

GCP 9 – 5:1999
(Corrected, 2003)

GUYANA STANDARD

Building Code - Section 5: Plumbing

Prepared by
GUYANA NATIONAL BUREAU OF STANDARDS

Approved by
NATIONAL STANDARDS COUNCIL

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(Corrected, 2003)

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Foreword

This Guyana Standard was adapted by the Guyana National Bureau of Standards in 1999, after the draft was finalised by the **Technical Committee - Civil engineering** and approved by the National Standards Council.

This standard was developed to protect the public health, welfare and safety by properly

designing, installing and maintaining plumbing systems.

This standard is intended to be made mandatory.

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Building Code -
Section 5: Plumbing

1 Scope

This Code of Practice specifies the requirements for good plumbing practice for water supply and distribution, and sewerage.

2 Definitions

For the purpose of this Code the following definitions shall apply:

- 2.1 **air gap:** The unobstructed vertical distance between the outlet of any faucet or pipe and the flood level rim of the water supply or receptacle.
- 2.2 **anti-flood valve:** A valve installed in a building sewer to prevent sewage from flowing back into the building.
- 2.3 **area drain:** A drain installed to collect surface water from an open area.
- 2.4 **authority:** Any body or bodies authorised by the Government to enforce this Code or any part thereof.
- 2.5 **back-flow:** Such flow of:
- (a) water from any source other than the public water supply system of potable water; or
 - (b) any solid, liquid, or gaseous substance, or any combination thereof into a potable water distributing pipe as may make the water in that pipe non potable.
- 2.6 **back-flow preventer:** A device for installation in a water supply pipe to prevent back-flow from the outlet end of the water supply system.
- 2.7 **back vent:** (See 2.75). 1
- 2.8 **branch:** That part of a pipe system which extends from a water distribution pipe, or from a main soil or waste pipe, to one or more fixtures, or the pipe connecting one or more individual vents with the main stack or stack vent.
- 2.9 **branch interval:** The length of soil or waste stack, not less than the distance between floors, into which the horizontal branches from one floor or storey of a building are connected.
- 2.10 **branch vent:** (See 2.75).

- 2.11 building drain:** That part of the lower horizontal piping which received the discharge from soil, waste and other sanitary drainage pipes within a building and conveys it to the building sewer beginning 1 metre outside the building wall.
- 2.12 building sewer:** That part of a drainage system outside a building commencing at a point, 1 metre from the outer face of the building wall and connecting the building drain to the collecting sewer or place of disposal of sewerage.
- 2.13 building sub-drain:** That part of a drainage system which cannot drain by gravity into the building sewer.
- 2.14 building-trap:** A trap installed in the building to prevent circulation of air between the drainage system inside the building and the building sewer.
- 2.15 building vent:** (See 2.75).
- 2.16 clean out:** A device that has a removable cap or plug securely attached to it and is so constructed that it can be installed in a pipe so that the cap or plug may be removed to permit pipe cleaning apparatus to be inserted into the pipe.
- 2.17 code:** These plumbing regulations.
- 2.18 collecting sewer:** The public sewer in a street, lane, or other location.
- 2.19 continuous vent:** (See 2.75).
- 2.20 crown weir:** The highest portion of the inside lower surface of the outlet end of a trap. 2
- 2.21 dead:** A pipe leading from the drainage piping or vent pipe that ends in a cap, plug or other closed fitting.
- 2.22 developed length:** The length along the centre line of a pipe and fittings.
- 2.23 drainage piping:** All the piping within the premises which conveys sewerage, industrial wastes, or other liquid wastes, to a point of disposal, but excluding:
- (a) a main sewer; and

(b) a private or public sewerage treatment plant, or a sewerage disposal plant.

2.24 dual vent: (See 2.75).

2.25 effective opening: The cross-sectional area of a faucet, fitting or pipe at the point of discharge.

2.26 first: When used with reference to a fixture-connection to a horizontal branch, means nearest to the waste or soil stack.

2.27 fixture: A receptacle, including a floor drain, that receives water, liquids, water-borne wastes or sewage and discharges any of them into a drainage system.

2.28 fixture-drain: The drain-pipe from that of a fixture to the junction of that pipe with a soil-pipe or another drain-pipe.

2.29 fixture unit: A design factor by which hydraulic load produced by fixtures may be expressed as multiples of that factor. It is usually regarded as the amount of water discharged in one minute from a lavatory basin with a standard 32 mm waste, flowing full bore. This has been determined to be 28.4 litres.

2.30 flood level: When used with reference to a fixture, means the level at which water begins to overflow the top or rim of the fixture.

2.31 flood level rim: The top edge of a fixture from which water overflows.

2.32 floor: A room or set of rooms, 3 on the same level in a building.

2.33 floor drain: A drain to receive water from a floor or section of a floor of a building.

2.34 flushing syphon: A device (manual or automatic) actuated by syphonic action.

2.35 flush valve: A device located at the bottom or the side of the tank for the purpose of flushing water closets and similar fixtures.

2.36 grade: The slope of a pipe with reference to its true horizontal plane.

2.37 grease trap: A trap designed to intercept and prevent the passage of grease into the

drainage piping.

- 2.38 gulley trap:** A trap installed outside of the building to prevent the circulation of air between the drainage system outside of the building and the building sewer.
- 2.39 horizontal:** Not departing from the true horizontal plane by more than 22.5 degrees.
- 2.40 horizontal branch:** That part of a waste pipe that is horizontal and installed to convey the discharge from more than one fixture.
- 2.41 indirect waste:** Waste that is not discharged directly into drainage piping.
- 2.42 indirect waste pipe:** A waste pipe that does not connect directly with drainage piping, but discharges into it through a trapped fixture.
- 2.43 individual vent:** (See 2.75).
- 2.44 industrial wastes:** Liquid wastes resulting from the processes employed in industrial establishments and which are free from faecal matter.
- 2.45 in front of:** When used with reference to the point of connection of a fixture to a horizontal branch, means in the direction of discharge.
- 2.46 interceptor:** A device designed and installed so as to separate and retain deleterious, hazardous or 4 undesirable matter from normal wastes to discharge into the disposal terminal by gravity.
- 2.47 last:** When used with reference to a fixture-connection to a horizontal branch, furthest from the waste or soil stack.
- 2.48 load factor:** 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.
- 2.49 loop vent:** (See 2.75).

- 2.50 main vent:** (See 2.75).
- 2.51 multiple unit dwelling:** A building so constructed, altered or used to provide accommodation for more than one family to dwell in separately.
- 2.52 offset:** When used with reference to piping, means a pipe or a bend of pipe or both that takes one section of the piping out of line with, but parallel to another section.
- 2.53 plumbing inspector:** A person appointed by the Authority to enforce this Code.
- 2.54 plumbing system:** The arrangement of drains, pipes, fixtures and other appurtenances (including venting system), for conveying water, sewage, or other liquid wastes to, in or from a building and its associated premises. This does not include arrangement outside the property boundary.
- 2.55 potable water:** Water which is satisfactory for human consumption and meets the requirements of the World Health Organisation (WHO) Standards.
- 2.56 potable water system:** The plumbing system that conveys potable water.
- 2.57 private sewerage disposal system:** Any privately owned and operated system of sewage disposal approved by the Authority for that purpose.
- 2.58 public building:** Any building to which the public have a right of access.
- 2.59 relief vent:** (See 2.75).
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- 2.60 rim:** The unobstructed open edge of a fixture.
- 2.61 riser:** A water supply pipe which extends vertically for one full storey or more, to convey water to branches or fixtures.
- 2.62 sanitary unit:** Any fixture which receives internal body wastes for discharge, such as a water closet, bidet, slop sink, urinal or bed pan washer.
- 2.63 separator:** (See 2.46).
- 2.64 sewerage:** Any liquid waste containing animal, vegetable or mineral matter, in suspension or solution, and includes household wastes, and wastes from commercial and

industrial establishments.

2.65 sewerage system: Includes the following:

- (a) drainage piping;
- (b) main sewers; and
- (c) private or public sewerage - treatment plants, sewerage - disposal plants.

2.66 soil pipe: A pipe that conveys the discharge of sanitary units with or without the discharge from other fixtures.

2.67 stack: The vertical main of any system of soil or vent pipe.

2.68 stud: The threaded outlet connection from a waste-closet or urinal tank or inlet to a water-closet bowl.

2.69 sub-drain: A drain that is at a level lower than the building drain and the building sewer.

2.70 sump: A watertight tank or pit:-

- (a) that receives the discharge from a sub-drain; and
- (b) from which the discharge flows or is ejected into the drainage piping by pumping.

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2.71 trap: 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 sewerage or waste through it.

2.72 trap dip: The lowest portion of the inside upper surface of a trap.

2.73 trap seal: The maximum vertical depth of liquid that traps will retain, measured between the crown weir and the top of the dip of the trap.

2.74 trap-standard: A service sink which has its trap integral with the support for the sink.

2.75 vents

- 2.75.1 back vent:** A pipe installed to vent a trap, soil pipe, or waste pipe, and connected back to the general venting system at a point above the fixture served by the trap, soil trap, or waste pipe or terminating in the open air. Back vented has a corresponding meaning.
- 2.75.2 branch vent:** A vent pipe connecting one or more individual vent pipes to a main vent or a main vent to a stack vent.
- 2.75.3 circuit vent:** A branch vent that functions for two or more traps and extends to a main vent from a point on a horizontal in front of the fixture connecting furthest from the vent stack.
- 2.75.4 common vent:** A vent connecting at the junction of two or more fixture drains or fixture waste pipes and serving as a vent for each fixture.
- 2.75.5 continuous vent:** A continuation of a vertical waste pipe above the connection of the waste fitting.
- 2.75.6 individual vent:** (See 2.7).
- 2.75.7 loop vent:** A circuit vent the flow line of the fixtures and ⁷ except that the vent pipe loops back over re-connects with the stack vent instead of the main vent.
- 2.75.8 main vent:** Vertical vent pipe installed to provide a flow of air to or from a drainage system.
- 2.75.9 relief vent:** A vent connected to a horizontal waste or soil pipe at a point between the soil stack and first or nearest fixture and carried above the flow line of the highest fixture to the main vent or stack vent.
- 2.75.10 soil stack vent:** The extension of a vertical soil pipe above the highest horizontal drain connected to the stack.

- 2.75.11 stack vent:** The extension of a soil or waste stack above the highest horizontal drain connected to the stack, for the purpose of venting the stack.
- 2.75.12 vent pipe:** A pipe installed to provide a circulation of air within a plumbing system to exhaust foul gases, and to protect trap scales from siphonage and back pressure.
- 2.75.13 venting system:** An arrangement of one or more vent pipes.
- 2.75.14 waste stack vent:** The extension of a waste stack above the highest horizontal drain connected to the stack.
- 2.75.15 wet vent:** A soil or waste pipe which also serves as a vent.
- 2.75.16 yoke vent:** A pipe connecting upward from a soil or waste stack to a vent stack for the purpose of preventing pressure changes in the stacks.
- 2.76 vertical:** Not departing from the true vertical plane by more than 22.5 degrees.
- 2.77 waste pipe:** Any place which receives the discharge from any fixture except sanitary, and conveys it to the building drain, soil, stack, waste stack, or private sewage disposal system.
- 2.78 water-distributing pipe:** When used with reference to premises, means pipe to convey water from a water-service pipe to a fixture or to a water outlet, and includes the control valves and fittings connected to it, but does not include a meter or control-valve or other device owned and controlled by the water-supplier.
- 2.79 water main:** A water supply pipe for public or community use owned and controlled by the water supplier.

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- 2.80 water-outlet:** When used with reference to water distributing pipe, means an opening at which water is discharged from the pipe to:-
- (a) a faucet;
 - (b) a boiler or a heating system;
 - (c) a water-operated device, or equipment, that is not part of the water distributing

system; and

(d) the atmosphere, unless discharged into an open tank forming part of the water-supply system.

2.81 water seal: The depth of water in a trap, an interceptor or other similar unit, between the point of overflow and the lower level of the division separating the inlet and outlet.

2.82 water-supply system: When used with reference to a building, means the water-service pipes, water-distributing pipes, and all connecting pipes, fittings, control valves and devices adjacent to the building and under the control of the occupier thereof.

