

- 3.4.1 Note: Two stages of construction are covered – the reinforced concrete shell and the wire reinforced tile lining over the waterproof membrane.



WOOD FORM

- 3.4.2 Approved waterproofing membrane, mortar bed and finish construction shall conform to the general requirements of the Uniform Plumbing Code. Exception: In short sections where there is no foot traffic, the finished floor may exceed 1/2 inch per foot (12.7 mm/m) slope.
- 3.4.3 Each concrete shell shall be filled to its overflow rim with water and shall remain watertight for not less than twenty-four (24) hours before inspection and before the finish surface is installed.
- 3.4.4 The finish surface shall be ceramic tile installed with portland cement mortar mixed to a proper consistency in the proportion of one (1) part cement and four (4) parts mortar sand by volume and having an approved waterproofing admixture* included. Ceramic tile joints shall be thoroughly grouted with approved water-proofing grout containing an admixture.
- 3.4.5 The concave interior surfaces shall be such as to permit ready cleansing and all corners shall be rounded or at angles not in excess of 45°. Grout is not acceptable for rounding corners. See details below on approved corners.
- 3.4.6 Concealed overflow or built-in waste stopper may be used if designed and approved for this application.
- 3.4.7 For reinforcement in center of pour, use #30 @ 8 inch (203 mm) O.C. both ways.
- 3.4.8 2000 P.S.I. (13,780 kPa) compressive strength concrete shall be poured monolithically and shall have an approved waterproofing admixture included*. Concrete to have not less than six (6) sacks of portland cement per batch.
- 3.4.9 Reinforcing wire, as specified under materials in this standard or equal, shall be wired together in a self-supporting manner. Nails shall not be used through the waterproofing membrane to fasten wire reinforcing.

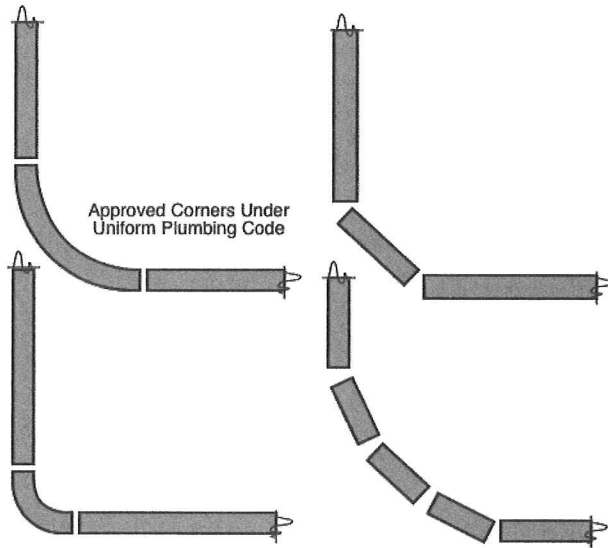
*Quantities of several approved waterproofing admixtures required per sack of cement:

- Anti-Hydro – 1 qt. (0.95 l) per sack of cement.
- Plastiment – 1 lb. (0.5 kg) of powder per sack of cement.
- Plastiment – 2 oz. (56.7 g) of fluid per sack of cement.
- Sika 3A – 1 qt. (0.95 l) per sack of cement.

Suconem (Red Label) – 1 pint (0.47 l) per sack of cement.

