Current Trends in Design: Curbless Shower Systems

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FinPan, Inc.
3255 Symmes Road
Hamilton, OH 45015
Tel: 513-870-9200
Fax: 513-870-9606
Toll-Free: 800-833-6444
Email: sales@finpan.net
Web: www.finpan.com

START

Current Trends in Design: Curbless Shower Systems

Presented by: FinPan, Inc.
3255 Symmes Road
Hamilton, OH 45015

Description: Bathrooms can be dangerous places for people with and without physical limitations. The prevalence of bathroom falls amongst persons of all age groups and levels of ability has driven the trend of accessible shower design. Presented here is an overview of how curbless shower pans are designed for durability and safety, and meet the needs of accessible design. Included are discussions on traditional and modern shower pan design and installation methods and their associated drawbacks and benefits. Industry resources and standards are outlined.

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Purpose and Learning Objectives

Purpose:

Bathrooms can be dangerous places for people with and without physical limitations. The prevalence of bathroom falls amongst persons of all age groups and levels of ability has driven the trend of accessible shower design. Presented here is an overview of how curbless shower pans are designed for durability and safety, and meet the needs of accessible design. Included are discussions on traditional and modern shower pan design and installation methods and their associated drawbacks and benefits. Industry resources and standards are outlined.

Learning Objectives:

At the end of this program, participants will be able to:

- identify the need for accessible shower design to accommodate all users and ability levels
- describe traditional methods of construction for curbless shower pans and the challenges presented to contractors
- describe innovative curbless shower pan products and how they are installed to guarantee a flush surface and watertight installation, and
- summarize the industry standards that should be met and the resources available to ensure dependable installation and performance.

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Introduction

Design Objective

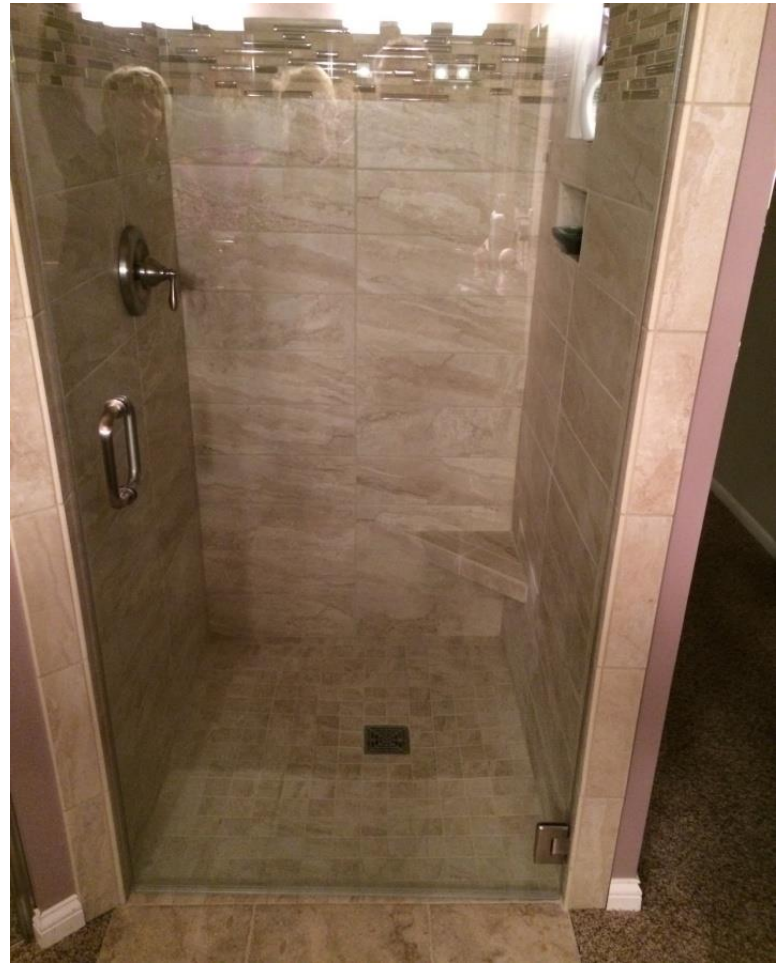
Designing bathrooms is a complex task where electrical and plumbing fixtures, furnishings, light, space and safety needs, and aesthetics all combine and compete in a very small space.

The overriding goal for a bathroom space is to meet the needs of the user while designing for durability and safety. New products and installation methods are available that are designed to make it easier to achieve this goal.

Need for Accessible Design

Aesthetics do not have to be sacrificed for function; bathrooms can be stylish and on-trend, and be designed to meet the functional needs of all users.

This course identifies the need for accessible design in shower pan construction. It also outlines traditional methods of installing curbless shower pans and provides insight into new products that solve the issues that have presented themselves in the past.



Need for Accessible Design

Most discussions surrounding bathroom-related falls and subsequent injuries are centered on older adults. However, bathroom falls are prevalent amongst all age groups. A 2011 article published by the Centers for Disease Control and Prevention reported that in 2008:

- falls were the source of most injuries in bathrooms
- on average, 234,094 people 15 years of age and older visited emergency rooms due to injuries suffered in bathrooms, and
- more than a third of the injuries happened while bathing or showering.

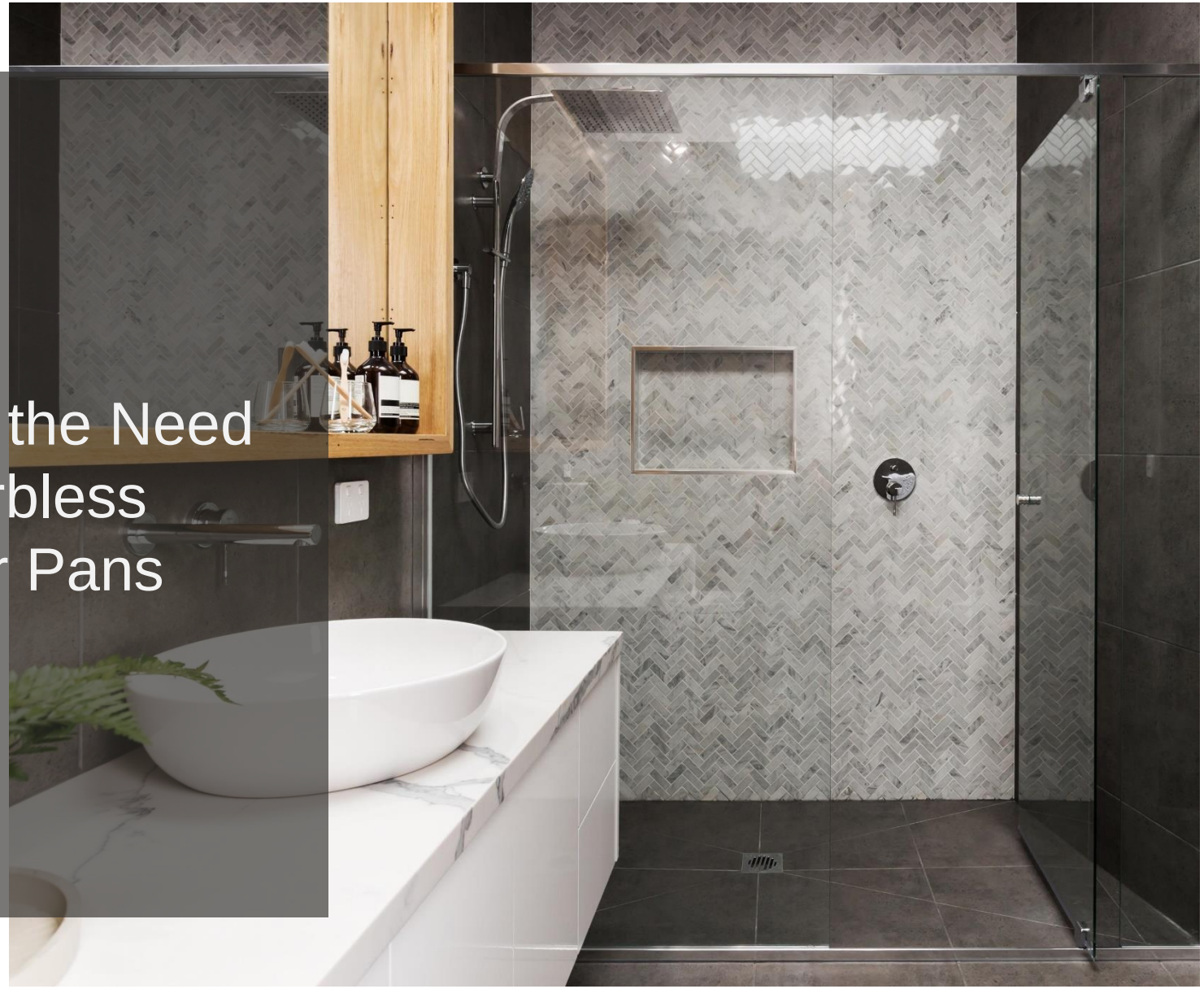
With the growing baby boomer population, builders, developers, and architects are driven to find design-based solutions to this issue. Recently, innovative options in shower designs have entered the market that offer increased safety for both young and old, and harmonize with today's most sought-after designs.

New Industry Trend: Barrier-Free (Curbless) Shower Pans

Barrier-free (curbless) shower pans are growing in popularity in the United States. In fact, a curbless shower is one of the leading bathroom design trends in the industry. From a design perspective, there is a movement towards open concept bathrooms for the modern or minimalist look, and a curbless shower lends itself perfectly to this aesthetic.

The entrance in a barrier-free shower is flat and flush with the bathroom floor, leaving a smooth transition into and out of the shower. The combination of style and accessibility enhances the value of the bathroom.

Identifying the Need for Curbless Shower Pans



The Need for Accessible Design in Bathrooms

"It defies logic to build new homes that block people out when it's so easy and cheap to build new homes that let people in."

