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**Plumbing works — Code of practice —
Part 1: General**

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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettelement as Rwanda Standards.

DRS 644-1 was prepared by Technical Committee RSB/TC 17, *Urban Planning*.

In the preparation of this standard, reference was made to the following standard (s):

IAPMO, 2024 *Uniform plumbing code*

The assistance derived from the above source is hereby acknowledged with thanks.

DRS 644 consists of the following parts, under the general title *Plumbing works — Code of practice*:

- *Part 1: General*
- *Part 2: Plumbing fixtures and fixture fittings*
- *Part 3: Water supply and distribution*
- *Part 4: Sanitary and drainage system installation*
- *Part 5: Water heaters*
- *Part 6: Fuel gas piping and firestop protection*
- *Part 7: Healthcare facilities and medical gas and medical vacuum systems*
- *Part 8: Alternate water sources for non-potable applications and non-potable rainwater catchment systems*

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Committee membership

The following organizations were represented on the Technical Committee on *Urban planning* (RSB/TC 17) in the preparation of this standard.

City of Kigali

Institute of Engineering Rwanda (IER)

Ministry of Infrastructure (MININFRA)

Rwanda Housing Authority (RHA)

Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA)

Rwanda Plumbers Organization (RPO)

Rwanda Polytechnic – Kigali College

Rwanda Polytechnic – Musanze College

Rwanda Transport Development Agency (RTDA)

Rwanda Utility Regulatory Authority (RURA)

Rwanda Water Resources Board (RWB)

University of Rwanda – College of Science and Technology (UR-CST)

Water and Sanitation Corporation (WASAC)

Water for People

Rwanda Standards Board (RSB) – Secretariat

Plumbing works — Code of practice — Part 1: General

1 Scope

This Draft Rwanda Standard provides the terms and definitions applicable in plumbing works.

It also specifies the general requirements for plumbing systems including the requirements for materials, plumbing fixtures and fixture fittings used in plumbing works to protect the public health, safety, and welfare.

This standard is applicable to the erection, installation, alteration, repair, relocation, replacement, addition to, use, or maintenance of plumbing systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ASTM E814, *Standard test method for fire tests of penetration firestop systems*

UL 1479-2015, *Fire Tests of penetration firestops*

ASTM C1277, *Standard specification for shielded couplings joining hubless cast iron soil pipe and fittings*

ASTM A888, *Standard specification for hubless cast iron soil pipe and fittings for sanitary and storm drain, waste, and vent piping applications*

ASTM A74-2021 *Standard specification for cast iron soil pipe and fittings*

RS ISO 1452-1, *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly (vinyl chloride) (PVC-U) — Part 1: General*

RS ISO 1452-2, *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly (vinyl chloride) (PVC-U) — Part 2: Pipes*

RS ISO 1452-3, *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly (vinyl chloride) (PVC-U) — Part 3: Fittings*

RS ISO 1452-4, *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly (vinyl chloride) (PVC-U) — Part 4: Valves*

RS ISO 1452-5, *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly (vinyl chloride) (PVC-U) — Part 5: Fitness for purpose of the system*

RS ISO 14531-3, *Plastics pipes and fittings— Crosslinked polyethylene (PE-X) pipe systems for the conveyance of gaseous fuels — Metric series — Specifications — Part 3: Fittings for mechanical jointing (including PE-X/metal transitions)*

RS ISO 15874-1, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 1: General*

RS ISO 15874-2, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 2: Pipes*

RS ISO 15874-3, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 3: Fittings*

RS ISO 15874, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 5: Fitness for purpose of the system*

RS ISO 4427-1: *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 1: General specifications*

RS ISO 4427-2, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 2: Pipes*

RS ISO 4427-3, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 3: Fittings*

RS ISO 4427-5, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 5: Fitness for purpose of the system*

RS ISO 4437-2, *Plastics piping systems for the supply of gaseous fuels – Polyethylene (PE) — Part 2: Pipes*

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1

accepted engineering practice

that which conforms to technical or scientific-based principles, tests, or standards that are accepted by the engineering profession

3.2

accessible

where applied to a fixture, connection, appliance, or equipment, “accessible” means having access thereto, but which first may require the removal of an access panel, door, or similar obstruction

3.3**accessible, readily**

having a direct access without the necessity of removing a panel, door, or similar obstruction

3.4**air break**

physical separation which may be a low inlet into the indirect waste receptor from the fixture, appliance, or device indirectly connected

3.5**air gap, drainage**

unobstructed vertical distance through the free atmosphere between the lowest opening from a pipe, plumbing fixture, appliance, or appurtenance conveying waste to the flood-level rim of the receptor

3.6**air gap, water distribution**

unobstructed vertical distance through the free atmosphere between the lowest opening from a pipe or faucet conveying potable water to the flood-level rim of a tank, vat, or fixture

3.7**alternate water source**

nonpotable source of water that includes but not limited to gray water, on-site treated non-potable water, rainwater, and reclaimed (recycled) water

3.8**anchors, supports, hangers**

devices for properly supporting and securing pipe, fixtures, and equipment

3.10**appliance**

device that utilizes fuel or electricity as an energy source to produce light, heat, power, refrigeration, or air conditioning. This definition also includes vented decorative appliances and electric storage or tankless water heaters

3.12

appliance, medium-heat

fuel-burning appliance that produces a continuous flue gas temperature, at the point of entrance to the flue, of more than 1 000 °F (538 °C) and less than 2 000 °F (1 093 °C)

3.14

appliance fuel connector

assembly of listed semi-rigid or flexible tubing and fittings to carry fuel between a fuel-piping outlet and a fuel-burning appliance

3.15

approved

acceptable to the Competent Authority

3.16

approved testing agency

organization primarily established for purposes of testing to approved standards and approved by the Competent Authority

3.17

area drain

receptor designed to collect surface or storm water from an open area

3.18

aspirator

fitting or device supplied with water or other fluid under positive pressure that passes through an integral orifice or constriction, causing a vacuum

3.19

competent authority, plumbing official

organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, installations, or procedures

3.20

backflow

flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from sources other than its intended source

3.21**backflow connection**

arrangement whereby backflow can occur

3.22**backflow preventer, vacuum breaker.**

backflow prevention device, an assembly, or another method to prevent backflow into the potable water system

3.23**backpressure backflow**

backflow due to an increased pressure above the supply pressure, which may be due to pumps, boilers, gravity, or other sources of pressure

3.24**backsiphonage**

flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel into a water supply pipe due to a pressure less than atmospheric in such pipe

3.25**backwater valve**

device installed in a drainage system to prevent reverse flow

3.26**bathroom**

room equipped with a shower, bathtub, or combination bath/shower

3.27**bathroom, half**

room equipped with only a water closet and lavatory

3.28**bathroom Group**

any combination of fixtures, not to exceed one water closet, two lavatories, either one bathtub or one combination bath/shower, and one shower, and may include a bidet and an emergency floor drain

3.29

battery of fixtures

group of two or more similar, adjacent fixtures that discharge into a common horizontal waste or soil branch

3.30

bedpan Steamer

fixture that is used to sterilize bedpans by way of steam

3.31

body spray

shower device for spraying water onto a bather from other than the overhead position

3.32

boiler blowoff

outlet on a boiler to permit emptying or discharge of sediment

3.34

bottle filling station

plumbing fixture connected to the potable water distribution system and sanitary drainage system that is designed and intended for filling personal use drinking water bottles or containers not less than 10 inches (254 mm) in height. Such fixtures can be separate from or integral to a drinking fountain and can incorporate a water filter and a cooling system for chilling the drinking water

3.35

branch

part of the piping system other than a main, riser, or stack

3.36

branch, fixture

water supply pipe between the fixture supply pipe and the water distribution pipe

3.37

branch, horizontal

drainpipe extending laterally from soil or waste stack or building drain with or without vertical sections or branches, which receives the discharge from one or more fixture drains and conducts it to the soil or waste stack or the building drain

3.37**branch vent**

vent connecting one or more individual vents with a vent stack or stack vent

3.38**building**

structure built, erected, and framed of component structural parts designed for the housing, shelter, enclosure, or support of persons, animals, or property of any kind

3.39**building drain**

part of the lowest piping of a drainage system that receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer beginning 2 feet (610 mm) outside the building wall

3.40**building drain (sanitary)**

building drain that conveys sewage only

3.41**building drain (storm), storm drain**

building drain that conveys storm water or another drainage, but no sewage

3.42**building sewer**

part of the horizontal piping of a drainage system that extends from the end of the building drain and that receives the discharge of the building drain and conveys it to a public sewer, private sewer, private sewage disposal system, or another point of disposal

3.43**building sewer (combined)**

building sewer that conveys both sewage and storm water or other drainage

3.44**building sewer (sanitary)**

building sewer that conveys sewage only

3.45

building sewer (storm)

building sewer that conveys storm water or another drainage, but no sewage

3.46

building subdrain

portion of a drainage system that does not drain by gravity into the building sewer

3.47

building supply

pipe is carrying potable water from the water meter or another source of water supply to a building or other point of use or distribution on the lot

3.53

certified backflow assembly tester

person who has shown competence to test and maintain backflow assemblies to the satisfaction of the Competent Authority

3.54

cesspool

lined excavation in the ground that receives the discharge of a drainage system or part thereof, so designed as to retain the organic matter and solids discharging therein but permitting the liquids to seep through the bottom and sides.

