

248 CMR: BOARD OF STATE EXAMINERS
OF PLUMBERS AND GAS FITTERS

10.06: Materials

- (1) Materials.
- (a) Minimum Standards. All materials, systems, and equipment used in the construction, installation, alteration, repair, replacement, or removal of any plumbing or drainage system or part thereof, shall conform at least to the standards listed in 248 CMR 10.06, except that:
1. the Inspector may allow the extension, addition to or relocation of existing water, soil, waste and/or vent pipes with materials of like grade or quality as permitted under 248 CMR 10.04(6)(a); or
 2. materials not covered by the standards listed in 248 CMR 10.06 may be used with the approval of the Board as permitted under 248 CMR 3.04.
- (b) Installation.
1. All materials installed in plumbing systems shall be so handled and installed as to avoid damage so that the quality of the material will not be impaired.
 2. No defective or damaged materials, equipment or apparatus shall be installed or maintained.
 3. All materials used shall be installed in strict accordance with the standards under which the materials are product accepted ~~and approved~~ by the Board, including the appendices of the standards, and in strict accordance with the manufacturer's instructions.
- (c) Standards and Approval.
1. Materials shall be used only as provided for in 248 CMR 10.00 or as permitted in 248 CMR 3.04.
- (2) Allowable Materials.
- (a) When installing fittings or piping for renovations or alterations within an existing soil stack, waste stack, vent stack or drain, the fitting or piping shall be of the same material as the existing stack or drain and be compliant with a joining method outlined in 248 CMR 10.07. Exception: In new residential construction cast iron pipe may be used exclusively with PVC for sound reduction.
- (b) Sheet Lead. shall meet the following requirements:
1. For a safe pan the sheet lead shall not be less than four pounds per square foot.
 2. For vent terminal flashing the sheet lead shall not be less than three pounds per square foot.
 3. For bends or traps the sheet lead shall not have less than an C inch wall thickness.
- (c) Sheet Copper. Sheet copper shall not be less than 12 ounces per square foot when used in the following applications:
1. safe pan;
 2. shower pan;
 3. flush tank linings;
 4. vent terminal flashing; or
 5. general use.
- (d) Floor Flanges. A floor flange used for a toilet or other similar fixture shall conform to the following requirements.
1. If the flange is composed of brass, the flange shall have a minimum thickness of C inch.
 2. If the flange is composed of cast iron the flange shall have a minimum thickness of ¼ inch, and the minimum caulking depth shall be two inches.
 3. If the flange is composed of hard lead, it shall weigh at least one pound nine ounces and be composed of lead alloy with not less than 7.75% antimony by weight.
 4. Copper and plastic flanges may be used.
 5. A plastic flange must meet current NSF Standards and shall be of the same material to which it connects.

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6. A flange shall be secured to the finished floor on which it sets by screwing or bolting and shall be connected to the specific piping by soldering, caulking or solvent welding as provided for in 248 CMR 10.07.

(e) Cleanouts. Cleanout plugs shall meet the following requirements.

1. Shall be composed of brass or plastic.
2. Shall meet the latest Standards.
3. Shall have raised or countersunk square or hexagon heads.
4. If a tripping hazard may exist, only a countersunk head shall be used.
5. A plastic cleanout plug shall be of the same material to which it connects.

(f) ~~Building Drains (Inside Building). When the Sanitary Drain or Storm Drain is installed in a trench excavated to a uniform width and level and the trench will also encompass the water service pipe, the drain piping shall be bell and spigot cast iron tarred soil pipe with lead and oakum joints. This Section is purposely left blank.~~

(g) Storm and Sanitary Below Ground. The following materials may be used for storm and sanitary piping that is located below ground level, except for materials that are to be used for Special Hazardous Wastes (for Special Hazardous Wastes, See 248 CMR 10.13).

1. Extra heavy cast iron soil pipe and fittings, coated tar or asphaltum ~~may be used provided that the joints are made with packed oakum and molten lead or resilient gaskets.~~
2. Iron size brass or copper pipe with cast brass drainage fittings.
3. Hard drawn type K or L copper tubing, with cast brass drainage pattern fittings.
4. Copper alloy tubing "Heavy" weight conforming to ASTM Standard, color coded aqua and incised marked as "Heavy" with cast brass drainage pattern fittings.
5. Grade H or SL copper coated stainless steel tubing conforming to ASTM Standard, made of Type 430 or Type 439 stainless steel, marked in conformance with 248 CMR 10.06(2)(q); provided that the fittings are cast in the brass drainage pattern.
6. ABS (Acrylonitrile-Butadiene-Styrene) Schedule 40 pipe and fittings as specified under 248 CMR 10.06(2)(p).
7. PVC (Polyvinyl-Chloride) Schedule 40 pipe and fittings as specified under 248 CMR 10.06(2)(o).
8. Epoxy re-enforced fiberglass piping system may be used only for storm water drainage.
9. Service weight cast iron soil pipe and fittings provided that the tarred or plain joints are made with packed oakum and molten lead or resilient gaskets.
10. Hubless Cast Iron Soil Pipe and Fittings.

a. Hubless cast iron soil pipe and fittings may be used in accordance with manufacturer installation instructions, if:

~~i. they are manufactured in accordance with CISPI Standard 301-75; and~~

~~ii. the following test requirements are satisfied:~~

~~(i) Every manufacturer shall perform the pressure and leak test as required under 248 CMR 10.06(2)(v).~~

~~(ii) Deflection Test. A test deflecting the free end of a ten foot length of hubless cast iron soil pipe joined together with a coupling to a secured length of pipe. The test assembly shall be subjected to an internal hydrostatic pressure of ten P.S.I.G. and a minimum deflection of one inch per lineal foot and shall show no visible signs of leakage.~~

~~(iii) Shear Test. The shear test requires the application of a uniformly distributed force or weight of 50 pounds per inch of nominal diameter of the pipe over an arc of 120°, along a longitudinal distance of 12 inches of the unsupported end of the two coupled lengths of pipe immediately adjacent to the assembled joint. The opposite end of the test assembly shall be rigidly secured and the entire unit shall be under an internal hydrostatic pressure of ten P.S.I.G. and shall show no visible signs of leakage.~~

~~(iv) All tests shall be performed in the Commonwealth of Massachusetts and certified as per 248 CMR 10.06(2)(v)5.~~

b. Installations. Installations of hubless systems underground shall conform to 248 CMR 10.05(1) and (2)(a) through (d) and 10.06(1)(b).

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c. Trenching, Tunneling and Backfilling. Trenching, tunneling and backfilling procedures for hubless systems underground shall conform to 248 CMR 10.05(5)(a) through (d) and 10.06(2)(g)10.d.

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d. Hangers and Supports for hubless cast iron soil piping shall conform to the following requirements.

i. General piping shall be installed with provisions for expansion, contraction or structural settlement.

ii. Material. Hangers, anchors and supports shall be composed of metal having sufficient strength to support the piping and its contents, except that piers may be composed of concrete or brick.

iii. Attachments to Buildings or Structures. Hubless cast iron soil pipe shall be supported in accordance with the manufacturer's recommendations or as outlined in the most recent edition of the Cast Iron Soil Pipe Institute (CISPI) Handbook.

iv. Base of Stacks. Bases of stacks shall be supported on concrete, brick laid in cement mortar or metal brackets attached to the building or structure.

v. Hubless Fittings.