- Rep. Jan Schakowsky (D-IL)

There are three main areas of concern:

1. Loss of independence
2. All age groups are affected
3. Costs to society

Loss of Independence

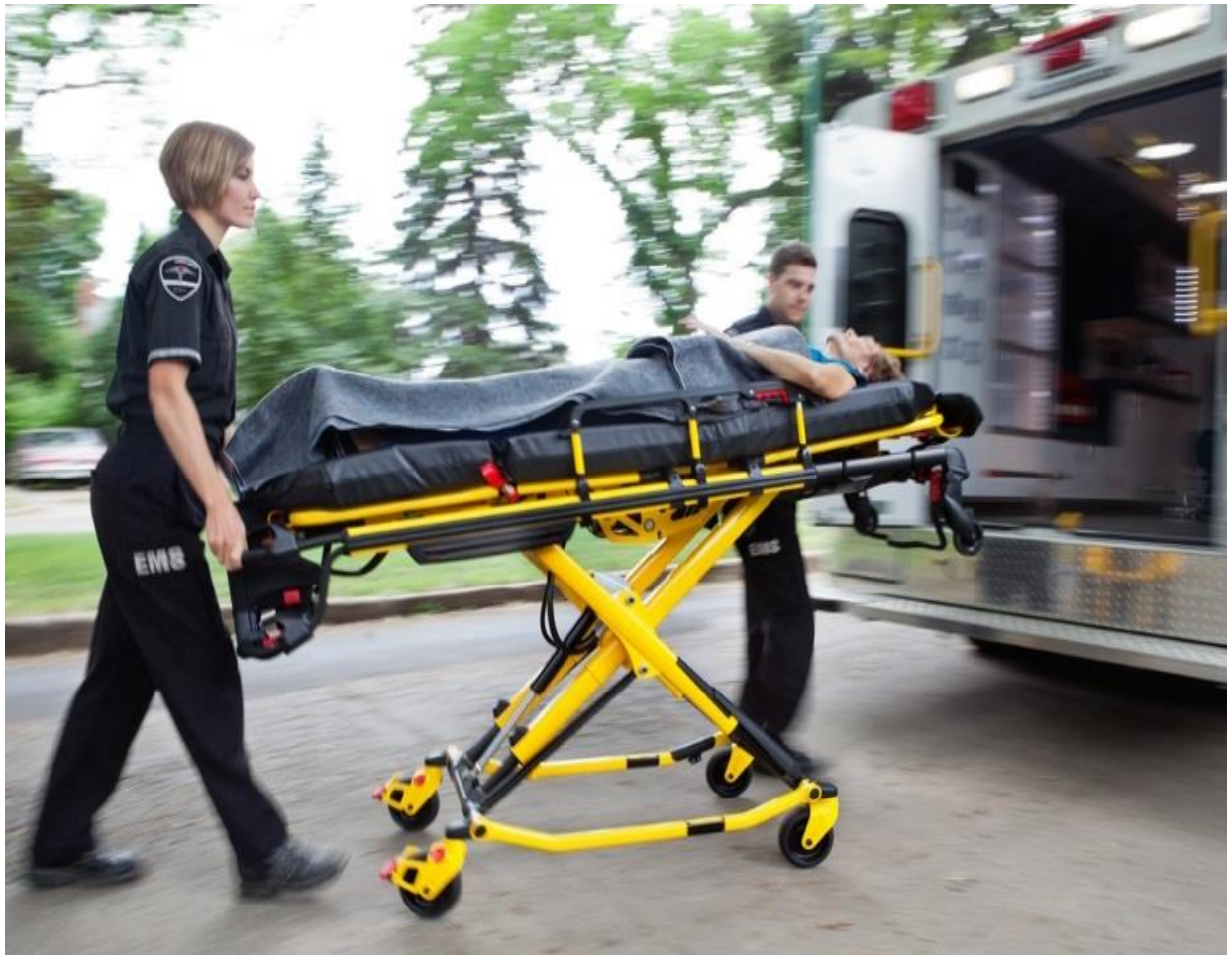
According to the Administration on Aging (AOA) and the Pew Research Center:

- the oldest baby boomers reached age 65 in 2011, and
- every day from 2011 to 2030, 10,000 baby boomers will reach age 65.

A research study, “Aging in Place in America,” commissioned by Clarity®, examined the attitudes and anxieties of the nation’s elderly population and found that:

- the vast majority of seniors (89%) feel the ability to age in place is very important; however, more than half of those surveyed (53%) are concerned with their ability to do so, and
- 75% of their children, who are in the boomer generation, said they are worried about the well-being of their parents, with the potential for falls/injuries being a major concern.

All Age Groups Are Affected



According to the Centers for Disease Control and Prevention (CDC):

- one in five Americans—about 53 million people—has a disability of some kind, and
- 33 million Americans have a disability that makes it difficult for them to carry out daily activities.

Costs to Society

Our current healthcare system can't handle the cost of healthcare, coverage issues, and demographic pressures of the aging population. We need building designs that address one's ability to age-in-place and provide self-care within the home.

According to the CDC, more than $50 billion is spent annually on healthcare related to falls among older adults: $9 billion on Medicaid, $12 billion private/out of pocket, and $29 billion on Medicare.

The Genworth Cost of Care Survey states that the annual average cost of an assisted living facility in the U.S. in 2017 was $45,000.

Shower Solutions in Design

The Americans with Disabilities Act requires access for people with disabilities for all new multi-family dwellings and a small percentage (5%) of single-family homes constructed using public funds.

Traditional showers fall short in meeting accessibility requirements for a number of reasons, including:

- Built-in barriers are part of the design
- Design is inflexible
- Design is focused on a single-use space

Shower Solutions in Design

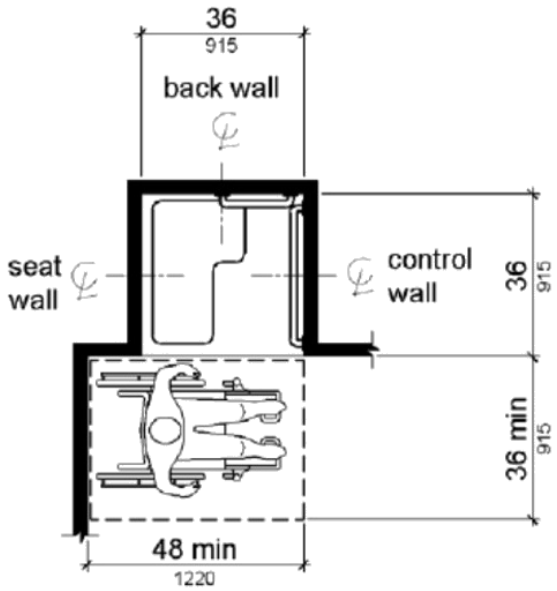


Figure 608.2.1
Transfer Type Shower Compartment Size and Clearance

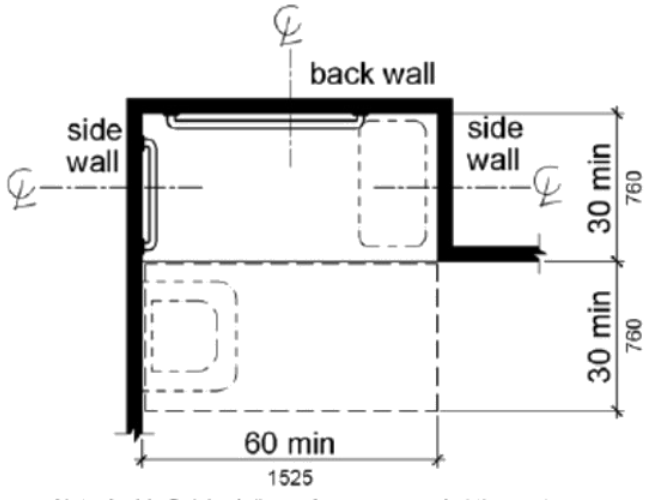


Figure 608.2.2
Standard Roll-In Type Shower Compartment Size and Clearance

ADA Shower Stall Parameters

608.2.1 Transfer Type Shower Compartments. Transfer type shower compartments shall be 36 inches (915 mm) by 36 inches (915 mm) clear inside dimensions measured at the center points of opposing sides and shall have a 36 inch (915 mm) wide minimum entry on the face of the shower compartment.

608.2.2 Standard Roll-In Type Shower Compartments. Standard roll-in type shower compartments shall be 30 inches (760 mm) wide minimum by 60 inches (1525 mm) deep minimum clear inside dimensions measured at center points of opposing sides and shall have a 60 inch (1525 mm) wide minimum entry on the face of the shower compartment.

Shower Solutions in Design

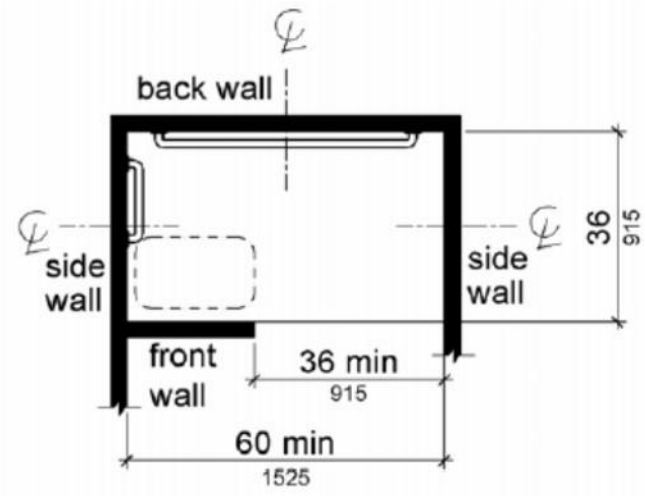


Figure 608.2.3 Alternate Roll-In Type Shower Compartment Size and Clearance

ADA-compliant Threshold

ADA Shower Stall Parameters

608.2.3 Alternate Roll-In Type Shower Compartments. Alternate roll-in type shower compartments shall be 36 inches (915 mm) wide and 60 inches (1525 mm) deep minimum clear inside dimensions measured at center points of opposing sides. A 36 inch (915 mm) wide minimum entry shall be provided at one end of the long side of the compartment.

608.7 Thresholds. Thresholds in roll-in type shower compartments shall be 1/2 inch (13 mm) high maximum in accordance with 303. In transfer type shower compartments, thresholds 1/2 inch (13 mm) high maximum shall be beveled, rounded, or vertical.

Traditional Methods for Building Curbless Shower Pans

Traditional Methods

Barrier-free shower pans have presented several issues and complications in the construction trades in terms of actual installation. In the past, there were two basic methods used to create a curbless pan.

Method 1: More common method is to drop the floor by cutting down floor joists and adding additional framing.

