PHCP SELF-INSTRUCTION PROGRAM

BOOK #14

- ***COMMERCIAL FIXTURES AND FAUCETS***

Commercial Fixtures and Faucets

Series Two Unit Seven

PHCP Self Instruction Program

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CONTENTS

For a complete list of topics covered, see the index.

UNIT OBJECTIVES

The information in this Manual has been selected to give you an overview of fixtures and faucets used in commercial applications. It includes definitions of common industry terms, descriptions of the major types of commercial plumbing fixtures as well as the fittings and mounting methods for each type of fixture

Some of the products reviewed in this Unit may not be a part of your company's current inventory. Other products which may be stocked by your company may not be discussed in this Unit. Always refer to manufacturers' literature and recommendations on the products your company sells if unsure about a particular product.

To do your job well, it is important that you learn the details about specific items stocked by your company. The most complete and accurate information can be found in manufacturers' catalogs and materials. Be certain to spend time studying these materials.

When completing this Unit, you will be able to

- recognize the similarities and differences of fixtures for residential and commercial installations.
- discuss the specifications for different types of fixtures within commercial installations
- recognize the various types of faucets, valves, and supports required in commercial applications as each relates to different fixtures.

THESE MATERIALS SHOULD NOT BE USED TO PLAN ACTUAL INSTALLATIONS OR TO INSTALL COMMERCIAL FIXTURES, FITTINGS OR VALVES.

DISCLAIMER

Although the information contained in this Unit is believed to be accurate, the ASA Education Foundation and the American Supply Association disclaim any and all warranties, expressed or implied, regarding both the accuracy of that information and its application.

STEPS FOR COMPLETING THIS UNIT

1. Use the answer mask/book mark to cover the printed answers in the left hand column. Read the information in each Frame carefully.

2. Keeping the answer covered, write your response to the Frame question in the empty column at the right of each page.

3. Move the answer mask to check your response with the answer in the left column.

   - If your response is reasonably close to the printed answer, go on to the next Frame.

   - If your response differs from the answer given, review the material in the Frame to see why the printed answer is considered the best answer for the question.

   - If after reviewing the material in the Frame you still believe that your response is better than the printed answer, circle the printed answer. If you agree that the printed answer is best, mark an "X" through your response.

   - If after several attempts, you cannot understand the Frame or the answer to the Frame question, ask someone in your company for help.

   - If you still feel confused, contact the Foundation, and we will try to find a product knowledge expert to assist you.

4. Answer the questions in the Review at the end of each section. Check your responses with the answers given at the back of the book. Reread the Frames indicated for answers you have missed.

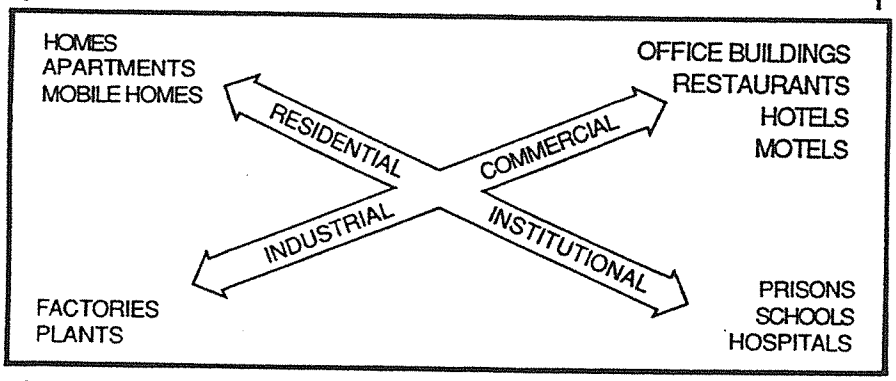
5. When you've completed all Frames, prepare for the Unit Quiz by going over the Review pages and the definitions in the Glossary.

6. Take the Unit Quiz at the end of the Manual.

7. Send the whole book, with the completed Quiz, to the ASA Education Foundation for grading. You and your immediate supervisor will be notified about your completion of the Unit.

Overview of Commercial Fixtures 1

In previous units we defined plumbing fixtures according to market sectors.



However, when we look at fixtures installed in some "commercial" entities, we see that many are the same type used in residential installations. Examples are lavatories and water closets found in hotels, motels, and some office buildings.

Since there isn't always a clear distinction between the fixture used and the place where it is installed, some fixtures have been covered in earlier units dealing with residential fixtures. We will refer you to those units for certain types of information.

In this unit we will look at fixtures and faucets most commonly found in commercial, institutional, and industrial installations.

No

Is there always a clear distinction between residential and commercial plumbing fixtures?

2

To help distinguish the types of fixtures, some industry experts classify commercial plumbing fixtures according to usage as light commercial, medium commercial, or heavy commercial.

Light commercial is defined as places where small groups of people would use the fixtures. Examples are office buildings, and private hotel or motel rooms.

Medium commercial is defined as places where the fixture gets a lot of use, but is not necessarily abused. An example is a hospital.

Heavy commercial is defined as places where fixtures receive heavy use and probably abuse. Examples are factories and road side rest rooms.

Keep in mind, these terms are not "official" industry terms, but a way some experts classify commercial fixture installations.

light commercial, medium commercial, heavy commercial

What are the three ways some experts classify commercial fixtures?

3

In earlier units, we also classified plumbing fixtures into three basic groups: sanitary fixture, such as water closets; lavatories and sinks; and bathing fixtures, such as bathtubs and showers.

In this unit you will find a segment on each of these three classifications of fixtures for commercial use plus segments on non-residential faucets and non-residential accessories.

Sanitary fixtures, lavatories and sinks, and bathing fixtures

What are the three basic groups of plumbing fixtures?

4

First, let's review the types of material commonly used to construct plumbing fixtures. The most common materials are vitreous china, plastics, cast iron, and stainless steel. (See Unit 1 for a complete discussion of each material.)

The two major reasons a manufacturer chooses a material are its durability for its given purpose and its capacity to be non-absorbent.

Durability, and capacity to be non-absorbent.

What are the two major reasons a manufacturer chooses a material for fixture construction?

5

Sanitary fixtures, both residential and commercial, are almost always made of vitreous china.

Recall that vitreous china has a "glasslike" finish making it hard to scratch and stain resistant; and, it is also totally non-absorbent. These features make it ideal for sanitary fixtures where the overall concern is creating sanitary conditions for the user.

An exception to using vitreous china for sanitary fixtures is in some institutional settings such as prisons. These installations may use stainless steel water closets.

scratch and stain resistant and totally non-absorbent

What makes vitreous china an ideal material for sanitary fixtures?

6

Unlike sanitary fixtures which are almost always made of vitreous china, you will find a variety of materials used to manufacture lavatories, sinks, bathtubs, and showers. Some of the more common materials are vitreous china, plastics, cast iron, and steel.

Enameled cast iron is found in bathtubs, whirlpool bathtubs, sink, and lavatory construction. Enameled steel, too, is found in bathtubs, lavatories, and sinks.

Stainless steel and galvanized steel are also used to construct sinks. For a full discussion on each of these materials and others, refer to Series Two, Units 1 through 5.

As with sanitary fixtures, durability and non-absorbency for sanitary reasons are important factors when choosing fixtures for commercial installations. For example, enameled steel may not be durable enough for heavy use commercial applications.

Vitreous china, cast iron, steel, and plastics

What are the most common types of materials used to manufacture lavatories, sinks, bathtubs, and showers?

7

Water conservation is another factor considered in both the construction and the installation of commerical fixtures.

October 1992, President George Bush signed into law an Energy Bill which included a section related to plumbing fixtures. The law established federal minimum efficiency standards for such equipment as showerheads, faucets, toilets, and urinals. Requirements will be phased in beginning in 1994 and completed in 1997. We will refer to some of the requirements in later portions of this unit.

Keep in mind, the law establishes minimum water conservation efficiency standards. Some local and state laws may already require more stringent efficiency standards. When this is the case, the local and state codes prevail.

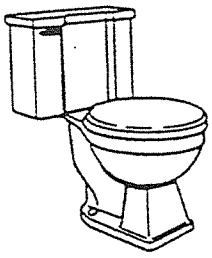
You should become familiar with both the federal minimum standards for plumbing fixtures and your state and local requirements.

Local and state codes

When local and state codes are more strict than federal codes, which codes must you follow to determine the appropriate fixtures installation?

8

Next, recall from previous units one way plumbing fixtures may be classified is by the method of installation. For example, sanitary fixtures may be classified as floor mount or wall hung mount.



FLOOR MOUNTED

WALL HUNG

Method of installation

What is one way plumbing fixtures may be classified?

9

Another way plumbing fixtures may be classified is by how they are used. An example comes from the Unit 3, Residential Lavatories and Sinks, we use both lavatories and sinks to wash, but to wash different things.

Sinks may be further classified based upon how they are used: the three basic groups identified in Unit 3 were: kitchen sink, bar sink, and laundry sink.

We will find similar classifications in commercial plumbing fixtures.

Kitchen, bar, and laundry

What are three classifications of sinks, based on how they are used as discussed in Unit 3?

DIRECTIONS: In the space to the left, label each of the following statements "TRUE" or "FALSE".

_____ 1. There is always a clear distinction between plumbing fixtures used in residential and commercial installations.

_____ 2. The basic groups of plumbing fixtures are sanitary fixtures, sinks and lavatories, and bathing fixtures.

_____ 3. The most common materials used to construct plumbing fixtures are vitreous china, plastics, cast iron and steel.

_____ 4. Stainless steel is most often used to construct commercial water closets.

_____ 5. The minimum water conservation standards established by federal law are the only standards you need to know about.

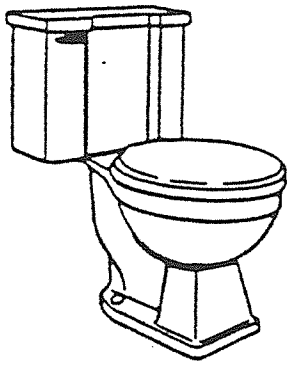
_____ 6. Plumbing fixtures may be classified by method of installation and by how they are used.

Compare your responses to the answers given on page 99.

Commercial Water Closets 10

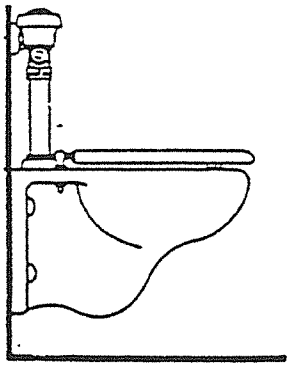
First we will look at one type of sanitary fixture commonly used in commercial installations, the water closet. While water closet is the official industry term for this sanitary fixture, manufacture's catalogues refer to the water closet as a toilet. We will use both terms in this unit.

The first classification for toilets used in commercial installations is how they are flushed. One method is a tank type closet that stores the water in a tank above the bowl.



You learned about this type in Unit 2 - Residential Water Closets. This type of toilet will commonly be used in light commercial and some medium commercial installations. Examples are hotel, motel, and some health care facilities.

The second method does not have a tank but draws its water directly from the supply line. This tankless toilet is called a closet bowl with flush valve. This type of toilet is almost always used in heavy commercial installations such as stadiums, some office buildings, and institutional installations.

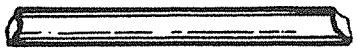


Light commercial, some medium commercial installations

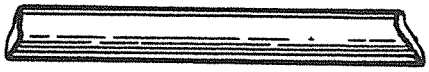
Where would you most likely find a tank type water closet?

11

The tankless water closet design requires a larger size supply pipe and higher operating pressure than is needed for a tank type closet. A larger supply pipe is needed to deliver enough flush water through the supply system. And the higher pressure is needed to deliver the water fast enough to flush the bowl.



Residential - typically 3/8"



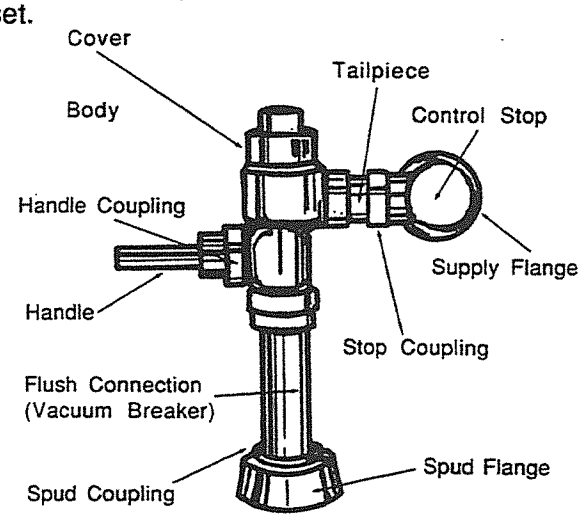
Commercial - typically 1"
SUPPLY LINE

Larger supply pipe and higher operating pressure

What are two requirements for a tankless water closet installation?

12

The flush valve used in a tankless design has some of the same parts found in a tank type design. It has a built-in supply stop, a vacuum breaker, and a valve which releases water into the closet bowl. Each performs the same function as in a tank type closet.



An advantage of the closet bowl with flush valve is, water to flush the bowl is always available immediately and there's no waiting for a tank to refill with water.

Water is always available and there is no waiting for a tank to refill

What is the advantage of a closet bowl with flush valve?

13

Conventional water closets, with or without a tank, need 5-8 gallons of water per flush (wpf). We mentioned earlier that new federal laws will require stricter water conservation measures in plumbing fixtures. Since water shortages have existed in some areas for several years, the industry responded with toilets which need less water per flush.

In commercial installations you will find two types of water saving toilets, the 3.5 gallons per flush and the 1.6 gallons per flush.

One type is called a Water saving toilet . This type uses 3.5 gallons of water per flush, saving 1.5 gallons or more per flush. This type must be made of china. It will be a blow-out design. It is found where there is heavy use, such as airports, schools or hospitals.

Another type is a low consumption water closet. This type uses only 1.6 gallons or less per flush. This type, when used commercially, is made of stainless steel and is found in prisons, etc. Toilets with this capacity may be made of china when in residential use.

However, beginning in 1994, manufacturers must clearly mark the 3.5 gals. wpf water closets "for commercial use only." New residential installations will require 1.6 gwpf. Schools and hospitals will be able to qualify for an exception, if they choose, and use the 3.5 gals. wpf size.

Again, consult your local codes for further information about which type of water conserving closet may be used for a specific installation.

1.6 gallons or less

How many gallons per flush does a low consumption water closet use?

14

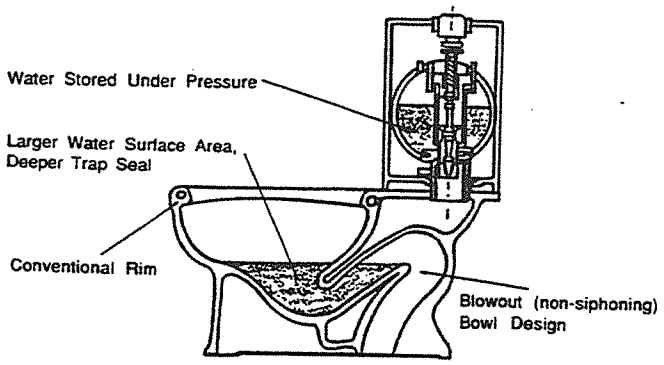
Low consumption water closets come in both tank and tankless models for commercial applications.

Those with tanks have either one of two types of flush mechanisms: pressure assisted or gravity feed. You will need to know the differences between a pressure assisted closet and a gravity feed low consumption water closet. Both of these are used for commercial installations.

Pressure assisted and gravity feed

What are the two types of low consumption water closet flushing mechanisms used in commercial installations?

The pressure assisted closet is an extension of the water supply line. It uses water in the supply system to compress trapped air. This "charges" the air, causing it to react like a tightly wound spring. When the toilet is flushed, the air acts like a spring or siphon and forces the water out of the tank and into the bowl at a high velocity.



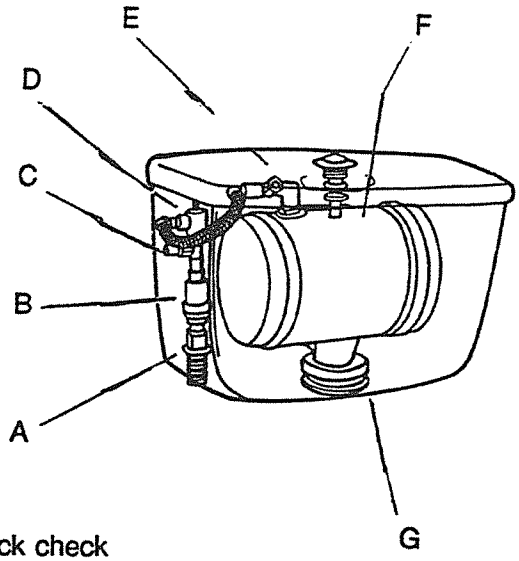
You may have noticed that the inside of the closet tank looks different than the ballcock type flush mechanism described in Unit 2, Residential Water Closets. A pressure assisted closet has a flush mechanism called a flushometer.

The refill cycle begins after each flush. Water and air are drawn into the flushometer tank. When the water and air pressure are equal, the tank is ready to be flushed again.

Compressed air

What is used to force the water out of the tank and into the bowl at a high velocity?

The flushometer tank system has different components than is found on a ballcock system.



A - Back check
B - Pressure regulator
C - Pressure relief valve
D - Vacuum breaker
E - Air inducer
F - Vessel with flush cartridge
G - Discharge extension with ball check drain port

Air is compressed in the vessel (F) at 35 PSI and is constantly regulated by the pressure regulator (B). This stored energy forces water through to the bowl at a rate of 60 gallons per minute. At the end of the flush, air is replaced through the air inducer (E). Any water that may collect inside the outer tank is allowed to drain through the ball check drain in the discharge extension (G).

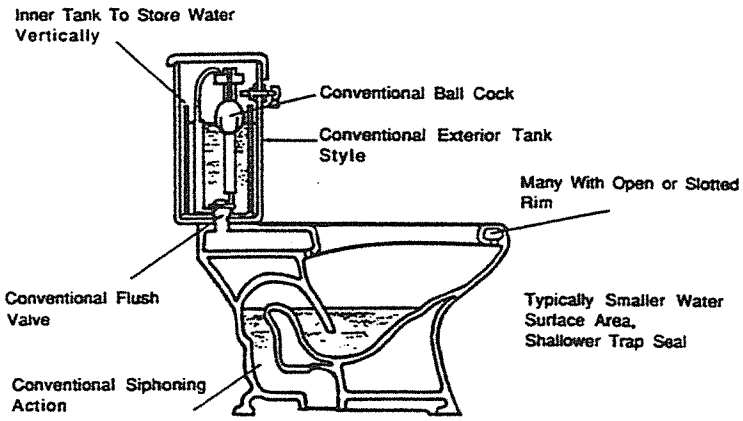
60 gallons per minute

What is the rate of the water flow through the bowl when a flushometer is used?

