Chapter 3:
General Regulations

General Comments

The content of Chapter 3 is often referred to as "miscellaneous," rather than general regulations. Chapter 3 received that label because it is the only chapter in the code whose requirements do not interrelate. If a requirement cannot be located in another chapter, it should be located in this chapter.

Some nonplumbing regulations merely reference other codes that have the specific requirements. The requirements provide a cross reference to the appropriate document, recognizing that it affects the plumbing system but the details are not specifically contained in the code (Sections 307, 309, 310 and 313 reference other International Codes®).

The jurisdictional requirements specify that the water and sewer must connect to the public system when a public system is provided (Sections 602.1 and 701.2 are more specific on this issue).

Nonplumbing requirements include surface requirements for walls and floors in a toilet room, light and ventilation, floodproofing and rodentproofing.

Purpose

Chapter 3 contains safety requirements for the installation of plumbing and nonplumbing requirements for toilet facilities, including requirements for the identification of pipe, pipe fittings, traps, fixtures, materials and devices used in plumbing systems.

The safety requirements provide protection for the building's structural members, stress and strain of pipe and sleeving. The building's structural stability is protected by the regulations for cutting and notching of structural members. Additional protection for the building occupants includes requirements to maintain the plumbing in a safe and sanitary condition, as well as privacy for those occupants.

SECTION 301
GENERAL

301.1 Scope. The provisions of this chapter shall govern the general regulations regarding the installation of plumbing not specific to other chapters.

❖ The requirements included in Chapter 3 are not interrelated, as is typical with other chapters. Many regulations are not specific plumbing requirements but relate to the overall plumbing system.

301.2 System installation. Plumbing shall be installed with due regard to preservation of the strength of structural members and prevention of damage to walls and other surfaces through fixture usage.

❖ The installation of plumbing systems in a building should not result in the strength of the building's members being compromised. There is often a need for piping to be routed through structural and nonstructural members of the building. The *International Building Code*® (IBC®) provides limitations for alteration of some of the more common building members such as studs, joists and rafters. Appendix C is a reprint of those limitations. Section 307 of the code provides additional direction.

Clearances around fixtures are covered in Section 405 and provide for the necessary space to allow the fixtures to be used without causing damage to walls or other surfaces such as doors. Note that the requirements for accessibility in Section 404 could require more clearance around fixtures. IBC Chapter 12 provides information about interior building surfaces in toilet and bathing facilities.

301.3 Connections to drainage system. Plumbing fixtures, drains, appurtenances and appliances used to receive or discharge liquid waste or sewage shall be directly connected to the sanitary drainage system of the building or premises, in accordance with the requirements of this code. This section shall not be construed to prevent indirect waste systems required by Chapter 8.

Exception: Bathtubs, showers, lavatories, clothes washers and laundry trays shall not be required to discharge to the sanitary drainage system where such fixtures discharge to an *approved* system in accordance with Chapters 13 and 14.

❖ All wastewater captured or generated within a building is required to be directed into the sanitary drainage system. In most cases, the connection to the drainage system is a direct connection, meaning that each drain pipe, (typically from a fixture's trap) is routed in a continuous manner to its connecting point to a branch of the sanitary drainage system. However, there are some situations where it is not desirable to have a direct connection. For example, a direct connection of the drainage pipe of a commercial kitchen food preparation sink is not desirable because a wastewater backup could contaminate the contents of the sink, perhaps without being noticed by kitchen staff. In these special cases, the drainage pipe is required to discharge through an air break or an air gap into a waste receptor (usually a floor sink.) The outlet of the waste receptor is directly connected to the sanitary drainage system. Chapter 8 covers which fixtures and appliance drains are required to be indirect connected.

The exception to this section recognizes that certain wastewater flows (graywater) can be a source of water that can be treated and reused for the purposes of water-closet flushing, urinal flushing or subsurface irrigation. These wastewater flows must be collected by a drainage system that is separate from other portions of the sanitary drainage system carrying wastewater that cannot be utilized in a graywater system.

301.4 Connections to water supply. Every plumbing fixture, device or appliance requiring or using water for its proper operation shall be directly or indirectly connected to the water supply system in accordance with the provisions of this code.

❖ Fixtures, devices and appliances that require potable water or nonpotable water must be connected, directly or indirectly, to the water supply. In other words, a sink (other than a floor sink) cannot be installed without a faucet installed on the sink.

Indirect connections include faucets or fixture fittings discharging into fixtures such as tubs and lavatories. Direct connections occur at water closets and urinals. Water closets and urinals can be supplied with treated graywater through a direct connection to the fixture if the system meets the requirements of Chapter 13.

301.5 Pipe, tube and fitting sizes. Unless otherwise indicated, the pipe, tube and fitting sizes specified in this code are expressed in nominal or standard sizes as designated in the referenced material standards.