IS 2

ADOPTED: 1966
REVISED: 1977, 1982, 1990, 2003, 2006



**Installation Standard
For
TILE-LINED SHOWER RECEPTORS (and Replacements)**

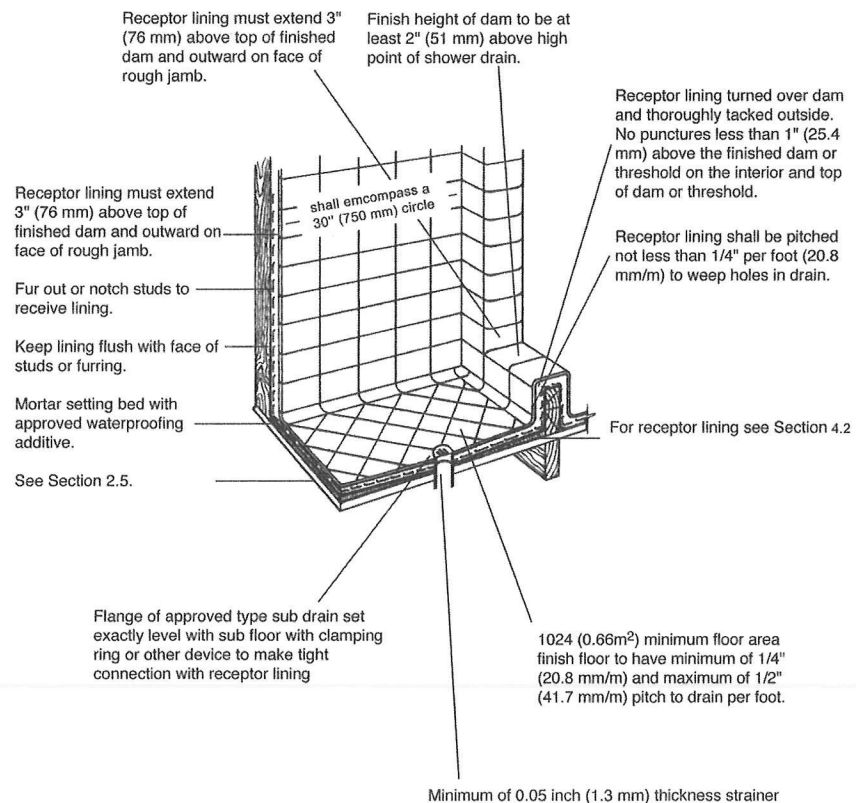
IAPMO IS 4-2006

FORWARD

This standard specification for the installation of tile-lined shower receptors is the result of extensive study and research by the following:

Ceramic Tile Institute of America
Associated Tile Contractors of Southern California, Inc.
Tile Layers Local No. 18 of I.U.B.A.C, United States and Canada
Tile Helpers Local No. 18 of I.U.B.A.C., of the United States and Canada

**APPROVED CONSTRUCTION OF TILE-LINED
SHOWER RECEPTORS
STANDARD SPECIFICATION FOR THE INSTALLATION OF
TILE-LINED SHOWER RECEPTORS**



1.0 SCOPE

- 1.1** Installation and material of tile-lined shower receptors shall comply with this standard and the current edition of the Uniform Plumbing Code [UPC]TM, published by the International Association of Plumbing and Mechanical Officials (IAPMO).

Note: The following sections of the Uniform Plumbing Code shall apply.

- 411.1 Floor drains
- 411.5 Shower receptors
- 411.6 Shower receptor approval
- 411.7 Shower compartments
- 411.8 On-site built-up shower
- 411.9 Floors of public shower rooms

2.0 GENERAL REQUIREMENTS

- 2.1 Inspection of Work.** All surfaces prepared by others shall be inspected by the tile installer before starting tile work and all unsatisfactory conditions reported to the Administrative Authority. Starting tile work by the tile installer shall be considered as acceptance of surfaces prepared by others.
- 2.2 Surface.** All surfaces to receive tile work shall be clean, structurally sound, and conform in every way to the local building code.
- (**Note:** No tile work shall proceed until the pan and drain construction has been inspected and approved by the Administrative Authority, where required.)

3.0 PRODUCT REQUIREMENTS**3.1 Materials**

- 3.1.1 Tile Quality and Grade** – Tile shall comply with American National Standard Specification for Ceramic Tile, A137.1 (equivalent to and incorporating U.S. Dept. of Commerce Simplified Practice Recommendation, R61-61 and Federal Specification SS-T-308b, Tile, Floor, Wall, and Trim Units, Ceramic), or CTI 69.5.
- 3.1.2 Cement.** Cement shall be portland cement type I or type II, conforming to ASTM C150.
- 3.1.3 Sand.** Sand shall be damp, clean and graded ASTM C 778.
- 3.1.4 Water.** Water shall be potable.
- 3.1.5 Reinforcing** shall be 2.5 lbs. per sq. yard (1.1 kg per m²) or greater galvanized metal lath conforming to ANSI A42.3 or 2 inches x 2 inches (51 mm x 51 mm), 16/16 gage or 3 inches x 3 inches (76 mm x 76 mm) mesh, 13 x 13 gage or 1-1/2 inches x 2 inches (38 mm x 51 mm) mesh, 16 x 13 gage steel, wire conforming to ASTM A82 and A 185.
- 3.1.6 Asphalt** shall conform to Federal Specification A-A-50694 OR ASTM D1227.
- 3.1.7 Plastic Roof Cement** shall conform to Federal Specifications SS-C-153.
- 3.1.8 Water Resistant Felt Membrane.** The water resistant felt membrane shall be at least 15 lb. (6.8 kg) asphalt saturated felt conforming to ASTM D2626.
- 3.1.9 Plastic Membrane** shall comply with ANSI A118.10.
- 3.1.10 Other Membranes** – Where the Administrative Authority approves their use, non-metallic sub-pans or linings or lead sheets weighing not less than 4 lbs. per sq. foot (191.5 Pa) and copper pans of at least No. 24 B & S gage (Brown & Sharp 0.0201 inches) or greater in thickness may be used.
- 3.1.11 Waterproofing Admixture** – The mortar bed of the receptor shall be mixed with a waterproof admixture approved by the Administrative Authority in the amounts allowed by such approval.
- 3.2 CURRENTLY APPROVED MORTAR ADDITIVES**
Anti-Hydro—1 qt. (0.95 l) per sack of cement

