STATE OF IOWA
1973

RULES AND REGULATIONS
GOVERNING THE INSTALLATION
OF PLUMBING

State Plumbing Code

(1973)

KFI
4659.3
.A4
1973

EDITION LIMITED: PLEASE PRESERVE

Prepared by

STATE DEPARTMENT OF HEALTH

Des Moines, Iowa 50319

Published by the
STATE OF IOWA
Des Moines

State Library Of Iowa
State Documents Center
Miller Building
Des Moines, Iowa

OFFICIAL NOTICE

The code of rules governing the installation of plumbing in cities and towns, as adopted by the State Department of Health in 1956 and known as the State Plumbing Code, has been amended in accordance with the provisions of chapter 135, Code of Iowa, 1971, as amended, to become effective October 15, 1971.

Under provisions of section 368.17, Code of Iowa, 1971, all cities with a population of 6,000 or more shall, and other cities and towns may, by ordinance, adopt plumbing regulations not inconsistent with state law or with this code. Where no local ordinance has been adopted, this code is to be enforced as rules and regulations under provisions of section 137.6, Code of Iowa, 1971.

Anyone using this code should first determine that there is no local code in effect.

This code may be adopted in cities and towns by reference under provisions of section 366.7, Code of Iowa, 1971, and by regulation of the County Board of Supervisors under provisions of section 358A.25, Code of Iowa, 1971.

Arnold M. Reeve, M.D., M.P.H.
Commissioner of Public Health

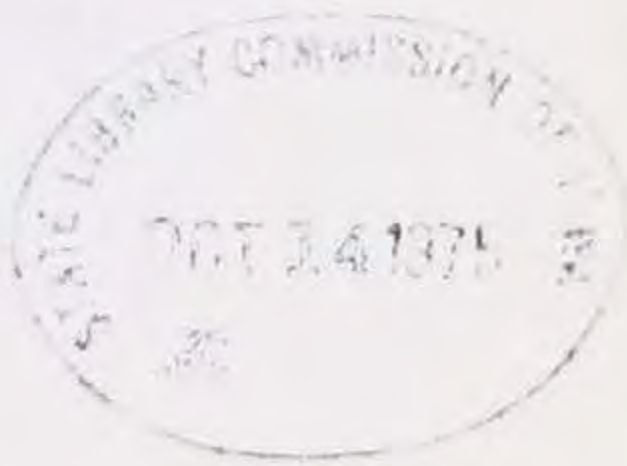
STATE OF IOWA
1973

RULES AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH GOVERNING THE INSTALLATION OF PLUMBING

STATE PLUMBING CODE

EFFECTIVE JANUARY 1, 1973

Published by the
STATE OF IOWA
Des Moines



Iowa
628
I092
1973

STATE OF IOWA

STATE DEPARTMENT OF HEALTH
Arnold M. Reeve, M.D., M.P.H., Commissioner

PLUMBING CODE COMMITTEE

J. W. Clemens, M.S.

Deon F. Gadbury

Kenneth M. Karch, M.S.S.E., M.P.H.

Ronald A. Power

Arnold M. Reeve, M.D., M.P.H.

LUCAS STATE OFFICE BUILDING
Des Moines, Iowa 50319

CONTENTS

325543

FOREWORD

This amended code has been prepared by the Plumbing Code Committee of the State Department of Health. The committee has given a great deal of time and study to developments in the plumbing field since the 1956 edition of the plumbing code was revised in 1964.

Every effort has been made to provide for economical and practical plumbing services consistent with adequate protection of the public health. Special attention has been given to meeting the need of municipalities establishing housing programs acceptable to agencies of the Federal Government. Adoption of new materials, material standards, and methods of assemblage has met or exceeded requirements specified for model codes. The committee has drawn freely from various leading codes.

This booklet contains appendixes, not part of the code, providing explanations of certain portions of the text. The following basic plumbing principles, while not part of the code, are recognized as providing the foundation for sound plumbing procedures:

Principle No. 1: All premises intended for human habitation, occupancy, or use shall be provided with a supply of pure and wholesome water, neither connected with unsafe water supplies nor subject to the hazards of backflow or back-siphonage.

Principle No. 2: Plumbing fixtures, devices, and appurtenances shall be supplied with water in sufficient volume and at pressures adequate to enable them to function satisfactorily and without undue noise under all normal conditions of use.

Principle No. 3: Plumbing shall be designed and adjusted to use the minimum quantity of water consistent with proper performance and cleaning.

Principle No. 4: Devices for heating and storing water shall be so designed and installed as to prevent dangers from explosion through overheating.

Principle No. 5: Every building having plumbing fixtures installed and intended for human habitation, occupancy, or use on premises abutting on

a street, alley, or easement in which there is a public sewer shall have a connection with the sewer and if possible a separate connection.

Principle No. 6: Each family dwelling unit on premises abutting on a sewer or with a private sewage-disposal system shall have, at least, one water closet and one kitchen-type sink. It is further recommended that a lavatory and bathtub or shower shall be installed to meet the basic requirements of sanitation and personal hygiene.

All other structures for human occupancy or use on premises abutting on a sewer or with a private sewage-disposal system shall have adequate sanitary facilities, but in no case less than one water closet and one other fixture for cleaning purposes.

Principle No. 7: Plumbing fixtures shall be made of smooth, non-absorbent material, shall be free from concealed fouling surfaces, and shall be located in ventilated enclosures.

Principle No. 8: The drainage system shall be designed, constructed, and maintained so as to guard against fouling, deposit of solids, and clogging, and with adequate cleanouts so arranged that the pipes may be readily cleaned.

Principle No. 9: The piping of the plumbing system shall be of durable material, free from defective workmanship and so designed and constructed as to give satisfactory service for its reasonable expected life.

Principle No. 10: Each fixture directly connected to the drainage system shall be equipped with a water-seal trap.

Principle No. 11: The drainage system shall be designed to provide an adequate circulation of air in all pipes with no danger of siphonage, aspiration, or forcing of trap seals under conditions of ordinary use.

Principle No. 12: Each vent terminal shall extend to the outer air and be so installed as to minimize the possibilities of clogging and the return of foul air to the building.

Principle No. 13: The plumbing system shall be subjected to such tests as will effectively disclose all leaks and defects in the work.

Principle No. 14: No substance which will clog the pipes, produce explosive mixtures, destroy the pipes or their joints, or interfere unduly with the sewage-disposal process shall be allowed to enter the building drainage system.

Principle No. 15: Proper protection shall be provided to prevent contamination of food, water, sterile goods, and similar materials by backflow of sewage. When necessary, the fixture device, or appliance shall be connected indirectly with the building drainage system.

Principle No. 16: No water closet shall be located in a room or compartment which is not properly lighted and ventilated.

Principle No. 17: If water closets or other plumbing fixtures are installed in buildings where there is no sewer within a reasonable distance, suitable provision shall be made for disposing of the building sewage by some method of sewage treatment and disposal approved by the State Department of Health.

Principle No. 18: Where a plumbing drainage system shall be subjected to backflow of sewage, suitable provision shall be made to prevent its overflow in the building.

Principle No. 19: Plumbing systems shall be maintained in a sanitary and serviceable condition.

Principle No. 20: All plumbing fixtures shall be so installed with regard to spacing as to be reasonably accessible for their intended use.

Principle No. 21: Plumbing shall be installed with due regard to preservation of the strength of structural members and prevention of damage to walls and other surfaces through fixture usage.

Principle No. 22: Sewage or other waste, from a plumbing system which may be deleterious to surface or subsurface waters, shall not be discharged into the ground or into any waterway unless it has first been rendered innocuous through subjection to some acceptable form of treatment.

TITLE III

STATE PLUMBING CODE

CHAPTER I

DEFINITIONS

1.1(135)T.III GENERAL.

1.1(1) Meaning. For the purpose of this code, the following terms shall have the meaning indicated in this chapter.

1.1(2) Scope. No attempt is made to define ordinary words which are used in accordance with their established dictionary meaning except where the word has been loosely used and it is necessary to define its meaning as used in this code to avoid misunderstanding.

1.2(135)T.III DEFINITIONS OF TERMS.

1.2(1) Administrative authority. The administrative authority is the individual official, board, department, or agency established and authorized by law to administer and enforce the provisions of the plumbing ordinance as adopted or amended. (See section 368.17 of the Code of Iowa.)

1.2(2) Air gap. An air gap in a water supply system is the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe, faucet or appurtenance supplying water to a tank, plumbing fixture or other device and the flood level rim of the receptacle. An air gap in the drainage system is the unobstructed vertical distance through the free atmosphere between the lowest opening in a fixture or appliance drain and the flood-level rim of the receiving receptacle, floor drain, or other sewer inlet.

1.2(3) Anchors. See supports.

1.2(4) Approved. Approved means accepted or acceptable under an applicable specification stated or cited in this code, or accepted as suitable

for the proposed use under procedures and powers of the State Department of Health.

1.2(5) **Area drain.** An area drain is a receptacle designed to collect surface or rain water from an open area.

1.2(6) **Backflow.** Backflow is the flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source.

1.2(7) **Backflow preventer.** A backflow preventer is a device or means to prevent backflow into the potable water system.

1.2(8) **Back-siphonage.** Back-siphonage is the flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel into a water supply pipe due to a negative pressure in such pipe. See backflow.

1.2(9) **Backflow of sewage or wastes.** The term backflow is also used to mean the flowing back of liquid wastes or sewage.

1.2(10) **Battery of fixtures.** A "battery of fixtures" is any group of two or more similar adjacent fixtures which discharge into a common horizontal waste or soil branch.

1.2(11) **Boiler blow-off.** A boiler blow-off is an outlet on a boiler to permit emptying or discharge of sediment.

1.2(12) **Branch.** A branch is any part of the piping system other than a main, riser, or stack.

1.2(13) **Branch, fixture.** See fixture branch.

1.2(14) **Branch, horizontal.** See horizontal branch.

1.2(15) **Branch interval.** A branch interval is a length of soil or waste stack corresponding in general to a story height but in no case less than eight feet, within which the horizontal branches from one floor or story of a building are connected to the stack.

1.2(16) **Branch vent.** A branch vent is a vent connecting one or more individual vents with a vent stack or stack vent.

1.2(17) Building. A building is a 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.

1.2(18) Building drain. The building (house) drain is that part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building (house) sewer beginning three feet outside the building wall.

1.2(19) Building sewer. The building (house) sewer is that part of the horizontal piping of a drainage system which extends from the end of the building drain and which receives the discharge of the building drain and conveys it to a public sewer, private sewer, individual sewage-disposal system, or other point of disposal.

1.2(20) Building storm drain. A building (house) storm drain is a building drain used for conveying rain water, surface water, ground water, subsurface water, or other similar discharge to a building storm sewer or a combined building sewer, extending to a point not less than three feet outside the building wall.

1.2(21) Building storm sewer. A building (house) storm sewer is the extension from the building storm drain to the public storm sewer, combined sewer, or other point of disposal.

1.2(22) Building subdrain. A building (house) subdrain is that portion of a drainage system which cannot drain by gravity into the building sewer.

1.2(23) Circuit vent. A circuit vent is a branch vent that serves two or more traps and extends from in front of the last fixture connection of a horizontal branch to the vent stack.

1.2(24) Code. The word "code" when used alone shall mean these regulations, subsequent amendments thereto, or any emergency rule or regulation which the administrative authority having jurisdiction may lawfully adopt.

1.2(25), Combination fixture. A combination fixture is a fixture combining one sink and tray or two- or three- compartment sink or tray in

one integral unit.

1.2(26) Combined building sewer. A combined building sewer receives storm water and sewage.

1.2(27) Common vent. A common vent is a vent connection at the junction of two fixture drains and serving as a vent for both fixtures.

1.2(28) Conductor. See leader.

1.2(29) Continuous vent. A continuous vent is a vertical vent that is a continuation of the drain to which it connects.

1.2(30) Continuous waste. A continuous waste is a drain from two or three fixtures connected to a single trap.

1.2(31) Cross-connection. A cross-connection is any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other water of unknown or questionable safety, whereby water may flow from one system to the other, the direction of flow depending on the pressure differential between the two systems. See backflow and back-siphonage.

1.2(32) Dead-end. A dead-end is a branch leading from a soil, waste, or vent pipe, building drain, or building sewer, which is terminated at a developed distance of two feet or more by means of a plug or other closed fitting.

1.2(33) Developed length. The developed length of a pipe is its length along the center line of the pipe and fittings.

1.2(34) Diameter. Unless specifically stated, the term "diameter" is the nominal diameter as designated commercially.

1.2(35) Double offset. A double offset is two changes of direction installed in succession or series in continuous pipe.

1.2(36) Downspout. See leader.

1.2(37) Drain. A drain is any pipe which carries waste water or water-borne wastes in a building drainage system.

1.2(38) **Drainage system**. A drainage system (drainage piping) includes all the piping within public or private premises, which conveys sewage, rain water, or other liquid wastes to a legal point of disposal, but does not include the mains of a public sewer system of a private or public sewage-treatment or disposal plant.

1.2(39) **Dual vent**. See common vent.

1.2(40) **Durham system**. Durham system is a term used to describe soil or waste systems where all piping is of threaded pipe, tubing or other such rigid construction, using recessed drainage fittings to correspond to the types of piping.

1.2(41) **Effective opening**. The effective opening is the minimum cross-sectional area at the point of water-supply discharge, measures are expressed in terms of:

a. Diameter of a circle.

b. If the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable to air gap.)

1.2(42) **Fixture branch**. A fixture branch is a pipe connecting several fixtures.

1.2(43) **Fixture drain**. A fixture drain is the drain from the trap of a fixture to the junction of that drain with any other drain pipe.

1.2(44) **Fixture supply**. A fixture supply is a water-supply pipe connecting the fixture with the fixture branch.

1.2(45) **Fixture unit**. A fixture unit is a design factor so chosen that the load producing values of the different plumbing fixtures can be expressed approximately as multiples of that factor.

1.2(46) **Fixture-unit flow rate**. Fixture-unit flow rate is the total discharge flow in g.p.m. of a single fixture divided by seven and one-half which provides the flow rate of that particular plumbing fixture as a unit of flow. Fixtures are rated as multiples of this unit of flow.

1.2(47) **Flood level**. See flooded.

1.2(48) **Flood-level rim**. The flood-level rim is the top edge of the

receptacle from which water overflows.

1.2(49) **Flooded**. A fixture is flooded when the liquid therein rises to the flood-level rim.

1.2(50) **Flush valves**. A flush valve is a device located at the bottom of the tank for the purpose of flushing water closets and similar fixtures.

1.2(51) **Flushometer valve**. A flushometer valve is a device which discharges a predetermined quantity of water to fixtures for flushing purposes and is actuated by direct water pressures.

1.2(52) **Frostproof closet**. A frostproof closet (prohibited) is a hopper that has no water in the bowl and has the trap and the control valve for its water supply installed below the frost line.

1.2(53) **Grade**. Grade is the 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 per foot length of pipe.

1.2(54) **Grease interceptor**. See interceptor.

1.2(55) **Grease trap**. See interceptor.

1.2(56) **Hangers**. See supports.

1.2(57) **Horizontal branch**. A horizontal branch is a drain pipe extending laterally from a soil or waste stack of 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 to the building (house) drain.

1.2(58) **Horizontal pipe**. A horizontal pipe is any pipe or fitting which is installed in a horizontal position or which makes an angle of less than 45 degrees with the horizontal.

1.2(59) **House drain**. See building drain.

1.2(60) **House sewer**. See building sewer.

1.2(61) **Indirect waste pipe**. An indirect waste pipe is a pipe that

does not connect directly with the drainage system but conveys liquid wastes by discharging into a plumbing fixture or receptacle which is directly connected to the drainage system.

1.2(62) Individual vent. An individual vent is a pipe installed to vent a fixture trap and which connects with the vent system above the fixture served or terminates in the open air.

1.2(63) Industrial wastes. Industrial wastes are liquid wastes resulting from the processes employed in industrial establishments which do not contain domestic sewage.

a. Liquid wastes. Liquid wastes are the discharges from any fixture, appliance, area, or appurtenance, which do not contain fecal matter.

1.2(64) Interceptor. An interceptor is a device designed and installed so as to separate and retain deleterious, hazardous, or undesirable matter from normal wastes and permit normal sewage or liquid wastes to discharge.

1.2(65) Leader. A leader (downspout) is the water conductor from the roof to the building storm drain, combined building sewer, or other means of disposal.

1.2(66) Load factor. Load factor is the percentage of the total connected fixture unit flow rate which is likely to occur at any point in the drainage system. It varies with the type of occupancy, the total flow unit above this point being considered, and with the probability factor of simultaneous use.

1.2(67) Loop vent. A loop vent is the same as a circuit vent except that it loops back and connects with a stack vent instead of a vent stack.

1.2(68) Main. The main of any system of continuous piping is the principal artery of the system, to which branches may be connected.

1.2(69) Main sewer. See public sewer.

1.2(70) Main vent. The main vent is the principal artery of the venting system, to which vent branches may be connected.

1.2(71) **Offset**. An offset in a line of piping is a combination of elbows or bends which brings one section of the pipe out of line but into a line parallel with the other section.

1.2(72) **Person**. Person is a natural person, his heirs, executors, administrators, or assigns; and includes a firm, partnership or corporation, its or their successors or assigns. Singular includes plural; male includes female.

1.2(73) **Pitch**. See grade.

1.2(74) **Plumbing**. Plumbing includes the practice, materials, and fixtures used in the installation, maintenance, extension, and alteration of all piping, fixtures, appliances, and appurtenances in connection with any of the following: Sanitary drainage or storm drainage facilities, the venting system and the public or private water-supply systems, within or adjacent to any building, structure, or conveyance; also the practice and materials used in the installation, maintenance, extension, or alteration of the storm-water, liquid wastes, or sewerage, and water-supply systems of any premises to their connection with any point of public disposal or other acceptable terminal.

1.2(75) **Plumbing fixtures**. Plumbing fixtures are installed receptacles, devices, or appliances which are supplied with water or which receive or discharge liquids or liquid-borne wastes, with or without discharge into the drainage system with which they may be directly or indirectly connected.

1.2(76) **Plumbing inspector**. See administrative authority.

1.2(77) **Plumbing system**. The plumbing system includes the water-supply and distribution pipes; plumbing fixtures and traps; soil, waste, and vent pipes; building drains and building sewers including their respective connections, devices, and appurtenances within the property lines of the premises, and water-treating or water-using equipment.

1.2(78) **Pool**. A pool is a water receptacle used for swimming or as a plunge or other bath, designed to accommodate more than one bather at a time.

1.2(79) **Potable water**. Potable water is water which is satisfactory

for drinking, culinary, and domestic purposes, and meets the standards of the State Department of Health.

1.2(80) Private or private use. In the classification of plumbing fixtures, private supplies to fixtures in residences and apartments and to fixtures in private bathrooms of hotels and similar installations where the fixtures are intended for the use of a family or an individual.

1.2(81) Private sewer. A private sewer is a sewer privately owned and not directly controlled by public authority.

1.2(82) Public or public use. In the classification of plumbing fixtures, public applies to fixtures in general toilet rooms of schools, gymnasiums, hotels, railroad stations, public buildings, bars, public comfort stations, or places to which the public is invited or which are frequented by the public without special invitations, and other installations (whether pay or free) where a number of fixtures are installed so that their use is similarly unrestricted.

1.2(83) Public sewer. A public sewer is a common sewer directly controlled by public authority.

1.2(84) Relief vent. A relief vent is a vent the primary function of which is to provide circulation of air between drainage and vent systems.

1.2(85) Return offset. A return offset is a double offset installed so as to return the pipe to its original alinement.

1.2(86) Rim. A rim is an unobstructed open edge of a fixture.

1.2(87) Riser. A riser is a water-supply pipe which extends vertically one full story or more to convey water to branches or fixtures.

1.2(88) Roof drain. A roof drain is a drain installed to receive water collecting on the surface of a roof and to discharge it into the leader (downspout).

1.2(89) Roughing-in. Roughing-in is the installation of all parts of the plumbing system which can be completed prior to the installation of fixtures. This includes drainage, water supply, vent piping, and the necessary fixture supports.

1.2(90) **Sand interceptor**. See interceptor.

1.2(91) **Sanitary sewer**. A sanitary sewer is a pipe which carries sewage and excludes storm, surface, and ground water.

1.2(92) **Separator**. See interceptor.

1.2(93) **Septic tank**. A septic tank is a watertight receptacle which receives the discharge of a drainage system or part thereof, and is designed and constructed so as to separate solids from the liquids, digest organic matter through a period of detention, and allow the settled sewage to discharge therefrom (usually) to some form of secondary treatment.

1.2(94) **Secondary treatment**. Secondary treatment is provided for septic tank effluent by one or a combination of the following means, including: A system of open-jointed or perforated lines, laid in soil capable of absorbing the liquid; by buried or open sand filters with or without collector tile; or by other soil absorption systems all designed to reduce the organic matter in the liquid and dispose of the liquid without nuisance or public health hazard.

1.2(95) **Sewage**. Sewage is any liquid waste containing animal or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

a. **Domestic sewage**. Domestic sewage is the water-borne wastes derived from ordinary living processes.

1.2(96) **Shall, should**. The word "shall" is a mandatory term. The word "should" is a non-mandatory term, but describes recommended procedures.

1.2(97) **Side vent**. A side vent is a vent connecting to the drain pipe through a fitting at an angle not greater than 45 degrees to the vertical.

1.2(98) **Slope**. See grade

1.2(99) **Soil pipe**. A soil pipe is any pipe which conveys the discharge of water closets, urinals, or fixtures having similar functions, with or without the discharge from other fixtures, to the building drain or building sewer.

1.2(100) **Special waste pipe**. See chapter 9, T.III.

1.2(101) Stack. A stack is the vertical main of a system of soil, waste, or vent piping.

1.2(102) Stack group. Stack group is a term applied to the location of fixtures in relation to the stack so that by means of proper fitting, vents may be reduced to a minimum.

1.2(103) Stack vent. Stack vent (sometimes called a waste vent or soil vent) is the extension of a soil or waste stack above the highest horizontal drain connected to the stack.

1.2(104) Stack venting. Stack venting is a method of venting a fixture or fixtures through the soil or waste stack.

1.2(105) Storm drain. See building storm drain.

1.2(106) Storm sewer. A storm sewer is a sewer used for conveying rain water, surface water, condensate, cooling water, or similar liquid wastes, exclusive of sewage and industrial waste.

1.2(107) Subsoil drain. A subsoil drain is a drain which receives only subsurface or seepage water and conveys it to a place of disposal.

1.2(108) Sump. A sump is a tank or pit which receives sewage or liquid waste, located below the normal grade of the gravity system and which must be emptied by mechanical means.

1.2(109) Supports. Supports, hangers, and anchors are devices for supporting and securing pipe and fixtures to walls, ceilings, floors, or structural members.

1.2(110) Trap. A trap is a fitting or device so designed and constructed as to provide, when properly vented, a liquid seal which will prevent the back passage of air without materially affecting the flow of sewage or waste water through it.

1.2(111) Trap seal. The trap seal is the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.

1.2(112) Vacuum breaker. See backflow preventer.

1.2(113) Vent pipe. See vent system.

1.2(114) Vent stack. A vent stack is a vertical vent pipe installed primarily for the purpose of providing circulation of air to and from any part of the drainage system.

1.2(115) Vent system. A vent system is a 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 back pressure.

1.2(116) Vertical pipe. A vertical pipe is any pipe or fitting which is installed in a vertical position or which makes an angle of not more than 45 degrees with the vertical.

1.2(117) Waste. See industrial wastes and liquid wastes.

1.2(118) Waste pipe. A waste pipe is a pipe which conveys only liquid waste, free of fecal matter.

1.2(119) Water-distributing pipe. A water-distributing pipe in a building or premises is a pipe which conveys water from the water-service pipe to the plumbing fixtures and other water outlets.

1.2(120) Water main. The water (street) main is a water supply pipe for public or community use.

1.2(121) Water outlet. A water outlet, as used in connection with the water-distributing system is the discharge opening for the water (1) to a fixture; (2) to atmospheric pressure (except into an open tank which is part of the water-supply system); (3) to a boiler or heating system; (4) to any water-operated device or equipment requiring water to operate, but not a part of the plumbing system.

1.2(122) Water riser pipe. See riser.

1.2(123) Water-service pipe. The water-service pipe is the pipe from the water main or other source of water supply to the building served.

1.2(124) Water-supply system. The water-supply system of a building, or premises, consists of the water-service pipe, the water-distributing pipes, and the necessary connecting pipes, fittings, control valves and all appurtenances in or adjacent to the building or premises.

1.2(125) Wet vent. A wet vent is a vent which receives the discharge from waste other than water closets.

1.2(126) Yoke vent. A yoke vent is a pipe connecting upward from a soil or waste stack to a vent stack for the purpose of preventing pressure changes in the stacks.

CHAPTER 2

GENERAL REGULATIONS

2.1(135)T.III CONFORMANCE WITH CODE.

2.1(1) Requirements. Whenever provisions of this code are inconsistent with provisions of the Uniform Plumbing Code, published by the International Association of Plumbing and Mechanical Officials, 1970 Edition with subsequent additions and supplements in effect at the time this subrule is filed with the Secretary of State, counties, cities and towns may adopt by regulation or ordinance either the provisions of this code or of the Uniform Plumbing Code referenced above.

2.1(2) Applicability. The provisions of this code are applicable to the plumbing in buildings and premises within cities and towns and to plumbing in buildings and premises located outside the corporate limits of any city or town but which are served by individual connections to municipal water supply or sewer systems located inside the corporate limits.

2.2(135)T.III HORIZONTAL DRAINAGE PIPING.

2.2(1) Uniform grade. Horizontal drainage piping shall be run in practical alinement at a uniform grade. (See 11.3 (135)T.III for specific slopes.)

2.3(135)T.III CHANGE IN DIRECTION.

2.3(1) Fittings. Changes in direction in drainage piping shall be made by the appropriate use of 45 degree Y's, long-or-short-sweep quarter bends, sixth, eighth, or sixteenth bends, or by a combination of these or equivalent fittings. Single and double sanitary T's and quarter bends may be used in drainage lines only where the direction of flow is from the horizontal to the vertical.

2.3(2) Short sweeps. Short sweeps no less than three inches in diameter may be used in soil and waste lines where the change in direction of flow is from either the horizontal to the vertical or from the vertical to the horizontal and may be used for making necessary offsets between the ceiling and the next floor above.

2.4(135)T.III FITTINGS AND CONNECTIONS.

2.4(1) **Fittings prohibited.** No double T, or double sanitary branch, twin ell, threaded St. ell, or St. 45 degree ells shall be used on soil or waste lines. The drilling and burning of holes in, or the tapping of, house drains, soil, waste, or vent pipes, the use of saddle hubs and bends, and the welding or brazing of parts into pipes to make fittings, is prohibited. Sanitary crosses having at least twice the diameter of the branch opening may be used in a vertical position. Cast iron closet bends shall be used only in or underground.

2.4(2) **Heel or side-inlet bend.** A heel or side-inlet opening quarter bend shall not be used as a dry vent when the inlet is placed in a horizontal position.

2.4(3) **Obstruction to flow.** No fitting, connection, device, or method of installation which obstructs or retards the flow of water, wastes, sewage, or air in the drainage or venting systems in an amount greater than the normal frictional resistance to flow, shall be used unless it is indicated as acceptable in this code, or is approved by the administrative authority as having a desirable and acceptable function and as of ultimate benefit to the proper and continuing functioning of the plumbing system. The enlargement of a three-inch closet bend or stub to four inches shall not be considered an obstruction. None of the methods described in 2.27(1-3)T.III shall be considered as restriction to flow.

2.5(135)T.III REPAIRS AND ALTERATIONS.

2.5(1) **Existing buildings.** In existing buildings or premises in which plumbing installations are to be altered, repaired, or renovated, deviations from the provisions of this code may be permitted, provided such deviations are found to be necessary, conform to the intent of this code and are approved in writing by the administrative authority. When a building is moved from one location to another no additional work or connection shall be made until the plumbing in said building is inspected and if necessary reconstructed to comply with this code. Nor shall additional plumbing work be installed in any building where there is defective or improperly installed plumbing until such defects have been repaired, renovated, replaced, or removed.

2.5(2) **Health or safety.** Wherever compliance with all the provisions

of this code fails to eliminate or alleviate a nuisance which may involve health or safety hazards, the owner or his agent shall install such additional plumbing or drainage equipment as may be found necessary by the administrative authority.

2.6(135)T.III SEWER AND WATER PIPES.

2.6(1) Separate trenches. Water-service pipes, or any underground water pipes, shall not be run or laid in the same trench as the building sewer or drainage piping, except as provided in subrules 10.6(2) and 11.2(2).

2.7(135)T.III TRENCHING, EXCAVATION, AND BACKFILL.

2.7(1) Support of piping. Buried piping shall be supported throughout its entire length.

2.7(2) Tunneling and driving. Tunneling may be done in yards, courts, or driveways of any building site.

2.7(3) Open trenches. All excavations required to be made for the installation of a building-drainage system, or any part thereof within the walls of a building, shall be open trench work. All such trenches and tunnels shall be kept open until the piping has been inspected, tested and accepted.

2.7(4) Mechanical excavation. Mechanical means of excavation may be used.

2.7(5) Backfilling. Adequate precaution shall be taken to insure proper compactness of backfill around piping without damage to such piping.

2.7(6) Backfill material. Trenches shall be backfilled in thin layers to twelve inches above the top of the piping with clean earth which shall not contain stones, boulders, cinder-fill, or other materials which would damage or break the piping or cause corrosive action. Mechanical devices such as bulldozers, graders, etc., may be then used to complete backfill to grade. Fill shall be properly compacted.

2.8(135)T.III STRUCTURAL SAFETY.

2.8(1) Safe condition required. In the process of installing or repairing any part of a plumbing and drainage installation, the finished floors, walls, ceilings, tile work, or any other part of the building or premises which must be changed or replaced shall be left in a safe structural condition as determined by the proper administrative authority.

2.9(135)T.III WORKMANSHIP.

2.9(1) Conformance. Workmanship shall conform to generally accepted good practice.

2.10(135)T.III PROTECTION OF PIPES.

2.10(1) Breakage and corrosion. Pipes passing under or through walls shall be protected from breakage. Pipes passing through or under cinder or concrete or other corrosive material, shall be protected against external corrosion by protective coating, wrapping, or other means which will prevent such corrosion.

2.10(2) Cutting or notching. No structural member shall be weakened or impaired by cutting, notching, or otherwise, except to the extent permitted by the proper administrative authority.

2.10(3) Pipes through footings or foundation walls. A soil or waste pipe, or building drain passing under a footing or through a foundation wall shall be provided with a relieving arch; or there shall be built into the masonry wall a pipe sleeve two pipe sizes greater than the pipe passing through or equivalent protection shall be provided.

2.10(4) Freezing. No water, soil or waste pipe shall be installed or permitted outside of a building or in an exterior wall unless adequate provision is made to protect such pipe from freezing where necessary.

2.11(135)T.III DAMAGE TO DRAINAGE SYSTEM OR PUBLIC SEWER.

2.11(1) Hazardous materials prohibited. No person shall deposit by any means into the building drainage system or sewer any ashes; cinders;

rags; inflammable, poisonous, or explosive liquids, gases, oils; or any other material which would or could obstruct, damage, or overload such system or sewer, except as herein provided.

2.12(135)T.III INDUSTRIAL WASTE.

2.12(1) **Treatment and disposal.** Waste 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 administrative authority having jurisdiction.

2.13(135)T.III SLEEVES.

2.13(1) **Exterior walls.** When directed, annular space between sleeves and pipes located in exterior walls shall be filled or tightly calked with coal tar or asphaltum compound, lead, or other material found equally effective and approved as such by the administrative authority.

2.14(135)T.III RATPROOFING.

2.14(1) **Exterior openings.** All exterior openings provided for the passage of piping shall be properly sealed with snugly fitting collars of metal or other approved rat-proof material securely fastened into place.

2.14(2) **Interior openings.** Interior openings through walls, floors, and ceilings shall be rat-proofed as found necessary by the administrative authority.

2.15(135)T.III USED OR SECONDHAND EQUIPMENT.

2.15(1) **Conformance required.** It shall be unlawful to purchase, sell, or install used equipment or material for plumbing installations unless it complies with the minimum standards set forth in this code.

2.16(135)T.III CONDEMNED EQUIPMENT.

2.16(1) **Prohibited.** Any plumbing equipment condemned by the administrative authority because of wear, damage, defects, or sanitary hazards, shall not be reused for plumbing purposes.

2.17(135)T.III DEPTH OF BUILDING SEWER AND WATER SER-

VICE (OUTSIDE OF BUILDING).

2.17(1) **Frost protection.** Sewers and water-service piping shall be installed below the expected frost penetration.

2.18(135)T.III PIPING IN RELATION TO FOOTINGS.

2.18(1) **Parallel.** No piping shall be laid parallel to footings or outside bearing walls closer than three feet, except as may be approved by the administrative authority, upon a finding that a less distance is safe. Such piping installed deeper than footings or bearing walls shall be 45 degrees therefrom, except as may be approved by the administrative authority, upon a finding that a greater angle is safe.

2.19(135)T.III DRAINAGE BELOW SEWER LEVEL.

2.19(1) **Installation.** Drainage piping located below the level of the sewer shall be installed as provided for in chapters 10T.III and 11T.III.

2.20(135)T.III CONNECTIONS TO PLUMBING SYSTEM REQUIRED.

2.20(1) **Adequate connections.** All 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 code.

2.21(135)T.III SEWER REQUIRED.

2.21(1) **Connection.** Every building in which plumbing fixtures are installed shall have a connection to a public sewer or private sewer except as provided in 2.22(1)T.III.

2.22(135)T.III INDIVIDUAL OR PRIVATE SEWAGE DISPOSAL SYSTEM.

2.22(1) **Individual system.** When a public sewer is not available for use, sewage and drainage piping shall be connected to an individual sewage disposal system of adequate capacity, and of proper location, design, and construction, to prevent an insanitary or stream pollution condition. A

plan showing the location and the design of the sewage treatment facilities, and the location of any wells within seventy-five feet of the site, shall be filed with the application for a plumbing permit. (See 14.3(1)T.III.)

Under the provisions of the water pollution control law, section 455B.25, Code of Iowa, a permit for the disposal of sewage or water-borne wastes is required to be obtained from the State Department of Health; except that no permit is required for any new disposal system, or extension or addition to an existing disposal system, that receives or may receive only domestic sewage from a building to be occupied by fifteen persons or less. Plans and specifications for such installations must be submitted to the State Department of Health before a permit will be issued, and construction of such an installation shall not be started until such a permit has been obtained. See subrule 14.3(1).