(i) There shall be a hanger installed at each change of direction.

(ii) When joining three or more fittings, there shall be a minimum of one hanger for every three-feet or part thereof.

vi. Backfilling. The on-site licensed plumber or the holder of the permit for the underground hubless cast iron soil piping system shall notify the Inspector when the installation is to be backfilled. A licensed plumber shall be present during the backfilling procedure including when all concrete slabs are being poured. This notification provision shall not be subject to the 48 hour notice requirement of 248 CMR 3.05(3)(e).

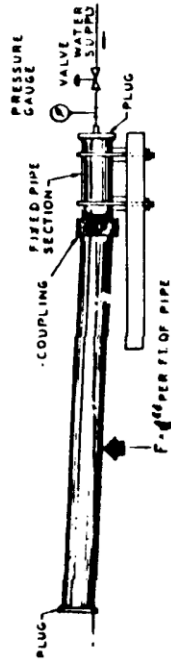
11. Ductile pipe and approved compatible drainage fittings.

12. For Limited Use Only: Schedule 40 PVC, See 248 CMR 10.06(2)(o).

NOTE: BELOW IS BEING DELETED

TEST FOR HUBLESS SOIL PIPE UNDERGROUND COUPLINGS

DEFLECTION TEST

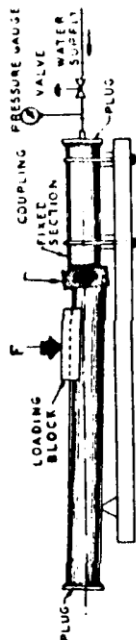


PROCEDURE: the free end of the 10 ft. length of pipe was deflected 1" per foot of pipe length, while the length of pipe, on the other side of the coupling, was secured. The test assembly was subjected to an internal hydrostatic pressure of 10 PSI during the test.

RESULTS:

1½" coupling	no leakage was noted
2" coupling	no leakage was noted
3" coupling	no leakage was noted
4" coupling	no leakage was noted
5" coupling	no leakage was noted
6" coupling	no leakage was noted
8" coupling	no leakage was noted
10" coupling	no leakage was noted

SHEAR TEST



PROCEDURE: A force of 50 pounds per inch of nominal diameter of pipe per 12 inch longitudinal distance was applied over an arc of 120° and along the longitudinal dimension of the unsupported end of the two coupled lengths of pipe. The other end of the test assembly was rigidly secured. A Unite-O-Matic Universal Tester, with a load cell and a recorder, was used to apply the load. The load was held for one hour. The test assembly was subjected to an internal hydrostatic pressure of 10 PSI during the test. The maximum deflection of the coupling joining the two pieces of pipe was also noted.

RESULTS:

	Maximum Coupling Deflection
1½" coupling	no leakage
2" coupling	no leakage
3" coupling	no leakage
4" coupling	no leakage
5" coupling	no leakage
6" coupling	no leakage
8" coupling	no leakage
10" coupling	no leakage

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(h) Storm and Sanitary Above Ground. The following materials may be used for storm and sanitary piping that is located above ground level, except the following materials shall not be to be used for Special Hazardous Wastes (for Special Hazardous Wastes, See 248 CMR 10.13).

1. Extra heavy cast iron soil pipe and fittings, tarred or plain, ~~provided that joints are made with~~ packed oakum and molten lead ~~or resilient gaskets~~.
2. Service weight cast iron soil pipe and ~~fittings provided that tarred or plain joints are made with~~ packed oakum and molten lead ~~or resilient gaskets~~.
3. Hubless cast iron soil pipe and fittings that are manufactured in accordance with CISPI Standard 301-75, and joined with a product approved clamp.
4. Iron size brass or copper pipe with cast brass drainage fittings.
5. Hard drawn Type K, L, M or DWV copper tubing having cast brass or wrought copper drainage pattern fittings;
6. Copper alloy tubing "Heavy" and "Standard" weights conforming to ASTM Standard, color coded aqua and incised marked as either "Heavy" or "Standard" having cast brass or wrought copper drainage pattern fitting.
7. Grades H, G, SL or SM copper coated stainless steel tubing conforming to ASTM Standard, manufactured of Type 430 or Type 439 stainless steel that are plainly marked in conformance with 248 CMR 10.06(2)(q) and provided that the relevant fittings are cast in a brass or wrought copper drainage pattern.
8. Schedule 40 galvanized wrought iron or galvanized steel pipe provided that for sizes greater than two inches it has a plain or galvanized drainage pattern fittings.
9. Schedule 40 galvanized wrought iron or galvanized steel pipe for cases when pipe and fittings are end grooved and are to be joined with an approved split and bolted galvanized steel coupling with gasket;
10. Groove type couplings and fittings for applications that join storm water piping.
11. ABS (Acrylonitrile-Butadiene-Styrene) Schedule 40 pipe and fittings as specified under 248 CMR 10.06(2)(p).
12. PVC (Polyvinyl-Chloride) Schedule 40 pipe and fittings as specified under 248 CMR 10.06(2)(o).
13. For Storm Water Drainage Only. Approved epoxy re-enforced fiberglass piping system.
14. Aluminum DWV pipe with pipe end cap protectors manufactured and installed with hubless cast iron fittings manufactured according to CISPI Standard 301 and joined with a Product-accepted stainless steel no hub pipe clamp and elastomeric sealing sleeve.
15. Ductile pipe and approved compatible drainage fittings.

(i) Vent Pipe and Fittings Below Ground. All materials listed under 248 CMR 10.06(2)(g)1. through 10.06(2)(g)11 may be used.

(j) Vent Pipe and Fittings Above Ground. For vent pipe and fitting above ground the following materials may be used.

1. All materials listed under 248 CMR 10.06(2)(h)1. through 10.06(2)(h)15.
2. Galvanized wrought or galvanized steel pipe not lighter than schedule 40, with cast iron or malleable iron screw or grooved end fittings, plain or galvanized.

(k) Water Service Piping (Outside Building). The materials used shall be those specified by the local municipality.

(l) Water Distribution Piping Below Ground (Inside Building). For water distribution piping that is installed inside a building and below ground, only the following materials may be used.

1. Type K or L tubing incised marked with cast brass fittings.
2. Copper alloy tubing "Heavy" weight conforming to ASTM Standard, color coded aqua and incised marked as "Heavy" with cast brass fittings.
3. Copper core pre-insulated cement pressure pipe that is PVC coated.
4. Any pipe, valve, pipe fitting, aerator, or faucet used in a potable water system shall comply with all applicable NSF-61 Standards.

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5. Cross-linked Polyethylene (PEX) tubing and fittings installed in accordance with 248 CMR 10.06 and 248 CMR 10.08.