2.83 water service pipe: The pipe, with necessary controls, extending from the water main or other source of supply to the building served.

2.84 size of pipe (or fitting): Except where otherwise stated, means the nominal size by which the pipe (or fitting) is customarily known in the plumbing trade and in accordance with acceptable International Standards.

3 General requirements

3.1 Administration

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3.1.1 The provisions of this clause shall apply and govern plumbing on the basis of the practice, materials and fixtures used in the installation, maintenance, extension and alteration of all the pipes, fixtures, appliances, and appurtenances in connection with any of the following:- sanitary facilities, the venting system, and the public or private water supply systems within or adjacent to any building; also the practice and materials used in the installation maintenance, extension or alteration of the sewage system of any premises to their connection with any point of public disposal or other terminal.

3.2 Approval

- 3.2.1** Except as provided in **3.1**, no connection shall be made with any sewer and no construction, replacement, re-construction, alteration, extension, or disconnection of any plumbing system or part thereof shall be started until approval to do so has been obtained from the Authority.
- 3.2.2** Approval shall be granted only to persons meeting qualifications prescribed by the Authority.
- 3.2.3** No approval shall be required for the repair, within the property boundary of the working parts of a faucet or valve, the clearance of stoppages, repairing of leaks, or replacement of defective faucets, fixtures or valves, provided that no change is made in the piping to the fixtures therein.

3.3 Application for approval

Application for approval shall be made to the Authority by the Plumbing Contractor on a form provided by the Authority.

3.4 Plans and specifications

- 3.4.1** Every application for approval shall be accompanied by a specification or abstract of the proposed work, and by a plan, sectional and isometric drawings in triplicate, drawn to a minimum scale of 1:100 (3 mm : 300 mm) showing the size and location of all relevant piping, fixtures and appurtenances.

- 3.4.2** After approval has been granted, no description submitted with the Authority. 10 departure shall be made from the plan or application, without the permission of the Authority.

3.5 Duration of approval

Approvals shall be valid for six (6) months or for such other periods as determined by the Authority.

3.6 Responsibility

The approval by the Authority of plans, specifications, and construction work shall in no way relieve the Plumbing Contractor of full responsibility for carrying out the work in strict accordance with this Code.

3.7 Application of code

All plumbing installations, including alterations and additions, shall be subjected to the requirements of this Code.

3.8 Units of measure

The metric unit of measure applies.

3.9 Workmanship

All plumbing shall be installed in a workmanlike manner and shall conform to the requirements of this Code. All work shall be subjected to inspection and testing by the Authority. After laying, soil and ventilating pipes shall be capable of withstanding smoke or air tests under pressure and have no bend (except where unavoidable). Where bends are used, they shall be as obtuse as possible so as not to reduce the internal diameter of the pipe.

3.10 Existing buildings

In existing buildings in which the plumbing system is to be altered, repaired or renovated, deviations from this Code are permitted, provided such deviations are found necessary, conform to the intent of this Code, and are approved in writing by the Authority.

3.11 Connection

3.11.1 Every building in which plumbing fixtures are installed shall have a connection to a public sewer or private sewerage - disposal system approved by the Authority. Such connections shall not be made before the plumbing work is inspected and tested and approval for connection is granted by the Authority.

3.11.2 Where, for the purpose of carrying out any work for the purpose of any approved plan, it is necessary to cut into an existing sewer or any collection sewer between the street sewer and first inspection chamber, the person undertaking such work shall make the necessary

excavation and the connections shall be made at the expense of the owner by the Authority or any person authorised to make such a connection.

- 3.11.3** The owner of the premises shall take adequate steps to exclude from any house sewer, collection sewer or any fitment connected to the house sewers all trade wastes, rain water from any roof and storm water or any other surface water.

3.12 Surface drainage

- 3.12.1** The owner of the premises shall provide a good and sufficient system of surface water drainage in the form of gutters and pipes attached to the premises and an open channel of bricks, stoneware, masonry, concrete or other material approved by the Authority, discharging into the side channel of an adjacent street or into an alleyway drain, or into such other stream or channel approved by the Authority.

- 3.12.2** The owner of the premises shall provide every gully or other inlet to any house drains with such raised rims as will exclude rain or other surface water and no person shall connect any down pipe from any roof to any house sewer or collecting sewer, or permit any such down pipe to discharge into any gully or trap connected with any house sewer or collection sewer.

3.13 House connections

- 3.13.1** Every owner shall at all time keep his house connection, including the structure enclosing any water closet, in good order and free from leaks or any obstruction.

- 3.13.2** Every such owner shall take 12 adequate steps to prevent rags, leaves, refuse or any debris from entering the water closets or house sewers and shall at all times keep all gullies to all house sewers properly protected by adequate gratings and shall give immediate notice of any defect or stoppage to the Authority.

3.14 Work not approved

Where any person does any work in respect of any water closet, urinal, sink or other house connection otherwise than in accordance with this Code or where the Authority does not approve of the materials used in connection with such work, the Authority may,

by notice in writing, require such person to dismantle such water closet, urinal, sink or other house connection within a specified time.

3.15 Changes in direction

3.15.1 General

The centre line of a long-sweep bend of piping of a trade size itemised in **Column 1** of **Table 1**, shall have a curvature equal to that of the arc of a circle having a radius not less than the number of millimetres prescribed in **Column 2**.

3.16 Soil/waste pipe

3.16.1 Changes in direction in horizontal soil pipe or waste pipe shall be made by the appropriate use of 45 degree Y's, long-sweep quarter bends, sixth, eighth or sixteenth bends or by a combination of these, or by the use of equivalent fittings (including manholes and inspection chambers).

3.16.2 Short-sweep quarter bends and sanitary T's may be used to effect a change in direction of flow from horizontal to vertical.

3.16.3 Accessible clean outs shall be installed at each change of direction of the building drain greater than 45 degrees.

3.17 Vent/water pipe

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3.17.1 Changes in direction in vent and water distributing pipe may be made by the appropriate use of quarters, sixth, eighth or sixteenth bends, T's and the use of equivalent fittings.

3.17.2 Bends, Tees, Wyes, and crosses may be used in a vent pipe as well as in a water - distribution pipe.

3.18 Prohibited fittings and connections

3.18.1 No pipe or fitting with double-hubs on the same run, and no double tee shall be used on soil or waste pipe.

3.18.2 Every fitting, connection or joint shall be so constructed and installed that it does not reduce the free flow of liquid by more than 19 percent.

3.18.3 Double wye fittings without access doors shall not be used on any horizontal line.

3.18.4 The waste pipe from a bath tub or other fixture shall not discharge into a water-closet bend or stud.

3.18.5 No caulked cast-iron fitting with double hubs shall be used except on a vent pipe.

3.18.6 In waste water plumbing a metal-faced union shall not be used in a vent pipe.

3.19 Dead ends

3.19.1 Where a dead end is installed it shall be so graded that all moisture accumulating in it drains back into the system.

3.19.2 Every unconnected opening in drainage and vent-piping, other than an opening to the atmosphere, shall be closed by air-tight capping.

3.20 Supports and hangers

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3.20.1 Support of vertical piping

Vertical piping shall be supported and anchored with strong metal rests or otherwise approved by the Authority.

3.20.2 Subject to **3.20.3**, **3.20.4**, **3.20.6** and **3.20.7** rests shall be set not farther apart than:-

- (a) a floor-levels; or
- (b) 3 m vertical distance.

3.20.3 Where pipes are offset or branched, the rests shall be placed at such shorter intervals as

are necessary to support and keep the piping in alignment when full of liquid.

3.20.4 Cast-iron soil pipe shall be supported at not less than at every storey height and at its base.

3.20.5 Copper tubing shall be supported at each storey, for piping 33 mm and smaller, and at not more than 1.2 m intervals, for 44 mm and larger.

3.20.6 Lead pipe shall be supported at intervals not exceeding 1.2 m.

3.20.7 Rigid plastic pipe shall be supported at intervals not exceeding 1.2 m.

3.21 Support of horizontal piping

3.21.1 Subject to **3.21.2 to 3.21.5**, both inclusive, horizontal piping shall be supported at points sufficiently close, in order to prevent the pipe from sagging when it is full of liquid.

3.21.2 In a horizontal run of cast-iron pipe there shall be at least one support at each hub.

3.21.3 Lead pipe in horizontal runs shall be supported throughout its entire length.

3.21.4 Copper tubing shall be supported at approximately 2 m intervals for piping
38 mm and smaller and 3 m intervals for piping 50 mm and larger.

3.21.5 In a horizontal run of piping of material other than cast-iron, lead or copper, the supports shall be placed at intervals of not more than:

- (a) 2 m for pipes of 20 mm or smaller;
- (b) 2.5 m for pipes from 20 mm to 90 mm;
- (c) 4 m for pipes of 100 mm, or more.

3.22 Hangers

3.22.1 Strap hangers may be used for any pipe of trade size up to and including 100 mm.

3.22.2 Ring hangers may be used for pipe of any trade size.

3.22.3 Where a hanger of either type is used, it shall be:-

- (a) of metal in design and strength, sufficient to support the load carried; and
- (b) securely attached to the building.

3.22.4 Where a hanger of either type is attached to stone, brick, cement, concrete, or other similar material, the attachment shall be made by means of metal or expansion-type plugs inserted in the material.

3.22.5 A hanger of either type supporting brass or copper pipe may be of the same material as the pipe, but if of a material that is different from the pipe, it shall be insulated to prevent electrolysis between the pipe and the hanger.

3.23 Supports for drains

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3.23.1 Where a drain is laid on unstable foundation, it shall be of cast iron and supported by a layer of concrete, conforming to either ASTM Standards or British Standards, or piers of brick, stone or concrete.

3.23.2 Where a layer of concrete is used, it shall be not less than 100 mm thick, and 150 mm wider than the nominal diameter of the pipe.

3.23.3 Where piers are used, they shall:-

- (a) have a cross-sectional area each of not less than 0.65 m^2 at the point of contact of the pipe;
- (b) be at intervals not greater than 2.5 m; and
- (c) extend down to a stable foundation.

3.23.4 Where a wrought-iron or steel rod is placed underground to support piping, its smallest dimension shall not be less than 20 mm.

3.24 Soil and waste systems

3.24.1 Pipe materials

These shall be of suitable material, laid, smooth, impervious and non-corrosive such as copper, PVC or cast-iron.

Black-iron, galvanised iron or concrete pipes are not recommended for use as soil pipes.

3.24.2 Pipe sizes

The diameter of pipes shall be as small as may be consistent with the maximum load, but soil pipes shall not be less than 7.6 mm in diameter.

Waste water pipes shall not be less than 32 mm in diameter.

3.25 Inspection and testing

3.25.1 Notice for inspection and testing 17

The plumbing contractor shall notify the Authority when any plumbing work is completed and ready for inspection or test.

3.26 New work

3.26.1 All new plumbing work and such portions of existing systems as may be affected by new work, or by any changes, shall be subject to inspection by the Authority.

3.26.2 Where plumbing has been constructed, repaired, renewed or altered, such plumbing shall not be put into use until it has been inspected and found to conform with this Code.

3.27 Existing plumbing

3.27.1 The existing plumbing system in any building shall be subject to inspection by the Authority.

3.27.2 If any part of an existing plumbing system is found to be in such condition that it is or may become injurious or dangerous to health, the relevant Authority may, by written order, require the owner to make such changes, alterations or replacements as may be necessary within the specified time.

3.27.3 Wherever there is reason to believe that the plumbing system of any building became defective, it shall be subjected to tests or inspection and any defects found shall be corrected as directed by the Authority.

3.28 Tests

Tests shall be conducted in the presence of an inspector representing the Authority.

3.29 Violations

Notices for violations shall be written and mailed or delivered by the Authority to the person responsible at the time of inspection.

3.30 Materials and labour for tests

The equipment, material and labour shall be furnished by the person to inspection is requested.

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necessary to assist in inspection or tests whom the permit is issued or by whom

3.31 Covering of work

No plumbing system or part thereof shall be covered until it has been inspected and approved. If any plumbing system or part thereof is covered before being inspected or approved, it shall be uncovered upon the direction of the Authority.