3.59

chimney classifications

3.59.1

chimney, high-heat appliance-type

factory-built, masonry, or metal chimney suitable for removing the products of combustion from fuel-burning high-heat appliances producing combustion gases in excess of 2000°F (1093°C), measured at the appliance flue outlet

3.59.2

chimney, low-heat appliance-type

factory-built, masonry, or metal chimney suitable for removing the products of combustion from fuel-burning low-heat appliances producing combustion gases not in excess of 1 000 °F (538 °C) under normal operating

conditions, but capable of producing combustion gases of 1 400 °F (760 °C) during intermittent forced firing for periods up to one hour. Temperatures are measured at the appliance flue outlet

3.59.3

chimney, medium-heat appliance-type

factory-built, masonry, or metal chimney suitable for removing the products of combustion from fuel-burning medium-heat appliances producing combustion gases, not in excess of 2 000 °F (1 093 °C), measured at the appliance flue outlet

3.59.4

chimney, residential appliance-type

factory-built or masonry chimney suitable for removing products of combustion from residential-type appliances producing combustion gases, not in excess of 1 000 °F (538 °C), measured at the appliance flue outlet. Factory-built Type HT chimneys have high-temperature thermal shock resistance

3.60

circuit vent

vent that connects to a horizontal drainage branch and vents two traps to a maximum of eight traps connected into a battery of fixtures

3.61

clarifier, interceptor, sand interceptor

device designed and installed to separate and retain deleterious, hazardous, or undesirable matter from normal wastes and permit normal sewage or liquid wastes to discharge into the disposal terminal by gravity

3.62

clear water waste

cooling water and condensate drainage from refrigeration and air-conditioning equipment; cooled condensate from steam heating systems, and cooled boiler blowdown water

3.63

clinical sink/bedpan washer

fixture that has the same flushing and cleansing characteristics of a water closet that is used to receive the wastes from a bedpan

3.64

coastal high hazard areas

area within the flood hazard area that is subject to high-velocity wave action

3.65

code

standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes and standards

3.66

combination temperature and pressure-relief valve/T&P Valve

relief valve that actuates when a set temperature, pressure, or both is reached

3.67

combination thermostatic/pressure balancing valve

mixing valve that senses outlet temperature and incoming hot and cold water pressure and compensates for fluctuations in incoming hot and cold water temperatures, pressures, or both to stabilize outlet temperatures

3.68

combination waste and vent system

specially designed system of waste piping embodying the horizontal wet venting of one or more sinks or floor drains using a common waste and vent pipe adequately sized to provide free movement of air above the flow line of the drain

3.70

commercial modular system

drinking water treatment unit system consisting of multiple components attached to a manifold, produced specifically for food service applications, and not intended for use in residential applications

3.71

common

part of a plumbing system that is so designed and installed as to serve more than one appliance, fixture, building, or system

3.72

condensate

liquid phase produced by condensation of a gas or vapor

3.74**conductor**

pipe inside the building that conveys storm water from the roof to a storm drain, combined building sewer, or other approved point of disposal

3.75**confined space**

space with limited entrance and egress that is not suitable for inhabitants and not intended for continuous human occupancy

3.76**construction documents**

plans, specifications, written, graphic, and pictorial documents prepared or assembled for describing the design, location, and physical characteristics of the elements of a project necessary for obtaining a permit

3.77**contamination**

impairment of the quality of the potable water that creates an actual hazard to the public health through poisoning or the spread of disease by sewage, industrial fluids, or waste

3.78**Continuous Vent**

vertical vent that is a continuation of the drain to which it connects

3.79**continuous waste**

drain is connecting the compartments of a set of fixtures to a trap or connecting other permitted fixtures to a common trap

3.80**copper alloy**

homogenous mixture of two or more metals in which copper is the primary component, such as brass and bronze

3.81

critical care area, patient care space

space of a health care facility wherein patients are intended to be examined or treated

3.82

critical level

critical level (C-L or C/L) marking on a backflow prevention device or vacuum breaker is a point conforming to approved standards and established by the testing laboratory (usually stamped on the device by the manufacturer) that determines the minimum elevation above the flood-level rim of the fixture or receptor served at which the device may be installed. Where a backflow prevention device does not bear a critical level marking, the bottom of the vacuum breaker, combination valve, or the bottom of such approved device shall constitute the critical level

3.83

cross-connection

connection or arrangement, physical or otherwise, between a potable water supply system and a plumbing fixture or a tank, receptor, equipment, or device, through which it may be possible for nonpotable, used, unclean, polluted, and contaminated water, or other substances to enter into a part of such potable water system under any condition

3.84

dead leg

section of potable water pipe which contains water that has no flow or does not circulate

3.85

debris excluder

device installed on the rainwater catchment conveyance system to prevent the accumulation of leaves, needles, or other debris in the system

3.86

design flood elevation

elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation is the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number is taken as being equal to 2 feet (610 mm)

3.87**developed length**

length along the centerline of a pipe and fittings

3.88**diameter**

unless specifically stated, "diameter" is the nominal diameter as designated commercially

3.90**diverter valve, gray water**

valve that directs gray water to the sanitary drainage system or a subsurface irrigation system

3.91**diverter valve, on-site treated nonpotable water**

component in the collection system to control inflow and overflow in collection tanks intended for on-site treatment and direct beneficial use

3.92**diverter valve, rainwater**

component in commercial rainwater catchment systems to control high inflow and overflow volumes in rainwater storage tanks

3.93**domestic sewage**

liquid and water-borne wastes derived from the ordinary living processes, free from industrial wastes, and of such character as to permit satisfactory disposal, without special treatment, into the public sewer or by means of a private sewage disposal system

3.94**downspout**

rain leader from the roof to the building storm drain, combined building sewer, or other means of disposal located outside of the building

3.95**drain**

pipe that carries waste or waterborne wastes in a building drainage system

3.96

drainage system

includes all the piping within public or private premises that conveys sewage, storm water, or other liquid wastes to a legal point of disposal, but does not include the mains of a public sewer system or a public sewage treatment or disposal plant

3.97

drinking fountain

plumbing fixture connected to the potable water distribution system and sanitary drainage system that provides drinking water in a flowing stream so that the user can consume water directly from the fixture without the use of accessories. Drinking fountains should also incorporate a bottle filling station and can incorporate a water filter and a cooling system for chilling the drinking water

3.98

dry vent

A vent that does not receive the discharge of any sewage or waste

3.99

Durham system

soil or waste system in which all piping is threaded pipe, tubing, or other such rigid construction, using recessed drainage fittings to correspond to the types of piping

3.101

effective opening

minimum cross-sectional area at the point of water supply discharge measured or expressed in terms of (1) diameter of a circle or (2) where the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This applies to an air gap)

3.102

emergency floor drain

floor drain that does not receive discharge from any fixture drain or indirect waste pipe, and serves to protect from damage where accidental spills, leaks or fixture backups occur

3.103

essentially nontoxic transfer fluid

fluid generally recognized as safe by the Food and Drug Administration (FDA) as food grade

3.104

exam room sink

sink used in the patient exam room of a medical or dental office with a primary purpose of the washing of hands

3.106

existing work

plumbing system or any part thereof that has been installed prior to the effective date of this standard

3.107

expansion joint

fitting or arrangement of pipe and fittings that permit the contraction and expansion of a piping system

3.108

expansion tank

vessel used to protect potable water systems from excessive pressure

3.109

F rating

time period that the penetration firestop system limits the spread of fire through the penetration, where tested in accordance with ASTM E814 or UL 1479.

3.110

fixture drain

drain from the trap of a fixture to the junction of that drain with any other drainpipe

3.111

fixture fitting

device that controls and guides the flow of water

3.112

fixture supply

3.113

water supply pipe is connecting the fixture with the fixture branch

3.114

fixture unit

quantity in terms of which the load-producing effects on the plumbing system of different kinds of plumbing fixtures are expressed on some arbitrarily chosen scale

3.115

flammable vapor or fumes

The concentration of flammable constituents in the air that exceeds 25 percent of its lower flammability limit (LFL).

3.116

flood hazard area

area greater of the following two areas

- (1) The area within a floodplain subject to a 1 percent or greater chance of flooding in any given year.
- (2) The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

3.117

flood level, flooded.

fixture is flooded where the liquid therein rises to the flood-level rim

3.118

flood-level rim

top edge of a receptor or fixture from which water overflows.

3.120

flush tank

tank located above or integral with water closets, urinals, or similar fixtures for the purpose of flushing the usable portion of the fixture

3.121

flush valve

valve located at the bottom of a tank for flushing water closets and similar fixtures

3.122**flushometer tank**

tank integrated within an air accumulator vessel that is designed to discharge a predetermined quantity of water to fixtures for flushing purposes

3.123**flushometer valve**

valve that discharges a predetermined quantity of water to fixtures for flushing purposes and is actuated by direct water pressure

3.124**FOG disposal system**

grease interceptor that reduces nonpetroleum fats, oils, and grease (FOG) in the effluent by separation, mass, and volume reduction

3.125**fuel gas**

natural, manufactured liquefied petroleum, or a mixture of these

3.126**gang or group shower**

two or more showers in a common area

3.127**gas piping**

installation of pipe, valves, or fittings that are used to convey fuel gas, installed on a premise or in a building

3.128**gas piping system**

arrangement of gas piping or regulators after the point of delivery and each arrangement of gas piping serving a building, structure, or premises, whether individually metered or not

3.130**grade, slope**

slope or fall of a line of pipe in reference to a horizontal plane. In drainage, it is usually expressed as the fall in a fraction of an inch (mm) or percentage slope per foot (meter) length of pipe

3.131

gravity grease interceptor

plumbing appurtenance or appliance that is installed in a sanitary drainage system to intercept nonpetroleum fats, oils, and greases (FOG) from a wastewater discharge and is identified by volume, 30 minute retention time, baffle(s), not less than two compartments, a total volume of not less than 300 gallons (1135 L), and gravity separation. [These interceptors comply with the requirements of Chapter 10 or are designed by a registered design professional.] Gravity grease interceptors are generally installed outside