2.23(135)T.III LOCATION OF FIXTURES.

2.23(1) Light and ventilation. Plumbing fixtures, except drinking fountains and single lavatories, shall be located in compartments or rooms provided with adequate ventilation and illumination.

2.23(2) Improper location. Piping, fixtures, or equipment shall not be located in such a manner as to interfere with the normal operation of windows, doors, or other exit openings.

2.24(135)T.III PIPING MEASUREMENTS.

2.24(1) Method. Except where otherwise specified in this code, all measurements between pipes or between pipes and walls, etc., shall be made to the center lines of the pipes.

2.25(135)T.III VENTING.

2.25(1) Trap seal protection. The drainage system shall be provided with a system of vent piping which will permit the admission or emission of air so that under no circumstances of normal or intended use shall the seal of any fixture trap be subjected to a pressure differential of more than one inch of water.

2.26(135)T.III VENTILATION DUCTS.

2.26(1) Independent system. Ventilation ducts from wash rooms

and toilet rooms shall exhaust to the outer air or form an independent system.

2.26(2) Gas water heaters. All gas water heaters shall have a vent pipe of approved material installed so as to vent to the outside air; either through an established flue or independently through the roof. Rubber tubing shall not be used as gas supply lines.

2.27(135)T.III WATER CLOSET CONNECTIONS.

2.27(1) Lead. Three-inch lead bends and stubs may be used on water closets or similar connections, provided the inlet is dressed or expanded to receive a four-inch flange.

2.27(2) Reducing. Four- by three-inch reducing bends are permitted.

2.27(3) Copper. Three-inch copper bends may be used on water closets or similar connections provided a four- by three inch flange is used to receive the fixture horn.

2.27(4) Cast iron. Wall-hung water closets with cast iron drainage connections may be used when approved by the local administrative authority.

2.27(5) Plastic. Plastic closet bends and flanges may be used when approved by the local administrative authority.

2.28(135)T.III DEAD ENDS.

2.28(1) Restricted. In the installation or removal of any part of a drainage system, dead ends shall be avoided except where necessary to extend a cleanout so as to be accessible.

2.29(135)T.III TOILET FACILITIES FOR WORKMEN.

2.29(1) Facilities required. Suitable toilet facilities shall be provided and maintained in a sanitary condition for the use of workmen during the construction of any building.

CHAPTER 3

MATERIALS—QUALITY AND WEIGHT

3.1(135)T.III MATERIALS.

3.1(1) Minimum standards. The materials listed in this chapter shall conform at least to the current issues of the standards cited when used in the construction, installation, alteration, or repair of any part of a plumbing and drainage system, except that the administrative authority may allow the extension, addition, or relocation of existing soil, waste, or vent pipes with materials of like grade or quality, as permitted in 2.5(1)T.III.

Extra heavy weight cast iron soil and waste pipe may be either statically or centrifugally cast. Service weight cast iron soil or waste pipe shall be centrifugally (spun cast) or of equal quality.

3.1(2) Use of materials. Each material listed in table 3.5(135)T.III shall conform to the current issue of at least one of the standards cited opposite it. Its use shall be further governed by the requirements imposed in other chapters of this code. Materials not included in the table shall be used only as provided in 3.1(1)T.III. Materials shall be free of manufacturing defects or damage, however occasioned, which would, or would tend to, render such materials defective, unsanitary, or otherwise improper to accomplish the purpose of this code.

3.1(3) Specifications for materials. Standard specifications for materials for plumbing installations are listed in table 3.5(135)T.III. Products conforming at least to any of the specifications listed for a given material shall be considered acceptable.

Note 1. Abbreviations used in table 3.5(135)T.III refer to standards or specifications as identified below:

ANSI Standards approved by the American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018.

ASTM Standards and Tentative Standards published by the American

Society for Testing Materials, 1916 Race St., Philadelphia, Pennsylvania 19103.

FS Federal Specifications published by the Federal Specifications Board and obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

AWWA Standards and Tentative Standards published by the American Water Works Association, 2 Park Avenue, New York, N.Y. 10016.

MSS Standards published by the Manufacturers Standardization Society of the Valve and Fittings Industry, 420 Lexington Avenue, New York, N.Y. 10017.

CS Commercial Standards representing recorded voluntary recommendations of the trade, issued by the United States Department of Commerce, and obtainable from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

PS Product Standards will be used to identify all new commercial standards as well as all revisions of existing standards marked 'CS' for Commercial Standards or 'SPR' for Simplified Practice Recommendations. Product standards, commercial standards and simplified practice recommendations are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

SPR Simplified Practice Recommendations representing recorded recommendations of the trade and issued by the United States Department of Commerce, Washington, D.C. 20402.

NSF Standards and approvals issued by the National Sanitation Foundation Testing Laboratories, Inc., 2355 West Stadium Blvd., Ann Arbor, Michigan 48106.

Note 2. ASTM standards are issued under fixed designations; the final number indicates the year of original adoption, or in the case of revision the year of the last revision. T indicates Tentative. In the CS series of standards, also, the final number indicates the year of issue. For Federal Specifications, the year indicated in table 3.5(135)T.III is that of the date of issue or that of the latest revision or amendment.

325543

STATE LIBRARY COMMISSION OF IOWA
Historical Building
DES MOINES, IOWA 50319

Note 3. All standards and specifications for materials are subject to change. Designations carrying indication of the year of issue may thus become obsolete. Table 3.5(135)T.III gives the full designations of standards current at the time this code is printed.

3.1(4) Identification of materials. Each length of pipe, and each pipe fitting, trap, fixture, and device used in a plumbing system shall have cast, stamped or indelibly marked on it the maker's mark or name, the weight, type, and classes of the product, when such marking is required by the approved standard that applies. Septic tanks shall be marked with effective capacity and the gauge of metal.

Copper pipe and tubing used for water supply and distribution, and for drainage, waste, and vent installations, shall be marked in color code by the manufacturer in the form of a spiral or in the form of longitudinal stripes; which markings shall be clearly visible in the completed installation at the time of inspection.

3.2(135)T.III SPECIAL MATERIALS.

3.2(1) Metal sheets. Sheet lead shall not be less than four pounds per square foot for safe pans, three pounds per square foot for vent terminal flashings and shall have a minimum wall thickness of one-eighth inch for lead bends and traps. Sheet copper shall not be less than twelve ounces per square foot for safe pans and eight ounces per square foot for vent terminal flashings.

3.2(2) Plastic sheets. Non-plasticized chlorinated polyethylene sheet plastic having a minimum thickness of .040 inch may be used for safe pans.

3.2(3) Red brass ferrules. Calking ferrules shall be manufactured from red brass and shall be in accordance with the following:

Pipe sizes	Inside diameter	Length	Minimum weight each
inches	inches	inches	lb. oz.
2	2¼	4½	1 0
3	3¼	4½	1 12
4	4¼	4½	2 8

3.2(4) **Red brass bushings.** Soldering bushing shall be of red brass in accordance with the following:

Pipe sizes	Minimum weight each	Pipe sizes	Minimum weight each
inches	lb. oz.	inches	lb. oz.
1¼	0 6	2½	1 6
1½	0 8	3	2 0
2	0 14	4	3 8

3.2(5) **Floor flanges.** Floor and wall flanges for water closets or similar fixtures shall be not less than one-eighth inch thick for brass, one-fourth inch thick and not less than two-inch calking depth for cast iron or galvanized malleable iron. Flanges shall be soldered to lead bends, or shall be calked or screwed to other metal. Closet screws and bolts shall be of brass. Plastic floor flanges marked to show conformance with applicable standards and also the National Sanitation Foundation Testing Laboratory may be used when specifically permitted in other sections of this code.

3.2(6) **Cleanouts.**

a. Cleanout plugs shall be of brass and shall conform to Federal Specifications WW. P-401, or plastic.

b. Plugs may have raised square heads or counter sunk.

c. Counter-sunk heads should be used where raised heads may cause a hazard.

3.2(7) **Chemically stable materials.** Separate drainage and venting systems for chemical wastes shall be of corrosion resistant material approved by the administrative authority. Materials acceptable for such systems include prestressed low expansion borosilicate glass pipe, high silicon content wrought iron pipe, plastic pipe, lead pipe, or other material with equal properties and qualities suitable for the wastes to be conveyed.

3.3(135)T.III ALTERNATE MATERIALS AND METHODS.

3.3(1) **Existing premises.** In existing buildings or premises in which plumbing installations are to be altered, repaired, or renovated, the

administrative authority has discretionary powers to permit deviation from the provisions of this code, provided that such a proposal to deviate is first submitted for proper determination in order that health and safety requirements, as they pertain to plumbing, shall be observed.

3.3(2) **Approval.** Provisions of this code are not intended to prevent the use of any material, device, method of assemblage or installation, fixture, or appurtenance not specifically authorized, providing such alternate has been approved by the administrative authority, in accordance with this rule and the State Department of Health.

3.3(3) **Evidence of compliance.** The administrative authority shall require sufficient evidence to enable him to judge whether proposed alternates meet the requirements of this code for safety and health.

3.3(4) **Tests.** When there is insufficient evidence to substantiate claims for alternates, the administrative authority may require tests of compliance as proof to be made by an approved agency at the expense of the applicant.

3.3(5) **Test procedure.** Tests shall be made in accordance with generally recognized standards; but in the absence of such standards, the administrative authority shall specify the test procedure.

3.3(6) **Repeated tests.** The administrative authority may require tests to be repeated if, at any time, there is reason to believe that an alternate no longer conforms to the requirements on which its approval was based.

3.4(135)T.III APPROVED MATERIALS.

3.4(1) **Periodic review.**

Note. All standards and specifications for materials are subject to change. Designations carrying indication of the year of issue may thus become obsolete. Table 3.5(135)T.III gives the full designations of standards current at the time this code is printed.

3.4(2) **Specific usage.** Each chapter of this code indicates specifically the type of material permitted for the various parts of the plumbing system. The standards for each of those materials are given in table 3.5(135)T.III.

TABLE 3.5(135)T.III MATERIALS FOR PLUMBING INSTALLATIONS

Materials	ANSI	ASTM	FS	Other Standards Remarks
Nonmetallic Piping				
Clay Sewer Pipe and Fittings	--	-	SS-P-361D-1968	
Standard Strength Clay Sewer Pipe	A106.3-67	C13-69	SS-P-361D-1968	
Extra Strength Clay Sewer Pipe	-	C200-69	SS-P-361D-1968	
Clay Pipe Perforated	A106.1-69	C211-68	SS-P-359B-1960	CS143-60
Clay Drain Tile	A6.1-63	C4-62		
Concrete Sewer Pipe		C76-70	SS-P-375D-1970	Remforced
Concrete Sewer Pipe		C14-70		
Bituminized Fiber Pipe & Fittings-Laminated		D1862-64		
Bituminized Fiber Pipe & Fittings-Homogenous		D1861-69		
Bituminized Fiber Pipe (Perforated Drainage)				CS116-54
Asbestos Cement Sewer Pipe		C428-71	SS-P-331C-1967	Non-Pressure
Asbestos Cement Water Pipe		C296-71	SS-P-351C-1968	
Plastic Water Pipe & Fittings, P.E. Series 2 & 3	B72.1-67	D2239-69		PS11-69 nSf
Plastic Water Pipe & Fittings, Rigid ABS	B72.3-67	D2282-69a		PS19-69 nSf
Plastic Water Pipe & Fittings, Rigid PVC	B72.2-67	D2241-69		PS22-70 nSf
Plastic Pipe & Fittings, ABS Schedule 40 (DWV) Drainage, Waste & Vent		D2661-68	LP-322A-1966	nSf DWV
Plastic Pipe & Fittings, PVC Schedule 40 (DWV) Drainage, Waste & Vent		D2665-68	LP-320A-1966	nSf DWV
Plastic Sewer Pipe & Fittings, Styrene Rubber				CS228-61

Continued

TABLE 3.5(135)T.III MATERIALS FOR PLUMBING INSTALLATIONS (Continued)

Ferrous Pipe and Fittings				
Cast Iron Soil Pipe & Fittings	A112.5.1-1971	A74-69	WW-P-401D-1969	CS188-66
Cast Iron Water Pipe	A21.6-1970		WW-P-421C-1967	AWWA-C106-1970
Cast Iron (Threaded) Pipe	A40.5-1943		WW-P-356-1936	
Cast Iron (Screwed) Fittings	B16.4-1971		WW-P-501D-1967	
Cast Iron Drainage Fittings	B16.12-1971		WW-P-491B-1967	
Galvanized Pipe & Fittings			WW-P-406C-1969	
Wrought Iron Pipe (Welded)	B36.2-1969	A72-68		
Steel Pipe (Seamless & Welded) Black and Hot Dipped Zinc Coated (Galvanized)	B125.2-1970	A120-69	WW-P-406C-1969	
Malleable Iron Fittings (Threaded) 150 lbs	B16.3-1971		WW-P-521F-1968	
Unions, Malleable-Iron or Steel 300 lbs.				CS7-29
Valves, Cast Iron Gate 125 & 250 lbs.			WW-V-58B-1971	
Ferrous Bushings, Plugs & Lock Nuts (Threaded)			WW-P-471B-1970	
Nipples Pipe, Threaded			WW-N-351B(1)-1970	CS5-65
Nonferrous Pipe and Fittings				
Nonferrous Bushings, Plugs & Lock Nuts (Threaded)			WW-P-471B-1970	CS5-65
Brass Tubing, Seamless	H36.1-1969	B135-71a	WW-T-791(1)-1933	
Brass Pipe, Seamless, Red	H27.1-1967	B43-70	WW-P-351A-1963	
Brass or Bronze Flanged Fittings 150 & 300 lbs.	B16.24-1971			
Cast Bronze Solder-Joint Fittings for Water Tube	B16.18-1963 (Addenda(a)1967)			
Brass or Bronze Screwed Fittings 125 & 250 lbs.	B16.15-1971		WW-P-460B-1967	
Copper Pipe-Seamless	H26.1-1967	B42-70	WW-P-377D-1962	
Copper Tube-Seamless	H23.3-1970	B75-68	WW-T-797C-1963	
Copper Pipe-Threadless	H26.2-1967	B302-70		
Copper Water Tube, Types K, L, M	H23.1-1970	B88-71	WW-T-799C-1967	
Wrought Copper and Wrought Bronze Solder Joint Pressure Fittings	B16.22-1963			

Continued

TABLE 3.5(135)T.III MATERIALS FOR PLUMBING INSTALLATIONS (Continued)

Cast Bronze Fittings for Flared Copper Tubes	B16.26-1967			
Copper Drainage Tube, Type DWV	H23.6-1967	B306-71b		CS229-60
Valves, Bronze: Angle, Check & Globe, 125 & 150 lbs., Threaded & Flanged			WW-V-51D-1967	
Miscellaneous				
Caulking Lead			QQ-C-40(2)-1970	CS94-41
Sheet Lead			QQ-L-201F(2)-1970	
Sheet Brass		B36-69		
Leaded Brass		B121-66	QQ-B-613C-1967	
Sheet Copper		B152-68	QQ-C-576B(1)-1964	
Sheets, Galvanized Iron & Steel	G8.8-1937	A163-66	QQ-S-775D-1967	
Cement Lining	A21.4-1971			AWWA-C104-64
Coaltar Enamel (Protective Coating)				AWWA-C203-66
Soft Solder			QQ-S-571D-1963	
Fixture Setting Compound			HH-C-536A-1954	
Air Gap Standards	A40.4-1942			
Backflow Preventers	A40.6-1943			
Hangers & Supports-Pipe			WW-H-171D-1970	
Compression Joints for Vitrified Clay Pipe		C425-71		
Rubber Gaskets for Cast Iron Soil Pipe & Fittings		C564-70		
Gel-Coated Glass-Fiber Reinforced Polyester Resin Bathtub Units	Z-124.1-1967			
Gel-Coated Glass-Fiber Reinforced Polyester Resin Shower Receptor and Shower Stall Units	Z-124.2-1967			
Plumbing Fixtures Land Use			WW-P-541B(4)-1962	
Domestic Hot Water Heaters	Z21.10.1-1971		WH-196F-1967	
Steel Septic Tanks				CS177-62

CHAPTER 4

JOINTS AND CONNECTIONS

4.1(135)T.III TIGHTNESS.

4.1(1) Test conformance. Joints and connections in the plumbing system shall be gastight and watertight for the pressures required by test, with the exception of those portions of perforated or open-joint piping which are installed for the purpose of collecting and conveying ground or seepage water to the underground storm drains.

4.2(135)T.III TYPES OF JOINTS.

4.2(1) Calked joints. Calked joints for cast iron bell- and spigot-soil pipe shall be firmly packed with oakum or hemp and filled with molten lead not less than one inch deep and not to extend more than one-eighth inch below rim of hub. No paint, varnish, or other coatings shall be permitted on the jointing material until after the joint has been tested and approved.

4.2(2) Threaded joints and screwed joints. Threads shall conform to ANSI B32.1-1968, or current issue thereof. All burrs shall be removed. Pipe ends shall be reamed out full bore and all chips removed. Pipe jointing compounds shall be used only on male threads.

4.2(3) Wiped joints. Joints in lead pipe or fittings, or between lead pipe or fittings and brass or copper pipe, ferrules, solder nipples, or traps shall be full-wiped joints. Wiped joints shall have an exposed surface on each side of a joint not less than three-fourths inch and at least as thick as the material being joined. Wall or floor flange lead-wiped joints shall be made by using a lead ring or flange placed behind the joint at wall or floor.

Joints between lead pipe and cast iron, steel, or wrought iron shall be made by means of a calking ferrule, soldering nipple, or bushing.

4.2(4) Soldered or sweat joints. Soldered or sweat joints for tube shall be made with approved fittings. Surfaces to be soldered or sweated shall be cleaned bright. The joints shall be properly fluxed and made with approved solder.

Joints in copper water tubing shall be made by the appropriate use of

approved brass or copper water fittings, properly soldered or sweated together.

4.2(5) Flared joints. Flared joints for soft copper water tubing shall be made with fittings meeting approved standards. The tubing shall be expanded with a proper flaring tool.

4.2(6) Hot-poured joints. Hot-poured compound for clay or concrete sewer pipe shall not be water absorbent and when poured against a dry surface shall have a bond of not less than one hundred pounds per square inch. All surfaces of the joint shall be cleaned and dried before pouring. If wet surfaces are unavoidable, a suitable primer shall be applied. Compound shall not soften sufficiently to destroy the effectiveness of the joint when subjected to a temperature of 160 degrees F. nor be soluble in any of the waste carried by the drainage system. Approximately twenty-five percent of the joint space at the base of the socket shall be filled with jute or hemp. A pouring collar, rope, or other device shall be used to hold the hot compound during pouring. Each joint shall be poured in one operation until the joint is filled. Joints shall not be tested until one hour after pouring.

4.2(7) Precast joints. Precast joints for clay sewer pipe shall be made of a material that is inert, and resistant to both acids and alkalies. Such joints shall be formed both on the spigot and in the bell of the pipe at the time of pipe manufacture.

Precast compression joints having resilient properties (See table 3.5(135)T.III) may be used for building sewers of clay tile, except when the temperature of the waste will exceed 212 degrees F. Immediately prior to making joint contact, the surfaces shall be wiped free of foreign matter, and coated with an appropriate lubricant compound; followed by positioning the top or one side of the spigot into the previously laid bell, easing the pipe into alignment with steady pressure, and drawing or pushing the pipe until the spigot is seated against the shoulder of the hub.

Precast joints of bituminous or similar compounds may be used for building sewers of clay tile, provided that the joint material is not soluble in any of the wastes carried by the drainage system and that the temperature of the wastes does not exceed 160 degrees F. Collar surfaces of such joints shall be conical, with side slopes of 3 degrees with the axis of pipe, and the length shall be equal to the depth of the socket. Prior to making joint contact the surfaces shall be cleaned and coated with

appropriate solvents and adhesives. When the spigot end is inserted in the collar, it shall bind before contacting the base of the socket.

4.2(8) Brazed joints - soldered joints. Brazed or soldered joints shall be made with approved fittings. Surfaces to be brazed or soldered shall be cleaned bright. The joints shall be properly fluxed and made with approved solder. Brazed joints shall be made in accordance with ANSI B 31.1.0–1967, or current issue thereof.

4.2(9) Cement mortar joints. Cement joints shall be used only when specifically permitted in other chapters of this code or when approved by the administrative authority, as sufficient to accomplish the purpose of this code. A layer of jute or hemp shall be inserted into the base of the joint space and rammed to prevent mortar from entering the interior of the pipe. Jute or hemp shall be dipped into a slurry suspension of portland cement in water prior to insertion into bell. Not more than twenty-five percent of the joint space shall be used for jute or hemp. The remaining space shall be filled in one continuous operation with a thoroughly mixed mortar composed of one part cement and two parts sand, with only sufficient water to make the mixture workable by hand. After one-half hour of setting, the joint shall be rammed around entire periphery with a blunt tool to force the partially stiffened mortar into the joint and to repair any cracks formed during the initial setting period. Pipe interior shall be swabbed to remove any material that might have fallen into the interior. Additional mortar of the same composition shall then be troweled so as to form 45 degree taper with barrel of the pipe.

4.2(10) Burned lead joints. Burned (welded) lead joints shall be lapped and the lead shall be fused together to form a uniform weld at least as thick as the lead being joined.

4.2(11) Asbestos cement sewer pipe joints. Joints in asbestos cement pipe shall be made with sleeve couplings of the same composition as the pipe, sealed with rubber rings. Joints between asbestos cement pipe and metal pipe shall be made by means of an adapter coupling calked as required in 4.2(1)T.111.

4.2(12) Bituminized fibre pipe joints. Joints in bituminized fibre pipe shall be made with tapered type couplings of the same material as the pipe. Joints between bituminized fibre pipe and metal pipe shall be made by means of an adapter coupling calked as required in 4.2(1)T.III.

4.2(13) Flexible plastic pipe joints. Joints in flexible plastic pipe shall be made by the appropriate use of insert and clamp type fittings which bear the National Sanitation Foundation seal of approval. All clamps shall be broad flat bands of corrosion resistant material, with all parts of the same material. The pipe to be joined shall be squarely cut, free of burrs, and the ends wiped clean. Hot water may be used as the lubricant for the fittings; but under no circumstances shall pipe dope, gasket cement, detergent, or petroleum lubricants be used. Each clamp shall be positioned over the smooth section ahead of the serrations of a fitting, and securely tightened.

4.2(14) Rigid plastic pipe joints. Joints in rigid plastic pipe shall be made only with solvent welded, or threaded type, fittings; provided that threaded joints may be used only with Schedules 80 and 120 I.P.S. pipe and fittings. Fittings for solvent welded joints shall be of the same material as the pipe to be joined. The solvent cement used shall be specifically designated for the pipe material and, for potable water lines, also shall bear the approval of the National Sanitation Foundation Testing Laboratory. The pipe to be joined shall be squarely cut, free of burrs, and the ends wiped dry and clean. The solvent cement shall be applied uniformly to the bell of the fitting, and to the spigot of the pipe to a distance equal to the fitting depth. The pipe shall be inserted firmly to assure seating of the spigot against the shoulder of the fitting and, if possible, rotated slightly to assure even distribution of the cement. All excess cement shall be wiped from the exterior of the finished joint.

Threaded joints in rigid plastic pipe shall be made as provided in 4.2(2)T.III.

4.2(15) Pre-formed gaskets. Joints in cast iron soil pipe may be made using moulded elastomeric compression type gaskets as an alternate for and interchangeably with calked joints as described in subrule 4.2(1) provided the pipe is centrifugally (spun) cast and of suitable design to provide a watertight joint. The soil pipe and fittings and the gaskets shall be marked to show that they were manufactured in conformance with the applicable standards. See table 3.5,T.III.

4.3(135)T.III TYPE OF PIPES.

4.3(1) Clay sewer pipe. Joints in vitrified clay pipe or between such pipe and metal pipe shall be made as provided in 4.2(6, 7) T.III, or otherwise approved under 3.3(2)T.III.

4.3(2) Concrete sewer pipe. Joints in concrete sewer pipe or between such pipe and metal pipe shall be made as provided in 4.2(6, 7)T.III, or otherwise approved under 3.3(2)T.III.

4.3(3) Cast iron soil pipe. Joints in cast iron soil pipe shall be calked as provided in subrule 4.2(1) or made up using compression type joints as provided in subrule 4.2(15).

4.3(4) Threaded pipe to cast iron. Joints between wrought iron, steel, brass, or copper pipe, and cast iron pipe shall be either calked or threaded joints made as provided in 4.2(1, 2)T.III, or shall be made with approved adapter fittings.

4.3(5) Lead to cast iron, wrought iron, or steel. Joints between lead and cast iron, wrought iron, or steel pipe shall be made by means of wiped joints to a calking ferrule soldering nipple, or bushing as provided in 4.2(3)T.III.

4.3(6) Copper water tube. Joints in copper tubing shall be made either by the appropriate brass or copper water fittings, properly sweated, or soldered together, or by means of approved compression fittings as provided by 4.2(4, 5).

4.3(7) Flexible plastic pipe to metal water pipe. Joints between flexible plastic pipe and metal water pipe shall be made by means of insertable adapter fittings; with the plastic pipe attached as provided in 4.2(13)T.III, and with the metal pipe attached as provided in 4.2(2)T.III. Joint compound bearing the approval of the National Sanitation Foundation Testing Laboratory shall be used on the male threads on the metal side only, and no joint compound shall be used on the plastic pipe side.

4.3(8) Rigid plastic pipe to metal water pipe. Joints between rigid plastic pipe and metal water pipe shall be made by means of suitable adapter fittings; with the plastic pipe attached as provided in 4.2(14)T.III, and with the metal pipe attached as provided in 4.2(2)T.III.

4.3(9) Rigid plastic pipe to metal soil and waste pipe. Joints between rigid plastic pipe and metal pipe shall be made with suitable adapter fittings except that plastic pipe shall be attached to cast iron soil pipe as provided in subrule 4.2(1).

4.4(135)T.III SPECIAL JOINTS.

4.4(1) Copper tube to threaded pipe joints. Joints from copper tube to threaded pipe shall be made by the use of brass or copper converter fittings. The joint between the copper tube and the fitting shall be properly sweated or soldered, and the connection between the threaded pipe and the fittings shall be made with a standard pipe size or screw joint.

4.4(2) Brazing or welding. Brazing or welding shall be performed in accordance with requirements of recognized published standards of practice, ANSI B31.1.0-1967, or current issue thereof, and by qualified mechanics; except when the method proposed is determined by the administrative authority to be equivalent procedure for the purpose of this code.

4.4(3) Slip joints. In drainage and water piping, slip joints may be used only on the inlet side of the trap or in the trap seal, and on the exposed fixture supply.

4.4(4) Ground joint brass connections. Ground joint brass connections which allow adjustment of tubing but provide a rigid joint when made up shall not be considered as slip joints.

4.5(135)T.III UNIONS (THREADED).

4.5(1) Drainage system. Unions may be used in the trap seal and on the inlet side of the trap. Unions shall have metal-to-metal seats.

4.5(2) Water-supply systems. Unions in the water-supply system shall be metal-to-metal with ground seats.

4.6(135)T.III WATER CLOSET, PEDESTAL URINAL, AND TRAP STANDARD SERVICE.

4.6(1) Floor outlet fixture connections. Fixture connections between drainage pipes and water closets, floor-outlet service sinks, pedestal urinals, and earthenware trap standards, shall be made by means of brass, or iron flanges calked, soldered or screwed to the drainage pipe. The connection shall be bolted, with an approved gasket, or washer, or setting compound between the earthenware and the connection. The floor flange

shall be set on an approved firm base. The use of commercial putty or plaster is prohibited. Plastic flanges may also be used when specifically permitted in other sections of this code.

4.7(135)T.III PROHIBITED JOINTS AND CONNECTIONS.

4.7(1) Drainage system. Any fitting or connection which has an enlargement, chamber, or recess with a ledge, shoulder, or reduction of pipe area, that offers an obstruction to flow through the drain, is prohibited.

4.7(2) Exception. No fitting or connection that offers abnormal obstruction to flow shall be used. The enlargement of a three-inch closet bend or stub to four inches shall not be considered an obstruction.

4.7(3) Lead bend or ferrule. No branch connection shall be made to a lead bend or ferrule.

4.8(135)T.III WATERPROOFING OF OPENINGS.

4.8(1) Approved material. Joints at the roof, around vent pipes, shall be made watertight by the use of lead, copper, or other approved flashings or flashing material. Exterior-wall openings shall be made watertight.

4.9(135)T.III INCREASERS AND REDUCERS.

4.9(1) Proper size. Where different sizes of pipes, or pipes and fittings are to be connected, the proper size increasers or reducers or reducing fittings shall be used between the two sizes.

CHAPTER 5

TRAPS AND CLEANOUTS

5.1(135)T.III TRAPS.

5.1(1) Fixture traps. Plumbing fixtures, excepting those having integral traps, shall be separately trapped by a water-seal trap, placed as close to the fixture outlet as possible, except that a set of not more than three laundry trays or lavatories or a set of two laundry trays and one sink, cast or made as one fixture, may connect with a single trap, provided that no horizontal arm shall exceed three feet in developed length from the fixture trap.

5.2(135)T.III TYPE AND SIZE OF TRAPS AND FIXTURE DRAINS.

5.2(1) Trap size. The size (nominal diameter) of trap for a given fixture shall be sufficient to drain the fixture rapidly but in no case less than given in table 11.4(2)T.III.

5.2(2) Relation to fixture drains. No trap shall be larger than the drain to which it is connected.

5.2(3) Type of traps.

a. Fixture traps shall be self-cleaning other than integral traps without partitions or movable parts.

b. Slip joints or couplings may be used on the trap inlet or within the trap seal of the trap if metal-to-metal ground joint is used.

c. A trap integral with the fixture shall have a uniform interior and smooth waterway.

5.3(135)T.III GENERAL REQUIREMENTS.

5.3(1) Trap seal. Each fixture trap shall have a water seal of not less than two inches and not more than four inches, except where a deeper seal is found necessary by the administrative authority for special conditions.

5.3(2) Trap cleanouts. Each fixture trap, except those cast integral or in combination with fixtures in which the trap seal is readily accessible or except when a portion of the trap is readily removable for cleaning

purposes, shall have an accessible brass trap screw of ample size protected by this water seal.

5.3(3) Trap level and protection. Traps shall be set true with respect to their water seals, and where necessary, they shall be protected from freezing.

5.3(4) Reserved for future use.

5.3(5) Reserved for future use.

5.3(6) Prohibited traps.

a. No trap which depends for its seal upon the action of movable parts shall be used.

b. S traps are prohibited.

c. Bell traps are prohibited.

d. Crown-vented traps are prohibited.

e. Building or house traps on the main house sewer or house drain are prohibited.

5.3(7) Double trapping. No fixture shall be double trapped.

5.4(135)T.III PIPE CLEANOUTS.

5.4(1) Location. Cleanouts shall not be more than fifty feet apart in horizontal drainage lines of four-inch nominal diameter or less and not more than one hundred feet apart for larger pipes.

5.4(2) Underground drainage. Cleanouts, when installed on an underground drain, shall be extended to or above the finished grade level directly above the place where the cleanout is installed; or may be extended to the outside of the building when found necessary by the administrative authority.

5.4(3) Reserved for future use.

5.4(4) Concealed piping. Cleanouts on concealed piping shall be extended through and terminate flush with the finished wall or floor; chases may be left in the wall or floor, provided they are of sufficient size to permit removal of the cleanout plug and effective cleaning of the system.

5.4(5) **Base of stacks.** A cleanout shall be provided in each vertical waste or soil stack at a point at least forty-two inches above the floor. For buildings with a floor slab on the ground surface, the following will be acceptable in lieu of a cleanout at the base of the stack: The building drain may be extended to the outside of the building and terminated in an accessible cleanout; or an accessible cleanout installed in the building drain downstream from the stack, not more than five feet outside the building wall.

5.4(6) **Building drain junction.** There shall be a cleanout near the junction of the building drain and building sewer or a cleanout with Y branch inside the building wall unless the cleanout at the base of the stack is within five feet of the point where the sewer enters the building and in such case the stack cleanout will be sufficient.

5.4(7) **Direction of flow.** Every cleanout shall be installed so that the cleanout opens in a direction opposite to the flow of the drainage line or at right angle thereto.

5.4(8) **Prohibited connection.** Cleanout plugs shall not be used for the installation of new fixtures or floor drains except where approved in writing by the administrative authority.

5.5(135)T.III SIZE OF CLEANOUTS.

5.5(1) **Small pipes.** Cleanouts shall be of the same nominal size as the pipes up to four inches and not less than four inches for larger piping.

5.6(135) T.III CLEANOUT CLEARANCES.

5.6(1) **Large pipes.** Cleanouts on three-inch or larger pipe shall be so installed that there is a clearance of not less than eighteen inches for the purposes of rodding.

5.6(2) **Small pipes.** Cleanouts smaller than three inches shall be so installed that there is a twelve-inch clearance for rodding.

5.6(3) **Calking.** Cement, plaster, or any other permanent finishing material shall not be placed over a cleanout plug.

5.6(4) **Concealment.** Where it is necessary to conceal a cleanout plug, a covering plate or access door shall be provided which will permit ready access to the plug.

5.7(135)T.III CLEANOUT EQUIVALENT.

5.7(1) **Alternate.** A fixture trap or a fixture with integral trap, readily removable without disturbing concealed roughing work, may be accepted as a cleanout equivalent.

CHAPTER 6

INTERCEPTORS – SEPARATORS AND BACKWATER VALVES

6.1(135)T.III INTERCEPTORS AND SEPARATORS.

6.1(1) When required. Interceptors (including grease, oil, and sand interceptors, etc.) shall be provided when, in the judgment of the administrative authority having jurisdiction, they are necessary for the proper handling of liquid wastes containing flammable wastes, sand, and other ingredients harmful to the building drainage system, and public sewer or sewage-treatment plant or processes.

6.1(2) Approval. The size, type, and location of each interceptor or separator shall be approved by the administrative authority in accordance with generally accepted standards and no wastes other than those requiring treatment or separation shall be discharged into any interceptor.

6.2(135)T.III GREASE INTERCEPTORS.

6.2(1) Commercial buildings. A grease interceptor shall be installed in the waste line leading from sinks, drains, or other fixtures in the following establishments when, in the judgment of the administrative authority, a hazard exists: Restaurants, hotel kitchens or bars; factory cafeterias or restaurants; clubs; or other establishments where grease can be introduced into the drainage system in quantities that can affect line stoppage or hinder sewage disposal.