3.32 Method of testing of plumbing and drainage system

3.32.1 Each drain shall be tested, if required by the Authority by rolling through it a ball made of hard material of sufficient weight to prevent it from floating.

3.32.2 The diameter of the ball shall be: -

- (a) 50 mm for piping of 75 mm or larger trade size; and

(b) 25 mm for smaller piping.

3.32.3 All roughed-in work or pipe shall be tested with water or smoke and after the plumbing fixtures have been set, the entire system shall be submitted to a smoke or peppermint or chemical test as specified. Tests may be applied to the plumbing and drainage system in its entirety or in sections.

3.32.4 When the water test is applied to the entire system, all openings shall be tightly closed by proper testing plugs or screw caps, except the highest opening above the roof and the system shall be filled with water to the point of overflow above the roof.

3.32.5 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 tested with less than 3 m head of water.

3.32.6 The water shall be kept in the system or the portion under test, for at least 15 minutes before inspection; the system shall then be tight at all points.

3.33 Smoke test

3.33.1 The smoke test shall be made by 19 filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof they shall be closed, and a pressure equivalent to a 25 mm water column shall be built up and maintained for a period of at least 15 minutes.

3.33.2 The final test of the completed drainage vent system may either be a smoke test or a peppermint test. Where the smoke test is preferred, it shall be made by filling all traps with water and then introducing into the entire system, a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at the stack openings on the roof, they shall be closed and a pressure equivalent to a 25 mm water column shall be built up and maintained for 15 minutes before inspection starts. Where the peppermint test is preferred, 57 g of oil of peppermint shall be introduced for each line of stack.

3.33.3 When fixtures have been set and connected, the system shall then be subjected to an additional air or chemical test of at least 25 mm of water.

3.33.4 The Authority may apply any or all of the afore-mentioned tests or any other test as it may deem necessary.

3.34 Testing of building sewer

3.34.1 Tests shall consist of plugging end of building sewer at point of connection with the public sewer or private sewage disposal facility and filling the building sewer with water and testing with not less than a 1.5 m head of water. A flow test, as provided by the Authority may be substituted.

3.35 Testing of water supply system

3.35.1 The inspector testing a potable water system or a section thereof shall:-

- (a) conduct the test at a time when the water in the section being tested is at 1½ times the working pressure; and
- (b) ensure that all air is expelled before the outlets are closed and all outlets are thereafter tightly closed.

3.35.2 After the system or section has been subjected for not less than an hour to the pressures under the conditions prescribed, 20 3.35.1 the inspector shall:

- (a) by visual examination of all unconcealed parts; and
- (b) by gauge tests, satisfy himself that no water is leaking or seeping out from any pipe, joint or fitting, otherwise than at an outlet.

3.35.3 The water used for tests shall be obtained from a potable source of supply.

3.36 Retesting

If the Authority finds that the work will not pass the test, the plumber shall be required to make necessary corrections and the work shall then be re-submitted for tests or inspection.

3.37 Inspection and tests not required

No test or inspection shall be required after the repair or replacing of a fixture, faucet or valve, or after forcing out a stoppage or repairing leaks.

3.38 Certificate of approval

On the satisfactory completion and final test of the plumbing system, a certificate of approval shall be issued by the Authority to the owner, and to the plumbing contractor.

4 Water supply and distribution

4.1 Protection of potable water supply - General

- 4.1.1** No connection shall be made in a potable water system whereby any foreign or non-potable water may enter the potable water system.
- 4.1.2** No person shall interfere with a potable water system in such manner as to cause the water to become non-potable.
- 4.1.3** No pipe or fitting that has been used for any purpose other than the distribution of potable water shall be installed in a potable water system.
- 4.1.4** A potable water system shall be separate from and independent of a supply system for non-potable water.
- 4.1.5** No pipe conveying non-potable water or sewage shall be installed where it may contaminate the water in:
- (a) a tank for potable water that is not a sealed tank; or
 - (b) any food handling equipment.
- 4.1.6** No part of a sewage ejector shall be connected to any part of a potable water system.
- 4.1.7** Every well pump, filter, softener, appliance or other device connected to a potable water system shall be provided with such covers, walls, coping and casing as shall entirely exclude superficial ground or surface water and other sources of contamination.

4.2 Back-flow

The water distribution system shall be protected from 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 4.3.1 to 4.3.4.

4.3 Prevention of back-flow

4.3.1 In this Code, 'wall' includes:

- (a) a wall of a room or building; and
- (b) the inner surface of a fixture and of its superstructure.

4.3.2 Except as permitted under **Clause 4**, where the orifice of a faucet, spout or distributing pipe, supplies potable water to a fixture, it shall be so located that it is above the flood level rim of the fixture at a vertical distance of not less than the minimum air gap prescribed by 4.3.3 or 4.3.4.

4.3.3 Where that point of the orifice that is nearest to a wall is located:

- (a) a distance more than three times ²² the diameter of the effective opening of the orifice from one wall; or
- (b) a distance more than four times the diameter of the effective opening of the orifice from each of two intersecting walls.

The minimum air gap shall be not less than a distance equal to two times the diameter of the effective opening.

4.3.4 Where that point of the orifice that is nearest to a wall is located:

- (a) a distance equal to or less than three times the diameter of the effective opening of the orifice from one wall; or
- (b) a distance equal to or less than four times the diameter of the effective opening of the orifice from each of two intersecting walls;

The minimum air gap shall not be less than a distance equal to three times the diameter of the effective opening.

4.4 Storage tanks - Drain lines

4.4.1 Where a tank is connected to a potable water system, the tank shall have a valved drain

line connected at the lowest point of the tank.

4.4.2 Where the drain line discharges into a receptacle, the discharge outlet of the drain line shall be located above the flood level rim of the receptacle, a distance not less than the air gap prescribed by **4.3.3**.

4.5 Back-flow preventer

4.5.1 In this Code, 'critical level' means the horizontal plane at which a back-flow preventer functions.

4.5.2 Subject to sub-subclause **4.5.4** where as prescribed by **4.3.3.1**, a back-flow distributing pipe in a readily valve on the distributing pipe and the 23 it is not practical to provide an air gap preventer shall be installed on the accessible position between the last outlet.

4.5.3 A back-flow preventer shall be installed in a manner, that its critical level is above:

- (a) the flood level rim of the fixture; or
- (b) the highest possible water level in the tank, a vertical distance not less than:
 - (i) four times the diameter of the inlet of the control valve; or
 - (ii) 100 mm, whichever is greater.

4.5.4 Where a tank that is not a pressure tank is so constructed or so located that it is not practicable to provide above the flood level rim of the tank, the minimum air gap prescribed by **4.3.3** or to install a back-flow preventer:

- (a) the tank, shall have an over-flow outlet consisting of a channel or pipe below the flood level rim and below all pipes supplying water to the tank;
- (b) the vertical distance from the lowest point of any of the supply pipes to the top of the over-flow outlet shall be not less than 1½ times the minimum air gap prescribed by regulation **4.3.3**;

- (c) the total effective opening of the over-flow outlets shall be enough that, when water is flowing into the tank at maximum rate with all inlets fully opened and all outlets, except the over-flow outlets, closed, water will not rise to a point above the top of the highest over-flow outlet at a distance greater than one half the minimum air gap prescribed in **4.3.3**;
 - (d) the over-flow outlet shall have unobstructed discharge to the open air;
 - (e) the channel or pipe shall have an unobstructed cross-sectional area throughout its length not less than the effective opening of the outlet; and
 - (f) the discharge end of the over-
or any other device of approved
of all foreign matter.
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- flow pipe shall be fitted with a back flap
design and material to prevent the entry

4.6 Cleansing

All newly installed, repaired or altered parts of a potable water system shall, before the system is put into use, be thoroughly cleansed and disinfected to ensure freedom from contamination.

4.7 Non-potable supply

4.7.1 For the purpose of preventing non-potable water being mistaken for potable water, all piping distributing non-potable water shall be:

- (a) identified by distinct, easily recognisable, permanent marking; and
- (b) not accessible as a supply of water for drinking or for preparation of food.

4.7.2 Non-potable water shall not be distributed to any part of a food processing establishment where food is actually being processed.

4.8 Special devices

4.8.1 Subject to **sub-subclause 4.8.2** where a cooling jacket, a condenser or an industrial or

special appliance is constructed or located so that:

- (a) the prescribed minimum air gap is not provided; or
- (b) a back-flow preventer is not installed; the jacket condenser or appliance shall not be connected to or supplied directly from a potable water system.

4.8.2 Water from a potable water system may be used in a jacket, condenser or appliance where the potable water:

- (a) is first discharged into a tank conforming to **4.3** or **4.8.5**, as the case may be; and
- (b) is not returned to the potable water system from the jacket, condenser or appliance.

4.8.3 A service pipe shall not be installed to supply a hot water tank, unless a check valve is installed on the distribution pipe supplying the hot water tank.

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4.8.4 Where a check valve is installed on the distributing pipe supplying a hot water tank, the hot water tank shall be equipped with a pressure relief valve or other device designed to open when the water in the tank reaches a predetermined pressure and a temperature relief valve for which the sensing element is within the top 150 mm of the tank and designed to open when the sensing element reaches a predetermined temperature.

4.8.5 The valve or other device shall terminate in the open.

4.9 Materials

4.9.1 Quality of materials

Materials used in any part of a plumbing system shall be free from defects and shall conform to the requirements of this Code.

4.9.2 Specification for material

Materials for plumbing systems shall conform to the relevant specifications as required by either:

- (a) the British Standards Institution (BSI);

- (b) the American Society for Testing Materials (ASTM).
- (c) the Canadian Standards Association (CSA);
- (d) the International Organisation for Standardisation (ISO.); or
- (e) the A.W.W.A.

Classes of pipe within these standards are subject to approval by the Authority.

4.10 Non-metallic pipe

4.10.1 Asbestos-cement pipe and couplings ²⁶ shall be sound and shall comply with the appropriate specifications (**See 4.3.2**). Rubber rings for coupling shall consist of moulded and vulcanised rubber compounds.

4.10.2 Plastic pipe and fittings shall comply with the appropriate specifications (**See 4.9.2**).

4.10.3 Plastic pipe, when used for potable water, shall be of a dark colour.

4.11 Ferrous pipe (black or blue)

4.11.1 All ferrous pipe and fittings shall be sound, free from cracks, sandholes, blow-holes or other defects, and shall comply with the appropriate specifications (**See 5.2**).

4.11.2 All cast iron pipe and fittings shall be finished inside and outside with a corrosion retarding coating approved by the Authority.

4.11.3 Every cast iron fitting shall be of a quality at least corresponding to that of the straight pipe.

4.11.4 All screwed drainage fittings shall be recessed to provide a smooth channel.

4.11.5 Couplings for steel pipe shall be of wrought iron and steel.

4.11.6 All steel and wrought iron pipes and fittings shall be suitably protected against corrosion,

internally and externally. The following methods of treatment are accepted:

- (a) galvanizing;
- (b) bituminising; and
- (c) concrete lining.

4.12 Non-ferrous pipe

4.12.1 Brass and copper pipe, or tubing, used in a plumbing system shall comply with the appropriate specifications (**See 4.9.2**).

4.12.2 All brass ferrules and nipples shall 27 comply with the appropriate specifications (**See 5.2**).

4.12.3 Lead pipe shall not be used on any potable water system without the permission of the Authority.

4.12.4 Identification of materials

Every length of pipe and every fitting used in a plumbing system shall have cast, stamped or indelibly marked on it, the maker's name or mark, and the weight and class or quality of the product.

4.13 Used material

4.13.1 Used material may be installed only if it conforms to the requirements for new material for the same purpose.

4.13.2 Used pipe or fittings shall not be reinstalled in a new location except on written consent of the Authority and of the owner of the building.

4.14 Joints and connections

4.14.1 All surfaces to be soldered shall be suitably cleaned.

4.14.2 Joints of copper tubing shall be silver soldered, sweated, bronze welded or be

compression joints.

4.14.3 A soldered joint for copper tubing shall be:

- (a) made with a fitting having solders or other means for limiting the insertion; and
- (b) properly diluted and soldered.