❖ Pipe, tube and fitting sizes called out in the code are nominal or standard "inch pound" (I-P) system sizes indicated in the referenced standard for a particular material type of pipe, tube or fitting. In many cases, the indicated size is not an actual measurement of the item. Examples are: (1) $^1/_2$ inch Type L copper water tubing measuring $^5/_8$ inch outside diameter and approximately 0.545 inch inside diameter and (2) $1^1/_2$ inch Schedule 40 PVC pipe measuring 1.9 inches outside diameter and approximately 1.61 inches inside diameter. Although differences in pipe or tube materials result in slightly different actual dimensions of the products, the code's size requirements are based on nominal or standard sizes so that the choice of pipe or tube material is independent.

The code could have a requirement that is specific to a pipe dimension such as "A pipe that is not less than 3 inches inside diameter." In this case, a 3-inch Schedule 80 PVC pipe would not be compliant because the approximate inside diameter is only 2.9 inches. Throughout code language, metric dimensions [International System of Units (SI)] for pipe sizes are provided in parentheses or brackets after the I-P unit dimension, for example, "$^3/_4$ inch (19.1 mm)". The indicated SI dimensions are "soft conversions" of the I-P dimension, that is, the SI dimension is derived from a simple mathematical conversion from inches to millimeters. There is no attempt to identify the nominal or standard metric sizes for pipe or tube. For example, in some tube materials, 20 mm is the standard size, not 19.1 mm.

For I-P pipe or tube sizes in code tables, an SI conversion formula is provided at the bottom of the table, above any notes.

301.6 Prohibited locations. Plumbing systems shall not be located in an elevator shaft or in an elevator equipment room.

Exception: Floor drains, sumps and sump pumps shall be permitted at the base of the shaft, provided that they are indirectly connected to the plumbing system and comply with Section 1003.4.

❖ Plumbing systems are prohibited in elevator shafts and elevator equipment rooms because of inaccessibility for repairs and the potential for water damage that could be caused to the elevator equipment if a leak developed in the plumbing piping or components. The exception allows for floor drains, sumps and sump pumps to be located at the bottom of an elevator shaft (hoistway) because most elevator codes (standards referenced by the IBC) require a means to drain water from the bottom of the shaft. An indirect connection is required to prevent waste from a plumbing system from backing up into the elevator shaft. Note that a backwater valve is not intended to be used as a substitute for the indirect connection.

The designer has to make an informed decision of whether to put the discharge from the floor drain, sump or sump pump into the sanitary system, storm sewer system or perhaps, to a grade surface. Two reasons for water to be in the base of an elevator shaft are: the base of the elevator shaft is below grade where ground water (from rain events or a seasonally high water table) might enter through cracks and seams in the walls and floors of the shaft, and water from an activated fire sprinkler system could enter through elevator doors. If the water is considered to be storm water, Section 1101.3 would prohibit its discharge to the sanitary drainage system. If the water is considered to be no different than what would enter a floor drain, then Section 301.3 would require its discharge to the sanitary drainage system. Other considerations could be whether local storm water regulators or wastewater plant operators have authority to specify where such water should be discharged. In some localities, sumps (with sump pumps) that collect the water from subsoil foundation drainage systems are required to discharge to a grade surface on the building's property to lessen the impact of storm water flow during peak rainfall events.

The exception references Section 1003.4 to alert the code user that if the elevator is a hydraulic type, an oil separator is required to be installed before the discharge of the floor drain, sump or sump pump enters a plumbing system or other point of discharge such as exterior grade locations.

301.7 Conflicts. In instances where conflicts occur between this code and the manufacturer's installation instructions, the more restrictive provisions shall apply.

❖ A conflict refers to instances where the code and manufacturer's instructions differ. The code official must evaluate each circumstance of perceived conflict and identify the requirements that provide the greatest level of protection for life and property.

SECTION 302
EXCLUSION OF MATERIALS DETRIMENTAL TO THE SEWER SYSTEM

302.1 Detrimental or dangerous materials. Ashes, cinders or rags; flammable, poisonous or explosive liquids or gases; oil, grease or any other insoluble material capable of obstructing, damaging or overloading the building drainage or *sewer* system, or capable of interfering with the normal operation of the sewage treatment processes, shall not be deposited, by any means, into such systems.

❖ This section prohibits the disposal of detrimental or dangerous materials into the sewer system. Such materials can cause the pipes to clog or accelerate the clogging of pipes, which prevents the proper disposal of sewage waste. Section 1003 contains design and installation details for the use of interceptors and separators to remove oil, grease, sand and other detrimental substances.

Discharge of materials that are flammable or combustible into the public sewer system is prohibited because an accumulation of these types of materials poses a fire and explosion hazard. Insoluble chemicals that are not processed before disposal could react with other discharged chemicals to cause damage to the piping and components of the drainage, sewer and waste treatment systems. Section 803.1 provides details for using approved dilution or neutralizing devices to process harmful chemicals prior to disposal.