Method 2: Less common method is to build the shower pan directly on top of the subfloor and ramp up or build up the surrounding floor to the height of the shower.

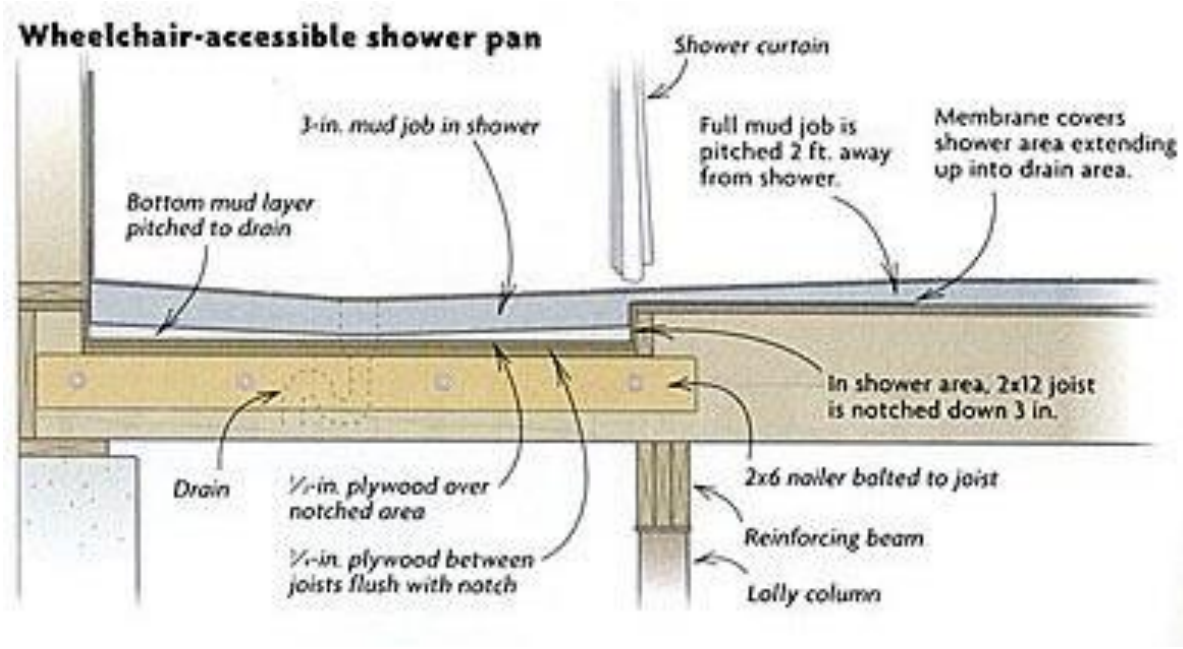
Both methods 1 and 2 traditionally have required a thick mortar bed (mud bed) to build up the shower pan and achieve the proper slope to drain of ¼″ per 1′. This is the standard slope required by the National Tile Contractors Association (NTCA).

Method 1: Modifying Floor Joists

The first step of this method involves the removal of the existing subfloor at the shower location.

Following this, the floor joists must be modified—which sometimes involves removing as much as 3″ from the joist depth in order to accommodate the sloped shower pan.

Extra framing must be installed to ensure the structural integrity of the floor system.



Method 1: Modifying Floor Joists

Any changes to the existing structural design of a space should involve input from a licensed architect or engineer. Load analysis of the cut-down joists must also take into account the new dead loads imposed by the shower bed.

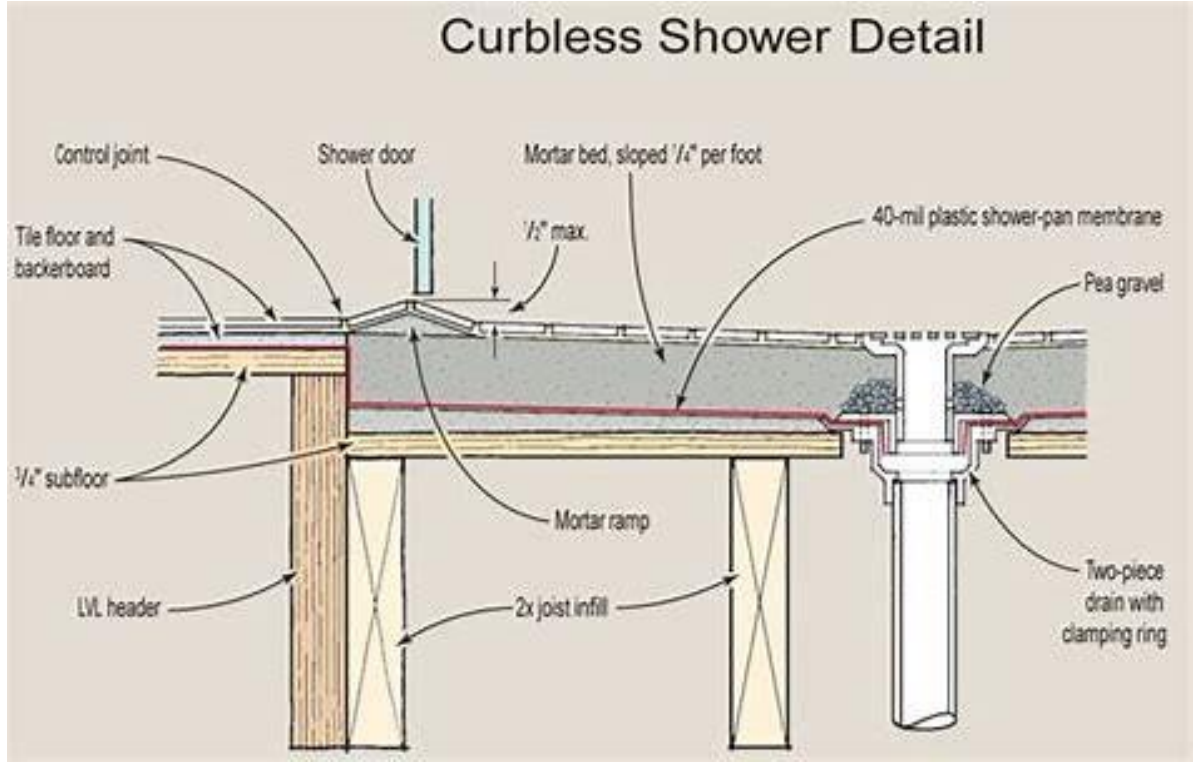
Once the additional framing needs are determined and installed, a plywood subfloor is installed.

Method 1: Modifying Floor Joists

Next, a pre-slope is installed on top of the shower subfloor sloping to the weep holes in the drain. Per industry standards, a ¼″ per 1′ slope is required before installing a mortar bed. This pre-slope can be made with mortar or by using pre-sloped foam pieces commonly available in the marketplace.

The waterproofing membrane is placed over the pre-slope and clamped to the drain.

The mortar bed is then floated over the waterproofing membrane to provide slope to the drain. The mortar bed is terminated even with the surrounding subfloor and backerboard.



Tile is laid on top of the mortar bed flush with the finished floor level. A common practice is to build a slight ramp at the entrance to help keep water in the shower area, but this is not required by code.

Method 2: Build Shower Pan on Top of Existing Floor

The second and less preferred method is to build the shower pan complete with pre-slope, waterproofing membrane, mortar bed, and tile directly on top of the existing subfloor, and ramp up or build up the surrounding bathroom floor to the height of the shower.

This method is less popular because ramps can be unsightly and obtrusive in smaller bathrooms. Also, building up the floor adjacent to the shower creates an undesirable floor level change that must be addressed at entry doors into the bathroom or bedroom.

Potential Issues: Structural Changes

Building the traditional thick mortar bed for methods 1 and 2 is time and labor intensive, and creates a potential liability issue for tile contractors.

In the first method, the joists are cut and their structural capacity changed. In both methods, a heavy mortar bed is added to the dead load. The existing wood floors need to be able to withstand the weight of the modifications.

Most tile contractors' general liability insurance does not cover structural changes to a flooring system.

Potential Issues: Structural Changes

It’s important for homeowners to be aware of this when remodeling an existing bathroom where the flooring system will be modified. Their overall interests and safety may be dependent on ensuring the structural integrity of the flooring system.

A structural engineer or architect should be contacted to ensure that the floor system can handle the new weight, especially on second-story installations.

Potential Issues: Engineered Floor Systems

Another issue that may be encountered is that today's engineered floor systems are not designed to be modified in the field. Engineered wood structural framing systems are now used in approximately 50% of new home construction in the U.S.

There are four categories of engineered wood products:

1. Wood structural panels
2. I-joists
3. Structural composite lumber
4. Glue laminated timber

The traditional method of recessing floor joists and building a curbless shower pan that meets the existing floor height cannot be done with engineered wood framing.

Sidebar: Engineered Floor Systems

Since their introduction into the building trade, there have been several technical considerations and limitations for installing tile over these systems.

The Tile Council of North America (TCNA) Reference Manual 2014–2015 states:

“It’s important for the tile contractor to understand that the building-code prescribed live-load deflection limit of L/360 is not the same L/360 that is required by the Tile Council of North America (TCNA) as a minimum performance standard under tile floors. The TCNA deflection standard requires the tile floor system resist a dynamic (moving), 300-pound concentrated load.”

“The TCNA deflection standard is a more demanding test on the floor panels than the code prescribed uniform loads, and more importantly, it does not reflect the performance of the entire joist system.”

Sidebar: Engineered Floor Systems

The Manual also has guidelines for tile installation using I-joist construction:

“The maximum deflection of an I-joist under the ceramic tile floor finishes should be no greater than L/480 under live loads, and not the code required minimum of L/360. The Marble Institute of America recommends maximum deflection of L/720 under live loads for natural stone tile installations.”

“I-joist design and selection must be based on realistic uniform dead loads (weight of materials) for a tile installation (especially if a thick mortar bed installation is proposed) as well as anticipated concentrated loads whenever possible.”