3.132

gray water

untreated wastewater that has not come into contact with toilet waste, kitchen sink waste, dishwasher waste or similarly contaminated sources. Gray water includes wastewater from bathtubs, showers, lavatories, clothes washers, and laundry sinks. Also, known as grey water, graywater, and greywater

3.133

grease interceptor

plumbing appurtenance or appliance that is installed in a sanitary drainage system to intercept nonpetroleum fats, oil, and greases (FOG) from a wastewater discharge

3.134

Grease Removal Device (GRD)

hydromechanical grease interceptor that automatically, mechanically removes non-petroleum fats, oils and grease (FOG) from the interceptor, the control of which are either automatic or manually initiated

3.136

groundwater

water that exists beneath the earth's surface

3.137

group wash fixture

lavatory that allows more than one person to utilize the fixture at the same time. The fixture has one or more drains and one or more faucets

3.139 high hazard

impairment of the quality of the potable water that creates an actual hazard to the public health through poisoning or the spread of disease by sewage, industrial fluids, or waste

3.140**horizontal pipe**

pipe or fitting that is installed in a horizontal position or which makes an angle of less than 45° (0.79 rad) with the horizontal

3.141**hot water**

water at a temperature exceeding or equal to 120 °F (49 °C)

3.142**hydromechanical grease interceptor**

plumbing appurtenance or appliance that is installed in a sanitary drainage system to intercept nonpetroleum fats, oil, and grease (FOG) from a wastewater discharge and is identified by flow rate, and separation and retention efficiency. The design incorporates air entrainment, hydromechanical separation, interior baffling, or barriers in combination or separately, and one of the following:

- (1) External flow control, with an air intake (vent), directly connected.
- (2) External flow control, without air intake (vent), directly connected.
- (3) Without external flow control, directly connected.
- (4) Without external flow control, indirectly connected.

3.143**indirect-fired water heater**

water heater consisting of a storage tank equipped with an internal or external heat exchanger used to transfer heat from an external source to heat potable water. The storage tank either contains heated potable water or water supplied from an external source, such as a boiler

3.144**indirect waste pipe**

pipe that does not connect directly to the drainage system but conveys liquid wastes by discharging into a plumbing fixture, interceptor, or receptacle that is directly connected to the drainage system

3.145**individual vent**

pipe installed to vent a fixture trap, and that connects with the vent system above the fixture served or terminates in the open air

3.145

industrial waste

liquid or water-borne waste from industrial or commercial processes, except domestic sewage

3.146

insanitary, unsanitary

condition that is contrary to sanitary principles or is injurious to health.

Conditions to which “insanitary” shall apply include the following:

- (1) A trap that does not maintain a proper trap seal
- (2) An opening in a drainage system, except where lawful that is not provided with an approved liquid-sealed trap
- (3) A plumbing fixture or other waste discharging receptor or device that is not supplied with water sufficient to flush and maintain the fixture or receptor in a clean condition
- (4) A defective fixture, trap, pipe, or fitting
- (5) A trap, except where in this standard exempted, directly connected to a drainage system, the seal of which is not protected against siphonage and backpressure by a vent pipe
- (6) A connection, cross-connection, construction, or condition, temporary or permanent that would permit or make possible by any means whatsoever for an unapproved foreign matter to enter a water distribution system used for domestic purposes
- (7) The preceding enumeration of conditions to which the term “insanitary” shall apply, shall not preclude the application of that term to conditions that are, in fact, insanitary

3.147

interceptor (clarifier)

device designed and installed to separate and retain deleterious, hazardous, or undesirable matter from normal wastes and permit normal sewage or liquid wastes to discharge into the disposal terminal by gravity

3.148

invert

lowest portion of the inside of a horizontal pipe

3.149**joint, brazed**

joint obtained by joining of metal parts with alloys that melt at temperatures exceeding 840°F (449°C), but less than the melting temperature of the parts to be joined

3.150**joint, compression**

multipiece joint with cup-shaped threaded nuts that, when tightened, compress tapered sleeves so that they form a tight joint on the periphery of the tubing they connect

3.151**joint, flanged**

one made by bolting together a pair of flanged ends

3.152**joint, flared**

metal-to-metal compression joint in which a conical spread is made on the end of a tube that is compressed by a flare nut against a mating flare

3.153**joint, heat-fusion**

joint used in some thermoplastic systems to connect the pipe to fittings or pipe lengths directly to one another (butt-fusion). This method of joining pipe to fittings includes socket-fusion, electro-fusion, and saddle-fusion. This method of welding involves the application of heat and pressure to the components, allowing them to fuse together forming a bond between the pipe and fitting

3.154**joint, mechanical**

general form for gas-tight or liquid-tight joints obtained by the joining of parts through a positive holding mechanical construction

3.155**joint, press-connect**

permanent mechanical joint incorporating an elastomeric seal or an elastomeric seal and corrosion resistant grip ring. The joint is made with a pressing tool and jaw or ring that complies with the manufacturer's installation instructions

3.156

joint, soldered

joint obtained by the joining of metal parts with metallic mixtures or alloys that melt at a temperature up to and including 840°F (449°C)

3.157

joint, welded, sam

gastight joint obtained by the joining of metal parts in the plastic molten state

3.158

labeled

equipment or materials bearing a label of a listing agency (accredited conformity assessment body)

3.159

lavatories in sets

two or three lavatories that are served by one trap

3.160

leader

exterior vertical drainage pipe for conveying storm water from roof or gutter drains

3.161

Liquefied Petroleum Gas (LP-Gas) facilities

liquefied petroleum gas (LP-Gas) facilities include tanks, containers, container valves, regulating equipment, meters, appurtenances, or any combination thereof for the storage and supply of liquefied petroleum gas for a building, structure, or premises

3.162

liquid waste

discharge from a fixture, appliance, or appurtenance in connection with a plumbing system that does not receive fecal matter

3.163

listed (Third-Party Certified)

equipment or materials included in a list published by a listing agency (accredited conformity assessment body) that maintains periodic inspection of current production of listed equipment or materials and whose listing states

either that the equipment or material complies with approved standards or has been tested and found suitable for use in a specified manner

3.164

listing agency

agency accredited by an independent and authoritative conformity assessment body to operate a material and product listing and labeling (certification) system and that are accepted by the Competent Authority, which is in the business of listing or labeling. The system includes initial and ongoing product testing, a periodic inspection on current production of listed (certified) products, and that makes available a published report of such listing in which specific information is included that the material or product is in accordance with applicable standards and found safe for use in a specific manner

3.165

lot

single or individual parcel or area of land legally recorded or validated by other means acceptable to the Competent Authority on which is situated a building or which is the site of any work regulated by this standard, together with the yards, courts, and unoccupied spaces legally required for the building or works, and that is owned by or is in the lawful possession of the owner of the building or works

3.166

low hazard, pollution

impairment of the quality of the potable water to the degree that does not create a hazard to the public health but which does adversely and unreasonably affect the aesthetic qualities of such potable water for domestic use

3.167

low-pressure water dispenser

terminal fitting located downstream of a pressure reducing valve that dispenses drinking hot water above 71°C (160°F) or cold water or both at a pressure of 105 kPa (15 psi) or less

3.168

macerating toilet system

system comprised of a sump with macerating pump and with connections for a water closet and other plumbing fixtures, which is designed to accept, grind and pump wastes to an approved point of discharge

3.169

main

principal artery of a system of continuous piping to which branches may be connected

3.170

main sewer, public sewer

common sewer directly controlled by public authority

3.171

main vent

principal artery of the venting system to which vent branches may be connected

3.178

mid-story guide

support designed to keep piping in alignment, located mid-way between floors or a floor and ceiling

3.179

mobile home park sewer

part of the horizontal piping of a drainage system that begins 610 mm (2 feet) downstream from the last mobile home site and conveys it to a public sewer, private sewer, private sewage disposal system, or other point of disposal

3.180

mulch

organic materials, such as wood chips and fines, tree bark chips, and pine needles that are used in a mulch basin to conceal gray water outlets and permit the infiltration of gray water

3.181

mulch basin

subsurface catchment area for gray water that is filled with mulch and of sufficient depth and volume to prevent ponding, surfacing, or runoff

3.183

nonwater urinal with drain cleansing action

nonwater urinal that conveys waste into the drainage system without the use of water for flushing and automatically performs a drain-cleansing action after a predetermined amount of time

3.184**nuisance**

includes, but is not limited to:

- (1) A public nuisance known at common law or in equity jurisprudence
- (2) Where work regulated by this standard is dangerous to human life or is detrimental to health and property
- (3) Inadequate or unsafe water supply or sewage disposal system

3.185**offset**

combination of elbows or bends in a line of piping that brings one section of the pipe out of line but into a line parallel with the other section

3.186**on-site treated nonpotable water**

nonpotable water, including gray water that has been collected, treated, and intended to be used on-site and is suitable for direct beneficial use

3.180**penetration firestop system**

specific assemblage of field-assembled materials, or a factory-made device, which has been tested to a standard test method and, where installed properly on penetrating piping materials, is capable of maintaining the fire- resistance rating of assemblies penetrated

3.180**person**

natural person, his heirs, executor, administrators, or assigns and shall also include a firm, corporation, municipal or quasi-municipal corporation, or governmental agency. The singular includes the plural, male includes female

3.180**pipe**

cylindrical conduit or conductor is conforming to the dimensions commonly known as "pipe size"

3.181

plumbing

business, trade, or work having to do with the installation, removal, alteration, or repair of plumbing systems or parts thereof

3.182

plumbing appliance

special class of device or equipment that is intended to perform a special plumbing function. Its operation, control, or both may be dependent upon one or more energized components, such as motors, controls, heating elements, or pressure- or temperature-sensing elements. Such device or equipment may operate automatically through one or more of the following actions: a time cycle, a temperature range, a pressure range, a measured volume or weight; or the device or equipment may be manually adjusted or controlled by the user or operator