302.2 Industrial wastes. Waste products from manufacturing or industrial operations shall not be introduced into the public *sewer* until it has been determined by the code official or other authority having jurisdiction that the introduction thereof will not damage the public *sewer* system or interfere with the functioning of the sewage treatment plant.

❖ Harmful or hazardous industrial waste must be treated before it is discharged to the sewer. This can require the complete removal or neutralization of certain chemicals or substances.

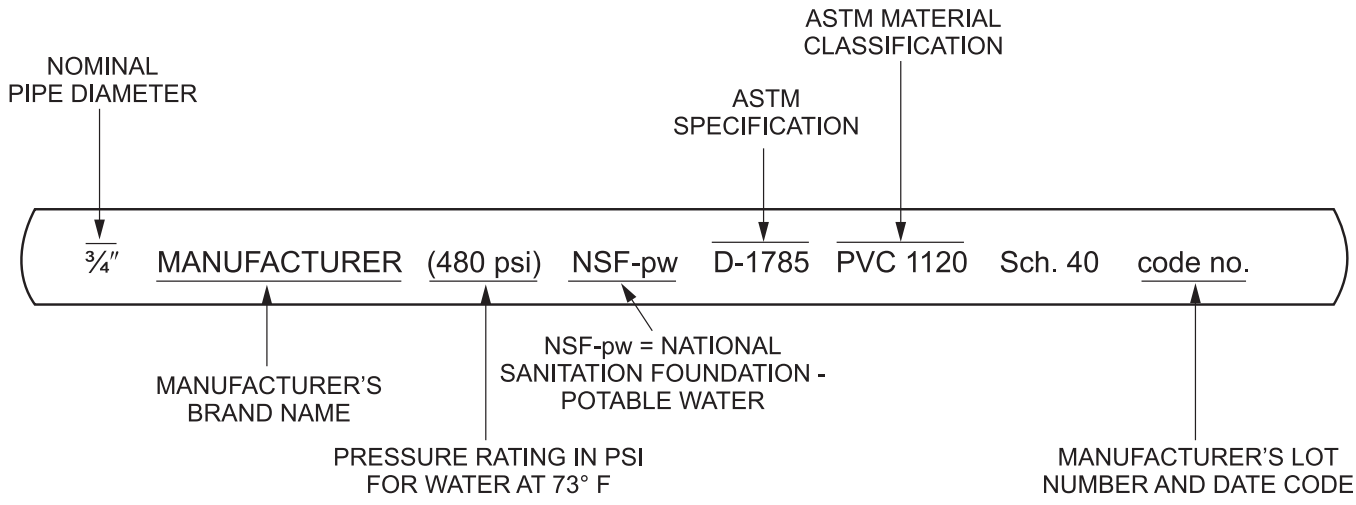
SECTION 303
MATERIALS

303.1 Identification. Each length of pipe and each pipe fitting, trap, fixture, material and device utilized in a plumbing system shall bear the identification of the manufacturer and any markings required by the applicable referenced standards.

❖ For general accountability and rudimentary traceability within the plumbing industry, pipe, fittings, traps, fixtures, material and devices must bear the name or unique mark of its manufacturer. Should problems with the product develop at installation or at a later point in time, the manufacturer can be contacted for assistance. The manufacturer has the option of determining their unique mark if their full name is not or cannot be embossed or printed on the item. Where the code requires an item to be in compliance with a reference standard, the manufacturer must comply with the requirements in the standard for marking of the product [see Commentary Figures 303.1(1) and 303.1(2)]. The requirement in Section 303.4 for third-party certification of items that are to comply with a reference standard ensures that the markings required by the standard will be present.

Several questions are commonly asked:

1. What if the installed length of pipe, cut from a longer length, is of a length that doesn't show all of the required information? The code requirement for "each length" is assumed to mean the standard length(s) that the manufacturer offers the pipe for sale. For example, 10- or 20-foot lengths of drainage pipe. Once the pipe arrives at the project site, it will be cut to length as necessary for installation so all of the required markings may not necessarily show on shorter field-cut lengths. The intent of this section is not for all of the required markings to be indicated on every field-cut length of pipe. On most projects, longer installed lengths of pipe will show all of the mark-



For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.895 kPa, °C = [(°F) - 32]/1.8.

Commentary Figure 303.1(1)
SAMPLE MARKING OF PVC PRESSURE PIPE

ings, and generally it is assumed that the shorter lengths were cut from the same manufacturer-provided lengths of pipe. Because the code does not require that the installed piping be from the same manufacturer or be from the same production "lot," piping could have different appearances throughout a project. Also, as shorter "cut offs" from longer lengths are commonly used up for needed short lengths, there could be situations where there is a significant visible difference in appearance from adjacent longer lengths of piping. From an inspection viewpoint, how can it be determined that the shorter pipe lengths (without markings and perhaps of a different appearance) are of compliant material? The code does not address this matter.