(m) Water Distribution Piping Above Ground (Inside Building). For water distribution piping that is installed inside a building and above ground, only the following materials may be used:

1. Iron size brass or copper pipe with cast brass fittings.
2. Type K or L hard drawn copper tubing that is incised marked and has cast brass or wrought copper fittings.
3. Copper alloy tubing "Heavy" and "Standard" weight incised marked, color coded aqua, conforming to ASTM Standard and having cast brass or wrought copper fittings.
4. Exposed galvanized wrought iron or galvanized steel pipe and galvanized fittings only when used for replacement in existing buildings or structures or when used for replacement of large size water mains.
5. CPVC (Chlorinated Polyvinyl Chloride) pipe and fittings may be used in the following situations provided that none of this material is located within 24 inches of any connection to a hot water tank as defined in M.G.L. c. 142, § 17:
 - a. for hot and cold water distribution that is located only in the dwelling portion of a residential dwelling, multiple family dwelling, hotel, motel, inn, condominium and similar building six stories ~~or 60 feet in height~~; or
 - b. On the first floor of mixed use buildings where:
 - i. The only plumbing fixtures on the first floor are toilets, sinks, and drinking water stations;
 - ii. the total number of employees that can be accommodated at any one time on the first floor is 20 individuals and the total gross space on that floor is less than 2,000 square feet; and
 - iii. All additional floors of the building are residential.
 - ~~cb.~~ for the exclusive cold water supply distribution beginning at the outlet of the water meter (or the control valve inside a building) directly dedicated to a drinking water fountain(s) in state licensed or accredited school buildings only.
6. Mechanically grooved pipe couplings and fittings when the following requirements are satisfied.
 - a. The couplings and fittings are used with exposed galvanized wrought iron pipe or exposed galvanized steel pipe on water supply distribution systems provided that the water supply systems operating condition temperature will not exceed 130°F.
 - b. The coupling housings and fittings are cast of malleable galvanized iron as described in ASTM A-47 or all products that meet the requirements of ASTM A-269.
 - c. The elastomeric gasket for the coupling has properties as designated by ASTM D-2000.
7. Cross-linked Polyethylene (PEX) Tubing and Fittings.
 - a. PEX may be used for residential dwellings/ buildings if the installation conforms to the following requirements:
 - i. The PEX tubing is used for hot and cold water distribution in residential dwelling/buildings up to and including ~~three-six~~ stories in height.
 - ii. PEX tubing shall not be installed closer than 24-inches to any connection to a direct-fired water heater, tankless type hot water coil or heating boiler.
 - iii. Mechanical compression type fittings shall not be concealed and must be accessible.
 - iv. Fittings meet Board requirements unless otherwise Product-accepted by the Board as provided for under 248 CMR. 3.04.
 - v. PEX tubing and fittings shall be installed in accordance with the manufacturers recommendations and meet the U.L. flame spread requirements for return air plenums in commercial buildings in accordance with 780 CMR: *The Massachusetts State Building Code.*

- b. PEX tubing may be utilized on the first floor of mixed use buildings where:
 - i. The only plumbing fixtures on the first floor are toilets, sinks, and drinking water stations;

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ii. the total number of employees that can be accommodated at any one time on the first floor is 20 individuals and the total gross space on that floor is less than 2,000 square feet; and

iii. All additional floors of the building are residential.

~~bc.~~ PEX tubing and fittings ~~shall~~may additionally be used in commercial buildings if the installation conforms to the following requirements:

i. PEX tubing is used in a commercial building for the purpose of conveying reverse osmosis or other similar technology processes that produce ("purified water" 248 CMR 10.03), from the point of treatment to a point or multiple points of use for drinking water.

ii. PEX tubing shall be installed at a point which, begins on the outlet side of a Product-accepted reverse osmosis, ("purified water") drinking water device and terminates at a point or multiple points of use *e.g.* Product-accepted dispensers and faucets.

iii. PEX tubing and fittings are not to be used for steam flushing of water purification systems. Only type 316 stainless steel tube and fittings shall be used for this purpose.

8. Polybutylene or polyethylene tanks when used for Storage Heaters and when the tanks have been reinforced with a Product-accepted material.

9. 316 stainless steel tanks when used for storage heaters.

10. Polybutylene, polyethylene, natural polypropylene, Type 1 Grade 1 polyvinyl chloride meeting ASTM standard D 1784 and D 1785, schedule 40 or 80 and cross-linked polyethylene shall be used for the purpose of conveying reverse osmosis purified water from a point of purification to a final point of use.

11. The use of a Product-accepted polypropylene homopolymer drain tube assembly that is designed to be vertically mounted in the downturned outlet of a horizontally mounted relief valve provided that the capacity of the relief valve served by the approved drain assembly does not exceed 100,000 BTU per hour.

12. Any pipe, valve, pipe fitting, aerator, or faucet used in a potable water system shall comply with all applicable NSF-61 Standards.

(n) Pipe, Fittings and Gaskets. Resilient gaskets specified for use with cast iron soil pipe shall be marked as follows.

1. The exposed lip shall be marked clearly and legibly to include:

- a. Manufacturer's name and/or registered trade-mark;
- b. Neoprene;
- c. Date of manufacture; and
- d. ASTM standard.

2. Gaskets for service weight cast iron soil pipe shall bear the letters "SV" on the exposed lip.

3. Gaskets for extra heavy cast iron soil pipe shall bear the letters "XH" on the exposed lip.

(o) PVC Plastic Pipe and Fittings. The following requirements apply to PVC plastic pipe and fittings.

1. PVC ~~shall not~~ be used for drains, waste or vents in commercial kitchens, laundry rooms, public toilet facilities or other commercial areas located in assisted living facilities, hotels, motels, inns or similar establishments, except where provided for elsewhere in 248 CMR 10.06, *i.e.* 248 CMR 10.06(2)(o)2.

2. PVC, Schedule 40 Pipe and Fittings, may be used for the drains, waste and vent piping that serve the sanitary or storm drainage systems in the following buildings:

- a. residential dwellings;
- b. assisted living facilities;
- c. hotels;
- d. motels;
- e. inns;
- f. condominiums; and
- g. other residential buildings that are similar to 248 CMR 10.06(2)(o)2.a. through 10.06(2)(o)2.f. and that are no greater than ten stories in height.