6.2(2) Residential units. A grease interceptor is not necessary for individual dwelling units or any private living quarters.

6.3(135)T.III OIL SEPARATORS.

6.3(1) Where required. An oil separator shall be installed in the drainage system or section of the system where, in the judgment of the administrative authorities, a hazard exists or where oils or other inflammables can be introduced or admitted into the drainage system in appreciable quantities by accident or otherwise. (See Appendix Gen. 6.13(1).)

6.4(135)T.III SAND INTERCEPTORS.

6.4(1) Commercial installations. Sand and similar interceptors for heavy solids shall be so designed and located as to be readily accessible for cleaning, and shall have a water seal of not less than six inches. (See Appendix Gen. 6.13(1).)

6.5(135)T.III VENTING INTERCEPTORS.

6.5(1) Relief vent. Interceptors shall be so designed that they will not become air bound if closed covers are used.

6.6(135)T.III ACCESSIBILITY OF INTERCEPTOR.

6.6(1) Easy access required. Each interceptor shall be so installed as to provide ready accessibility to the cover and means for servicing and maintaining the interceptor in working and operating condition. The use of ladders or the removal of bulky equipment in order to service interceptors shall constitute a violation of accessibility.

6.7(135)T.III INTERCEPTOR'S EFFICIENCY.

6.7(1) Flow rate. Interceptors shall be rated and approved for their efficiency as determined by the administrative authority and in accordance with generally accepted practice.

6.7(2) Water connection. Water connection for cooling or operating an interceptor shall be such that backflow cannot occur, and be protected by an approved air gap.

6.8(135)T.III LAUNDRIES.

6.8(1) Interceptors. Commercial laundries shall be equipped with an interceptor having a removable wire basket or similar device that will prevent strings, rags, buttons, or other material detrimental to the public sewerage system from passing into the drainage system.

6.9(135)T.III BOTTLING ESTABLISHMENTS.

6.9(1) Bottling plants. Bottling plants shall discharge their process

wastes into an interceptor which will provide for the separation of broken glass or other solids, before discharging liquid wastes into the drainage system.

6.10(135)T.III SLAUGHTERHOUSES.

6.10(1) Separators. Slaughtering-room drains shall be equipped with separators which shall prevent the discharge into the drainage system of feathers, entrails, and other materials likely to clog the drainage system.

6.10(2) Food grinder. Food grinder wastes may discharge directly to the building drainage system.

6.11(135)T.III COMMERCIAL GRINDERS.

6.11(1) Discharge. Where commercial food-waste grinders are installed, the waste from those units may discharge direct into the building drainage system and not through a grease interceptor.

6.11(2) Approval. The administrative authority shall determine where and what type of interceptor is necessary, except that interceptors shall not be required for private living quarters or residential units.

6.12(135)T.III MAINTENANCE.

6.12(1) Cleaning. Interceptors shall be maintained in efficient operating condition by periodic removal of accumulated grease.

6.13(135)T.III OIL INTERCEPTORS.

6.13(1) Where required. Oil separators shall be installed when required by the administrative authority and shall conform to the requirements of 6.13(2)T.III.

6.13(2) Minimum dimension. Interceptors for service stations and garages where both oil wastes and sand or mud may be expected, shall have a minimum capacity of twenty-five cubic feet. (See Appendix Gen. 6.13(1).)

6.13(3) Special type separators. Before installing any special type separator, a drawing including all pertinent information shall be submitted

for approval of the administrative authority, as being in accordance with this code.

6.14(135)T.III BACKWATER VALVES.

6.14(1) Reserved for future use.

6.14(2) Reserved for future use.

6.14(3) Material. All bearing parts of backwater valves shall be of corrosion-resistant material.

6.14(4) Positive seal. Backwater valves shall be so constructed as to insure a mechanical seal against backflow.

6.14(5) Diameter. Backwater valves, when fully opened, shall have a capacity not less than that of the pipes in which they are installed.

6.14(6) Location. Backwater valves shall be so installed as to provide ready accessibility to their working parts.

CHAPTER 7

PLUMBING FIXTURES

7.1(135)T.III GENERAL REQUIREMENTS – MATERIALS.

7.1(1) Quality of fixtures. Plumbing fixtures shall be structurally sound, of durable materials, have smooth impervious surfaces, and be free from defects and concealed fouling surfaces.

7.2(135)T.III ALTERNATE MATERIALS.

7.2(1) Materials. Sinks and special-use fixtures may be made of soapstone, chemical stoneware, or may be lined with lead, copper-base alloy, nickel-copper alloy, corrosion-resisting steel, or other materials especially suited to the use for which the fixture is intended.

7.3(135)T.III OVERFLOWS.

7.3(1) Design. When any fixture is provided with an overflow, the waste shall be so arranged that the standing water in the fixture cannot rise in the overflow when the stopper is closed or remain in the overflow when the fixture is empty.

7.3(2) Connection. The overflow pipe from a fixture shall be connected on the house or inlet side of the fixture trap.

7.4(135)T.III INSTALLATION.

7.4(1) Cleaning. Plumbing fixtures shall be installed in a manner to afford easy access for cleaning. Where practical, all pipes from fixtures shall be run to the nearest wall.

7.4(2) Hangers. Wall-hung fixtures shall be secured or attached with proper hangers.

7.4(3) Securing fixtures. Floor-outlet fixtures shall be rigidly secured to floor by screws or bolts.

7.4(4) Wall-hung bowls. Wall-hung water-closet bowls shall be rigidly

supported by a concealed metal supporting member so that no strain is transmitted to the closet connection.

7.4(5) Setting. Fixtures shall be set level and in proper alinement with reference to adjacent walls. (See 4.6(1)T.III.)

7.5(135)T.III WATER-SUPPLY PROTECTION.

7.5(1) Supply fittings. The supply lines or fittings for every plumbing fixture shall be so installed as to prevent backflow. (See 10.4(3)T.III.)

7.6(135)T.III PROHIBITED FIXTURES AND CONNECTIONS.

7.6(1) Fixtures. Pan, valve, plunger, offset, washout, latrine, range, frost-proof, and other water closets having an invisible seal or an unventilated space or having walls which are not thoroughly washed at each discharge, are prohibited. Any water closet which might permit siphonage of the contents of the bowl back into the tank is prohibited.

7.6(2) Connections. Fixtures having concealed slip-joint connections shall be provided with an access panel or utility space so arranged as to make the slip connections accessible for inspection and repair.

7.7(135)T.III WATER CLOSETS.

7.7(1) Public use. Water-closet bowls for public use shall be of the elongated type.

7.7(2) Flushing device. Water-closet tanks shall have a flushing capacity sufficient to properly flush the water-closet bowls with which they are connected.

7.7(3) Ball cocks. Ball cocks for flushing tanks shall be of the anti-siphon type, properly installed and shall provide for trap refill.

7.7(4) Close-coupled tanks. The flush-valve seat in close-coupled water-closet combinations shall be one inch or more above the rim of the bowl, so that the flush-valve will close even if the closet trapway is clogged, or any closets with flush-valve seats below the rim of the bowl shall be so constructed that in case of trap stoppage, water will not flow continuously over the rim of the bowl.

7.7(5) **Automatic flush valve.** Flushometers shall be so installed that they will be readily accessible for repairing. When the valve is operated, it shall complete the cycle of operation automatically, opening fully and closing positively under the service pressure. At each operation the valve shall deliver water in sufficient volume and at a rate that will thoroughly flush the fixture and refill the fixture trap. Means shall be provided for regulating flush valve flow. Not more than one fixture shall be served by a single flush valve. Protection against backflow shall be provided as specified in 10.4(3)T.III.

7.7(6) **Seats.** Water closets shall be equipped with seats of smooth nonabsorbent material. All seats of water closets provided for public use shall be of the open-front type. Integral water-closet seats shall be of the same material as the fixture.

7.8(135)T.III URINALS.

7.8(1) **Automatic flushing tank.** Tanks flushing more than one urinal shall be automatic in operation and of sufficient capacity to provide the necessary volume to flush and properly cleanse all urinals simultaneously.

7.8(2) **Urinals equipped with automatic flush valves.** Flushometers shall be as prescribed in 7.7(5)T.III and no valve shall be used to flush more than one urinal.

7.8(3) **Trough urinals.** Trough urinals shall be permitted only in places of temporary occupancy. They shall be not less than six inches deep and shall be furnished with one-piece backs and have strainers with outlets at least one and one-half inches in diameter. The washdown pipe shall be perforated so as to flush with an even curtain of water against the back of the urinal. This pipe shall be securely clamped as high as practicable to the back of the urinal. Trough urinals shall have tanks with a flushing capacity of not less than one and one-half gallons of water for each two feet of urinal length.

7.8(4) **Reserved for future use.**

7.8(5) **Floor-type urinals.** Floor-type trough urinals are prohibited.

7.8(6) **Surrounding materials.** Wall and floor space to a point one foot in front of urinal lip and four feet above the floor, and at least one foot to each side of the urinal shall be lined with nonabsorbent material.

7.9(135)T.III STRAINERS AND FIXTURE OUTLETS.

7.9(1) Design. All plumbing fixtures, other than water closets and siphon-action washdown or blowout urinals, shall be provided with metal strainers having waterway area in accord with acceptable design.

7.10(135)T.III LAVATORIES.

7.10(1) Waste outlets. Lavatories shall have waste outlets not less than one and one-fourth inches in diameter. Wastes may have open strainers or may be provided with stoppers.

7.11(135)T.III SHOWER RECEPTORS AND COMPARTMENTS.

7.11(1) Shower. All shower compartments, except those built directly on the ground, shall have a lead or copper shower pan or the equivalent thereof or as determined by the administrative authority. The pan shall turn up on all sides at least two inches above finished floor level. Traps shall be so constructed that the pan may be securely fastened to the trap at the seepage entrance making a watertight joint between the pan and trap. Shower receptor waste outlets shall be not less than one and one-half inches in diameter and have removable strainers.

7.11(2) On the ground. Shower receptors built on the ground shall be constructed of dense nonabsorbent and noncorrosive materials and shall have smooth impervious surfaces, or be as provided in 7.11(1)T.III.

7.11(3) Dimensions. Shower compartments shall have not less than nine hundred square inches in floor area and, if rectangular, square, or triangular, shall be not less than thirty inches in the shortest dimension.

7.11(4) Construction. Floors under shower compartments shall be laid on a smooth and structurally sound base, and shall be lined and made watertight with sheet lead, copper, or other acceptable material. Shower compartments located in basements, cellars, or in other rooms in which the floor has been laid directly on the ground surface, need not be lined.

7.11(5) Public or institution showers. Floors of public shower rooms shall be drained in such a manner that no waste water from any shower head will pass over areas occupied by other bathers.

7.11(6) Walls. Shower compartments shall have walls constructed of smooth, noncorrosive and nonabsorbent waterproof materials to a height of not less than six feet above the floor.

7.11(7) Joints. Built-in tubs with overhead showers shall have waterproof joints between the tub and walls, and the walls shall be waterproof.

7.12(135)T.III SINKS.

7.12(1) Waste outlets. Sinks shall be provided with waste outlets not less than one and one-half inches in diameter. Waste outlets may have open strainers or may be provided with stoppers.

7.13(135)T.III FOOD-WASTE-GRINDER UNITS.

7.13(1) Separate connections. Domestic food-waste-disposal units shall be connected and trapped separately from any other fixture or compartment. Units may have either automatic or hand-operated water supply control. (See 10.4(135)T.III.)

7.13(2) Grease interceptors. No food-waste grinder shall be connected through a grease interceptor.

7.13(3) Commercial-type grinders. Commercial-type food-grinders shall be provided with not less than a two-inch waste line. Each waste line shall be trapped and vented as provided in other rules of this code.

7.14(135)T.III DRINKING FOUNTAINS.

7.14(1) Design and construction. Drinking fountains shall conform to American National Standards Institute specifications for drinking fountains, ANSI Z4.2-1942, or current issue thereof.

7.14(2) Protection of water supply. Stream projectors shall be so assembled as to provide an orifice elevation as specified by American National Standards Institute specifications ANSI A40.4-1942, relating to air gaps and ANSI A40.6-1943, relating to backflow preventers, or current issue thereof.

7.15(135)T.III FLOOR DRAINS.

7.15(1) Trap and strainers. Floor drains shall have metal traps and a minimum water seal of three inches and shall be provided with removable strainers. The open area of strainer shall be at least two-thirds of the cross-section area of the drain line to which it connects.

7.15(2) Size. Floor drains shall be of a size to serve efficiently the purpose for which it is intended.

7.16(135)T.III DISHWASHING MACHINES.

7.16(1) Protection. Domestic dishwashing machines shall meet requirements in 10.4(3)T.III.

7.16(2) Separate trap. Each unit shall be separately trapped or discharged indirectly into a properly trapped and vented fixture.

7.16(3) Air gap. Dishwashing machines shall not be directly connected through a food waste grinder or to the drainage system without the use of an approved dishwasher air gap fitting on the discharge side of the dishwashing machine or similarly reliable method of connection to the drainage system.

7.16(4) Hot water. Dishwashing machines or similar dishwashing equipment not in private living quarters or dwelling units shall be provided with water at least 180 degrees F. for disinfection.

7.17(135)T.III MULTIPLE WASH SINKS.

7.17(1) Circular type. Each eighteen inches of wash sink circumference (circular type) shall be equivalent to one lavatory.

7.17(2) Straight-line type. Multiple wash sinks of the straight-line type shall have hot and cold combination spouts not closer than eighteen inches from adjacent similar spouts and each spout shall be considered the equivalent of one lavatory.

7.18(135)T.III GARBAGE CAN WASHERS.

7.18(1) Discharge. Garbage can washers shall not discharge through

a trap serving any other device or fixture.

7.18(2) **Reserved for future use.**

7.18(3) **Baskets.** The receptacle receiving the wash from garbage cans shall be provided with a basket or similar device to prevent the discharge of large particles and utensils into the building drainage system.

7.18(4) **Connections.** Water supply connections shall conform to 10.4(3)T.III.

7.19(135)T.III LAUNDRY TRAYS.

7.19(1) **Waste outlets.** Each compartment of a laundry tray shall be provided with a waste outlet not less than one and one-half inches in diameter and with a stopper.

7.20(135)T.III SPECIAL FIXTURES AND SPECIALTIES.

7.20(1) **Water and drain connections.** Baptistries, ornamental and lily pools, aquaria, ornamental fountain basins, and similar constructions when provided with water supplies shall be protected from back-siphonage as required in 10.4(3)T.III.

7.21(135)T.III MINIMUM PLUMBING FACILITIES.

7.21(1) **Minimum number of fixtures.** Plumbing fixtures should be provided for the type of building occupancy and in the minimum number(s) shown in table 7.21(135) Minimum Number of Plumbing Fixtures. Types of building occupancy not shown in table 7.21(135) will be considered individually by the Administrative Authority.

7.21(2) **Separate facilities.** In other than residential installations where toilet facilities are provided to serve members of both sexes, separate facilities should be installed for each sex.

TABLE 7.21(135)T.III MINIMUM NUMBER OF PLUMBING FIXTURES

Type of building occupancy	Type of fixture					
	Water closets	Urinals	Lavatories	Bathtubs or showers	Drinking fountains	Other fixtures
Assembly—places of worship.	Number of persons / Number of fixtures 150 Women ——— 1 300 Men ——— 1	Number of persons / Number of fixtures 300 Men* ——— 1	1 ———	———	1 ———	
Assembly—other than places of worship (auditoriums, theaters, convention halls).	Number of persons / Number of fixtures 1-100 ——— 1 101-200 ——— 2 201-400 ——— 3 Over 400, add 1 fixture for each additional 500 men and 1 for each 300 women.	Number of persons / Number of fixtures 1-200 ——— 1 201-400 ——— 2 401-600 ——— 3 Over 600, add 1 fixture for each 300 men.*	Number of persons / Number of fixtures 1-200 ——— 1 201-400 ——— 2 401-750 ——— 3 Over 750, add 1 fixture for each 500 persons.	———	1 for each 300 persons.	1 slop sink.
Dormitories—school or labor, also institutional.	Men: 1 for each 10 persons. Women: 1 for each 8 persons.	1 for each 25 men. Over 150, add 1 fixture for each 50 men.*	1 for each 12 persons. (Separate dental lavatories should be provided in community toilet rooms. A ratio of 1 dental lavatory to each 50 persons is recommended.)	1 for each 8 persons. For women's dormitories, additional bathtubs should be installed at the ratio of 1 for each 30 women. Over 150 persons add 1 fixture for each 20 persons.	1 for each 75 persons.	Laundry trays, 1 for each 50 persons. Slop sinks, 1 for each 100 persons.
Dwellings—one and two family.	1 for each dwelling unit.	———	1 for each dwelling unit.	1 for each dwelling unit.	———	Kitchen sink 1 for each dwelling unit.
Dwellings—multiple or apartment.	1 for each dwelling unit or apartment.	———	1 for each dwelling unit or apartment.	1 for each dwelling unit or apartment.	———	Kitchen sink 1 for each dwelling unit or apartment. For apartments or multiple dwelling units in excess of 10 apartments or units, 1 double laundry tray for each 10 units or 1 automatic laundry washing machine for each 20 units.
Industrial—factories, warehouses, foundries, and similar establishments.	Number of each sex / Number of fixtures 1-10 ——— 1 11-25 ——— 2 26-50 ——— 3 51-75 ——— 4 76-100 ——— 5 1 fixture for each additional 30 employees.	Where more than 10 men are employed: Number of men / Number of urinals 11-30 ——— 1 31-80 ——— 2 81-160 ——— 3 161-240 ——— 4	Number of persons / Number of fixtures 1-100 ——— 1 to 10 Over 100 ——— 1 to 15	1 shower for each 15 persons exposed to excessive heat or to occupational hazard from poisonous, infectious or irritating material.	1 for each 75 persons.	

TABLE 7.21(135)T.III MINIMUM NUMBER OF PLUMBING FIXTURES (Continued)

Institutional—Other than hospitals or penal institutions (on each occupied story).	1 for each 25 men ---- 1 for each 20 women.	1 for each 50 men* ----	1 for each 10 persons -	1 for each 10 persons	1 for each 50 persons.	
Hospitals ----------	1 ----------	----------	1 ----------	1 ----------	----------	1 slop sink per floor.
Individual room wards.	1 for each 8 patients --	----------	1 for each 10 patients	1 for each 20 patients.	1 for each 100 patients.	
Waiting rooms ----	1 ----------	----------	1 ----------	----------	----------	
Employees ----------	Same as public ------	Same as public ------	Same as public ------	----------	Same as public ------	
Penal institutions ---	1 in each cell --------	1 in each exercise room.	1 in each cell --------	1 on each cell block floor.	1 on each cell block floor.	1 slop sink per floor.
		----------	1 in each exercise area	----------	1 in each exercise area.	
Prisoners ----------	1 in each exercise room	----------	----------	----------	----------	
Employees ----------	Same as public ------	Same as public ------	Same as public ------	----------	Same as public ------	
Public buildings, offices, business, mercantile, storage, and institutional employees.	Number of each sex Number of fixtures 1-15 ---------- 1 16-35 ---------- 2 36-55 ---------- 3 56-80 ---------- 4 81-110 ---------- 5 111-150 ------ ------6 1 fixture for each additional 40 employees.	Urinals may be provided in men's* toilet rooms in lieu of water closets but for not more than ⅓ of the required number of water closets.	Number of employees Number of fixtures 1-15 ---------- 1 16-35 ---------- 2 36-60 ---------- 3 61-90 ---------- 4 91-125 ---------- 5 1 fixture for each additional 45 persons.	----------	1 for each 75 persons.	1 slop sink per floor.
Schools:	Boys Girls					
Elementary --------	1/40 1/35	1/30 boys ----------	1/50 pupils ----------	In gym or pool shower rooms, 1/5 Pupils of a class.	1/100 pupils but at least 1 per floor.	Slop sinks, 1 on each floor.
Secondary ----------	1/75 1/45	1/30 boys ----------	1/50 pupils ----------			
Working men, temporary facilities.	1/30 working men ----	1/30 working men ----	1/30 working men ----		1 fixture or equivalent for each 100 working men.	

*Where urinals are provided for the women, the same number shall be provided as for men.

CHAPTER 8

HANGERS AND SUPPORTS

8.1(135)T.III STRAINS AND STRESSES.

8.1(1) **General.** Piping in a plumbing system shall be installed without undue strains and stresses, and provision shall be made for expansion, contraction, and structural settlement.

8.2(135)T.III VERTICAL PIPING.

8.2(1) **Attachment.** Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alinement and carry the weight of the pipe and contents.

8.3(135)T.III HORIZONTAL PIPING.

8.3(1) **Supports.** Horizontal piping shall be supported at sufficiently close intervals to keep it in alinement and prevent sagging.

8.3(2) **Cast iron soil pipe.** Cast iron soil pipe shall be supported at five foot intervals except where ten foot lengths are used the pipe shall be supported at least every ten feet.

8.3(3) **Threaded pipe.** Threaded pipe (SPS) shall be supported at approximately twelve-foot intervals.

8.3(4) **Copper tube.** Copper tube shall be supported at approximately six-foot intervals for piping one and one-half inches and smaller and ten-foot intervals for piping two inches and larger.

8.3(5) **Lead pipe.** Lead pipe shall be supported for its entire length.

8.3(6) **Plastic pipe.** Plastic pipe for DWV applications shall be supported at intervals of not greater than four feet.

8.3(7) **In ground.** Piping in the ground shall be laid on a firm bed for its entire length.

8.4(135)T.III HANGERS AND ANCHORS.

8.4(1) **Material.** Hangers and anchors shall be of metal of sufficient strength to maintain their proportional share of the weight of pipe and contents.

8.4(2) **Attachment.** Hangers and anchors shall be securely attached to the building construction.

8.5(135)T.III STRAINS AND STRESSES.

8.5(1) **Installation of pipe.** Piping in a plumbing system shall be so installed as to prevent undue strains and stresses.

8.5(2) **Expansion and contraction.** Provisions shall be made for expansion and contraction of piping and for structural settlement that may affect the piping.

8.5(3) **Piping in concrete.** Piping in concrete or masonry walls or footings shall be placed or installed in chases or recesses which will permit access to the piping for repair or replacement.

8.6(135)T.III BASE OF STACKS.

8.6(1) **Supports.** Bases of cast-iron stacks shall be supported on concrete, brick laid in cement mortar, metal brackets attached to the building construction, or by other methods approved by the administrative authority.

CHAPTER 9

INDIRECT WASTE PIPING AND SPECIAL WASTES

9.1(135)T.III INDIRECT WASTE PIPING.

9.1(1) General. Wastes from the following shall discharge to the building drainage system through an air gap serving the individual fixtures, devices, appliances, or apparatus.

9.1(2) Food handling. Establishments engaged in the storage, preparation, selling, serving, processing, or otherwise handling of food shall have the waste piping from all refrigerators, ice boxes, rinse sinks, cooling or refrigerating coils, laundry washers, extractors, steam tables, egg boilers, coffee urns, or similar equipment discharge indirectly into a water-supplied sink or receptor and the waste outlet shall terminate at least two inches above the flood rim of such sink or receptor. (See Appendix Gen. 9.1(2).)

9.1(3) Commercial dishwashing machines. Dishwashing machines shall be connected to the water distribution system through an air gap or similarly reliable method of protection to the water supply. The contents of the machine shall be protected from the backflow of sewage or wastes through an air gap (air break) or similarly reliable method of connection to the drainage system.

9.1(4) Interceptor. An interceptor may be placed on the outlet side of the dishwashing machine, or on the discharge side of the indirect waste receptor.

9.1(5) Connection. Drains, overflows, or relief vents from the water-supply system shall not be directly connected to the drainage system.

9.1(6) Sterile materials. Appliances, devices, or apparatus such as stills, sterilizers, and similar equipment requiring water and waste and used for sterile material shall be indirectly connected or provided with an air gap between the trap and the appliance. (See Appendix Gen. 9.1(6).)

9.1(7) Drips. Appliances, devices, or apparatus not regularly classed as plumbing fixtures but which have drips or drainage outlets, may be

drained by indirect waste pipes discharging into an open receptacle as provided in 9.1(2)T.III.

9.2(135)T.III MATERIAL AND SIZE.

9.2(1) Design. The material and size of indirect waste pipes shall be in accordance with the provisions of the other rules of this code applicable to sanitary-drainage piping, except that refrigerator and similar indirect fixtures or appliances may be provided with waste pipes trapped and of a size not less than one and one-fourth inches for one to two traps; one and one-half inches for three to six traps; and two inches for six to twelve traps.

9.3(135)T.III LENGTH.

9.3(1) Waste pipe. Any indirect waste pipe exceeding three feet in length shall be trapped.

9.3(2) Venting of indirect wastes. When indirect wastes extend more than one floor above the fixture they discharge over, they must be vented full size through the roof.

9.3(3) Cleaning. Indirect waste piping shall be so installed as to permit ready access for flushing and cleansing.

9.4(135)T.III AIR GAP OR BACKFLOW PREVENTER.

9.4(1) Provision for air gap. The air gap between an indirect waste pipe outlet and a drainage system component shall be at least twice the effective diameter of the indirect waste pipe served as follows:

a. By extending the indirect waste pipe to an open, accessible service sink, floor drain, or other suitable fixture which is properly trapped and vented. The indirect waste shall terminate a sufficient distance above the flood level rim of the receiving fixture to provide the required air gap and shall be installed in accordance with other applicable sections of this code.

b. By providing a break (air gap) in the drain connection on the inlet side of the trap serving the fixture, device, appliance or apparatus. (Also see Appendix C)

9.5(135)T.III RECEPTORS.

9.5(1) Installation. Waste receptors serving indirect pipes shall not be installed in any toilet room nor in any inaccessible or unventilated space.

9.5(2) Reserved for future use.

9.5(3) Strainers and baskets. Suitable strainers, baskets, or beehive strainers shall be provided on indirect waste receptors or floor drains receiving such drainage.

9.5(4) Splashing. All plumbing receptors receiving the discharge of indirect waste pipes shall be of such shape and capacity as to minimize splashing or flooding. No plumbing fixture which is used for domestic or culinary purposes shall be used to receive the discharge of an indirect waste pipe.

9.6(135)T.III CLEAR WATER WASTES.

9.6(1) Method. Waste lifts, expansion tanks, cooling jackets, sprinkler systems, drip or overflow pans, or similar devices which waste clear water only shall discharge onto a roof or into the building drainage system through an indirect waste or over a suitable floor drain.

9.7(135)T.III CONDENSERS AND SUMPS.

9.7(1) Direct connection prohibited. No steam pipe shall connect to any part of a drainage or plumbing system, nor shall any water above 212 degrees F. be discharged into any part of the drainage system. Such pipes may be indirectly connected by discharging through an interceptor or device designed to render such wastes harmless to the plumbing or drainage system.

9.7(2) Indirect connection required. No high pressure steam or blowoff exhaust shall be directly connected to the building drain or sewer. When such waste is directed through an approved and properly vented expansion chamber, condenser, or similar device, designed to reduce the pressure to a safe level and the temperature to or below 212 degrees F., such devices shall discharge to the building sewer.

9.8(135)T.III DRINKING FOUNTAINS.

9.8(1) Indirect waste permitted. Drinking fountains may be installed with indirect wastes. (Also See Appendix C)

9.9(135)T.III SPECIAL WASTES.

9.9(1) Acid waste. Acid and chemical waste pipes and jointing materials shall be of materials unaffected by the discharge of such wastes.

9.9(2) Neutralizing device. In no case shall corrosive liquids, spent acids, or other harmful chemicals which might destroy or injure a drain, sewer, soil or waste pipe, or which might create noxious or toxic fumes, discharge into the plumbing system without being thoroughly diluted or neutralized by passing through a properly constructed and acceptable dilution or neutralizing device. Such device shall be provided with a sufficient intake of diluting water or neutralizing medium, so as to make its contents noninjurious before being discharged into the soil or sewage system.

9.10(135)T.III SWIMMING POOLS.

9.10(1) Waste piping. Piping carrying waste water from swimming or wading pools including pool drainage, back wash from filters, or water from scum gutter drains or floor drains which serve walks around pools, shall be installed as an indirect waste pipe utilizing any existing circulation pump, if necessary, when indirect waste pipe is below the sewer grade.

9.10(2) Plans and specifications. Plans and specifications for public swimming pools shall be submitted for approval to the Iowa State Department of Health before construction begins.

CHAPTER 10

WATER SUPPLY AND DISTRIBUTION

10.1(135)T.III QUALITY OF WATER SUPPLY.

10.1(1) Potable water. Potable water is water which is satisfactory for drinking, culinary, and domestic purposes, and meets the requirements of accepted standards including those of the State Department of Health.

10.1(2) Acceptable sources. Where a public supply of potable water is not available, requirements satisfactory to the administrative authority shall be observed.

10.1(3) Nonpotable water. Where an adequate supply of potable water is not available, nonpotable water may be used for cooling, flushing water closets and urinals and other fixtures not requiring potable water, provided such water shall not be accessible for drinking or culinary purposes, nor cross-connected with a potable water supply.

10.2(135)T.III COLOR CODE.

10.2(1) Identification of piping. All piping conveying a nonpotable water should be adequately and durably identified by a distinctive yellow-colored paint so that it is readily distinguished from piping carrying potable water. (See Safety Color Code for Marking Physical Hazards, ANSI Z53.1-1967, or current issue thereof.)

10.3(135)T.III WATER SUPPLY.

10.3(1) Required. Every building for human occupancy or habitation in which plumbing fixtures are installed shall be provided with an ample supply of pure and wholesome water.

10.4(135)T.III PROTECTION OF POTABLE WATER SUPPLY.

10.4(1) Cross-connections. Potable water-supply piping, water discharge outlets, backflow prevention devices, or similar equipment shall not be so located as to make possible their submergence in any contaminated or polluted liquid or substance. (See Appendix Gen. 10.4)

10.4(2) Approval of devices. Before any device for the prevention of backflow or back-siphonage is installed, it shall have first been certified as meeting the requirements of American Standard Backflow Preventers in Plumbing Systems, ANSI A40.6-1943, or current issue thereof, by a reputable testing laboratory. Devices installed in a potable water supply system for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices, and if found to be ineffective or inoperative shall require the repair or replacement thereof.

10.4(3) Backflow. The water distributing system shall be protected against backflow. Every water outlet shall be protected from backflow, preferably by having the outlet end from which the water flows spaced a distance above the flood-level rim of the receptacle into which the water flows sufficient to provide a "minimum required air gap" as defined in American Standard Air Gaps in Plumbing Systems, ANSI A40.4-1942, or current issue thereof. Where it is not possible to provide a minimum air gap, the water outlet shall be equipped with an accessibly located backflow preventer complying with American Standard Backflow Preventers in Plumbing Systems, ANSI A40.6-1943, or current issue thereof, installed on the discharge line of the manual control valve. (See Appendix C)

10.4(4) Special device. Where it is not possible to provide either a minimum air gap or a backflow preventer, as may be the case in connection with cooling jackets, condensers, or other industrial or special appliances, the administrative authority shall require other means of protection approved by the State Department of Health.

10.5(135)T.III VACUUM BREAKERS AND AIR GAPS.

10.5(1) Flushometer valves. Flushometer valves shall be equipped with approved vacuum breakers. Vacuum breakers shall be installed on the discharge side of flushing valves with the critical level at least four inches above the overflow rim of the fixture served.

10.5(2) Flushing tanks. Flushing tanks shall be equipped with approved anti-siphon ball cocks. The ball cock shall be installed with the critical level of the vacuum breaker at least one inch above the full opening of the overflow pipe. In cases where the ball cock has no hush tube, the bottom of the water supply inlet shall be installed one inch higher than the

opening of the overflow pipe.

10.5(3) Trough urinals. Trough urinals when permitted shall be equipped with a vacuum breaker installed on the discharge side of the last valve and not less than thirty inches above the spray pipe.

10.5(4) Lawn sprinklers. Lawn-sprinkler systems shall be equipped with a backflow preventer on the discharge side of each of the last valves. The backflow preventer shall be at least six inches above the surrounding ground. Where combination control valves and backflow preventers are installed, the bottom of the valve shall constitute the bottom of the backflow preventer. (See Appendix C)

10.5(5) Water valve outlet. Fixture faucets with hose attachments shall be protected by a backflow preventer installed six inches above the highest point of usage and on the discharge side of the valve.

Faucets or valves independent of fixtures with hose attachments used for special purposes including morgue table cleaning, garbage can washing, special sinks, and chemical sinks, wherever the end of the water supply hose may become submerged shall also be protected as above.

10.5(6) Swimming pools. The water supply for each swimming or wading pool shall be protected from the pool water by installing the water supply piping to provide a minimum required air gap as defined in Air Gaps in Plumbing Systems, ANSI A40.1942, or current issue thereof.

10.6(135)T.III WATER SUPPLY SYSTEM.

10.6(1) Water service pipe. Materials for water service piping shall be of brass, lead, cast iron, wrought iron, open-hearth iron or steel, Type K copper or plastic. (See chapter 3, T.III, for standards.) All threaded ferrous pipe and fittings shall have been galvanized (zinc coated) or cement lined. All ferrous pipe threaded joints shall be coal tar enamel coated and wrapped at the time of installation in the trench. Copper pipe and tubing shall be installed so that the color marking is clearly visible at the time of inspection.

Plastic pipe and fittings marked to show approval by the National Sanitation Foundation Testing Laboratory may be used as a water service pipe when installed in accordance with the instructions of the manufacturer. It shall not be installed in any chase or tunnel that is heated or which contains hot water, hot air or steam piping. It shall terminate at a

point not more than twelve inches inside the building wall, floor or foundation. When passed through or under a foundation wall or footing, or through a floor, the pipe shall be installed within a sleeve two pipe diameters larger in size. Provisions shall be made to accommodate the rate of expansion and contraction in plastic pipe being approximately ten times greater than that found in ferrous pipe and five times greater than that found in copper pipe. Flexible plastic pipe shall be laid in snake fashion to provide a uniform slack of at least two inches per one hundred feet. Plastic pipe shall not be jacked or pulled.

Plastic pipe used for water service lines shall be installed so that the markings will be clearly visible at the time of inspection at intervals of not more than five feet showing an internal diameter of not less than three-fourths inch, a pressure rating of at least one hundred and twenty-five pounds per square inch, the applicable CS or ASTM standard, name or trademark of the manufacturer, formulation identification code and approval of the National Sanitation Foundation by the nSf insigne which shall also appear on the fittings along with the trademark of the manufacturer.