2. What if the manufactured item is too small for the manufacturer to apply all of the required information? Typically, this question arises for smaller pipe fittings and manufactured pipe nipples (see Section 605). The standards for those products allow for the packaging to have the necessary information. Although the code official can't be 100 percent certain that the packaging (if made available on request) is actually for the installed product, the code official has to use their own judgment about whether the appearance of the installed product seems to be similar to one that comes from a package that has the required markings.

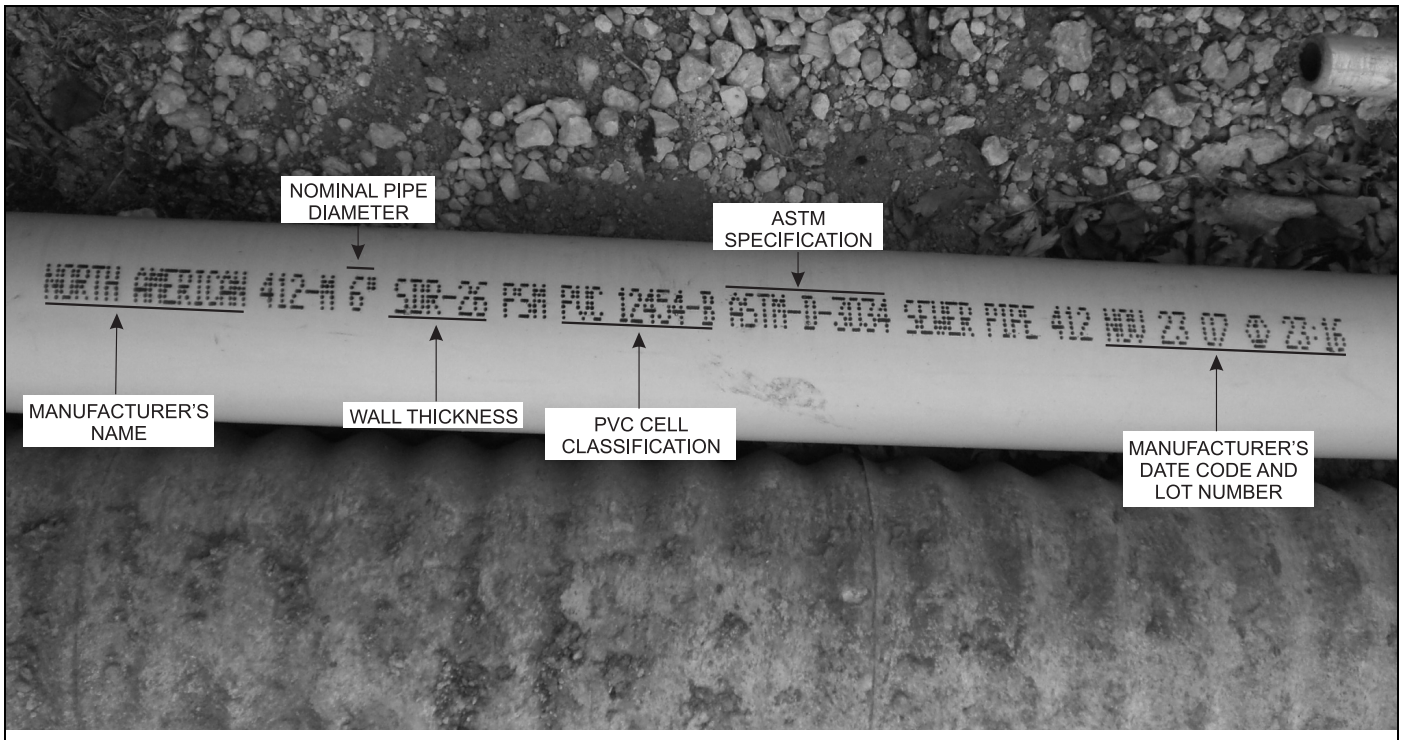
303.2 Installation of materials. Materials used shall be installed in strict accordance with the standards under which the materials are accepted and *approved*. In the absence of such installation procedures, the manufacturer's instructions shall be followed. Where the requirements of referenced standards or manufacturer's installation instructions do not conform to minimum provisions of this code, the provisions of this code shall apply.

❖ Plumbing components and materials are to be installed in accordance with the requirements of the applicable standard indicated in the code. Where a standard is not provided, the manufacturer's instructions must be followed. For example, because there are very few standards available that regulate the installation of valves, the manufacturer's instructions must be used to install these components.

303.3 Plastic pipe, fittings and components. Plastic pipe, fittings and components shall be third-party certified as conforming to NSF 14.