The second type of low consumption closet is called a gravity feed closet. It is similar to a conventional closet because it also uses a ballcock and a conventional flush valve.

The water closet itself has been redesigned with a steeper bowl and an exposed trapway to allow greater velocity when flushing.

This type of flush mechanism uses the natural force of gravity, allowing water to drop down from the tank to begin the flushing action.



GRAVITY FEED LOW CONSUMPTION WATER CLOSET

What makes a low consumption gravity feed closet similar to a conventional water closet?

It has a ballcock and a conventional flush valve

18

You learned in Unit 2 that water closet bowls come in two shapes, round front and elongated. We also covered in Unit 2 the types of closet seats: round, elongated, and open front or closed front design.

Some experts consider the elongated bowl to be more comfortable than the round bowl; but more importantly, primary code requirements in some areas require the elongated bowl for sanitary reasons for commercial installations.

Comfort and required by code

What are two reasons customers might choose the elongated closet bowl and seat?

19

Closet bowls, for tank or tankless type closets, come in different heights. It is important to know the most common bowl heights and the reasons for selecting each height.

Most closet bowls are 14"-15" from the floor to the top of the bowl rim. Experts consider this height the most comfortable for average adult use.

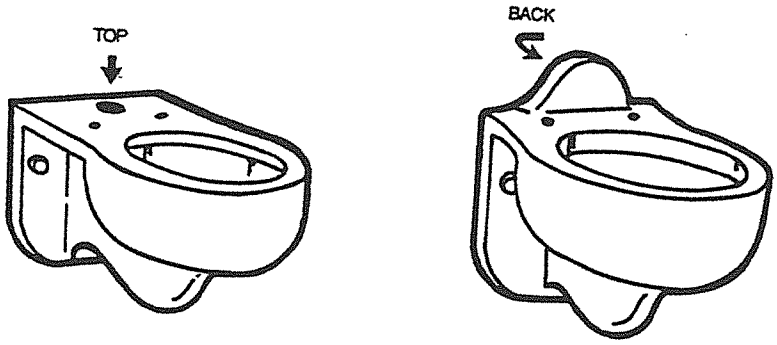
A 17"-18" closet bowl is most commonly used to accommodate people with disabilities and the elderly. The Americans With Disabilities Act (ADA) requires that minimum and maximum heights for toilets, measured to the top of the toilet seat, be no less than 17" and no more than 19". (See Unit 8 for additional information.)

Closet bowls 10" and 13" high are used in installations for children. The 10" is designed for pre-school age children and the 13" closet bowl is specified for elementary school or juvenile installations. These heights create a more sanitary area for children because they can sit down and get up without using their hands.

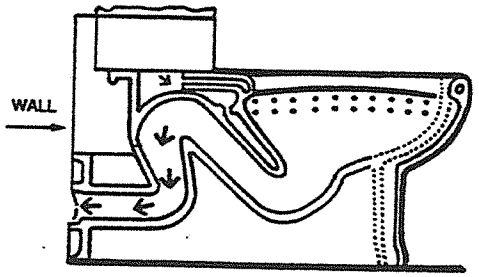
14"-15" high

What is considered to be the most comfortable bowl height for average adult users?

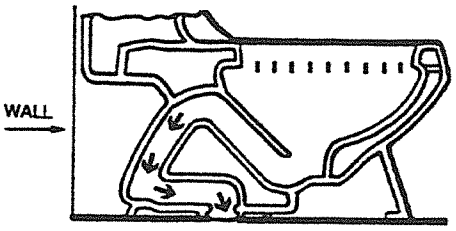
The closet bowl has an inlet to provide an opening for flush water to enter the bowl. The inlet may be located on the top or at the back of the bowl.



The outlet location provides an opening for waste to be discharged from the fixture into the DWV system. Outlets may be located on the back of the bowl, discharging waste through the wall.



If the outlet is in the bottom of the bowl, waste is discharged through the floor.



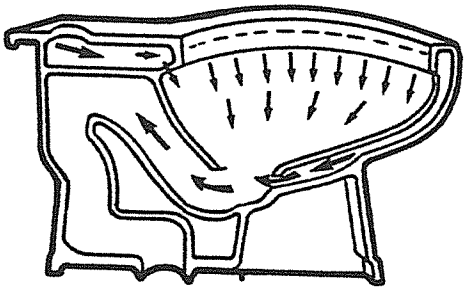
Where are the two possible locations for an outlet?

Back or the bottom of the closet bowl

All closet bowls have integral (built-in) traps. The trap provides a passageway for removing waste from the fixture.

The design of the trap makes it easy for waste to be siphoned into the DWV system. The siphoning action begins in the downleg of the trap. Water is sucked through the trap until air entering the trap breaks the siphon.

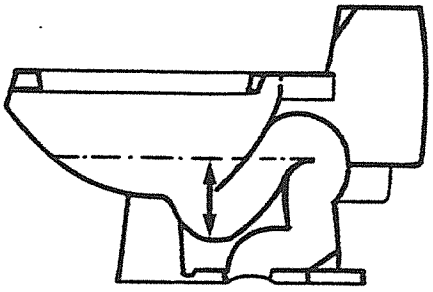
Wall



Front

Refill water slowly fills the trap. When the bowl water reaches the height of the dam, the seal is complete. The distance from the top of the water surface to the top of the trap entrance is called the <u>water seal</u>.

Front



Wall

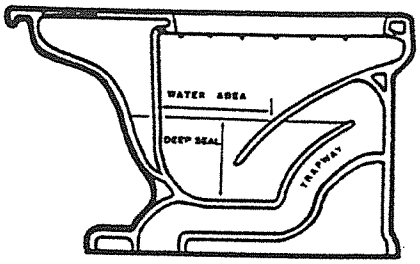
Water seal

What is the area between the top of the water surface and the top of the trap entrance called?

The amount of water surface area inside the bowl depends upon the bowl design. Small water surface areas leave more dry bowl area. This dry bowl area is more likely to be left dirty by waste matter after flushing.

In this design, the trapway is at the front of the fixture. It does not allow much area inside the bowl to be covered with water. A bowl design with a front trapway is not used much today and is not allowed by many local codes.

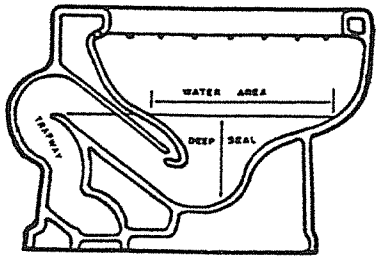
Wall



Front

This bowl is designed opposite of the one illustrated above with the trap at the back of the fixture. Bowl designs with back trapways are the most common and permit larger water surface areas. The bowl is more likely to be left clean after flushing with a bowl design with a larger water surface area.

Wall



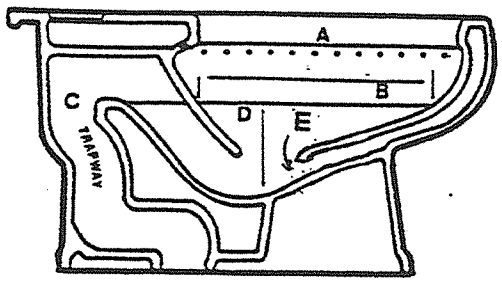
Front

In the back of the bowl

In which location should a trap be on a bowl design to make it easier to flush the bowl clean?

There are a number of different bowl designs which accomplish the flushing action in different ways. The bowl design refers to how a closet bowl is constructed on the inside. However, there are elements which are common to all bowl designs.

Wall



Front

All designs have a
- rim flush (A)
- water surface (B)
- trap (C)
- water seal (D)
- jet (E)

Water is released into the closet bowl from a tank or flush valve. Some of the water enters the bowl from the rim flush (A) and flows down inside the bowl surface to clean it after use.

The water surface (B) is the area inside the bottom of the bowl which remains covered with water.

The trap or trapway (C) allows a passageway for waste to be flushed out of the fixture and to seal it, preventing sewer gas from escaping up through the bowl.

The water seal (D) is actually the depth of the seal which is provided by the length of the trap.

The jet (E) is a stream of water discharged at the base of the passageway which shoots upward into the trap entrance to start the siphoning action.

Flushing actually happens when turbulent water has filled the downleg of the trap.

What five elements are common to all closet bowls?

Rim , flush, water surface, water seal, trap, and jet

24

One and two piece closets are available with different bowl designs. The bowl design is named according to the type of flushing action it uses. The most common bowl designs used in commercial closet bowls are:

- reverse trap
- siphon jet
- blow-out
- siphon vortex

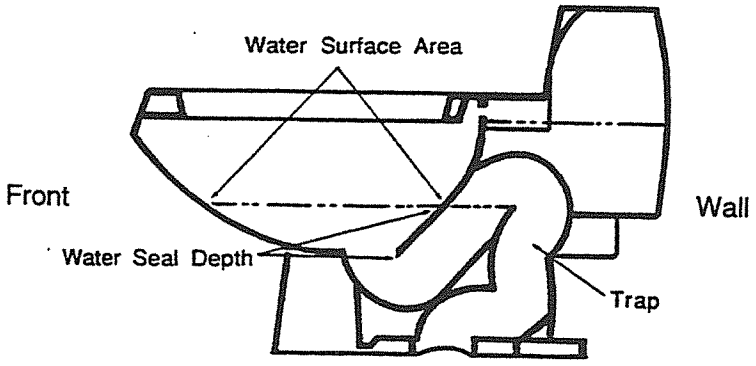
Each of these will be reviewed in the next few frames to give you a basic idea of the differences between the water action in each.

How has a particular bowl design gotten its name?

By the type of flushing action it uses

25

Each bowl design has specifications which have been set by codes and standards. The three common specifications for all bowl designs are the water surface area, the water seal depth, and the trap size.

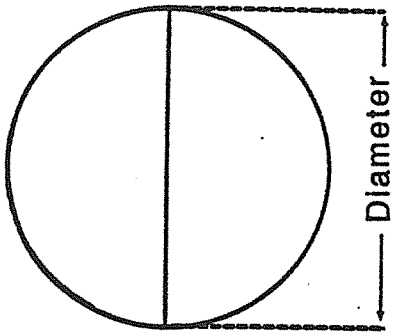


What are the three common specifications which have been set for all bowl designs?

Water surface area, water seal depth, and trap size

Codes require that the water surface area must be a minimum of 5" by 4". Also, the depth of the water seal from the surface of the water down to the top of the trap entrance must be a minimum. of 2".

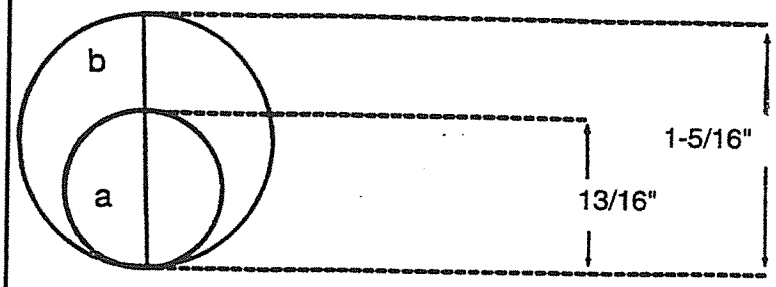
Trapway size is defined either in actual dimensions of the passageway or by ball pass. A ball pass measurement is the diameter of a ball which can pass through the trap.



Above is a circle with a line down the center. This center line divides the circle into two equal parts. The diameter of a circle is any straight line which connects two points of the circle by passing through the center of the circle.

a= 13/16"
b= 1 - 5/16"

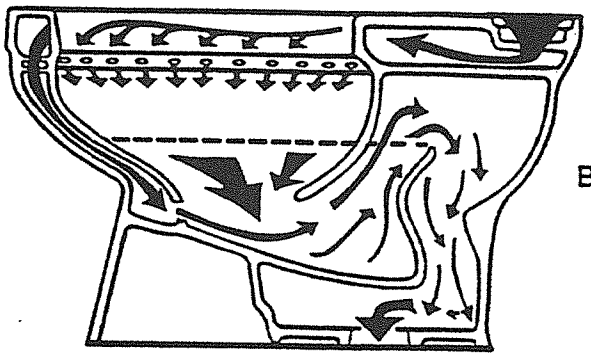
What is the diameter of the circles shown below?



27

All newer bowl designs have traps which are located at the back of the bowl. The first to have this type of design was called a reverse trap design. This design is characterized by incoming water coming from around the rim of the bowl, and a jet outlet which is directed into the upward leg of the trap to enhance the siphoning action.

The reverse trap design has a larger water surface. Water surface dimensions are a minimum of 9" X 8". It also has a minimum ball pass of 1-1/2" and a water seal minimum of 2-1/2".



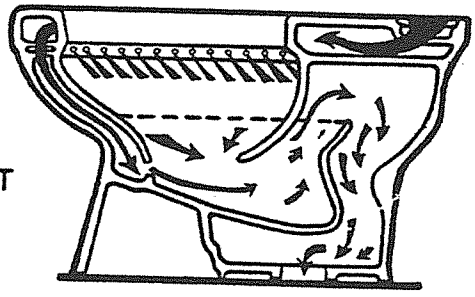
Reverse trap

Of washdown and reverse trap designs, which has a larger water surface area?

28

A siphon jet design also has a trap at the back of the bowl, but the jet delivers a larger volume of water flow to immediately begin the siphoning action without causing a rise in the water level before the contents are drawn through the outlet.

This type of design has a larger water surface area than does a washdown design or reverse flow design. The water surface area is a minimum of 12" x 10". It also has a ball pass of 2" and has a 3" water seal.

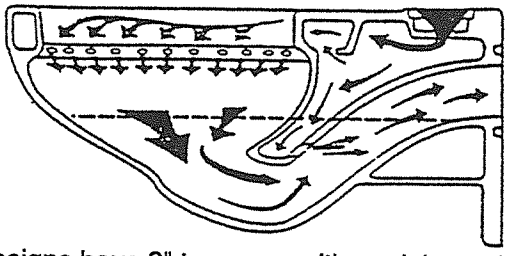


The back of the bowl

In a siphon jet design, where is the trap located?

29

Unlike the other designs, the blow-out bowl flush design relies on the force of a jet action and has no siphoning action. Because of the water capacity needed to accomplish this action, blowout designs are only used for tankless design installations. These bowls are 3.5 gal. wpf and are made of china. Where the bowl must be 1.6 gal. wpf it will be stainless steel.



Blowout designs have 3" trapways with a minimum ball pass of 2 1/8" and have the largest of all water surfaces at 12" x 10". The water seal depth is a minimum of 3".

This type of water closet is generally used in industrial installations and where there is heavy use, such as airports or hospitals.

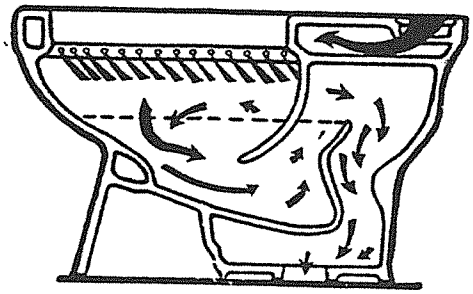
No

Does the blowout flush design use siphoning action?

30

A siphon vortex, which is sometimes called siphon action, is a design in which the flushing action is caused by diagonal rim outlets which generate a swirling or whirlpool action of the water in the bowl. The trap fills up quickly and triggers the siphoning of the bowl contents.

This type of flush design is used for one piece tank/bowl designs. The siphon vortex design is known for its large water surface area and the quietness of its operation. The water surface area is 11" x 9" and the water seal is 3". This design may or may not have a jet. Although this type of flush design is not generally used in commercial installations, it might be used in some light commercial applications such as luxury hotels.

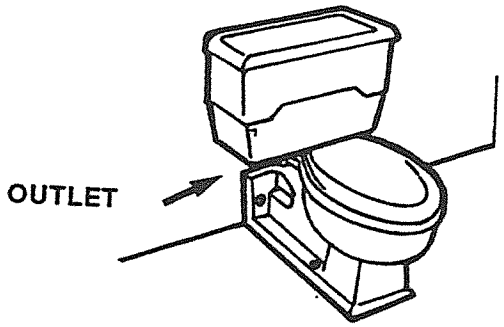


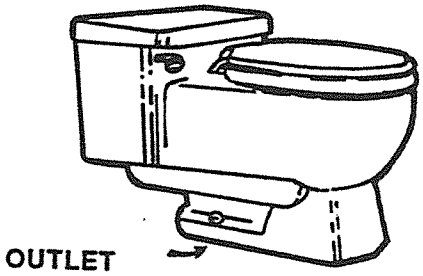
One piece bowl and tank designs

Which type of bowl/tank design is a siphon vortex flush design used with?

We mentioned earlier one way of classifying plumbing fixtures is by how they are mounted. Water closets are available in either a wall hung mount or a floor mounted design. These two mounting types are not interchangeable since each is connected differently to the drain, waste, and vent (DWV) system.

A wall-hung mounted closet always connects to the DWV system through the wall. However, a floor mounted design may connect to the DWV system through the floor or some may connect to the DWV system through the wall.





Whenever you see water closets specified as back outlet, wall outlet, or wall waste outlet, you will know these connect to the DWV system through the wall.

back outlet, wall outlet, wall waste outlet

What are three ways manufacturers might specify water closets that connect to the DWV system through the wall?

32

A wall mounted closet is not mounted directly onto the wall but is attached to a closet carrier which is a special fitting for connecting and supporting the closet. It may also be called a chair carrier.

Wall mounted closets are not connected directly to the wall because any shift in the foundation could cause a break in the connection. The carrier allows some space to be left between the closet and the wall helping to keep the closet attached to the DWV system if the wall or the plumbing system should move slightly.

Another reason closets are not mounted to the wall is that walls generally could not support the weight of the closet. Carriers are concealed in the wall and support the fixture using a faceplate and base support which if anchored to the floor.

In effect then, the weight is taken off the wall and transferred to the floor.

closet carrier or chair carrier

What is the fitting that is used to mount a water closet to a wall?

33

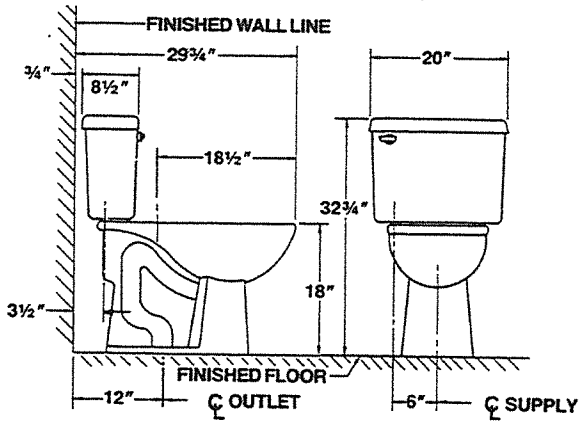
As with residential water closets, you need to know about rough-in dimensions in commercial installations. One important dimension is where the fixture connects to the DWV system. This dimension varies with manufacturers and with:

- type of mount
- location of outlet
- flushing action

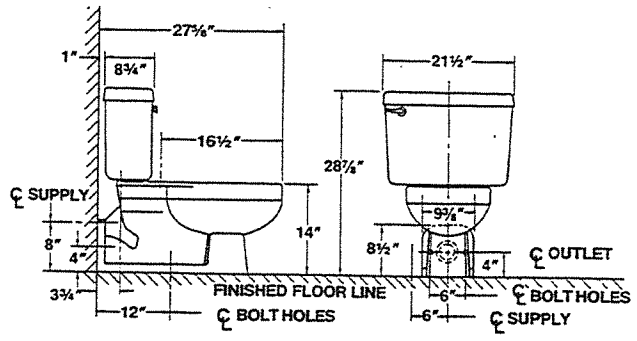
Type of mount, location of outlet, flushing action

Other than manufacturer variances, what causes different rough-in dimensions for where the fixture connects to the DWV system?