3.183

plumbing appurtenance

manufactured device, a prefabricated assembly, or an on-the-job assembly of component parts that is an adjunct to the basic piping system and plumbing fixtures. An appurtenance demands no additional water supply, nor does it add a discharge load to a fixture or the drainage system. It performs some useful function in the operation, maintenance, servicing, economy, or safety of the plumbing system

3.184

plumbing fixture

approved type installed receptacle, device or appliance that is supplied with water or that receives liquid or liquid-borne wastes and discharges such wastes into the drainage system to which it may be directly or indirectly connected. Industrial or commercial tanks, vats, and similar processing equipment are not plumbing fixtures, but may be connected to or discharged into approved traps or plumbing fixtures where and as otherwise provided for elsewhere in this standard

3.185

plumbing system

includes all potable water, alternate water sources, building supply, and distribution pipes; all plumbing fixtures and traps; all drainage and vent pipes; and all building drains and building sewers, including their respective joints and connections, devices, receptors, and appurtenances within the property lines of the premises and shall include potable water piping, potable water treating or using equipment, medical gas and medical vacuum systems, liquid and fuel gas piping, and water heaters and vents for same

3.186

plumbing vent, vent pipe

pipe provided to ventilate a plumbing system, to prevent trap siphonage and backpressure, or to equalize the air pressure within the drainage system

3.187**plumbing vent system, vent system**

pipe or pipes installed to provide a flow of air to or from a drainage system or to provide a circulation of air within such system to protect trap seals from siphonage and backpressure

3.188**point-of-entry, water treatment unit**

device serving the water distribution system of a building for the purposes of altering, modifying, adding, or removing minerals, chemicals, contaminants, and suspended solids in the water

3.189**point-of-use, water treatment unit**

device serving a single atmospheric outlet such as a faucet for the purposes of altering, modifying, adding, or removing any minerals, chemicals, contaminants, and suspended solids in water

3.190**potable water**

water that is satisfactory for drinking, culinary, and domestic purposes and that meets the requirements of the health regulatory authority

3.191**pre-fabricated shower enclosure**

factory-assembled watertight structure with enclosing walls, a drain, and door or open access way

3.192**pressure**

normal force exerted by a homogeneous liquid or gas, per unit of area, on the wall of the container

3.193**residual pressure**

pressure available at the fixture or water outlet after allowance is made for pressure drop due to friction loss, head, meter, and other losses in the system during maximum demand periods

3.194**static pressure**

pressure is existing without any flow

3.195

pressure-balancing valve

mixing valve that senses incoming hot and cold water pressures and compensates for fluctuations in either to stabilize outlet temperature

3.196

pressure-lock-type connection

mechanical connection that depends on an internal retention device to prevent pipe or tubing separation.

Note 1 to entry: The connection is made by inserting the pipe or tubing into the fitting to a prescribed depth

3.197

private or private use

applies to plumbing fixtures in residences and apartments, to private bathrooms in hotels, hospitals, and health care facilities, and to restrooms in commercial establishments where the fixtures are intended for the use of a family or an individual

3.198

private sewage disposal system

septic tank with the effluent discharging into a subsurface disposal field, into one or more seepage pits, or into a combination of subsurface disposal field and seepage pit or of such other facilities as may be permitted under the procedures set forth elsewhere in this standard

3.199

private sewer

building sewer that receives the discharge from more than one building drain and conveys it to a public sewer, private sewage disposal system, or another point of disposal

3.201

public or public use

applies to plumbing fixtures that are not defined as private or private use

3.202

public water system

system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of twenty-five individuals daily for at least 60 days per year

3.203**push fit fitting**

mechanical fitting where the connection is assembled by pushing the tube or pipe into the fitting and is sealed with an o-ring

3.204**quick-disconnect device**

hand-operated device that provides a means for connecting and disconnecting a hose to a water supply, and that is equipped with a means to shut off the water supply when the device is disconnected

3.206**rainwater**

natural precipitation that has not been contaminated by use

3.207**rainwater catchment system**

system that utilizes the principal of collecting, storing, and using rainwater from a rooftop or other manmade, aboveground collection surface. Also, known as a rainwater harvesting system

3.208**rainwater storage tank**

The central component of the rainwater catchment system. Also, known as a cistern or rain barrel

3.209**receptor**

approved plumbing fixture or device of such material, shape, and capacity as to adequately receive the discharge from indirect waste pipes, so constructed and located as to be readily cleaned

3.210**reclaimed water**

nonpotable water provided by a water/wastewater utility that, as a result of tertiary treatment of domestic wastewater, meets requirements of the public health Competent Authority for its intended uses

3.211**registered design professional**

individual who is registered or licensed by the laws of the to perform such design work in the jurisdiction

3.212

regulating equipment

includes valves and controls used in a plumbing system that is required to be accessible or readily accessible

3.213

relief vent

vent, the primary function of which is to provide circulation of air between drainage and vent systems or to act as an auxiliary vent on a specially designed system

3.214

remote outlet

where used for sizing water piping, it is the furthest outlet dimension, measuring from the meter, either the developed length of the cold-water piping or through the water heater to the furthest outlet on the hot-water piping

3.215

riser

water supply pipe that extends vertically one full story or more to convey water to branches or fixtures.

3.216

roof drain

drain installed to receive water collecting on the surface of a roof and to discharge it into a leader, downspout, or conductor.

3.217

roof washer

device or method for removal of sediment and debris from a collection surface by diverting initial rainfall from entry into the cistern(s). Also, known as a first flush device.

3.218

roughing-in

installation of all parts of the plumbing system that can be completed prior to the installation of fixtures. This includes drainage, water supply, gas piping, vent piping, and the necessary fixture supports

3.220**Standard Dimensional Ratio (SDR)**

specific ratio of the average specified outside diameter to the minimum wall thickness for outside controlled diameter plastic pipe.

3.221**Seepage Pit**

lined excavation in the ground which receives the discharge of a septic tank so designed as to permit the effluent from the septic tank to seep through its bottom and sides

3.222**septic tank**

watertight receptacle that receives the discharge of a drainage system or part thereof, designed and constructed so as to retain solids, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a system of open joint piping or a seepage pit meeting the requirements of this standard.

3.223**service piping**

The piping and equipment between the street gas main and the gas piping system inlet that is installed by, and is under the control and maintenance of, the serving gas supplier

3.224**sewage**

Liquid waste containing animal or vegetable matter in suspension or solution and that may include liquids containing chemicals in solution

3.225**sewage ejector**

device for lifting sewage by entraining it on a high-velocity jet stream, air, or water

3.226**sewage pump**

permanently installed mechanical device, other than an ejector, for removing sewage or liquid waste from a sump

3.227

shielded coupling

approved elastomeric sealing gasket with an approved outer shield and a tightening mechanism

3.228

shock arrester, water hammer arrester.

device designed to provide protection against hydraulic shock in the building water supply system

3.229

single-family dwelling

building designed to be used as a home by the owner of such building, which shall be the only dwelling located on a parcel of ground with the usual accessory buildings

3.230

slip joint

adjustable tubing connection, consisting of a compression nut, a friction ring, and a compression washer, designed to fit a threaded adapter fitting or a standard taper pipe thread

3.230

soil pipe

pipe that conveys the discharge of water closets, urinals, clinical sinks, or fixtures having similar functions of collection and removal of domestic sewage, with or without the discharge from other fixtures to the building drain or building sewer

3.231

special wastes, chemical waste

wastes that require some special method of handling, such as the use of indirect waste piping and receptors, corrosion-resistant piping, sand, oil or grease interceptors, condensers, or other pretreatment facilities

3.232

stack

vertical main of a system of soil, waste, or vent piping extending through one or more stories

3.233

stack vent

extension of soil or waste stacks above the highest horizontal drain connected to the stack

3.238**sterilizer**

piece of equipment that disinfects instruments and equipment by way of heat

3.239**storm sewer**

sewer used for conveying rainwater, surface water, condensate, cooling water, or similar liquid wastes

3.240**subsoil drain**

drain that collects subsurface or seepage water and conveys it to a place of disposal

3.241**subsoil irrigation field**

Gray water irrigation field installed in a trench within the layer of soil below the topsoil. This system is typically used for irrigation of deep rooted plants

3.242**subsurface irrigation field**

gray water irrigation field installed below finished grade within the topsoil

3.243**sump**

approved tank or pit that receives sewage or liquid waste and which is located below the normal grade of the gravity system and which must be emptied by mechanical means

3.244**surge tank**

reservoir to modify the fluctuation in flow rates to allow for uniform distribution of gray water to the points of irrigation

3.245**T Rating**

time period that the penetration firestop system, including the penetrating item, limits the maximum temperature rise of 325 °F (181 °C) above its initial temperature through the penetration on the nonfire side, where tested in accordance with ASTM E814 or UL 1479

3.246**tailpiece**

pipe or tubing that connects the outlet of a plumbing fixture to a trap

3.247**thermostatic (temperature control) valve**

mixing valve that senses outlet temperature and compensates for fluctuations in incoming hot or cold water temperatures

3.248**toilet facility**

room or space containing not less than one lavatory and one water closet

3.249**transition gas riser**

listed or approved section or sections of pipe and fittings used to convey fuel gas and installed in a gas piping system to provide a transition from belowground to aboveground

3.250**trap**

fitting or device so designed and constructed as to provide, where properly vented, a liquid seal that will prevent the back passage of air without materially affecting the flow of sewage or wastewater through it