❖ Plastic piping, fittings and plastic pipe-related components, including solvent cements, primers, tapes, lubricants and seals used in plumbing systems, must be tested and certified as conforming to NSF 14. This includes all water service, water distribution, drainage piping and fittings and plastic piping system components, including but not limited to pipes, fittings, valves, joining materials, gaskets and appurtenances. This section does not apply to components that only include plastic parts such as brass valves with a plastic stem, or to fixture fittings such as fixture stop valves. NSF 14 requires that plastic piping systems, fittings and related components intended for use in the potable water supply system must comply with NSF 61.

303.4 Third-party certification. Plumbing products and materials required by the code to be in compliance with a referenced standard shall be listed by a *third-party certification agency* as complying with the referenced standards.



Commentary Figure 303.1(2)
MARKING OF PVC GRAVITY SEWER PIPE

Chapter 4:
Fixtures, Faucets and Fixture Fittings

General Comments

Determining the exact number of plumbing fixtures needed by the maximum number of possible users in any given building continues to be a challenging problem for the plumbing industry. Various methods have been used to evaluate the number and type of plumbing fixtures needed for an occupancy. Studies of office buildings have produced design guidelines based on occupancy times, arrival rates and patterns of fixture use that offer insight into the number of required plumbing fixtures for a desired level of service. The Building Technology Research Laboratory at the Stevens Institute of Technology conducted a study based on the Queueing Theory, which involves probabilities for waiting times and fixture use times based on a preferred level of service. The study resulted in design guidelines for the quantities of fixtures needed in public toilet facilities. For residential-type buildings and health care facilities, plumbing fixture numbers are based on the minimum need, resulting in at least one water closet and one lavatory for each dwelling unit, guestroom or hospital room.

Studies completed by the United States military have been used for dormitories and prisons to determine the number of fixtures required based on a simultaneous need in a regimented society. This assumes that everyone rises at approximately the same time and has a limited amount of time to shower and use the water closet and lavatory.

The National Restaurant Association conducted a study based on the difference in use between a restaurant and a nightclub. It should be noted that the study did not take into account fast-food restaurants, nor did it allow for restaurants located along heavily traveled routes, such as those at highway rest stops or oases.

Fixture requirements for factory and industrial uses are based on the same requirements as for storage facilities. This method establishes a realistic minimum requirement for factory occupancies. The reasonableness in the number of plumbing fixtures was established through a limited study of factory projects in Henrico County, Virginia.

The fixture needs for the remaining occupancies were determined based on empirical data, experience and tradition. There are no exact studies providing values that are definitively supportable; the values have been modified periodically based on general observations. Various studies will most likely continue to be performed in order to develop a completely rational method for determining the minimum number of plumbing fixtures for any occupancy.

Purpose

The purpose of Chapter 4 is to provide a building with the necessary number of plumbing fixtures of a specific type and quality. The fixtures must be properly installed to be usable by the individuals occupying the building. The quality and design of every fixture must conform to the applicable referenced standard.

SECTION 401
GENERAL

401.1 Scope. This chapter shall govern the materials, design and installation of plumbing fixtures, faucets and fixture fittings in accordance with the type of *occupancy*, and shall provide for the minimum number of fixtures for various types of occupancies.

❖ This section contains the scoping requirements for Chapter 4. Compliance with this chapter will result in a building or structure having adequate plumbing fixtures for the sanitary, hygienic, cleaning, washing and food preparation needs of the occupants. Many of the requirements of this chapter have been duplicated in Chapter 29 of the *International Building Code*® (IBC®) for the convenience of the architect, who is often responsible for the layout of the rooms when creating the floor plans for a building.

401.2 Prohibited fixtures and connections. Water closets having a concealed trap seal or an unventilated space or having walls that are not thoroughly washed at each discharge in accordance with ASME A112.19.2/CSA B45.1 shall be prohibited. Any water closet that permits siphonage of the contents of the bowl back into the tank shall be prohibited. Trough urinals shall be prohibited.

❖ Water closet fixture designs that do not adequately clean the inside bowl surfaces with flushing water can harbor bacteria, resulting in an insanitary condition. The inspection and testing requirements of ASME A112.19.2/CSA B45.1 ensure that water closet designs have the necessary scouring action as well as a visible trap seal. Tank-type water closets must be designed so that the bowl contents cannot be siphoned into the tank as this can ultimately expose the occupants to waterborne diseases should a backflow event in the potable water system occur. Trough urinals are not allowed to be installed as they do not offer the necessary privacy to the users. Also, urine stream splashing creates insanitary conditions for adjacent users.

401.3 Water conservation. The maximum water flow rates and flush volume for plumbing fixtures and fixture fittings shall comply with Section 604.4.