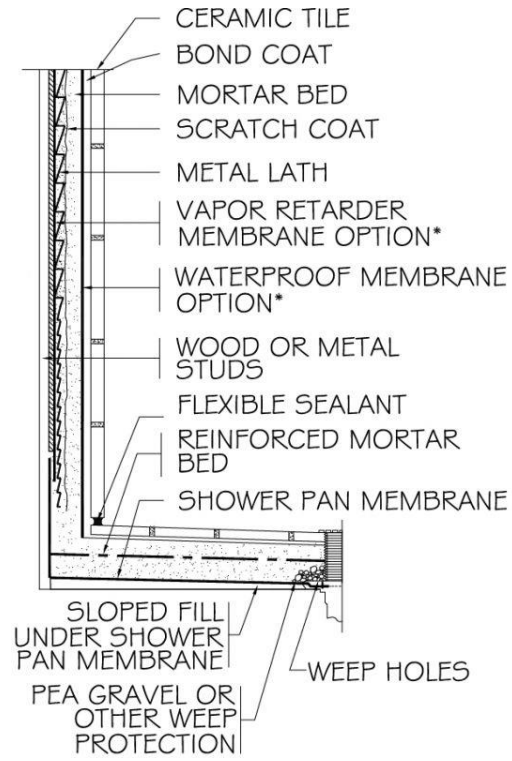
When adding a curbless shower to homes built with engineered wood floor joists, both load and deflection due to the shower have to be considered.

Potential Issues: Common Errors

Both traditional methods of installation use a mud or mortar bed as the base for the tile and these installations experience common construction errors.

In a traditional mortar bed shower, the mortar is saturated with water during use. Tile and grout are not waterproof and allow the passage of water through them. With regular use, the mortar bed may not dry out. Over time, this can increase the risk of leaks, efflorescence, and mold growth.

An insufficient slope—not using the code prescribed pre-slope—promotes mortar bed saturation. A pre-slope encourages the flow of water to the weep holes; this constant movement of water helps prevent mortar bed saturation. If the shower pan liner sits flat on the floor, water can and will puddle. This can lead to a multitude of problems over time for the unsuspecting homeowner.



New Methods in Curbless Shower Pan Design

Product Innovations

The market has seen an influx of new technologies that address the problems associated with the traditional methods of constructing a curbless shower pan. These are innovative in their features and each has its own individualized means of installation.

These modern products are easy to install and substantially reduce the labor costs and floor joist modifications associated with traditional construction methods.

Product Innovations

Architects should be cognizant to the differences between manufacturers' products.

Before specifying shower bases on a project, ensure that they have been third-party tested and meet established industry standards.

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Prefabricated Shower Pans

In response to recent trends for curbless showers, prefabricated shower pans are one option available from manufacturers.

There are two types of prefabricated shower pans, structural and nonstructural.

Structural

Nonstructural

Structural Prefabricated Shower Pans: Installation

Structural prefabricated shower pans can be installed directly to the floor joists after removing the existing wood subfloor. These pans are typically ⅞″ thick and pre-pitched, and come in several sizes with pre-existing drain locations. Additional blocking is required on all edges and around the drain area during installation. Trays can be cut to fit in the field; however, drain locations are preset.

Multiple layers of liquid waterproofing must be applied to the pan bases in order to make them watertight.

Benefits over traditional methods:

1. No cutting into the floor system is required, which saves hours on modifying joists and blocking in added support.
2. The pan is lightweight and strong, reducing the weight on floor systems over traditional mortar bed installations.

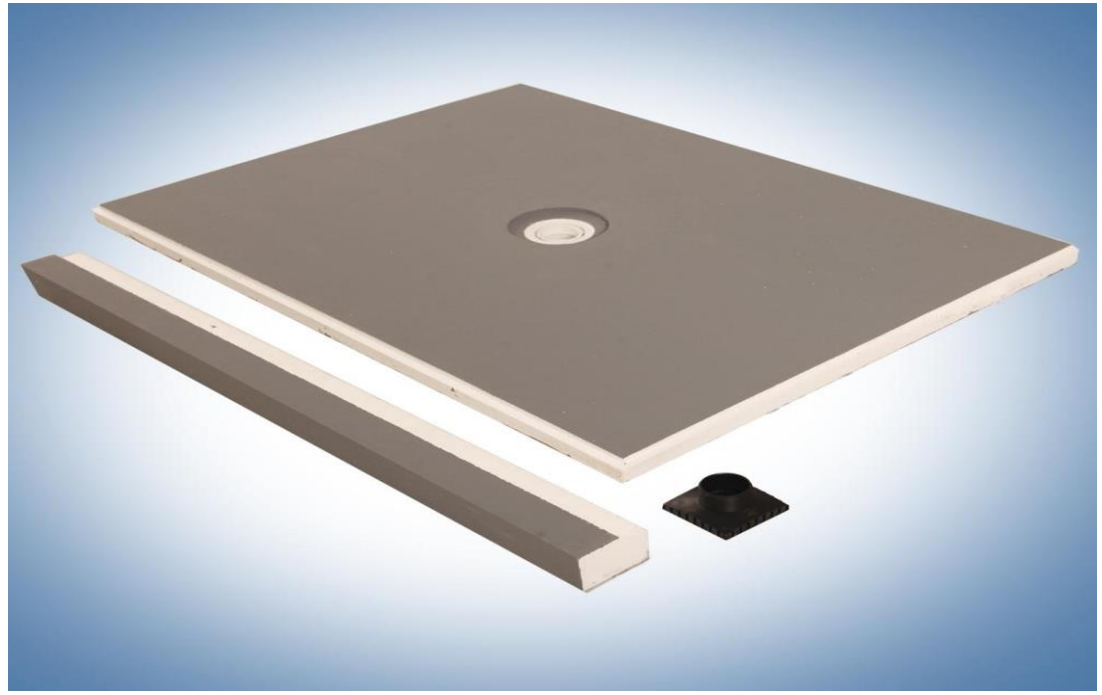
Structural Prefabricated Shower Pans: Installation

1. Using a circular saw or reciprocating saw, remove a section of the ¾″ plywood subfloor.
2. Install 2x4 blocking to support the entire perimeter of the structural pan and drain area.
3. Dry fit the pan and ensure that it's level and fully supported.
4. Fasten the pan to the blocking using fasteners and adhesive supplied by the manufacturer.
5. Next, install the drain per the manufacturer's specifications.
6. Install backerboard on the walls and subfloor around the shower pan.
7. Next, it is important to scuff up the smooth pan surface with sandpaper to prepare it for waterproofing.
8. Embed joint tape on all joints and coat the entire pan floor area with liquid waterproofing. NOTE: Most manufacturers supply the waterproofing materials with their pan systems.
9. Apply a second coat of waterproofing over the entire pan area.
10. After the second coat cures, tile the pan according to NTCA specifications.

Nonstructural Prefabricated Shower Pans: Installation

Nonstructural prefabricated shower pans are also an option.

Prefabricated shower pans are manufactured without an integrated curb. These are pre-sloped units and the overall thickness of the pan must be accounted for during the installation. The floor joists must be modified in order to achieve a level entry with the existing floor to account for the thickness of the shower pan base. When installing these units, the supplied curb is not used to achieve a level entry.



Benefits over traditional methods:

1. The pan is waterproof and ready to tile, which eliminates the traditional method of installing a pan liner and floating a mortar bed with a slope of ¼″ per 1′ drop to drain.
2. The prefabricated shower pan saves 2–3 days of time and labor over traditional mortar bed methods.

Nonstructural Prefabricated Shower Pans: Installation

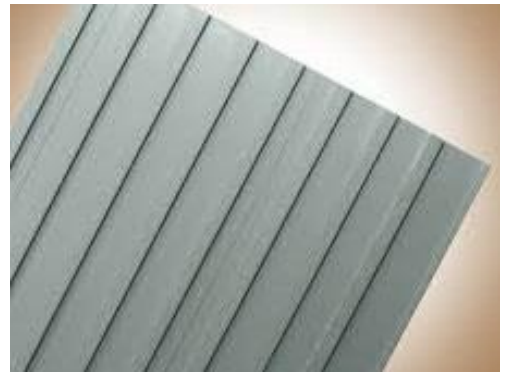
1. Using a circular saw or reciprocating saw, remove a section of the ¾″ plywood subfloor.
2. Install 2x4 blocking ¾″ below the top of the floor joists, between joists, and along the bottom perimeter of the framing in order to support ¾″ plywood strips.
3. Install ¾″ plywood over the 2x4 blocking to finish flush with the top of the floor joists.
4. Make certain that the entire perimeter is supported by the floor joists and/or adequate blocking.
5. Cut the opening for the drain and follow the manufacturer's specifications for installation of the drain unit.
6. Apply a thinset to the floor area and underneath of the shower unit.
7. Set the pan in place and ensure that it is level and flush with the surrounding subfloor.
8. Treat the shower pan joints with the specified sealant and allow the thinset and sealant to cure.
9. Next, install backerboard on the walls and subfloor around the shower pan.

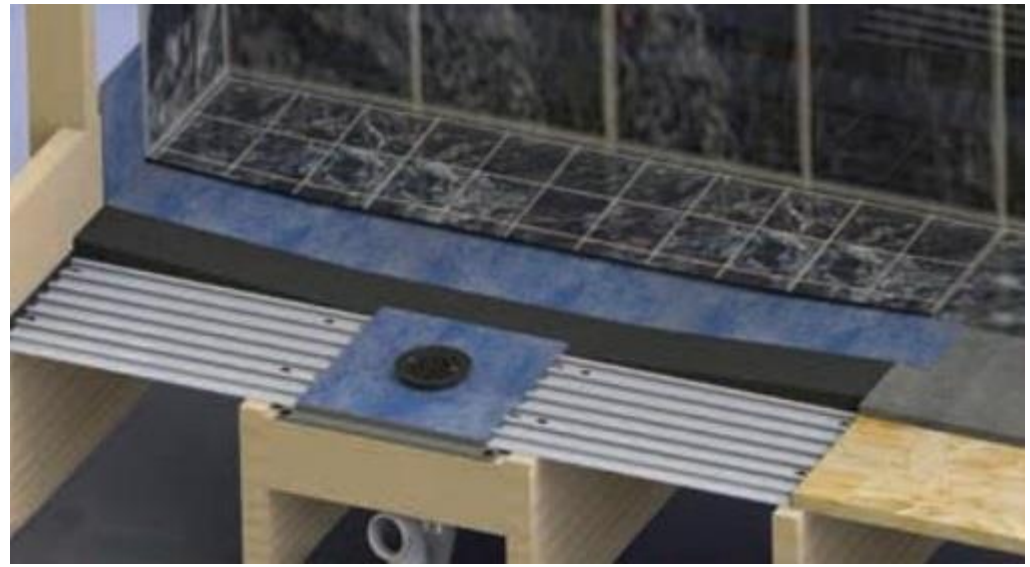
NOTE: See the shower pan manufacturer's installation guide for specific installation instructions. This is only an overview of a typical installation process.