3. PVC Schedule 40 Pipe and Fittings may be utilized on the first floor of mixed use buildings where:

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- a. The only plumbing fixtures on the first floor are toilets, sinks, and drinking water stations;
 - b. the total number of employees that can be accommodated at any one time on the first floor is 20 individuals and the total gross space on that floor is less than 2,000 square feet; and
 - c. All additional floors of the building are residential.
- 3. Additional ~~Limited~~-limited use of PVC for Commercial Buildings. PVC pipe and fittings may be installed for limited purposes in commercial buildings or establishments, provided that the following requirements are satisfied.
 - a. PVC is used for the drains, waste, or vents when the piping serves only the fixtures that are necessary to accommodate waste generated as a direct result of the conduct of business that is particular to the type of commercial establishment itemized in 10.06(o)(3)b.
 - b. PVC Schedule 40 may be used in the following buildings:
 - i. beauty salons;
 - ii. barber shops;
 - iii. manicure salons;
 - iv. pedicure salons;
 - v. photo-labs; and
 - vi. in commercial buildings that incorporate patron areas for the purpose of serving alcohol, soda or other similar carbonated type beverages where the carbonated liquid waste shall drain directly into a floor sink or floor drain.
 - c. The PVC Schedule 40 shall be installed in compliance with the following:
 - i. No PVC schedule 40 pipe and fittings may be used for the toilet fixtures and other plumbing connections in the building.
 - ii. The piping shall be connected to a main drain or branch drain from other fixtures to provide a point of waste dilution.
 - iii. A label shall be affixed at the point of dilution that reads "Limited Use Waste Drain" in one inch high lettering shall identify the piping.
 - iv. The vent piping from the fixture discharging the waste shall extend to a point six inches above the flood rim of the fixture and then shall re-transition to cast iron or copper piping material as used throughout the rest of the commercial building.
- 4. Use of PVC Schedule 40 for Dialysis Equipment. Type 1 PVC pipe and fittings may be used as indirect waste piping for dialysis equipment in medical buildings.
- 5. PVC Schedule 40 perforated pipe may be used for subsoil drainage in commercial buildings.
- 6. Pipe and Fittings shall be manufactured from Type I, Polyvinyl Chloride (PVC) materials having a deflection temperature of 169EF under a load of 264 P.S.I.G. when tested in accordance with ASTM D-648.
- 7. PVC materials shall be classified as self-extinguishing when tested in accordance with ASTM D-635 and have a flamespread rating of 0-25 when tested in accordance with ASTM E-84.
- 8. PVC materials shall meet the requirements of ASTM, CS, and/or NSF Standards.
- 9. At the request of the Board, the manufacturer of PVC pipe shall submit to the Board the results of tests conducted by an Approved-testing-lab in compliance with 248 CMR 3.00.
- 10. Identification of PVC Pipe.
 - a. The pipe shall be in a light color such as beige, buff, grey, white, cream, and shall be marked in accordance with listed standards.
 - b. The following Listed Standards shall appear on opposite sides of the pipe: Schedule 40, "Size", PVC, DWV-NSF stamp of approval, manufacturer's name and registered trademark, Type and Grade.
- 11. Pipe and Fittings.
 - a. Identification of Fittings. Fittings shall be in light color as for pipe and shall bear the following markings by molding on the body or hub:
 - i. Manufacturer's name or registered trademark;
 - ii. NSF-DWV stamp of approval;
 - iii. PVC 1; and
 - iv. Size.

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- b. Use PVC fittings ONLY with PVC pipe and ABS fittings ONLY with ABS. NEVER use PVC solvent weld on ABS pipe or ABS solvent weld on PVC pipe.
12. Transition Fittings. Fittings used to connect PVC to other Product-accepted materials shall meet the proper standard and comply with the requirements of 248 CMR 3.04:
13. Installation. The following installation requirements and procedures shall be followed when assembling PVC and ABS piping materials.
- a. Solvent Welded Joint.
- i. Clean joining surfaces of pipe and fitting with PVC primer.
 - ii. With a natural bristle brush one inch or larger, apply a heavy coat of solvent cement to the pipe joining surface and then a light coat to the socket joining surface.
 - iii. Immediately insert the pipe to the full socket depth while rotating the pipe fitting ¼ turn to insure even distribution of solvent cement.
 - iv. Wipe excess solvent cement from the outside of the pipe at the shoulder of the fitting.
 - v. Do not turn pipe spigot in the socket while wiping.
 - vi. If a fillet or bead of solvent cement is not visible after a joint is assembled, a heavier coat of solvent cement should be used on the pipe spigot.
 - vii. The assembly can be handled with care within two minutes.
 - viii. Do not attempt to adjust the joint after the solvent cement has set or damage will result.
 - ix. Pipe and fittings conforming to these standards will normally have an interference fit, which maintains pressure between the joining surfaces during the solvent cementing process. Fittings that do not have an interference fit shall have not more than 0.009 inch clearance to produce strong watertight joints.
 - x. (NOTE --- CAUTION!) When using primers and solvents for plastics, plumbers and apprentices shall always follow directions carefully and be in a well ventilated area.
 - xi. The solvent cement shall conform to the requirements of ASTM D2564-67 or CS 272-65 latest issue. The cleaner is a solvent that has a limited effect on PVC but will remove dirt and grease. The solvent cement shall be labeled with the NSF Seal of Approval.
- b. Threaded Joints (I.P.S.). When threads are required or used for connecting PVC-DWV pipe to other materials:
- i. do not thread the pipe use proper PVC male or female threaded adapters for transitioning;
 - ii. note that threaded joints in a PVC-DWV system are primarily used for trap connections and clean out plugs.
14. Supports.
- a. Conventional pipe clamps, brackets or strapping that have a bearing width of ¾ inch or more are suitable supports.
 - b. Supports for horizontal runs of pipe 1½ inches or less in diameter shall be at three-foot centers as a maximum. Supports for larger diameters shall have a maximum spacing at four-foot centers.
 - d. Trap arms shall be supported at the trap discharge.
 - e. Vertical pipes shall be supported at each story height but not more than ten-foot intervals and elsewhere as required to maintain alignment.
 - f. All supports shall permit expansion and contraction of the pipe without binding.
 - g. Horizontal piping shall be supported at each change of direction.
15. Thermal Expansion.
- a. Thermal expansion of PVC pipe occurs at the rate of approximately ¼ inch per ten feet length per 100°F temperature change.
 - b. In a PVC-DWV system an expansion allowance of ½ inch per ten feet length of pipe is required.
 - c. Expansion fittings utilize a rubber o-ring that shall be lubricated with grease, petroleum jelly or other water-resistant grease to facilitate assembly.
 - d. Protect the operating end of the expansion fitting from grime.