3.251**trap arm**

those portions of a fixture drain between a trap and the vent

3.252**trap primer**

device and system of piping that maintains a water seal in a remote trap

3.253**trap seal**

vertical distance between the crown weir and the top dip of the trap

3.254**crown weir (trap weir)**

lowest point in the cross-section of the horizontal waterway at the exit of the trap

3.255**top dip (of the trap)**

highest point in the internal cross-section of the trap at the lowest part of the bend (inverted siphon). By contrast, the bottom dip is the lowest point in the internal cross-section

3.256**vacuum**

pressure less than that exerted by the atmosphere

3.257**vacuum relief valve**

device that prevents excessive vacuum in a pressure vessel

3.258**vacuum system-level 1**

system consisting of central vacuum-producing equipment with pressure and operating controls, shutoff valves, alarm warning systems, gauges, and a network of piping extending to and terminating with suitable station inlets at locations where patient suction could be required

3.259**valve, balancing**

valve that regulates and controls the return of water to the water heater in a recirculating hot water piping system

3.260**valve, isolation**

valve that isolates one piece of equipment from another

3.261**valve, pressure-relief**

pressure-actuated valve held closed by a spring or other means and designed automatically to relieve pressure in excess of its setting

3.262

valve, riser

valve at the base of a vertical riser that isolates that riser

3.263

valve, service

valve is serving horizontal piping extending from a riser to a station outlet or inlet

3.264

valve, source

single valve at the source that controls a number of units that makes up the source

3.265

valve, zone

A valve that controls the gas or vacuum to a particular area

3.266

vent connector, gas

portion of a gas venting system that connects a listed gas appliance beginning at the draft hood or flue collar to a gas vent and is installed entirely within the space or area in which the appliance is located

3.268

vent stack

vertical vent pipe installed primarily for the purpose of providing circulation of air to and from any part of the drainage system

3.270

vented flow control device

device installed upstream from the hydromechanical grease interceptor having an orifice that controls the rate of flow through the interceptor, and an air intake (vent) downstream from the orifice, which allows air to be drawn into the flow stream

3.272

vent, gas

listed factory-made vent pipe and vent fittings for conveying flue gases to the outdoors

3.273**type B gas vent**

factory-made gas vent listed by a nationally recognized testing agency for venting listed or approved appliances equipped to burn only gas

3.274**type BW gas vent**

factory-made gas vent listed by a nationally recognized testing agency for venting listed or approved gas-fired vented wall furnaces

3.275**type L gas vent**

venting system consisting of listed vent piping and fittings for use with oil-burning appliances listed for use with Type L or with listed gas appliances

3.276**vertical pipe**

pipe or fitting that is installed in a vertical position or that makes an angle of not more than 45 degrees (0.79 rad) with the vertical

3.277**wall-hung water closet**

water closet installed in such a way that no part of the water closet touches the floor

3.278**waste pipe**

pipe that conveys only liquid waste, free of fecal matter

3.279**water-conditioning or treating device**

device that conditions or treats a water supply to change its chemical content or remove suspended solids by filtration

3.280

water distribution pipe

in a building or premises, a pipe that conveys potable water from the building supply pipe to the plumbing fixtures and other water outlets

3.281

water heater, dual purpose

appliance intended to be a heat source for both space heating and domestic hot water applications

3.282

water heater or hot water heating boiler

appliance designed primarily to supply hot water for domestic or commercial purposes and equipped with automatic controls limiting water temperature to a maximum of 210 °F (99 °C)

3.283

water main (street main)

water supply pipe for public or community use

3.284

water station

designated location intended to provide access to drinking water through a device or appliance

3.285

water supply system

building supply pipe, the water distribution pipes, and the necessary connecting pipes, fittings, control valves, backflow prevention devices, and all appurtenances carrying or supplying potable water in or adjacent to the building or premises

3.286

water/wastewater utility

public or private entity which may treat, deliver or do both functions to reclaimed (recycled) water, potable water, or both to wholesale or retail customers

3.287

welder, pipe

person who specializes in the welding of pipes and holds a valid certificate of competency from a recognized competency certification body

3.289**wet vent**

vent that also serves as a drain

3.290**whirlpool bathtub**

bathtub fixture equipped and fitted with a circulating piping system designed to accept, circulate, and discharge bathtub water upon each use

3.291**yoke vent**

pipe connecting upward from soil or waste stack to a vent stack to prevent pressure changes in the stacks

4 Abbreviated terms

ABS: Acrylonitrile Butadiene Styrene

CPVC: Chlorinated Polyvinyl Chloride.

PE: Polyethylene.

PE-AL-PE: Polyethylene-aluminum-polyethylene.

PE-RT: Polyethylene of raised temperature.

PEX: Cross-linked polyethylene.

PEX-AL-PEX: Cross-linked polyethylene–aluminum-cross-linked polyethylene.

PVC: Polyvinyl Chloride.

PVDF: Polyvinylidene Fluoride.

PP: Polypropylene.

5 General application of this standard

5.1 Applicability

5.1.1 Conflicts between standards

5.1.1.1 Where the requirements of this standard conflict with the requirements of the mechanical standards, the requirements of this standard shall govern.

5.1.1.2 In instances where this standard, applicable standards, or the manufacturer's installation instructions conflict, the more stringent provisions shall govern.

5.1.1.3 Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

5.1.2 Existing Installations

Plumbing systems lawfully in existence at the time of publication of this standard, shall be permitted to have their use, maintenance, or repair continued where the use, maintenance, or repair is in accordance with the original design and location and no hazard to life, health, or property has been created by such plumbing system.

5.1.3 Maintenance

5.1.3.1 The plumbing and drainage system, both existing and new, of a premise under the Competent Authority shall be maintained in a sanitary and safe operating condition. Devices or safeguards required by this standard shall be maintained in accordance with the standard edition under which installed.

5.1.3.2 The owner or the owner's designated agent shall be responsible for maintenance of plumbing systems. To determine compliance with this subsection, the Competent Authority shall be permitted to cause a plumbing system to be reinspected.

5.1.4 Additions, alterations, renovations or repairs

5.1.4.1 General

Additions, alterations, renovations or repairs shall conform to that required for a new system without requiring the existing plumbing system to be in accordance with the requirements of this standard. Additions, alterations, renovations, or repairs shall not cause an existing system to become unsafe, insanitary, or overloaded. Additions, alterations, renovations, or repairs to existing plumbing installations shall comply with the provisions for new construction unless such deviations are found to be necessary and are first approved by the Competent Authority.

5.1.4.2 Building sewers and drains

Existing building sewers and building drains shall be permitted to be used in connection with new buildings or new plumbing and drainage work where they are found on examination and test to be in accordance with the requirements governing new work, and the proper Competent Authority shall notify the owner to make changes necessary to be in accordance with this standard. No building, or part thereof, shall be erected or placed over

a part of a drainage system that is constructed of materials other than those approved elsewhere in this standard for use under or within a building.

5.1.4.3 Openings

Openings into a drainage or vent system, excepting those openings to which plumbing fixtures are properly connected or which constitute vent terminals, shall be permanently plugged or capped in an approved manner, using the appropriate materials in accordance with this standard.

5.1.5 Health and safety

Where compliance with the provisions of this standard fails to eliminate or alleviate a nuisance, or other dangerous or insanitary condition that involves health or safety hazards, the owner or the owner's agent shall install such additional plumbing and drainage facilities or shall make such repairs or alterations as ordered by the Competent Authority.

5.1.6 Changes in building occupancy

Plumbing systems that are a part of a building or structure undergoing a change in use or occupancy, as defined in the building code and regulations, shall be in accordance with the requirements of this standard that are applicable to the new use or occupancy.

5.1.7 Moved structures

Parts of the plumbing system of a building or part thereof that is moved from one foundation to another, or from one location to another, shall be in accordance with the provisions of this standard for new installations and completely tested as prescribed elsewhere in this section for new work, except that walls or floors need not be removed during such test where other equivalent means of inspection acceptable to the Competent Authority are provided.

5.2 Duties and powers of Competent Authority

5.2.1 General

5.2.1 The Competent Authority shall be the Authority duly appointed to enforce this standard. For such purposes, the Competent Authority shall have the powers of a law enforcement officer. The Competent Authority shall have the power to render interpretations of this standard and to adopt and enforce rules and regulations supplemental to this standard as deemed necessary in order to clarify the application of the provisions of this standard. Such interpretations, rules, and regulations shall comply with the intent and purpose of this standard.

5.2.2 In accordance with the prescribed procedures and with the approval of the appointing authority, the Competent Authority shall be permitted to appoint a such number of technical officers, inspectors, and other employees as shall be authorized from time to time. The Competent Authority shall be permitted to deputize such inspectors or employees as necessary to carry out the functions of the standard enforcement agency.

The Competent Authority shall be permitted to request the assistance and cooperation of other officials as required in the discharge of the duties in accordance with this standard or other pertinent law or ordinance.

5.2.2 Liability

The Competent Authority charged with the enforcement of this standard, acting in good faith and without malice in the discharge of the Competent Authority's duties, shall not thereby be rendered personally liable for damage that accrues to persons or property as a result of an act or by reason of an act or omission in the discharge of duties. A suit brought against the Competent Authority or employee because of such act or omission performed in the enforcement of provisions of this standard shall be defended by legal counsel provided by this jurisdiction until final termination of such proceedings.

5.2.3 Applications, permits and licence

5.2.3.1 The Competent Authority shall be permitted to require the submission of plans, specifications, drawings, and such other information in accordance with the Competent Authority, prior to the commencement of, and at a time during the progress of, work regulated by this standard.

5.2.3.2 The issuance of a permit upon construction documents shall not prevent the Competent Authority from thereafter requiring the correction of errors in said construction documents or from preventing construction operations being carried on thereunder where in violation of this standard or of other pertinent ordinance or from revoking a certificate of approval where issued in error.