Below is an example of a floor mounted, floor outlet water closet with a tank. Remember, the rough-in for this type of closet measures from the finished wall to the centerline of the closet flange or fixture outlet. The rough-in dimension to connect this closet to the DWV system is normally 12", but could be 10" or 14".



Below, is a floor mounted closet with a tank, but this one has a back outlet to connect to the DWV system. For this type, the rough-in measures from the finished floor to the centerline of the fixture outlet.

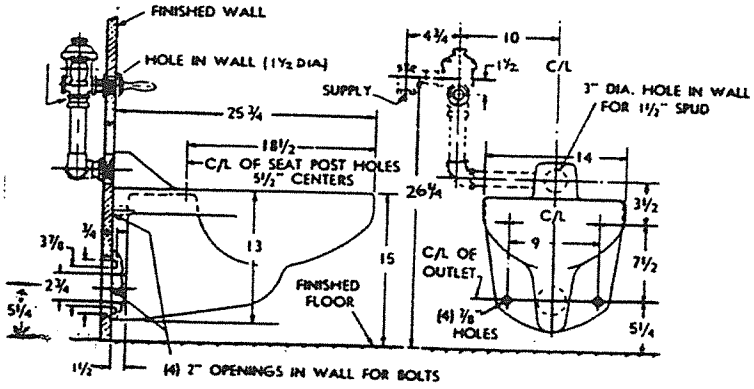


4"

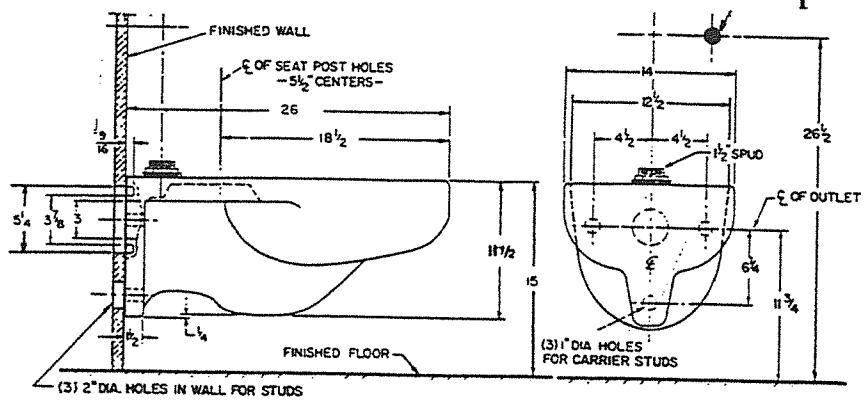
What is the rough-in dimension for the floor mounted, back outlet closet shown above?

The rough in for wall hung tankless closets measures the distance from the finished floor to the center line of the fixture outlet. However, the distance will vary with the type of flushing action.

Below are examples of two wall hung closets, but they have different flushing actions. This one uses a syphoning action and the bottom illustration uses a blow-out flushing action. Because a syphon flush action goes up and back down again, the outlet is lower. The rough in dimension for this model is 5 1/4".



With the blow-out flushing action in this illustration, waste is pushed with high speed velocity, and it goes up and then out to the waste pipe. So, the outlet is higher.



11 3/4

What is the rough-in dimension for the location of the outlet on the water closet in the second illustration?

Commercial Water Closets — Review

DIRECTIONS: Write the answer to each of the following questions in the space provided.

1. What are the two types of flush mechanism found in low consumption water closets?

2. Which type of bowl and bowl seat is most commonly used in commercial applications?

3. Which closet bowl height is considered the most appropriate for children?

4. Where are the two possible locations for an inlet?

5. What refers to how a closet bowl is constructed on the inside?

6. What are the four most common flushing actions used in commercial closet bowls?

7. Which type of flushing action is only used for tankless design installations?

8. Where does a wall-hung mounted closet connect to the DWV System?

9. What is the fitting called that is used to mount a WC to the wall?

10. How many gallons per flush does a low consumption water closet use?

Compare your responses to the answers given on page 99.

Urinals

36

Next, we will look at another commercial sanitary fixture, the urinal. The urinal is generally installed in public restrooms for men and is designed to receive and dispose of urine only. It is not for any other type of waste disposal.

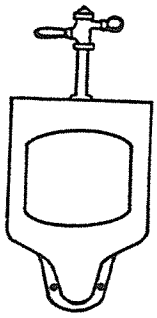
A flush valve is more commonly used with urinals than is a tank type flush mechanism.

In public restrooms for men

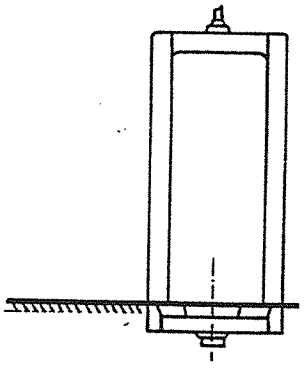
Where are urinals installed?

37

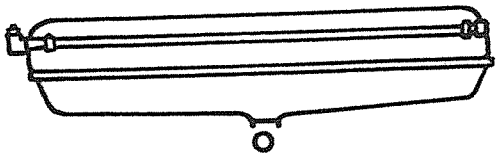
There are three basic types of urinals; individual wall-hung, trough, and stall.



WALL HUNG



STALL



TROUGH

Both the wall hung and trough type urinal are wall mounted and discharge waste through the wall. The stall type urinal is floor mounted and discharges waste through the floor.

Wall hung, trough and stall

What are the three basic types of urinals?

38

Regardless of the shape or mount, all urinals have five basic parts which are listed below.

- a basin
- a flush mechanism
- a trap
- an inlet
- an outlet

These parts provide the same basic functions as discussed for water closets. The only one we have not discussed is the basin. The basin is the portion of the urinal which receives the urine. It provides the same function as does the bowl in a water closet.

Wall hung and stall type urinals are generally made of vitreous china. Trough type urinals are often made of enameled cast iron.

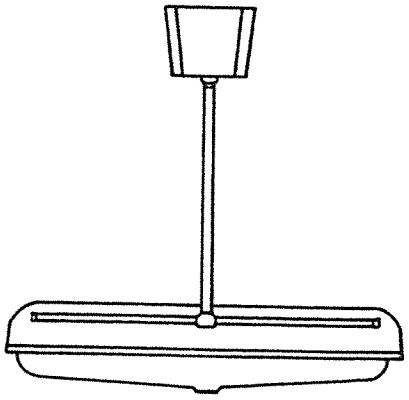
What are the five parts found in all urinals?

Basin, flush mechanism, inlet, outlet, and trap

39

Like water closets, a urinal has a flush mechanism which rinses the fixture clean after its use. The flush mechanism may be a tank type or a flush valve.

The trough type urinal below uses a high tank to flush it after use. This type of flush mechanism may be installed when the waste pressure and water volume from the supply line is too low to use a flush valve.



As we noted earlier, urinals with a flush valve are more common than those with a tank and are better suited to handle frequent use.

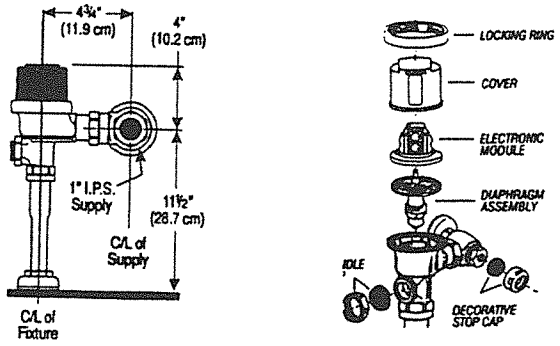
Which type of flush mechanism is better suited to a urinal which must handle frequent use?

A flush valve

40

It is becoming common for electronic flush valves to be used with urinals. The following example illustrates a sensor operated flush valve in a urinal. These types of urinals are frequently used in airports and other public places.

Once the user enters the sensor's effective range and then steps away, the electronic module initiates the flushing cycle to flush the fixture. Many of these are battery operated mechanisms.



ELECTRONIC FLUSH VALVE URINALS

Electronic flush valve urinals

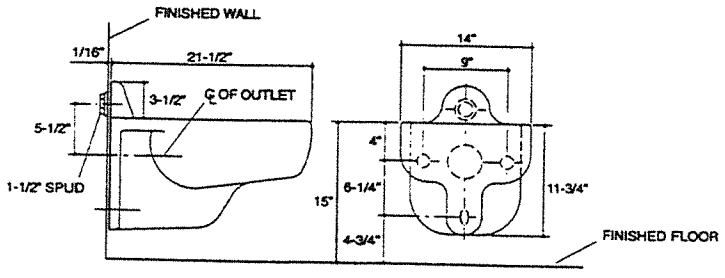
What type of urinal installation would use a sensor operated flush valve?

41

Most urinals will have a spud connection to the water supply system. Urinals may also have a spud connection to the DWV system. The spud connection is designed to provide a water tight seal.

An inlet spud connection is used to attach the fixture to the tank or flush valve. The outlet spud connection is used to attach the fixture to the DWV system.

Spud connections will vary in size depending upon the type of urinal installed.



To connect the fixture to the DWV system

What is the purpose of an outlet spud connection?

42

All urinals use traps to keep the sewer gas away from the fixture. Most urinals have the trap built in to the fixture, just like a water closet. These traps are known as integral traps.

Urinals which do not have integral traps must be installed with a P-trap fitting. The P-trap is installed between the fixture and the DWV system. It is an external trap (it is not built in.)

URINAL WITH A P-TRAP CONNECTION

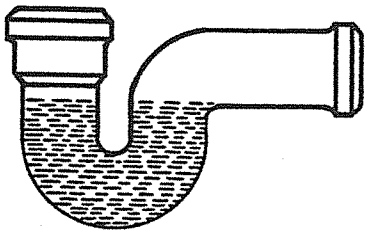
Integral traps and external P-traps

What are the two types of traps found with urinals?

43

Both integral traps and P-traps seal urinals in the same way. Traps are meant to stand full of water. The water forms the seal which keeps sewer gas from escaping through the fixture.

The water seal is shown in the P-trap below. Water in the U shaped portion of the trap is the same height on both sides of the U. As long as the water remains higher than the top of the dip in both sides of the U, the seal is formed and will keep the sewer gas from escaping.

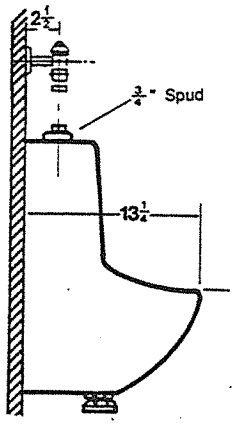


Water

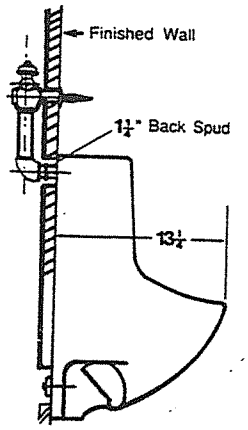
What forms the seal in both integral and P-traps?

There are stall urinals and wall hung urinals held by carriers. The wall hung type of urinal is the most common. An individual wall hung urinal will have either a top or a back inlet spud to connect the flush mechanism to the fixture.

Wall hung urinals are available with 3/4", 1-1/4", or 1-1/2" inlet spuds.



TOP INLET SPUD



BACK INLET SPUD

Flush valves or flush tanks and connections are ordered separately. The flush mechanism must match the inlet spud size and the spud location on the fixture.

Top or back inlet spud

Where are the spud connection locations for the connection of urinals to flush mechanisms

A special fitting called a chair carrier is used to support and connect a wall hung urinal to the wall. The carrier is similar to one which might be used with a wall mounted water closet. The chair carrier is the most common installation method for wall hung urinals.

Generally, urinals are installed 24" from the finished floor. This is the standard height which is thought to be most comfortable for adults. There are no special urinals which are made for children; instead, urinals are lowered to a height which is better for children.

24" from the floor

What is the standard height for installing urinals for adult use?

46

There are different types of flushing actions for wall hung urinals. Often the shape of the urinal will give a clue as to the type of flushing action it has. Each type of flushing action works a little differently. Some have larger water surface areas, some require integral traps, while others require the installation of a P-trap.

The most common types of flushing actions for wall hung urinals are

- blowout
- siphon jet
- washout

The following frames will provide an overview of these three types of flushing actions.

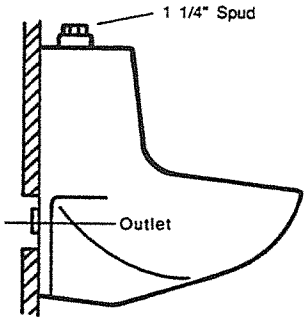
Review manufactures' literature to gain more information on the flushing action used with the urinals your company stocks.

The shape of the urinal

What feature about a wall hung urinal might give you a clue about it's flushing action?

47

The blowout wall hung urinal has the most distinctive shape. The blowout flushing action requires more water pressure and volume to flush than any other flush design.



BLOWOUT URINAL DESIGN

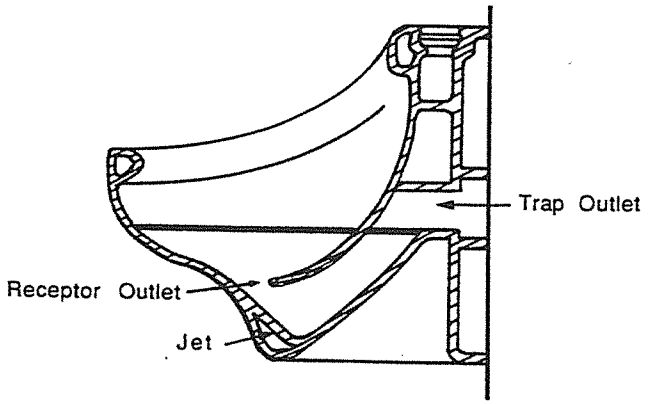
Blowout urinals have a 1 1/4" or 1 1/2" inlet spud. Depending upon the inlet location, they will have either an exposed or concealed flush valve. The flush valve is ordered separately.

1 1/4" spud with an exposed flush valve

What would be the inlet spud size and the type of flush valve needed for the blowout urinal pictured above?

48

A blowout urinal design uses a powerful jet, just as is found in a blowout water closet design, to help the flushing action. This flush design has an integral trap. The trap is generally larger than the receptor outlet. The receptor outlet is where the urine flows from the receptor bowl into the trap.



Integral trap

What type of trap is found in a blowout urinal design?

49

Another type of flushing action used in urinal design is siphon jet. This design also uses a jet, but only to begin the siphoning action to flush the urinal. The jet used in this type of flushing action is not as powerful as the one used in blowout flush design.

Siphon jet urinals are available with a 3/4" or 1 1/4" inlet spud. The inlet spud may be in the back or on the top depending upon whether an exposed or concealed flush valve is used. The siphon jet wall hung urinal has an integral trap.

3/4" or 1 1/4"

What are the two inlet spud sizes found on siphon jet urinals?

50

The third common type of urinal flush design is a washout design. This type of urinal is available with an 3/4" inlet spud only. Like blowout or siphon jet designs, a urinal with a washout design has either a top or back inlet spud.

This type is different from the others because it comes either with an integral trap or is installed with an outside P-trap.

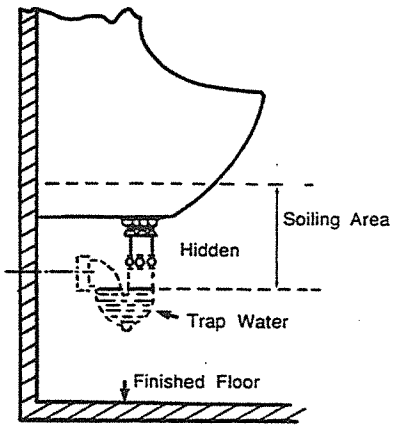
When installed with a P-trap, the inlet spud size is the same as a washout design with an integral trap, but the outlet spud is different. As with all fixtures using an exposed P-trap, the P-trap size must match the fixture outlet size.

3/4"

What is the inlet spud size for a washout design urinal with a P-trap connection?

51

Unlike the other urinal flush designs with integral traps, one with an exposed P-trap design leaves a hidden area which is not covered by trap water. This area is illustrated below. With this type of urinal design only the receptor area is rinsed and a build-up of urine can form in the hidden area. This build-up creates a sanitary problem because it breeds bacteria.



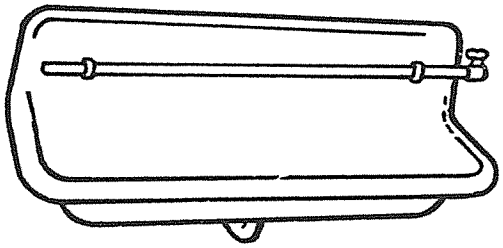
Some state or local codes prohibit the installation of urinals with exposed P-traps because they are not as sanitary as other flush designs.

Washout design with an exposed P-trap

What is the type of urinal flush design which is most likely to have a urine build-up problem?

5 2

One of the earliest types of wall mounted urinals was the trough. This type of urinal is made of cast iron and then is covered with a coat of fused glass, which is commonly called enameled cast iron.



The trough type of urinal is specified for industrial and institutional installations where low cost is a factor.

enameled cast iron

What are trough urinals made of?

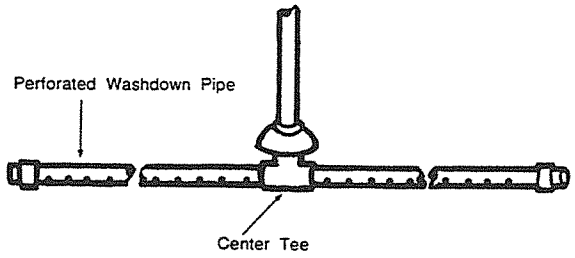
5 3

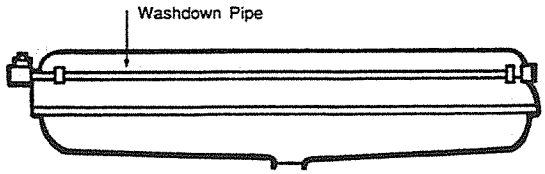
Troughs are commonly available in four sizes; 3', 4', 5', and 6'. The size of the urinal refers to the length. Some manufacturers state the size in inches instead of feet, so the four common sizes would be stated as 36", 48", 60", and 72".