4.14.4 PVC cement manufactured for cold water piping shall not be used on hot water piping and fittings.

4.14.5 Every joint and connection in a potable water system shall be watertight under an internal water pressure of at least 1.03 N/mm^2 .

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4.15 Pipes and trenches

4.15.1 Except as permitted by the Authority, the underground water service pipe and the building drain or building sewer shall not be less than 3 m apart horizontally and shall be separated by undisturbed or compacted earth.

4.15.2 When permitted by the Authority, the water service pipe and the building drain or building sewer may be placed less than 3 m apart horizontally, provided the following conditions are met:

- (a) the bottom of the water service pipe, at all points shall be at least 300 mm above the top of the sewer line at its highest point;
- (b) the water service pipe shall be placed on solid ground at least 300 mm to one side of the sewer pipe; and
- (c) the number of joints in the service pipe shall be kept to a minimum. Materials and joints of the sewer and water service pipe shall be installed in such manner and shall possess the necessary strength and durability to prevent the escape of solids, liquids and gases there from, under all known adverse conditions such as corrosion, strains due to temperature change, settlement, vibrations and superimposed loads.

4.16 Water piping

4.16.1 Service pipes

- (a) The water service pipe from the street main to the water distribution system at the property boundary 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 20 mm nominal diameter.
- (b) It shall be placed at least 300 mm beneath the surface of the ground whenever possible unless otherwise authorised by the Authority.
- (c) It shall be provided with a shut-off valve outside of the boundary of the property. The shut-off valve shall be adequately protected and readily accessible. 29

4.16.2 Distribution and branch supply pipes

- (a) Pipes, fittings and valves used on distribution and branch supply piping may be of a standard as specified in **4.9.2**, provided that no section of the lines is subjected to a working pressure which at any time is greater than half the rated pressure of any pipe, fitting or valve on the said section of the line.
- (b) The minimum size allowed for any pipe in the water supply system is 12 mm nominal. Approved flex lines to fixtures may be used provided all couplings are accessible.
- (c) The supply line taken from pressure or gravity tanks shall be valved at or near its source, and an interior stop-and-waste valve or cock shall be provided for each exterior outlet or group of outlets.
- (d) Every tank connected to a potable water distributing pipe shall be equipped with:
 - (a) a valve in the water-inlet line; and
 - (b) a drain-off valve.

Approved flex lines may be used providing all couplings are exposed.

4.17 Stopcocks and valves

4.17.1 Shut-off valves and stopcocks

- (a) When used on any section of the water supply system shall be :-
 - (i) of a high quality brass, bronze, PVC or other equally strong corrosion-resistant material approved by the Authority; or
 - (ii) have their internal parts, which are likely to be affected by corrosion, made of such material or otherwise suitable protected as specified by the Authority.
- (b) When of nominal size of 50 mm and used on a direct or street pressure system, shall be of the screwed down pattern, globe and gate variety.
- (c) When of nominal size larger than 30 50 mm and used on a direct or street pressure system shall be of the bolted down pattern, globe and gate variety.
- (d) When used on the low pressure side of an indirect or gravity feed system, shall be of the screwed down pattern, full way gate variety.
- (e) Shall be installed in a manner so that they shall be readily accessible and shall facilitate the draining of the system at sections thereof.
- (f) Shall be so constructed as to have an effective opening not less than half the cross-sectional area of the pipe to which it is fitted.

4.17.2 In all buildings a shut-off valve shall be installed at the foot of each riser.

4.17.3 A stopcock or valve shall be installed at each sanitary unit.

4.17.4 In a public building a stopcock or valve shall be installed at:

- (a) the foot of each riser or where there is no riser, at the place where each distributing pipe serving more than three fixtures, connects to the service pipe; and
- (b) at each fixture or at each battery of wash basins.

4.17.5 In multiple dwellings the water supply for each family unit shall be controlled by an arrangement of shut-off valves which will permit each group of fixtures or the individual fixtures to be metered or shut off by the Authority without interference with the water supply to any other family unit or portion of the building. For the purpose of this Code, a

group of fixtures means two or more fixtures adjacent to or near each other.

4.17.6 In all public buildings shut-off valves shall be installed which will permit the water supply to all equipment in each separate room to be shut off without interference with the water supply to any other room or portion of the building.

4.17.7 Valves in the water supply immediately controlling one fixture 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. 31 distribution system except those supply, when fully opened, shall have a

4.18 Ball-valves

4.18.1 Ball-valves used on the water supply system may be horizontal or vertical in design and be of the Portsmouth, Croydon or Equilibrium type or of any other design and/or type which conforms to the specifications of the approved standards provided that:

- (a) no ball-valve which requires its entire body to be submerged beneath the surface of the water in the cistern it serves is installed; and
- (b) where a ball-valve is provided with a pipe so arranged as to discharge water into a cistern below its water level an air-hole or other means of preventing back siphonage shall be provided.

4.19 Water supply to fixtures

4.19.1 The water supply to every fixture shall be such that a sufficient amount of water will be available to flush the fixture to the extent necessary to keep it in a sanitary condition.

4.19.2 The water distribution pipe and branches in a building shall be of sizes adequate to provide a positive flow and pressure to each fixture, but in no case shall the sizes of water supply pipes to fixtures be less than prescribed in **Table 2**. (See also **4.16.2**).

4.20 Water storage tanks

4.20.1 The Authority may require any public, commercial, industrial or other building to be

provided with a water storage tank of adequate capacity.

- 4.20.2** Every water storage tank other than a pressure tank shall be provided with a ball valve or other approved automatic shut-off device.
- 4.20.3** Every water supply tank shall be supported and pipes shall be connected to each tank so that no weight stress is transmitted 32 from the tank to the pipes or pipe connections.
- 4.20.4** Tanks other than pressure tanks shall be covered to prevent contamination.
- 4.20.5** An adequate overflow pipe shall be provided for water supply tanks and in no case shall such overflow be connected directly to any drainage system.
- 4.20.6** Every water supply tank shall be provided with a valve drain line located at its lowest point and discharged above flood level rim of the receptacle into which the drain water flows, and as required for overflow pipes in this Clause.
- 4.20.7** Where storage tanks are installed, there shall be no direct line from the water supply pipe to the fixtures, unless adequate means of preventing back-flow are provided and a cock or gate valve is installed on the supply line.
- 4.20.8** No water pump shall be installed, for the purpose of filling a storage tank, with a direct connection to the supply pipe. Where installed, water pumps shall be fed from a separate ground storage tank.

4.21 Safety devices

- 4.21.1** A check valve shall be installed in the cold water supply line to each storage water heater.
- 4.21.2** A pressure-relief valve shall be installed for all equipment used for heating and storage of hot water. The rate of discharge of such a valve shall limit the pressure rise for any given rate of heat input to 10 percent of the pressure at which the valve is set to open.
- 4.21.3** A temperature-relief valve shall be installed for all equipment used for the heating or storage of hot water. Each valve shall be rated in Joules or as to its capacity. At 98.5° C it shall be capable of discharging sufficient hot water to prevent any further rise in temperature.

4.21.4 A combination of pressure and temperature relief valves shall be considered acceptable subjected to **(4.21.2)** and **(4.21.3)**.

4.21.5 Temperature - relief valves shall be placed directly above tanks served and in no case more than 75 mm away from such tanks. Pressure - relief valves may be located adjacent to the equipment they serve. There shall be no check valve or shut-off valve between a relief valve and the heater or tanks for which it is installed.

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4.21.6 The outlet of a pressure and temperature relief valves or other relief valves shall not be connected to the drainage system as a direct waste.

4.21.7 Any storage tank hereafter installed for domestic hot water shall have, clearly and indelibly stamped in the metal or so marked upon a plate welded thereto or otherwise permanently attached, the maximum allowable working pressure. Such markings shall be placed in an accessible position on the outside of the tank so as to make inspection or reinspection readily possible. All storage tanks for domestic hot water shall meet the applicable standards as determined by the Authority.

4.21.8 All relief valves to be used shall be of a type approved by the Authority.

5 Sewerage

5.1 Materials

5.1.1 Quality of materials

Materials used in any part of a plumbing system shall be free from defects which may affect its usefulness for purpose of sanitation.

5.2 Specification for material

5.2.1 Materials for plumbing systems shall conform to the relevant specifications as required by either:-

(a) the British Standards Institution (BSI);

5.4.1 All ferrous pipe and fittings shall be sound, free from cracks, sandholes, blow holes and other defects, and shall comply with the appropriate specifications **(See 5.2)**.

5.4.2 All cast iron pipes and fittings shall be finished inside and outside with a corrosion resistant coating approved by 35 the Authority.

5.4.3 Every cast iron fitting shall be of a quality corresponding to that of the straight pipe.

5.4.4 All screwed drainage fittings shall be recessed to provide a smooth channel.

5.4.5 Couplings for steel pipe shall be wrought iron and/or steel.

5.5 Non-ferrous pipe

5.5.1 Brass, copper and iron pipe used in a plumbing system shall comply with the appropriate specifications **(See 5.2)**.

5.5.2 All brass ferrules and nipples shall comply with the appropriate specifications **(See 5.2)**.

5.5.3 Copper tube for vent and waste pipes within a building shall be drawn (hard) and shall comply with the appropriate specifications **(See 5.2)**.

5.5.4 Lead waste pipe shall comply with the appropriate specifications **(See 5.2)**.

5.6 Sheet lead

Sheet lead shall weigh not less than 25 kg/m².

5.7 Floor flanges

Floor flanges for fixtures having an integral trap shall be not less than 4.5 mm thick, of brass or cast iron, designed for soldering to lead pipe, caulking to cast iron pipe, and all floor flange bolts, washers and nuts, shall be of heavy brass or gun metal. Alternatively, plastic flanges and fixtures are acceptable if in compliance with the relevant specifications **(See 5.2)**.

5.8 Galvanising

All steel and wrought-iron pipe and fittings used for waste or vent pipe shall be galvanised inside and outside.

5.9 Identification of materials

Every length of pipe and every ³⁶ fitting used in a plumbing system shall have cast, stamped or indelibly marked on it, the maker's name or mark, and the weight, and class or quality of the product.

5.10 Used material

5.10.1 Used material may be installed only if it conforms to the requirements of new material for the same purpose.

5.10.2 Used pipe fittings shall not be reinstalled in a new location except on written consent of the Authority and of the owner of the building in which it is to be installed.

5.11 Plumbing fixtures

5.11.1 Installation

- (a) A fixture shall be installed as to be readily accessible for cleaning.
- (b) Where feasible, all pipes from a fixture shall be run to a wall and any pipe or trap of a type subject to damage shall be adequately protected if it extends to within 300 mm.
- (c) A suitable access door shall be provided in the construction to facilitate repairs and replacements of the connection of built-in bath tubs and other built-in fixtures which have a concealed union, slip-joint, or gasket, water or waste connection.

5.12 Materials

Every plumbing fixture shall be made of materials with smooth, hard, impervious, corrosion-resistant surfaces, free from flaws or blemishes which would tend to interfere with cleaning.

5.13 Water closet bowls

5.13.1 A water closet bowl shall be made of vitreous china, or smooth vitreous glazed earthen ware, or any material having an equally smooth, hard, impervious, corrosion-resistant surface.

5.13.2 A water closet may be siphon jet, wash-down, reverse trap or blow-out type, or floor outlet with wall.

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5.13.3 A water closet bowl shall be so constructed that when the bowl is filled with water to the point of trap overflow, the volume will be sufficient to prevent fouling of the surface of the bowl, and the bowl shall have an integral flushing rim so constructed as to flush the entire surface.

5.13.4 A water closet bowl shall be securely attached to the floor or wall, and fitted with an approved type of seat made of or treated with a smooth non-absorbent material.

5.14 Water closet tanks

5.14.1 A water closet tank shall have a water capacity of not less than 9 litres and syphonic flushing equipment or any other device (approved by the Authority) that will ensure at all times there is a supply of water sufficient to flush normal solids and soil out of the bowl.