5.2.3.3 The provision for the required licences shall be determined by the Competent Authority.

5.3 Permits

5.3.1 Permits Required

It shall be unacceptable for a person, firm, or corporation to make an installation, alteration, repair, replacement, or remodel a plumbing system regulated by this standard except as permitted in 5.2.3, or to cause the same to be done without first obtaining a separate plumbing permit for each separate building or structure.

5.3.2 Exempt work

5.3.2.1 A permit shall not be required for the following:

(1) The stopping of leaks in drains, soil, waste, or vent pipe, provided, however, that a trap, drainpipe, soil, waste, or vent pipe become defective, and it becomes necessary to remove and replace the same with new material, the same shall be considered as new work and a permit shall be procured and inspection made as provided in this standard.

(2) The clearing of stoppages, including the removal and reinstallation of water closets, or the repairing of leaks in pipes, valves, or fixtures, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes, or fixtures.

5.3.2.2 Exemption from the permit requirements shall not be deemed to grant authorization for work to be done in violation of the provisions of this standard or other laws or ordinances of this jurisdiction.

5.3.3 Existing building

In existing buildings or premises in which plumbing installations are to be altered, repaired, or renovated, the Competent Authority has discretionary powers to permit deviation from the provisions of this standard, provided that such proposal to deviate is first submitted for proper determination in order that health and safety requirements, as they pertain to plumbing, shall be observed.

5.4 Inspections and testing

5.4.1 General

5.4.1.1 Plumbing systems for which a permit is required by this standard shall be inspected by the Competent Authority. The inspections shall be conducted in accordance with the procedure established by the Competent Authority.

5.4.1.2 No plumbing system or portion thereof shall be covered, concealed, or put into use until inspected and approved by the Competent Authority. Plumbing systems shall not be connected to the water, the energy fuel supply, or the sewer system until authorized by the Competent Authority.

5.4.2 Required inspections

5.4.2.1 New plumbing work and such portions of existing systems as affected by new work, or changes, shall be inspected by the Competent Authority to ensure compliance with the requirements of this standard and to ensure that the installation and construction of the plumbing system are in accordance with approved plans.

5.4.2.2 The inspections to be conducted included the following and other such inspections as necessary:

- (1) The underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place.
- (2) Rough-in inspection shall be made prior to the installation of wall or ceiling membranes.
- (3) Final inspection shall be made upon completion of the installation.

5.4.3 Uncovering

5.4.3.1 Where a drainage or plumbing system, building sewer, private sewage disposal system, or part thereof, which is installed, altered, or repaired, is covered or concealed before being inspected, tested, and approved as prescribed in this standard, it shall be uncovered for inspection.

5.4.3.2 No water supply system or portion thereof shall be covered or concealed until it first has been tested, inspected, and approved.

5.4.3.3 No plumbing or drainage system, building sewer, private sewer disposal system, or part thereof, shall be covered, concealed, or put into use until it has been tested, inspected, and accepted as prescribed in this standard.

5.4.4 Other inspections

In addition to the inspections required by this standard, the Competent Authority shall be permitted to require other inspections to ascertain compliance with the provisions of this standard and other laws that are enforced by the Competent Authority.

5.4.5 Testing of systems

5.4.5.1 Plumbing systems shall be tested and approved in accordance with the requirement of this standard. Tests shall be conducted in the presence of the Competent Authority

5.4.5.2 No test or inspection shall be required where a plumbing system, or part thereof, is set up for exhibition purposes and has no connection with a water or drainage system.

5.4.5.3 In cases where it would be impractical to provide the required water or air tests, or for minor installations and repairs, the Competent Authority shall be permitted to make such inspection as deemed advisable in order to be assured that the work has been performed in accordance with the intent of this standard.

5.4.5.4 Joints and connections in the plumbing system shall be gastight and watertight for the pressures required by the test.

5.4.6 Defective Systems

An air test shall be used in testing the sanitary condition of the drainage or plumbing system of building premises where there is reason to believe that it has become defective. In buildings or premises condemned by the Competent Authority because of an insanitary condition of the plumbing system, or part thereof, the alterations in such system shall be in accordance with the requirements of this standard.

5.4.7 Retesting

Where the Competent Authority finds that the work will not pass the test, necessary corrections shall be made, and the work shall be resubmitted for test or inspection.

5.4.8 Approval

Where prescribed tests and inspections indicate that the work is in accordance with this standard, a certificate of approval shall be issued by the Competent Authority to the permittee on demand.

5.4.9 Connection to Service Utilities

No person shall make connections from a source of energy or fuel to a plumbing system or equipment regulated by this standard and for which a permit is required until approved by the Competent Authority. No person shall make connection from a water-supply line nor shall connect to a sewer system and for which a permit is required until approved by the Competent Authority. The Competent Authority shall be permitted to authorize temporary connection of the plumbing equipment to the source of energy or fuel for the purpose of testing the equipment.

6 General requirements of plumbing works

6.1 General

6.1.1 Minimum requirements

Pipe, pipe fittings, traps, fixtures, material, and devices used in a plumbing system shall be third-party certified by a certification body (accredited conformity assessment body) as conforming to the approved applicable recognized standards referenced in this standard, and shall be free from defects. Unless otherwise provided for in this standard, materials, fixtures, or devices used or entering into the construction of plumbing systems, or parts thereof shall be submitted to the Competent Authority for approval prior to being installed.

6.1.2 Plastic pipe, plastic pipe fittings, and components other than those for gas shall conform to RS ISO 1452-1, RS ISO 1452-2, RS ISO 1452-3, RS ISO 1452-4, RS ISO 1452-5, RS ISO 14531-3, RS ISO 15874-1, RS ISO 15874-2, RS ISO 15874-3, RS ISO 15874-5, RS ISO 4427-1, RS ISO 4427-2, RS ISO 4427-3, RS ISO 4427-5, RS ISO 4437-2.

6.1.2 Marking

6.1.2.1 Each length of pipe and each pipe fitting, trap, fixture, material, and device used in a plumbing system shall have cast, stamped, or indelibly marked on it any markings required by the applicable referenced standards and listing body (Certification Body), and the manufacturer's mark or name, which shall readily identify the manufacturer to the end user of the product.

6.1.2.2 Where required by the applicable approved standard, the product shall be marked with the weight and the quality of the product. Materials and devices used or entering into the construction of plumbing and drainage systems, or parts thereof shall be marked and identified in a manner satisfactory to the Competent Authority. Such marking shall be done by the manufacturer. Field markings shall not be acceptable.

6.2.2 Markings shall not be required on nipples created from cutting and threading of approved pipe.

6.2 Alternate materials and methods of construction equivalency

6.2.1 General

6.2.1.1 Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard. Technical documentation shall be submitted to the Competent Authority to demonstrate equivalency prior to installation. The Competent Authority shall have the authority to approve or disapprove the system, method, or device for the intended purpose.

6.2.1.2 However, the exercise of this discretionary approval by the Competent Authority shall have no effect beyond the jurisdictional boundaries of said Competent Authority. An alternate material or method of construction so approved shall not be considered as in accordance with the requirements, intent, or both of this code for a purpose other than that granted by the Competent Authority where the submitted data does not prove equivalency.

6.2.2 Testing

6.2.2.1 The Competent Authority shall have the authority to require tests, as proof of equivalency.

6.2.2.2 Tests shall be made in accordance with approved or applicable standards, by an approved testing agency at the expense of the applicant. In the absence of such standards, the Competent Authority shall have the authority to specify the test procedure.

6.2.2.3 The Competent Authority shall have the authority to require tests to be made or repeated where there is reason to believe that a material or device no longer is in accordance with the requirements on which its approval was based.

6.2.3 Flood hazard areas

6.2.3.1 Plumbing systems shall be located above the elevation in accordance with the building code for utilities and attendant equipment or the elevation of the lowest floor, whichever is higher.

6.2.3.2 Plumbing systems shall be permitted to be located below the elevation in accordance with the building code for utilities and attendant equipment or the elevation of the lowest floor, whichever is higher, provided that the systems are designed and installed to prevent water from entering or accumulating within their components, and the systems are constructed to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to such elevation.

6.2.3.3 Plumbing systems in buildings located in coastal high hazard areas shall be in accordance with the requirements of Clause 6.2.1, and plumbing systems, pipes, and fixtures shall not be mounted on or penetrate through walls that are intended to breakaway under flood loads in accordance with the building code.

6.2.4 Alternative engineered design

6.2.4.1 An alternative engineered design shall comply with the intent of the provisions of this standard and shall provide an equivalent level of quality, strength, effectiveness, fire resistance, durability, and safety. Material, equipment, or components shall be designed and installed in accordance with the manufacturer's installation instructions.

6.2.4.2 An approval of an alternative engineered design shall be at the discretion of the Competent Authority. The exercise of this discretionary approval by the Competent Authority shall have no effect beyond the regulatory boundaries of said Competent Authority. An alternative engineered design so approved shall not be considered as in accordance with the requirements, intent, or both of this standard for a purpose other than that granted.

6.2.4.3 The alternative engineered design shall be tested and inspected in accordance with the submitted testing and inspection plan and the requirements of this standard.

6.2.5 Tall wood (mass timber) buildings

Plumbing systems installed in tall wood (mass timber) buildings, shall comply with the following:

(1) Be designed by a licensed plumbing contractor or a registered design professional in accordance with this standard and other design standards.

(2) Be designed to accommodate expansion, contraction, and differential movement between parts of a tall wood (mass timber) building in accordance with Clause 6.13.

6.3 Iron pipe size (IPS) pipe

Iron, steel, copper, and copper alloy pipe shall be standard-weight iron pipe size (IPS) pipe.

6.4 Disposal of liquid waste

Sewage, human excrement or other liquid wastes shall not be disposed in a place or manner, except through and by means of an approved drainage system, installed and maintained in accordance with the provisions of this standard.