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Plastiment—1 lb. (0.5 kg) of powder per sack of cement
 Plastiment—2 oz. (56.7 g) of fluid per sack of cement
 Sika 3A—1 qt. (0.95 l) per sack of cement
 Suconem (Red Label)—1 pint (0.47 l) per sack of cement

4.0 INSTALLATION REQUIREMENTS

- 4.1 Shower Drains** – An approved type shower floor drain with sub-drain shall be installed with every such shower membrane. Flange of each sub-drain shall be accurately set exactly level with sloping sub-floor and shall be equipped with a clamping ring or other approved device to make a tight connection between the membrane and the sub-drain. The sub-drain shall have weep holes into the waste line. The weep holes located in the subdrain clamping ring shall be protected from becoming clogged during the placement of finish materials. The drain shall be of such design that there will be not less than 2" (51 mm) depth from the top of the sub-drain flange to top of the strainer. Unless otherwise approved by the Administrative Authority, drains shall be located in the approximate center of the shower area. [UPC 411.6]
- 4.2 Sloping Sub-Floor and Shower Membrane** All lining materials shall be pitched one quarter (1/4) inch per foot (20.8 mm/m) to weep holes in the sub-drain by means of a smooth and solidly formed sloping sub-base. All such lining materials shall extend upward on the side walls and rough jambs of the shower opening to a point not less than three (3) inches (76 mm) above the top of the finished dam or threshold and shall extend outward over the top of the rough threshold and be turned over and fastened on the outside face of both the rough threshold and the jambs.
- 4.2.1** Non-metallic shower sub-pans or linings may be built-up on the job site of not less than three (3) layers of standard grade fifteen (15) pound (6.8 kg) asphalt impregnated roofing felt. The bottom layer shall be fitted to the formed sub-base and each succeeding layer thoroughly hot-mopped to that below, with hot asphalt conforming to Fed. Spec. SS-A0666 Type Z, Grade 2, Class A on the basis of twenty (20) pounds (9.1 kg) of asphalt per layer per square. All corners shall be carefully fitted and shall be made strong and water-tight by folding or lapping, and each corner shall be reinforced with suitable webbing hot-mopped in place. All folds, laps, and reinforcing webbing shall extend at least four (4) inches (102 mm) in all directions from the corner and all webbing shall be of approved type and mesh, producing a tensile strength of not less than fifty (50) pounds per square inch (344.5 kPa per square meter) in either direction.
- 4.2.2** Non-metallic shower sub-pans or linings may also consist of single or multi-layers of other approved equivalent materials, suitably reinforced and carefully fitted in place on the job site, as elsewhere required in this section according to manufacturer's recommended installation procedures.
 Where flexible plastic sheet membranes are used, corners shall be carefully constructed by folding or bonding of prefabricated reinforcing corner. Joints in flexible plastic sheeting shall be constructed with the appropriate solvent bonding liquid, bodied solvent cement, or thermal welding.
- 4.2.3** Where lead and copper pans are used as membranes, the installation shall be made in similar manner as required for felt membranes except the asphalt moppings, and in addition the pans shall be insulated from all concrete and mortar surfaces and from all conducting substances other than their connecting drain by 15 lb. (6.8 kg) asphalt saturated felt or an approved equivalent hot mopped to the lead or copper pan. Joints in lead and copper pans shall not be soldered, but shall be burned or silver brazed respectively.
- 4.2.4** All linings shall be properly recessed and fastened to approved