Structural Underlayments

The final innovation in curbless shower pan construction is to use a structural underlayment in place of the plywood subfloor. Recent advances in pultrusion technology have led to the first structural underlayments that can replace traditional backerboards and structural plywood subfloors in floor tile installations. Structural underlayment boards are installed directly on top of the 16″ o.c. floor joists.

Pultrusion is a continuous molding process whereby reinforcing fibers are saturated with a liquid polymer resin and then carefully formed and pulled through a heated die to form a part. Pultrusion results in straight, constant cross-section parts.





Structural Underlayments

These boards, referred to as structural ribbed self-supporting boards (SRSB), are unique fiberglass composite and dovetailed-rib designed boards. When combined with floor joists 16″ o.c., and mortar mix between the dovetailed ribs, the system forms a structurally sound base for tile applications, both indoor and out.

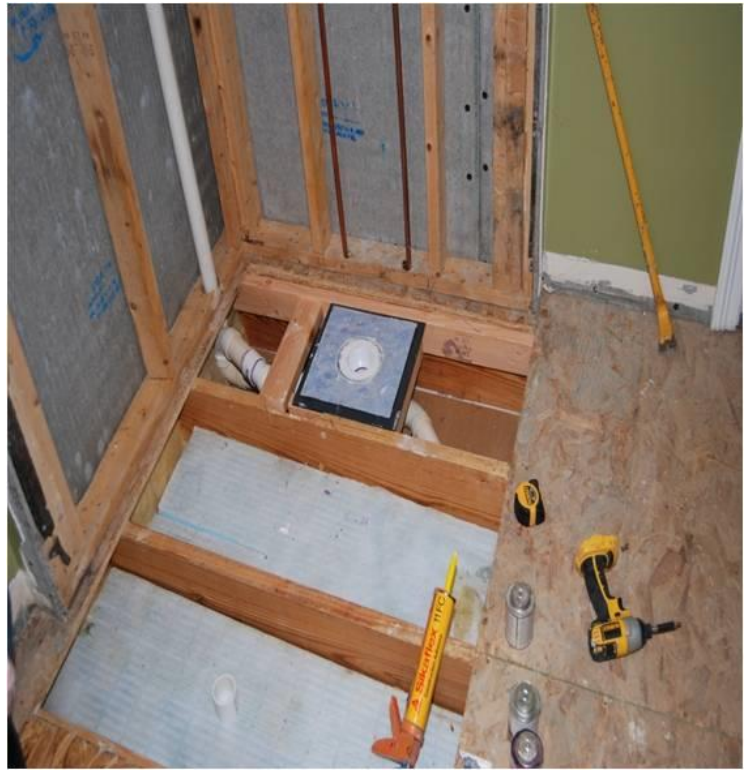
The material does not expand or contract, warp, or harbor mold and mildew. The boards are long-lasting and virtually maintenance-free. In fact, SRSB were originally developed for exterior deck tile applications. Per ASTM D790, “Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials,” the ultimate load with mortar in the flexural test was 2,600 pounds per square foot. The boards have superior strength and an extra heavy floor rating.

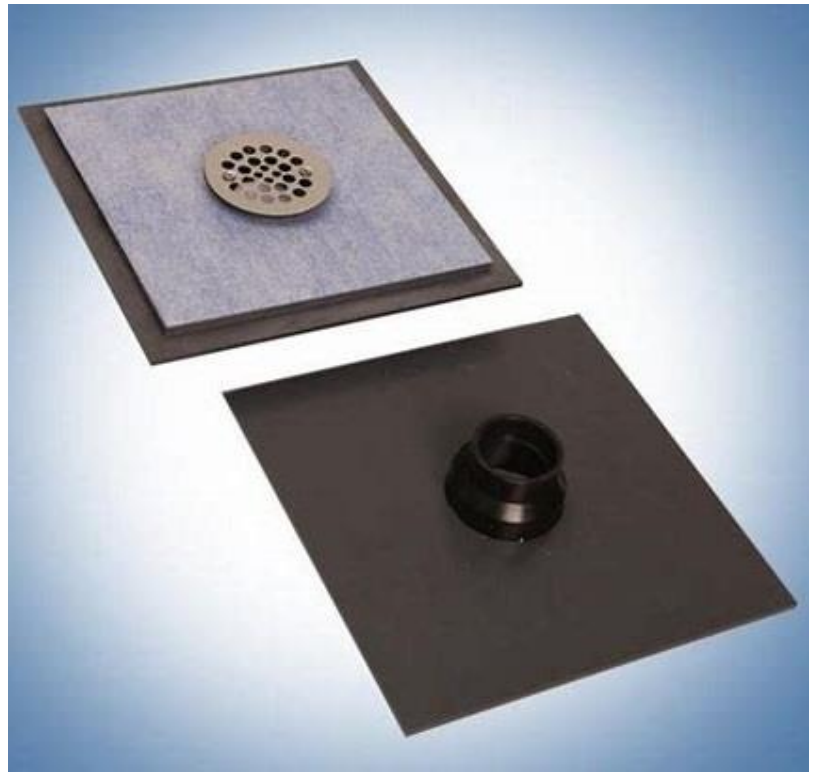
Structural Underlayments: Installation Process

These boards eliminate the need for structural modifications to the floor joist system.

Simply cut out the subfloor in the area where the pan will be installed. Install additional blocking if required to ensure that the SRSB are fully supported on their ends.

Block the integrated drain plate ¼″ below the top of the floor joists. This allows for the SRSB to overlap the drain plate and tie the parts together in a system approach. The drain can be placed anywhere in the shower pan area.





Structural Underlayments: Installation Process

The next step is to install the SRSB directly on top of the 16″ o.c. floor joists. If joists are spaced farther apart, simply add additional cross blocking support.

- Begin the layout of the boards on the butt edges and work your way out to the edges of the shower pan.
- The boards can be cut with a wet saw to fit the shower configuration.

The SRSB panels are ⅜″ thick and interlock with a tongue-and-groove design. If used with an adjacent ¾″ subfloor and a ¼″–½″ backboard on the bathroom floor, the SRSB easily accommodates the proper slope for drainage.

Structural Underlayments: Installation Process

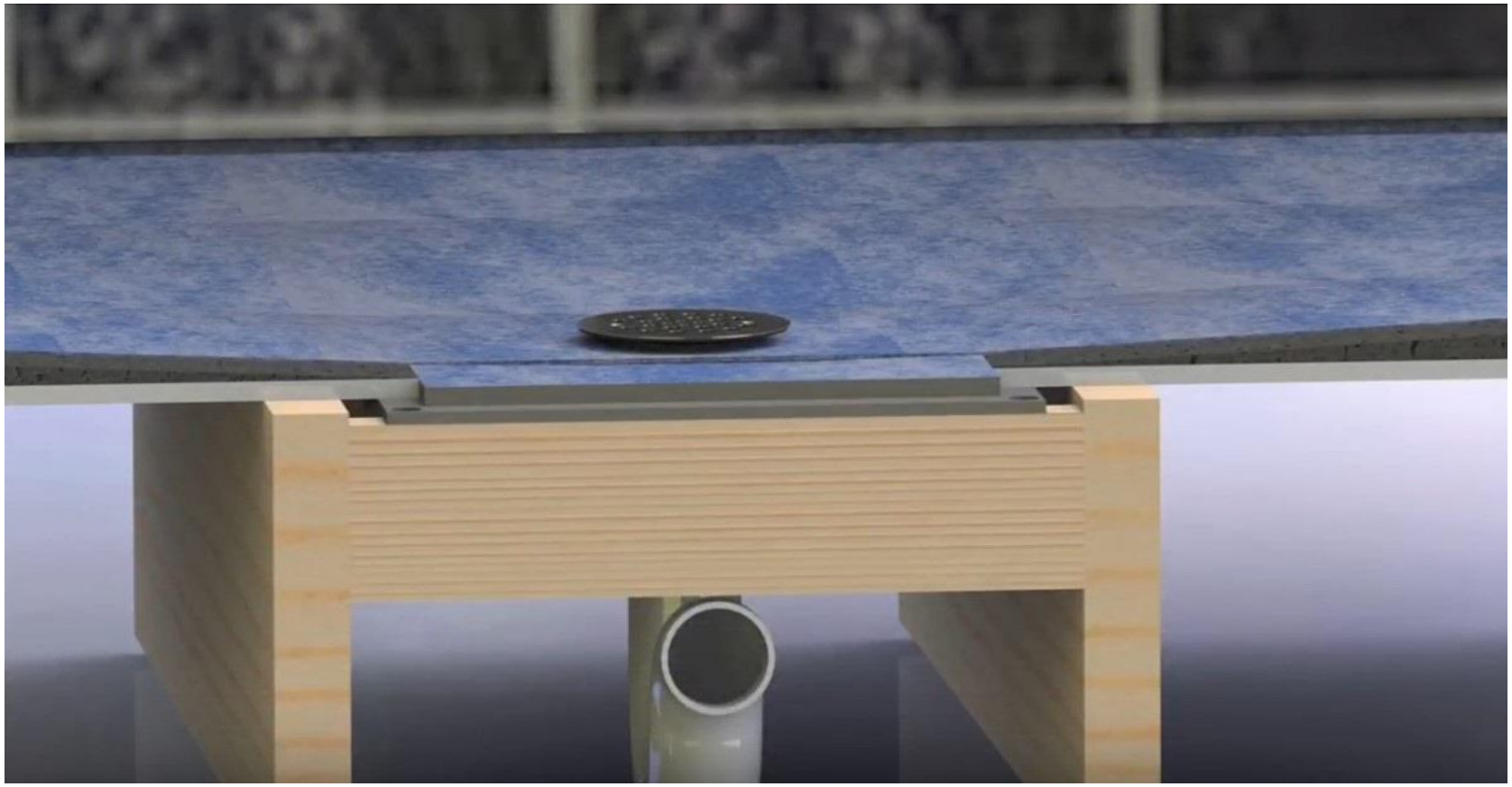
The next step is to float an ultra-thin mortar bed on top of the structural underlayment to meet the industry standard ¼″ per 1′ slope to drain. Take the shower slope from the surrounding plywood and backerboard thickness on the floor outside of the shower area so it is flush with the floor and slopes to the drain.