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- e. Expansion joints shall be provided at every other branch interval up to and including ten stories in height.
 - f. The expansion fitting shall be installed in a accessible location in horizontal runs exceeding 20 feet in length.
 - g. Expansion joints shall not be required underground.
 - h. Expansion fittings shall be installed as designed in proper alignment with the piping being served.
 - i. The expansion joint shall be set for the maximum expansion or contraction rate based on the installation temperature and manufacturer's recommendations.
16. Roof Flashing. The piping that penetrates through the roof shall be made weather tight with an approved flashing.
17. Lead Joints.
~~a. The piping shall be connected to cast iron soil pipe hubs using oakum and no less than one inch of molten lead.~~
~~b. Caulk the joint along the inside and outside edges after it has cooled for four minutes.~~
Lead may be utilized as a joining method.
18. Sleeving.
a. The piping that penetrates concrete floors slabs or concrete walls shall be provided with sleeves. Maintain an annular space of one-inch between the pipe and sleeve.
b. Pipes that penetrate concrete slabs placed on grade shall also provide a sleeve. Maintain an annular space of one-inch between the pipe and sleeve.
19. Piping Trench Installations.
a. Prepare a smooth, uniformly compacted trench bottom using sand. Place the pipe in uniform alignment and grade with a continuous bearing on the bottom quadrant of the pipe along its entire length.
b. Using sand or other fine granular material, compact and backfill around the pipe to a point at least six-inches over the crown of the pipe.
c. Do not allow large stones or pieces of earth to be dropped into the trench when completing the backfilling process.
d. The requirements of the above four sentences shall be the responsibility of the on-site licensed plumber.
20. Installation Through Fire-walls or Rated Fire Separation Walls.
a. When piping passes through a rated fire separation wall or enclosure to another dwelling unit or space, the pipe shall be encased or shielded by a metal sleeve extended 20 inches on each side of the wall, floor or ceiling. The metal sleeve shall be 18 gauge (.040 in.) or heavier.
b. The annular space between the metal sleeve and the piping shall be sealed with approved non-combustible fire retardant material installed in accordance with 780 CMR: *The Massachusetts State Building Code*.
c. Alternate procedures and devices for fire-stopping may be used if installed in accordance with 780 CMR: *The Massachusetts State Building Code*.
d. The piping connections that penetrate fire-walls and ceilings in one and two family passenger car garages located beneath dwelling units are exempt and are not required to be encased.
e. The pipe penetrations should be sufficiently sealed by means of caulking or other approved materials to prevent the passage of smoke from space to space.
- (p) ABS Plastic Pipe and Fittings. The following requirements apply to ABS plastic pipe and fittings:
- 1. ABS shall not be used for drains, waste, or vents in the commercial kitchens, laundry rooms, public restrooms or other commercial areas located in assisted living facilities, hotels, motels, inns and similar establishments except where provided for elsewhere in 248 CMR 10.06, i.e. 248 CMR 10.06(2)(p).
 - 2. ABS - DWV (Acrylonitrile - Butadiene - Styrene) Schedule 40 Pipe and Fittings, may be used only for the drains, waste and vent piping that serve the sanitary or storm drainage systems in the following buildings:
 - a. residential dwellings;
 - b. assisted living facilities;
 - c. hotels;

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- d. motels;
- e. inns;
- f. condominiums; and
- g. other residential buildings that are similar to 248 CMR 10.06(2)(p)2.a. through 10.06(2)(p)2.f. and that are no greater than ten stories in height.

3. ABS Pipe and Fittings may be utilized on the first floor of mixed use buildings where:

- a. The only plumbing fixtures on the first floor are toilets, sinks, and drinking water stations;
- b. the total number of employees that can be accommodated at any one time on the first floor is 20 individuals and the total gross space on that floor is less than 2,000 square feet; and
- c. all additional floors of the building are residential.

4. Additional Limited use of ABS for Commercial Buildings: ABS pipe and fittings may be installed for limited purposes in commercial buildings or establishments, provided that the following requirements are satisfied.

- a. ABS is used for the drains, waste, or vents when the piping serves only the fixtures that are necessary to accommodate waste generated as a direct result of the conducts of business that is particular to the type of commercial establishment as itemized in 10.06(2)(p)3.b.
- b. ABS may be used in the following buildings:
 - i. beauty salons;
 - ii. barber shops;
 - iii. manicure salons;
 - iv. pedicure salons;
 - v. photo-labs; and
 - vi. in commercial buildings that incorporate patron areas for the purpose of serving alcohol, soda or other similar carbonated type beverages where the carbonated liquid waste shall drain directly into a floor sink or floor drain.
- c. The ABS Schedule 40 shall be installed in compliance with the following:
 - i. No ABS schedule 40 pipe and fittings may be used for the toilet fixtures and other plumbing connections in the establishment.
 - ii. The piping shall be connected to a main drain or drain from other fixtures to provide a point of waste dilution.
 - iii. A label at the point of dilution that reads "Limited Use Waste Drain" in one inch high lettering shall identify the piping.
 - iv. The vent piping from the fixture discharging limited use waste shall extend to a point six inches above the flood rim of the fixture and then shall transition back to compliant material in a commercial building.

4. Installation. ABS-DWV pipe and fittings shall be installed

- a. using the same methods and requirements as stated in:
 - i. 248 CMR 10.06(2)(o)13.a.ii. through x.;
 - ii. 248 CMR 10.06(2)(o)12.; and
 - iii. 248 CMR 10.06(2)(o)14. through 18.
- b. In addition, the following requirements shall be satisfied:
 - i. For solvent welded joints clean joining surfaces of pipe and fittings shall be made with an ABS primer.
 - ii. Expansion joints are not required.
 - iii. An ABS solvent that is recommended by the manufacturer that meets the required standard shall be used for solvent welding or cementing in connecting the ABS materials.
 - iv. The solvent cement shall conform to the requirements of ASTM D2564-67 or CS 272-65 latest issues. The cleaner is a solvent that has a limited effect on ABS but will remove dirt and grease. The solvent cement shall be labeled with the NSF Seal or Approval.

5. Identification of Pipe and Fittings.

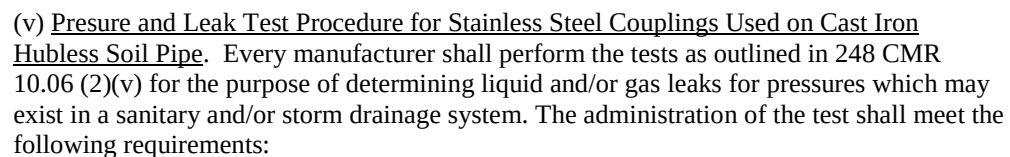
- a. Identification of Pipe and Fittings. The pipe and fittings shall be black in color and shall be marked in accordance with listed standard. The following markings shall appear on two (opposite) sides of the pipe:

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- i. ABS-DWV Schedule 40 and the listed standard;
 - ii. NSF-DWV stamp of approval;
 - iii. Manufacturer's name and/or registered trademark;
 - iv. Type;
 - v. Grade; and
 - vi. Size.
- b. Use PVC fitting ONLY with PVC pipe and ABS fittings ONLY with ABS pipes. NEVER use PVC Solvent weld on ABS or ABS solvent weld on PVC.
- (q) Stainless Steel Tube Marking. Stainless steel tubing shall be in conformance with ASTM designated standard, Type 430 or Type 439, and shall meet the following marking requirements:
1. Tubing Grade H or SL shall be color-coded blue.
 2. Tubing Grade G or SM shall be color-coded red.
 3. Tubing shall be marked at intervals no greater than three feet in length in letters not less than 1/8 inch in height, with the following:
 - a. manufacturer's name or registered trademark; and
 - b. the ASTM designation nominal diameter and grade.
 4. The name of the manufacturer shall be permanently incised in each tube at intervals not greater than 18 inches in length.
- (r) Urinal Wastes. Urinal waste branches and urinal fixture wastes shall conform to the following:
1. They shall be made of:
 - a. extra heavy or service weight cast iron soil pipe and fittings with caulked joints
 - b. threaded cast iron pipe with cast iron drainage fittings; or
 - c. iron size copper or brass pipe with cast brass drainage fittings.
 2. Resilient gaskets and no hub clamps with elastomeric sealing sleeves ~~shall not be used when in direct contact with urinal wastes drains or branches until a intersecting point of dilution with other fixtures in the drainage system is attained.~~
 3. PVC and ABS schedule 40 plastic pipe and fittings may be used only in residential type buildings. (Refer to 248 CMR 10.07(4)(f) for (alternative) schedule 80 nipple requirements for carriers.)
- (s) Sumps and Tanks for Sewage. All sumps and tanks for receiving sewage removed by mechanical or ejector methods, shall be constructed as follows:
1. Concrete. Three-inch minimum wall.
 2. Cast Iron. Minimum ¼ inch thickness.
 3. Steel.
 - a. Minimum ¼ inch thickness for above ground.
 - b. For below ground installation the sump or tank shall be encased in concrete having a thickness of at least three-inches.
 4. Fiberglass. Reinforced polyester resin glass fibers that comply with ANSI listed standards.
- (t) Single Stack Sanitary Drainage System-(“So-Vent”). An engineered single stack system employing the use of aerator and de-aerator fittings, designed in compliance with *Cast Iron Sovent Design Manual No. 802* and ANSI standard ASME/ANSI B16.45-87 may be used in buildings provided the following requirements are satisfied:
1. Every such system shall be:
 - a. designed or engineered by a qualified person;
 - b. plans of such system shall be approved by a Massachusetts registered professional engineer; and
 - c. Special-Permission must be sought and granted by the Board pursuant to 248 CMR 3.04 before installation of such system.
 2. Piping material shall be Type K, L, M, or DWV hard drawn copper tubing or cast iron.
 3. All fittings shall be made of cast brass or drawn wrought copper or cast iron and must be of DWV design.
 4. No part of a copper system shall receive the waste from urinals.
 5. Any change or redesign in the So-Vent system shall be subject to the requirements of 248 CMR 10.06(2)(t).
 6. Every So-Vent system shall have at least one full size vent stack that meets the following requirements:

- a. The diameter of the full size vent stack is no smaller than three inches.
- b. The vent stack shall run undiminished in size from the base of the soil or waste stack to a point 18 to 24 inches above the roof or reconnect to a stack vent installed in accordance with 248 CMR 10.16(4)(b).

Figure 1
No-Hub Coupling Test Configuration Design



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10.06: continued

1. The testing shall be performed by an Approved-testing-lab pursuant to 248 CMR 3.04(4).
2. Testing shall be completed at the expense of the manufacturer who shall perform such test.
3. The Approved-testing-lab shall give at least two weeks advance notice to the Board of the date scheduled for the test.
4. The test shall be conducted with:
 - a. hubless pipe and fittings manufactured in compliance with CISPI Standard Specification 301 latest issue; and
 - b. joints that have been assembled in accordance with the manufacturer's instructions and/or recommendations.
5. The test shall be for an eight-hour period of time, under a 30-foot hydrostatic head of water and at 13-P.S.I.G. and shall show no visible signs of leakage.
6. The test assembly shall employ gauges at each end with means of expelling air and the gauges shall be graduated so that, at maximum test, the indicator on the gauges shall be approximately mid-point on said gauges.
7. The test results shall be certified by the Approved-testing-lab that conducted the testing and also by a Massachusetts registered professional engineer or a registered engineer having a reciprocal agreement with the Board of Professional Engineers for the Commonwealth of Massachusetts.
8. The test assembly and configuration shall employ pipe and fittings listed and as shown in 248 CMR 10.06, Figure 1 and shall be installed in accordance with the pertinent provisions of 248 CMR 10.00.
9. All repair and transition friction type couplings and clamps shall conform to the requirements stated in 248 CMR 10.06(2)(v).
- (w) Vacuum Drainage System. An engineered vacuum system that employs specifically designed fixtures, piping arrangements and vacuum pumps that are designed and installed in compliance with the manufacturer's recommendations may be used in a building or structure provided that in addition to being in conformance with 248 CMR 1.00 through 10.00 the following requirements are satisfied:
 1. Each system shall be designed or engineered by a Massachusetts registered professional mechanical engineer and Special-Permission must be granted by the Board.
 2. Piping material shall be type K, L, M or DWV hard drawn copper or cast iron.
 3. All fittings shall be made of cast brass or hard drawn wrought or cast iron and must be of DWV design.
 4. Any change or redesign in the vacuum drainage system shall be subject to the requirements of 248 CMR 10.06(2)(w) and 10.23.

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NO CHANGES TO 10.07

10.08: Traps and Cleanouts

(1) Fixture Traps.

(a) Separate Traps for Each Fixture.

1. Separate Trapping Required:

- a. Individual plumbing fixtures shall be separately trapped by a water seal trap placed as close as possible to the fixture outlet.
- b. The developed length distance from the fixture outlet to the trap weir shall not exceed 24 inches.
- c. No fixture shall be double trapped.

2. A fixture need not be separately trapped. Exceptions to the separate trapping requirements are as follows:

- a. Fixtures having integral traps.
- b. A combination plumbing fixture may be installed on one trap provided one compartment is not more than six inches deeper than the other and the waste outlets are not more than 30 inches apart.
- c. One trap may be installed for not more than three single compartment sinks or lavatories, immediately adjacent to each other, and in the same room. The trap is to be centrally located when three such fixtures are installed. The center to center measurement of the waste outlets shall not exceed 30 inches apart.
- d. The waste for a domestic type dishwasher may be separately trapped, or may connect to the manufactured inlet side opening of a food waste grinder. A “wye” fitting may be installed between the outlet of the food waste grinder and the inlet of the trap serving the kitchen sink.

(b) Size of Fixture Traps.

1. Fixture trap size (nominal diameter) shall be sufficient to drain the fixture rapidly and in no case less than outlined in 248 CMR 10.08: *Table 1* (Minimum Size of Fixture Traps).
2. No trap shall be larger than the drainage pipe into which it discharges.

TABLE 1
MINIMUM SIZE OF FIXTURE TRAPS

<u>Plumbing Fixture</u>	<u>Trap Size in Inches</u>
Bathtub (with or without overhead shower)	1½
Bidet	1½
Clothes washer (domestic)	1½ 2
Combination sink and wash tray	1½
Combination sink and wash tray with food waste grinder unit	1½
Dental unit or cuspidor	1½
Dental Lavatory	1½
Drinking Water Station, with Drain	1½
Dishwasher, commercial	2
Dishwasher, domestic	1½
Floor drain	2
Food waste grinder	1½
Kitchen sink, domestic, with food waste grinder unit	1½
Kitchen sink (two compartments)	1½
Kitchen sink, domestic	1½
Lavatory, common	1½
Lavatory (barber shop, beauty parlor or surgeon's)	1½
Lavatory, (multiple type) (wash fountain or wash sink)	1½
Laundry sink (one or two compartments)	1½
Shower stall	2
Sink (surgeon's)	1½

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Sink (flushing rim type, flush valve supplies)	3
Sink (service type with floor outlet trap standard)	3
Sink (service trap with P trap)	2
Sink, commercial (pot, scullery, or similar type)	2
Sink, commercial (with food grinder unit)	2

(c) Prohibited Traps. The following type traps are prohibited.

1. Traps which depend upon moving parts to maintain their seal.
2. Bell traps.
3. Crown vented traps.
4. Separate fixture traps which depend on interior partitions for their seal.
5. Full "S" traps.