5.14.2 A water closet tank flush pipe shall have an inside diameter not less than 32 mm.

5.15 Flush valves

5.15.1 A direct flush valve shall be so installed that it is readily accessible for repairing.

5.15.2 All flush valves shall be of a type approved by the Authority and shall be provided with a vacuum breaker.

5.15.3 Means shall be provided for regulating the flow to direct flush valves.

5.16 Urinals

5.16.1 Every urinal shall have an approved flushing device.

5.16.2 A urinal shall be made of materials similar to that prescribed for water closet bowls.

5.16.3 A urinal of a siphon jet, blow-out, or pedestal type shall have its flushing rim and its trap

integral with it, and the water seal shall be not less than 50 mm.

5.16.4 Stall-type urinals shall be so connected to the waste pipe that water does not accumulate on the walls or 38 flooring or under the fixture.

5.16.5 The outlet of all urinals shall be fitted with a strainer of a design approved by the Authority.

5.16.6 The use of trough urinals is prohibited.

5.17 Urinal tanks

A urinal tank shall have a water capacity of not less than 4.5 litres per stall bowl of 600 mm of slab and flush valve and pipe connections that will ensure that at all times there is a supply of water sufficient to flush the urinal thoroughly. Where urinal tanks of the chain and pull type are used, a separate tank shall be provided for each urinal.

5.18 Urinal flush valves

5.18.1 A flush valve may be of the goose-neck siphon type.

5.18.2 A non-automatic direct flush valve shall not be used to flush more than one urinal.

5.19 Wash basin

5.19.1 A wash basin shall:

- (a) be of material similar to that prescribed for water closet bowls;
- (b) have a waste pipe not smaller than 32 mm trade size; and
- (c) have an overflow, preferably the integral weir type.

5.19.2 The waste opening shall be equipped with a strainer having a mesh of not finer than 4 to 25 mm and shall have an inside diameter of not less than 32 mm.

5.19.3 Where a stopper is provided it shall be so arranged that the standing water in the fixture does not rise to the overflow pipe or channel when the stopper is used, or remain in the

overflow pipe or channel when the fixture is empty.

5.20 Sinks

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5.20.1 Except as hereinafter provided a sink shall comply with the conditions prescribed in **5.12**.

5.20.2 A sink, other than laboratory sink, shall be provided with a waste fitting having a size not less than that of the trap to which it is connected, but in another case less than 38 mm in diameter.

5.20.3 No concealed overflow port shall be provided on sinks except those for laboratory purposes.

5.21 Laundry trays

5.21.1 A laundry tray shall comply with the conditions prescribed in **5.12**.

5.21.2 Each compartment of a laundry tray shall be provided with a waste fitting of not less than 38 mm in diameter and with a stopper.

5.21.3 A concrete laundry tray may be installed provided:

- (a) the tray is made of strong, dense concrete, moulded in one piece with edges and corners rounded inside and out; and
- (b) the sides and partitions are not less than 28 mm thick at the top and 32 mm thick at the bottom, and the bottom slab is not less than 32 mm thick.

5.21.4 The top edges of a concrete laundry tray may be protected with a rim of zinc-coated steel or other approved material securely bonded to the tray and corners of the rim are rounded.

5.22 Shower baths

5.22.1 A shower receptor, except a bath tub, shall be provided with a waste fitting not less than 38 mm in diameter, and have a strainer.

5.22.2 A shower drain shall be considered a fixture and shall be provided with a trap having a water seal of not less than 50 mm.

5.22.3 A shower bath that does not discharge into a tub or other fixture shall have provision made against leakage through the floor.

5.22.4 All shower compartments, constructed on a wooden floor except those having metal enameled receptors, shall have a shower pan of lead, copper, or other material approved by the Authority. 40 The pan shall turn up on all sides at least 150 mm 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 water tight joint between the pan and trap. Shower receptacle waste outlets shall not be less than 38 mm and have removable strainers.

5.23 Bath tubs

A bath tub shall have a smooth, hard interior surface impervious to water, and shall be equipped with a water fitting not smaller than 38 mm in diameter.

5.24 Drinking fountains

5.24.1 A drinking fountain shall:

- (a) be of such materials and design as will ensure that all surfaces on which potable water may reach before going into the waste pipe:
 - (i) are hard, smooth, impervious to water, and free from chips and cracks;
 - (ii) can be readily cleansed; or
 - (iii) directs the water at an angle of approximately 45 degrees upward from the horizontal; and
 - (iv) be equipped with readily accessible means for regulating the flow of water.

5.24.2 Where the orifice has an effective opening not greater than 98 cm², the nozzle shall be located so that the lower edge of the orifice is not less than 19 mm above the flood level rim of the receptacle.

5.25 Floor drains

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A floor drain in any room where food or beverage is stored, prepared, or served, or where a plumbing fixture other than a laundry tray or wash basin is installed shall be considered a fixture and shall be made of approved metal and have a proper trap and vent in accordance with the provisions of this Code.

5.26 Special fixtures

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 resistant steel, or other minerals suited to the use for which the fixture is intended.

5.27 Used plumbing fixtures

5.27.1 A used plumbing fixture shall not be reinstalled in a new location unless it is found upon inspection by the Authority to conform in all respects to the requirements of this Clause of the Code and to be in satisfactory physical and sanitary condition, and then only on written consent of the owner of the building in which it is to be installed.

5.27.2 A used fixture which is to be installed on premises other than where originally installed shall be plainly labelled "used fixture" before delivery to the other premises, and such label shall be maintained until after installation and final inspection and approval by the Authority.

5.28 Fixture overflow

5.28.1 The overflow pipe or channel from a fixture shall be connected on the building or inlet side of the trap and be so arranged that it can be readily and effectively cleaned.

5.28.2 The overflow fitting shall be so designed that the standing water in the fixture cannot rise in the overflow when the stopper is closed nor remain in the overflow when the fixture is empty.

5.29 Fixture strainers

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A fixture, other than a water closet, full flush urinal, clinical service sink, bed pan washer or similar fixture, shall be provided with a strong metallic, PVC or porcelain strainer of approved design.

5.30 Soil and waste pipes

5.30.1 Materials

- (a) Soil and waste pipes within a building shall be of cast iron, galvanised wrought iron, galvanised open hearth iron, galvanised, steel, brass, copper, lead or plastic. The pipe and fittings for each type of material shall comply with the specifications set out in 5.2.
- (b) **Underground piping within buildings:** All drains within buildings, when underground, shall be of cast iron soil pipe or of other material to be approved by the Authority. For buildings over two stories or more in height, the pipe shall be of extra-heavy weight.
- (c) All underground pipe from a point 1 m beyond the external wall of a building shall be of cast iron, asbestos cement, bituminised fibre glass, concrete or plastic.

5.31 Underground pipe

No black or galvanised wrought iron or steel pipe, shall be used underground for vent, soil or waste pipe.

5.32 Building sewer pipe

Building sewer pipe shall be of concrete, asbestos cement, bituminised fibre glass, cast iron, or plastic and the minimum size shall be 100 mm in diameter.

5.33 Multiple sewers and drainage systems

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Unless otherwise approved by the Authority, no sanitary sewer shall pass under any building other than the building it serves, and the plumbing system of every building or premises shall be separate from and independent of that of every other building or premises as far as the street or property line.

5.33.2 Where such consent is given, that portion of the pipe which is laid under the building shall be embodied in a mass of concrete not less than 150 mm thick all around as directed by the Authority. Where cast iron pipes are used, they shall be of material and weight as approved by the Authority. Any such sewerage pipe shall have free connection with the outer air at each end of the building under which it is laid, if so required by the Authority.

5.34 Slope of pipes

5.34.1 A slope of not less than 1 in 40 shall be provided for a fixture branch not larger than 75 mm in diameter.

5.34.2 A horizontal branch not larger than 75 mm in diameter shall have a slope of not less than 1 in 60.

5.34.3 A horizontal drain pipe larger than 75 mm in diameter shall have a slope of not less than 1 in 100.

5.34.4 Subject to **5.36.4** a building drain or building sewer shall have a slope not less than that prescribed for waste and drain pipes in **5.34.1** and **5.34.2**.

5.34.5 Where conditions do not permit a building sewer or building drain to have the slope prescribed in **5.34.3** it may have a lesser slope but velocity of flow of the liquid shall not be less than 600 mm per second.

5.35 Fixture units

5.35.1 A fixture itemised in **Table 4** shall be considered to produce a hydraulic load equal to the number of fixture units specified. **Table 4** shall be used in estimating the total load carried by soil or waste pipes.

5.35.2 A fixture not itemised in **Table 4** and having a waste pipe or trap itemised in **Table 5** shall be considered to produce a hydraulic load equal to the number of fixture units prescribed therein.

5.35.3 The maximum number of fixture units that may be connected to a given size of horizontal or vertical waste or soil pipe or drain shall comply with **Table 6** or **7** whichever one is applicable, provided however that no water closet shall be connected to a pipe of less than 100 mm.

5.35.4 A pump, ejector, or other device or equipment discharging water, liquids, or water borne wastes, in a continuous or intermittent flow shall be deemed to produce a hydraulic load equal to (2 fixture units per 4.5 L of flow).

5.36 Future fixtures

When provision is made for the future installation of fixtures, those to be provided for shall be included in calculating the required sizes of drain pipes. Construction to provide for such fixture installation shall be terminated with a plugged fitting or fittings and shall be vented as required in **5.35**.

5.37 Drainage below sewer level

5.37.1 All building subsoil drains carrying sewage or similar wastes shall discharge into a leak proof sump or receiving tank, so located as to receive the sewage by gravity. The sewage shall be lifted and discharged into the building sewer by a pump, an ejector, or other equally efficient method.

5.37.2 Potable water supplies shall not be used for the operation of ejectors.

5.37.3 Such sumps or tanks shall discharge automatically, or shall be of sufficient capacity to hold the maximum accumulated sewage and wastes for a period of not less than 24 hours.

5.37.4 The discharge from the sump or receiving tank shall be connected to the sewer side of the trap.

5.38 Basement and subsoil drainage

5.38.1 A basement or cellar shall be drained into a trapped catch basin or floor drain.

5.38.2 Where premises may be subject to reverse flow, an anti-flood valve of design approved by the Authority shall be installed. A manually operated gate valve may be substituted for the screw cap.

5.39 Fixture below ground level

Where premises may be subject to reverse flow, all plumbing fixtures, other than floor drains, set below the level of the adjoining street or property, but not draining into a sump, shall have fixed on the discharge pipe, an anti-flooding device.

5.40 Prohibited connections

5.40.1 No direct connection of a system discharging steam or hot liquid at a temperature in excess of 76° C shall be made with the building drainage system.

5.40.2 No soil waste pipe shall be fitted with double hubs, double tees or double wyes (without an access door).

5.40.3 No waste pipe shall discharge into a bend attached to a water closet bowl.

5.41 Joints and connections

Under this sub-clause the term "sewer pipe" includes soil, waste and vent pipes.

5.42 Tightness

All joints and connections used in a plumbing system shall be air-tight, and water-tight and shall be capable of meeting the tests specified in **3.32**.

5.43 Prohibited joints and fittings

No joint, enlarged connection, fitting chamber or recess having in the direction of flow on the outlet or waste-side of a tap, a ledge or shoulder which is likely to create a reduction of the pipe area, or otherwise interfere with the flow of the liquids in the piping, shall be installed in a drainage system.

5.44 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 or material of equal quality. Joints between asbestos cement pipe and metal pipe shall be made by means of an adaptor coupling and caulked as required in **5.49**.

5.45 Brazed joints

Where brazed joints are used, precaution shall be made to prevent any obstruction of the bore.

5.46 Bituminised fibre glass pipe joints

Joints in bituminised fibre glass pipe shall be made with tapered type couplings of the same material as the pipe or snap ring joints. Joints between bituminised fibre glass pipe and metal pipe shall be made by means of an adaptor coupling caulked as required in **5.50**.

5.47 Plastic sewer pipe joints

Joints in plastic pipe shall be made with a suitable fitting of the same composition as the pipe and sealed by solvent welding or by rubber 'O' joints in spigot and socket pipes.

5.48 Burned lead joints

Lead "Burned" or welded joints shall be lapped and the lead shall be fused together to form a uniform weld at least 1½ times as thick as the lead being joined.