3', 4', 5', 6'

What are the four common sizes stated in feet for trough type urinals?

A trough urinal has a perforated washdown pipe to rinse the urinal after use. Perforated means that the washdown pipe has a number of tiny holes in it. When the fixture is being rinsed, the water sprays out of these holes and runs down the back of the trough.

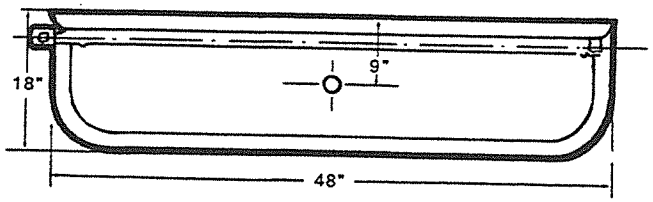




As with most sanitary fixture fittings, the washdown pipe is ordered separately and is specified according to the length of the trough.

48" washdown pipe

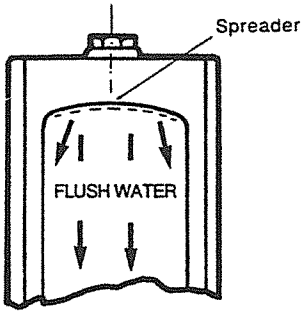
What size washdown pipe would be ordered for the urinal shown below?



55

A stall urinal is a floor mounted urinal. They are available in vitreous china only. This type of urinal may have a tank or a flush valve to rinse the fixture after use. If a flush valve is used, a top or back inlet spud will determine whether the flush valve is exposed or concealed.

A stall urinal is similar to the washout type of wall mounted urinal because flush water only rinses the fixture after use. Stall urinals have a spreader which distributes the water to rinse the inside walls of the fixture.



Distributes water to rinse the inside walls of the stall

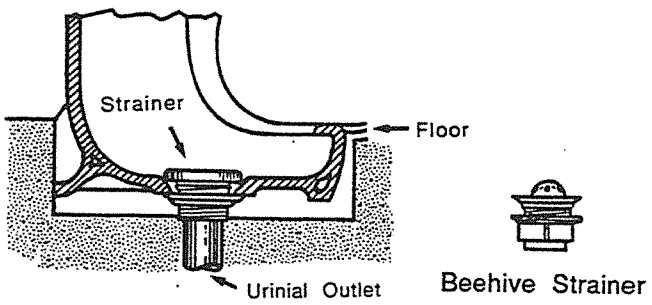
What is the function of a spreader?

56

Since stall urinals do not flush by siphon action, only water and urine can flow easily through the pipe.

Stall urinals do not have built in traps. Instead, these urinals have a drain outlet which is at the base of the fixture and is connected to a trap concealed under the floor.

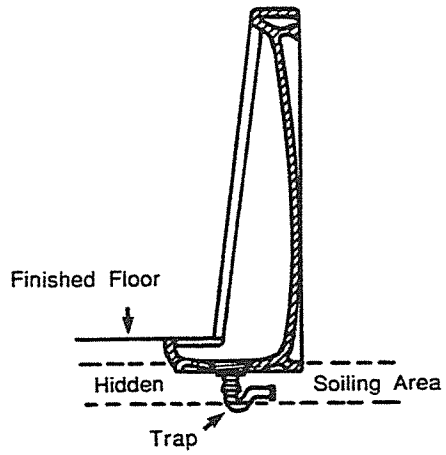
A strainer is used to cover the fixture outlet and keep foreign objects from entering the trap and clogging the DWV system.



Concealed beneath the floor

Where is the trap located on a stall urinal?

The stall type urinal is the only urinal which is partially recessed into the floor. This characteristic along with the outside trap creates a hidden soiling area which is not covered by trap water. As a result, a build-up of urine creates an unsanitary condition.

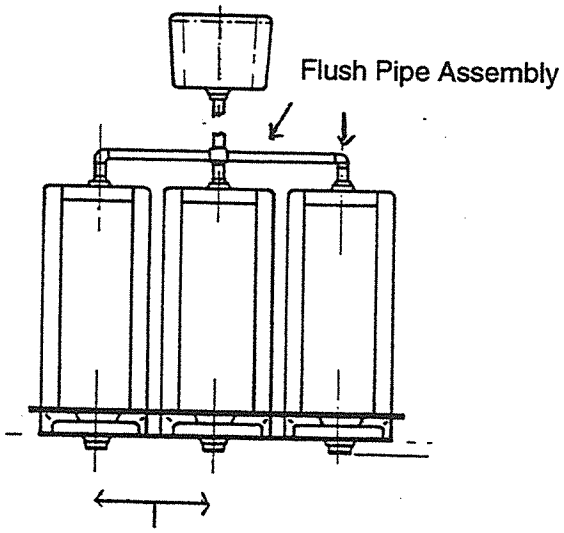


As mentioned, some local codes do not allow urinals with outside or exposed traps to be installed because they can create unsanitary conditions.

The portion of the fixture recessed into the floor and not covered by trap water

What part of a stall urinal may have a urine build-up?

Stall urinals are generally ordered in batteries. A group of two or more urinals installed in a single row against a wall is commonly called a battery of urinals. The picture below is a battery of three units.



A special flush pipe assembly is used to connect a battery of urinals to a flush valve or tank. When one tank or flush valve is used to flush a battery, a special flush pipe assembly is ordered according to the number of urinals in the battery and the spacing distance between the center of the outlets.

The urinals are spaced at 21", 24", or 26" centers. The specification of these dimensions refers to the distance from the centerline of one urinal outlet to the centerline of the next urinal outlet. 25" centers are the most commonly specified. However, some local codes will have special requirements for this dimension.

It is important that you are aware of the dimension requirements for local codes in the areas your company services.

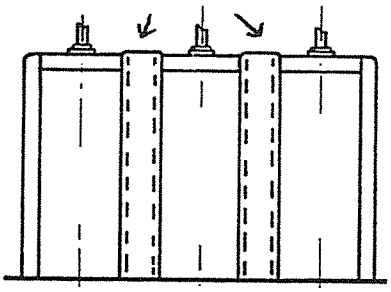
What are the two specifications given when ordering a flush pipe assembly for a battery of stalls?

The number of urinals in the battery and the spacing distance between them

59

Seam covers, which protect the area between the stalls from getting soiled, are also ordered for a battery of urinals. As you can see in the picture below, two seam covers would be ordered for a battery of three urinals.

Seam Cover



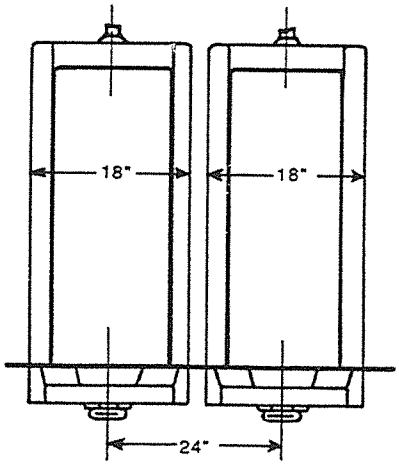
To protect the area between the urinal stalls from getting soiled

What is the purpose of a seam cover?

60

Seam covers are available in different widths to accommodate the different spacing distances of batteries.

Most urinals are 18" wide each. To determine the size of the seam cover needed, you will only need to know the spacing distance of the urinals in the battery. You would subtract the width of 18" (9" from one urinal and 9" from the next urinal in the battery) from the spacing distance to determine the accurate seam cover size. In the illustration below it would be 24" - 18" = 6"



26" - 18" = 8"

What would the seam cover size be for a battery of urinals which had 26" spacing?

Your customers will have various reasons for urinal choice. Remember that state and local codes may prohibit the use of stall urinals or wall hung urinals with exposed or outside traps because of the sanitary problems these types can cause.

Your customers may also consider factors such as cost, ease of installation, ease of cleaning, and the frequency of usage in a given installation.

Stall urinals and wall hung urinals with exposed or outside traps

What types of urinals have been prohibited by some state and local codes because of the sanitary problems they may cause?

DIRECTIONS: In the space to the left, write the term described in each of the following definitions.

_____ 1. Style of urinal which is made of enameled cast iron.

_____ 2. A system which connects a battery of urinals to one tank or flush valve.

_____ 3. A type of urinal which uses a chair carrier for support.

_____ 4. This can occur as a result of hidden soiling areas which can be found with the use of stall urinals with exposed or outside traps.

_____ 5. The three types of flushing actions found with wall hung urinals.

_____ 6. This connects a urinal to the DWV system.

_____ 7. Distributes water to flow down the inside of a stall to clean it after use.

_____ 8. The flush device which is most commonly used with a urinal.

Compare your responses to the answers given on page 99.

Commercial Lavatories

62

We noted in the introduction that some of the more common materials used to manufacture lavatories and sinks are vitreous china, plastic, cast iron, and steel.

With the exception of light commercial installations, lavatories made of vitreous china are almost always used in other commercial applications. Recall that vitreous china is hard to scratch and it is stain resistant which makes it very durable.

Please refer Series Two, Unit 3 on Residential Sinks and Lavatories for a complete discussion on materials used to manufacture lavatories and for lavatories which might be used for light commercial applications.

Vitreous china

What type of material are you most likely to find in commercial lavatories?

63

Lavatories come in a selection of designs, shapes, and styles. One way in which they are classified into groups is based upon how they are installed or mounted.

In general, commercial lavatories will be installed one of three ways:

- wall mount
- undercounter mount
- vanity top mount
- pedestal mount

By how they are installed/mounted

How are lavatories classified?

64

Wall mounted lavatories are most commonly specified for medium and heavy commercial installations. The wall mount design makes it easy to clean the floor area under the fixture which promotes a more sanitary condition in public places.

Medium and heavy commercial

What two types of commercial installations are most likely to specify wall mounted lavatories?

65

When the lavatory is wall mounted, it will need additional support. There are four ways to support wall hung lavatories:

- arm carriers
- wall hangers
- brackets
- leg supports

The arm carrier is the method most commonly used in commercial installations.

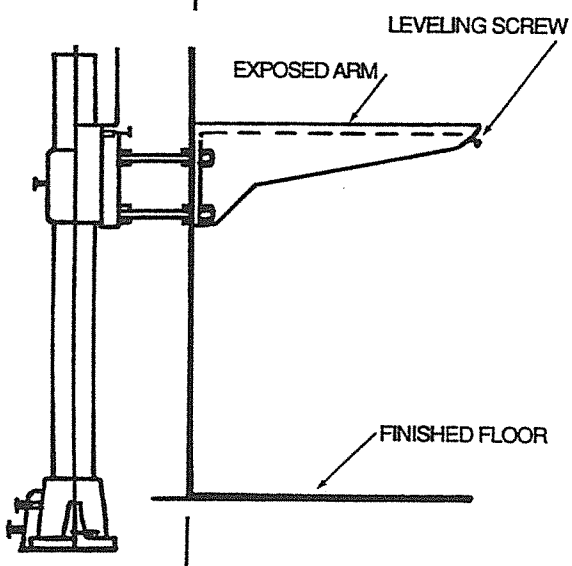
Arm carrier

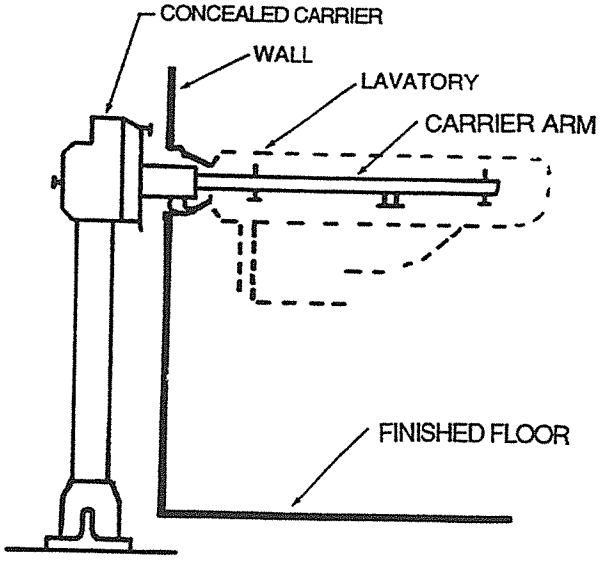
What is the most common method of supporting a wall hung lavatory for a commercial installation?

66

Arm carriers may be exposed or concealed, and each type of carrier fits the lavatory in a different way. Make sure you understand the difference between an exposed or concealed carrier.

In the left illustration, you can see an exposed arm carrier. Notice, exposed arm carriers fit directly under the sides of the lavatory. In the illustration on the right, you can see a concealed arm carrier. Concealed arm carriers are inserted through large, special holes in the back of the lavatory.

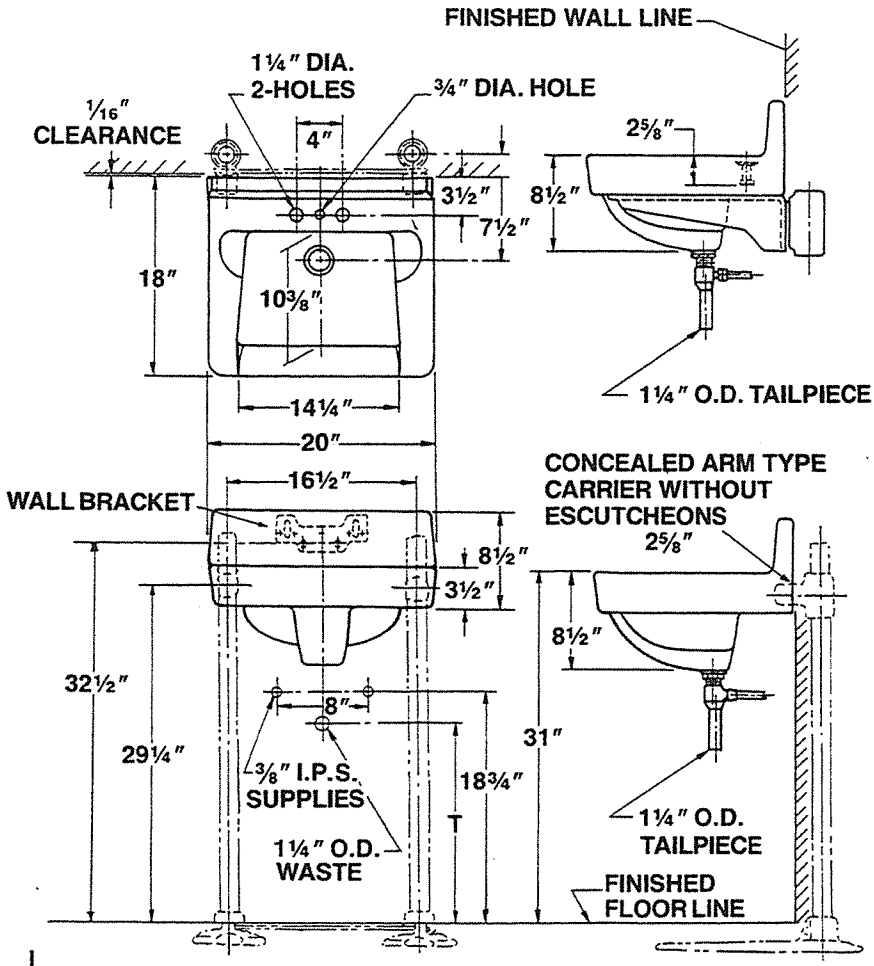




Exposed and concealed

What are the two types of arm carriers used for wall hung lavatories?

Most manufacturers now furnish their lavatories punched for both exposed and concealed arm carriers. However, some manufacturers offer exposed and concealed punch, but the lavatories must be ordered with the type of punch needed for the installation.



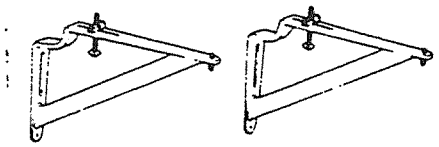
Also, you will find that lavatories made to use carriers may also use hangers. But, when a carrier is used the hanger is not. You may use one or the other, but not both together.

Concealed arm carrier

The lavatory shown above has special holes for a carrier. The hanger supplied with the lavatory will not be used. What type of support needs to be ordered for this lavatory?

6 8

The least common supports used are brackets like the ones below. The brackets are attached to the wall and often used with a backing board.



We will look at various types of carriers and supports used in commercial installations later in this unit.

Brackets

Which type of lavatory support is used less than any other?

6 9

Some manufacturers make wall-hung lavatories to use optional leg supports. They would most often be used in combination with hangers or brackets.

While leg supports may not be as common today, some installations will call for this type of support. Become familiar with manufacturers that offer this type of lavatory.

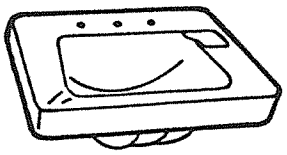
Yes

Are leg supports sometimes used as optional support for wall hung lavatories?

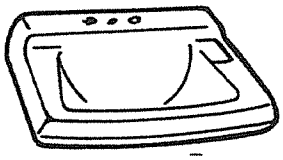
Another way to classify wall mounted lavatories is by the design or shape. The four most common types are

- slab
- raised ledge
- back splash
- shelf

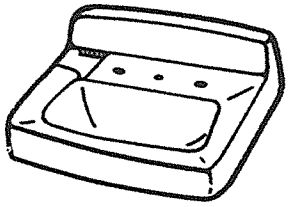
Notice the back of the lavatory changes with each type. Also, the location of the faucet holes may change with each type.



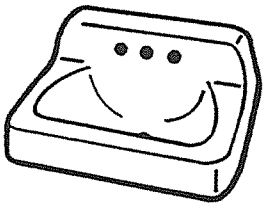
SLAB



RAISED LEDGE



BACK SPLASH

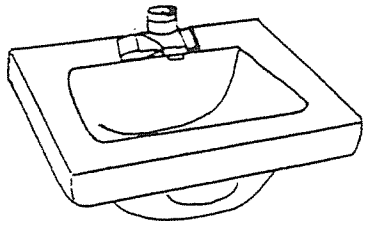


SHELF

Slab, raised ledge, back splash, & shelf

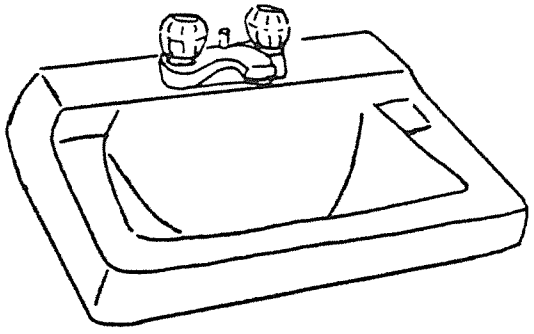
What are the four most common wall mounted lavatories called when classified by shape or design?

A slab lavatory is a wall mounted lavatory which is flat across the back and the fitting mount is flush with the top of the slab.