10.6(2) Separate trenches. The water service pipe and the building drain or building sewer shall be not less than ten feet apart horizontally, and shall be separated by undisturbed or compacted earth.

The water service pipe may be placed in the same trench with the building drain or building sewer, provided the following conditions are met (Also see 11.2(2)):

a. The bottom of the water service pipe, at all points, shall be at least twelve inches above the top of the sewer line at its highest point.

b. The water service pipe shall be placed on a solid shelf excavated at one side of the common trench. Where ground conditions do not permit a shelf, the pipe may be laid on a solidly tamped backfill.

c. The number of joints in the service pipe shall be kept to a minimum.

d. No portion of the building drain or building sewer shall be under pressure.

10.6(3) Stop-and-waste valve combination. Combination stop-and-waste valves and cocks shall not be installed in any underground potable water supply system unless an approved system of watertight piping from the weep hole of the stop-and-waste valve is installed to drain to a lower protected level.

10.6(4) Private water supply. No private water supply shall be interconnected with any public water supply unless the private supply meets the requirements of the State Department of Health and the specific written approval of the administrative authority having jurisdiction is obtained.

10.7(135)T.III WATER PUMPING AND STORAGE EQUIPMENT.

10.7(1) Pumps and other appliances. Water pumps, tanks, filters, softeners, compressors, and all other appliances and devices shall be protected against contamination.

10.7(2) Water-supply tanks. Potable water-supply tanks shall be properly covered to prevent the entrance of foreign material or insects into the water supply. Soil or waste lines shall not pass directly over such tanks.

10.7(3) Pressure tanks, boilers, and relief valves. The drains from pressure tanks, boilers, relief valves, and similar equipment shall only be connected to the drainage system through an indirect waste or over a drain.

10.7(4) Cleaning, painting, repairing water tanks. A potable water-supply tank used for domestic purposes shall not be lined, painted, or repaired with any material which will affect either the taste or the potability of the water supply when the tank is returned to service. Tanks shall be disconnected from the system during such operations, to prevent any foreign fluid or substance entering the distribution piping.

10.8(135)T.III WATER-SUPPLY TANKS – BOOSTER SYSTEM.

10.8(1) When required. When the water pressure from the city mains during flow is insufficient to supply all fixtures freely and continuously, the rate of supply shall be supplemented by a gravity house tank or booster system.

10.8(2) Support. All water-supply tanks shall be supported in accordance with the regulations which apply or with adequate structural design.

10.8(3) Overflow pipes for water-supply tank. Overflow pipes for gravity tanks shall discharge above a roof or catch basin, or they shall

discharge over an open, water-supplied sink. Adequate overflow pipes properly screened against the entrance of insects and vermin shall be provided.

10.8(4) Tank supply. The water-supply inlet within the tank shall be at an elevation no less than is required for an air gap in an open tank with overflow, but in no case shall the elevation be less than four inches above the overflow. (See Appendix C)

10.8(5) Drains. Water supply tanks shall be provided with valved drain lines located at their lowest point and discharged as an indirect waste, or as required for overflow pipes in 10.8(3)T.III.

10.8(6) Size of overflow. Overflow drains for water-supply tanks shall be adequately sized according to the supply.

10.8(7) Gravity and suction tanks. Tanks used for domestic water supply, combined supply to fire standpipes and domestic water system, or to supply standpipes for fire-fighting equipment only, shall be equipped with tight covers which are vermin and rodent proof. Such tanks shall be vented with a return bend vent pipe having an area not less than one-half the area of the down feed riser, and the vent opening shall be covered with a metallic screen.

10.8(8) Pressure tanks. Pressure tanks used for supplying water to the domestic water distribution system, combined supply to fire standpipes, and domestic water system, or to supply standpipes for fire equipment only, shall be equipped with a vacuum-breaking device located on the top of the tank. The air inlet of this device shall be covered with a metallic screen.

10.9(135)T.III DISINFECTION OF POTABLE WATER SYSTEM PIPING.

10.9(1) When required. The administrative authority having jurisdiction may require when necessary that the potable-water system or any part thereof installed or repaired be disinfected in accordance with one of the following methods before it is placed in operation.

10.9(2) Distribution system. The system, or part thereof, shall be filled with a solution containing one hundred parts per million of available

chlorine and allowed to stand two hours before flushing and returning to service.

10.9(3) Storage tank. In the case of a potable water storage tank where it is not possible to disinfect as provided in 10.9(2)T.III, the entire interior of the tank shall be swabbed with a solution containing two hundred parts per million of available chlorine, and the tank thoroughly flushed, before returning to service.

10.10(135)T.III WATER DISTRIBUTION PIPE, TUBING, AND FITTINGS.

10.10(1) Materials. Materials for water distribution pipes and tubing shall be of brass, copper, lead, cast iron, wrought iron, open-hearth iron, or steel pipe with appropriate approved fittings. (See chapter 3, T.III, for standards.) All threaded ferrous pipe and fittings shall have been galvanized (zinc coated) or cement lined, and when such pipe and fittings are used underground inside buildings, they shall be coal tar enamel coated and the threaded joints wrapped at the time of installation. Type K copper may be used under and above ground. Types L and M may be used above ground only. Copper pipe and tubing shall be installed such that the color marking is clearly visible at the time of inspection.

Plastic pipe and fittings marked to show approval by the National Sanitation Foundation Testing Laboratory and having properties suitable for the purpose intended may be used underground outside of any structure for cold water purposes including sprinkler systems serving lawns, golf courses and similar installations. Provisions shall be made to accommodate the rate of expansion and contraction in plastic pipe being approximately ten times greater than that found in ferrous pipe and five times greater than that found in copper pipe. Flexible plastic pipe shall be laid in snake fashion to provide a uniform slack of at least two inches per one hundred feet. Plastic pipe shall not be jacked or pulled.

10.11(135)T.III ALLOWANCE FOR CHARACTER OF WATER.

10.11(1) Selection of materials. When selecting the material and size for water-supply pipe, tubing, or fittings, due consideration shall be given to the working pressure and action of the water on the interior and of the soil, fill, or other material on the exterior of the pipe. No material that would produce toxic conditions in a potable water-supply system shall be used for piping, tubing, or fittings.

10.11(2) Used piping. No piping material that has been used for other than a potable water-supply system shall be reused in the potable water-supply system.

10.12(135)T.III WATER-SUPPLY CONTROL.

10.12(1) Water-supply control. A main shutoff valve on the water-service pipe shall be provided near the curb, and also, an accessible shutoff valve shall be provided inside near the entrance of the water-service pipe into the building.

10.12(2) Tank controls. Supply lines taken from pressure or gravity tanks shall be valved at or near their source.

10.12(3) Separate controls for each family unit. In two-family or multiple dwellings, each family unit shall be controlled by an arrangement of shutoff valves which permit each group of fixtures or the individual fixtures to be shut off without interference with the water supply to any other family unit or other portion of the building.

10.13(135)T.III SIZING THE WATER SUPPLY SYSTEM.

10.13(1) Water-service pipe. The water-service pipe from the street main to the water distribution system for the building shall be of sufficient size to furnish an adequate flow of water to meet the requirements of the building at peak demand, and in no case shall be less than three-fourths inch nominal diameter.

If flushometers or other devices requiring a high rate of water flow are used, the water-service pipe shall be designed to supply this flow.

10.13(2) Demand load. The demand load in the building water-supply system shall be based on the number and kind of fixtures installed and the probable simultaneous use of these fixtures.

10.14(135)T.III. SIZING THE WATER DISTRIBUTION SYSTEM.

10.14(1) Design factors. The sizing of the water distribution system shall conform with good engineering practice. Design factors used to determine pipe sizes shall be adequate in the judgment of the administrative authority.

10.14(2) Size of fixture supply. The minimum size of a fixture-supply pipe shall be as follows:

Type of fixture or device	Pipe size (inch)
Bath tubs	1/2
Combination sink and tray	1/2
Drinking fountain	3/8
Dishwasher (domestic)	1/2
Kitchen sink (residential)	1/2
Kitchen sink (commercial)	3/4
Lavatory	3/8
Laundry tray, 1, 2, or 3 compartments	1/2
Shower (single head)	1/2
Sinks (service, slop)	1/2
Sinks, flushing rim	3/4
Urinal (flush tank)	3/8
Urinal (direct flush valve)	3/4
Water closet (tank type)	3/8
Water closet (flush valve type)	1
Hose bibbs	1/2
Wall hydrant	1/2

For fixtures not listed, the minimum supply branch may be made the same as for a comparable fixture.

The minimum three-fourths inch service should be carried to the hot water heater or third branch opening in the usual residence. (See Appendix D)

10.15(135)T.III HOT-WATER DISTRIBUTION.

10.15(1) Hot water distribution piping. The sizing of the hot water distribution piping shall conform to good engineering practice. (See 10.14(135)T.III.)

10.16(135)T.III SAFETY DEVICES.

10.16(1) Pressure-relief valve. Pressure-relief valves shall be installed for all equipment used for heating or storage of hot water. The rate of discharge of such a valve shall limit the pressure rise for any given heat input to ten percent of the pressure at which the valve is set to open. The setting shall not exceed the tank working pressure. (See Appendix Gen. 10.16(1).)

10.16(2) Temperature relief valves or energy shutoff devices. Temperature relief valves or energy shutoff devices shall be installed for equipment used for the heating or storage of hot water. Each temperature relief valve shall be rated as to its BTU capacity. At 210 degrees F., it shall be capable of discharging sufficient hot water to prevent any further rise in temperature. As an alternative to the temperature relief valve, and in lieu thereof, an energy shutoff device may be used, which will cut off the supply of heat energy to the water tank before the temperature of the water in the tank exceeds 210 degrees F.

10.16(3) Approvals. Combination pressure and temperature relief valves, separate pressure and temperature relief valves, or energy shutoff devices, which have been tested and approved by, or meet the specification requirements of the American Gas Association, and Underwriters' Laboratories, Inc., or other recognized approval authorities, shall be considered acceptable.

10.16(4) Relief-valve location. Temperature-relief valves shall be so located in the tank as to be actuated by the water in the top one-eighth of the tank served and in no case more than three inches away from such tank. Pressure-relief valves may be located adjacent to the equipment they serve. There shall be no check valve or shutoff valve between a relief valve and the heater or tank for which it is installed.

10.16(5) Relief outlet wastes. The outlet of a pressure, temperature, or other relief valve shall not be connected to the drainage system as a direct waste but rather directed over a fixture if available or to the floor.

10.16(6) Pressure marking of storage tank. Hot water storage tanks shall be permanently marked in an accessible place with the maximum allowable working pressure.

10.17(135)T.III MISCELLANEOUS.

10.17(1) Drain cock. All storage tanks shall be equipped with adequate drain cocks.

10.17(2) Line valves. Valves in the water-supply distribution system, except those immediately controlling one fixture supply, when fully opened shall have a cross-sectional area of the smallest orifice or opening

through which the water flows at least equal to the cross-sectional area of the nominal size of the pipe in which the valve is installed.

10.17(3) Water used for processing. Water used for cooling of equipment or similar purposes shall not be returned to the potable water distributing system. When discharged to the building drainage system, the waste water shall be discharged through an indirect waste pipe or air gap.

10.17(4) Pilot flame safety. All automatic or semiautomatic water heaters using a burner having a pilot flame or low flame burner shall be provided with a suitable safety device which will prevent the escape of fuel in event the pilot flame is extinguished or fails. (See Appendix Gen. 10.16(1).)

CHAPTER 11

DRAINAGE SYSTEM

11.1(135)T.III MATERIALS.

11.1(1) General. Pipe, tube, and fittings for drainage systems shall comply with the provisions in chapter 3,T.III.

11.1(2) Above ground piping within buildings. Soil and waste piping for a drainage system within a building shall be of cast iron, galvanized wrought iron, galvanized open-hearth iron, galvanized steel, lead, brass, seamless copper pipe or copper tube Types K, L, M, DWV or plastic.

Seamless copper pipe or copper tube Types K, L, and M may be used in all buildings. Copper tube Type DWV may be used in single or two family dwellings provided that copper tube has proven to be a suitable material resistant to corrosion in the locality where used. All copper pipe and tube shall be installed so that the color marking is clearly visible at the time of inspection on the full length of each piece installed.

Plastic pipe and fittings except fixture traps marked to show conformance with ASTM Designations D2661-68 or D2665-68 or current issue thereof and standard number 14 of the National Sanitation Foundation Testing Laboratory may be used in buildings not exceeding two stories in height under the following conditions:

a. No vertical stack shall exceed thirty-five feet in height. No horizontal branch shall exceed fifteen feet in length.

b. All installations shall be made in accordance with recommendations of the manufacturer when found specifically conforming with other sections of these rules and the installation procedures appearing in the appendix of the applicable ASTM standard.

c. Installations shall not be made in any space where the surrounding temperature will exceed 140° F.

d. A variance in application of these materials may be allowed by the administrative authority in a particular case when specifically certified as warranted by a professional engineer or professional architect.

11.1(3) Underground piping within buildings. Drains within buildings when underground shall be of cast iron, lead, or seamless copper pipe or copper tube Types K or L. All copper pipe and tube shall be installed so that the color marking is clearly visible at the time of inspection on the

full length of each piece installed.

11.1(4) Fittings. Fittings in the drainage system shall conform to the type of piping used.

11.2(135)T.III BUILDING SEWER.

11.2(1) Separate trenches. The building sewer when installed in a separate trench from the water service pipe may be of cast iron soil pipe, vitrified clay or concrete sewer pipe.

Asbestos cement sewer pipe may be used at single or two family dwellings. Bituminized fibre sewer pipe may also be used at single and two family dwellings in a separate trench from the water service pipe if specifically permitted by municipal ordinance or county regulation.

For single or two family dwellings served by private sewage disposal systems, bituminized fibre or rigid plastic sewer pipe may be used for the building sewer. Joints shall be installed to remain watertight and rootproof. (See Appendix Gen. 11.2(1).)

11.2(2) One trench. The building sewer when installed in the same trench with the water service pipe shall be of cast iron soil pipe or vitrified clay pipe installed to remain watertight and rootproof. When vitrified clay is used, the joints shall be made as specified in the first and second paragraphs of subrule 4.2(7). The water service pipe shall be installed as specified in subrule 10.6(2).

11.2(3) Sewer in filled ground. A building sewer or building drain installed in filled or unstable ground shall be of cast iron pipe, except that nonmetallic piping may be laid upon an approved concrete pad if installed in accordance with 11.2(1)T.III.

11.2(4) Sanitary and storm sewers. Where separate systems of sanitary drainage and storm drainage are installed in the same property, the sanitary and storm building sewers or drains may be laid side by side in one trench.

11.2(5) Old house sewers and drains. Old house sewers and house

11.2(5) Old house sewers and drains. Old house sewers and house drains may be used in connection with new buildings or new plumbing and drainage work only when they are found, on examination, to conform in all respects to the requirements governing new house sewers.

11.2(6) Separate building sewer. Each new building or existing building in which plumbing is installed shall have an independent connection with a public or private sewer, except as provided below.

Exception: Where one building stands in the rear of another building or an interior lot and no private independent sewer is available or can be constructed to the rear building through an adjoining alley, court, yard, or driveway, the drain from the front building may be extended to the rear building, and the whole will be considered as one building drain.

11.3(135)T.III DRAINAGE PIPING INSTALLATION.

11.3(1) Horizontal drainage piping. Horizontal drainage piping shall be installed at a uniform slope, but at slopes not less than permitted in 11.3(2-4)T.III.

11.3(2) Small piping. Horizontal drainage piping of three-inch diameter and less shall be installed with a fall of not less than one-quarter inch per foot.

11.3(3) Large piping. Horizontal drainage piping of larger than three-inch diameter shall be installed with a fall of not less than one-eighth inch per foot excepting as allowed in table 11.5(2)T.III.

11.3(4) Minimum velocity. Where conditions do not permit building drains and sewers to be laid with a fall as great as that specified, then a lesser slope may be permitted providing the computed velocity is not less than two feet per second. (See Appendix Gen. 11.3(4).)

11.4(135)T.III FIXTURE UNITS.

11.4(1) Values for fixtures. Fixture-unit values as given in table 11.4(2)T.III designate the relative load weight of different kinds of fixtures which shall be employed in estimating the total load carried by a soil or waste pipe and shall be used in connection with the tables of sizes for soil, waste, and drain pipes for which the permissible load is given in terms of fixture units.

TABLE 11.4(2) FIXTURE UNITS PER FIXTURE OR GROUP

Fixture type	Fixture-unit value as load factors	Minimum size of trap (inches)
1 bathroom group consisting of water closet, lavatory, and bathtub or shower stall	Tank water closet .....6 Flush-valve water closet 8	
Bathtub[1] (with or without overhead shower)	2	1½
Bathtub[1]	3	2
Bidet	3	Nominal 1½
Combination sink-and-tray	3	1½
Combination sink-and-tray with food disposal unit	4	Separate traps 1½
Dental unit or cuspidor	1	1¼
Dental lavatory	1	1¼
Drinking fountain	½	1
Dishwasher,[2] domestic	2	1½
Floor drains[3]	1	2
Kitchen sink, domestic	2	1½
Kitchen sink, domestic, with food-disposal unit	3	1½
Lavatory[4]	1	Small P.O. 1¼
Do	2	Large P.O. 1½
Lavatory, barber, beauty parlor ..	2	1½
Lavatory, surgeon's	2	1½

Lavatory, surgeon's

TABLE 11.4(2) FIXTURE UNITS PER FIXTURE OR GROUP (Continued)

Laundry tray (1 or 2 compartments)	2		1½
Shower stall, domestic	2		2
Showers (group)per head[2]	3		
Sinks:			
Surgeon's	3		1½
Flushing rim (with valve)	8		3
Service (Trap standard)	3		3
Service (P trap)	2		2
Pot, scullery, etc[2]	4		1½
Urinal, pedestal, syphon jet, blowout	8	Nominal	3
Urinal, wall lip	4		1½
Urinal stall, washout	4		2
Urinal trough[2] (each 2-foot section)	2		1½
Wash sink[2] (circular or multiple), each set of faucets	2	Nominal	1½
Water closet:			
Tank-operated	4	Nominal	3
Valve-operated	8		3

[1] A shower head over a bathtub does not increase the fixture value.

[2] See paragraphs 11.4(3) and 11.4(4) for method of computing unit value of fixtures not listed in table 11.4(2) or for rating of devices with intermittent flows.

[3] Size of floor drain shall be determined by the area of surface water to be drained.

[4] Lavatories with 1¼- or 1½-inch traps have the same load value; larger P. O. plugs have greater flow rate.

11.4(3) Unlisted fixtures. Fixtures not listed in table 11.4(2)T.III shall be estimated in accordance with table 11.4(3)T.III.

TABLE 11.4(3)

Fixture drain or trap size	Fixture-unit value	Fixture drain or trap size	Fixture-unit value
1¼ inches and smaller	1	2½ inches	4
1½ inches	2	3 inches	5
2 inches	3	4 inches	6

11.4(4) Values for continuous flow. For a continuous or semi-continuous flow into a drainage system, such as from a pump, pump ejector, air-conditioning equipment, or similar device, two fixture units shall be allowed for each gallon-per-minute of flow.

11.5(135)T.III DETERMINATION OF SIZES FOR THE DRAINAGE SYSTEM.

11.5(1) Maximum fixture-unit load. The maximum number of fixture units that may be connected to a given size of building sewer, building drain, horizontal branch, vertical soil or waste stack, is given in tables 11.5(2) and 11.5(3)T.III.

TABLE 11.5(2) BUILDING DRAINS AND SEWERS

Diameter of pipe (inches)	Maximum number of fixture units that may be connected to any portion of the building drain or the building sewer.[1]			
	Fall per foot			
	1/16-inch	1/8-inch	¼-inch	½-inch
2			21	26
2½			24	31
3		(2) 20	(2) 27	(2) 36
4		180	216	250
5		390	480	575
6		700	840	1000
8	1400	1600	1920	2300
10	2500	2900	3500	4200
12	3900	4600	5600	6700

[1]Includes branches of the building drain.
[2]Not over 2 water closets.

TABLE 11.5(3) HORIZONTAL FIXTURE BRANCHES AND STACKS

Diameter of pipe (inches)	Maximum number of fixture units that may be connected to—			
	Any horizontal(1) fixture branch	1 stack of 3 stories in height or 3 intervals	More than 3 stories in height	
			Total for stack	Total at 1 story or branch interval
1¼	1	2	2	1
1½	3	4	8	2
2	6	10	24	6
2½	12	20	42	9
3	(2) 20	(3) 30	(3) 60	(2) 16
4	160	240	500	90
5	360	540	1100	200
6	620	960	1900	350
8	1400	2200	3600	600
10	2500	3800	5600	1000
12	3900	6000	8400	1500

[1] Does not include branches of the building drain.
[2] Not over 2 water closets.
[3] Not over 6 water closets.

11.5(4) Minimum size of soil and waste stacks. No soil or waste stack shall be smaller than the largest horizontal branch connected thereto except that a 4x3 w.c. connection shall not be considered as a reduction in pipe size. No main house sewer or drain shall be less than four inches in diameter.

11.5(5) Minimum size of stack-vent or vent stack. Any structure on which a building drain is installed shall have at least one stack-vent or vent stack carried full size through the roof not less than three inches in diameter.

11.5(6) Future fixtures. When provision is made for the future installation of fixtures, those provided for shall be considered in determining the required sizes of drain pipes. Construction to provide for such future installation shall be terminated with a plugged fitting or fittings at the stack so as to form no dead end.

11.6(135)T.III OFFSETS ON DRAINAGE PIPING.

11.6(1) Offsets of 45 degrees or less. An offset in a vertical stack,

with a change in direction of 45 degrees or less from the vertical, may be sized as a straight vertical stack. In case a horizontal branch connects to the stack within two feet above or below the offset, a relief vent shall be installed in accordance with 12.18(3)T.III.

11.6(2) Waste stacks serving kitchen sinks. In a one- or two-family dwelling only, in which the waste stack or vent receives the discharge of a kitchen-type sink and also serves as a vent for fixtures connected to the horizontal portion of the branch served by the waste stack, the minimum size of the waste stack up to the highest sink branch connection shall be two inches in diameter. Above that point the size of the stack shall be governed by the total number of fixture units vented by the stack.

11.6(3) Above highest branch. An offset above the highest horizontal branch is an offset in the stack-vent and shall be considered only as it affects the developed length of the vent.

11.6(4) Below lowest branch. In the case of an offset in a soil or waste stack below the lowest horizontal branch, no change in diameter of the stack because of the offset shall be required if it is made at an angle not greater than forty-five degrees. If such an offset is made at an angle greater than forty-five degrees, the required diameter of the offset and the stack below, it shall be determined as for a building drain. (See table 11.5(2)T.III.)

11.6(5) Offsets of more than 45 degrees. A stack with an offset of more than 45 degrees from the vertical shall be sized as follows:

a. The portion of the stack above the offset shall be sized as for a regular stack based on the total number of fixture units above the offset.

b. The offset shall be sized as for a building drain. (See table 11.5(2), column 5.)

c. The portion of the stack below the offset shall be sized as for the offset, or based on the total number of fixture units on the entire stack, whichever is the larger. (See table 11.5(3), column 4.)

d. A relief vent for the offset shall be installed as provided in chapter 12, T.III, and in no case shall a horizontal branch connect to the stack within two feet above or below the offset.

11.7(135)T.III SUMPS AND EJECTORS.

11.7(1) Building drains below sewer. Building drains which cannot

be discharged to the sewer by gravity flow shall be discharged into a tightly covered and vented sump from which the liquid shall be lifted and discharged into the building gravity drainage system by automatic pumping equipment or by any equally efficient method approved by the administrative authority. (Also see 11.7(9)T.III.)

11.7(2) Design storage period. The designed storage of drainage in a sump or ejector shall not exceed a period of twelve hours.

11.7(3) Design. Sump and pumping equipment shall be so designed as to discharge all contents accumulated in the sump during the cycle of emptying operation.

11.7(4) Venting. The system of drainage piping below the sewer level shall be installed and vented, in a manner similar to that of the gravity system.

11.7(5) Duplex equipment. Sumps receiving the discharge of more than six water closets shall be provided with duplex pumping equipment.

11.7(6) Vent sizes. Building sump vents shall be sized in accordance with table 12.21(5) but shall in no case be sized less than one and one-half inches.

11.7(7) Separate vents. Vents from pneumatic ejectors or similar equipment shall be carried separately to the open air as a vent terminal.

11.7(8) Connection. No direct connection of a steam exhaust shall be made with the building drainage system.

11.7(9) Sumps in single family dwellings. In single family dwellings sumps of approved construction to which no fixtures except one floor drain are connected, and which receive only laundry wastes or basement drainage, need not be airtight nor vented.

11.8(135)T.III FLOOR DRAINS.

11.8(1) Accessibility. Floor drains shall connect into a trap so constructed that it can be readily cleaned and of a size to serve efficiently the purpose for which it is intended. The drain inlet shall be so located that it is, at all times, in full view.

11.8(2) Connection. Floor drains subject to sewage backflow shall not be directly connected to the drainage system without suitable protection.

11.8(3) Provision for evaporation. Floor-drain trap seals subject to evaporation shall be of the deep-seal type or shall be fed from an approved plumbing fixture. All automatic floor-drain primers directly connected with the water supply are prohibited.

11.8(4) Size. Basement floor drains shall be not less than three inches in size and shall connect to the sewer at least five feet from the base of the stack unless vented.

11.9(135)T.III FROST PROTECTION.

11.9(1) Required. No soil or waste pipes shall be installed or permitted outside of a building, or concealed in outside walls or in any place where they may be subject to freezing temperatures, unless adequate provision is made to protect them from frost.

CHAPTER 12

VENTS AND VENTING

12.1(135)T.III MATERIALS.

12.1(1) Vents. Pipe, tube, and fittings for the vent piping system shall comply with the provisions in chapter 3,T.III.

12.1(2) Specific type. Standards given in table 3.5(135)T.III apply to the specific materials approved for use and as indicated in the various paragraphs in this chapter as they apply to the venting system.

12.1(3) Above ground piping. Vent piping above ground shall be of cast iron, galvanized wrought iron, galvanized ferrous alloys, lead, brass, seamless copper pipe or copper tube or plastic.

Seamless copper pipe or copper tube Types K, L, and M may be used in all buildings. Copper tube Type DWV may be used in single or two family dwellings provided that copper has proven to be a suitable material resistant to corrosion in the locality where used. All copper pipe and tube shall be installed so that the color marking is clearly visible at the time of inspection on the full length of each piece installed.

Plastic pipe and fittings marked to show conformance with ASTM Designation D2661-68 or ASTM Designation D2665-68 or current issue thereof and standard number 14 or the National Sanitation Foundation Testing Laboratory may be used in buildings not exceeding two stories in height under the following conditions:

a. No vertical stack shall exceed thirty-five feet in height.

b. All installations shall be made in accordance with recommendations of the manufacturer when found specifically conforming with other sections of these rules and the installation procedures appearing in the appendix of the applicable ASTM standard.

c. Installations shall not be made in any space where the surrounding temperature will exceed 140 degrees F.

d. A variance in application of these materials may be allowed by the administrative authority in a particular case when specifically certified as warranted by a professional engineer or professional architect.

12.1(4) Underground. Vent piping placed underground shall be of cast iron soil pipe, lead, seamless copper pipe or copper tube Types K or L. All copper pipe and tube shall be installed so that the color marking is

clearly visible at the time of inspection on the full length of each piece installed.

12.1(5) Fittings. Fittings shall conform to the type of pipe used in the vent system as required by 12.1(2, 3)T.III.

12.1(6) Acid system. Vent piping of acid waste systems shall conform to that required for acid waste pipe.

12.2(135)T.III. PROTECTION OF TRAP SEALS.

12.2(1) Traps protected. The protection of trap seals from siphonage or back pressure shall be accomplished by the appropriate use of soil or waste stacks, vents, revents, back vents, loop vents, circuit or continuous vents, or combinations thereof, installed in accordance with the requirements of this chapter.

12.3(135)T.III VENT STACKS.

12.3(1) Installation. A vent stack or a main vent shall be installed with a soil or waste stack whenever back vents, relief vents, or other branch vents are required in two or more branch intervals.

12.3(2) Terminal. The vent stack shall terminate independently above the roof of the building or shall be connected with the extension of the soil or waste stack (stack-vent) at least six inches above the flood-level rim of the highest fixture.

12.3(3) Main stack. Every building in which plumbing is installed shall have at least one main stack, which shall run undiminished in size and as directly as possible, from the building drain through to the open air above the roof.

12.4(135)T.III VENT TERMINALS.

12.4(1) Roof extension. Extensions of vent pipes through a roof shall be terminated at least six inches above it or above flood level.

12.4(2) Roof garden. Where a roof is to be used for any purpose other than weather protection, the vent extensions shall be run at least six feet above the roof.

12.4(3) Flashings. Each vent terminal shall be made watertight with the roof by proper flashing of copper, lead or similarly durable materials.

12.4(4) Flag poling. Vent terminals shall not be used for the purpose of flag poling, TV aerials, or similar purposes, except when the piping has been anchored to the construction and approved as safe by the administrative authority.

12.4(5) Location of vent terminal. No vent terminal from a drainage system shall be directly beneath any door, window, or other ventilating opening of the building or of an adjacent building, nor shall any such vent terminal be within ten feet horizontally of such an opening unless it is at least two feet above or back of the top of such an opening. (See Appendix Gen. 12.4(5).)

12.4(6) Vent terminals of existing buildings. Where a new building is higher than an adjacent existing building, the owner of the new building shall defray the cost of complying with 12.4(5)T.III as approved by the administrative authority.

12.4(7) Extensions outside building. No soil, waste, or vent pipe extension shall be run or placed on the outside of a wall of any new building, but shall be carried up inside the building.

12.5(135)T.III FROST CLOSURE.

12.5(1) Vent terminal. The roof terminal of any stack or vent shall be increased in size as shown in the following table:

1¼ inches	increased to 2½ inches
1½ inches	increased to 2½ inches
2 inches	increased to 4 inches
2½ inches	increased to 4 inches
3 inches	increased to 5 inches
3½ inches	increased to 5 inches
4 inches	increased to 6 inches

12.6(135)T.III VENT GRADES AND CONNECTIONS.

12.6(1) Grade. All vent and branch-vent pipes shall be so graded and connected as to drip back to the soil or waste pipe by gravity.

12.6(2) Vertical rise. Where vent pipes connect to a horizontal soil or waste pipe, the vent shall be taken off above the center line of the soil pipe, and the vent pipe shall rise vertically, or at an angle not more than 45 degrees from the vertical, to a point at least six inches above the flood-level rim of the fixture it is venting before offsetting horizontally or before connecting to the branch vent.

12.6(3) Height above fixture. A connection between a vent pipe and a vent stack or stack-vent shall be made at least six inches above the flood-level rim of the highest fixtures served by the vent. Horizontal vent pipes forming branch vents, relief vents, or loop vents shall be at least six inches above the flood-level rim of the highest fixture served.

12.7(135)T.III BARS AND SODA-FOUNTAIN SINKS.

12.7(1) Bar and soda-fountain wastes. A bar or soda fountain may be drained indirectly over a sink or other receptacle and such sink or receptacle shall be located in full view on the same floor level as the bar or fountain it serves, and shall connect directly to the sewer and be properly vented. All such bar or soda-fountain connections shall be installed under the approval of the proper administrative authority. (See Appendix Gen. 9.1(2).)

12.7(2) Sumps. Sinks or sumps, receiving indirect waste, shall be located in a properly lighted and ventilated space.

12.8(135)T.III FIXTURES BACK-TO-BACK.

12.8(1) Distance. Two fixtures set back-to-back, or adjacent to each other within the distance allowed between a trap and its vent, may be served with one continuous soil or waste-vent pipe, provided that each fixture wastes separately into an approved double fitting having inlet openings at the same level. (See 12.10(2)T.III.)

12.9(135)T.III FIXTURE VENTS.

12.9(1) Distance of trap from vent. Each fixture trap shall have a protecting vent so located that the slope and the developed length in the fixture drain from the trap weir to the vent fitting are within the requirements set forth in table 12.9(3)T.III. (See Appendix Gen. 12.9(1).)

12.9(2) Trap-seal protection. The plumbing system shall be provided with a system of vent piping which will permit the admission or emission of air so that under normal and intended use the seal of any fixture trap shall not be subjected to a pressure differential of more than one inch of water.

12.9(3) Table. Distance of fixture trap from vent, using sanitary Tee connection:

Size of fixture and drain (inches)	Distance trap to vent	
	feet	inches
1¼	5	0
1½	6	0
2	8	0
3	12	0
4	12	0

12.9(4) Trap dip. The vent pipe opening from a soil or waste pipe, except for water closets and similar fixtures, shall not be below the top weir of the trap.

12.9(5) Crown vent. No back vent shall be installed within two pipe diameters of the trap weir.

12.10(135)T.III COMMON VENT.

12.10(1) Individual vent. An individual vent, installed vertically, may be used as a common vent for two fixture traps when both fixture drains connect with a vertical drain at the same level.

12.10(2) Common vent. A common vent may be used for two fixtures set on the same floor level but connecting at different levels in the stack, provided the vertical drain is one pipe size larger than the upper fixture drain but in no case smaller than the lower fixture drain, whichever is the larger and that both drains conform to table 12.9(3)T.III.

12.11(135)T.III VENTS FOR FIXTURE TRAP BELOW TRAP DIP.

12.11(1) Hydraulic gradient. Fixture drains shall be vented within the hydraulic gradient between the trap outlet and vent connection, but in no case shall the unvented drain exceed the distance provided for in table 12.9(3) T.III.

12.11(2) Different levels. If any stack has fixtures entering at different levels, the fixtures other than the fixture entering at the highest level shall be vented, except as may be permitted in other rules of this chapter.

12.12(135)T.III WET VENTING.

12.12(1) Single bathroom groups. A group of fixtures located on the same floor level may be group vented, providing that the highest fixture trap of such a group is not more than four feet above the lowest fixture trap, but such installations shall be subject to the following limitations:

a. One fixture of two or less units may drain into the vent of a three-inch closet branch.

b. One fixture of two or less units may drain into the vent of a one and one-half inch bathtub waste pipe.

c. Two fixtures of two or less units may drain into the vent of a two-inch bathtub waste serving two or less tubs providing that they drain into the vent at the same level. (See Appendix Gen. 12.12.)