6.5 Connections to plumbing system required

Plumbing fixtures, drains, appurtenances, and appliances, used to receive or discharge liquid wastes or sewage, shall be connected properly to the drainage system of the building or premises, in accordance with the requirements of this standard.

6.6 Damage to drainage system or public sewer

Any ashes; cinders; solids; rags; inflammable, poisonous, or explosive liquids or gases; oils; grease; or any other thing whatsoever that is capable of causing damage to the drainage system or public sewer shall not be deposited into a plumbing fixture, floor drain, interceptor, sump, receptor, or device, which is connected to a drainage system, public sewer, private sewer, septic tank, or cesspool,

6.7 Industrial wastes

6.7.1 Detrimental wastes

Wastes detrimental to the public sewer system or detrimental to the functioning of the sewage treatment plant shall be treated and disposed of as found necessary and directed by the Competent Authority.

6.7.2 Safe discharge

Sewage or other waste from a plumbing system that is capable of being deleterious to surface or subsurface waters shall not be discharged into the ground or a waterway unless it has first been rendered safe by some acceptable form of treatment in accordance with the Competent Authority.

6.8 Location

6.8.1 System

Except as otherwise provided in this standard, no plumbing system, drainage system, building sewer, private sewage disposal system, or parts thereof shall be located in a lot other than the lot that is the site of the building, structure, or premises served by such facilities.

6.8.2 Ownership

No subdivision, sale, or transfer of ownership of existing property shall be made in such manner that the area, clearance, and access requirements of this code are decreased.

6.9 Prohibited locations

Piping, fixtures, appliances, or equipment shall not be so located as to interfere with the normal use thereof or with the normal operation and use of windows, doors, or other required facilities.

6.10 Workmanship

6.10.1 Plumbing practices

Design, construction, and workmanship shall be in accordance with accepted plumbing practices and shall be of such character as to secure the results sought to be obtained by this standard.

6.10.2 Concealing imperfections

Cracks, holes, or other imperfections in materials shall not be concealed by welding, brazing, or soldering or by using therein or thereon paint, wax, tar, solvent cement, or other leak-sealing or repair agent.

6.10.3 Burred ends

Burred ends of pipe and tubing shall be reamed to the full bore of the pipe or tube, and chips shall be removed.

6.10.4 Installation practices

Plumbing systems shall be installed in a workmanlike manner which is in accordance with this standard, applicable standards, and the manufacturer's installation instructions. All materials shall be installed so as not to adversely affect the systems and equipment or the structure of the building, and in compliance with all laws and other provisions of this standard. All plumbing systems shall be in accordance with construction documents approved by the Competent Authority.

6.10.5 Sound transmission

Plumbing piping systems shall be designed and installed in conformance with sound limitations as required in the building code.

6.10.6 Dead legs

Dead legs shall have a method of flushing.

6.11 Prohibited fittings and practices

6.11.1 Fittings

No double hub fitting, single or double tee branch, single or double tapped tee branch, side inlet quarter bend, running thread, band, or saddle shall be used as a drainage fitting.

6.11.2 Drainage and vent piping

No drainage or vent piping shall be drilled and tapped for the purpose of making connections thereto, and no cast-iron soil pipe shall be threaded.

6.11.3 Waste connection

No waste connection shall be made to a closet bend or stub of a water closet or similar fixture.

6.11.4 Use of vent and waste pipes

Except as hereinafter provided in DRS 644-4, no vent pipe shall be used as a soil or waste pipe, nor shall a soil or waste pipe be used as a vent. Also, single-stack drainage and venting systems with unvented branch lines are prohibited.

6.11.5 Obstruction of flow

No fitting, fixture and piping connection, appliance, device, or method of installation that obstructs or retards the flow of water, wastes, sewage, or air in the drainage or venting systems, in an amount exceeding the normal frictional resistance to flow, shall be used unless it is indicated as acceptable in this code or is approved in accordance with Section 301.2 of this code. The enlargement of a 3 inch (80 mm) closet bend or stub to 4 inches (100 mm) shall not be considered an obstruction.

6.11.6 Dissimilar metals

Except for necessary valves, where intermembering or mixing of dissimilar metals occurs, the point of connection shall be confined to exposed or accessible locations.

6.11.7 Direction of flow

Valves, pipes, and fittings shall be installed in correct relationship to the direction of flow.

6.11.8 Screwed fittings

Screwed fittings shall be ABS, cast-iron, copper, copper alloy, malleable iron, PVC, steel, or other approved materials. Threads shall be tapped out of solid metal or molded in solid ABS or PVC.

6.11.9 Female plastic connections

6.11.9.1 Female plastic tapered (NPT) threaded connections shall not be allowed to be used when threaded onto a male metallic connection.

6.11.9.2 Female plastic parallel (straight) threaded connections shall be permitted.

6.11.10 ABS and PVC transition joints

Except as provided in DRS 644-4, PVC and ABS pipe and fittings shall not be solvent welded to dissimilar material.

6.12 Independent systems

6.12.1 General

6.12.1.1 The drainage system of each new building and new work installed in an existing building shall be separate and independent from that of any other building, and, where available, every building shall have an independent connection with a public or private sewer.

6.12.1.2 Where one building stands in the rear of another building on an interior lot, and no public or private sewer is available or can be constructed to the rear building through an adjoining court, yard, or driveway, the building drain from the front building shall be permitted to be extended to the rear building.

6.13 Protection of piping, tubing, materials, and structures

6.13.1 General

Piping passing under or through walls shall be protected from breakage. Piping passing through or under cinders or other corrosive materials shall be protected from external corrosion in an approved manner. Approved provisions shall be made for expansion of hot water piping. Voids around piping passing through concrete floors on the ground shall be sealed.

6.13.2 Installation

Piping in connection with a plumbing system shall be so installed that piping or connections will not be subject to undue strains or stresses, and provisions shall be made for expansion, contraction, and structural settlement. No plumbing piping shall be directly embedded in concrete or masonry. No structural member shall be seriously weakened or impaired by cutting, notching, or otherwise, as defined in the building code.

6.13.3 Building sewer and drainage piping

No building sewer or other drainage piping or part thereof, constructed of materials other than those approved for use under or within a building, shall be installed under or within 610 mm (2 feet) of a building or structure, or less than 305 mm (1 foot) below the surface of the ground.

6.13.4 Corrosion, erosion, and mechanical damage

Piping subject to corrosion, erosion, or mechanical damage shall be protected in an approved manner.

6.13.5 Protectively coated pipe

Protectively coated pipe or tubing shall be inspected and tested, and a visible void, damage, or imperfection to the pipe coating shall be repaired in an approved manner.

6.13.6 Freezing protection

No water, soil, or waste pipe shall be installed or permitted outside of a building, in attics or crawl spaces, or in an exterior wall unless, where necessary, adequate provision is made to protect such pipe from freezing.

6.13.7 Fire-resistant construction

Piping penetrations of fire-resistance-rated walls, partitions, floors, floor/ceiling assemblies, roof/ceiling assemblies, or shaft enclosures shall be protected in accordance with the requirements of the building code and Chapter 14, "Firestop Protection."

6.13.8 Waterproofing of openings

Joints at the roof around pipes, ducts, or other appurtenances shall be made watertight by the use of lead, copper, galvanized iron, or other approved flashings or flashing material. Exterior wall openings shall be made watertight. Counterflashing shall not restrict the required internal cross-sectional area of the vent.

6.13.9 Steel nail plates

Plastic piping or tubing, and copper or copper alloy piping or tubing penetrating framing members to within 25.4 mm (1 inch) of the exposed framing shall be protected by steel nail plates not less than No. 18 gauge 1.2 mm (0.0478 inches) in thickness. The steel nail plate shall extend along the framing member not less than 1 1/2 inches (38 mm) beyond the outside diameter of the pipe or tubing. Fuel gas piping shall be protected in accordance with Section 1210.4.3.

6.13.10 Sleeves

Sleeves shall be provided to protect piping through concrete and masonry walls, and concrete floors.

Exception: Sleeves shall not be required where openings are drilled or bored.

6.13.11 Building loads

Piping through concrete or masonry walls shall not be subject to a load from building construction.

6.13.12 Exterior walls

In exterior walls, annular space between sleeves and pipes shall be sealed and made watertight, as approved by the Competent Authority. A penetration through fire-resistive construction shall be in accordance with Clause 6.13.7.

6.13.13 Firewalls

A pipe sleeve through a firewall shall have space around the pipe completely sealed with an approved fire-resistive material in accordance with other codes.

6.13.14 Structural members

A structural member weakened or impaired by cutting, notching, or otherwise shall be reinforced, repaired, or replaced so as to be left in a safe structural condition in accordance with the requirements of the building code.

6.13.15 Rodent proofing

Strainer plates on drain inlets shall be designed and installed so that no opening exceeds 1/2 of an inch (12.7 mm) in the least dimension.

6.13.16 Meter boxes

Meter boxes shall be constructed in such a manner as to restrict rodents or vermin from entering a building by following the service pipes from the box into the building.

6.13.17 Metal collars

In or on buildings where openings have been made in walls, floors, or ceilings for the passage of pipes, such openings shall be closed and protected by the installation of approved metal collars securely fastened to the adjoining structure.

6.13.18 Tub Waste openings

Tub waste openings in framed construction to crawl spaces at or below the first floor shall be protected by the installation of approved metal collars or metal screen securely fastened to the adjoining structure with no opening exceeding 12.7 mm (1/2 of an inch) in the least dimension.

6.14 Hangers, supports, and anchors

6.14.1 General

Piping, tubing, fixtures, appliances, and appurtenances shall be supported in accordance with this standard, the manufacturer's installation instructions, and in accordance with the Competent Authority. Seismic restraints shall be in accordance with the applicable building code.