SLAB LAVATORY

A raised ledge lavatory is shown below. Although similar to the slab design, this lavatory has a raised ledge on which the fitting is mounted.

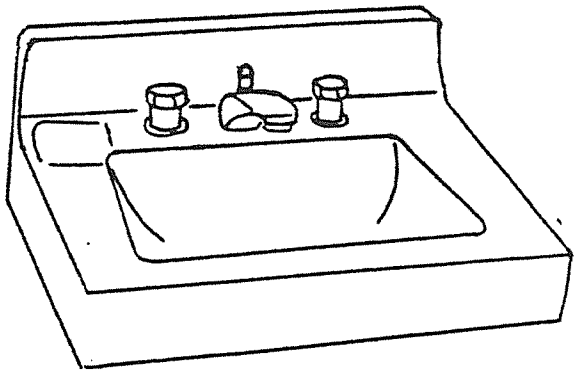


RAISED LEDGE LAVATORY

Along the top of the slab and the raised ledge

Where are the faucet holes punched for slab type and raised ledge type lavatories?

The back splash lavatory has a raised back too. The raised back is also called the "integral back lavatory". The back splash prevents water in the basin from splashing the wall behind the fixture. Notice the back is not wide enough to be used as a shelf. The 4"cc or 8"cc faucet holes are always punched on the ledge, but are in front of the back splash.



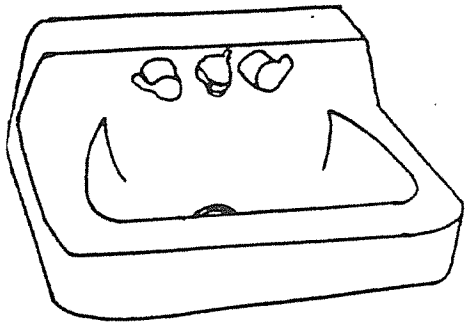
BACK SPLASH LAVATORY

The integral back protects the wall from water splashes

What is the function of a back splash on a back splash type lavatory?

Like the back splash lavatory in the previous frame, the shelf-back lavatory has an integral back splash. However, this back is wide enough to use as a shelf.

The second difference is where the faucet holes are punched. Here, space is gained by mounting the faucet on the vertical face of the back splash.



SHELF BACK LAVATORY

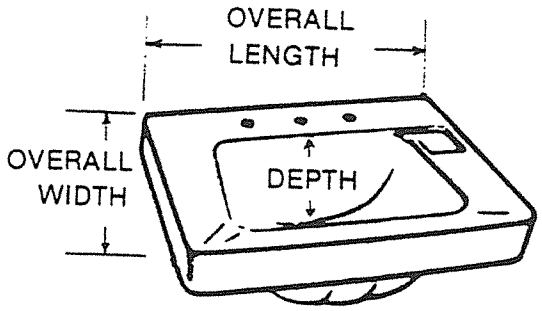
Back splash and shelf back

Name two types of lavatories that have an integral back to protect the wall from splashing water?

7 4

Recall from the unit on Residential lavatories, oval, square or rectangular lavatories are specified by using length and width to determine the size.

Length is measured side to side.Width is the measurement of the distance from the front of the lavatory to the back of the lavatory. Do not confuse the description some manufacturers have in their categories which use "depth" to describe the width of the lavatory. The specification size is what you need to know.

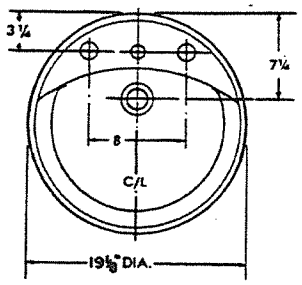


How is the width of a lavatory measured?

The distance from the front of the lavatory to the back of the lavatory

7 5

Round lavatories are specified by diameter. As you might recall, the diameter is the length of a straight line which divides a circle into two equal parts.



This lavatory measures 19 1/8" in diameter.

Round lavatories are most commonly used for a counter or under counter mount. Review the unit on Residential Lavatories and Sinks for additional information about this type of installation.

How is the size of a round lavatory specified?

By diameter

76

We mentioned in previous frames that the faucet holes are punched in different places for the different shapes of lavatories. Recall from previous units that most lavatories are punched with 4"cc (center to center) or 8"cc combination faucets. (You may want to review these in Unit 6.)

Today, commercial installations may use a conventional 4"cc or 8"cc faucet. Or, in many medium and heavy installations, metered or electronic faucets are used. We will review some of these newer faucets later in this unit.

Metered or electronic faucets

What type of faucets might be used in some commercial installations instead of a conventional 4"cc or 8"cc type faucet?

77

Yet another way to classify lavatories is by the type of application. We will look at two, prisons and healthcare facilities.

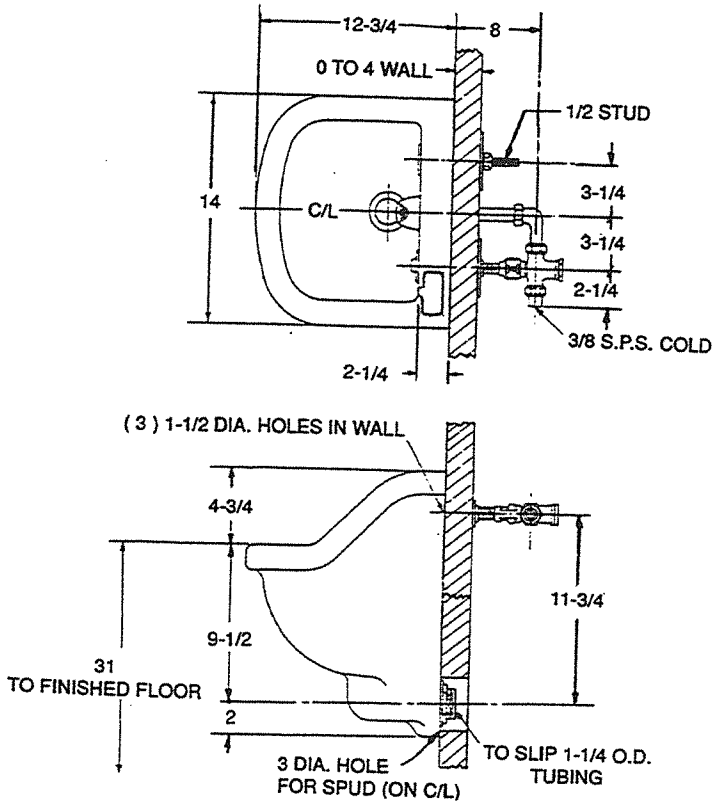
There a two ways that lavatories for prison installations might differ from other types of installations. Because security is the major concern with prison installations, most of the fittings are concealed behind the wall. Also, prison lavatories often have integral components.

Fittings are concealed behind the wall and may have integral components

What are the two ways lavatories for prisons might differ from other lavatories?

Below is one type of lavatory designed for prison installation. Note that this lavatory has:

- an integral drain outlet that connects to a trap installed in the wall. The drain may or may not have a non-removable stopper
- an integral spout that is also a drinking fountain. When users hold their fingers over an area in the spout, water shoots up like a water fountain
- valves which are push button and are self closing. Water will flow only when the buttons are depressed.



A trap installed in the wall

How does the drain outlet on this type of lavatory connect to the DWV system?

79

Another difference to note about a lavatory for prison installations and other lavatories is the overflow. There are two holes in the back of the lavatory which serve as overflows. Even if a stopper was left in the closed position, the lavatory would not overflow and flood the area.

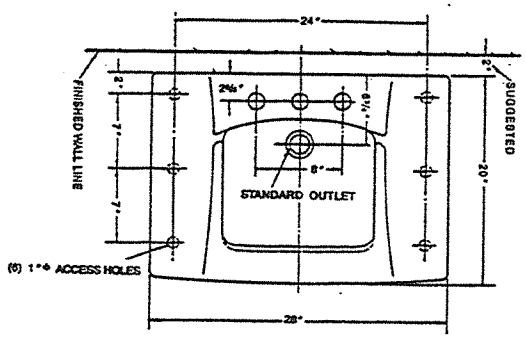
Read your suppliers literature to learn about other types of prison lavatories.

No

If the stopper was left in a closed position, would a lavatory made for a prison installation overflow?

80

Below is an example of a lavatory commonly used in healthcare installations. It is often used in doctor's offices and hospital operating rooms. It will have a gooseneck faucet with wrist handles. These allow the user to turn off the water using the elbow.



Sometimes, this lavatory is single hole punched and fitted with a faucet using a knee action mixing valve which allows for no contact with handles after the hands are washed.

The lavatory with the knee action mixing valve is frequently used in patient's rooms. It fits into a corner and is wall hung; this saves space and allows for more sanitary conditions.

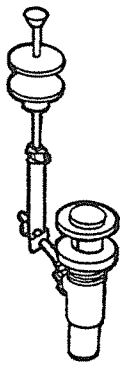
Gooseneck Faucet with wrist handles and faucet with knee action mixing valve

What are the two types of lavatories commonly used in healthcare installations?

81

Drain stoppers for commercial lavatories can be a plug, a pop-up, or a strainer.

In light commercial installations, a pop-up drain (commonly called a P.O. plug) is commonly used. The pop-up drain uses a mechanism called a lift rod to control the opening and closing of the drain and it allows you to open and close the drain without getting your hands wet.

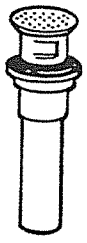


Pop-up (or P.O. plug)

What type of drain stopper is commonly used with lavatories in light commercial installations?

82

In medium to heavy commercial installations, lavatories may use a plug stopper on a chain. More commonly, they will use a P.O. Plug with open grid strainer to prevent vandalism and accidental overflow. The open grid strainer prevents the drain from being closed off.



Also recall from the unit on residential lavatories that all lavatories have overflows. The overflow forms a channel for excess water to flow out of the basin, through an opening (open grid) in the P.O. plug, even when the drain is closed.

P.O. plug with open grid strainer

What is the most common type of drain stopper used in medium or heavy commercial installations?

Another option for commercial lavatories is no drain stopper and some lavatories are designed specifically to be installed without a stopper. This type is often installed to accommodate people with physical disabilities because it might be impossible for some people to operate a drain stopper that had been left closed by a previous user.

Lavatories designed for people with physical disabilities

What type of lavatory might be designed without a drain stopper?

DIRECTIONS: In the space to the left, label each of the following statements "TRUE" or "FALSE".

_____ 1. Wall mounted lavatories promote a more sanitary condition in public places.

_____ 2. Leg supports are commonly used in commercial installations today.

_____ 3. The fitting is mounted on the front of a slab lavatory.

_____ 4. The back splash lavatory has an integral raised back.

_____ 5. Lavatories are specified width first and then length.

_____ 6. Faucet holes are punched in different places for the different shapes of lavatories.

_____ 7. Lavatories always have some type of drain stopper.

_____ 8. One way lavatories are classified is by how they are mounted.

_____ 9. You need to know the difference between an exposed or concealed arm carrier because each fits the lavatory differently.

_____ 10. Brackets are the most common support used in commercial installations.

Compare your responses to the answers given on page 100.

Commercial Sinks

84

Next, we will look at sinks used in commercial installations. We noted in Unit 3, Residential Lavatories and Sinks, that some light commercial applications will require kitchen sinks. Examples are hotels that have small kitchens in guest rooms and some offices that have kitchens for employee use.

Another type of sink sometimes used in both residential and commercial applications is the bar sink. Again, the type of bar sink used in both is most likely found in hotel/motel guest rooms. For a complete discussion on kitchen sinks and bar sinks, review Unit 3, Residential Lavatories and Sinks.

Kitchen sink and bar sinks

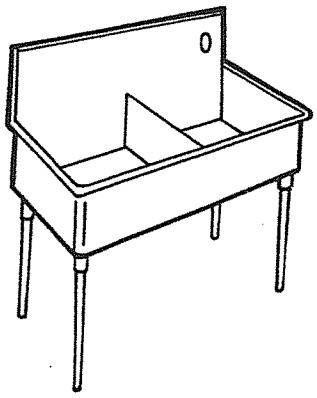
Name two types of sinks for residential applications that are sometimes used in light commercial applications, too.

85

Sinks are separated into groups based upon how they are used. In this section we will look at four groups of sinks:

- scullery
- hand washing
- health care
- service

The scullery sink is used in the commercial market for food preparation. It is the non-residential version of the kitchen sink.



The word "scullery" means a room for washing dishes and cooking utensils. Scullery sinks are bigger and are able to withstand rougher use. Restaurants, factories, schools, and hospitals buy scullery sinks for their kitchens.

Scullary sink

What type of sink is used in the commercial market for food preparation?

8 6

Most scullery sinks are made of stainless steel; however you will find a few sinks made of galvanized steel. Galvanized steel has a zinc coating to protect the steel from rusting, but the material does not stand up against corrosion as well as stainless steel. Galvanized steel is less expensive.

What is an advantage of stainless steel over galvanized steel?

Stainless steel resists corrosion better than galvanized steel

8 7

Gauges of steel for scullery sinks are thicker than the gauges used for residential sinks. You will find 12, 14, 16, and some 18 gauge stainless steel used in making scullery sinks.

Recall from previous units, the smaller the gauge the thicker the stainless steel.

What is the thickest gauge used for commercial sinks?

12 gauge

8 8

Scullery sinks are made of drawn steel or fabricated steel.

Drawn steel is stamped. (Recall from previous units that "drawn" means the steel is actually stretched to form the shape.) Fabricated steel is made by bending and welding steel pieces together to form the sink.

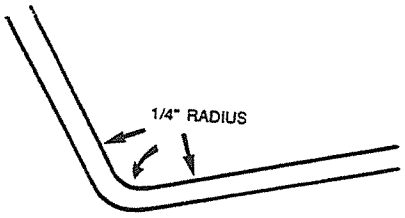
Most scullery sinks are manufactured by fabrication. However some are manufactured using drawn steel for the sink bowl and fabrication for other parts of the sink.

Which manufacturing process is likely to have been used in making a scullery sink?

Fabrication

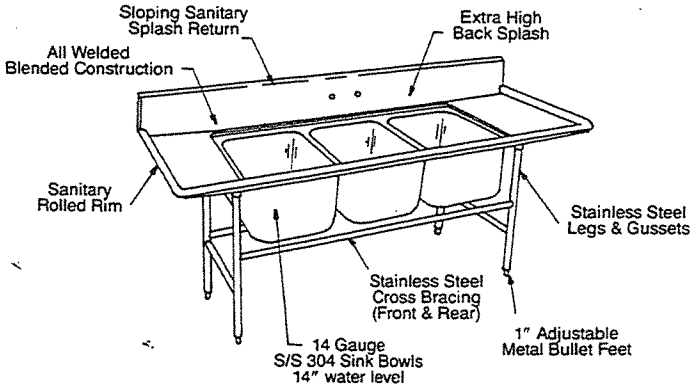
Scullery sink wells have coved or rounded corners. Coved corners make it easier to keep the corners clean and to prevent dirt build-up in the crevices.

The National Sanitation Foundation (NSF) requires a 1/4" radius or more on scullery sink corners.



Fabricated sinks have a 1/4" corner radius. Drawn sinks tend to have a larger radius.

The scullery sink illustrated below has a 3" corner radius according to the manufacturer's specifications. Therefore, this sink does meet the minimum requirement of the NSF.

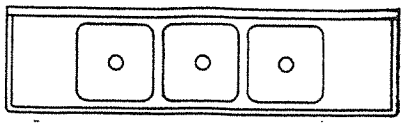


To prevent dirt build up in the crevices

Why does the National Sanitation Foundation standards require coved corners on scullery sinks?

90

Scullery sinks come in one, two, three, or four compartments (bowls). Some codes may require a specified number of compartments; be sure your customer is familiar with codes in your area. Here is an example of a scullary sink with three compartments.



Scullary sinks may also have right or left drainboards; some have both as illustrated above. NSF requires drainboards, when provided, to be with a splash that is integrally welded to the sink. Also, the left to right dimensions of the drainboard must be equal to or greater than the smallest dimension of the sink bowl opening.

They may have one, two, three or four

How many compartments (bowls) do scullery sinks have?

91

Scullery sinks are generally punched with 8" center holes. Sinks with four compartments require two sets of faucet holes.

Some dish and pot sinks also come punched for hot water sanitizing. (A separate heater is installed to raise the water temperature to 180 degrees.) Read manufacturers' information to learn which may offer this feature.

Two

How many sets of faucet holes are required for a four compartment sink?

92

Sink bowl sizes vary depending on the intended purpose. Common sizes are:

- 16" x 20" - dish sink
- 20" x 20" - dish and pot sink
- 24" x 24" - pot sink
- 20" x 28" - pot and pan sink

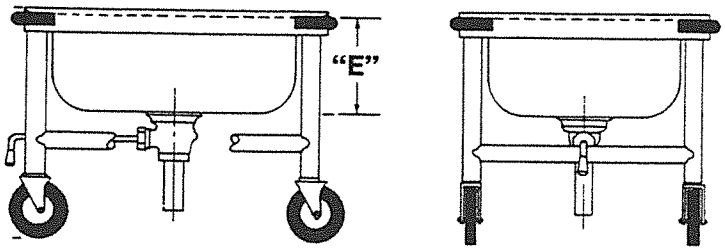
Common depths are 15" and 17" which allows for water levels levels of 12" and 14" respectively.

20" x 28"

If a sinks designated purpose is a pot and pan sink, what is the size likely to be?

93

Another sink sometimes used in a scullery operation is a soak sink which is used to collect and wash, dishes and flatware. This type of sink is mobile so it can be moved around the clean up area for greater flexibility.



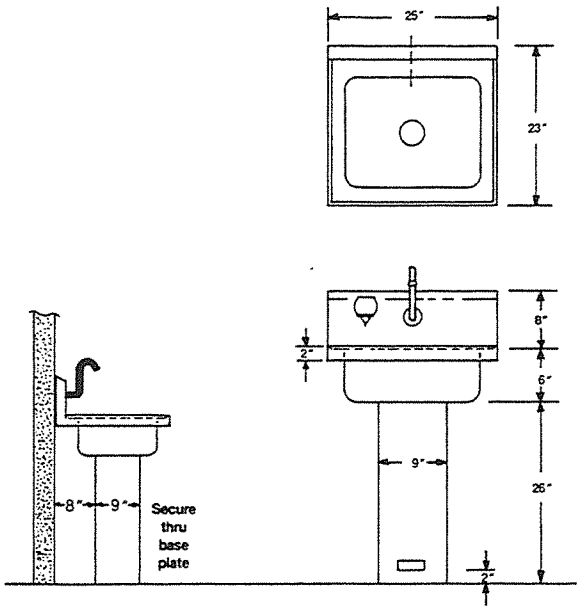
Because the sink is mobile, it has a different type of drain. A twist lever drain is used to empty the waste water from the sink into a floor drain.