5.49 Cast iron pipe joints

Joints in cast iron pipe shall be either caulked or screwed as provided for in **5.50** and **5.56** respectively or of the gasket type.

5.50 Caulked joints

5.50.1 A caulked joint shall be:

- (a) made with the spigot-end downstream from the hub-end in the direction of the flow;
- (b) firmly packed with oakum or hemp or other approved packing material; and
- (c) secured only with caulking lead not less than 25 mm deep, caulked tight.

5.50.2 No paint, varnish, putty or other coating shall be applied on the jointing material until the joint has been tested.

5.51 Cement joints

5.51.1 A cement joint for cement concrete pipe shall be made by ramming a closely twisted hemp or oakum gasket or other recognised packing material, of suitable size to pass around the annular space between the pipes. The remaining space shall be fitted with Portland cement paste for sizes of 150 mm or less, and for larger than 150 mm shall be filled with mortar compound of not more than an equal part of clean sharp mortar sand to one part of the Portland cement. The Portland cement paste or mortar shall first be tempered for a minimum of 20 minutes and a maximum of 1 hour before using.

5.51.2 Each joint shall be carefully banked and the joint and pipe thoroughly swabbed and cleansed inside.

5.52 Concrete sewer pipe joints

A joint in concrete sewer pipe shall be hot-poured, cemented or of a gasket type approved by the Authority.

5.53 Expansion joints

Expansion joints shall be accessible and may be used where necessary to provide for expansion and contraction of the pipes.

5.54 Hot poured joints

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5.54.1 The compound for a hot-poured joint shall be applied in a viscous state.

5.54.2 Sulphur-compound used in a hot-poured joint shall:

- (a) be of such composition as not to re-soften at a temperature below 93°C; and
- (b) have a tensile strength that a bar 6.25 cm² will not break when subjected to a pull of 272 kg after the bar has been immersed for 10 cycles as specified in **5.54.3**.

5.54.3 Each immersion-cycle shall consist of:

- (a) immersion for 5 minutes in water at 90 - 93°C; and
- (b) immersion for 5 minutes in water at 0°C.

5.54.4 Asphaltic compound shall be of such composition as not to re-soften at a temperature below 71°C.

5.54.5 An asphaltic hot-poured joint shall be:

- (a) rammed with twisted oakum;
- (b) caulked closely; and
- (c) at least 25 mm deep all round the pipe.

5.55 Lead pipe joints

5.55.1 Joints between lead and cast-iron, wrought-iron, or steel pipe shall be made by means of wiped joints to a caulking ferrule or soldering nipple as specified in this Clause.

5.55.2 Soldering nipples shall be used on a waste or soil pipe but may not be used on a vent pipe.

5.56 Screw joints

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5.56.1 Pipe threads shall conform to the current standards of **ASTM, Standard for pipe thread or British Standard for tapered pipe thread** and such other standards

as approved by the Authority.

5.56.2 Pipe ends shall be reamed or filed out to the size of bore, and all chips and cuttings shall be removed.

5.56.3 Pipe joint cement or paint shall be permitted only on external threads.

5.57 Pre-cast joints

Pre-cast collars shall be formed in both the spigot and bell of the pipe in advance of use. Collar surfaces shall be conical with side slopes of 30° with the axis of the pipe and the length, shall be equal to the depth of the socket. Prior to making joint contact, surfaces shall be cleaned and coated with solvents and adhesives as recommended in the standard.

When the spigot end is inserted in the collar, it shall bind before contacting the base of the socket. Material shall be inert and resistant to both acids and alkalis.

5.58 Slip joints and unions

5.58.1 Slip joints and unions may have metal-to-metal or gasketed seats.

5.58.2 Slip joints and gasket unions may be used only in the trap seal or in the waste pipe between the trap seal and the fixture, and shall be readily accessible.

5.59 Trap joints

The connection between:

- (a) the inlet-end of a trap and a fixture drain, and
- (b) the outlet-end of a trap and a fixture drain, shall be soldered, screwed, caulked, or hot-poured.

5.60 Asbestos cement pipe to metal pipe

Joints between asbestos cement pipe 50 and metal pipe shall be made by means of an approved adaptor coupling caulked as required in **5.50** or of approved adaptor fittings.

5.61 Bituminous fibre glass pipe to metal pipe

Bituminised fibre glass pipe joints shall be made with tapered type couplings of the same material as the pipe.

5.62 Cast iron pipe to wrought iron, steel, brass and copper

Joints between wrought iron, steel, brass or copper pipe and cast iron pipe shall be either caulked or threaded joints made as provided in **5.50** and **5.57** or shall be made with approved adaptor fittings.

5.63 Concrete to metal pipe

A connection between concrete pipe and metal pipe shall be made with a taper fitting and the joint shall be hot-poured or connected.

5.64 Lead pipe to wrought iron, cast iron, steel

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 caulking ferrule, soldering nipple or bushing as provided in **5.60**.

5.65 Lead pipe to brass and copper pipe

Joints in lead pipe or fittings, or between lead pipe and fittings and brass or copper pipes, 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 19 mm and at least as thick as the material being jointed. 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 caulking ferrule, soldering nipple or bushing.

5.66 Plastic pipe to metal pipe

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Joints between plastic and metal pipes shall be made by means of an adaptor coupling or caulked as required in **5.50**.

5.67 Copper pipe

Joints in copper tubing shall be made either by the appropriate use of approved brass or wrought copper fittings, properly soldered or brazed or by means of approved compression fittings.

5.68 Copper tubing to screwed pipe

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

5.69 Traps, interceptors and clean outs

5.69.1 Fixture traps

Plumbing fixtures except those which have an integral trap shall be separately trapped by a water seal trap, placed as close to the fixture outlet as possible, with the exception:

- (a) that a combination plumbing fixture may be installed on one trap if one compartment is not more than 150 mm deeper than the other, and the waste outlets are not 750 mm apart;
- (b) that one trap may be installed for a set of not more than 3 single compartment sinks or laundry drains, or 3 laboratories immediately adjacent to each other in the same room. If the waste outlets are not more than 750 mm apart and the trap is centrally located when the three compartments are installed; and
- (c) that one trap may be installed for one set of not more than 3 stall type urinals immediately adjacent to each other in the same room.

5.69.2 The vertical distance from the fixture outlet to trap weir shall not exceed 600 mm.

5.69.3 Each fixture shall be separately trapped 52 by a water seal trap placed as close to the fixture as possible, except that a set of not more than two laundry trays immediately adjacent to each other, or a two or three compartment sink with outlets at the same level, may connect with a single trap, provided the trap is located not more than 600 mm from the farthest fixture outlet, and the horizontal waste pipe is one size larger than the outlet.

The distance from a trap to a fixture outlet shall be measured along the developed length of the pipe including fixture outlet tailpiece, if any, from the water level of the trap to the joint where the waste leaves the fixture.

5.69.4 A grease interceptor may serve as a trap under conditions defined in **5.80**.

5.69.5 The waste pipe from permanently connected laundry machines shall be trapped and vented.

5.69.6 The waste pipe from any fixture, other than a water closet, shall not discharge into the trap, lead bend, or lead stud of a water closet.

5.70 Type and size of traps

5.70.1 The trap and the fixture outlet connection of a fixture itemised in **Column 1** or **Table 7** shall be of a trade size not smaller than that prescribed in **Column 2**.

5.70.2 No trap shall be smaller than the waste pipe opening to which it is connected.

5.70.3 No fixture drain shall be smaller than the trap it serves.

5.70.4 The soil pipe for a fixture having an integral trap shall not be smaller than the fixture outlet.

5.71 Trap seal

5.71.1 Depth of water seal

Water seals shall conform to the following:

(a) in the two pipe system: If the internal diameter of the trap is 63 mm or more, it shall have a 50 mm water seal. If the trap has an internal diameter of less than 63 mm it shall have a 38 mm water seal; and

(b) in the one pipe and single track system: If the internal diameter of the trap is 63 mm or more, it shall have a 50 mm water seal.

If the trap has an internal diameter of less than 63 mm it shall have a 75 mm water seal unless the trap is individually ventilated by a back vented pipe connected within the limits of 75 mm and 450 mm from the crown of the trap, when a 38 mm seal will be adequate.

5.71.2 The water seal of a floor drain shall be not less than 75 mm.

5.71.3 A trap shall be set level and plum so that its water seal is kept constant.

5.72 Trap clean-outs

5.72.1 Subject to **5.70.2**, every fixture trap shall have at its lowest point and protected by the trap seal, a brass screw of a diameter not less than one half of that of the trap, and installed, that it may be removed for cleaning purposes.

5.72.2 Sub-sub-clause **5.70.1** shall not apply to:

- (a) a fixture trap combined with a fixture in which the trap dip is accessible for cleaning purposes; or
- (b) a trap whereof a portion is removable for cleaning purposes.

5.73 Disconnecting traps

The water seal of a disconnecting trap shall be not less than:

- (a) 50 mm for a trap of 100 mm trade size; and
- (b) 63 mm for a trap of a trade size 150 mm or 200 mm.

5.74 Building traps

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5.74.1 Building traps shall not be installed except where so required by the Authority to accomplish the purpose of this Code.

5.74.2 Every building trap shall be vented by a fresh air inlet of a design approved by the Authority located not more than 1.2 m from the inlet side of the trap on the building side.

5.74.3 Every building trap shall be provided with an accessible cleanout at a point between the trap and the wall.

5.75 Laboratory sinks

Any group of laboratory sinks may be connected to a single vented trap except when used in connection with food or other organic matter.

5.76 Prohibited traps

5.76.1 No form of trap with partitions, except those integral with fixtures, shall be used unless approved by the Authority.

5.76.2 No form of trap whose seal depends upon the action of movable parts, shall be used. 'Moving parts' does not include valves and other devices controlling the flushing of the fixture served by the trap.

5.77 Clean-outs

5.77.1 Every clean-out shall be of the gasket and bolt type, or of the hub and ferule type.

5.77.2 A clean-out plug shall:

- (a) be of brass, plastic or other non-corroding metal approved by the Authority;
- (b) have a thickness equal to the thickness of the wall of the piping into which it is screwed;
- (c) be threaded its full length; and
- (d) have a solid raised nut or a recessed socket, so that the plug may be removed. The nut shall be not less than 19 mm high and not less than 25 mm in the smallest horizontal dimension.

5.77.3 A clean-out connected to a pipe:

- (a) up to 100 mm trade size, shall be of the same trade size as the pipe; and

(b) larger than 100 mm trade size, shall be not smaller than 100 mm trade size.

5.77.4 Clean-out plugs shall not be used for the installation of new fixtures or floor drains except where approved in writing by the Authority.

5.78 Direction of flow

Every clean-out shall be installed so that the clean-out opens in a direction opposite to the flow of the drainage line or at right-angle thereto.

5.79 Location of clean-out

5.79.1 A clean-out shall be so installed as to be readily accessible.

5.79.2 Where a clean-out is fitted to a pipe underground, the clean-out shall be made readily accessible by extending it above ground or by providing an access pit.

5.79.3 Clean-outs on concealed piping shall be extended through and terminate flush with the finished wall or floor, or pits or chases may be left in the wall or floor provided they are of sufficient size to permit removal of the clean-out plug and proper cleaning of the system.

5.79.4 Clean-outs, when installed on an underground drain, shall be extended to or above the finished grade level directly above the place where the clean-out is installed, or by providing an access pit or may be extended to outside the building upon approval of the Authority.

5.79.5 A clean-out shall be installed at the up-slope side of each place at which a drain or sewer changes direction by forty-five or more degrees.

5.79.6 Clean-outs in a horizontal drainage line shall be at intervals not greater than:

(a) 15 m where the piping is of 100 56 mm or smaller, trade size; or

(b) 30 m where the piping is of larger trade size.

5.79.7 Every waste pipe connected to a sink shall be provided with sufficient clean-outs to reach each 6 m of the waste pipe or fraction thereof.

5.79.8 For buildings with a floor slab on fill or ground or with less than 450 mm crawl space under the floor the following will be acceptable in lieu of a clean-out at the base of the stack. The building drain may be extended to the outside of the building and terminate in an accessible clean-out installed in the building drain downstairs from the stack not more than 1.5 m outside the building wall.