❖ The impetus for the plumbing code to begin regulating the amount of water used in the operation of certain plumbing fixtures was the Federal Energy Policy Act of

1992 (EPAct). The process of transporting raw water to treatment plants, the treatment of water, the conveyance of treated water to the users, the transportation of wastewater to treatment plants, and the treatment of wastewater consume tremendous amounts of energy. As the amount of water processed through this never-ending cycle becomes greater, the energy consumed increases proportionally. The production of energy for this purpose (primarily electricity) depletes the planet's nonrenewable resources of coal, gas, oil and fissionable materials. The purpose of the Energy Act of 1992 was to put controls in place to reduce the consumption rate of nonrenewable resources used for power generation. Among the many restrictions required by EPAct, certain plumbing fixtures were targeted for a reduction in the rate of water use. These flow and volume restrictions are reflected in Table 604.4.

Water is a resource that all life forms on this planet must have to survive. While there is an abundance of water on the earth, the total amount of water is finite and is not necessarily located where water is needed. As the planet's population continues to increase and as more countries become industrialized, the demand for potable water continues to rise. Many regions of the world are quickly depleting once-plentiful freshwater resources. Water conservation practices are now a major factor in building designs as there is already a real crisis of exhausting freshwater resources in some regions of the world.

SECTION 402
FIXTURE MATERIALS

402.1 Quality of fixtures. Plumbing fixtures shall be constructed of *approved* materials, with smooth, impervious surfaces, free from defects and concealed fouling surfaces, and shall conform to standards cited in this code. Porcelain enameled surfaces on plumbing fixtures shall be acid resistant.

❖ This section is provided to direct plumbing fixture standard creators as to the core requirements that all plumbing fixtures must meet. Most mass-produced plumbing fixtures for installation in accordance with the code have the design and quality regulated by the various standards as specified in the code. Where a plumbing fixture that doesn't have a standard is desired to be used, the information in this section assists the code official in evaluating the product in accordance with Section 105.2.

402.2 Materials for specialty fixtures. Materials for specialty fixtures not otherwise covered in this code shall be of stainless steel, soapstone, chemical stoneware or plastic, or shall be lined with lead, copper-base alloy, nickel-copper alloy, corrosion-resistant steel or other material especially suited to the application for which the fixture is intended.

❖ Most commercially available fixtures are designed and made in compliance with nationally recognized standards that are referenced in the code. Where a fixture is produced to a fixture standard not referenced by the code or no fixture standard exists, the code official must evaluate and approve the fixture in accordance with Section 105.2, regardless of whether the fixture is made of the materials listed in this section. For example, consider a stainless steel kitchen sink that is made from one of the materials listed in this section but is in compliance only with an unrecognized fixture standard. The faucet hole(s) and drain outlet dimensions could be such that fittings complying with the referenced standards in the code will not fit properly. The stainless steel material used to make the sink might be of a grade that will quickly corrode or be stained in normal service. Therefore, the code official might deem the fixture not suitable since he or she is charged with the responsibility to ensure that the sink will provide for reasonable durability, sanitary conditions and ease of maintenance.

Shower bases and group wash-up sinks made of terrazzo are fixtures that are not covered by standards referenced in the code and, as such, must be specifically approved by the code official.

Other specialty fixtures include lavatory bowls made of exotic metals, glass, and antique wash basins; bathtubs of hollowed-out blocks of granite or other natural materials such as wood and custom-fabricated copper kitchen sinks. If these products are not made to a referenced standard listed in the code, these products must be approved by the code official.

402.3 Sheet copper. Sheet copper for general applications shall conform to ASTM B152 and shall not weigh less than 12 ounces per square foot (3.7 kg/m^2).

❖ In the past, general-use sheet copper was predominantly used as a lining in plumbing fixtures. Today, that material is rarely used. The ASTM International (ASTM) standard regulates cold-rolled tempered sheet copper, hot-rolled tempered sheet copper and annealed copper sheet. Note that Section 415.3.3 permits the use of 10-ounce-per square-foot (0.026 kg/m^2) sheet copper to line flush tanks, and Section 902.2 permits the use of 8-ounce-per-square-foot (0.021 kg/m^2) sheet copper for vent flashings.

402.4 Sheet lead. Sheet lead for pans shall not weigh less than 4 pounds per square foot (19.5 kg/m^2) and shall be coated with an asphalt paint or other *approved* coating.

❖ In years past, general-use sheet lead was used to field fabricate shower pans. It was previously used as a liner on a more extensive basis in many other areas of plumbing systems. The approximate thickness of 4-pound-per-square-foot (20 kg/m^2) sheet lead is $^1/_{16}$ inch (1.6 mm).

SECTION 403
MINIMUM PLUMBING FACILITIES

403.1 Minimum number of fixtures. Plumbing fixtures shall be provided in the minimum number as shown in Table 403.1, based on the actual use of the building or space. Uses not shown in Table 403.1 shall be considered individually by the code official. The number of occupants shall be determined by the *International Building Code*.