Use a 4:1 sand/mortar mix for this mortar bed. A slightly wetter than normal mix is specified to ensure the mortar keys into the dovetail grooves of the board.

Allow to cure and then install a waterproofing membrane over the top of the mortar bed with a modified thinset mortar.

Next, install the tile per NTCA guidelines.

Structural Underlayments: Installation Cross Section

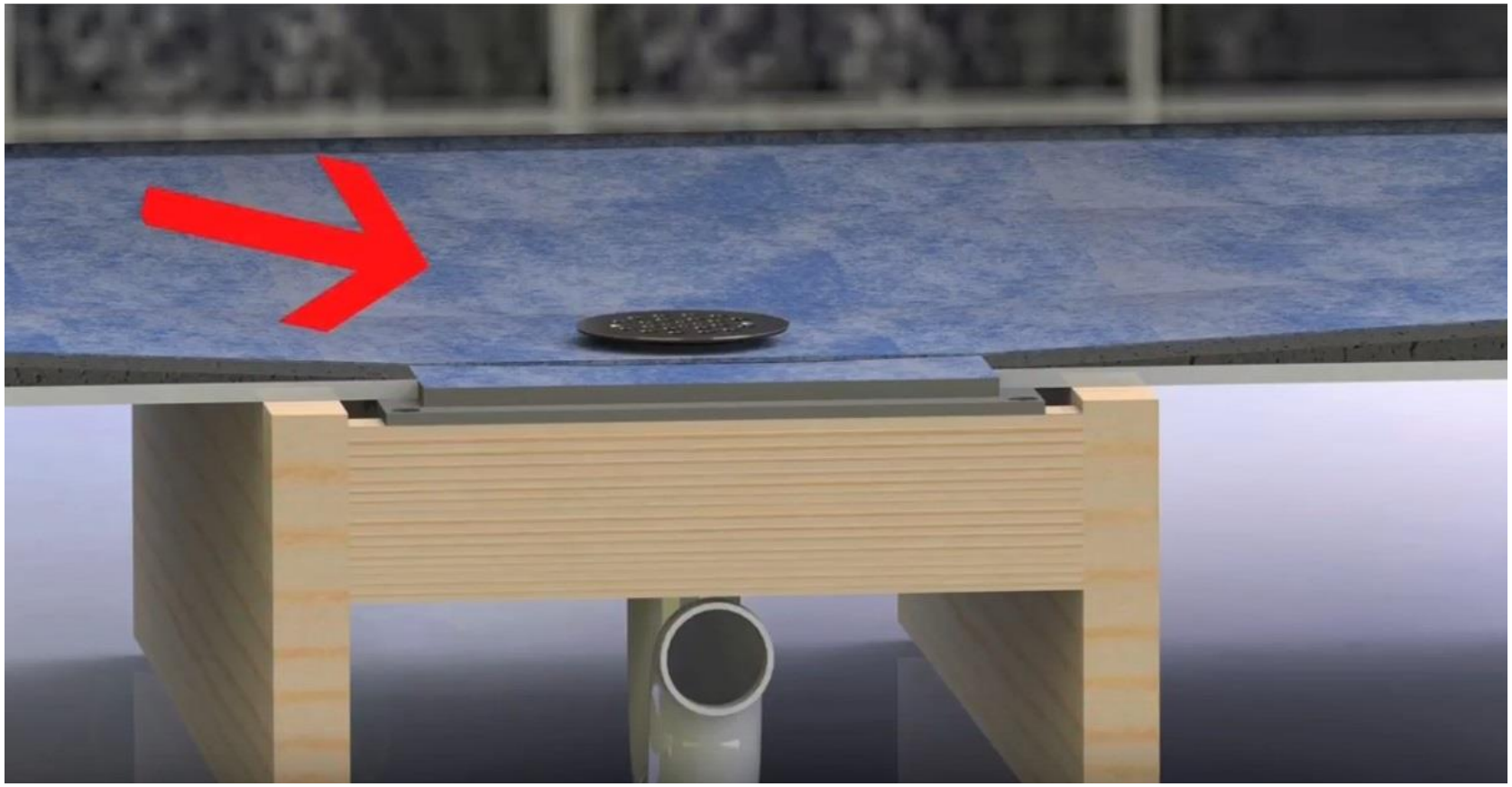


Shown here is a cross section of the drain area of the structural underlayment curbless shower system.

Structural Underlayments: Installation Cross Section

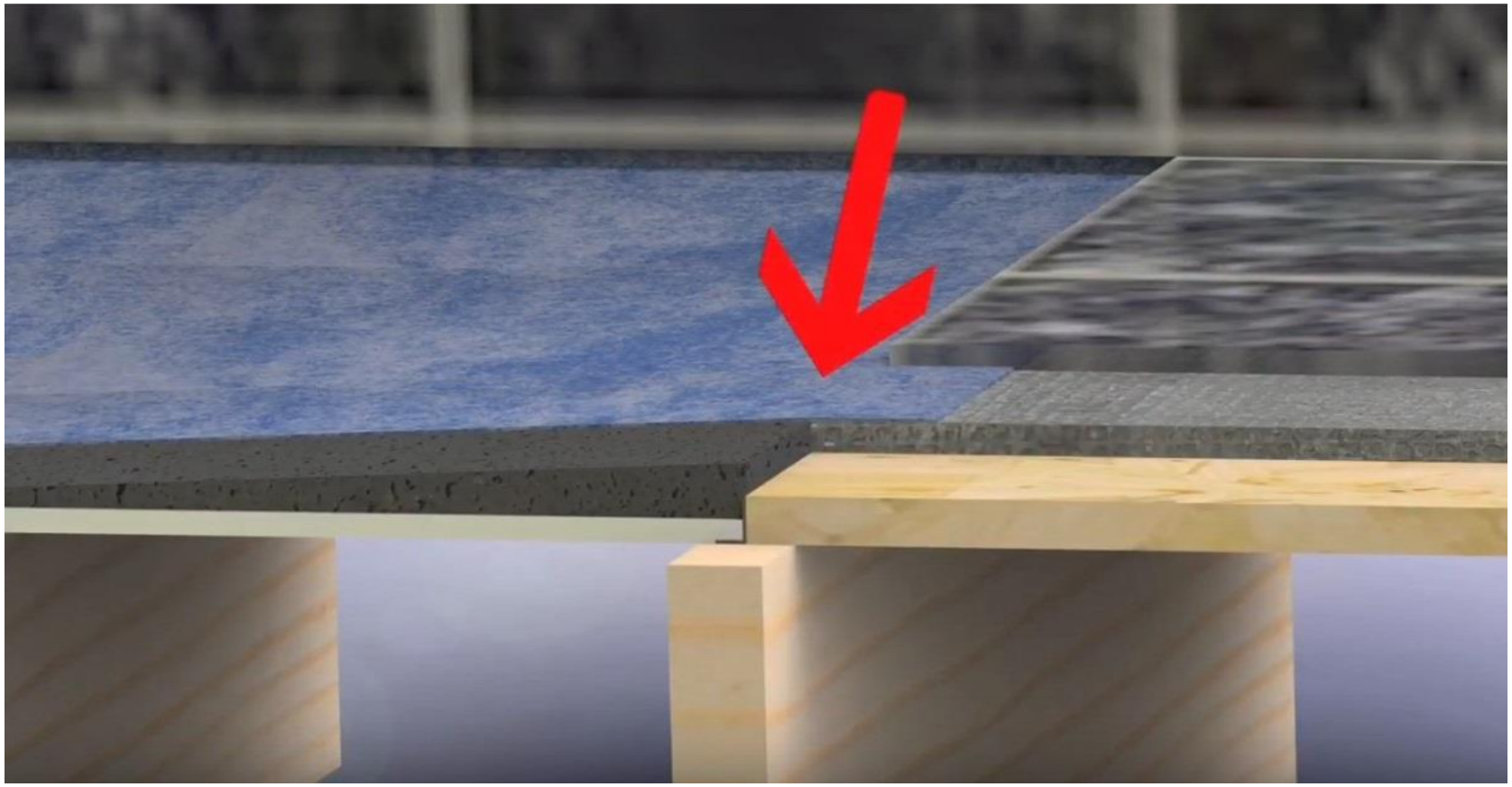
The drain plate is installed with the SRSB overlapping the flange.