5.79.9 A clean-out shall be installed in the building drain as near as practicable to the inner face of the wall through which the drain passes. Where a building trap is inside a building, the clean-out shall be installed between the trap and the wall.

5.80 Separators and interceptors - General

5.80.1 When required, interceptors (including grease, oil and sand interceptors, etc.) shall be provided when, in the opinion of the Authority, they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand and other ingredients harmful to the building drainage system, the public sewer or sewerage treatment plant or processes.

5.80.2 The size, type and location of each interceptor or separator shall be approved by the Authority and no wastes other than those requiring treatment or separation shall be discharged into any interceptor.

5.80.3 A mixture of light and heavy solids or liquids having various specific gravities may be treated and then separated in an interceptor as approved by the Authority.

5.80.4 A grease interceptor shall be of sufficient capacity to intercept all grease likely to flow into it under normal conditions.

5.80.5 A grease interceptor shall be located as near as practicable to the fixture or fixtures from which it receives discharges.

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5.80.6 A grease interceptor shall be installed in the waste line leading from sinks, drains or other fixtures in the following establishments, when in the opinion of the Authority, hazards exist: 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.

5.80.7 A grease interceptor shall be required for individual dwelling units or other private

living quarters unless exempted by the Authority.

- 5.80.8** Oil separators shall be installed in the drainage system or section of the system where, in the opinion of the Authority, a hazard exists or where oils or other flammable material can be introduced or admitted into the drainage system by accident or otherwise.
- 5.80.9** Sand interceptors - 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 150 mm.
- 5.80.10** No interceptor shall be installed if it is so constructed that a pocket of air is likely to form in it and retard its action.
- 5.80.11** Every interceptor shall be vented and its vent pipe shall discharge into open air, not less than 2.1 m above ground level or at a height approved by the Authority.
- 5.80.12** Each interceptor shall be so installed as to provide ready accessibility to the cover and means for cleaning, 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.
- 5.80.13** Interceptors shall be rated and approved for their efficiency, in accordance with standard practice as directed by the Authority.
- 5.80.14** No interceptor shall be approved until it has successfully passed the testing and rating procedure set up by the Authority.
- 5.80.15** Water connection for cooling such that back-flow occurs. 58 or operating an interceptor shall not be
- 5.80.16** Interceptors shall be maintained under efficient operating conditions by periodic removal of accumulated grease.

5.81 Interceptors for laundries

Commercial laundries shall be equipped with an interceptor having a removable wire

basket or similar device that will prevent strings, rags, buttons or other materials detrimental to the public sewerage system from passing into the drainage system.

- 5.81.2** An intercepting device such as a basket or similar device shall be used to prevent solids of 120 mm or larger in size from passing into the drainage system. The basket or device shall be removable for cleaning purposes.

5.82 Interceptors for bottling establishments

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.

5.83 Separators/interceptors for slaughter houses

- 5.83.1** Separators shall be installed in slaughtering room drains in order to prevent the discharge into the drainage system of feathers, entrails and other materials likely to clog the drainage system.
- 5.83.2** Slaughtering room and dressing room drains may be provided with interceptors approved by the Authority.
- 5.83.3** Food-grinder wastes may discharge directly to the building drainage system and no food-grinder shall be installed without the prior approval of the Authority.
- 5.83.4** Where commercial food-waste grinders are installed, the waste from these units may discharge directly into the building drainage system and not through a grease interceptor.
- 5.83.5** The Authority shall determine where and what type of interceptor is required.

5.84 Oil separators for automotive garages

- 5.84.1** Oil separators shall be installed in any garage where to required by the Authority.
- 5.84.2** Oil separators shall have a depth of not less than 600 mm below the invert of the discharge drain.

5.84.3 Motor vehicle storage: Separators shall have a capacity of 0.18 m³ where not more than three vehicles are serviced and 0.03 m³ in net capacity shall be added for each additional vehicle up to ten vehicles. Where more than ten vehicles are serviced and stored, the Authority shall determine the size of separator required.

5.84.4 Where storage facilities are not maintained, as in repair shops, the capacity of the separator shall be based on a net capacity of 0.03 m³ for each 9 m² of surface to be drained into the separator with a minimum capacity of 0.18 m³.

5.85 Venting system

5.85.1 Protection of trap seals

The seal of every fixture trap in a plumbing system shall be protected against siphonage and back pressure, and air-circulation shall be assured throughout the drainage system by a properly installed individual vent, or system of venting except as otherwise provided in this sub-clause.

5.86 Venting required

5.86.1 Every vent pipe not terminating in open air shall be connected into a main vent or stack vent.

5.86.2 The total fall in the fixture waste pipe from the trap weir to the vent fitting shall be not greater than the diameter of the waste pipe.

5.86.3 The developed length of the waste pipe from the trap weir to the vent fitting shall not be less than twice the diameter of the waste pipe.

5.87 Material

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5.87.1 Vent piping shall be of cast-iron, galvanised wrought iron, galvanised steel and ferrous alloys, lead, brass, copper pipe, copper tube or plastic, asbestos cement or bituminous fibre glass.

5.87.2 Vent piping placed underground shall be cast-iron soil pipe. Other materials may be used for underground vents only when approved and installed as directed by the Authority. Where threaded joints are approved for use underground, they shall be coated and

wrapped after installation and test.

5.87.3 Nothing in this sub-clause shall be deemed to preclude the use of other materials of equal or better quality when approved by the Authority.

5.88 Noxious or explosive gases

Any device containing or giving off noxious or explosive gases shall be vented in a safe manner directly to the outside air.

5.89 Main vent

Every building in which plumbing is installed shall have at least one main stack which shall run as directly as possible from the building through to the open air above the roof. (See Table 8).

5.90 Stack vents

5.90.1 Every soil or waste stack shall be extended vertically as a stack vent at least 300 mm above the flood level rim of the highest fixture, then to the open air preferably through the roof, or the stack vent and main vent 300 mm above the flood level rim of the highest fixture with a single extension from the connection to the open air preferably through the roof.

5.90.2 A main vent shall connect full size at its base to the main soil or waste pipe at or immediately below the lowest horizontal branch and shall extend through the roof and to the open air, or it may be connected with the stack vent as described in this sub-clause.

5.91 Vent terminals

5.91.1 Extensions of vent pipes through a ⁶¹ roof shall be terminated at least 150 mm above it.

5.91.2 Where a roof is to be used for any purpose other than weather protection, the vent extensions shall run at least 2 m above the roof.

5.91.3 Each vent terminal shall be made watertight with the roof by proper flashing.

5.91.4 Vent terminals shall not be used for the purpose of flag poling, aerials or similar purposes, except when the piping has been anchored to the construction and approved by the Authority.

5.91.5 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 4 m horizontally or such an opening unless it is at least 1 m above the top of such opening.

5.92 Distance of vent from trap

5.92.1 Except for water-closets, pedestal urinals, trap standards and other fixtures which depends on siphoning action for the proper functioning of the fixture and except for connections which do not exceed one wye, and one-eight bend between the trap outlet and the vent, each fixture trap shall have a protecting vent so located that:

- (a) the total fall in the fixture waste pipe from the trap weir to the vent pipe is not greater than the diameter of the waste pipe; and
- (b) the developed length of the waste pipe from the trap weir to the vent pipe is not less than twice the diameter of the waste pipe and not greater than the 450 mm.

5.93 Dual vent

5.93.1 An individual vent pipe of a continuous unit vent pipe installed vertically may be used as a dual vent pipe when both fixture waste pipes connect on the same level with a vertical waste pipe.

5.93.2 The total fall, and developed length, prescribed in **5.92.1** and **5.93.1** shall apply to each fixture waste pipe installed as permitted by **5.93.1**.

5.93.3 Where a dual vent is installed in conformity with **5.94.1** and **5.94.2**, no additional vent is required for the 62 traps of two fixtures served by the two fixture waste pipes.

5.94 Wet vent

5.94.1 Subject to **5.95.2** and **5.95.3** the waste pipe for a wash basin or sink, may serve as a vent

pipe for a bath tub or a shower bath.

5.94.2 The waste pipe serving as a wet vent shall be not less than 38 mm when venting a shower bath.

5.94.3 The waste pipe for the bath tub or shower bath shall have a developed length of not less than 450 mm between the trap and the vent pipe.

5.94.4 Where there are no fixtures on the floor above, a wet vent pipe may be installed in connection with a water-closet, urinal, wash basin or sink, where:

- (a) the diameter of the waste pipe of the fixture being vented is not less than 50 mm; and
- (b) the diameter of the vent pipe is not less than 38 mm.

5.95 Circuit, loop and relief vents

5.95.1 A branch, soil or waste pipe to which two and not more than eight water-closets or urinals are connected in series on the same floor level, may be vented by a circuit or loop vent which shall be taken off above the centre line of the soil or waste pipe and in front of the last fixture connection.

5.95.2 Where other fixtures discharge above such branch, or when the branch is connected to a building drain, each branch shall have a relief building vent taken off above the centre line of the soil or waste pipe and in front of the first fixture connection.

5.95.3 Two or more circuit vented horizontal 63 branches serving a total of not more than 8 fixtures as specified in **5.95.1** and in the same branch interval, may have a combined relief vent. Where the vents are joined, the point of joining shall be not less than 50 mm above the flood level rim of the highest fixture connected to either branch.

5.95.4 A bend of not greater than the standard length shall be used coming out of a wye on a

loop or circuit vented waste pipe.

5.95.5 A relief or circuit vent shall not be used to serve other fixtures unless increased in size according to the fixture units connected there to.

5.95.6 The vertical leg of a waste pipe on battery vented fixtures shall not exceed 1 m and be not less than the size of the horizontal branch.

5.96 Sump vents

Every sump receiving sewage shall be vented by a vent pipe of size not less than one size smaller than the largest inlet pipe of the sump.

5.97 Back vents

No back vent shall be closer to a trap weir than a distance equal to twice the diameter of the back vent.

5.98 Venting of offsets

Where a soil or waste stack:

- (a) has an offset greater than 45 degrees; and
- (b) receives discharges from fixtures:
 - (i) one or more of which are below the offset; and
 - (ii) one or more of which are on two or more floors above the offset;

The soil or waste stack shall be 64 vented as two separate stacks or be yoke-vented.

5.99 Yoke vents

5.99.1 All soil or waste stacks in buildings over five floors in height, shall be provided with a yoke vent at each five-storey interval measured from the top floor down. The size of the yoke vent shall be equal to the size of the vent stack to which it connects.

5.99.2 The lower end of the yoke shall connect to the soil or waste stack through a wye below the horizontal branch serving that floor, and the upper end shall connect to the main vent not less than 1 m above the floor level.

5.100 Vent headers

5.100.1 A stack or main vent may be connected into a common vent header at the top of the stack and extended to the open air at one point above the roof.

5.100.2 The header shall be sized in accordance with **Table 9**, the number of fixture units being the sum of all fixture units on all stacks connected thereto, and the developed length shall be that of the longest vent pipe calculated by beginning at the base of the stack most distant from the header continuing through that stack to the header and thence to its terminal in the open air.

5.101 Vent pipe grades and connections

5.101.1 Vent pipes shall be as direct as possible and shall be free from drops or sags and be so graded and connected as to drip back to the soil or waste pipe or vent stack by gravity through the fixture connections.

5.101.2 Where a vent pipe is connected to a horizontal soil or waste pipe the vent shall be taken off above the centre line of the soil or waste pipe and the horizontal length shall not exceed 600 mm after which it shall rise vertically to a point not less than 150 mm above the flood level rim of the fixture it is venting.

5.101.3 The connection between a vent pipe and a main vent, shall be above the flood level rim of the highest fixture served by the vent.

5.101.4 A horizontal vent pipe forming a branch vent, circuit vent or loop vent shall be above the flood level of the highest fixture served by such vent.

5.102 Size and lengths of vents

5.102.1 The minimum size piping for trap vents shall be in accordance with **Table 10**.

5.102.2 The diameter of a relief vent shall be at least equal to one-half the diameter of the soil or

waste branch it serves.