❖ This section requires that the type and number of plumbing fixtures be based on the actual use of the building or space and the occupant load (number of persons) as determined for the means of egress for

the building or space. Occupancy load densities (the number of persons per square foot) are given in Section 1004 of the IBC. Table 403.1 includes ratios indicating the maximum number of occupants that can be served by one fixture of each type. For example, "1 per 75" means one fixture will serve up to 75 occupants. These "ratios" are applied to the occupant load of the building or space in order to determine the total number of each required fixture type.

The table's "description" column determines which table row of fixture ratios is used to calculate plumbing fixture quantities. In most cases, the description of plumbing fixture use will match the IBC occupancy classification (the classification column in the table). However, there are situations where a description could be different from the IBC occupancy classification.

Educational Facilities

Consider an educational facility (Grades 1-12) with a gymnasium with a stage. The IBC, in Chapter 3, states that assembly areas that are accessory to Group E occupancies are not to be considered as a separate occupancy (classification). Therefore, the number of water closets should be determined from Section 3 of Table 403.1, which requires one water closet per 50 occupants. Because this gymnasium has a stage, a greater occupant density than for a gymnasium-only space must be chosen as nonfixed chairs will most likely be set up for viewing on-stage activities. Therefore, for egress purposes, the gymnasium is considered to be an assembly area with an occupant density of 7 square feet (0.65 m^2) per person. The resulting occupant load number applied with a Group E occupancy plumbing fixture ratio would result in an excessive number of plumbing fixtures for the building. The correct approach is to consider the plumbing fixture ratios in the fourth row of Table 403.1 for gymnasium space, since these ratios reflect how the space is intended to be used with respect to the occupancy density chosen for the space. In other words, fixture ratios must be chosen to "agree" with the actual use of the space.

A question that is often asked about Group E occupancies is whether the concept of nonsimultaneous occupancy could be considered in order to further reduce the number of required plumbing fixtures. For example, where a school auditorium is occupied by only the students within the school, the students are in either the classroom or the auditorium but not in both places at the same time. Therefore, why should each area require a number of fixtures as if both areas were occupied simultaneously? The code does not recognize a nonsimultaneous use concept for any building as simultaneous use could easily occur. For example, while students are in the classrooms, a school auditorium could be used temporarily for blood drives, regional science fairs and town meetings. However, this is not to say that in some circumstances, a nonsimultaneous use could, in some way, be completely guaranteed such that the local code official might entertain a proposed reduction in the required number of plumbing fixtures for the building.

Business Facilities

Consider a barber college where the IBC classifies the entire building as a Group B occupancy. The building has several large assembly rooms where the intent is to have training sessions for large groups of students. Clearly, these areas are used for assembly and therefore, the use of the fixture ratios in Section 1, Description Row 5 of Table 403.1 should be used.

The choice of an occupancy use for the purposes of determining plumbing fixtures does not affect the occupancy group chosen for IBC purposes, that being for egress. In other words, using a previous example, the school gymnasium with stage space should be chosen to be "assembly use" for plumbing fixture requirements, but the entire building is still a Group E occupancy for the purposes of egress as far as the IBC is concerned.

Note that Section 1004.1.2 of the IBC has an exception that allows the designer to propose an "actual" occupancy load number to the code official for approval instead of the calculated load for the occupancy square footage. While this exception would allow a smaller occupancy load to be chosen for the purposes of determining the required number of plumbing fixtures, code officials must carefully consider and appropriately justify the reduction. The code official should consider the potential for the space to be loaded with more persons than proposed by the designer, future use by different tenants of the same occupancy classification and the difficulty of enforcement of the maximum occupancy load for the limited number of plumbing fixtures provided.

In Table 403.1, the brief wording in the "Description" column is not intended to be complete or inclusive of all uses for a particular building or space. However, the descriptions do identify a majority of the types of uses encountered in the design of most buildings. Because the descriptions guide the user toward the row of ratios to use, using the description column as the entry point to the table is beneficial. The "number" and "classification" columns are intended only for reference purposes. The requirements for type and number of plumbing fixtures are driven by the actual use of a building or space, which is usually consistent with the occupancy group classification, but not always.

Some use description rows have a different ratio for male and female water closets, and in some cases, for lavatories. The smaller ratio for female fixtures provides an "equality of fixture availability" in those particular use descriptions. The buildings or spaces having these use descriptions have historically had numerous situations where there were long lines (queues) of females waiting to use toilet facilities while male facilities had very short or no lines. The reasons for this include the following:

1. For a variety of social and physical reasons, women generally take a longer period of time to use the facilities.
2. Women somewhat outnumber men in the general population and this becomes especially evident in large groups of people.
3. Women, in general, tend to use the facilities more frequently.