12.12(2) Double bathroom group. Where bathrooms or water closets or other fixtures are located on opposite sides of a wall or partition or are adjacent to each other within the prescribed distance, such fixtures may have a common soil or waste pipe and common vent. Water closets having a common soil and vent stack shall drain into the stack at the same level.

12.12(3) Multistory bathroom groups. On the lower floors of a multistory building, the waste pipe from one or two lavatories may be used as a wet vent for one or two bathtubs or showers provided that:

a. The wet vent and its extension to the vent stack is two inches in diameter.

b. Each water closet below the top floor is individually back vented.

c. The vent stack is sized as given in the following table:

SIZE OF VENT STACKS

Number of wet-vented fixtures	Diameter of vent stacks (inches)
1 or 2 bathtubs or showers	2
3 to 5 bathtubs or showers	2½
6 to 9 bathtubs	3
10 to 16 bathtubs	4

12.12(4) **Reserved for future use.**

12.12(5) **Basement closets.** Basement closets, or floor drains, may be vented by the waste line from a first floor sink or lavatory having a one and one-half inch waste and vent pipe.

12.13(135)T.III STACK VENTING.

12.13(1) **One-bathroom group.** A group of fixtures, consisting of one bathroom group and a kitchen sink or combination fixture, may be installed without individual fixture vents, in a one-story building, or on the top floor of a building, providing that the highest fixture trap of such a group is not more than four feet above the lowest fixture trap. (See Appendix Gen. 12.13(1).)

12.14(135)T.III INDIVIDUAL FIXTURE REVENTING.

12.14(1) **Horizontal branches.** With the fixtures located in the same room, one sink and one lavatory, or three lavatories (within eight feet developed length of a main-vented line) may be installed on a two-inch horizontal waste branch without reventing, provided the branch is not less than two inches in diameter throughout its length, and provided that the wastes are connected into the side of the branch and the branch leads to its sanitary tee stack connection with a slope of not more than one-fourth inch per foot.

12.14(2) **Where required.** When fixtures other than water closets or floor drains discharge downstream from a water closet, each fixture

connecting downstream shall be individually vented, except as in 12.23(1)T.III.

12.14(3) Limits of fixture units above highest bathroom groups. A fixture or combination of fixtures whose total discharge rating is not more than three fixture units may discharge into a stack not less than three inches in diameter without reventing, provided such fixture connections are made above the connection to the highest bathroom group, and the fixture unit rating of the stack is not otherwise exceeded, and their waste piping is installed as otherwise required in 12.14(1)T.III. When this is done, vents from lower fixtures shall be carried above the highest fixture waste connection to the stack.

12.15(135)T.III CIRCUIT AND LOOP VENTING.

12.15(1) Battery venting. A branch soil or waste pipe to which two but not more than eight water closets, pedestal urinals, trap standard to floor, shower stalls, or floor drains are connected in battery, shall be vented by a circuit or loop vent which shall take off in front of the last fixture connection. In addition, lower-floor branches serving more than three water closets shall be provided with a relief vent taken off in front of the first fixture connection. (See Appendix Gen. 12.15(1).)

12.15(2) Dual relief vents. Two-circuit vented horizontal branches serving a total of not more than eight water closets in the same branch interval shall have a dual relief vent. Where the vents are joined, the point of joining shall be at least six inches above the flood-level rim of the highest fixture connected to either branch. When other fixtures discharge above such a branch, each branch shall be provided with a vent.

12.15(3) Vent connections. When the circuit, loop, or relief vent connections are taken off the horizontal branch, the vent branch connection shall be taken off at a vertical angle or from the top of the horizontal branch.

12.16(135)T.III PNEUMATIC EJECTORS.

12.16(1) Vent installation. Relief vents from a pneumatic ejector shall not be connected to a fixture-branch vent but shall be carried separately to a main vent or stack vent or to the open air.

12.17(135)T.III RELIEF VENTS.

12.17(1) Stacks of more than ten branch intervals. Soil and waste stacks in buildings having more than ten branch intervals shall be provided with a relief vent at each tenth interval installed, beginning with the top floor. The size of the relief vent shall be equal to the size of the vent stack to which it connects. The lower end of each relief vent shall connect to the soil or waste stack through a Y below the horizontal branch serving the floor and the upper end shall connect to the vent stack through a Y not less than three feet above the floor levels.

12.18(135)T.III OFFSETS AT AN ANGLE LESS THAN 45 DEGREES FROM THE HORIZONTAL IN BUILDINGS OF FIVE OR MORE STORIES.

12.18(1) Offset vents. Offsets less than 45 degrees from the horizontal, in a soil or waste stack, except as permitted in 11.6(135)T.III, shall comply with 12.18(2, 3).T.III.

12.18(2) Separate venting. Such offsets may be vented as two separate soil or waste stacks, namely, the stack section below the offset and the stack section above the offset.

12.18(3) Offset reliefs. Such offsets may be vented by installing a relief vent as a vertical continuation of the lower section of the stack or as a side vent connected to the lower section between the offset and the next lower fixture or horizontal branch. The upper section of the offset shall be provided with a yoke vent. The diameter of the vents shall be not less than the diameter of the main vent, or of the soil and waste stack, whichever is the smaller.

12.19(135)T.III MAIN VENTS TO CONNECT AT BASE.

12.19(1) Size. All main vents or vent stacks shall connect full size at their base to the building drain or to the main soil or waste pipe, at or below the lowest fixture branch. All vent pipes shall extend undiminished in size above the roof, or shall be reconnected with the main soil or waste vent.

12.20(135)T.III VENT HEADERS.

12.20(1) Connections of vents. Stack vents and vent stacks may b connected into a common vent header at the top of the stacks and the extended to the open air at one point. This header shall be sized i accordance with the requirements of table 12.21(5)T.III, the number c units being the sum of all units on all stacks connected thereto, and th developed length being the longest vent length from the intersection at th base of the most distant stack to the vent terminal in the open air as direct extension of one stack.

12.21(135)T.III SIZE AND LENGTH OF VENTS.

12.21(1) Length of vent stacks. The length of the vent stack or mai vent shall be its developed length from the lowest connection of the ver system with the soil stack, waste stack, or building drain to the vent stac terminal, if it terminates separately in the open air, or to the connection c the vent stack with the stack vent, plus the developed length of the stac vent from the connection to the terminal in the open air, if the two vent are connected together with a single extension to the open air.

12.21(2) Size of individual vents. The diameter of an individual ven shall be not less than one and one-fourth inches or less than one-half th diameter of the drain to which it is connected.

12.21(3) Size of relief vent. The diameter of a relief vent shall b not less than one-half the diameter of the soil or waste branch to which i is connected.

12.21(4) Size of circuit or loop vent. The diameter of a circuit o loop vent shall be not less than one-half the size of the diameter of th horizontal soil or waste branch or the diameter of the vent stack whichever is the smaller.

12.21(5) Size of vent piping. The size of vent piping shall b determined from its length and the total of fixture units connecte thereto, as provided in table 12.21(5)T.III. Twenty percent of the tota length may be installed in a horizontal position.

TABLE 12.21(5) SIZE AND LENGTH QF VENTS

Size of soil or waste stack (inches)	Fixture units connected	Diameter of vent required (inches)								
		1¼	1½	2	2½	3	4	5	6	8
		Maximum length of vent (feet)								
1¼	2	30	...	...	...	...	....	....	....	....
1½	8	50	150	...	...	...	....	....	....	....
1½	10	30	100	...	...	...	....	....	....	....
2	12	30	75	200	...	...	....	....	....	....
2	20	26	50	150	...	...	....	....	....	....
2½	42	...	30	100	300	...	....	....	....	....
3	10	...	30	100	200	600	....	....	....	....
3	30	...	...	60	200	500	....	....	....	....
3	60	...	...	50	80	400	....	....	....	....
4	100	...	...	35	100	200	1000	....	....	....
4	200	...	...	30	90	250	900	....	....	....
4	500	...	...	20	70	180	700	....	....	....
5	200	...	...	...	35	80	350	1000	....	....
5	500	...	...	...	30	70	300	900	....	....
5	1100	...	...	...	20	50	200	700	....	....
6	350	...	...	...	25	50	200	400	1300	....
6	620	...	...	...	15	30	125	300	1100	....
6	960	...	...	...	...	24	100	250	1000	....
6	1900	...	...	...	...	20	70	200	700	....
8	600	...	...	...	...	...	50	150	500	1300
8	1400	...	...	...	...	...	40	100	400	1200
8	2200	...	...	...	...	...	30	80	350	1100
8	3600	...	...	...	...	...	25	60	250	800
10	1000	...	...	...	...	...	....	75	125	1000
10	2500	...	...	...	...	...	....	50	100	500
10	3800	...	...	...	...	...	....	30	80	350
10	5600	...	...	...	...	...	....	25	60	250

12.22 **Reserved for future use.**

12.23(135)T.III VENTS NOT REQUIRED.

12.23(1) Vents not required. No vents will be required on a downspout or rain leader trap, a backwater valve, a subsoil catch basin trap, on a three-inch basement floor drain, or a water closet, provided its drain branches into the house drain on the sewer side at a distance of five feet or more from the base of the stack and the branch line to such floor drain or water closet is not more than twelve feet in length.

12.24(135)T.III SPECIAL WASTE AND VENT INSTALLATIONS.

12.24(1) Where permitted. Where unusual design and structural conditions appear to preclude or prevent the conventional installations of plumbing in accord with this code, the administrative authority should be consulted. (See appendix for illustrations, Gen. 12.24(1).)

CHAPTER 13

STORM DRAINS

13.1(135)T.III GENERAL.

13.1(1) Drainage required. Roofs, paved areas, yards, courts, and courtyards shall be drained into a storm sewer when such a sewer is abutting the property, or otherwise available as required by the local administrative authority.

Such drainage may be discharged into a combined sewer system where such a system is available and where not prohibited by the administrative authority having jurisdiction.

13.1(2) Prohibited drainage. Storm water shall not be drained into sewers intended for sewage only.

13.1(3) Traps. Leaders or downspouts, when connected to a combined sewer, shall be trapped.

13.1(4) Expansion joints. Expansion joints or sleeves shall be provided where warranted by temperature variations or physical conditions.

13.1(5) Subsoil drainage. No subsoil drainage system shall be installed to drain into a sewer intended for sanitary sewage unless approval is obtained from the proper local administrative authority.

13.1(6) Subsoil drain. Where subsoil drains are placed under the cellar or basement floor or are used to surround the outer walls of a building, they shall be made of open-jointed, horizontally split, or perforated clay tile; or perforated bituminized fibre pipe, asbestos-cement pipe, or rigid plastic pipe: not less than four inches in diameter. They shall be drained over an open floor drain that is supplied with water; and the subsoil drain shall be equipped with an approved type of back water valve if the building is subject to flooding. Subsoil drains may discharge into a properly installed sump. Such sumps do not require vents. The building storm and subsoil drainage systems shall be connected to a storm sewer when such a sewer abuts the property.

13.1(7) Building subdrains. Building subdrains located below the public sewer level shall discharge into a sump or receiving tank, the contents of which shall be automatically lifted and discharged into the drainage system as required for building sumps. (See section 11.7(135)T.III.)

13.2(135)T.III MATERIALS.

13.2(1) Inside conductors. Conductors placed within a building or run in a vent or pipe shaft shall be of cast iron, galvanized steel, galvanized wrought iron, galvanized ferrous alloy pipe, brass, copper tube, or lead.

13.2(2) Outside leaders. When outside leaders are of sheet metal and connected with a building storm drain or storm sewer, they shall be connected to a cast iron drain extending above the finish grade, or the sheet metal leader shall be protected against injury.

13.2(3) Underground storm drains. Building storm drains underground, inside the building, shall be of cast iron soil pipe or copper pipe or copper tubing.

13.2(4) Building storm drains. Building storm drains, which are underground and beneath the building, shall be of cast iron soil pipe, seamless copper pipe or copper tube. Reinforced concrete pipe meeting ASTM specification C76-70, or current issue thereof, may be used as an alternate to the above described materials when specifically approved by the administrative authority.

13.2(5) Building storm sewers. The building storm sewer shall be of cast iron soil pipe, vitrified clay pipe, concrete pipe, bituminized-fibre pipe, or asbestos-cement pipe. Cement mortar joints may be used in clay and cement pipe.

13.3(135)T.III TRAPS.

13.3(1) Main trap. Storm water drains connected to a combined sewage system shall be trapped except where the roof or gutter opening is located in accord with the requirements for vent terminals, 12.4(5)T.III. One trap may serve several conductors but traps must be set below frost or inside the building.

13.3(2) Material. Storm water traps, when required, shall be of cast iron or copper pipe or copper tube.

13.3(3) Exception. No traps shall be required for storm water drains which are connected to a sewer carrying storm water exclusively.

13.3(4) Size. Traps for individual conductors shall be the same size as the horizontal branch to which they are connected.

13.3(5) Location. Conductor traps shall be so located that an accessible clean-out may be installed on the building side of the trap.

13.4(135)T.III CONDUCTORS AND CONNECTIONS.

13.4(1) Prohibited uses. Conductor pipes shall not be used as soil, waste, or vent pipes, nor shall soil, waste, or vent pipes be used as conductors.

13.4(2) Protection. Rain water conductors installed along alleyways, driveways, or other locations where they may be exposed to damage shall be protected by metal guards, recessed into the wall, or constructed from ferrous alloy pipe.

13.5(135)T.III ROOF DRAINS.

13.5(1) Material. Roof drains shall be of cast iron, copper, lead, or other acceptable corrosion-resisting material, securely bolted or screwed to the conductor or leader.

13.5(2) Strainers. All roof areas, except those draining to hanging gutters, shall be equipped with roof drains having strainers.

13.5(3) Flat decks. Roof drain strainers for use on sun decks, parking decks, and similar areas, normally serviced and maintained, may be of the flat surface type, level with the deck.

13.5(4) Roof drain flashings. The connection between roofs and roof drains which pass through the roof and into the interior of the building shall be made watertight by the use of proper flashing material or roof connection.

13.6(135)T.III SIZE OF LEADERS AND STORM DRAINS.

13.6(1) Leaders. Vertical leaders shall be sized on the maximum projected roof area, according to the following table:

TABLE 13.6(1)
SIZE OF VERTICAL LEADERS

Diameter of leader or conductor(1) (inches)	Maximum projected roof area (sq. ft.)	Diameter of leader or conductor (inches)	Maximum projected roof area (sq. ft.)
2	720	5	8,650
2½	1,300	6	13,500
3	2,200	8	29,000
4	4,600		

[1]The equivalent diameter of a square or rectangular leader may be taken as the diameter of that circle which may be inscribed within the cross-sectional area of the leader.

Note. See footnote to table 13.6(2)T.III.

13.6(2) Building storm drain. The size of the building storm drain or any of its horizontal branches having a slope of one-half inch or less per foot, shall be based upon the maximum projected roof area to be handled according to the following table:

TABLE 13.6(2)
SIZE OF HORIZONTAL STORM DRAINS

Diameter of drain (inches)	Maximum projected roof area for drains for various slopes		
	⅛ inch (sq. ft.)	¼ inch (sq. ft.)	½ inch (sq. ft.)
3	822	1,160	1,644
4	1,880	2,650	3,760
5	3,340	4,720	6,680
6	5,350	7,550	10,700
8	11,500	16,300	23,000
10	20,700	29,200	41,400
12	33,300	47,000	66,600
15	59,500	84,000	119,000

Tables 13.6(1)T.III and 13.6(2)T.III are based on a maximum rate of rainfall of four inches per hour.

13.6(3) Roof gutters. The size of semicircular gutters shall be based on the maximum projected roof area, according to the following table:

TABLE 13.6(3) SIZE OF GUTTERS

Diameter of gutter(1) (inches)	Maximum projected roof area for gutters of various slopes			
	1/16 inch (sq. ft.)	1/8 inch (sq. ft.)	1/4 Inch (sq. ft.)	1/2 inch (sq. ft.)
3	170	240	340	480
4	360	510	720	1,020
5	625	880	1,250	1,770
6	900	1,360	1,920	2,770
7	1,380	1,950	2,760	3,900
8	1,990	2,800	3,980	5,600
10	3,600	5,100	7,200	10,000

(1) Gutters other than semicircular may be used provided they have an equivalent cross-sectional area.

13.7(135)T.III SIZE OF COMBINED DRAINS AND SEWERS.

13.7(1) Conversion of roof area to fixture units. In computing the size of combined building drains or sewers to which storm drains serving a roof, court, or paved area are to be connected, the area drained may be converted to equivalent fixture unit loads by placing a value of two hundred fifty-six fixture units on the first one thousand square feet, or portion thereof, of area to be drained; and one additional fixture unit for each 3.9 square feet thereafter.

13.8(135)T.III VALUES FOR CONTINUOUS FLOW.

13.8(1) Flow factor. Where there is a continuous or semicontinuous discharge into the building storm drain or building storm sewer, as from a pump, ejector, air-conditioning plant, or similar device, each gallon per minute of such discharge shall be computed as being equivalent to twenty-four square feet of roof area, based on a four-inch rainfall.

CHAPTER 14

INSPECTION AND TESTS

14.1(135)T.III INSPECTIONS.

14.1(1) New work. All new plumbing work, and such portions of existing systems as may be affected by new work or any changes, shall be inspected to insure compliance with all the requirements of this code and to assure that the installation and construction of the plumbing system is in accordance with approved plans.

14.2(135)T.III NOTIFICATION.

14.2(1) Advance notice. It shall be the duty of the holder of a permit to give notice to the administrative authority when plumbing work is ready for test or inspection.

14.2(2) Responsibility. It shall be the duty of the holder of a permit to make sure that the work will stand the test prescribed before giving the notification.

14.2(3) Retesting. If the administrative authority finds that the work will not pass the test, necessary corrections shall be made and the work shall then be resubmitted for test or inspection.

14.2(4) Tests. Tests shall be conducted in the presence of the administrative authority or of his duly appointed representative.

14.3(135)T.III PLUMBING PLANS.

14.3(1) Examination of plans. All plans and specifications required to be submitted shall be examined by the administrative authority for acceptability under the provisions of this code.

14.4(135)T.III VIOLATIONS.

14.4(1) Notice delivery. Notices of violations shall be mailed or delivered by the administrative authority to the person responsible at the time inspection was made.

14.5(135)T.III COVERING OF WORK.

14.5(1) Requirements. No drainage or plumbing system or part thereof shall be covered until it has been inspected, tested, and accepted as prescribed in this code.

14.5(2) Uncovering. If any building drainage or plumbing system or part thereof which is installed, altered, or repaired, is covered before being inspected, tested, and approved, as prescribed in this code, it shall be uncovered for inspection after notice to uncover the work has been issued to the responsible person by the administrative authority.

14.6(135)T.III MATERIAL AND LABOR FOR TESTS.

14.6(1) Facilities to be provided. The equipment, material, and labor necessary for inspection or tests shall be furnished by the person to whom the permit is issued or by whom inspection is requested.

14.7(135)T.III TESTS OF DRAINAGE AND VENT SYSTEMS.

14.7(1) Requirements. The piping of the plumbing, drainage, and venting systems shall be tested with water or air. After the plumbing fixtures have been set and their traps filled with water, the entire drainage system shall be submitted to a final inspection. The administrative authority may require the removal of any cleanouts, to ascertain if the pressure has reached all parts of the system.

14.8(135)T.III METHODS OF TESTING DRAINAGE AND VENT SYSTEMS.

14.8(1) Water test. The water test shall be applied to the drainage system either in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a ten-foot head of water. In testing successive sections, at least the upper ten feet of the next preceding section shall be tested, so that no joint or pipe in the building (except the upper most ten feet of the system) shall have been

submitted to a test of less than a ten-foot head of water. The water shall be kept in the system, or in the portion under test, for at least fifteen minutes before inspection starts; the system shall then be tight at all points.

14.8(2) Air test. The air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and, after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of five pounds per square inch or sufficient to balance a column of mercury ten inches in height. This pressure shall be held without introduction of additional air for a period of at least fifteen minutes.

14.9(135)T.III BUILDING SEWER.

14.9(1) Test required. Building sewers shall be tested.

14.9(2) Method. Test shall consist of plugging end of building sewer at point of connection with the public sewer and filling the building sewer with water and testing with not less than a ten-foot head of water.

14.10(135)T.III INSPECTION AND TESTS NOT REQUIRED.

14.10(1) Exception. 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.

14.11(135)T.III TESTS OF WATER-SUPPLY SYSTEM.

14.11(1) Test of system. Upon completion of a section or of the entire water-supply system, it shall be tested and proved tight under a water pressure not less than the working pressure under which it is to be used. The water used for tests shall be obtained from a potable source of supply.

14.12(135)T.III TESTS OF INTERIOR LEADERS OR DOWNSPOUTS.

14.12(1) Tests of leaders. Leaders or downspouts and branches

within a building may be tested by water or air in accordance with 14.8(1,2)T.III.

14.13(135)T.III CERTIFICATE OF APPROVAL.

14.13(1) Records required. Upon satisfactory completion and final tests of the plumbing system, the administrative authority shall keep a permanent record thereof and shall issue a written approval upon request.

14.14(135)T.III DEFECTIVE PLUMBING.

14.14(1) Correction required. Wherever there is reason to believe that the plumbing system of any building has become defective, it shall be subjected to test or inspection, and any defects found shall be corrected as required in writing by the administrative authority.

All installed plumbing systems and fixtures attached thereto found defective or in an insanitary condition, shall be repaired, renovated, replaced, or removed within ten days upon written notice from the proper administrative authority. When defective plumbing is found to be dangerous to the health of the occupants of a building or to the patrons of a food establishment, the proper administrative authority shall notify the health officer having jurisdiction, and said health officer shall take immediate steps to protect the health of such occupants or patrons. In the event the proper administrative authority is of the opinion the defect found endangers the public water supply, the defects shall be immediately corrected or the plumbing system disconnected from the public water supply.

APPENDIX

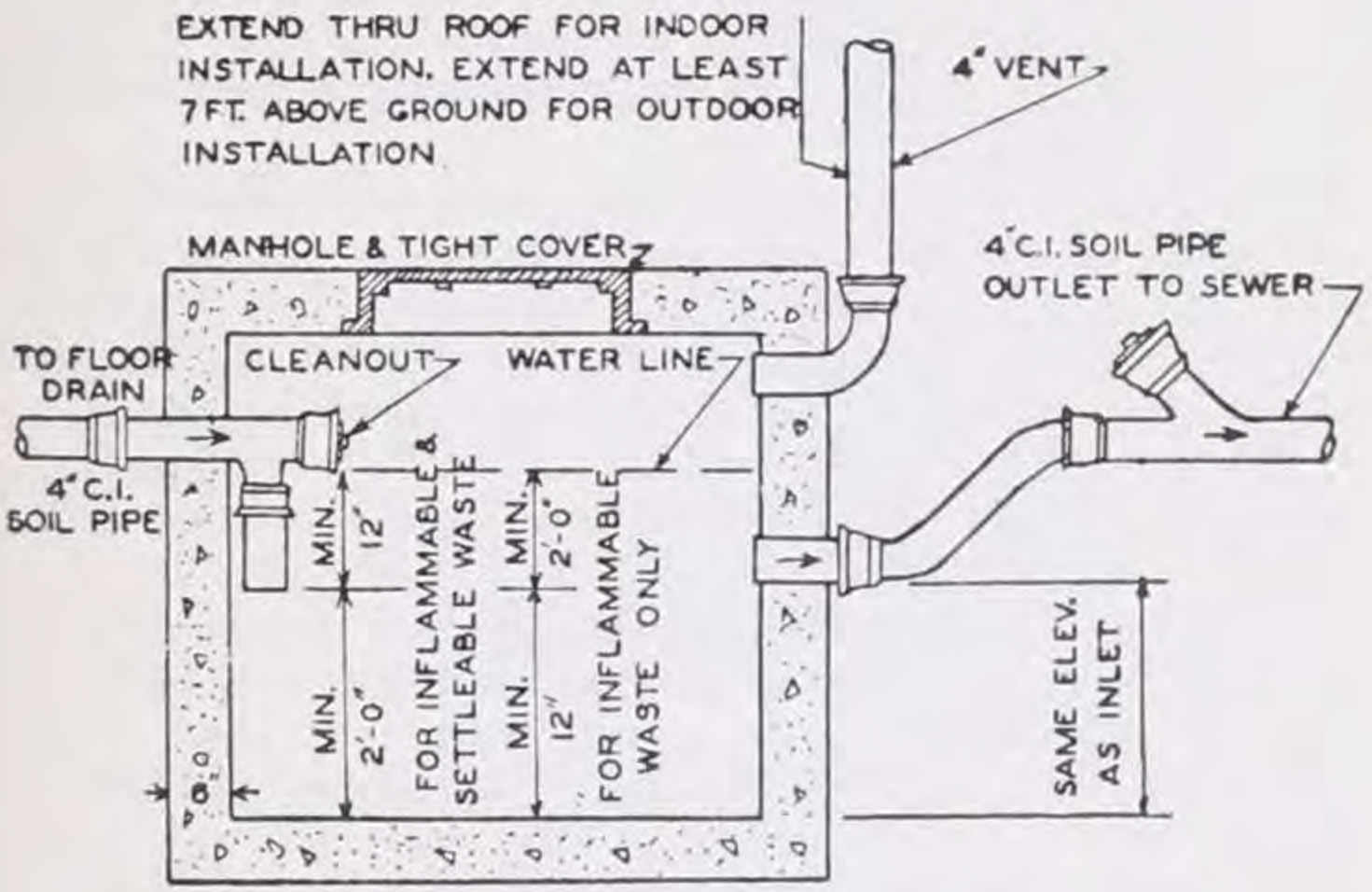
The following appendix should be considered as a presentation of further details, design, data, and amplification of the material covered in the Code. Several subjects related to plumbing and public health are also included for the convenience of the industry.

(Section numbers in the Appendix general refer to related sections in the Code.)

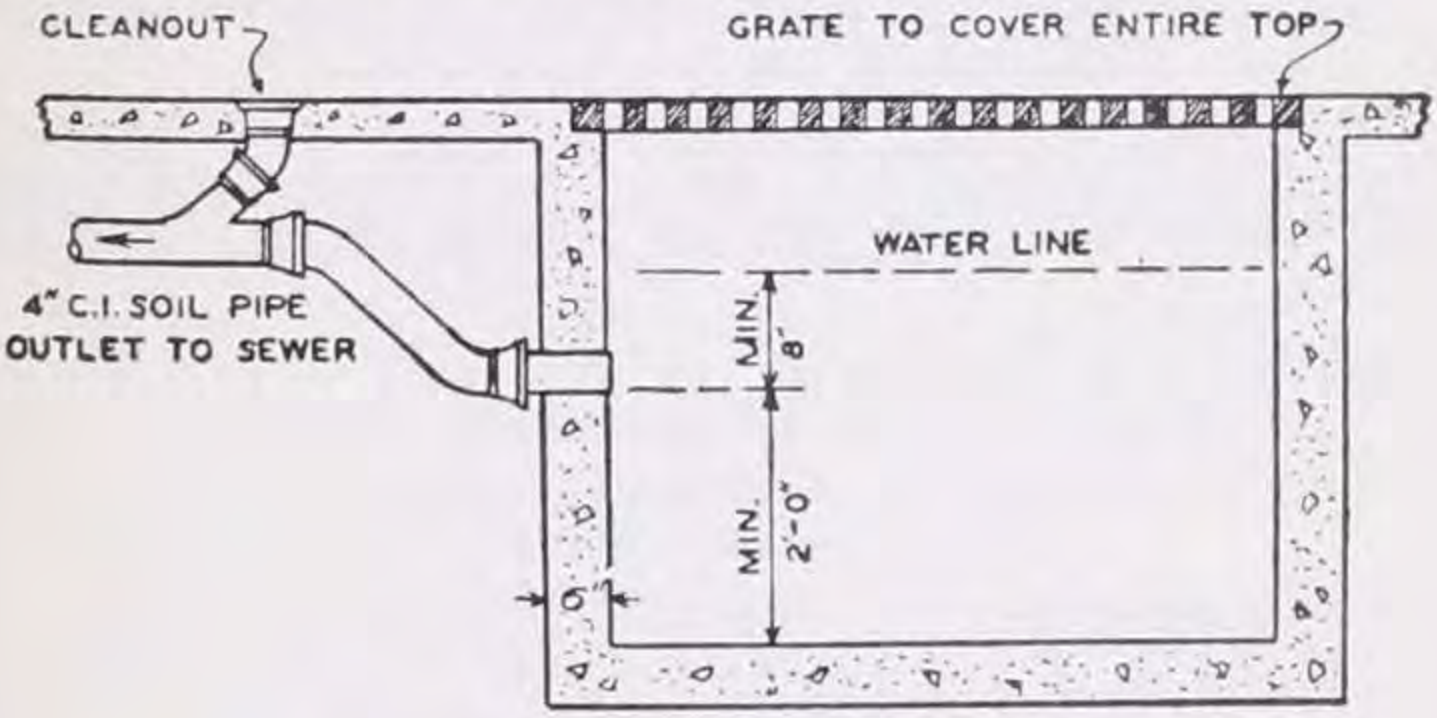
APPENDIX–GENERAL

Gen. 6.13(1) Interceptors. Drainage from commercial garages, gasoline filling stations, dry cleaning establishments, or extraction plants, and other industries where oils or solvents are used, is likely to contain inflammable compounds and should therefore be intercepted before discharging into the city sewer. The interceptor should have a capacity sufficient to separate the oil, grease, or other inflammable compound and should be so located and constructed to prevent fire or explosion. Drainage from commercial garages and oil stations where automobile wash racks are installed is also likely to contain mud and sand which should be separated from the wastes before discharging into the city sewer. Hence, the interceptor for these wastes should afford sufficient capacity for both separating the oil and grease by flotation and the sand and mud by settling.

Fig. Gen. 6.13(1)



INFLAMMABLE WASTE INTERCEPTOR



ALTERNATE INTERCEPTOR FOR AUTOMOBILE WASH RACK

Where the wastes do not contain sand, mud, or other solid material and inflammable conpounds only are to be separated, the interceptor should have a minimum capacity of 15 cubic feet, with a minimum effective depth of 3 feet, and should be provided with a vent and manhole with tightly fitting cover.

For drainage from commercial garages or other places where the wastes are likely to contain sand, mud, or other solid material in addition to oil, grease, or other inflammable compounds, a minimum capacity of 25 cubic feet, with a minimum effective depth of 3 feet, should be provided and a vent and manhole with tightly fitting cover should be installed.

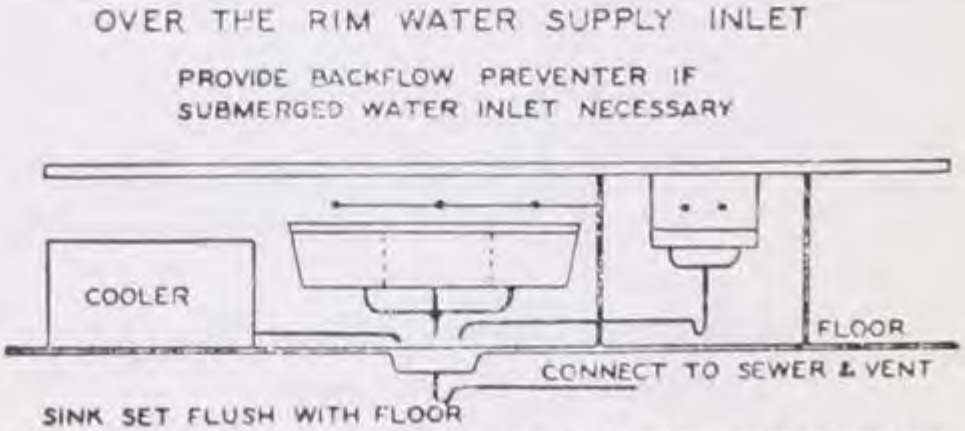
Where inflammable compounds are not present in the wastes, a vent may not be necessary except for odor control when organic wastes are intercepted and the interceptor is located inside a building.

Interceptors for automobile wash racks should be provided with a vent and tightly fitting manhole cover where inflammable compounds are likely to be discharged therein. Where separate means for disposal of inflammable compounds are provided and the interceptor is to receive car washings only, it may be located directly under the wash rack and provided with a grating over the entire top. In either case, a minimum capacity of 25 cubic feet, with a minimum effective depth of 3 feet, should be provided.

All interceptors depend upon periodic cleaning for satisfactory operation.

Gen.9.1(2) Indirect waste piping. The following sketch illustrates typical indirect waste connections used for food handling equipment and fixtures.

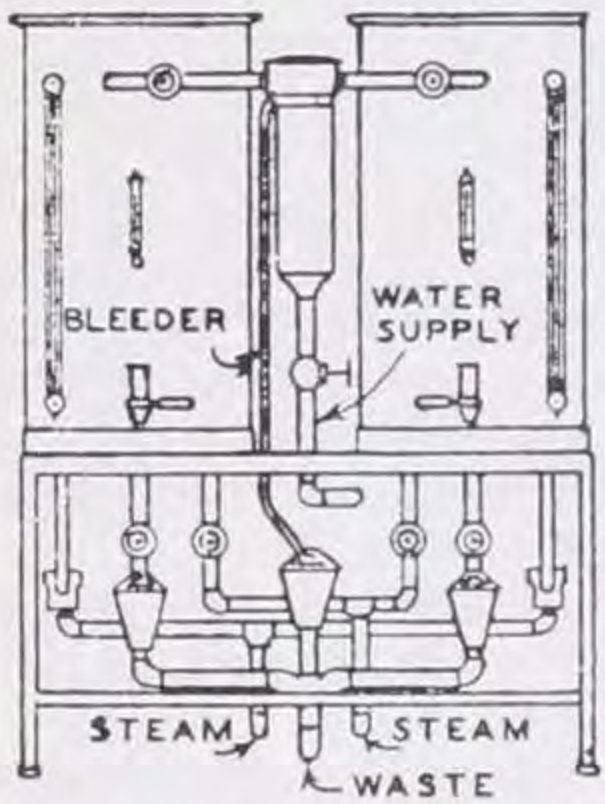
Fig. Gen. 9.1(2).



BAR AND SODA FOUNTAIN OPEN WASTE CONNECTIONS

Gen. 9.1(6) Sterile materials. Open waste connections for sterilizers, stills, and hospital equipment are shown below. Attention should also be given to protecting the water supply from backflow and the vessel contents from contamination with all this equipment.

Fig. Gen. 9.1(6).



OPEN WASTE CONNECTIONS, HOSPITAL AND SIMILAR EQUIPMENT

Gen. 10.4(1) On January 15, 1930, the State Department of Health adopted the following regulations governing cross-connections between the public water supply and private non-potable supplies.