By a twist lever drain into a floor drain

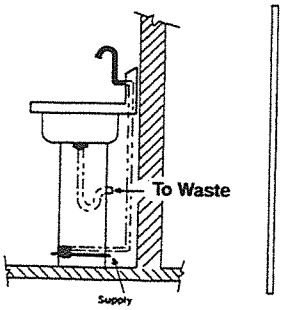
How is the waste water removed from the mobile soak sink?

The second group of sinks are called hand washing sinks. Schools, factories, or food preparation areas often have this type of sink. They look very much like a lavatory, but will most commonly be made of stainless steel or enameled cast iron.

The sink illustrated below would most often be used where food is prepared. (Some health department codes requires that multiple hand washing sinks be installed in larger operations.) The sink is made with stainless steel and has coved corners for easy maintenance.



Hot and cold supply connect to the pedal valves.

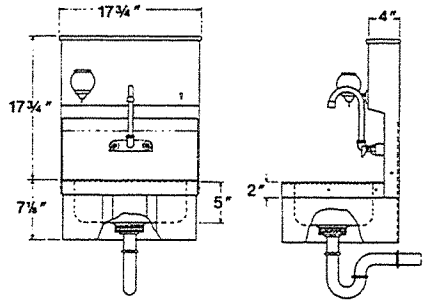


Pedal valves

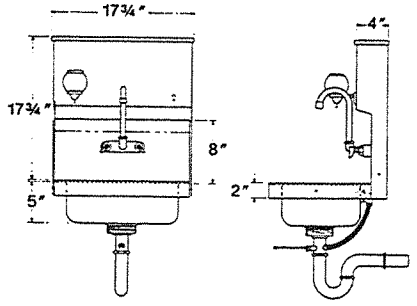
What type of valve does the sink illustrated above use?

The lavatory sink in the previous frame is mounted on a pedestal which is then secured to the floor. Other types of hand washing sinks may be wall hung.

Depending on the intended use, other types of hand washing sinks may use a conventional faucet or a knee operated valve like those illustrated here.



WALL MOUNTED WITH CONVENTIONAL FAUCET



WALL MOUNTED WITH KNEE VALVE

Review your suppliers literature for the types of hand washing sinks available.

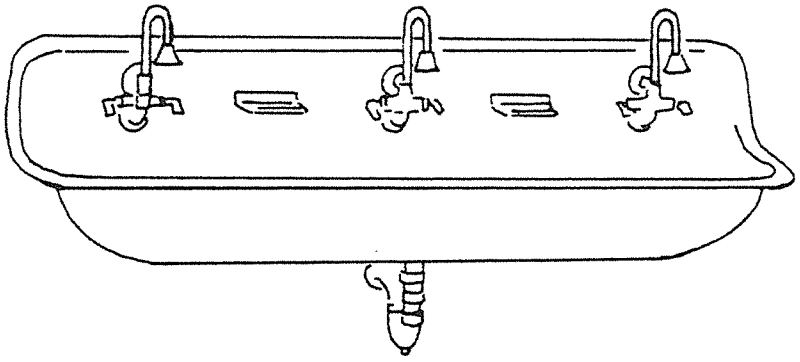
Knee operated valve

In addition to a conventional faucet, what other type of valve might a handwashing sink use?

96

Another hand washing sink is sometimes called a group wash sink. Group wash sinks are used primarily for washing hands and has space for two or more people to use the sink at the same time. This sink is most commonly used in schools and factories.

The wash sink illustrated below is made of enameled cast iron and comes punched with two or three faucet fillings. It is mounted to the wall using hangers.



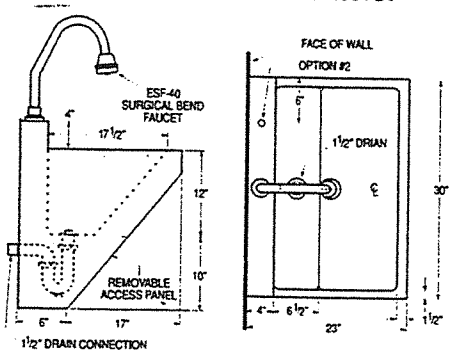
Schools or factories

Where would you most likely find a group wash sink?

97

The third group of sinks we will look at is used in health care applications. One common type of sink in this group is the scrub sink. This sink is often used by health care professionals preparing for surgical procedures.

The scrub sink illustrated below is wall mounted using an exposed bracket support. Scrub sinks come with single hole punch or with faucet holes on 8" centers.



The dimensions of the scrub sink is specified the same way as other sinks and lavatories.

A scrub sink

What type of sink is used by healthcare professionals preparing for surgical procedures?

98

Another type of sink used in health care applications is the clinic service sink. Do not confuse this sink with the service sinks we will look at next. This sink is used in connection with patient care and is commonly used to empty and wash bed pans.

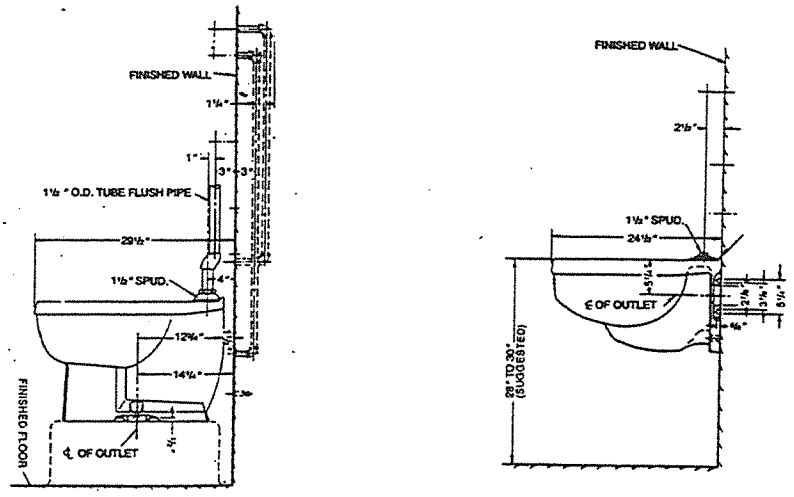
This serivce sink is is distinctive because it fuctions both like a sink and a water closet.

Empty & wash bed pans

What is a health care service sink commonly used for?

99

Below are illustrations of two types of health care service sinks. The sink on the left is floor mounted and has a siphon jet flushing action flushing rim. The sink on the right is wall mounted and has a blowout action flushing rim.



The sink on the left may also be specified to use any one of the following to clean out waste:

- faucet
- pedal valve
- flush valve
- bed pan cleanser

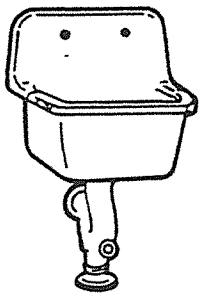
We will cover these flushing mechanisms and faucets later in this unit.

Floor or wall

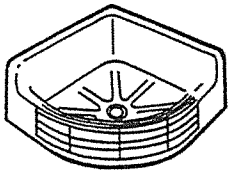
What two ways might a service sink used in healthcare applications be mounted?

100

Service sinks are used for janitorial and clean-up work. These sinks are made of enameled cast iron, stainless steel, and vitreous china. They are available in two installation methods: wall mounted or floor mounted. Floor mount service sinks are commonly called mop sinks or mop basin.



WALL MOUNTED



FLOOR MOUNTED

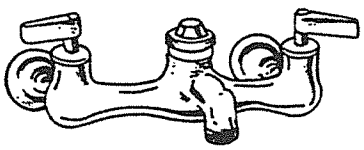
Mop sink or mop basin

What is another name for a floor mount service sink?

101

Faucets for service sinks have special spouts. This spout usually has a hook to hang a bucket.

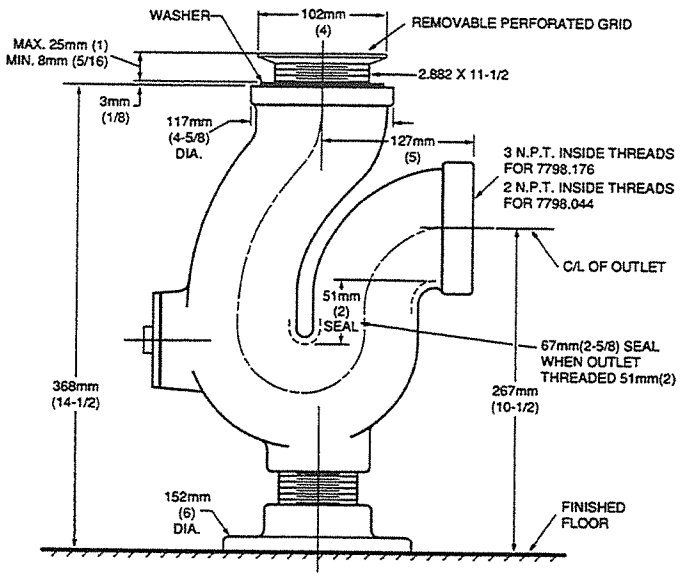
If the spout has a thread it is a hose-thread and it will be at the outlet for the hose attachment. Some service sink faucets do not have any threads at all. When this faucet does have a hose thread, most codes require a vacuum breaker to prevent the back flow of dirty water into the supply system.



Hose thread

When there is a thread what type of thread is found on a service sink faucet?

Wall mounted service sinks need a special type of trap. The trap has a larger I.D. (inside diameter) than most. Since the large trap is also used to help support the sink, it is called a "trap standard." The trap is generally glass lined to prevent corrosion.



It is important to know the rough-in distance for the trap connection to the DWV system. This rough-in distance is measured from the centerline of the trap outlet to the finished wall or floor. This rough-in dimension will vary with manufacturers.

Trap standard

What is the large trap that is also used to help support the sink called?

Drain connections depend on the type of trap used. P-traps use a 2" or 3" IPS connection. Used less today is the S-trap which used a 3" or 4" lead or soil pipe connection. (Most codes prohibit S-traps). The wall P-trap design allows room to make a screwed connection. Floor S-traps must have a caulked connection because the rough-in dimensions do not allow enough room to rotate the trap.

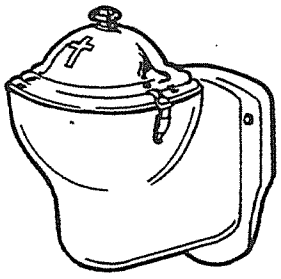
Review the unit on Residential lavatories and sinks for more information about waste or drain connections for sinks.

Floor traps

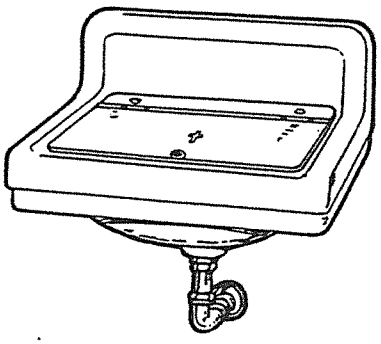
Which trap has a caulked connection?

There are a few special sinks which have characteristics you should know. Sinks made for use in churches and other religious institutions have an important characteristic not found with the other sinks discussed. Normally the drain is not connected to the DWV system because blessed water should not mix with waste water.

A holy water dispenser is where Blessed water is often stored in a small tank behind the dispenser. The drain is connected to a jar and when the jar is full, the used water is sprinkled over the church lawn.



The sacristy sink is used to wash the church vessels and linens. It has a cover and lock for one bowl. There's a single drilling for clod water connection. Water from the sink drains into a chamber beneath the church or into a sand filled well.



These sinks are not connected to the DWV system

What is the most important difference between the sinks here and the more common sinks we have studied?

DIRECTIONS: Match the terms on the left with the correct definition listed on the right.

1. _____ scullary sink
2. _____ coved
3. _____ soak sink
4. _____ scrub sink
5. _____ clinic service sink
6. _____ service sinks
7. _____ trap standard

a. special fitting used to help support a service sink

b. non-residential version of the kitchen sink, used when food is prepared

c. functions like both a sink and a water closet

d. corners which make it easier to keep the sink clean and prevents dirt build up in the crevices

e. used for janitorial and clean up work

f. mobile fixture used in scullary operations

g. often used by healthcare professionals preparing for surgical procedures

Compare your responses to the answers given on page 100.

Commercial Faucets, Valves and Supports 105

Next, we will look at faucets, flush valves, and support fittings commonly used in commercial installations.

First, you may want to review Series Two, Unit 6, Faucets and Accessories for information about faucet design and common materials used to manufacture them. In this unit we will focus on faucets used only in commercial installations.

In previous units you learned that a faucet is a valve located at an outlet in a piping system and is used to control the delivery of the water to a fixture.

Faucet

What is the valve called that is used to control delivery of the water to a fixture?

106

In general, you will find the same types of lavatory and sink faucets used in residential installations also used in light commercial applications. However, you probably would not find the "decorative" or "upscale" faucet in commercial installations. (See the unit on faucets and accessories.)

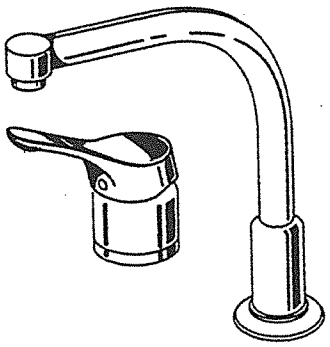
Like residential faucets, the type of lavatory or sink selected determines how the faucet is mounted. Too, like residential installations, commercial lavatories and sinks are punched to accommodate various types of faucets.

Decorative or upscale

What kind of faucet would you probably not find in commercial installations?

Generally you will find the same types of faucets in residential and light commercial installations.

You would most commonly use the faucet shown on a sink in a commercial installation, but it is also frequently requested for residential use. It is a single handle lever type with a high arc spout. The handle returns to the neutral position when the valve is turned off. The arc allows more room for maneuvering large items, such as pots and pans.



This faucet meets the guidelines specified in The Americans With Disabilities Act (ADA). The ADA is a code your customers need to consider when choosing faucets for commercial installations.

For more information on ADA guidelines, refer to Unit 8 of this Series, Special Needs Products for Assisted Living.

The ADA code

What guidelines does this type of faucet meet?

108

Next we will look at faucets designed specifically for commercial use. Two types of faucets commonly used on lavatories in medium and heavy commercial installations are:

- electronic faucets
- self-closing faucets

Electronic faucets use an infrared sensor system to activate the water flow and turn the flow off. These faucets respond to the public's concern about water conservation and sanitary conditions because the user's hands do not touch handles and the water shuts off automatically.

Self-closing faucets have a button on top and when the user applies pressure, water flows out of the spout and then closes automatically.

Electronic and self-closing

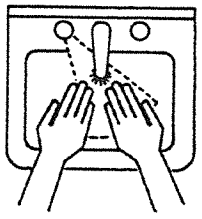
What two types of faucets are commonly used on lavatories in medium and heavy commercial installations?

109

Sensors for electronic faucets are commonly located in one of these places:

- a device mounted along side the spout on the trim
- plate
- on the throat (underside) of the faucet
- on a sensor plate mounted on the wall

Regardless of where the sensor is located, each uses the same principle: placing the hands or the body in ranges of the invisible (infrared) light beam. Water flows as long as the user's hands or body remain within range. When the user walk away, the water stops.

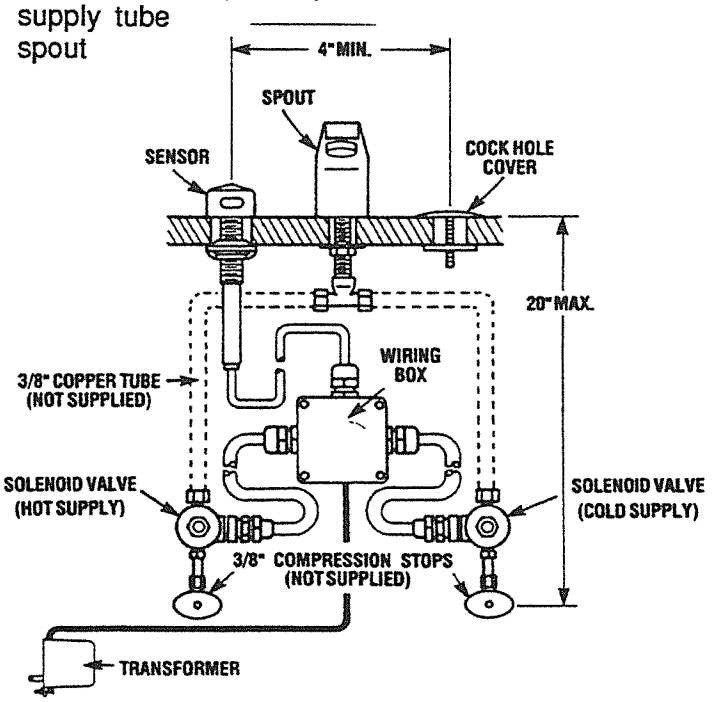


Placing the hands in range of the invisible light beam

What activates the water flow on an electronic faucet?

All electronic faucets have the following parts in common:

- transformer
- control module
- sensor
- solenoid valve (1 or 2)
- supply tube
- spout



The transformer converts the incoming electrical voltage to low 24V to increase safety.

The control module or junction box connects are the wiring needed for the system.

The sensor is the switch that activates the solenoid valve.

The solenoid valve controls the water flow. As long as the user is within the sensor's range, the valve allows water to flow. When the user is out of the sensor's range, the solenoid valve closes.

The supply tube carries the water from the solenoid valves to the faucet spout.

transformer, control module, sensor, solenoid valve, supply tube, and spout

What are the six parts common to all electronic faucets?

111

Electronic faucets may have one or two solenoid valves. The faucet will have one solenoid valve when a separate mixing valve is used. Also, when a bank of faucets is installed, one mixing valve might provide blended water to several faucets, so each faucet would have one solenoid valve to control the water flow.

One

How many solenoid valves would a faucet have when a separate mixing valve is used?

112

The electronic faucets we have discused in previous frames have used electricity as the power source. You should know some electronic faucets use batteries as the power source.

Some customers are choosing to retrofit existing faucets with an electronic faucet. The battery powered faucet is one way to retrofit without additional electrical wiring.

Batteries

What might be used as a power source on an electronic faucet other than electricity?

113

Some manufacturers offer electronic faucets with a choice of spouts-- a common horizontal spout or a goose neck spout. They also offer a choice of single hole mounting or 4" centers.

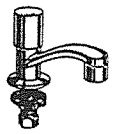
Review your suppliers literature to learn more about the electronic faucets your company stocks and sells.

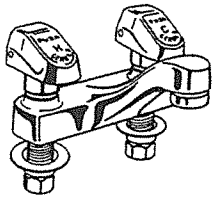
Horizontal or goose neck

What are two common choices of spouts with electronic faucets?

114

Self closing or push-type faucets have a button on top and when users apply pressure, water flows out of the spout, then closes automatically. The illustrations below show two push-type faucets for lavatories.





By applying pressure to the button, water flows, then closes automatically

How does the self-closing or push-type faucet work?

115

The push-button faucet shown in the previous frame (on the left) typically delivers either all cold water or all hot water. Your customer might use this faucet in facilities such as roadside rest stops.