Structural Underlayments: Installation Cross Section



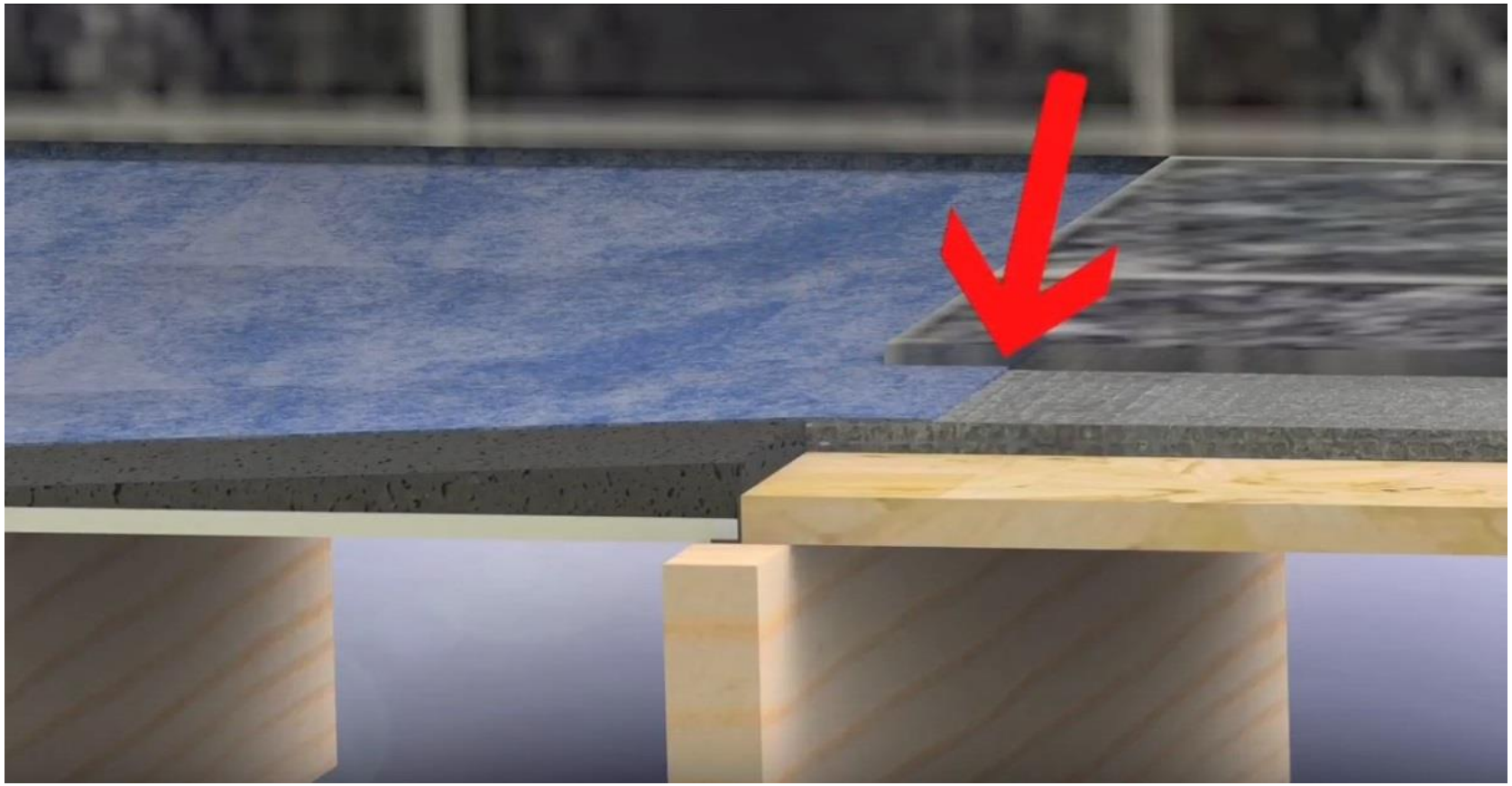
The ultra-thin mortar bed slopes from the outside of the shower to the drain.

Structural Underlayments: Installation Cross Section



This cross section shows where the outside edge of the shower meets the bathroom floor.

Structural Underlayments: Installation Cross Section

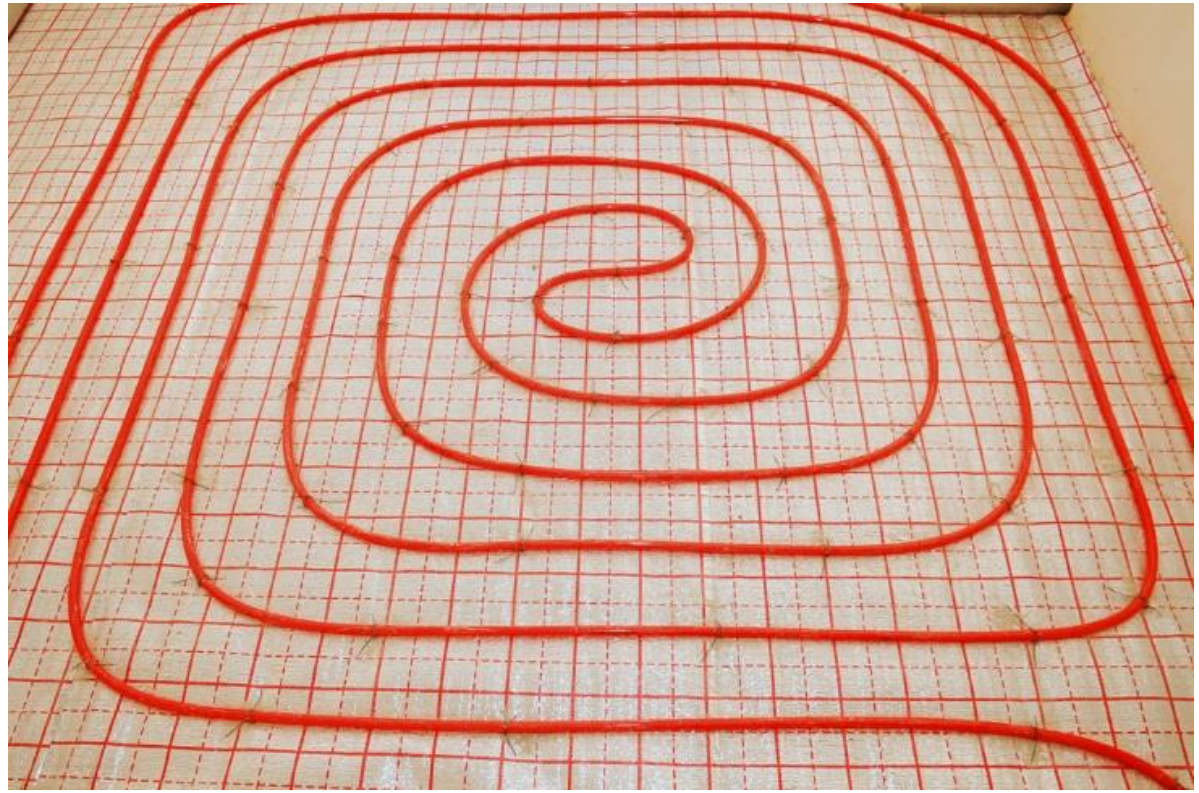


Note that the waterproofing membrane overlaps the backerboard by a minimum of 2″.

Structural Underlayments and In-Floor Heating

The structural underlayment system can be used with many types of in-floor heating. For instance, when installing the type of in-floor heating system pictured here with an SRSB, first use a 4:1 sand/mortar mix and float a sloping mortar bed. Once this is cured, install the waterproofing membrane with a modified thinset. Next, install the heating system per the manufacturer's installation instructions. It is important to ensure the system is rated for wet area use.

Many manufacturer's underlayments also feature an antifracture membrane built in to protect the tile from any movement in the floor over time and use.



Common Questions and Myths on Curbless Shower Pans

How does the water stay in the shower area?

A challenge with a curbless shower is there is no curb to hold the water in the defined shower area. This can be easily solved by installing the right products for this type of application. One solution for managing water is in the choice of the showerhead. Rain showerhead fixtures keep the water in a more concentrated spot versus traditional wall-mounted showerheads. Today, there are many rain showerhead fixtures to choose from, in both ceiling-mounted and wall-mounted options.

What tile size options are recommended?

With a curbless shower pan, you can use any sized tile that your client is specifying. If a linear drain is integrated into the shower design, the pan can be sloped in one direction to the drain. The single slope to the linear drain enables the installation of large format tiles throughout the entire bathroom and shower area. With this design, the bathroom floor flows right into the shower area, creating a seamless appearance.

Common Questions and Myths on Curbless Shower Pans

Is a curbless shower functional for all age groups?

A curbless shower pan is functional and safe for all generations. As stated earlier, falls are the source of most injuries in bathrooms. While a 4″ shower curb may be easy to step over for most, for the elderly and those with disabilities, it creates a challenge. A curbless shower can also make a small area seem larger because the design is more open versus the design of prefabricated shower enclosure units.

In terms of accessibility, can a curbless shower be aesthetically pleasing rather than institutional in design?

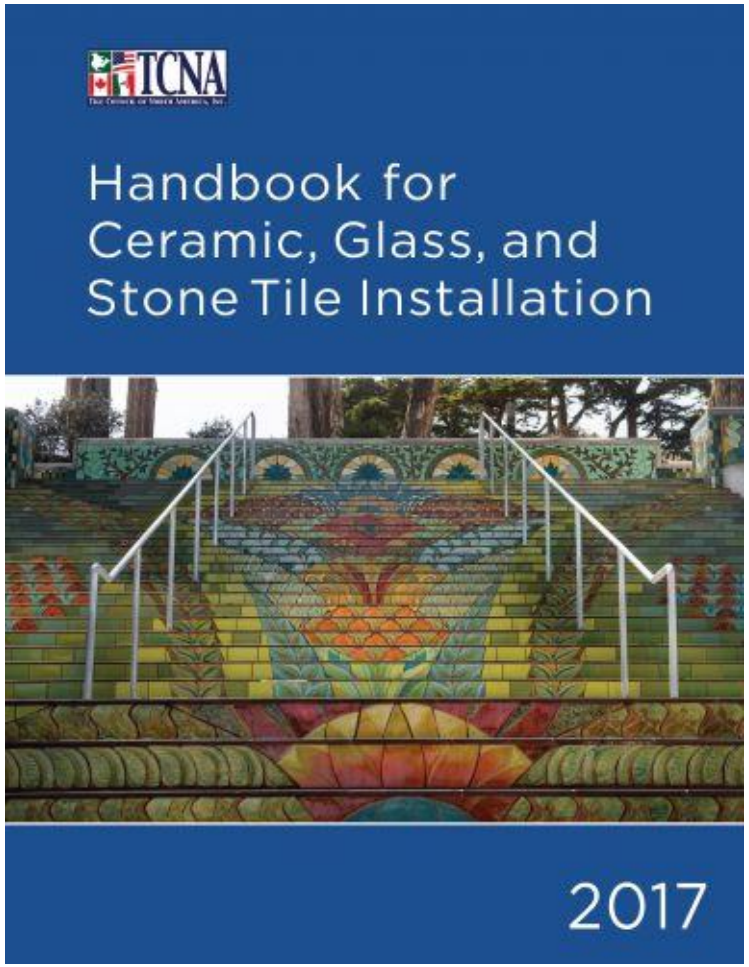
The true advantage of a curbless shower is that the benefits designed for accessibility do not have to look institutional in design. Today, there is a wide variety of grab bars, shower seats, and other accessories available; these design features are at the leading edge of style. As more homeowners install curbless showers pans, they are discovering that they have a bathroom that all generations of family members can enjoy in a safe, modern, stylish environment. Curbless showers were once primarily a solution for those with disabilities or accessibility issues; today, they are one of the leading bathroom design trends.

Industry Resources and Standards

Installation Is Critical

Curbless shower pans share one thing in common: how they are installed is critical. There are many industry resources available for guidance and support.