"No public water works system, either publicly or privately owned, shall be cross-connected with any other water works system, either publicly or privately owned, unless the water in the latter meets the standard of purity as required for public water supplies by the regulations of the Iowa State Department of Health."

"Any direct physical connection between pipes or piping of a public water works system and any other water system shall be deemed a cross-connection regardless of number or type of valves that may be inserted between the two systems, except in such instances where it is physically impossible for water from the secondary system to enter the public water system under any possible combinations of operating conditions, and in such instances connection shall be permitted only with the written approval of the Iowa State Department of Health."

Gen. 10.16(1) Pressure-temperature relief. During the years past, several disastrous explosions have occurred in residences and buildings resulting in loss of life and property, caused by overheated hot water storage tanks. In order to prevent these explosions it is necessary to control the amount of heat which might accumulate in the tank. Pressure relief valves alone are insufficient protection. A combination temperature or heat and pressure relief valve must be installed.

Temperature or heat relief valves should open at a maximum temperature of 210 degrees F. and should be capable of discharging a sufficient quantity of heat in the form of steam or water so as to prevent any further rise in temperature in the tank with the heater burning at its maximum capacity. Obviously a relief valve designed for a 30 gallon household tank employing a small heater will be too small for a 500 gallon apartment house tank employing a larger heater because the discharge port will not permit a sufficient amount of heat to escape to prevent a further rise in temperature within the tank.

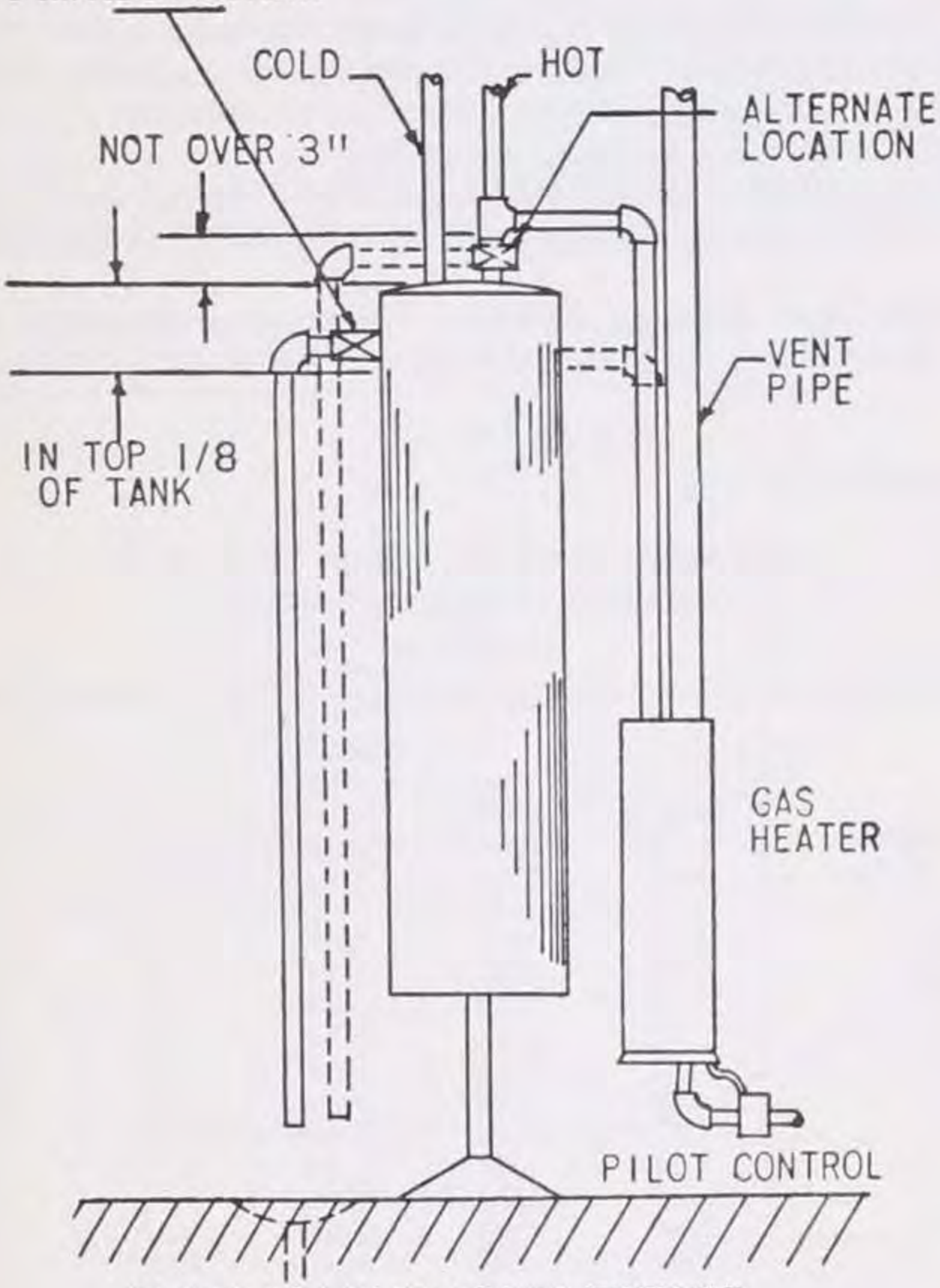
Where a floor drain is available, the relief discharge should be directed over it and in all cases at least directed to the floor so as to avoid accidental injury to life and property.

The pressure relief valve may be installed either in combination with the temperature relief or separately on the tank or the supply lines between the tank and any valves. The closure of a valve placed between the tank and relief would obviously make the relief ineffective.

The safety pilot control to be furnished on automatic and semi-automatic equipment should be placed over the pilot flame so that the absence of heat when the pilot fails will actuate the mechanism.

Fig. Gen. 10.16(1).

TEMPERATURE RELIEF OR A COMBINATION PRESSURE AND TEMPERATURE RELIEF VALVE PLACED IN TOP 1/8 TH OF TANK OR NOT OVER 3 In. ABOVE TANK



SAFETY DEVICES REQUIRED ON HOT WATER HEATERS AND STORAGE TANKS

Gen. 11.2(1) Building sewers in separate trenches. Information available to the Plumbing Code Committee indicates that bituminized fibre pipe has not been found to be a suitable sewer material in several cities whereas it has been accepted in others. Under the provisions of section 368.17 and 358A.25, Code of Iowa, all cities having a population of 6,000 or more shall, and other cities and towns may, adopt ordinances, and county boards of supervisors may adopt regulations, governing the installation of plumbing. When such ordinance or regulation is adopted the use of bituminized fibre pipe as specified in subsection 11.2(1), state plumbing code, may be permitted. When the state plumbing code is adopted by reference as specified in subsection 7, section 366.7, Code of Iowa, the same conditions apply to the use of bituminized fibre pipe.

Gen. 11.3(4) Minimum velocities. The following table shows approximate velocities to be expected in rough pipe laid at the specified slope of fall.

Table Gen. 11.3(4).

APPROXIMATE VELOCITIES FOR GIVEN SLOPES AND DIAMETERS
Rough Pipe

Diameter of Pipe	Velocities				
	1/32-Inch fall per foot	1/16-Inch fall per foot	1/8-Inch fall per foot	1/4-Inch fall per foot	1/2-Inch fall per foot
Inches	fps*	fps*	fps*	fps*	fps*
1¼	0.57	0.80	1.14	1.61	2.28
1½	.62	.88	1.24	1.76	2.45
2	.72	1.02	1.44	2.03	2.88
2½	.81	1.14	1.61	2.28	3.23
3	.88	1.24	1.76	2.49	3.53
4	1.02	1.44	2.03	2.88	4.07
5	1.14	1.61	2.28	3.23	4.56
6	1.24	1.76	2.49	3.53	5.00
8	1.44	2.03	2.88	4.07	5.75
10	1.61	2.28	3.23	4.56	6.44
12	1.76	2.49	3.53	5.00	7.06

*Feet per second.

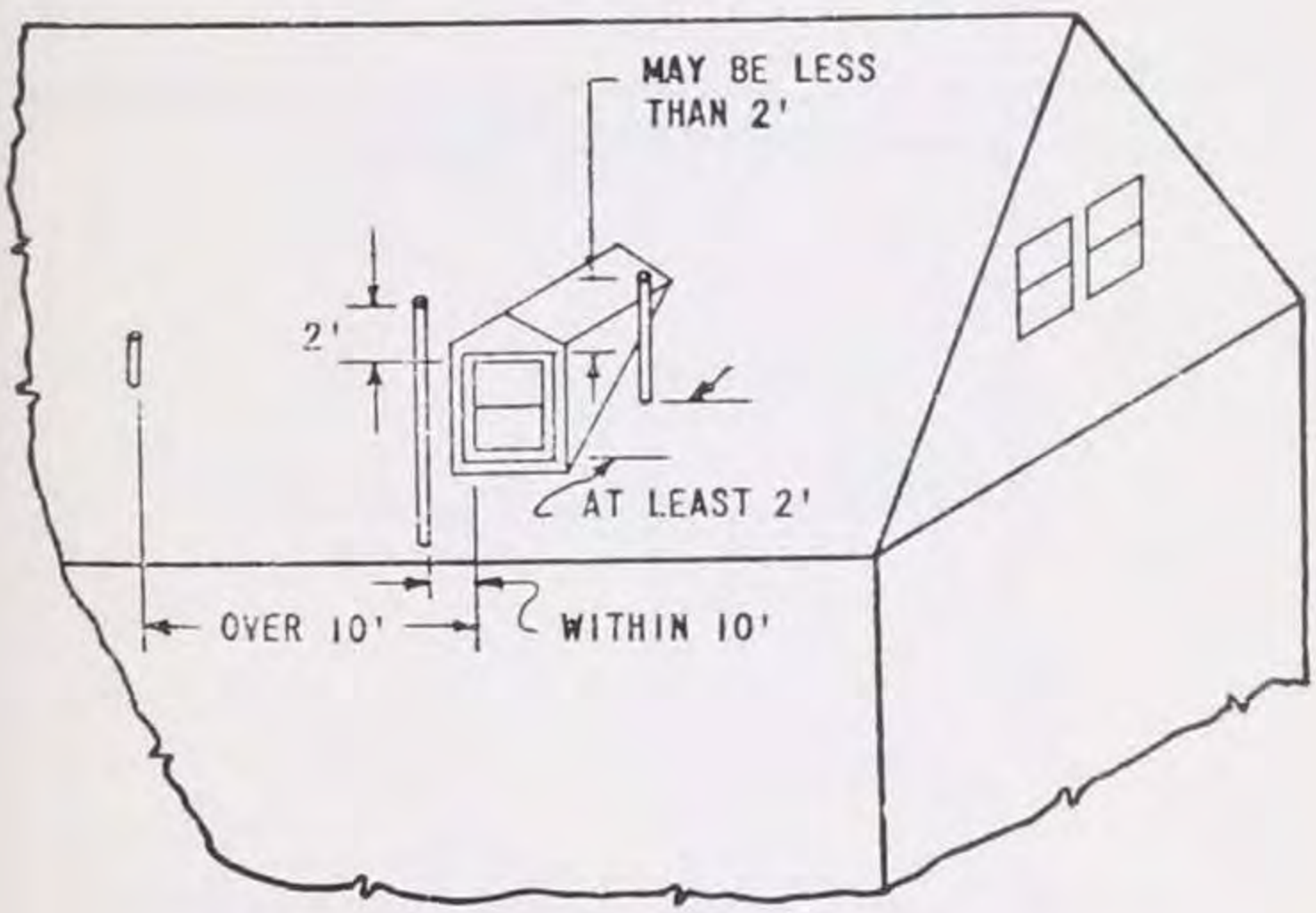
In general, the required fall in inches per foot is given approximately by the formula

$$S = S_1 \left(\frac{V}{V_1}\right)^2$$

in which S is the fall in inches per foot necessary to give a selected velocity V, and S_1 and V_1 are the fall and resultant velocity for pipe of the same diameter.

Gen. 12.4(5) Vent terminals. Various locations of vent terminals near windows and openings are shown below.

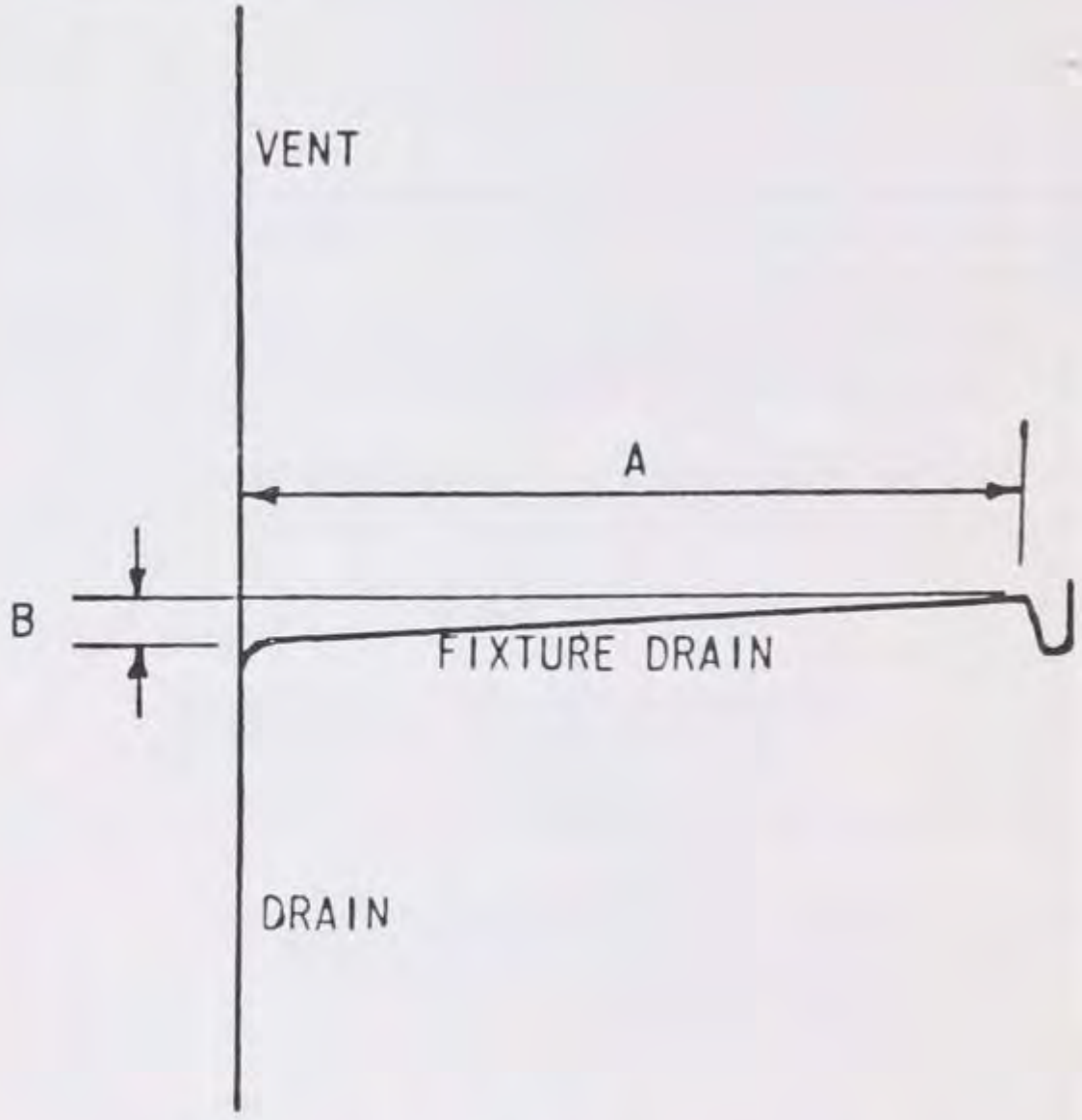
Fig. Gen. 12.4(5).



Roof Terminals

Gen. 12.9(1) Trap vent distance. The argument for table 12.9(3) and a rational approach to calculating the allowable distance between a trap and its vent is illustrated in the following diagram.

Fig. Gen. 12.9(1).

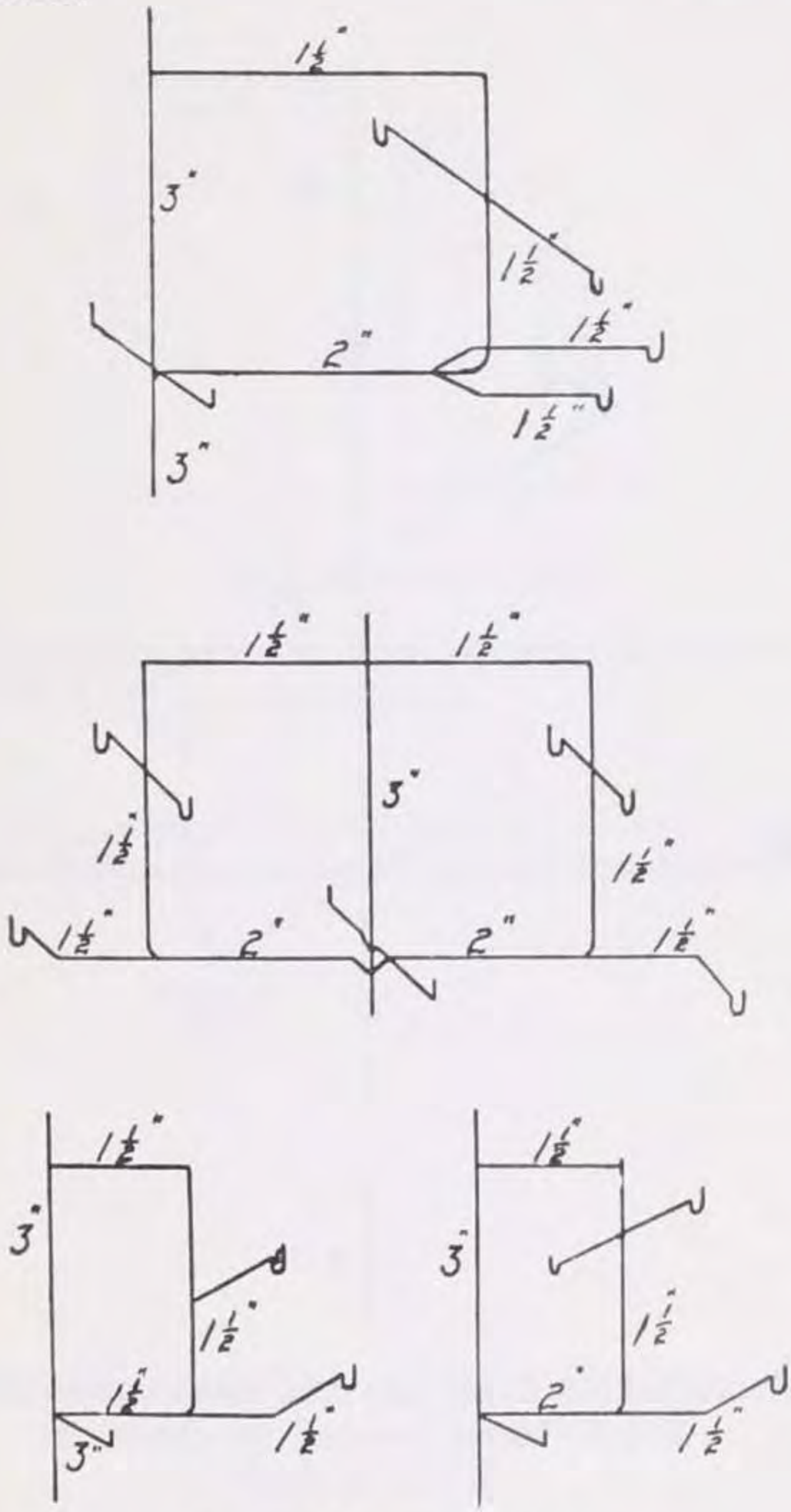


B - NOT MORE THAN ONE DIAMETER OF BRANCH DRAIN

Distance of Trap from Vent

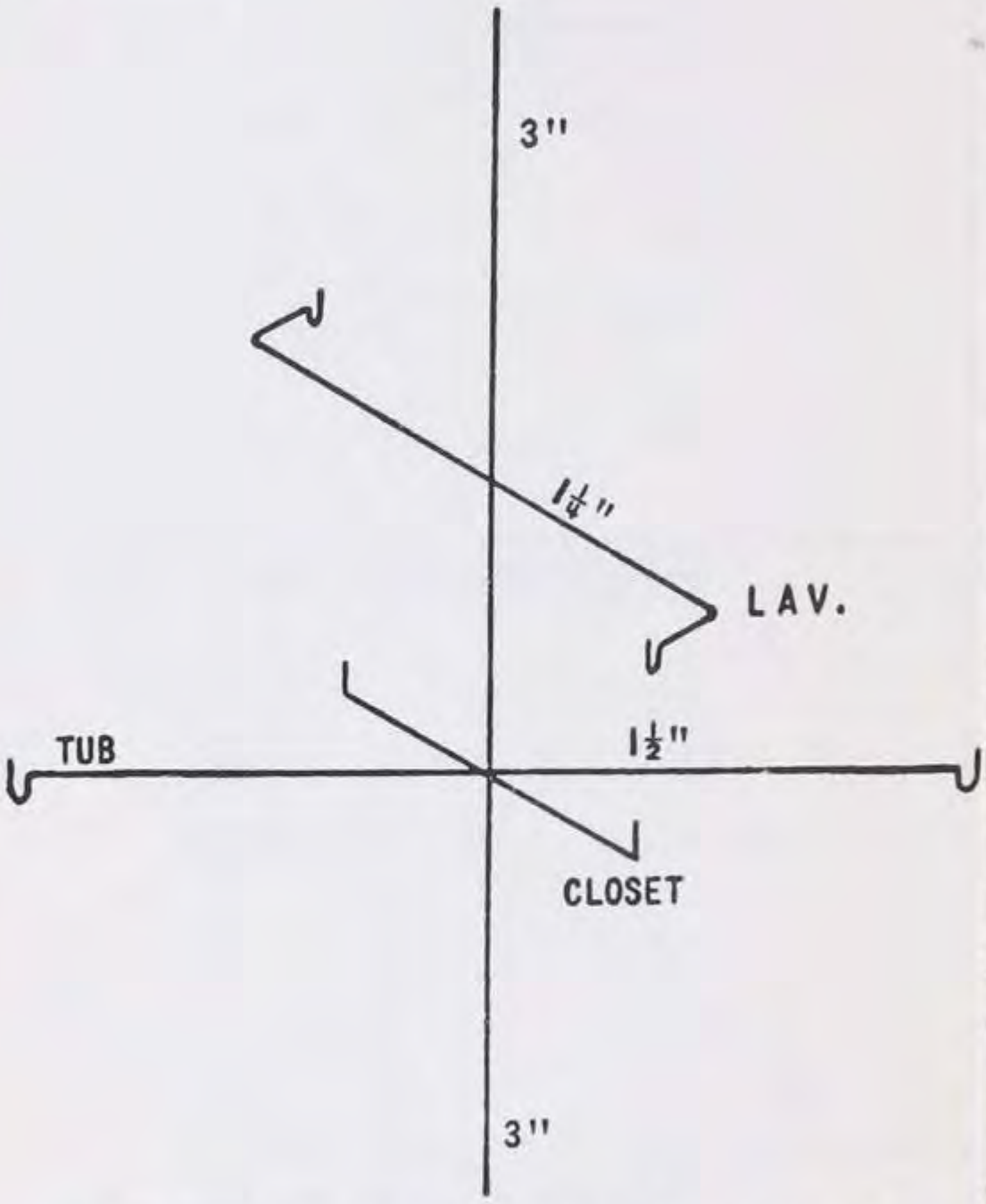
Gen. 12.12 Group and wet venting. Various allowable methods of group and wet venting are illustrated in the following figures.

Fig. Gen. 12.12.



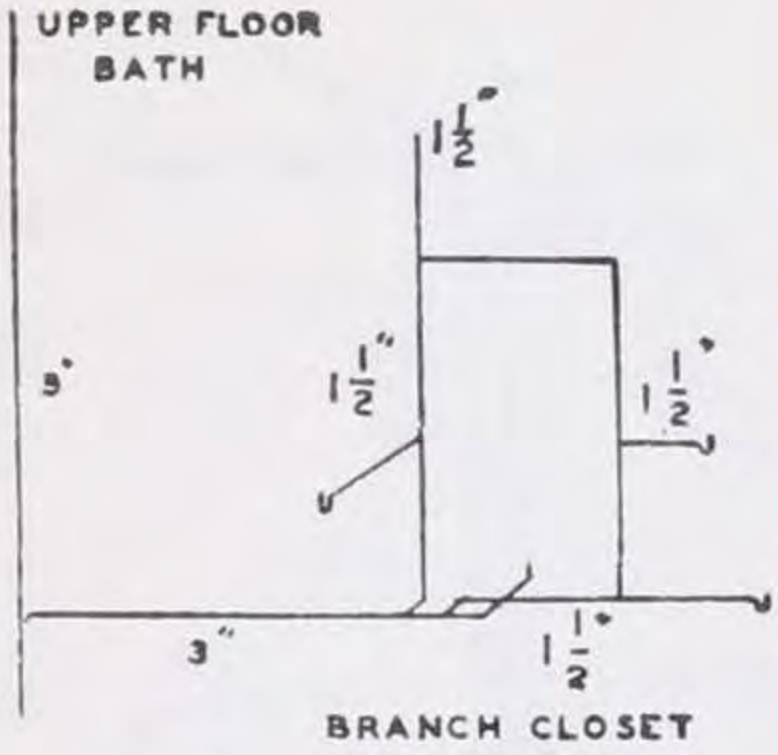
Types of group venting

Fig. Gen 12.12.



Permissable drainage and vent connections for fixtures located on opposite sides of wall

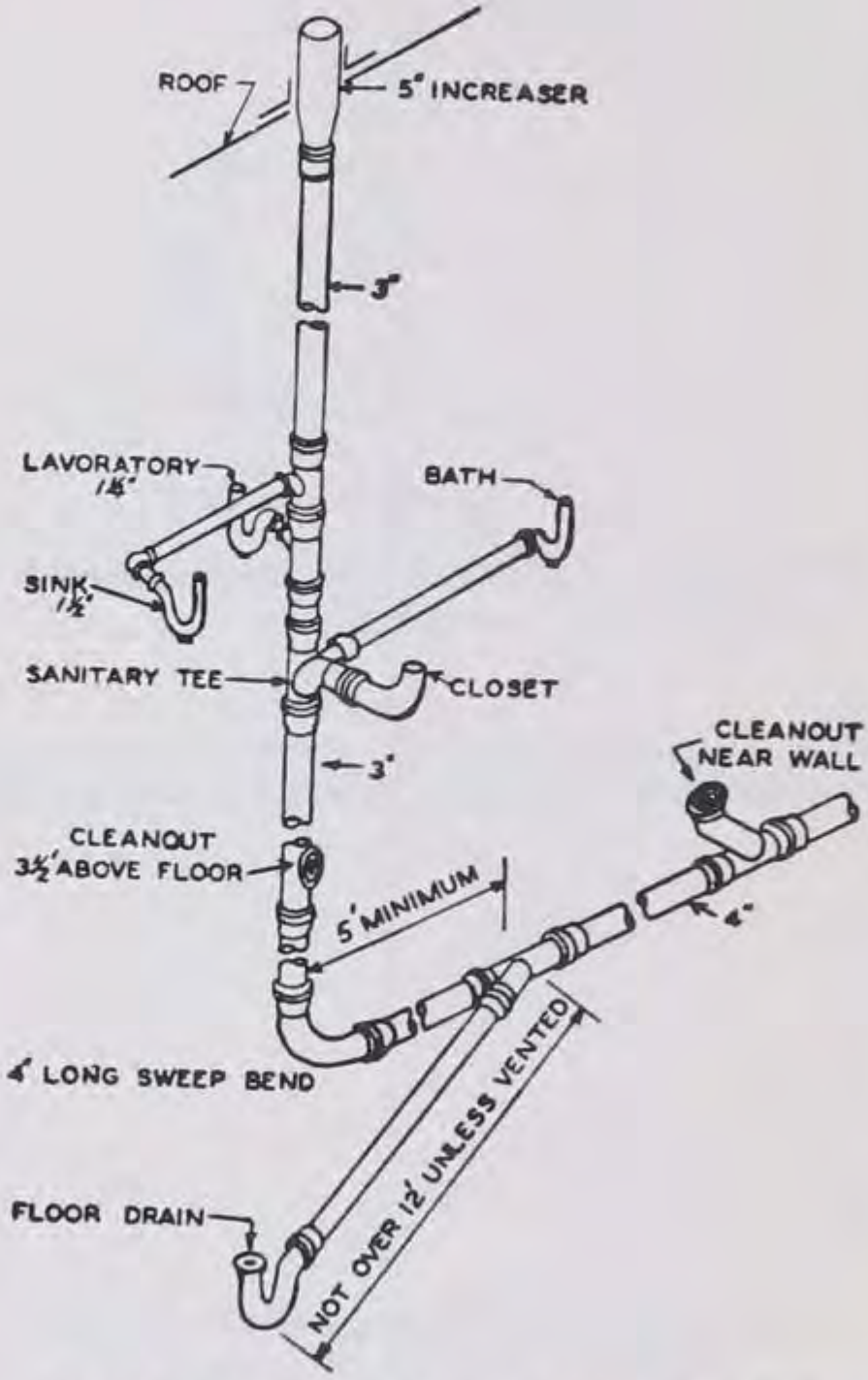
Fig. Gen. 12.12.



Permissable branch closet drainage and vent connections

Gen. 12.13(1) Stack venting. The drainage and venting layout for a one story house using stack venting is shown in Fig. Gen. 12.13(1).

Fig. Gen. 12.13(1).



Drainage layout for one-story house

Gen 12.15(1) Loop & Circuit vents. Loop, circuit, and battery venting is illustrated in Fig. Gen. 12.15(1).

Fig. Gen. 12.15(1).

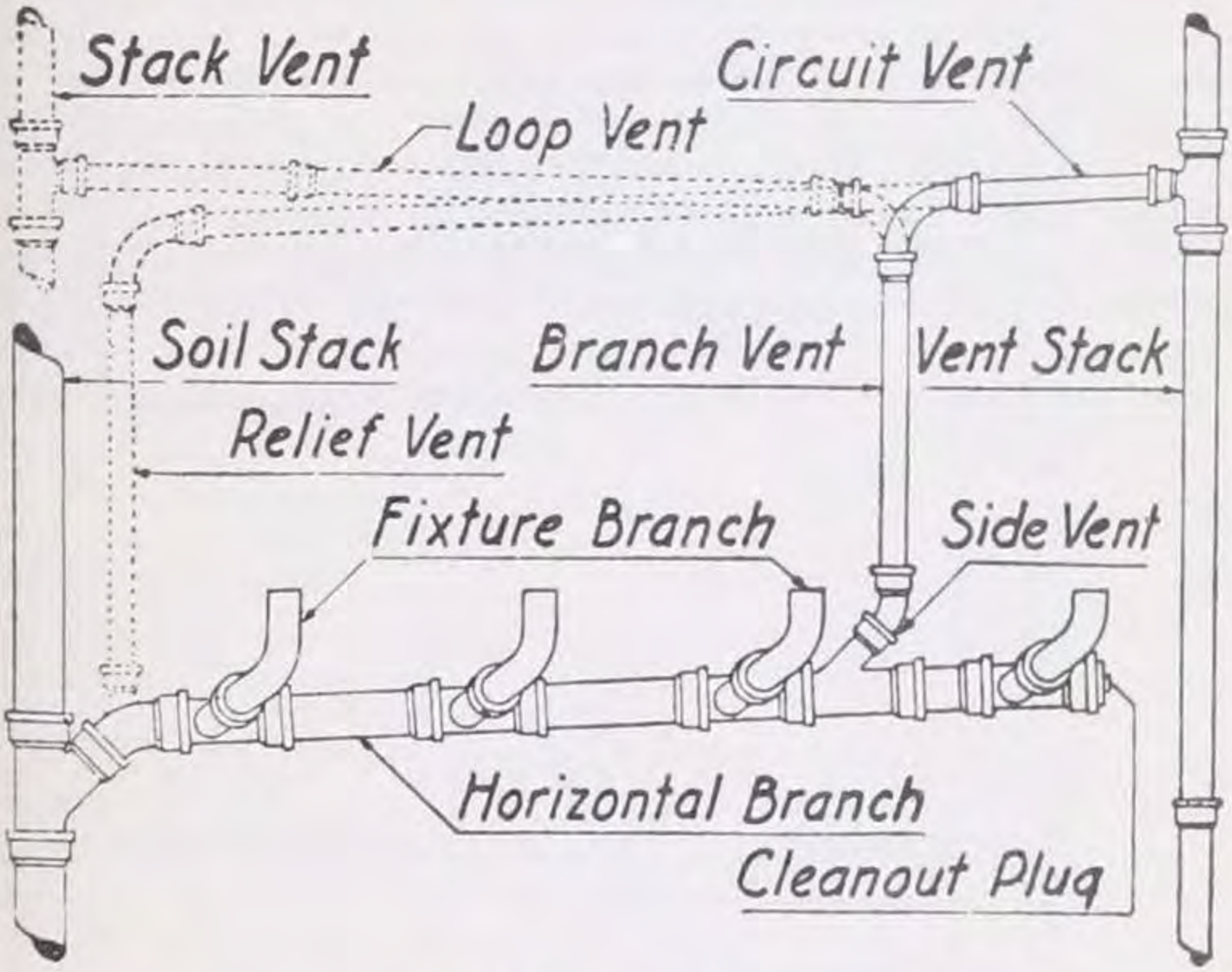
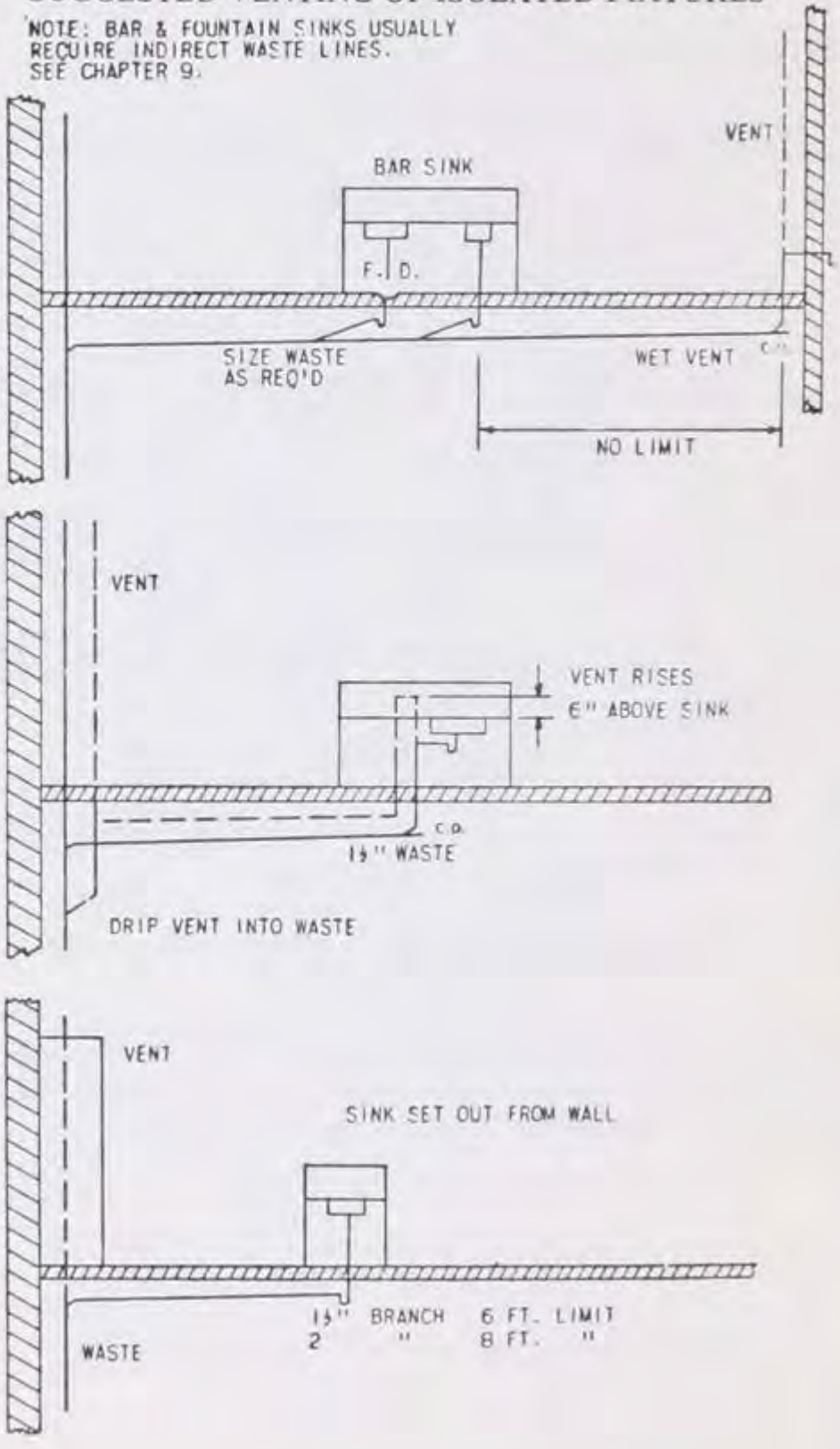


Illustration of loop and circuit vents

Gen. 12.24(1) Venting isolated fixtures. Where unusual design conditions appear to preclude conventional methods of venting, the following layouts may be applicable as shown in Fig. Gen. 12.24(1).