The push-type faucet on the right in the previous frame typically delivers blended water. Your customer might use this faucet in facilities such as airports.

The two handled push -type

Which of the two faucets in the previous frame delivers blended water?

116

Some push-type faucets may have a flow regulator, also called a flow control. A flow regulator is a device that limits the flow of water under various pressures.

Other push type faucets may have a metering device as part of its construction. This type allows the installed to adjust the faucet to discharge a specific amount of water--for example, 1/2 gallon per minute.

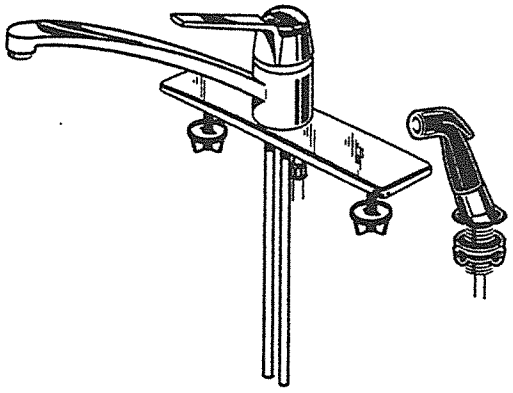
Second, the metering action may be adjusted to keep the water flowing for a specified length of time. The ADA requires a minimum of 10 seconds for self-closing faucets.

A flow regulator or a metering device

What are two methods used to control the flow of water in push-type faucets?

117

We mentioned earlier that sinks in light commercial applications use the same faucets as residential installations. Below is an example of a faucet that the manufacturer has designated as a commercial kitchen faucet. Note that, in general, it looks no different than a residential faucet.



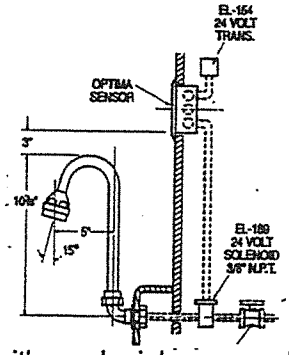
You may find that both your commercial customers and residential customers request gooseneck and hi-arc spouts. These two spouts allow more room for maneuvering large items such as pots and pans. Also, the gooseneck and hi-arc spout are commonly used to accommodate users with special needs.

Gooseneck and hi-arc

Name two types of faucet spouts commonly used on sinks in commercial and residential applications.

118

Earlier, we looked at sinks used in healthcare installations. Below is an example of a faucet used with scrub sinks. Note, the faucet is electronic with a gooseneck spout.



Some faucets used with scrub sinks use pedals to activate the water flow. Pedals may be knee or foot operated.

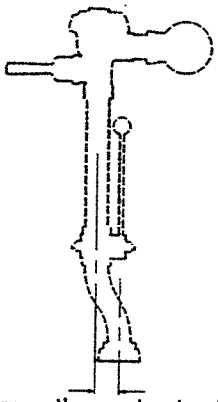
Electronic or pedals

What are two ways to activate the water flow on a scrub sink faucet?

119

Previously we looked at a clinic service sink which is used to empty and wash bed pans. This type of sink is not used to wash hands.

Below is a faucet commonly used with this type fixture. It is a combination flushing valve and faucet. It has a flush valve on a waste fixture; the arm is a bed pan washer.



A diverter valve allows the water to discharge by flushing or it can be discharged through the faucet. This valve may be activated one of three ways: Electronically, manual handle, or foot pedal.

Diverter valve

What valve determines how the faucet will discharge water?

120

Next, we will look at flush valves used with water closets and urinals. In the unit one water closets and urinals, we looked at water closets and urinals with tanks and the type of flush valves commonly used. We will not repeat that information here but will focus on flush valves used with tankless closets and urinals.

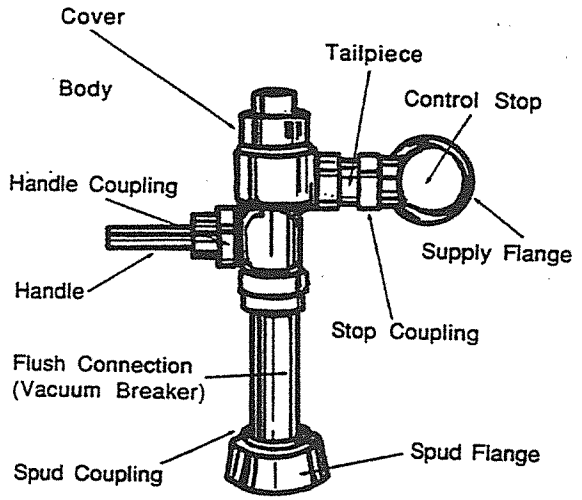
Recall that tankless closet and urinals flushing valves are pressurized flushing devices. They use the water supply to create a pressurized discharge to flush the fixtures. A common term used for these valves are flushometer valves.

Flushometer

What is a common term for flush valves used with tankless closets and urinals?

121

The flush valve used in a tankless design has some of the same parts found in a tank type design. It has a built-in supply stop, a vacuum breaker, and a valve which releases water into the closet bowl. Each of these perform the same function as in a tank type closet.



A closet bowl with flush valve is often specifies for installations which must handle frequent use. Water to flush the bowl is always available because there is no waiting for the tank to refill with water.

Closet bowl with flush valve

What type of fixture is often specified for installations which must handle frequent use?

122

We mentioned earlier that water conservation codes in some areas require that the flushing action on closets use no more than 1.6 gallons per flush and other areas will require no more than 3.5 gallons per flush. Many tankless closet flush valves are available as how consumption valves with a 1.6 gallon flush cycle or as a water saver valve with a 3.5 gallon flush cycle.

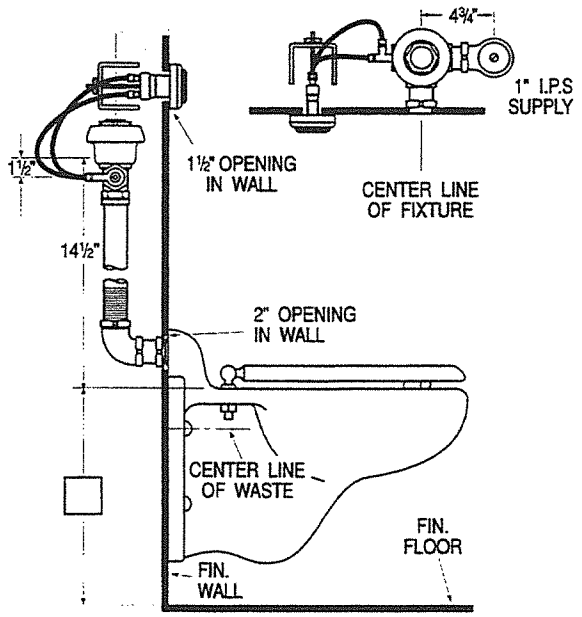
1.6 gallons per flush

How much water does a low consumption tankless closet valve use?

123

You need to be aware that tankless flush valves are available in a number of different styles. Generally, flush valves operate manually or automatically.

Manually operated flush valves may use a handle, a foot pedal, or a push button to activate the flushing action. Sometimes, these flush valves may be referred to as hydraulic flushing. With hydraulic flushing, the system uses water pressure to activate the valve. A push button releases water (at line pressure) and forces the water through hydraulic lines to a plunger attached to the Flushometer. Pressure forces the plunger against a relief valve which begins the flushing action.

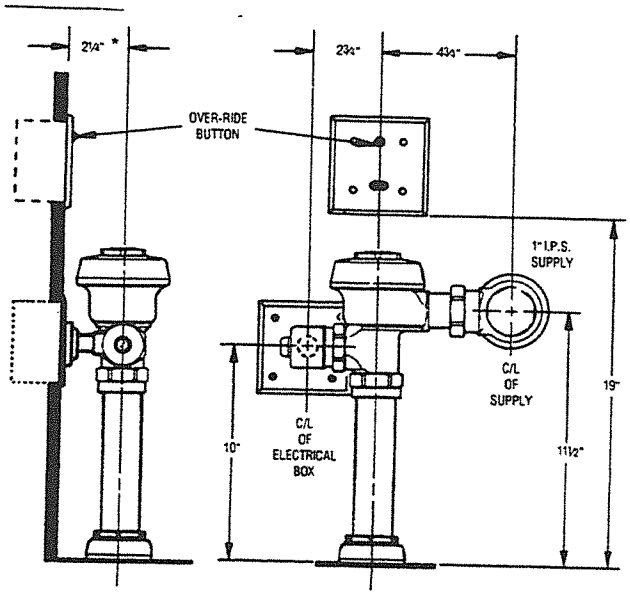


Automatically or manually

What are the two ways flush valves generally operate?

Automatic flush valves generally use electronic circuitry to activate the flushing action.

Electronic flush valves like electronic faucets operate by means of an infrared sensor. Too, electronic valves have a: transformer, control module, and a solenoid operator. Although both valves and faucets operate by means of an infrared sensor, flush valves are different.



As the user enters the sensor's range, the beam is reflected into a scanner window and activates an electrical circuit. Once activated, the output circuit continues in a "hold" mode as long as the user is within the range of the sensor. When the user steps away from the sensor, the loss of reflected light initiates an electrical "one-time" signal that operates the solenoid and starts the flushing cycle to flush the fixture. The circuit then automatically resets, ready for the next user.

When the user steps away from the sensor

When does the solenoid receive the signal to start the flushing cycle to flush the fixture?

125

Electronic valves commonly have an over ride button to allow manual flushing of the closet or urinal. This helps facilitate cleaning and also allows a courtesy flush.

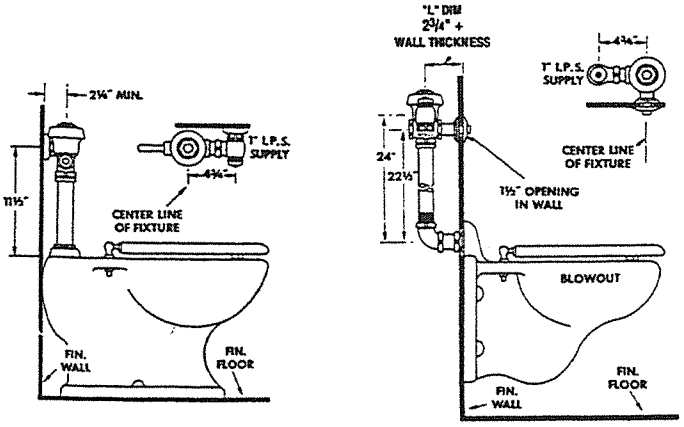
Like electronic faucets, electronic flush valves may use electricity or batteries as their power source.

Allows the closet or urinal to be flushed manually

What does an over ride button do?

126

Recall that flush valves are ordered separately from the closet bowl or urinal. Manufacturers often specify the type of flush valve needed, one choice is whether the flush valve will be exposed or concealed behind a wall.



EXPOSED CONCEALED

An exposed flush valve is shown below. All of the outside valve parts can be seen. This type of flush valve is most commonly used with closets or urinals that have a tap-inlet spud. However, some manufacturers offer an exposed valve that can be used with closets that have a back inlet spud.

A concealed flush valve is installed behind the finished wall. This type of flush valve may have only the operating handle (or sensor) where it may be seen. This type of flush valve is most commonly used with closets which have a back inlet spud.

Exposed or concealed

What are two ways flush valves are ordered?

127

We mentioned earlier that flush valves for water closets and urinals have the same parts and operate the same way. However, there are differences you need to be aware of.

Recall that the wall hung urinal is the most common and it will have either a tap or a back inlet spud to connect the flush mechanism to the fixture.

Wall hung urinals are available with 3/4"", 1 1/4" or 1 1/2" inlet spuds. You will need to specify the model that matches the urinal spud size and the location of the spud (tap or back).

3/4", 1 1/4" and 1 1/2"

What are three common inlet spud sizes for wall hung urinals?

128

Another difference between valves used for water closets and urinals is the amount of water used for the flushed cycle. Low consumption urinal valves have 1 gallon flush cycle and water saver valves have 1.5 gallon flush cycle.

Like water closets, you will need to specify the flush cycle when ordering.

1.5 gallons per flush

How much water per cycle does a water saver valve for urinals use?

129

We mentioned earlier that wall hung plumbing fixtures are mounted using arm carriers or "chair" supports. These fixture supports are concealed in the wall and support the load of the fixture by using a face plate and base support which is usually anchored to the floor or studs.

We will look at supports used to mount:

- water closets
- urinals
- lavatories
- sinks

How does the carrier support the load of the fixture?

Uses a face plate and base support which is anchored to the floor or studs

130

Supports used in commercial installations are commonly made of cast iron or steel. When cast iron is used, manufacturers will sometimes add a galvanized coating to increase longevity and decrease rusting of the cast iron. (Recall from previous units that galvanizing is the process of applying a zinc coating to the cast iron.)

What two materials are commonly used to make carrier supports?

Cast iron or steel

131

In general, fixture supports may be stud mounted or floor mounted. With each type, the base is anchored to either the floor or wall studs with 1/2" bolts.

Type of construction, type of fixture, and code are all considerations for choosing the type of support mount.

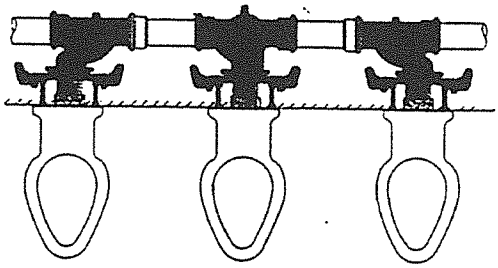
What two ways might a fixture support be mounted?

Stud mount or floor mount

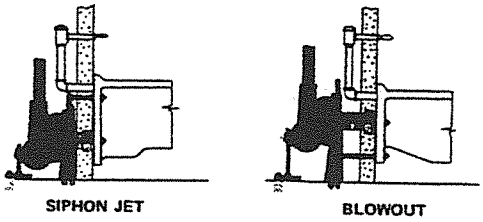
Now, let's look at supports specifically designed for water closets. Carriers for water closets are designed to accommodate different types of installations:

- battery
- single
- physically handicapped

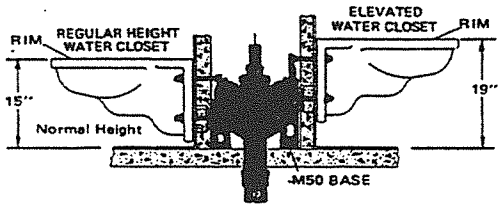
Below on is an illustration of a typical battery installation. We saw this type of piping system earlier in this unit.



And, here is an illustration of a single installation.



And, below is a support used to mount a water closet to accommodate the physically handicapped. (Recall that codes require a 17" to 19" seat height.) This special support is designed with an elevated support base to increase the height of the toilet bowl.



Will one type of carrier accommodate all types of water closet installations?

No. Each installation uses a different support design

Carriers for water closets are made with or without the required fittings. In the battery installation below the support has the fittings needed to connect it to the DWV system.

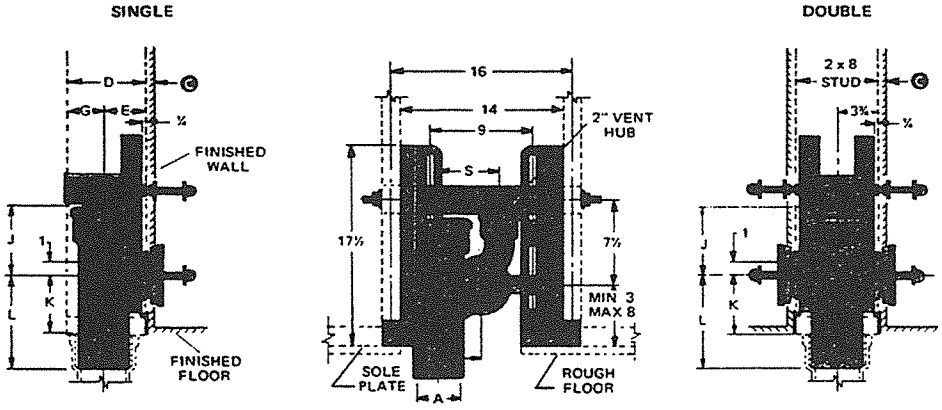
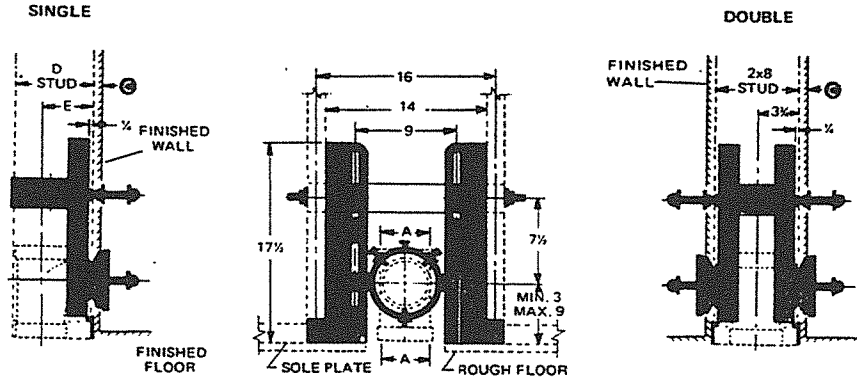


Fig. 550-R Side View

Front View

Fig. 550-D Side View

The illustration below shows a face plate type support without the required fittings. Separate fittings are needed to connect the water closet to the DWV when this support type is used.



Side View

Front View

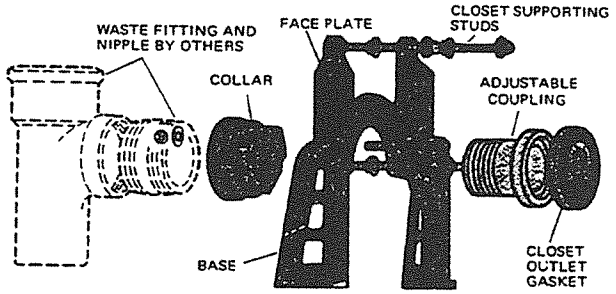
Side View

With a separate fitting

If your customer uses a face plate type support without fittings, how would the water closet connect to the DWV?

Another factor used to determine the support design is the type of bowl to be mounted.

Siphon jet bowls use four fixture studs to secure it to the support. The fixture stud is the bolt like extension that fits into the holes punched in the fixture for mounting.



The blowout bowl uses three fixture studs to secure it to the supports.