(d) Design of Traps.

1. Fixture traps shall be self-scouring and shall have no interior partitions except where such traps are integral with the fixture.
2. Slip joints or couplings may be used on the trap inlet or within the trap seal of the trap if a metal-to-metal ground joint is used.
3. Each fixture trap, except a trap that is cast integrally or in combination with the fixture 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 cleanout plug of ample size that is protected by the water seal.

(e) Fixture Trap and Connection Material (HOUSE SIDE) shall meet ASME A112.18.2-2002.

1. Fixture traps shall be made of cast brass, with a wall thickness of not less than .01 inches, or of schedule 40 ABS or PVC.
2. Cast iron traps may be used in connection with floor drains, slop sinks, building (house) traps, conductors (when necessary) and similar installations, weights and thicknesses to comply with like materials under 248 CMR 10.06.
3. Slip nuts used to connect fixture and appliance outlet piping to the trap, shall be composed of brass, copper or schedule 40 ABS or PVC.
4. Tubing traps made of brass or copper shall be of a thickness equal to a minimum of 17 gauge.
5. When devices including strainers, P. O. (pull out) plugs, tail pieces, waste arms, bathtub wastes and overflows, and any other similar fixture to trap connection, when of metal, shall be made of brass or other non-corrosive metal, and the device shall have a thickness greater than or equal to 17 gauge.
6. All items listed in 248 CMR 10.08(1)(e)4. and 10.08(1)(e)5. when made of ABS or PVC may be used, provided that they all comply with ASME A112.18.2 for PVC and ABS Tubular Traps and Fittings.

(f) Trap Seal. Each fixture trap shall have a liquid seal of not less than two inches and not more than four inches, except where for special conditions, a deeper seal may be required.

(g) Trap Setting and Protection. Traps shall be set level with respect to their water seals and, where necessary, shall be protected from freezing.

(h) Building Traps.

1. Building (House/running) traps shall not be installed, unless in the opinion of the Inspector they are necessary.
2. Each building trap when installed shall be provided with a cleanout and with a relieving vent or fresh air intake which need not be larger than ½ the diameter of the drain to which it connects.

(i) Acid Resistant Trap. Where a vitrified-clay or other brittleware, acid-resistant trap is installed underground, it shall be embedded in concrete extending six inches beyond the bottom and sides of the trap.

(2) Drainage Pipe Cleanouts.

(a) Location. Cleanouts shall not be placed more than 50 feet apart in all horizontal drainage piping and branch drain piping that is four inch nominal diameter or less. On piping that is over four inch nominal diameter the cleanouts shall not be more than 100 feet apart.

(b) Underground Drainage. Cleanouts, when installed on an underground drainage piping, shall be:

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1. extended vertically to or above the finished grade level; or

NO CHANGES TO THE REST OF 10.08 or 10.09, NEXT CHANGE 10.10(18)(table 1)

Table 1: Minimum Facilities For Building Occupancy.

Building Clarification	Use Group	Toilets		Urinals Males	Lavatories Each Sex	Drinking Water Station, with drain	Bath/ Show.	Other Fixtures	Pertinent Regulations. 248 CMR 10.10(19 18)
		Females	Males						
Theaters	A-1	1 per 30	1 per 60	50%	1 per 100	1 per 1000		1 service sink per floor	(b), (i)1., (m), (n), (p), <u>(r)</u>
Nightclubs, Pubs	A-2	1 per 30	1 per 50	50%	1 per 75				(b), (m), (n), (p), <u>(r)</u>
Restaurants	A-3	1 per 30	1 per 60	50%	1 per 200				(b), (m), (n), (p), <u>(r)</u>
Hall, Museums, Libraries Etc.	A-3	1 per 50	1 per 100	50%	1 per 200				(b), (i)1., (m), (n), (p), <u>(r)</u>
Coliseums, Arenas	A-3	1 per 30	1 per 60	50%	1 per 150				(b), (i)1., (m), (n), (p), <u>(r)</u>
House of Worship	A-4	1 per 50	1 per 100	50%	1 per 200				(b), (c), (m), (n), (p), <u>(r)</u>
Stadiums Etc.	A-5	1 per 30	1 per 60	50%	1 per 150				(i)1., (m), (n), (p), <u>(r)</u>
Pool/Fitness Centers	A-5	1 per 40	1 per 40	33%	1 per 60	At least one source	1 for every 40		(i)1., (m), (n), (p), <u>(r)</u> . For pools, see 105 CMR for bather load.
Bathing (Public Beaches)		1 per 200	1 per 500	33%	1 per 1000		1 per 1000	1 Service Sink	(d), (m), (n), (p), <u>(r)</u>
Day Care Facility (Child)	E-I-3	1 per 20	1 per 20		1 per 20			1 Service Sink	(e), (m), (n), <u>(r)</u>
(Staff)	N/A	1 per 20	1 per 25	33%	1 per 40				(i), (m), (n), (p), <u>(r)</u>
Detention Facility (Detainee)	I-3	1 per 6	1 per 8	33%	1 per 6		1 per 8		(f), (m), (p), <u>(r)</u>
(Staff)	N/A	1 per 20	1 per 25	33%	1 per 40				(i), (m), (n), (p), <u>(r)</u>
Dwellings (Single)	R	One Bathroom Group and One Kitchen Sink							(o), (q), <u>(r)</u>
(Multiple)	R	One Bathroom Group and One Kitchen Sink per Unit							(o), (q), <u>(r)</u>
(Hotel/Motel)	R	One Bathroom Group per Unit							(m), (q), <u>(r)</u>
(Dormitories)	R-2	1 per 6	1 per 8	33%	1 per 8		1 per 8	1 Service Sink per Floor	(g), (m), (n), (p), <u>(r)</u>
Educational (Kindergarten)	E	1 per 20	1 per 20		1 per 20	1 per 75		1 Service Sink Per Floor	(h), (i), (m), (n), (p), <u>(r)</u>
(Elementary)	E	1 per 30	1 per 60	1 per 60	1 per 60	1 per 75			
(Secondary)	E	1 per 30	1 per 90	1 per 90	1 per 90	1 per 75			
(Post Secondary)	E	1 per 90	1 per 180	1 per 180	1 per 180	1 per 75			
Staff)	E	1 per 20	1 per 25	33%	1 per 40				
Employee (Non-Industrial)		1 per 20	1 per 25	33%	1 per 40			1 Service Sink per Floor	(i), (m), (n), (p), <u>(r)</u>