- backing so as not to occupy the space required for the wall covering and shall not be nailed or perforated at any point which will be less than one (1) inch (25.4 mm) above the finished dam or threshold.
- 4.3 Tests.** Upon installation, all linings shall be tested for water tightness by being filled to the top of the rough threshold with water for a period of time sufficient to establish their water tightness. (Usually twenty-four (24) hours with no loss of water. See the local Administrative Authority for exact time limit.)
A test plug shall be so placed that both the upper and under sides of the lining shall be subjected to test at its point of contact with the sub-drain. When the test plug is removed, all of the test water shall drain out by gravity through the weep holes. A ring of non-absorbent material must be placed around the weep holes to keep them open when the finish materials are installed.
- 4.4 Receptor.** Shower floor shall be of ceramic tile set in portland cement mortar mixed in the proportion of one (1) part portland cement to four (4) parts of mortar sand by volume and shall be provided with an approved shower drain designed to make a water-tight joint at the floor. The mortar mixture shall be of such consistency that a troweled surface readily assumes a smooth screeded surface. All concrete mortar bases shall be mixed with an approved waterproofing admixture and properly reinforced with 2.5 lbs. per square yard (1.1 kg per square m) or more galvanized metal lath or 2 inches x 2 inches (51 mm x 51 mm), 16/16 gage or 3 inches x 3 inches (76 mm x 76 mm) mesh, 13 x 13 gage or 1-1/2 inches x 2 inches (38 mm x 51 mm) mesh, 16 x 13 gage cold drawn welded steel wire fabric located in the approximate center of the mortar bed and extending at least 3 inches (76 mm) at any point. The finished floor shall be not less than 2 inches (51 mm) measured from the top surface of the membrane. The high point of the tile floor shall be not less than 2 inches (51 mm) or more than 9 inches (229 mm) below the top of the finished dam and shall have a minimum of 1/4 inch (6.4 mm/m) and a maximum of 1/2 inch (19.1 mm/m) pitch per foot toward the drain. Shower walls to a minimum height of 3 inch (76 mm) and not less than 1 inch (25.4 mm) above the finished dam shall be lined with ceramic tile set in portland cement mortar.
- 4.5** Floors of public shower rooms shall have a non-skid surface and shall be drained in such a manner that waste water from one bather will not pass over areas occupied by other bathers. Gutters in public or gang shower rooms shall have rounded corners for easy cleaning and shall be sloped not less than two (2) percent toward drains. Drains in such gutters shall be spaced not more than eight (8) feet (2,438 mm) from side walls or more than sixteen (16) feet (4,877 mm) apart
- 4.6** Shower walls, including shower walls over bathtubs, shall be constructed of dense, non-absorbent waterproof materials, such as ceramic tile set in portland cement mortar or approved cementitious backer unit when no materials are adversely affected by moisture to a height of not less than six (6) feet (1,829 mm) above the floor.

ADOPTED: 1966

REVISED: 1977, 1982, 1990, 1992, 1996, 2003, 2006

IS 4

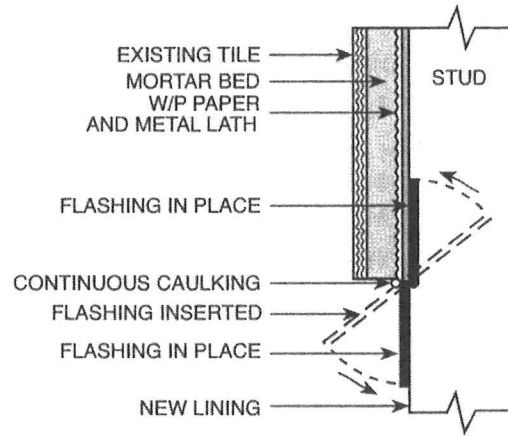


Figure 2

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Scale: None
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Flanges are required on all tubs used for shower receptors

After years of repetitive forensic investigation, by Ceramic Tile Institute of America Technical Committee's experts, there is little doubt that any tub used for a shower receptor must incorporate an integral 1-inch high continuous flange in order to properly shingle/weather lap the wall or seat membranes to the tub fixture.

These experts, involved with construction defect litigation, have documented overwhelming evidence of moisture damage and microbial issues resulting from the lack of properly lapped membranes due to the use of non-flanged tubs, including cast iron and self-rimming tubs, as shower receptors.

Due to installation errors documented during field investigations, the use of flange kits provided by the Manufacturer, for adding a flange to tubs manufactured without an integral flange, is not recommended except when installed, tested and warranted by the original tub Manufacturer and meets the requirements listed in this Position Paper.

Therefore, the CTIOA Technical Committee recommends any tub used in combination with a shower head must incorporate an integral, 1-inch high, continuous flange to allow the proper over-lapping of the wall and seat/bench membranes.

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No. TB003 Revision 0
March 20, 2007
Scale: None
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Siliconized Latex Caulk

The term caulk is used to describe “the process of filling or stopping a joint to prevent leaking.” The proper terminology for the material used to fill a joint is *sealant*.

In the past several years, it has become common practice in the tile industry to caulk movement joints using siliconized latex sealant. The product is likely selected due to its ease of application (water washable) and the variety of colors available. The draw back to these latex sealants is, they do not perform adequately in many scenarios and do not meet minimum industry criteria for performance of sealants in tile work. As a result, these products are not listed in standardized industry guidelines as acceptable for tile work.

Sealants used in tile work should comply with ASTM C920, which are typically of the non water-soluble variety, such as 100% silicones, polysulfides, or urethanes.

The CTIOA Technical Committee recommends that all tile transition joints be filled with a sealant that complies with ASTM C920