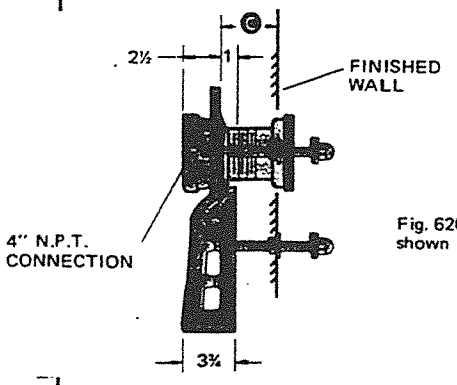
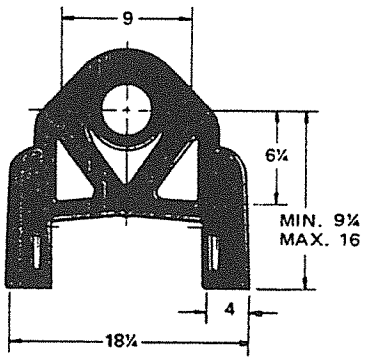


Fig. 620 shown

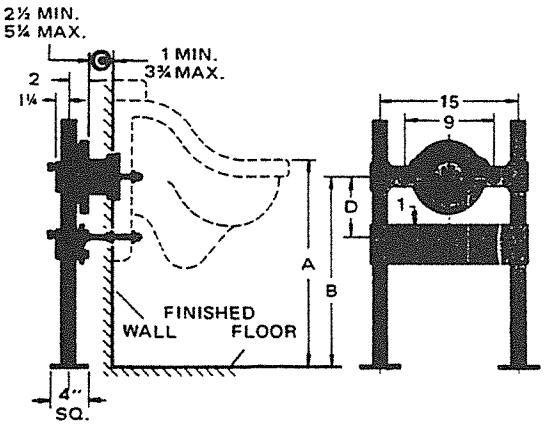


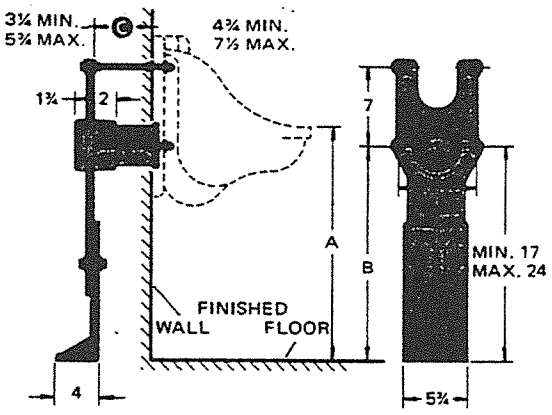
four

How many fixture studs will a support need to secure a siphon jet bowl?

As with water closet supports, urinal supports need to be specified for the type of flushing action and the type of urinal.

Below are illustrations of supports commonly used to mount blow out urinals. Note that the support has three support studs to connect to the fixture. Note that this support anchors to the floor.



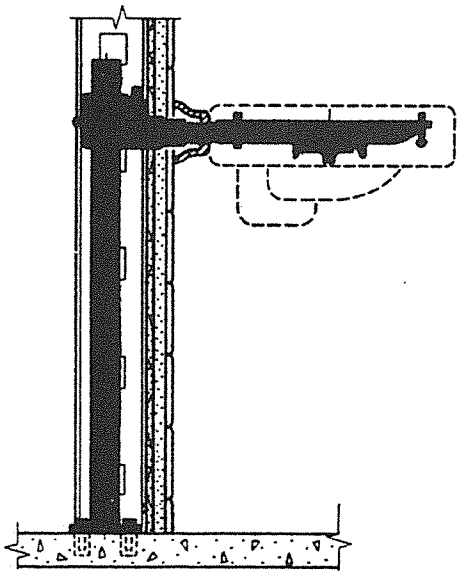


Type of flushing action and the type of urinal

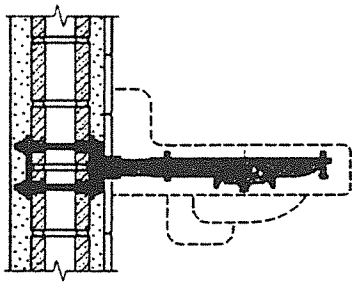
What two factors need to be specified for urinal supports?

Next we will look at supports used for lavatories and sinks. Like water closets and urinals, supports for lavatories and sinks may be floor mounted or wall mounted.

Floor mounted supports have a base support which is anchored to the floor.



Wall mounted supports are anchored to wall studs or special plates or backing boards designed to carry the weight of the fixture.



Wall mounted or floor mounted

What are two ways supports for lavatories and sinks might be mounted?

137

The most common type of support used for lavatories and sinks are arm carriers. Earlier we noted these carriers might be expose or concealed. The one used most often today is the concealed arm carrier. Regardless of which type is used, each will have their basic parts:

- adjustable sleeve
- arm support
- leveling screws

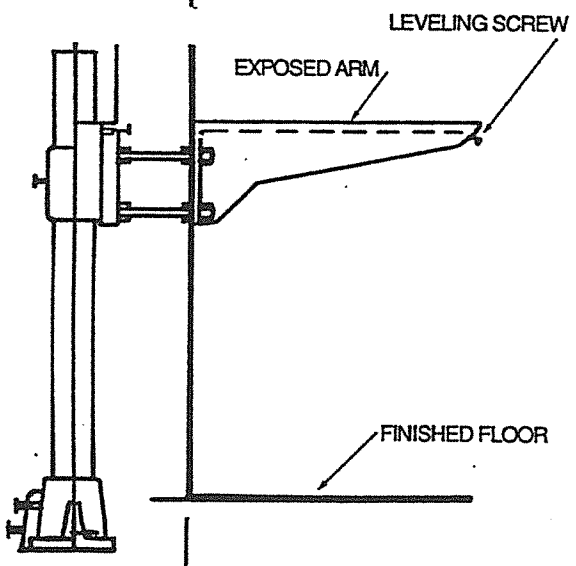
We will cover each of these in the next frame.

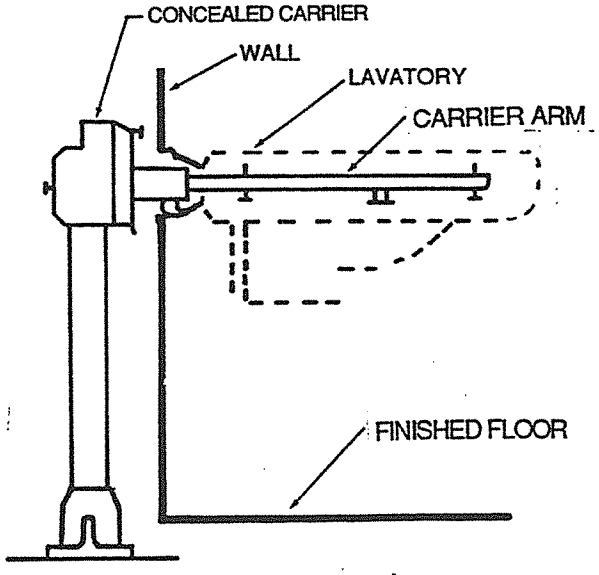
Concealed arm carrier

Which type of arm carrier is most commonly used today?

138

The three parts common to all arm carriers are: (1) The adjustable sleeve which allows the carrier to be adjusted vertically to meet specific rough-in heights. (2) The arm support which attaches to the fixture and the support. (3) The leveling screw which is used for proper leveling of the fixture.





Adjustable sleeve, arm support, and leveling screw

What are three parts common to all lavatory and sink arm carriers?

139

Like supports for water closets and urinals, there are many variations of supports for lavatories and sinks. And, like water closets and urinals, the type of construction, type of installation, and code requirements are all considerations for selecting a support.

Yet another consideration is the type of lavatory or sink to be mounted. You will need to specify the type of lavatory or sink because holes for mounting may be punched according to the type. And, you may need to specify concealed or exposed arm carriers.

Study manufacturers' catalogues for the type of supports your company sells.

Holes for mounting may be punched according to the type lavatory or sink

Why do you need to specify the type of lavatory or sink when considering a type support?

140

In general, supports for service sinks and sinks used in health care installations are heavier than other types of supports because the shape and size of these sinks requires a different type of support to handle the weight of the fixture.

Refer to manufacturers' liturature for recommendations on the type of support necessary for these special use fixtures.

The shape and size of these types of sinks require a different type of support

Why are supports for service sinks and sinks used in healthcare installations generally heavier than other supports?

DIRECTIONS: Fill in the blank with the word or words which best complete each statement.

1. A _____ is a valve located at an outlet in a piping system and is used to control the delivery of water to a plumbing fixture.

2. _____ faucets use an infrared sensor system to activate the flow of water and to turn the water flow off.

3. The _____ is the switch that activates the _____ valve which controls the water flow on an electronic faucet.

4. A combination flushing valve and faucet has a _____ which allows the water to discharge by flushing or through the faucet.

5. Tankless closet valves and urinal flushing valves are both considered _____ flushing devices.

6. Tankless flush valves operate _____ or automatically.

7. Electronic valves commonly have a (an) _____ _____ to allow manual flushing of the closet or urinal.

8. A _____ flush valve is installed behind the finished wall.

9. Wall hung fixtures are mounted using _____ _____ .

10. The bolt like extension that fits into the holes punched in the fixture for mounting is called the _____ _____ .

11. A common type of support used for lavatories and sinks are called _____ _____ .

12. The _____ _____ is used for proper leveling of a fixture.

Compare your responses to the answers given on page 100.

REVIEW ANSWERS

Overview of Commercial Fixtures, page 13

1.	FALSE	*See Frame 1*
2.	TRUE	*See Frame 3*
3.	TRUE	*See Frame 4*
4.	FALSE	*See Frame 5*
5.	FALSE	*See Frame 7*
6.	TRUE	*See Frames 8 & 9*

Commercial Water Closets, page 33

1.	pressure assisted & gravity feed	*See Frame 14*
2.	elongated	*See Frames 18*
3.	10" and 13"	*See Frame 19*
4.	top inlet and back inlet	*See Frame 20*
5.	the bowl design	*See Frame 23*
6.	reverse trap, siphon jet, blowout and siphon vortex	*See Frame 24*
7.	blowout	*See Frame 29*
8.	thru the wall	*See Frame 31*
9.	closet carrier or chair carrier	*See Frame 32*
10.	1.6 gallons per flush	*See Frame 13*

Urinals, page 49

1.	trough	*See Frame 52*
2.	flush pipe assembly	*See Frame 58*
3.	wall hung	*See Frames 44 & 43*
4.	bacteria buildup	*See Frames 51 & 57*
5.	blowout, siphon jet, and washout	*See Frame 46*
6.	outlet	*See Frame 56*
7.	spreader	*See Frame 55*
8.	flush valve	*See Frame 39*
9.	electronic flush valve	*See Frame 40*

Commercial Lavatories, page 63

1.	TRUE	*See Frame 64*
2.	FALSE	*See Frame 69*
3.	FALSE	*See Frame 71*
4.	TRUE	*See Frame 72*
5.	FALSE	*See Frame 74*
6.	TRUE	*See Frame 76*
7.	FALSE	*See Frame 83*
8.	TRUE	*See Frame 63*
9.	TRUE	*See Frame 66*
10.	FALSE	*See Frame 68*

Commercial Sinks, page 76

1.	b	*See Frame 85*
2.	d	*See Frame 89*
3.	f	*See Frame 93*
4.	g	*See Frame 97*
5.	c	*See Frame 98*
6.	e	*See Frame 100*
7.	a	*See Frame 102*

Commercial Faucets, Valves and Supports, page 98

1.	faucet	*See Frame 105*
2.	electronic	*See Frame 108*
3.	sensor, solenoid	*See Frame 110*
4.	diverter valve	*See Frame 119*
5.	pressurized	*See Frame 120*
6.	manually	*See Frame 123*
7.	override button	*See Frame 125*
8.	concealed	*See Frame 126*
9.	fixture supports (arm carriers, chair carriers, etc.)	*See Frame 129*
10.	fixture stud	*See Frame 134*
11.	arm carriers	*See Frame 137*
12.	leveling screw	*See Frame 138*

GLOSSARY

adjustable sleeve part of a carrier which is adjusted vertically to meet specific rough-in heights needed to support a fixture

arm carriers common term for supports used to mount wall hung lavatories and sinks

arm support part of an arm carrier that attaches to the fixture and the support

automatic flush valve type of flush valve which uses electronic circuitry to activate the flushing action

back splash lavatory with a raised back to prevent water in the basin from splashing the wall behind the fixture *(also called integral back lavatory)*

ball pass method of defining the size of a trapway; ball pass measurement is the diameter of a ball which can pass through the trapway

base support part of a floor mounted supports which is anchored to the floor

basin portion of a urinal which receives the urine

battery two or more fixtures installed in a single row against a wall

blowout closet design that uses the force of jet action but has no siphoning action; used only for tankless designs because of the water capacity needed

bowl design how a closet bowl is constructed on the inside

brackets type of mounting support used to attach wall mounted fixtures to the wall

chair carrier SEE CLOSET CARRIER

closet bowl with flush valve tankless water closet that draws its water directly from the supply line

closet carrier fitting used to connect and support a wall mounted water closet *(also called chair carrier)*

concealed flush valve valve installed behind the finished wall with only the operating mechanism seen by the user

concealed arm carrier support that is inserted through large holes in the back of a fixture, unseen by the user

control module connects all wiring needed for an electronic faucet or flush valve system *(also called junction box)*

coved rounded corners; usually found on fixtures such as scullery sinks to prevent dirt build-up in crevices

diameter straight line which connects two points of a circle by passing through the center of the circle

diverter valve changes water flow from one place in a fixture to another; in combination flushing valves, allows the water to discharge by flushing or through the faucet

drain outlet part of a stall urinal which is at the base of the fixture and is connected to a trap concealed under the floor

electronic faucet an infrared sensor system activates the water flow or turns the water flow off

enameled cast iron cast iron covered with a coat of fussed glass

exposed arm carrier supports that fit directly under the sides of a fixture and can be seen by the user

exposed flush valve valve installed outside a finished wall so that the valve parts can be seen; usually used with fixtures that have top inlet spuds

faucet valve located at an outlet in a piping system and is used to control the delivery of water to a fixture

fixture supports term used for arm carriers, closet carriers, or chair supports which are used to mount wall hung fixtures

fixture studs bolt like extensions on supports that fit into holes punched in the fixture for mounting

flow control SEE FLOW REGULATOR

flow regulator device used in some faucets which limits the water flow under various pressures *(also called a flow control)*

flush pipe assembly connects a battery of urinals to one flush valve or tank

flushometer flushing mechanism in a pressure assisted water closet

gravity feed water closet water closet with a steeper bowl which uses the natural force of gravity, allowing water to drop down to begin the flushing action

group wash sink sink large enough for two or more people to wash hands at the same time

hand washing sinks sinks used in applications where food is prepared; looks like a lavatory but are most often made of stainless steel

heavy commercial considered to be applications where fixtures get a lot of use and are most likely abused

high tank used to flush a urinal; called a high tank because the tank is located high above the fixture

holy water dispenser where Blessed water stored

hydraulic flushing manual flushing system which uses water pressure to activate the valve

inlet spud connection used to attach the fixture to the tank of flush valve

integral drain outlet drain used in a prison lavatory manufactured as part of the lavatory; connection to a trap installed in the wall

integral spout faucet spout found on a prison lavatory manufactured as part of the lavatory

integral trap trap built into the a fixture; water closets and most urinals have integral traps

integral back SEE BACK SPLASH

jet stream of water discharged at the base of the passageway which shoots upward into the trap entrance to begin the siphoning action in a fixture

junction box SEE CONTROL MODULE

leveling screw part of a carrier which is used to provide the proper leveling of the fixture

light commercial considered to be places where small groups of people would use a fixture

low consumption water closet type of water closet which uses 1.6 gallons or less each flush

manually operated flush valve valve which uses a handle, foot pedal, or push button to activate the flushing action

medium commercial considered to be applications where a fixture gets a lot of use, but not necessarily abused

metering faucet faucet which has an installed device allowing the faucet to be adjusted to discharge a specific amount of water

mop sink common name for a floor mounted service sink

open grid strainer type of strainer which prevents the drain from being totally closed off

outlet spud connection used to attach a fixture to the DWV system

over ride button feature on an electronic flush valve which allows manual flushing

perforated having tiny holes; as in perforated pipe

pop-up drain drain stopper that uses a lift rod allowing the drain to be opened and closed without getting hands wet *(also called a P.O. plug)*

pressure assisted water closet fixture which uses water in the supply system to compress air; the combination of water and "charged" air forces the water out of the tank and into the bowl at high velocity to create the flushing action in the fixture

push-type faucet SEE SELF-CLOSING FAUCET

raised ledge lavatory with a raised area in the back of the fixture on which the fitting is mounted

receptor outlet part of a urinal where the urine flows from the receptor bowl into the trap

reverse trap fixture bowl design that has a trap located at the back of the bowl

rim flush holes around the inside rim of a closet bowl that allows some of the water flow down inside the bowl surface to clean the bowl after use

sacristy sink fixture used in churches to wash church vessels and linens; typically the drain in this type of fixture is not connected to the DWV system

scrub sink sink commonly used in healthcare installations; often used by healthcare professionals preparing for surgical procedures

scullery sink sink used in commercial markets for food preparation; non-residential version of a kitchen sink

seam covers special covering installed between urinals in a battery to protect the area from becoming soiled

self-closing faucet manually directed faucet in which the user applies pressure to a button, the water flows out of the spout, then the water stops automatically *(also called push-type faucet)*

sensor switch that activates the solenoid valve on an electronic faucet or electronic flush valve

service sink sink used for janitorial or clean up work *(also called mop sink)*

service sink (healthcare) type of sink that serves as a water closet and a service sink

shelf back lavatory with an integral back splash that is wide enough to use as a shelf

siphon jet water closet bowl design that delivers a large volume of water flow to begin the siphoning action while flushing

siphon vortex water closet bowl design in which the flushing action is caused by diagonal rim outlets that generate a swirling or "whirlpool" action of the water in the bowl

slab lavatory lavatory which is flat across the back and the fitting mount is flush with the top of the slab

solenoid valve device which controls the water flow on an electronic faucet or an electronic flush valve

spreader device used in stall type urinals to distribute the water to rinse the inside walls of a fixture

spud threaded waterway fitting which is inserted into a fixture for the additional assembly of valves or trim

strainer fitting used to cover a fixture outlet in order to keep foreign objects from entering the trap and clogging the DWV system; used on urinals, lavatories, and sinks

supply tube carries the water from the solenoid valve or valves to the faucet spout

tank type closet water closet that has water stored in a tank above the bowl

transformer mechanism which converts electrical voltage to low 24v for increased safety; used on electronic faucets and electronic flush valves

trap passageway for waste to be flushed out of a fixture and then sealed, preventing gas from escaping up through the bowl

trap standard large trap used on service sinks which is also used to support the weight of the fixture

twist lever drain mechanism used on a mobile sink to empty waste water from the sink into a floor drain

urinals plumbing fixture, used by men, designed to receive and dispose of urine only

vitreous china material commonly used to manufacture plumbing fixtures because it is stain resistant and non-absorbent

washdown pipe perforated pipe used in a trough urinal to rinse the urinal after use

water surface area inside area of a water closet bowl which remains covered with water creating a seal on the trap

water saving water closet water closet which uses 3.5 gallons of water per flush

water seal the distance from the top of the water surface area to the top of the trap entrance

INDEX

S (cont.)

T

U, V, W

X, Y, Z