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10.10: continued

Building Clarification	Use Group	Toilets		Urinals Males	Lavatories Each Sex	Drinking Water Station, with drain	Bath/ Show.	Other Fixtures	Pertinent Regulations. 248 CMR 10.10(189)
		Females	Males						
Employee (Industrial Factory/ Warehouse and Similar Usage)	F	1 per 15	1 per 20	1 per 40	1 per 30		1 per 15		(j), (m), (n), (p), (r)
Institution Hospital (Private/Semi)	I	1 per Room Nursing Homes: 1 toilet and 1 lavatory with direct access from each bedroom (shared by 8 beds max), can be unisex.			1 per Room	1 Per each set of rest-rooms	1 per 15 (in ICU) 1 per 12 (inpatient facilities other than ICU) 1 per 6 patients (Psychiatric Hosp.) 1 per 8 (Rehab facility)	1 Service Sink Per Floor	(i), (m), (n), (r)
Nursing Homes (Ward)		1 per 8	1 per 10	33%	1 per 10		1 per 15	1 Service Sink Per Floor	(i), (m), (n), (p), (r)
Malls (Covered)	M	1 per 750	1 per 1500	50%	1 per 2000	1 per 2000			(i), (l), (m), (n), (p), (r)
Medical/Health Care Building	B	1 per 45	1 per 55	50%	1 per 200	1 Per each set of rest-rooms (may be a Water Station, without drain)			(i), (k), (m), (n), (p), (r)
Office Buildings	B	1 per 20	1 per 25	33%	1 per 50	1 per Floor (may be a Water Station, without drain)			(i), (m), (n), (p), (r)
Retail (Mercantile)	M	1 per 20	1 per 20	33%	1 per 40			Per Floor	(i), (m), (n), (p), (r)
Waiting Rooms (Airports, Railroad and Bus Stations)	A	1 per 35	1 per 75	50%	1 per 200	1 per 500			(b), (m), (n), (p), (r)

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NEXT CHANGE 10.15

10.15: Sanitary Drainage System

- (1) Materials. Pipe, tubing, fittings, and traps to be used on any part of the sanitary drainage system in a building or adjacent to a building shall comply with all relevant sections of 248 CMR, 3.00: through 10.00.
- (2) Determining Size of Drainage System.
 - (a) Fixture Units for Drainage Piping. The waste discharge calculations for the drainage system piping shall be computed in terms of drainage fixture units in accordance with 248 CMR 10.15, Table 1: *Fixture Unit Values for Various Plumbing Fixtures* and 248 CMR 10.15(2)(b).
 - (b) Values for Continuous Flow. Fixture unit values for continuous or semi-continuous flow into a building sanitary drainage system, such as from a waste pump, sewage ejector pump, or similar device that discharges sewage waste shall be computed on the basis of two fixture units for each gallon per minute of flow.
 - (c) Clear water condensate waste that is produced in cumulative amounts of 12.5 gallons per hour or 300 gallons per day or less in buildings by air conditioning equipment, air compressor blow-down discharge (free of petroleum hydrocarbons) or other similar apparatus or appliances may be discharged to the sanitary drainage system in accordance with 248 CMR 10.12(1)(a)4. The clear water waste requirement is not withstanding any local ordinance, by-law, rule or regulation to the contrary.
- (3) Selecting the Size of Drainage Piping. Pipe sizes shall be determined from 248 CMR 10.15(7): *Tables 1, 2 and 3* on the basis of drainage fixture unit values calculated from 248 CMR 10.15(7): *Table 1: Fixture Unit Values for Various Plumbing Fixtures* and 248 CMR 10.15(2)(b).
- (4) Minimum Size of Soil and Waste Stacks. No soil or waste stack shall be smaller than the largest horizontal waste branch connected thereto, (See 248 CMR 10.15(7): *Table 1: Fixture Unit Values for Various Plumbing Fixtures* and 248 CMR 10.15(7): *Table 3: Maximum Loads in Fixture Units for Any One Branch Interval on Multistory Soil and Waste Stacks*). Exception: a 4 x 3 toilet connection shall not be considered as a reduction in pipe size.
- (5) Minimum Size of the Stack Vent or Vent Stack. Any structure, in which a building drain is installed, shall have as a minimum one stack vent or a vent stack not less than three inches in diameter, (See 248 CMR 10.16(7): *Table 2: Size and Lengths of Vents* for fixture unit values when determining appropriate stack vent or vent stack sizing) that shall be carried undiminished in size through the roof.
- (6) Provision for the Installation of Future Fixtures.
 - (a) When future drainage provisions are employed for the potential installation of other fixtures, the drains provided shall be considered in determining the final required sizes of drains and vent pipes.
 - (b) The future drain installations, (if provided) shall be terminated with approved material(s) and fittings.
- (7) Size of Underground Drainage Piping.
 - (a) Underground or Basement Floor. No portion of the drainage system installed underground or below a basement floor, shall be less than two inches in diameter.
 - (b) Sanitary Piping Installed Through the Foundation Wall.
 1. Sanitary pipes that pass through an exterior foundation wall shall be no less than four inches in diameter, except:
 - a. When serving a Hazardous Waste System installed in accordance with (248 CMR 10.13).
 - b. When serving a **domestic laundry*, wherein the laundry drain is conducted to a

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separate (Local Board of Health Authorized) dry-well disposal system and ~~may shall~~ be at least two inches in diameter.

c. When serving as the waste for a *church Sacrarium, wherein the church Sacrarium drain may be two inches in diameter (see 248 CMR 10.10(16)).

d. When serving exclusively as the discharge from a semi-positive displacement grinder pump, and if so, the following shall be satisfied:

i. The minimum pipe size for a semi-positive displacement grinder pump discharge shall be 1¼-inch and shall provide a self-cleaning velocity of no less than two feet per second.

ii. The velocity in the pipe shall not be more than seven feet per second.

iii. A full port discharge valve and check valve shall be provided and made accessible inside the building.

iv. The waste discharge from semi-positive displacement grinder pumps shall be protected from freezing when the piping is installed less than four feet below grade in outside locations.

TABLE 1
FIXTURE UNIT VALUES FOR VARIOUS PLUMBING FIXTURES

Type of fixture or group of fixtures	Fixture Unit Value
Automatic clothes washer (1½-inch standpipe)	2
Automatic clothes washer (2-inch standpipe)	3
<i>Bathroom group consisting of a toilet, lavatory and bathtub or shower stall:</i>	
Flushometer valve closet	8
Tank type closet	6
Bathtub ¹ (with or without overhead shower)	2
Bidet	3
Combination sink and drain board with food waste grinder	4
Combination sink and drain board with one 1½-inch trap	2
Combination sink and drain board with separate 1½-inch traps	3
Vegetable Prep Sink (Residential or Commercial)	2
Dental chair unit or cuspidor	1
Dental lavatory	1
Drinking fountain	½
Dishwasher, commercial	6
Dishwasher, domestic	1
Trough or trench drain 3-inch	5
Trough or trench drain 4-inch	6
Floor drains ² with 2-inch waste	3
Kitchen sink, domestic, with one 1½-inch waste	2
Kitchen sink, domestic, with food waste grinder	2
Lavatory with 1¼-inch waste	1
Laundry Utility sink (1, 2 or 3 compartments)	2
Shower stall, domestic	2
Showers (group) per head	2
<i>Sinks:</i>	
Surgeons	3
Flushing rim (with valve)	6
Service (trap standard)	3
Service (P trap)	2
Commercial Pot, scullery, etc. (each section)	4
Shampoo	2
Toilet, tank operated	4
Toilet, valve operated	6

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Urinal, pedestal, siphon jet blowout	6
Urinal, wall lip	4
Wash sink (circular or multiple) each 20 inches of usable length	1

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