Tile Council of North America (TCNA)



TCNA
TILE COUNCIL OF NORTH AMERICA, INC.

TOTAL Solutions PLUS
NTCA + CTDA + TCNA + TCAA

The Tile Council of North America (TCNA) provides the TCNA “Handbook for Ceramic, Glass, and Stone Tile Installation” as a guide, not a product, to assist in clarifying and standardizing installation specifications for tile. Each installation method requires a properly designed, constructed, and prepared substructure using materials and construction techniques that meet nationally recognized material and construction standards.

The information presented represents a consensus of the national and regional organizations and individuals who serve on the Handbook Committee.

Ceramic Tile Education Foundation (CTEF)

The Ceramic Tile Education Foundation (CTEF) provides two distinct services to the tile industry.

The certification of currently successful tile installers is provided nationwide at regional warehouses through the Certified Tile Installer (CTI) program.

CTEF provides local training and education for people desiring to enter the tile installation field, construction professionals, architects, designers, building inspectors, sales associates, and consumers interested in the proper installation techniques necessary for a quality installation at the CTEF headquarters in Pendleton, South Carolina.

Advanced Certifications for Tile Installers (ACT)

ACT
ADVANCED CERTIFICATIONS FOR TILE INSTALLERS

The Advanced Certification for Tile Installers (ACT) program was created through the combined efforts of six leading organizations in the tile industry.

The intent of the ACT certification program is to provide a level of consumer confidence for tile installation procedures that exceed ANSI standards and TCNA guidelines for floor and wall. ACT certified installers represent the pinnacle of performance in the tile trade and maintain a level of excellence superior to non-ACT certified installers.

ACT is not a training program; it evaluates the skills and knowledge of tile installers and currently offers certifications in seven specific areas of tile installation.

Certified Installers

Improperly installed floor coverings are one of the biggest complaints in construction. The cost of replacing a poor installation is well over eight times the original price.

You have a vision for what your project should look like when completed. When specifying projects, require that installers are certified under one of the many specialized training programs available in the market to ensure skilled labor and productivity on your projects.

ASTM International (ASTM)
American National Standards Institute (ANSI)

ASTM International's mission:

To be recognized globally as the premier developer and provider of voluntary consensus standards, related technical information, and services that promote public health and safety, and support the protection and sustainability of the environment and the overall quality of life; contribute to the reliability of materials, products, systems, and services; and facilitate international, regional, and national commerce.

American National Standards Institute's (ANSI) mission:

To enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.

Waterproofing Definitions

The definitions below are according to ASTM D1079, “Standard Terminology Relating to Roofing and Waterproofing”:

Waterproof: Waterproofing is the treatment of a surface to prevent passage of water under hydrostatic pressure. Hydrostatic pressure provides the force to move water through the building envelope.

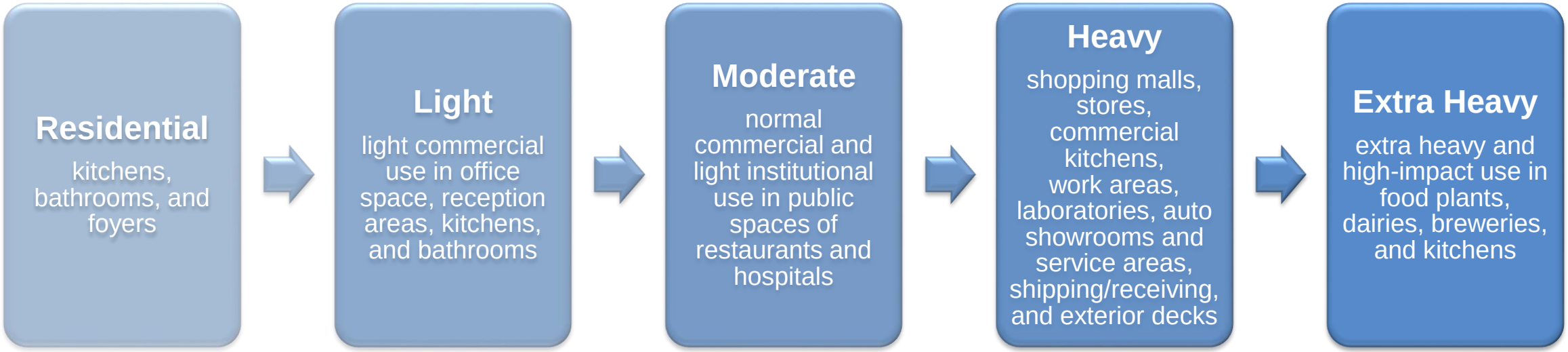
- ASTM D4068, “Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane,” is the applicable specification for a hydrostatic water pressure test for CPE sheeting.

Water Resistant: The ability for a material not to deteriorate or dissolve when exposed to water, although water may pass through the material.

Robinson Floor Test

ASTM C627, “Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester,” provides a standardized procedure for evaluating performance of ceramic floor tile installations under conditions similar to actual specific usages.

The Robinson Floor Test measures the compressive strength of the tile installation to characterize the test subject into five types of service levels. The incremental completion of each cycle without failure qualifies for the next service level.



International Association of Plumbing and Mechanical Officials (IAPMO)

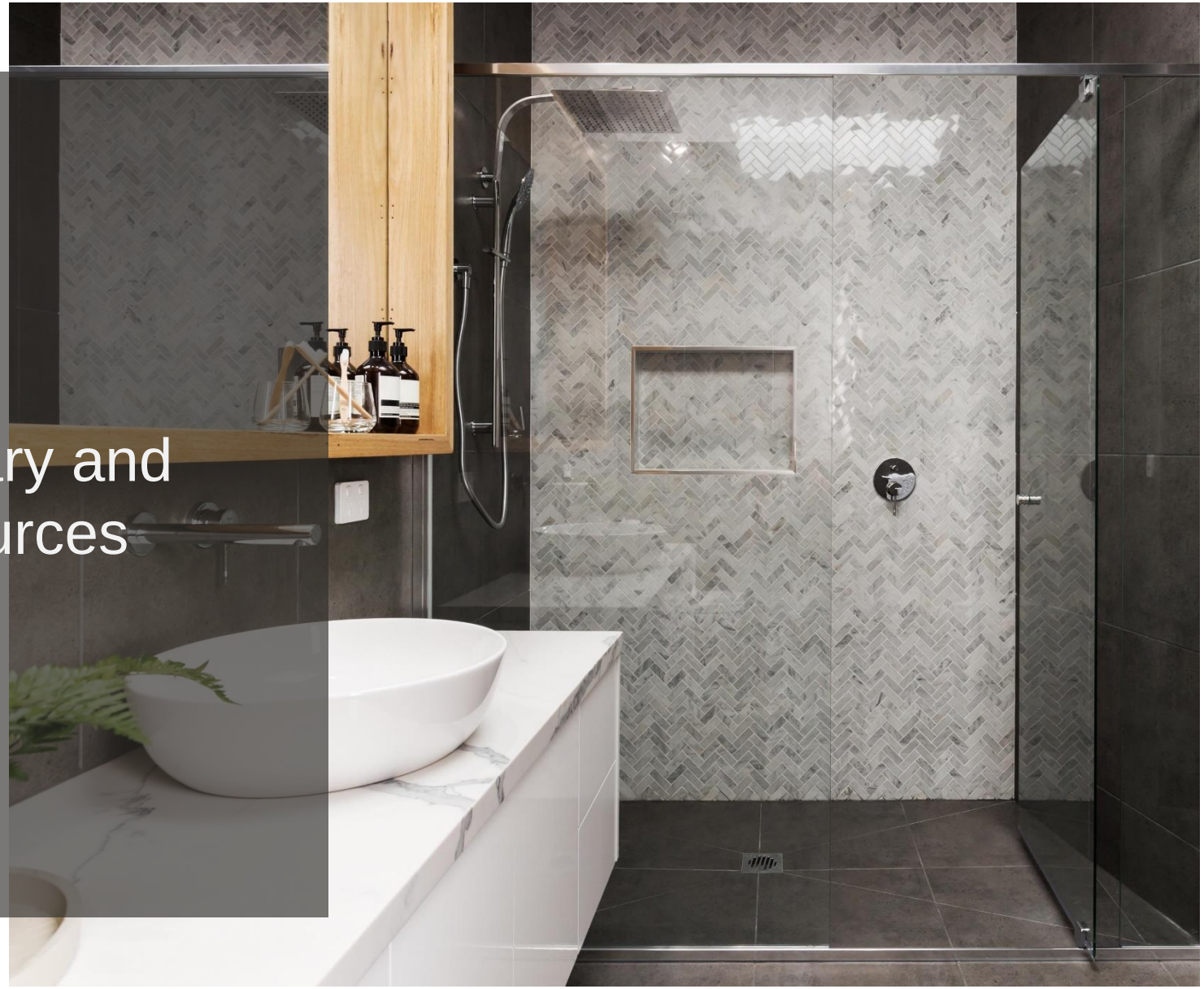
Backed by more than 80 years of the International Association of Plumbing and Mechanical Officials' (IAPMO) experience, IAPMO R&T Lab is a trusted name for independent testing, research, and technical services in the plumbing and mechanical industries.

IAPMO offers one-stop testing for listing in the U.S., Canadian, and Australian markets.

The 2018 Uniform Plumbing Code (UPC) established minimum requirements and standards for the protection of public health, safety, and welfare.

- 101.2 Scope. The provisions of this code shall apply to the erection, installation, alteration, repair, relocation, replacement, addition to, use, or maintenance of plumbing systems within this jurisdiction.

Summary and Resources



Summary

Bathrooms should be designed for durability and safety. As evidenced earlier, bathroom falls are prevalent amongst all age groups. In response to this, curbless showers have grown in popularity and offer increased safety and accessibility, and unlimited design options for every stage of life and ability level.

There are a number of problems associated with traditional methods of constructing curbless shower pans that lead to increased costs and labor. However, there are a variety of new products and installation methods for curbless shower pans that solve many of the issues that tile contractors faced in the past.

There are industry standards and resources available that detail curbless shower pan installation processes, and training is offered within the tile industry.

Whatever system is chosen for the project, beautiful, durable, safe, and accessible designs can be realized.

Resources

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Conclusion

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If you have colleagues that might benefit from this seminar, please let them know. Feel free to revisit the AEC Daily website to download additional programs from the Online Learning Center.

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