In a general sense, the term "potty parity" means that a sufficient number of female plumbing fixtures have been allocated such that women do not have to wait any longer than men to use an equivalent type of fixture. In a specific sense, "potty parity" also indicates the ratio of the number of male to the number of female fixtures of the same type. For example, if 24 male and 48 female water closets are installed in a building, then the potty parity is stated to be "1 to 2." The term "potty parity" is not used in the code but the concept is embedded in some of the ratios indicated the table.

The code does not require specific quantities of child-size water closets. In a child care facility having children ages 6 and under, the provision of child-size water closets (and sinks mounted at child height) could be beneficial to a facility's operation. Generally, for children over 6 years old, standard-sized fixtures are suitable because most children have learned to use such fixtures in a home setting. Note that the accessibility standard, ICC A117.1, as referenced by Section 404, has specific dimensional requirements for where accessible child-size water closets are to be installed.

Some school facilities are designed to have a single-user toilet room that can be accessed only from within the classroom. The code is silent on whether the fixtures in this limited-access toilet room can be counted toward the required number of plumbing fixtures for the building. Typically, the facility designer's intent for having these toilet rooms is for a student (or perhaps a teacher) to have access to a toilet facility while a class is in session. This mitigates the security/protection issue of a student having to leave the teacher-controlled classroom to walk around in hallways that may not be as well-monitored during class time. However, classrooms that are not in use are often locked, which prevents use of the classroom-accessed, single-user toilet room during the time periods between class sessions, when toilet facilities are often in high demand. The local code official must decide if classroom-accessed, single-user toilet rooms must be in addition to the required toilet facilities (outside the classroom) or not.

Table 403.1, Note d, concerning outdoor seating and entertainment areas, is intended to require that outdoor patios, decks, balconies, beer gardens and similar areas, whether those areas have seating or not, be included for calculating the number of plumbing fixtures. While seating does provide a definitive occupant load for these types of areas, there are many situations where these areas are not provided with seating in order to accommodate as many customers as possible. Therefore, the occupant load should be based on standing space density. This occupant load number must be applied to the ratios found in the appropriate description row in Table 403.1. For example, a restaurant has a fixed seating area with fixed booths and an outdoor entertainment area that has no seating or tables. The fixed seating area load is simply a count of the number of seats according to Section 1004.7 of the IBC. The restaurant fixture ratios (Section 1, Description Row 3 of Table 403.1) are then applied to this load to determine the number of plumbing fixtures for the fixed seating area. The outdoor area requires a different approach as it is a standing space area, not fixed seating. The occupant load is calculated from the area using Table 1004.4 of the IBC. Even though the building is a restaurant, this outdoor entertainment area might be used not as a restaurant, but as a nightclub/dance floor. Therefore, the fixture ratios in Description Row 2 of Table 403.1 (for nightclub/dance halls) are applied to the standing occupant load. Using Row 3 fixture ratios for this area would be inappropriate. The use of proper occupant loads and use ratios will ensure that an adequate number of plumbing fixtures is provided where the occupant load is substantially increased by the addition of outdoor seating or standing areas.

Choosing the proper use description for a restaurant having a bar or for a nightclub serving food can be challenging. Some restaurant operations evolve into a nightclub/dance hall in the late evening. Bars with dance floors often have kitchens for preparing food to serve to patrons at the bar. The code is silent on how to determine which use description (restaurant or night club) is the best "fit" for the demand on the toilet facilities. The answer to this question lies in determining what use is primary. Is the bar's main purpose to support the restaurant operation? Or is the serving of food in support of the bar operation? In situations where there is no clear answer, perhaps considering the occupancy as a mixed use arrangement is a practical answer.

The drinking fountain ratio indicated for a use description does not necessarily imply that every tenant space must have a drinking fountain within that building. Just as toilet facilities are only required to be provided when a building or space is in use, the provision of a drinking fountain follows similar logic. For example, consider a strip center with multiple tenant spaces, each tenant space having the required number of plumbing fixtures for and within each space. The drinking fountain for that space (and all the adjacent spaces) could be located exterior to all the tenant spaces in a common area. The calculation for the required number of drinking fountains to be used by multiple occupancies is performed in the same manner as for other plumbing fixtures. See the Sample Problems in this commentary section.

The "service sinks" required by Table 403.1 are intended to be of a type suitable for janitorial and building maintenance purposes. Service sinks include mop sinks/basins, utility tub/sinks, janitor sinks, slop sinks and laundry trays. Only one service sink is required for the entire building, except that hospitals are required to have a service sink on each floor. The one service sink per building should be in a location that can be accessed from all portions of the building. For example, in a building that has multiple tenant spaces, locating the service sink for the entire building in a tenant space that cannot be accessed by janitors for a different tenant would be inappropriate. Persons responsible for janitorial and maintenance services in the building have access to the required sink without the need to enter one tenant space in order to service a different tenant space. This does not mean that the service sink must be in an open area of the building for