Fig. Gen. 12.24(1).

SUGGESTED VENTING OF ISOLATED FIXTURES



Gen. 13.1(5) Subsoil drainage. The following principles apply to the discharge of water from subsoil drainage systems, including foundation drains for buildings, into a public sewer: a) If a storm sewer is available, the building subsoil drainage system should be connected directly to that storm drain; b) if a storm sewer is available at a grade higher than the subsoil drain, a sump and pump should be provided to make a connection to that storm sewer; and c) if a storm sewer is not available, and if such action is approved by the local administrative authority, the building subsoil drainage system may be connected to a sanitary sewer.

The local administrative authority should not permit subsoil drainage systems to be drained into sanitary sewers except where it has been determined that the sewers have sufficient capacity for the present and the anticipated future total flow of combined sewage, and that the sewage disposal facilities will not be adversely affected by the increased total flow.

APPENDIX A

SANITARY STANDARDS FOR WATER WELLS

A.1 GENERAL CONSIDERATIONS

A.1(1) The most satisfactory source of water supply for a residence or building is one obtained from a public supply and such a supply should therefore always be used when available. Many residential areas are developing at the edge of cities and towns where a public water supply is not available. In many such areas serious difficulty may be encountered in providing satisfactory individual water and sewerage systems. In such instances consideration should be given to extending an existing public water supply to serve the area or to development of a new public supply.

A.1(2) When an individual or private water supply must be used, it becomes the responsibility of both the designing and installing agencies to make sure that the water is satisfactory from the standpoint of quality (both bacterial and chemical) and of quantity. Individual supplies are generally from ground water sources, either wells or springs. Detailed recommendations with illustrations pertaining to the development of such supplies are contained in the State Department of Health bulletin "Sanitary Standards for Water Wells." It is recommended that anyone developing a private water supply avail themselves of this bulletin. Development of individual supplies from surface sources should be undertaken only under the direction of a sanitary engineer versed in water treatment. Cistern water is not recommended as a source of water for drinking or culinary purposes.

APPENDIX B

PRIVATE SEWAGE DISPOSAL SYSTEMS

B.1 GENERAL CONSIDERATIONS

B.1(1) The most satisfactory method of sewage disposal is a proper connection to a public sewer system. Every effort should be made to secure such a connection in planning new construction. In those instances where the installation of a private sewage disposal system cannot be avoided, careful consideration must be given to the design, layout, and construction of a suitable disposal system. However, such systems shall be regarded as temporary, and should be abandoned when a connection to a public sewer can be made.

B.1(2) Suggested layouts, construction details, and specifications for adequate private sewage disposal facilities are shown in the State Department of Health publication "Residential Sewage Disposal Systems" which is available free of charge. Any person planning such an installation should obtain and study a copy of this bulletin. Also ascertain local requirements.

Disposal systems to serve buildings other than single and two family residences require special design based on the quantity and the character of the sewage and industrial wastes.

APPENDIX C

AIR GAPS, BACKFLOW PREVENTERS AND DRINKING FOUNTAIN STANDARDS

(Based on ANSI A40.4 and A40.6)

C.1 GENERAL

C.1(1) Backflow connections shall not be permitted between the piping system carrying a potable water supply and any piping system or plumbing equipment carrying nonpotable water or water-borne waste.

C.2 AIR GAPS

C.2(1) The air gap in a water-supply system is the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank or plumbing fixture and the flood-level rim of the receptacle. (See figs. C.1 and C.2.)

C.2(2) The minimum required air gap shall be measured vertically from the end of the faucet spout or supply pipe to the flood-level rim of the fixture or vessel. (See figs. C.1 and C.2.)

C.2(3) The water inlet to certain fixtures, such as water-closet flush tanks and tanks or vats, may be difficult to protect with air gaps and therefore requires special consideration. (See paragraphs C.2(5), C.2(6), C.2(7), C.2(8), C.2(9).)

C.2(4) The minimum required air gap shall be twice the diameter of the effective opening, but in no case less than given in table C.2(4).

TABLE C.2(4)–MINIMUM AIR GAPS FOR GENERALLY USED PLUMBING FIXTURES.

Fixture	Minimum air gap	
	When not affected by near wall(1)	When affected by near wall(2)
	Inches	Inches
Lavatories with effective openings not greater than ½ inch diameter.....	1.0	1.50
Sink, laundry trays and goose-neck bath faucets with effective openings not greater than ¾ inch diameter.....	1.5	2.25
Overrim bath fillers with effective openings not greater than 1 inch diameter.....	2.0	3.00
Effective openings greater than 1 inch...	(3)	(4)

(1) Side walls, ribs, or similar obstructions do not affect the air gaps when spaced from inside edge of spout opening a distance greater than 3 times the diameter of the effective opening for a single wall, or a distance greater than 4 times the diameter of the effective opening for 2 intersecting walls. (See Fig. C.2)

(2) Vertical walls, ribs, or similar obstructions extending from the water surface to or above the horizontal plane of the spout opening require a greater air gap when spaced closer to the nearest inside edge of spout opening than specified in note (1) above. The effect of 3 or more such vertical walls or ribs has not been determined. In such cases, the air gap shall be measured from the top of the wall.

(3) 2x effective opening.

(4) 3x effective opening.

C.2(5) Where it is not practical to provide a minimum required air gap above the flood-level rim of a tank or vat, an arrangement similar to that shown on figure C.3 may be provided.

C.2(6) The overflow pipe or channel shall be so arranged as to allow overflow water a free discharge to atmosphere under all conditions, overflow piping to be provided with an adequate break in the piping as close to the tank as possible, and the area of the free opening shall be at least equal to that of the overflow pipe. (See fig. C.3.) Tank and overflow piping must be protected against freezing.

C.2(7) When water enters the tank at the maximum rate with all inlets open and all outlets closed, the size and capacity of overflow pipe or

channel shall be sufficient to keep the water level from rising to more than half of the minimum required air gap as shown in table C.2(4), said distance to be measured above the top of the overflow.

C.2(8) The minimum air gap, as measured from the lowest point of any supply outlet to the top of the overflow opening, shall be one and one-half times the minimum air gap as required by table C.2(4). (See fig. C.3.)

C.2(9) If a tank or vat cannot be provided with an adequate air gap as required, a backflow (back-siphonage) preventer is required.

C.3 DRINKING-FOUNTAIN NOZZLES

C.3(1) Minimum elevation. All drinking-fountain nozzles including those which may at times extend through a water surface with orifice not greater than 7/16 (0.440) inch diameter or 0.150 square inch area shall be placed so that the lower edge of the nozzle orifice is at an elevation not less than 3/4 inch above the flood-level rim of the receptacle.

C.3(2) The 3/4-inch elevation shall also apply to nozzles with more than one orifice, provided that the sum of the area of all orifices shall not exceed the area of a circle 7/16 inch in diameter.

C.3(3) Special conditions and certain other materials related to drinking fountains shall meet requirements set forth in American Standard ANSI A40.4-1942 and ANSI Z4.2-1942, or current issues thereof, respectively.

C.4 VACUUM BREAKERS OR BACKFLOW PREVENTERS.

C.4(1) Required. Backflow preventers shall be installed with any supply fixture, the outlet end of which may at times be submerged, such as hose and spray, direct flushing valves, aspirators and under-rim water supply connections to a plumbing fixture or receptacle in which the surface of the water in the fixture or receptacle is exposed at all times to atmospheric pressure. The type of preventer referred to will not protect against flow when water is discharged through it into a space which is higher than atmospheric pressures.

C.4(2) Where. Backflow preventers shall be installed between the control valve and the fixture and in such a manner that it will not be subjected to water pressure, except the back pressure incidental to water flowing to the fixture.

C.4(3) Backflow preventers shall not be installed on inlet side of the control valve.

C.5 EFFECTIVE OPENING

C.5(1) The effective opening is the minimum cross-sectional area at the point of water-supply discharge, and is measured or expressed in terms of the diameter of a circle, or, if the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (See fig. C.1, point B, in some cases it may be point X.)

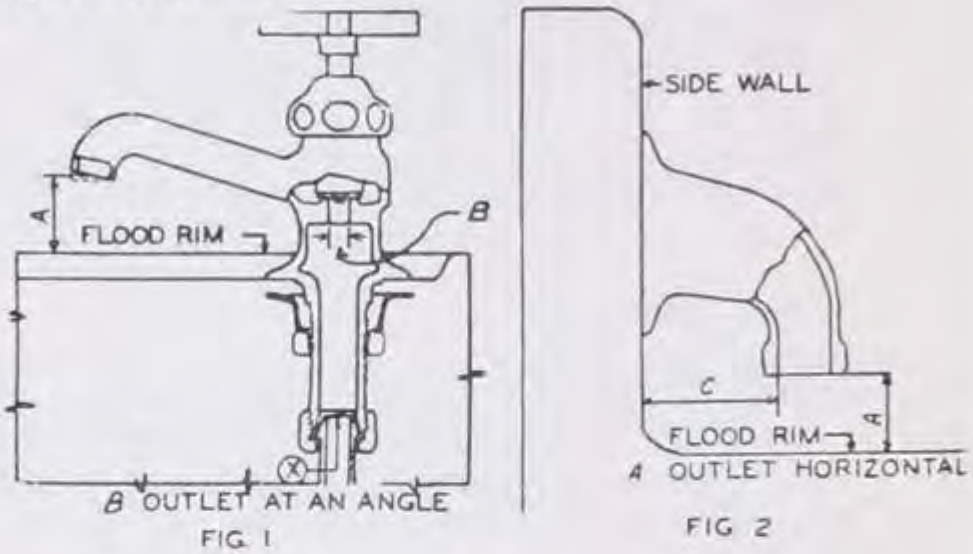
C.6 MATERIALS

C.6(1) Backflow preventers shall be made of corrosion-resistant material and shall be so designed and proportioned as to prevent deterioration or deformation under reasonable service conditions.

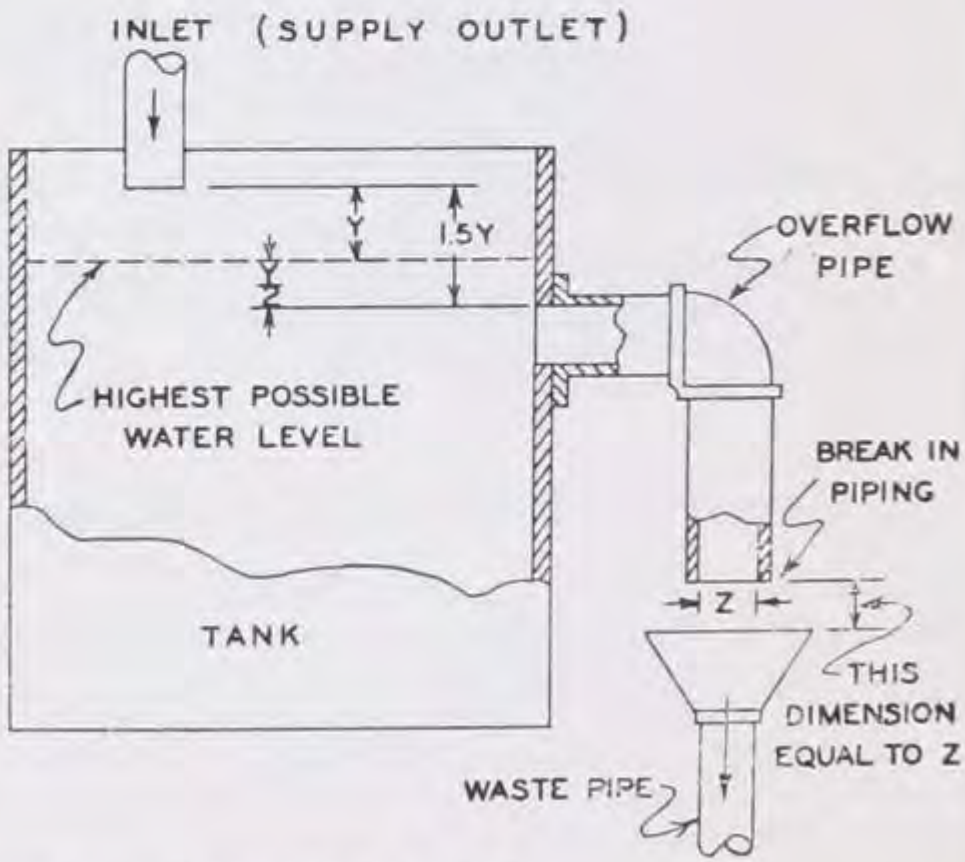
C.7 TESTS AND PERFORMANCE

C.7(1) Backflow preventers shall have been tested and approved to meet tests and performances as required for backflow preventers ANSI A40.6–1943, or current issue thereof.

Fig. C.1, C.2, and C.3.



AIR GAP FOR OPEN TANKS WITH OVERFLOW



Y = MINIMUM REQUIRED AIR GAP

C.8 DRINKING-FOUNTAIN STANDARDS (ANSI Z4.2–1942)

C.8(1) Material. The fountain should be so constructed of impervious material, such as vitreous china, porcelain, enameled cast iron, other metals, or stoneware.

C.8(2) Installation. The jet of the fountain should issue from a nozzle of nonoxidizing, impervious material set at an angle from the vertical such as to prevent the return of water in the jet to the orifice or orifices from whence the jet issues. The nozzle and every other opening in the water pipe or conductor leading to the nozzle should be above the edge of the bowl, so that such nozzle or opening cannot be flooded in case a drain from the bowl of the fountain becomes clogged.

C.8(3) Protection. The end of the nozzle should be protected by nonoxidizing guards to prevent the mouth and nose of the user from coming in contact with the nozzle. Guards should be so designed that the possibility of transmission of infection by touching the guards is reduced to a minimum.

C.8(4) Spattering. The inclined jet of water issuing from the nozzle should not touch the guard, and thereby cause spattering.

C.8(5) Cleansing. The bowl of the fountain should be so designed and proportioned as to be free from corners which would be difficult to clean or which would collect dirt.

C.8(6) Splashing. The bowl of the fountain should be so proportioned as to prevent unnecessary splashing at a point where the jet falls into the bowl.

C.8(7) Traps. The drain from the fountain should not have a direct physical connection with a waste pipe, unless the drain is trapped.

C.8(8) Flow regulator. The water-supply pipe should be provided with an adjustable valve fitted with a loose key or an automatic valve permitting the regulation of the rate of flow of water to the fountain so that the valve manipulated by the users of the fountain will merely turn the water on or off.

C.8(9) Height. The height of the fountain at the drinking leve should be such as to be most convenient to persons using the fountain The provision of several step-like elevations to the floor at fountains wi permit children of various ages to utilize the fountain.

C.8(10) Flow. The waste opening and pipe should be of sufficien size to carry off the water promptly. The opening should be provided wit a strainer.

APPENDIX D[1]

SIZING THE WATER SUPPLY SYSTEM

GENERAL

Proper design of the water-distributing system in a building is necessary in order that the various fixtures may function properly. The amount of either hot or cold water used in any building is variable, depending on the type of structure, usage, occupancy, and time of day. It is necessary to provide piping, water heating, and storage facilities of sufficient capacity to meet the peak demand without wasteful excess in either piping or equivalent cost.

For additional information on this subject the reader is referred to "Water Supply Piping for Plumbing Systems" by F.M. Dawson and A. A. Kalinske—Technical Bulletin No. 3 of the National Association of Master Plumbers; "Water-Distributing Systems for Buildings" by Roy B. Hunter; Report BMS 79 of the National Bureau of Standards; and Plumbing Manual -- Report BMS 66 also published by the National Bureau of Standards.

This appendix gives a suggested procedure for sizing the water-supply system prepared by F. M. Dawson.

D.1 PRELIMINARY INFORMATION

D.1(1) Available Pressure. Obtain the necessary information regarding the minimum daily service pressure in the area where the building is to be located.

D.1(2) Piping Material. Obtain all available local information regarding the use of different kinds of pipe with respect both to durability and to decrease in capacity with length of service in the particular water supply.

---

[1] Extracted from American Standard National Plumbing Code (ASA A40.8-1955) with the permission of the publisher, The American Society of Mechanical Engineers, 345 E. 47th Street, New York, New York, 10017.

D.2 ESTIMATE OF DEMAND LOAD AND PIPE CAPACITY

D.2(1) Rate of Flow. One of the important items that must b determined before any part of the water-piping system can be sized is th probable rate of flow in any particular reach of piping. The rate of flow i the service line, risers, and main branches, however, will rarely be equal t the sum of the rates of flow of all connected fixtures. In fact, th probability of every fixture in a large group being used at the same time so remote that it would be very poor engineering to design the piping larg enough to take care of such simultaneous flow.

D.2(2) Simultaneous Use. The demand load in building water supply systems cannot be determined exactly and is not readily stan dardized. The two main problems to be considered are: (1) Th satisfactory supply of water for a given fixture and (2) the number o fixtures which may be assumed to be in use at the same time.

D.2(3) Daily Demand. The minimum flow that will be satisfactor to the consumer depends greatly on the consumer, his standard of livin his professional needs, size of family, garden requirements, and simil factors. Depending on those factors, per capita water consumption fo domestic use usually varies between 20 and 80 gallons per day.

D.2(4) Type of Building. Experience indicates that the type o dwelling has considerable influence on the water consumption.

D.2(5) Apartment Buildings. In apartment houses the per capi daily water consumption is generally higher than in single family house This is due to the central metering system which is not conducive to th saving of water and to long hot-water lines which result in high heat losse thus in the wasting of the cooled water. In designing water supply systen for apartment houses, a daily per capita water consumption of 50 gallo may be considered a safe design figure.

D.2(6) Dwellings. Although a considerable number of housin projects have been developed across the nation, conclusive wate consumption data have not been gathered as yet. Nevertheless it seem that the daily per capita water consumption in housing projects falls i between the consumption in apartment houses and single dwellings at th

same geographical location. In general, a daily per capita water consumption of 50 gallons can be used as a safe design figure for housing projects.

D.3 FLOW AND PRESSURE REQUIRED

D.3(1) Table D.3(2) gives the rate of flow desirable for many common types of fixtures, and the average pressure necessary to give this rate of flow. The pressure necessarily varies with fixture design; with some, a much greater pressure is necessary to give the same rate of flow than with others.

D.3(2)

TABLE D.3(2)
RATE OF FLOW AND REQUIRED PRESSURE DURING FLOW FOR DIFFERENT FIXTURES

Fixture	Flow Pressure (a) psi	Flow rate gpm
Ordinary basin faucet	8	3.0
Self-closing basin faucet	12	2.5
Sink Faucet—3/8 inch	10	4.5
Sink Faucet—1/2 inch	5	4.5
Bathtub faucet	5	6.0
Laundry tub cock—1/2 inch	5	5.0
Shower	12	5.0
Ball-cock for closet	15	3.0
Flush valve for closet	10-20	15-40 (b)
Flush valve for urinal	15	15.0
Garden hose, 50 ft. and sill cock	30	5.0

(a) Flow pressure is the pressure in the pipe at the entrance to the particular fixture considered.

(b) Wide range due to variation in design and type of flush-valve closets.

D.3(3) In estimating the load, the rate of flow is frequently computed in fixture units.

D.3(4) Table D.3(5) gives the demand weight in terms of fixture units for different plumbing fixtures under several conditions of service.

D.3(5)

TABLE D.3(5)
DEMAND WEIGHT OF FIXTURES IN FIXTURE UNITS
(a)

Fixture or Group (b)	Occupancy	Type of supply Control	Weight in Fixture Units (c)
Watercloset	Public	Flush valve	10
Watercloset	Public	Flush tank	5
Pedestal urinal	Public	Flush valve	10
Stall or wall urinal	Public	Flush valve	5
Stall or wall urinal	Public	Flush tank	3
Lavatory	Public	Faucet	2
Bathtub	Public	Faucet	4
Shower head	Public	Mixing valve	4
Service sink	Office, etc.	Faucet	3
Kitchen sink	Hotel or restaurant	Faucet	4
Water closet	Private	Flush valve	6
Water closet	Private	Flush tank	3
Lavatory	Private	Faucet	1
Bathtub	Private	Faucet	2
Shower head	Private	Mixing valve	2
Bathroom group	Private	Flush valve for closet	8
Bathroom group	Private	Flush tank for closet	6
Separate shower	Private	Mixing valve	2
Kitchen sink	Private	Faucet	2
Laundry trays (1-3)	Private	Faucet	3
Combination fixture	Private	Faucet	3

(a) For supply outlets likely to impose continuous demands, estimate continuous supply separately and add to total demand for fixtures.

(b) For fixtures not listed, weights may be assumed by comparing the fixture to a listed one using water in similar quantities and at similar rates.

(c) The given weights are for total demand. For fixtures with both hot and cold water supplies, the weights for maximum separate demands may be taken at three-fourths the listed demand for supply.

D.3(6) Chart No. 1 gives the estimated demand in gallons per minute corresponding to any total number of fixture units. Chart No. 2 shows an enlargement of Chart No. 1 for a range up to 250 fixture units.

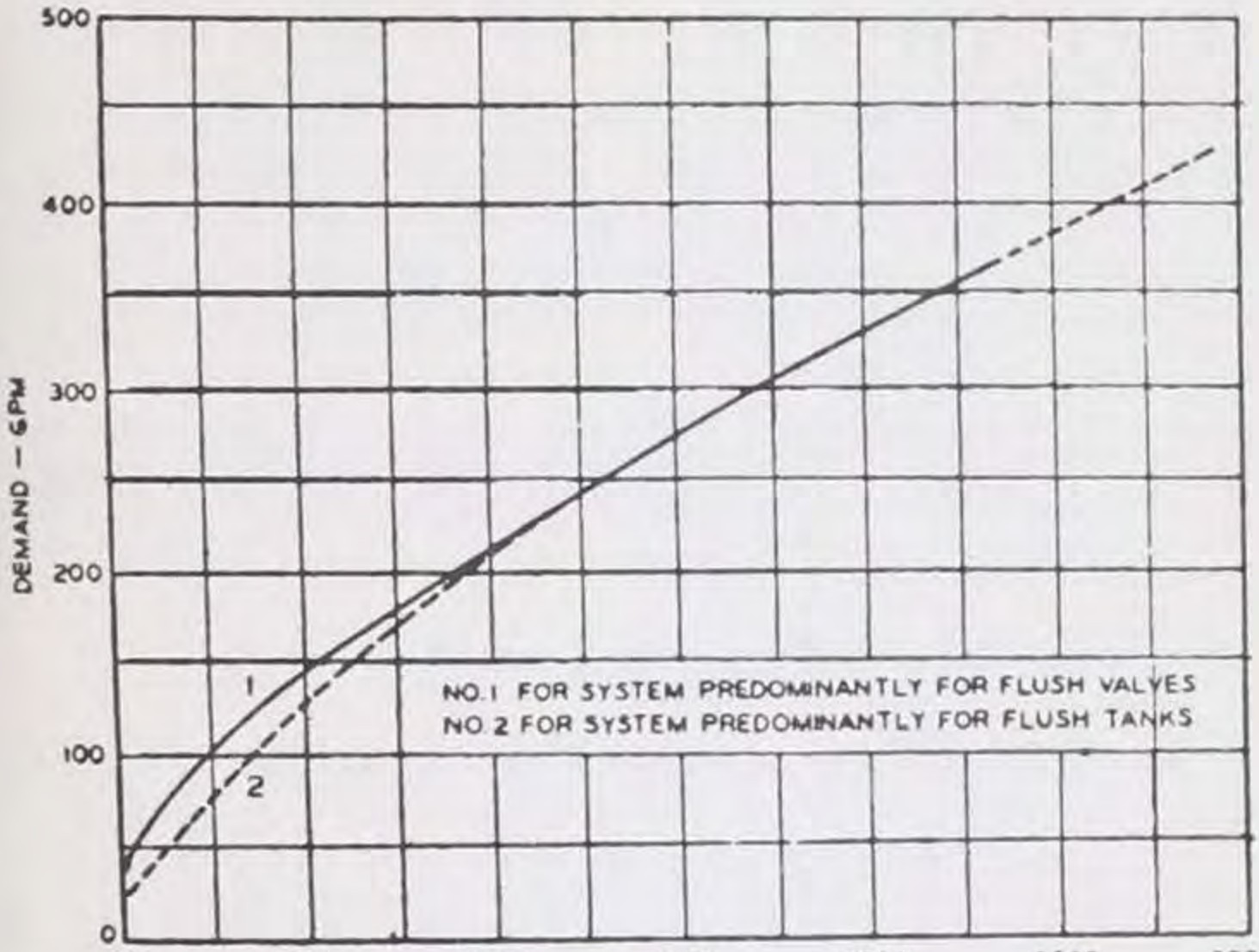


Chart 1 ESTIMATE CURVES FOR DEMAND LOAD

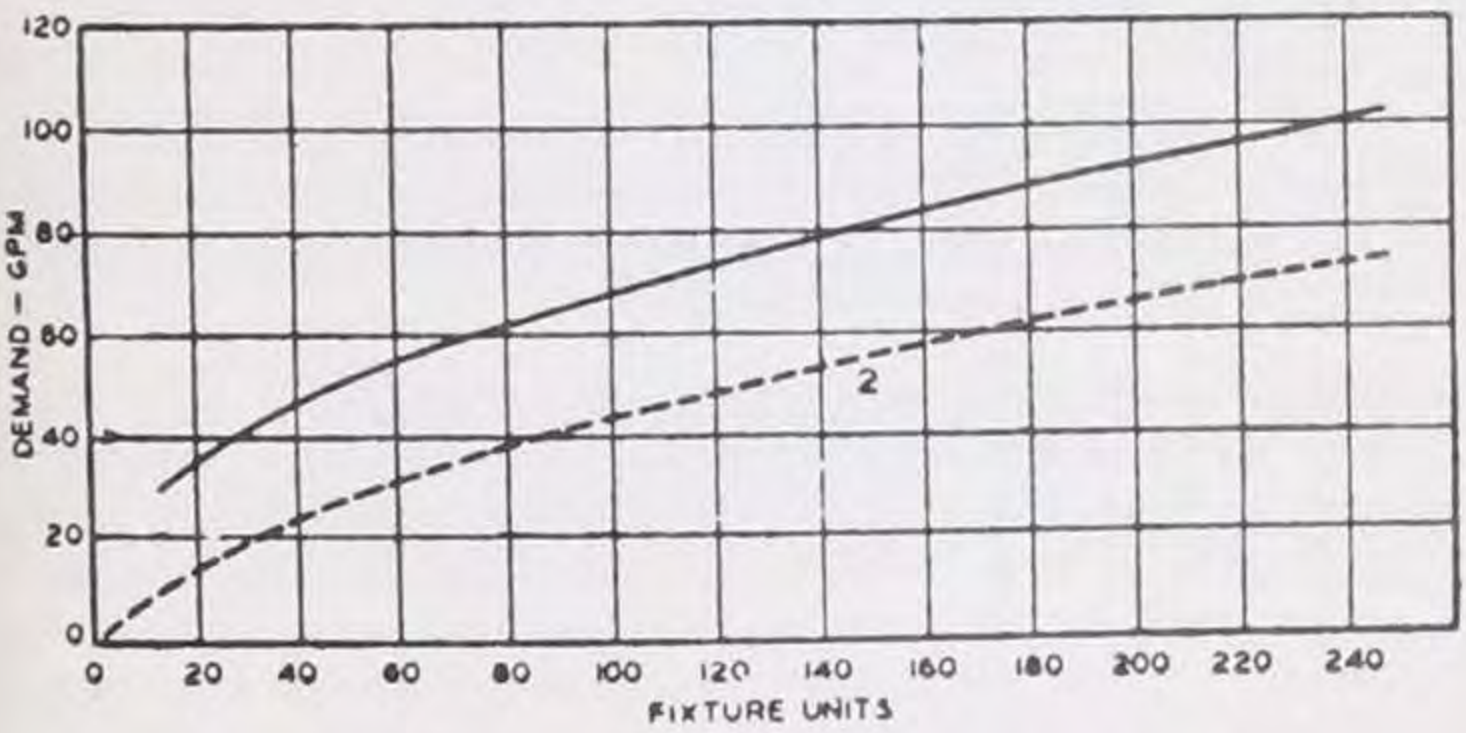


Chart 2 ENLARGED SCALE DEMAND LOAD

D.3(7) The estimated demand load for fixtures used intermittently on any supply pipe will be obtained by multiplying the number of each kind of fixture supplied through that pipe by its weight from Table D.3(5), adding the products, and then referring to the appropriate curve of Chart Nos. 1 or 2 to find the demand corresponding to the total fixture units. In using this method it should be noted that the demand for fixture or supply outlets other than those listed in the table of fixture units is not yet included in the estimate. The demands for outlets (such as hose connections, air conditioning apparatus, etc.) to impose continuous demand during times of heavy use of the weighted fixtures, should be estimated separately and added to the demand for fixtures used intermittently, in order to estimate the total demand.

D.4 SIZING COLD-WATER-SUPPLY PIPING

D.4(1) Pressure Loss. As water flows through a pipe, the pressure continually decreases along the pipe, due to loss of energy from friction. The problem is then one of ascertaining the minimum pressure in the street main, and the minimum pressure required for the operation of the topmost fixture. (A pressure of 15 psi is ample for flush valves, but reference should be made to the manufacturers' requirements. A minimum of 8 psi should be allowed for other fixtures.) The pressure differential thus obtained will be available for overcoming pressure losses in the distributing system and in overcoming the difference in elevation between the water main and the highest fixture.

D.4(2) Pressure Loss by Elevation. The pressure loss, in pounds per square inch, caused by the difference in elevation between the street main and the highest fixture, may be obtained by multiplying the difference in elevation in feet by the conversion factor 0.43.

D.4(3) Water Flow. When water flows through a pipe, friction occurs as the result of the sliding of water particles past one another. If the pipe wall is rough, the roughness projections cause additional friction, owing to the development of increased turbulence in the flowing water. As the water flows along a smooth pipe, the pressure decreases as a result of a dissipation of energy arising from the internal friction set up by viscosity of the water. This loss in energy is shown by the loss of pressure. The pressure loss in proportioned to the length of straight uniform pipes, and varies greatly with flow velocity, pipe diameter, and roughness of pipe.

D.5 PIPE CLASSIFICATION

D.5(1) On the basis of inside surface conditions, pipes may be classified as smooth, fairly rough, and rough, as follows:

D.5(2) Smooth pipe. The inside pipe surface shows no perceptible roughness. Pipes made of copper, brass, or lead may usually be classified as smooth.

D.5(3) Fairly Rough. All ordinary pipes such as wrought iron, galvanized iron, steel, and cast iron, after a few years of usage, may be called fairly rough.

D.5(4) Rough. Pipes that have deteriorated fairly rapidly for some 10 or 15 years after being laid, are classified as rough.

D.6 FLOW CHARTS

D.6(1) Charts 3, 4 and 5 give the pipe-friction losses corresponding to these three types of pipes for various nominal diameters.

Example 1. A 2½-inch fairly rough pipe supplies 100 gpm of water. Find the friction loss in head if the pipe length is 200 ft.

Solution. Enter Chart 4 at 100 gpm and move along this line until it intersects the 2½-inch diameter line. From this intersection point, move vertically down and read 4.5 psi friction loss per 100 ft. of pipe length. Then the total friction loss will be 2 X 4.5 = 9 psi.