6.14.2 Material

Hangers, supports, and anchors shall be of sufficient strength to support the weight of the pipe or tubing and its contents. Piping or tubing shall be isolated from incompatible materials.

6.14.3 Suspended piping

Suspended piping shall be supported at intervals not to exceed those shown in Table 1.

Table 1 — Hangers and supports

Material	Type of joints	Horizontal		Vertical
Cast	Lead and Oakum	5 feet, except 10 feet where 10 foot lengths are installed ^{1, 2, 3}		Base and each floor, not to exceed 15 feet
	Compression Gasket	Every other joint, unless over 4 feet then support each joint ^{1, 2, 3}		Base and each floor, not to exceed 15 feet
Cast-Iron Hubless	Shielded Coupling	Every other joint, unless over 4 feet then support each joint ^{1, 2, 3, 4}		Base and each floor, not to exceed 15 feet
Copper & Copper Alloys	Soldered, Threaded, Mechanical Brazed, or	1 1/2 inches and smaller, 6 feet; 2 inches and larger, 10 feet		Each floor, not to exceed 10 feet ⁵
Steel Pipe for Water or DWV	Threaded or Welded	3/4 inch and smaller, 10 feet; 1 inch and larger, 12 feet		Every other floor, not to exceed 25 feet ⁵
Steel Pipe for Gas	Threaded or Welded	1/2 inch, 6 feet; 3/4 inch and 1 inch, 8 feet; 1 1/4 inches and larger, 10 feet		1/2 inch, 6 feet; 3/4 inch and 1 inch, 8 feet; 1 1/4 inches every floor level
Schedule 40 PVC and ABS DWV	Solvent Cemented	All sizes, 4 feet; allow for expansion every 30 feet ³		Base and each floor; provide mid-story guides; provide for expansion every 30 feet
CPVC	Solvent Cemented	1 inch and smaller, 3 feet; 1 1/4 inches and larger, 4 feet		Base and each floor; provide mid-story guides
CPVC-AL-CPVC	Solvent Cemented	1/2 inch, 5 feet; 3/4 inch, 65 inches; 1 inch, 6 feet		Base and each floor; provide mid-story guides
Lead	Wiped or Burned	Continuous Support		Not to exceed 4 feet
Steel	Mechanical	In accordance with standards acceptable to the Competent Authority		
PEX	Cold Expansion, Insert and Compression	1 inch and smaller, 32 inches; 1 1/4 inches and larger, 4 feet		Base and each floor; provide mid-story guides
PEX-AL-PEX	Metal Insert and Metal Compression	1/2 inch 3/4 inch 1 inch	All sizes 98 inches	Base and each floor; provide mid-story guides
PE-AL-PE	Metal Insert and Metal Compression	1/2 inch 3/4 inch 1 inch	All sizes 98 inches	Base and each floor; provide mid-story guides
PE-RT	Insert and Compression	1 inch and smaller, 32 inches; 1 1/4 inches and larger, 4 feet		Base and each floor; provide mid-story guides

Polypropylene (PP)	Fusion weld (socket, butt, saddle, electrofusion), threaded (metal threads only), or mechanical	1 inch and smaller, 32 inches; 1¼ inches and larger, 4 feet	Base and each floor; provide mid-story guides

NOTE For SI units: 1 inch = 25.4 mm, 1 foot = 304.8 mm

NOTE:

1. Support adjacent to joint, not to exceed 18 inches (457 mm)
2. Brace not to exceed 40 foot (12 192 mm) intervals to prevent horizontal movement
3. Support at each horizontal branch connection
4. Hangers shall not be placed on the coupling
5. Vertical water lines shall be permitted to be supported in accordance with recognized engineering principles with regard to expansion and contraction, where first approved by the Competent Authority.

6.14.4 Alignment

Piping shall be supported in such a manner as to maintain its alignment and prevent sagging.

6.14.5 Underground installation

Piping in the ground shall be laid on a firm bed for its entire length; where other support is otherwise provided, it shall be approved in accordance with Clause 6.1.1.

6.14.6 Hanger rod sizes

Hanger rod sizes shall be not smaller than those shown in Table 2.

Table 2 — Hanger rod sizes

Pipe and tube size (inches)	Rod size (inches)
½ - 4	3/8
5 - 8	1/2
10 - 12	5/8
NOTE For SI Units: 1 inch = 25.4 mm	

6.14.7 Gas piping

Gas piping shall be supported by metal straps or hooks at intervals not to exceed those shown in DRS 644-6.

6.15 Trenching, excavation, and backfill

6.15.1 Trenches

Trenches deeper than the footing of a building or structure, and paralleling the same, shall be located not less than 45 degrees (0.79 rad) from the bottom exterior edge of the footing, or as approved in accordance with Clause 6.1.1.

6.15.2 Tunneling and driving

Tunneling and driving shall be permitted to be done in yards, courts, or driveways of a building site. Where sufficient depth is available to permit, tunnels shall be permitted to be used between open-cut trenches.

Tunnels shall have a clear height of 610 mm (2 feet) above the pipe and shall be limited in length to one-half the depth of the trench, with a maximum length of 2438 mm (8 feet). Where pipes are driven, the drive pipe shall be not less than one size larger than the pipe to be laid.

6.15.3 Open Trenches

Excavations required to be made for the installation of a building drainage system or part thereof, within the walls of a building, shall be open trench work and shall be kept open until the piping has been inspected, tested, and accepted.

6.15.4 Excavations

Excavations shall be completely backfilled as soon after inspection as practicable. Precaution shall be taken to ensure compactness of backfill around piping without damage to such piping. Trenches shall be backfilled in thin layers to 305 mm (12 inches) above the top of the piping with clean earth, which shall not contain stones, boulders, cinder fill, frozen earth, construction debris, or other materials that will damage or break the piping or cause corrosive action. Mechanical devices such as bulldozers, graders, etc., shall be permitted to be then used to complete backfill to grade. Fill shall be properly compacted. Precautions shall be taken to ensure permanent stability for pipe laid in filled or made ground.

Underground thermoplastic pipe and fittings for sewers and other gravity flow applications shall be installed in accordance with this standard and Clause 6.15.1.

6.15.5 Installation of thermoplastic pipe and fittings

Trench width for thermoplastic sewer pipe shall be not less than 1.25 times the outside diameter of the piping plus 305 mm (12 inches) or the outside diameter of the piping plus not less than 406 mm (16 inches). Thermoplastic piping shall be bedded in not less than 4 inches (102 mm) of granular fill supporting the piping. The backfill for thermoplastic piping shall be compacted along the sides of the piping in 152 mm (6 inch) layers and continue to not less than 305 mm (12 inches) above the piping. Compaction shall be not less than an 85 percent standard proctor density.

6.16 Joints and connections

6.16.1 Unions

Approved unions shall be permitted to be used in drainage piping where accessibly located in the trap seal or between a fixture and its trap; in the vent system, except underground or in wet vents; at any point in the water supply system; and in gas piping as permitted by 644-6.

6.16.2 Prohibited joints and connections

A fitting or connection that has an enlargement, chamber, or recess with a ledge, shoulder, or reduction of pipe area that offers an obstruction to flow through the drain shall be prohibited.

6.17 Increases and reducers

Where different sizes of pipes and fittings are to be connected, the proper size increasers or reducers or reducing fittings shall be used between the two sizes. Copper alloy or cast-iron body cleanouts shall not be used as a reducer or adapter from cast-iron drainage pipe to iron pipe size (IPS) pipe.

6.18 Food-handling establishments

Food or drink shall not be stored, prepared, or displayed beneath soil or drainpipes unless those areas are protected against leakage or condensation from such pipes reaching the food or drink as described below. Where building design requires that soil or drainpipes be located over such areas, the installation shall be made with the least possible number of joints and shall be installed to connect to the nearest adequately sized vertical stack with the provisions as follows:

- a) Openings through floors over such areas shall be sealed watertight to the floor construction.
- b) Floor and shower drains installed above such areas shall be equipped with integral seepage pans.
- c) Soil or drainpipes shall be of an approved material as given in DRS 644-4. Materials shall comply with established standards. Cleanouts shall be extended through the floor construction above.
- d) Piping subject to operation at temperatures that will form condensation on the exterior of the pipe shall be thermally insulated.
- e) Where pipes are installed in ceilings above such areas, the ceiling shall be of the removable type or shall be provided with access panels to form a ready access for inspection of piping.

6.19 Test gauges

6.19.1 General

Tests in accordance with this standard, which are performed utilizing dial gauges, shall be limited to gauges having the following pressure graduations or incrementations.

6.19.2 Pressure tests (10 psi or less)

Required pressure tests of 10 pounds-force per square inch (psi) (69 kPa) or less shall be performed with gauges of 0.10 psi (0.69 kPa) incrementation or less.

6.19.3 Pressure Tests (greater than 10 psi to 100 psi)

Required pressure tests exceeding 69 kPa (10 psi) but less than or equal to 689 kPa (100 psi) shall be performed with gauges of 7 kPa (1 psi) incrementation or less.

6.19.4 Pressure Tests (exceeding 100 psi)

Required pressure tests exceeding 689 kPa (100 psi) shall be performed with gauges incremented for 2 percent or less of the required test pressure.

6.19.5 Pressure Range

Test gauges shall have a pressure range not exceeding twice the test pressure applied.

6.20 Medical gas and vacuum systems

Such piping shall be in accordance with the requirements of DRS 644-7. The Competent Authority shall require evidence of the competency of the installers and verifiers.

6.21 Rehabilitation of piping systems

Where pressure piping systems are rehabilitated using an epoxy lining system, it shall be in accordance with ASTM F2831.

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