D.7 FITTINGS, VALVES, AND METERS

D.7(1) The pressure losses in the distributing system will consist of the pressure losses in the piping itself, plus the pressure losses in the pipe fittings, valves, and the water meter. Estimated pressure losses for disc-type meters for various rates of flow are given in Chart No. 6.

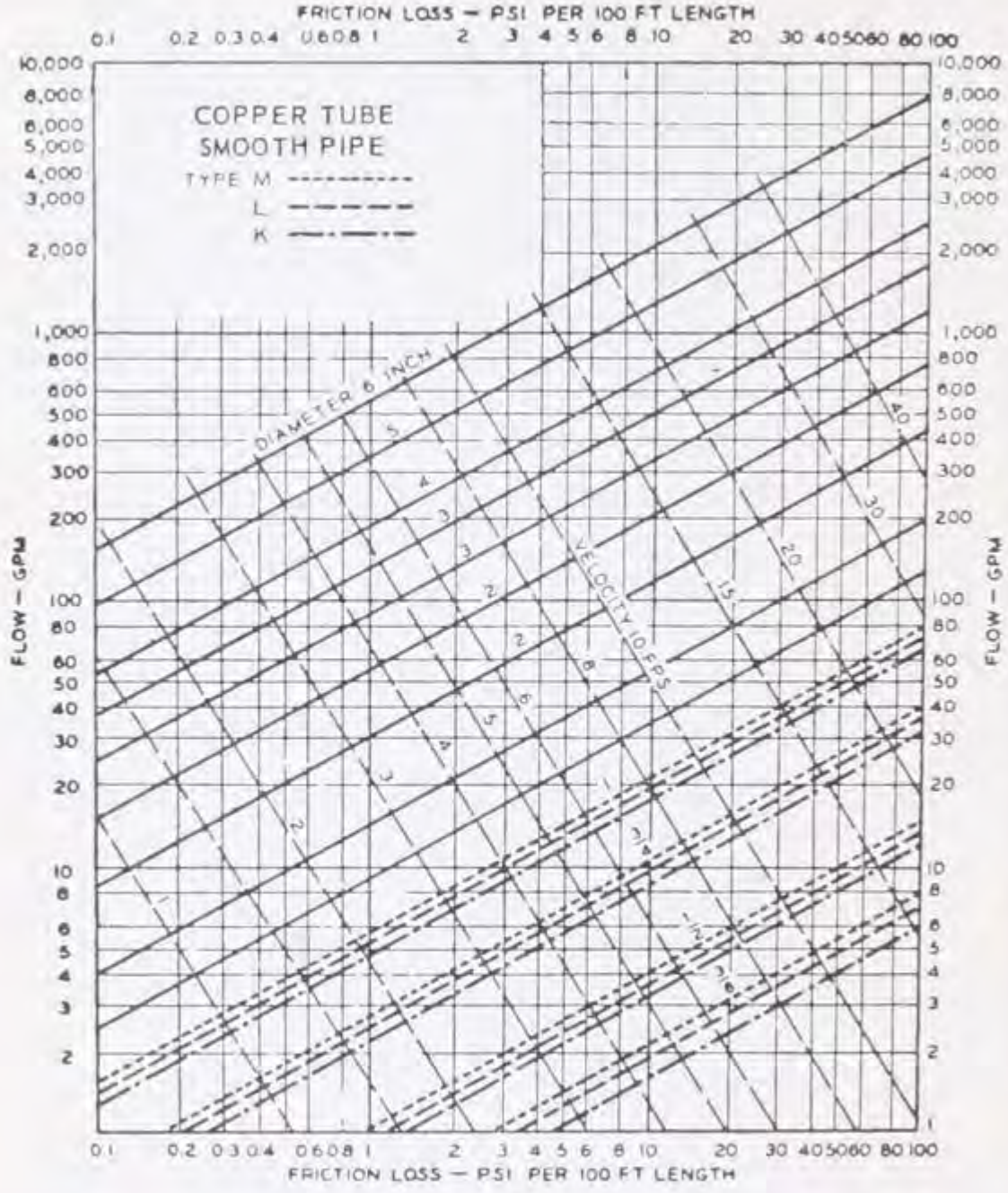

FRICTION LOSS — PSI PER 100 FT LENGTH
0.1 0.2 0.3 0.4 0.6 0.8 1 2 3 4 5 6 8 10 20 30 40 50 60 80 100
COPPER TUBE
SMOOTH PIPE
TYPE M
L
K
DIAMETER 6 INCH
VELOCITY 10 FPS
FLOW — GPM
10,000 8,000 6,000 5,000 4,000 3,000 2,000 1,000 800 600 500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1
FRICTION LOSS — PSI PER 100 FT LENGTH

Chart 3

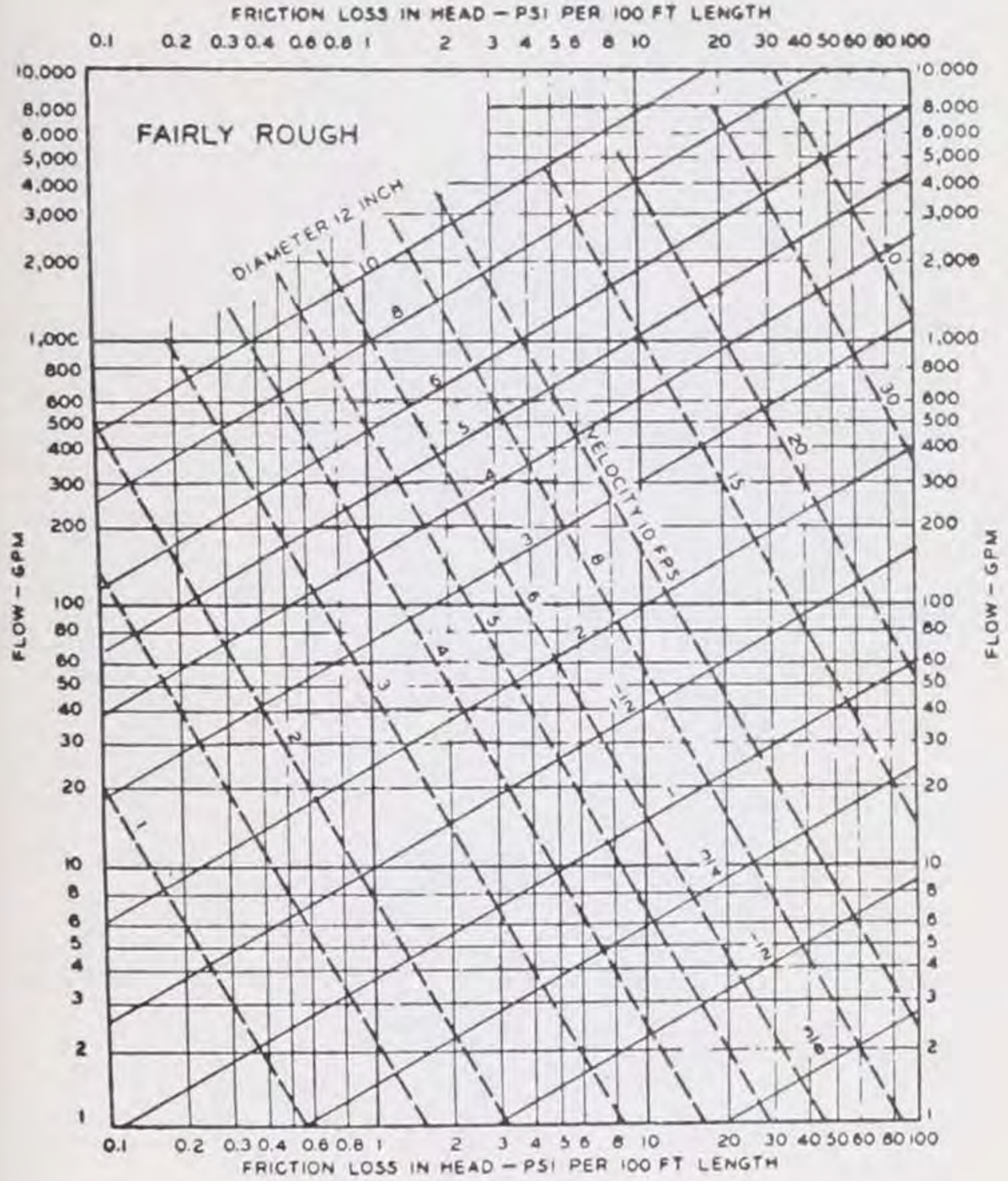

FRICTION LOSS IN HEAD — PSI PER 100 FT LENGTH
0.1 0.2 0.3 0.4 0.6 0.8 1 2 3 4 5 6 8 10 20 30 40 50 60 80 100
FAIRLY ROUGH
DIAMETER 12 INCH
10
8
6
5
4
3
2
1½
1
¾
½
VELOCITY 10 FPS
30
20
15
FLOW — GPM
10,000
8,000
6,000
5,000
4,000
3,000
2,000
1,000
800
600
500
400
300
200
100
80
60
50
40
30
20
10
8
6
5
4
3
2
1

Chart 4

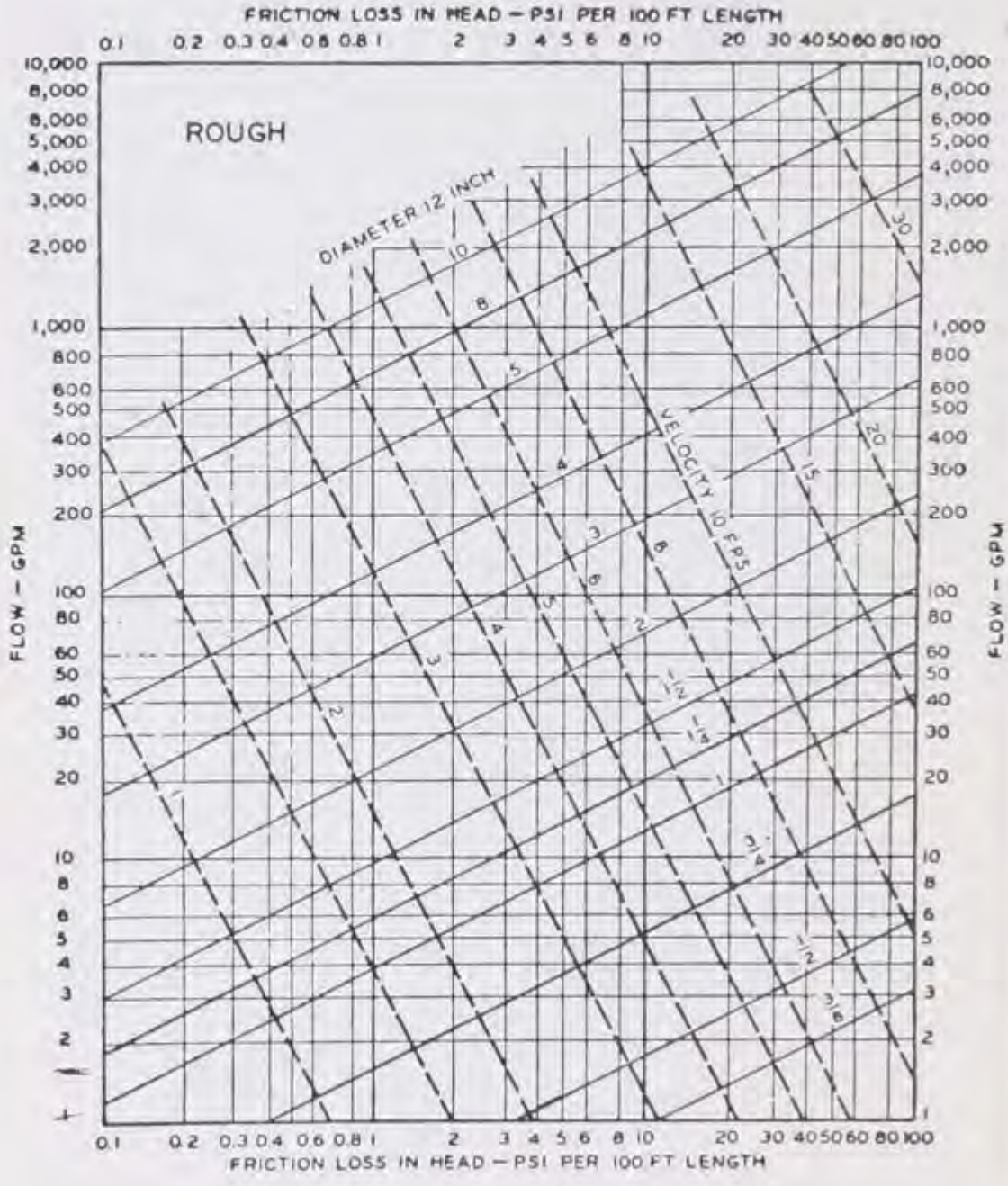

FRICTION LOSS IN HEAD — PSI PER 100 FT LENGTH
0.1 0.2 0.3 0.4 0.6 0.8 1 2 3 4 5 6 8 10 20 30 40 50 60 80 100
ROUGH
DIAMETER 12 INCH
10
8
5
4
3
2
1
VELOCITY 10 FPS
30
20
15
8
6
5
4
3
2
1½
1¼
1
¾
½
⅜
FLOW — GPM
10,000
8,000
6,000
5,000
4,000
3,000
2,000
1,000
800
600
500
400
300
200
100
80
60
50
40
30
20
10
8
6
5
4
3
2
1
FRICTION LOSS IN HEAD — PSI PER 100 FT LENGTH

Chart 5

D.7(2) Flow limits for disc-type meters, which may be regarded as the limits of recommended ranges in capacities, are given in Table D.7(3). For information on other types of meters, the manufacturer should be consulted.

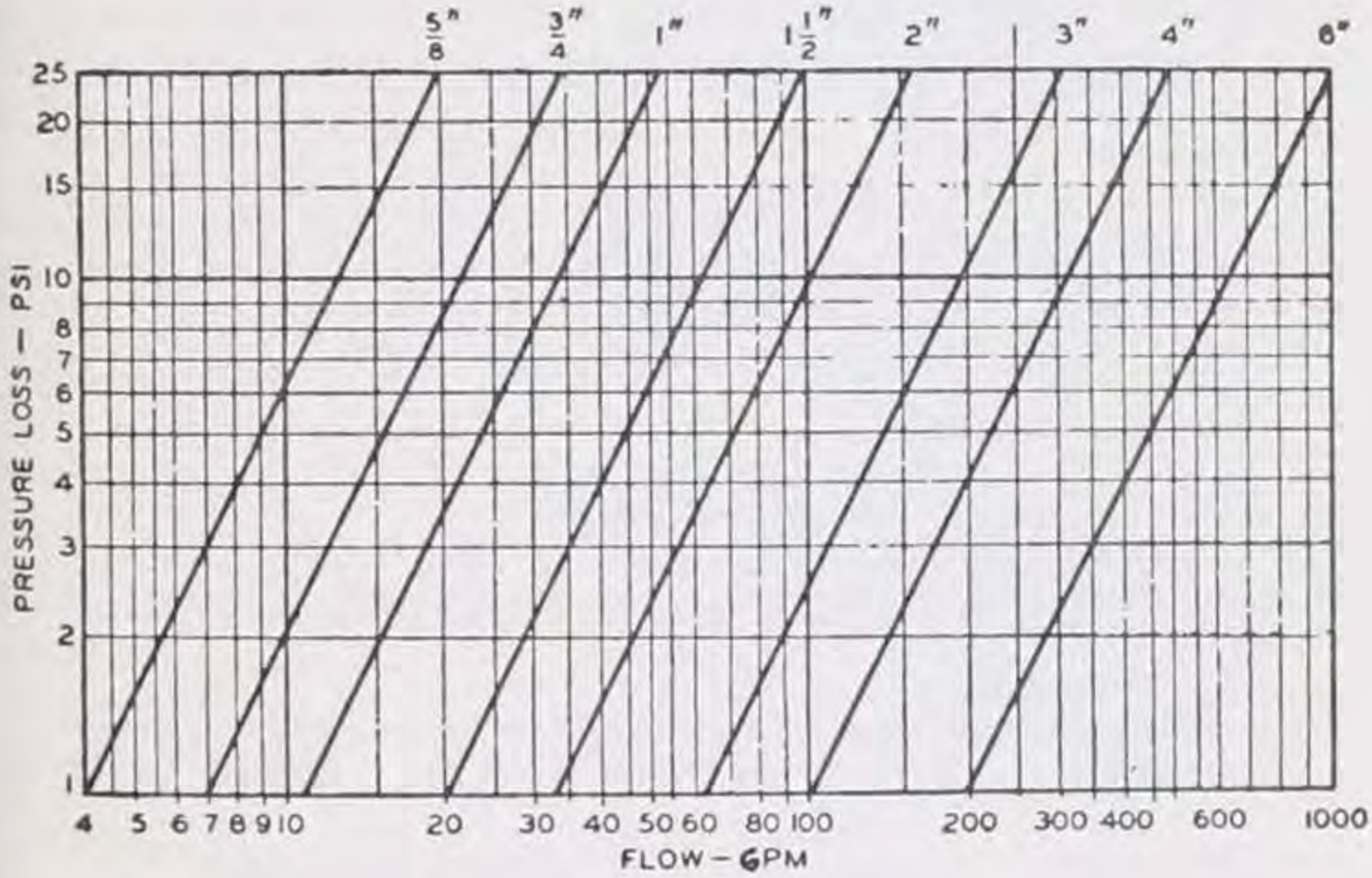


Chart 6
PRESSURE LOSSES IN DISC-TYPE WATER METERS

TABLE D.7(3)
PERFORMANCE REQUIREMENTS OF WATER METERS
(a)

Pipe Size inches	Normal Test-Flow Limits Gpm	Minimum Test Flow Hours
5/8	1 to 20	1/4
3/4	2 to 34	1/2
1	3 to 53	3/4
1 1/2	5 to 100	1 1/2
2	8 to 160	2
3	16 to 315	4
4	28 to 500	7
6	48 to 1,000	12

(a) American Water Works Association Standards.

D.7(4) Registration. The registration on the meter dial shall indicat the quantity recorded to be not less than 98 per cent nor more than 10 per cent of the water actually passed through the meter while it is bein tested at rates of flow within the specified limits (see Table D.7(3).) unde normal test-flow limits. There shall be not less than 90 per cent of th actual flow recorded when a test is made at the rate of flow set fort under minimum test flow.

D.7(5) Chart 7 shows the variation of pressure loss with rate of flow for various types of faucets and cocks, based on experimental dat obtained at the State University of Iowa.

A ½ in. laundry bib (old style)
B Laundry compression faucet
C_1 ½ in. compression sink faucet (manufacturer 1)
C_2 ½ in. compression sink faucet (manufacturer 2)
D Comb. comp. bathtub faucet (both open)
E Comb. compression sink faucet
F Basin faucet
G Spring self-closing faucet
H Slow self-closing basin faucet

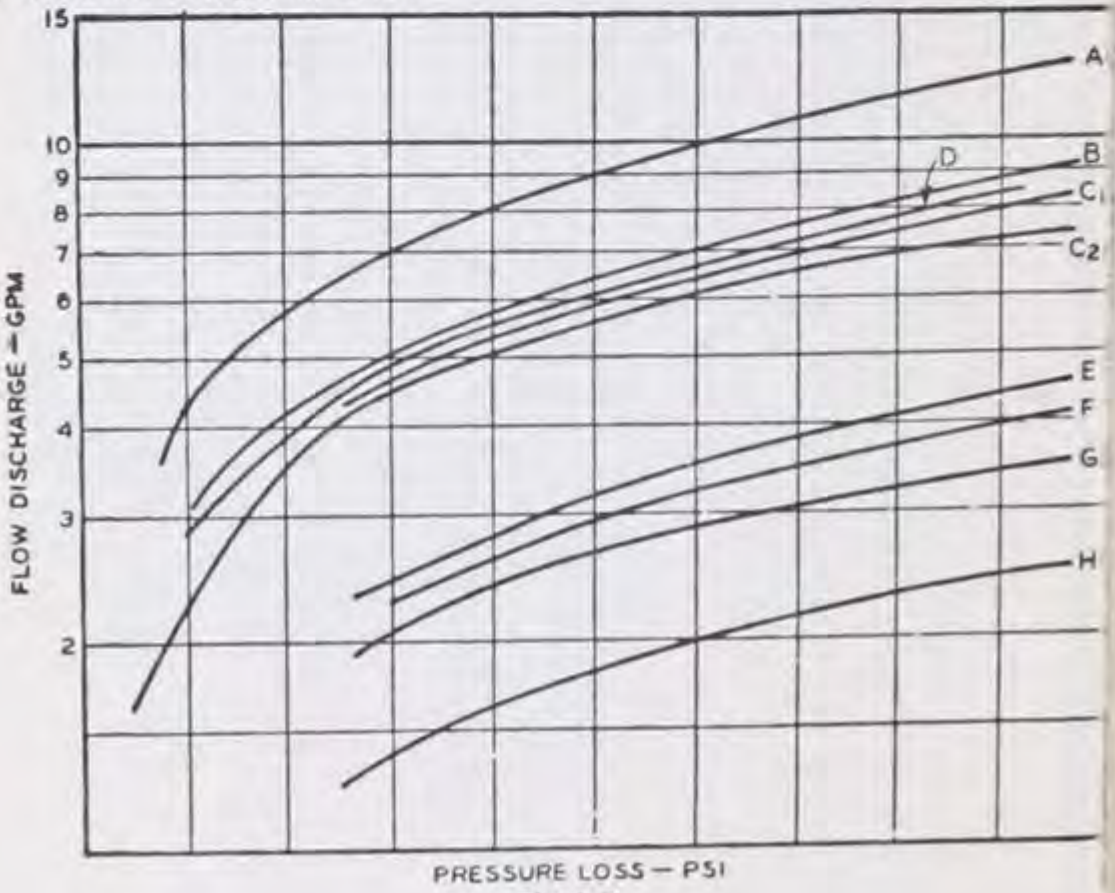


Chart 7

D.7(6) The loss of pressure through any fitting or valve can be expressed in pounds per square inch for any given rate of flow. Experience has shown, however, that the simplest method of expressing losses in fittings and valves is to use the concept of an equivalent length of straight pipe. It has been found, for example, that a 1-inch, 90-degree elbow, introduces a loss which is equivalent to a 2.2-feet of straight 1 inch pipe. Therefore, for each 1-inch, 90-degree elbow, 2.2-feet of 1-inch pipe are added to the total length of 1-inch pipe.

D.7(7) Estimated pressure losses for pipe fittings and valves in terms of equivalent pipe lengths are shown in Table D.7(8).

TABLE D.7(8)
ALLOWANCE IN EQUIVALENT LENGTH OF PIPE FOR FRICTION LOSS IN VALVES AND THREADED FITTINGS

Diameter of Fitting Inches	90 Deg. Standard Ell Feet	45 Deg. Stand-ard Ell Feet	90 Deg. Side Tee Feet	Coupling or Straight Run of Tee Feet	Gate Valve Feet	Globe Valve Feet	Angle Valve Feet
3/8	1	0.6	1.5	0.3	0.2	8	4
1/2	2	1.2	3	0.6	0.4	15	8
3/4	2.5	1.5	4	0.8	0.5	20	12
1	3	1.8	5	0.9	0.6	25	15
1 1/4	4	2.4	6	1.2	0.8	35	18
1 1/2	5	3	7	1.5	1	45	22
2	7	4	10	2	1.3	55	28
2 1/2	8	5	12	2.5	1.6	65	34
3	10	6	15	3	2	80	40
3 1/2	12	7	18	3.6	2.4	100	50
4	14	8	21	4	2.7	125	55
5	17	10	25	5	3.3	140	70
6	20	12	30	6	4	165	80

D.7(9) Table D.7(10) lists the equivalent lengths for various special types of apparatus and fittings. The loss in water meters varies considerably with the design even in meters of the same nominal size. The values given in Table D.7(10) are ample for the well-known meters now on the market.

TABLE D.7(10)
EQUIVALENT LENGTHS OF IRON PIPE TO GIVE SAME LOSS AS SPECIAL FITTINGS OR APPARATUS

Fitting Apparatus	Nominal Diameter of Pipe			
	½ In. Feet	¾ in. Feet	1 In. Feet	1¼ In. Feet
30-gal. Vertical hot-water tank, ¾-in. pipe	4	17	56	.....
30-gal. Horizontal hot-water tank, ¾-in. pipe	1.2	5	16	.....
Water meters (No valves included).....				
⅝ in. with ½-in. connections.....	6.7	28	90	.....
⅝ in. with ¾-in. connections	4.8	20	64	.....
¾ in. with ¾-in. connections	3.4	14	45	.....
1 in. with 1-in. connections	.....	9	30	115
1¼ in. with 1-in. connections.....	.....	4.4	14	54
Water softener	.....	50-200	.....	.....

Example 2. Assume a minimum street-main pressure of 55 psi; a height of topmost fixture above street main of 50 ft.; a developed pipe length from water main to highest fixture of 100 ft; a total load on the system of 50 fixture units; and that the water closets are flush-valve operated. Find the required size of supply main.

Solution. From Chart 2 the estimated peak demand is found to be 51 gpm. From Table D.7(3) it is evident that several sizes of meters would adequately measure this flow. From Chart No. 6 the pressure drop through a 1½-in. disc-type meter for a flow of 51 gpm is found to be 6.5 psi.

Then the pressure drop available for overcoming friction in pipes and fittings is 55–(15 + 50 times 0.43 + 6.5) = 12 psi.

At this point it is necessary to make some estimate of the equivalent pipe length of the fittings on the direct line from the street main to the highest fixture. The exact equivalent length of the various fittings cannot now be determined since the pipe sizes of the building main, riser, and branch leading to the highest fixture are not known as yet, but a first approximation is necessary in order to make a tentative selection of pipe sizes. If the computed pipe sizes differ from those used in determining the equivalent length of pipe fittings, a recalculation will be necessary, using

the computed pipe sizes for the fittings. For the purposes of this example assume that the total equivalent length of the pipe fitting is 50 ft. Then the permissible pressure loss per 100 ft. of equivalent pipe is 12 times 100/(100 + 50) = 8 psi.

Assuming that the corrosive and caking properties of the water are such that Chart No. 4 for fairly rough pipe is applicable, a 2-in. building main will be adequate.

The sizing of the branches of the building-main, the risers, and fixture branches follow the principles outlined. For example, assume that one of the branches of the building-main carries the cold water supply for 3 water closets, 2 bathtubs, and 3 lavatories. Using the permissible pressure loss of 8 psi per 100 ft. the size of the branch determined from Table D.3(5), and Charts 2 and 4 is found to be 1½ in. Items entering the computation of pipe size are given in Table D.7(11).

TABLE D.7(11)
COMPUTATION OF BRANCH SIZE IN EXAMPLE 2

Number and kind of Fixtures	Fixture Units (from Table D. 3(5) & Note C)	Demand (from Chart 2)	Pipe Size (from Chart 4) Inches
3 flush valves.....	3 x 6 =18		
2 bathtubs.....	¾(2 x 2)= 3		
3 lavatories.....	¾(3 x 1)= 2.25		
Total.....	23.25	38	1½

D.8 UP-FEED AND DOWN-FEED SYSTEMS

D.8(1) The principles involved in sizing either up-feed or down-feed systems are the same. The principal difference in procedure is that in the down-feed system, the difference in elevation between the house tank and the fixtures provides the pressure required to overcome pipe friction.

D.8(2) The water demand for hose hibbs or other large-demand fixtures taken off the building main is frequently the cause of inadequate water supply to the upper floor of a building. This condition may be

prevented by sizing the distribution system so that the pressure drops from the street-main to all fixtures are the same. It is good practice to maintain the building main of ample size (not less than 1 in. where possible) until all branches to hose bibbs have been connected. Where the street-main pressure is excessive and a pressure reducing valve is used to prevent water hammer or excessive pressure at the fixtures, it is frequently desirable to connect hose bibbs ahead of the reducing valve.

D.8(3) The recommended procedure in sizing piping systems may be outlined as follows:

1) Draw a sketch of the main lines, risers, and branches indicating the fixtures served. Indicate the rate of flow of each fixture.

2) Using Table D.3(5), compute the demand weights of the fixtures in fixture units.

3) Determine the total demand in fixture units and, using Chart 1 or Chart 2, find the expected demand in gallons per minute.

4) Determine the equivalent length of pipe in the main lines, risers, and branches. Since the sizes of the pipes are not known, the exact equivalent length for various fittings, etc., cannot be made. Add up the equivalent lengths starting at the street main and proceeding along the service line, main line in the building, and up the riser to the top fixture of the group served.

5) Determine the average minimum pressure in the street main and the minimum pressure required for the operation of the topmost fixture. This latter pressure should be 8 to 15 psi.

6) Calculate the approximate value of the average pressure drop per 100 feet of pipe in the equivalent length determined in Item 4.

Do this according to the following rule:

$$p = (P - 0.43\,H - 10)\,\frac{100}{L}$$

where p = average pressure loss per 100 feet of equivalent length of pipe in psi.

P = pressure in street-main in psi

H = height of highest fixture above street main in feet. .

L = equivalent length determined in Item 4

If the system is of the down-feed supply from a gravity tank, the height of water in the tank converted to pounds per square inch by multiplying 0.43 replaces the street-main pressure and the term 0.43H in the equation of Item 6 is added instead of subtracted in calculating the term p. In this case H will be the vertical distance in the fixture below the bottom of the tank.

7) From the expected rate of flow determined in Item 3 and the value of p calculated in Item 6, choose the sizes of pipe, from Charts 3,4 or 5.

APPENDIX M.H.P.

MOBILE HOME PARK PLUMBING

Chapter 135D, Code of Iowa, provides for the regulation of the establishment and operation of mobile home (trailer) parks. This law specifies that no park shall be constructed or remodeled without first obtaining a permit from the State Department of Health.

Under one provision of this law, the Department has adopted Rules and Regulations Governing Licensing of Mobile Home Parks. These rules include definite standards regarding park water supply and sanitary waste disposal systems; and provision for issuing permits for park construction or reconstruction projects on the basis of plans and specifications showing facilities that conform with certain specified standards.

Any person considering the construction of, or the alteration of the sanitary facilities in, a mobile home park should obtain a copy of the Rules and Regulations Governing Licensing of Mobile Home Parks, and the appropriate application forms, from the Department.

APPENDIX

IOWA STATUTES GOVERNING PLUMBING

(Code of 1971)

From Chapter 135, State Department of Health.

135.11 Powers and Duties. The Commissioner of public health shall be the head of the "State Department of Health," which shall:

8. Establish, publish, and enforce a code of rules governing the installation of plumbing in cities and towns and amend the same when deemed necessary in the manner prescribed in section 135.12.

17. Establish, publish and enforce rules not inconsistent with law for the enforcement of the provisions of this title and for the enforcement of the various laws, the administration and supervision of which are imposed upon the department.

135.12 Plumbing code committee. The code of rules governing the installation of plumbing provided for in the preceding section may be amended biennially as conditions may require. The necessary amendments shall be determined by a plumbing code committee which shall be appointed by the commissioner of public health on or before July 1, 1925, and every four years thereafter. Such committee shall consist of the engineer who is head of the division of sanitary engineering, the commissioner of health, the housing commissioner, one master plumber, and one journeyman plumber. The engineer member shall be chairman of the committee.

135.13 Powers of plumbing committee. The committee shall meet at the call of the chairman, which shall be issued during the month of December of each even-numbered year. It shall continue in session until it has agreed upon the amendments deemed necessary to the existing code governing the installation of plumbing.

135.15 Plumbing code fund. Cities and towns licensing plumbers shall pay to the treasurer of state one dollar for each license issued and twenty-five cents for each renewal thereof. The fees so received shall be

kept by the treasurer of the state in a separate fund to be known as th plumbing code fund. Such funds shall be used in paying the claims arisin under the preceding section and in paying the cost of printing the code o rules governing the installation of plumbing, plumbers' license, an application blanks.

From Chapter 368, General Powers of Municipal Corporations.

368.17 Plumbing. All cities having a population of six thousand o more shall, and other cities and towns may, by ordinance, adopt a set o plumbing regulations not inconsistent with state law or state administra tive regulations, and provide for the inspection of plumbing installations They shall have authority to examine and license plumbers, but suc licenses shall be valid only in the municipal corporations where issued provided, however, that any such license issuing authority may issue license without examination to any plumber holding a license fro another municipal corporation recognized by such authority as havin similar licensing standards.

From Chapter 366, Ordinances.

366.7 Notice to public. Notice of the passage, revision, o amendment of ordinances shall be given to the public in the followin manner.

7. The procedure set forth in subsection 5 of this section shall als apply to the adoption by reference of a complete milk, traffic, fir prevention, building, plumbing, and electrical code, and all other complet codes relating to the construction, maintenance, and operation o buildings.

From Chapter 137, Local Boards of Health.

137.6 Powers of local boards. Local boards shall have the followin powers:

1. Enforce state health laws and the rules and lawful orders of th state department.

From Chapter 358A, County Zoning Commission.

358A.25 Plumbing code enforced. Subject to the provisions of sections 358A.1 and 358A.2, the board of supervisors of any county is further authorized to adopt regulations to provide that every dwelling, whether now or hereafter erected within the county but outside the corporate limits of any city or town which shall develop a private water supply or install a pressure water system or install sanitary house drains, shall comply with the recommendations of the state department of health on minimum requirements as set out in the state plumbing code in regard to such development or installation. Any such regulation may be enforced in the same manner as any other regulation adopted under this chapter.

BIBLIOGRAPHY

1. Iowa State Plumbing Code, 1956, Division of Public Health Engineering, Iowa State Department of Health.

2. American Standard National Plumbing Code, ASA A40.8-1955 American Society of Mechanical Engineers, 29 West 39th Street, New York 19, New York. Code Committee also reviewed tentative copy of Revision of the National Plumbing Code, ASA A40.8-1955, Technical Committee on Plumbing Standards, U. S. Public Health Service, Washington 25, D.C., September 15, 1962.

3. Sanitary Standards for Water Wells, Residential and Other Small Installations, Revised 1962, Division of Public Health Engineering, Iowa State Department of Health.

4. Residential Sewage Disposal Systems, Revised 1955, Division of Public Health Engineering, Iowa State Department of Health.

5. Plumbing Cross Connections and Back-Siphonage Research – F. M. Dawson and A. A. Kalinske, Technical Bulletin No. 1, National Association of Master Plumbers of the United States, Inc.

6. Hydraulics and Pneumatics of the Plumbing Drainage System – F. M. Dawson and A. A. Kalinske. Technical Bulletin No. 2, National Association of Master Plumbers of the United States, Inc.

NOTES

NOTES

STATE LIBRARY OF IOWA
3 1723 02075 0766