5.102.3 The diameter of a circuit or loop vent shall be not less than one-half of the size of the diameter of the horizontal soil or waste branch or the diameter of the vent stack, whichever is smaller.

5.103 Vents not required

5.103.1 Where one fixture only is connected at the top-most waste opening and is within a developed length of 1.5 m from the soil stack it shall be considered as individually vented.

5.103.2 No individual fixture vent shall be required where the installation consists of not more than one water-closet and three smaller fixtures, all such fixtures being installed in the same floor, provided that:

- (a) the distance between the soil stack vent and fixture traps complies with **Table 10**; and
- (b) the waste pipes are connected directly and separately to the soil stack at a point above the water-closet connection.

5.103.3 Fixtures back-to-back in battery

When fixtures are connected to one horizontal branch through a double wye or a sanitary tee in a vertical position, a common vent for fixtures back-to-back or double connection shall be provided. The common vent shall be installed in a vertical position as a continuation of the double connection.

Table 1

Long sweep bends

Item No.	Piping, trade size in mm	Minimum radius of circle, in
----------	--------------------------	------------------------------

		mm
1	32	57
2	38	63
3	50	76
4	75	106
5	100	130
6	125	153
7	150	178
8	200	225
9	250	300
10	300	325
	375	362

Table 2

Minimum pipe size of fixture - supply

Item No.	Fixture	Minimum pipe
-----------------	----------------	---------------------

		size, in mm
1	Bath tub	13
2	Bidet	13
3	Combination sink and tray	13
4	Drinking fountain	13
5	Dishwasher, Domestic	13
6	Kitchen sink, Domestic	13
7	Kitchen sink, Commercial	13
8	Lavatory	13
9	Laundry tray 1, 2, or 3 compartments	13
10	Shower, Single head	13
11	Sink, Service, slop	13
12	Sink, Flushing rim	19
13	Urinal, Flush tank	13
14	Urinal, Direct flush valve	19
15	Water closet, Flush valve type	25
16	Water closet, Tank type	13
17	Hose bib	13
18	Wall hydrant	13

Table 3
Minimum thickness of steel before galvanising for cisterns and covers

3S type reference	Dimensions of cisterns			Minimum thickness of steel before galvanising for cisterns and covers					Covers		
	Length	Width	Depth	Capacity to water line	Distance of water line from top	Grade A cisterns	Grade B cisterns	Covers for cisterns	No. of pieces	Size of pieces Length	Size of pieces Width
	mm	mm	mm	L	mm	mm	mm	mm		mm	mm
SC 1 45	457	305	305	19	111	1.6	1.2	1.0	1	482	330
SC 1 70	610	305	371	36	111	1.6	1.2	1.0	1	635	330
SC 1 90	610	406	371	54	111	1.6	1.2	1.0	1	635	432
SC 1 110	610	412	422	68	114	1.6	1.2	1.0	1	635	457
SC 1 135	610	457	432	86	114	1.6	1.2	1.0	1	635	432
SC 1 130	696	508	508	114	114	1.6	1.2	1.0	1	711	533
SC 1 230	736	559	559	159	114	2.0	1.6	1.0	1	762	584
SC 1 270	762	584	610	191	114	2.0	1.6	1.0	1	787	610
SC 1 320	914	610	584	227	114	2.0	1.6	1.0	1	940	635
SC 1 360	914	660	610	264	114	2.0	1.6	1.0	1	940	686
SC 1 450/1	1219	610	610	327	114	2.0	1.6	1.0	1	1245	635
SC 1 450/2	965	686	686	335	114	2.0	1.6	1.0	1	991	711

Table 3 (cont'd)

Minimum thickness of steel before galvanising for cisterns and covers

3S type reference	Dimensions of cisterns			Minimum thickness of steel before galvanising for cisterns and covers					Covers		
	Length	Width	Depth	Capacity to water line	Distance of water line from top	Grade A cisterns	Grade B cisterns	Covers for cisterns	No. of pieces	Size of pieces Length	Size of pieces Width
SC 1 570	965	762	797	423	146	2.5	2.0	1.2	1	991	787
SC 1 680	1092	964	736	491	146	2.5	2.0	1.2	1	1118	889
SC 1 910	1168	889	889	709	146	2.5	2.0	1.2	1	1194	914
SC 1 1130	1524	914	813	841	146	2.5	2.0	1.2	1	1549	940
SC 1 1600	1524	1143	914	1227	146	3.2	2.5	1.6	2	1549	940
SC 1 2270	1829	1219	1016	1727	146	3.2	2.5	1.6	2	940	1251
SC 1 2720	1829	1219	1219	2137	190	3.2	2.5	1.6	2	940	1251
SC 1 4540	2438	1524	1219	3364	254	4.8	3.2	1.6	3	838	156

- Note:
1. Cisterns shall be ordered by the 3S type reference to avoid confusion.
 2. For welded cisterns, the length shall be increased by not more than 25 mm.
 3. These dimensions were determined for the depths necessary to accommodate ball valve, inlet and overflow pipes in the sizes likely to be used, and in the positions, to satisfy water by laws. The dimensions have been used in calculating the capacities.
 4. The dimension is for the lapping piece: The lapped piece is 5 mm less.

Table 4
Equivalent fixture units (waste water
fixture - Load factors of fixtures)

Item No.	Fixture	Number of fixture units
1	Bathroom group, consisting of 1 water-closet; 1 wash basin; and a bathtub or shower stall.	8
2	Bathtub with or without covered shower	1½
3	Bidet	3
4	Combination of sink and laundry tray	2
5	Combination of sink and tray with food disposal unit.	4
6	Cuspidor or dental unit	1
7	Dental lavatory	1
8	Dishwasher, Domestic	3
9	Drinking fountain	1
10	Floor drain	3
11	Ice box, Domestic	1
12	Kitchen sink, Domestic: (a) with 38 mm trap; and (b) with 50 mm trap	1½ 3
13	Laundry tray	3
14	Shower stall	3
15	Shower in a group, Each head	3

Table 4 (cont'd)
Equivalent fixture units (Waste water fixture - Load factors of fixtures)

Item No.	Fixture	Number of fixture units
16	Sink: (a) Flushing rim, With valve (b) Pot, Scullery (c) Service, Trap standard type (d) Service, P-trap type (e) Surgeon's	8 4 3 2 3
17	Urinal: (a) Pedestal, Siphon-jet or blow-out type (b) Stall, Washout type (c) Wall, Lip type	8 4 4
18	Lavatory: (a) With 44 mm trap (b) With 38 mm trap	1 2
19	Lavatory, Barber, beauty parlour with 38 mm trap	2
20	Lavatory, Surgeon's with 38 mm trap	2
21	Wash sink, Circular or multiple type, each set of faucets	2
22	Water-closet: (a) Tank operated (b) Valve operated	6 8
23	Beer dispenser	1½
24	Dead fish tank	1½
25	Domestic washing machine	1½
26	Dish washer, Commercial	4
27	Potable vegetable washers and peeler	4
28	Glass washer, Commercial	4
29	Cocktail mixing unit	1½
30	Small laboratory sinks	1
31	Miscellaneous fixtures - Waste pipe or trap: (a) 32 mm (b) 38 mm (c) 50 mm (d) 75 mm (e) 100 mm	1 2 3 5 6

Table 5
Maximum allowable number of fixture units for horizontal fixture branches and stacks

(Other than building drains and sewers)

(Single stack system excluded)

Item No.	Diameter of branch or stack pipe in mm	Maximum	Total	Load in	Fixture units
		For horizontal fixture branch (1)	For stack not exceeding branch intervals or storeys	For stack exceeding 3 branch — Total load for stack	Intervals or storeys — Total load for each branch interval or storey
1	32	1	2	2	1
2	30	3	4	8	2
3	50	6	10	24	6
4	75	30 (2)	50 (3)	60 (3)	16 (2)
5	100	160	240	500	90
6	125	360	540	1100	200
7	150	620	960	1900	350
8	200	1400	2200	3600	600
9	250	2500	3800	5600	1000
10	300	3900	6000	8400	1500
11	375	7000	-	-	-

(1) Does not include branches of the building drain.

(2) Not over 2 water-closets.

(3) Not over 6 water-closets.

Note: No water-closets shall be connected to a pipe having a diameter of less than

75 mm.

Table 6
Maximum allowable number of fixture units
for building drains and sewers

Item No.	Diameter of drain or sewer pipe in mm	Maximum total load fixture units, for any portion (1) of a building drain or building sewer of various slopes			
		Slope, per 300 mm			
		1.5 mm	3 mm	6 mm	12 mm
1	75	-	20	27	36
2	100	-	180	216	250
3	125	-	390	480	575
4	150	-	700	840	1000
5	200	1400	1600	1920	2300
6	250	2500	2900	3500	4200
7	300	3900	4600	5600	6700
8	375	7000	8300	10000	12000

(1) Includes branches of a building drain.

Table 7
Minimum sizes of traps and outlet-connections for fixtures

Item No.	Fixture	Minimum trade size of trap fixture-outlet connection, in mm
1	Bath-tub with or without overhead shower	38
2	Beer-cabinet	38
3	Bidet	50
4	Combination of sink and laundry-tray	38
5	Cuspidor or dental unit	32
6	Dental lavatory	32
7	Dishwasher, Domestic type	38
8	Drinking-fountain	32
9	Floor drain	50
10	Laundry-tray	38
11	Refrigerator	50
12	Shower-stall	38
13	Sinks: (a) Flushing rim with valve	75
	(b) Kitchen, Domestic type	38
	(c) Pot, Scullery	38
	(d) Service, With p- tray	50
	(e) Service, With trap- standard	75
	(f) Surgeon's	38
14	Urinals: (a) Blow-out, pedestal or siphon jet type:	75
	(b) Stall	50
	(c) Wall	38
15	Wash-basin	32
16	Wash-sink, Circular or multiple	38
17	Water-closet (Syphonic)	75
18	Water-closet (Washdown)	85

Table 8
Size and length of vent pipes



Item No.	Size of soil or waste stack	Fixture units connected	Maximum length of vent pipe, in mm for various diameters						
			Diameter of vent pipe required, in mm						
			38	50	75	100	125	150	200
1	38	8	45	-	-	-	-	-	-
2	38	10	30	-	-	-	-	-	-
3	50	12	23	61	-	-	-	-	-
4	50	20	15	45	-	-	-	-	-
5	75	42	9	30	-	-	-	-	-
6	75	10	9	30	182	-	-	-	-
7	75	30	-	18	152	-	-	-	-
8	75	60	-	15	121	-	-	-	-
9	100	100	-	10	79	304	-	-	-
10	100	200	-	9	76	273	-	-	-
11	100	500	-	6	54	212	-	-	-
12	125	200	-	-	24	106	304	-	-
13	125	500	-	-	21	91	273	-	-
14	125	1100	-	-	15	61	212	-	-
15	150	350	-	-	15	61	121	395	-
16	150	620	-	-	9	38	91	334	-
17	150	960	-	-	7	30	76	304	-
18	150	1900	-	-	6	21	61	212	-
19	200	600	-	-	-	15	45	152	395
20	200	1400	-	-	-	12	30	121	365
21	200	2200	-	-	-	9	27	106	334
22	200	3600	-	-	-	7	18	76	242
23	300	1000	-	-	-	-	22	38	304
24	300	2500	-	-	-	-	15	30	152
25	300	3800	-	-	-	-	9	24	106
26	300	5600	-	-	-	-	7	18	76

Table 9

Size of vent pipes for traps

Item No.	Trap size, in mm	Vent pipe size in mm
1	32	32
2	38	32
3	50	38
4	75	38
5	100	50

Table 10

**Maximum distance of fixture trap from vent
(Single stack system only)**

Item No.	Size of fixture drain, in mm	Distance from trap to vent, in m
1	32	1.5
2	38	2.1
3	50	2.4
4	75	2.7
5	100	3.0

Table 11
Minimum facilities (Explanation: per (No.) means 1 for every (No.) or part thereof)

Type of building or occupancy	Water closets		Urinals		Lavatories		Showers	Drinking fountains	Laundry tubs	Kitchen sinks	Cleaner sinks
	No. of persons	No. of fixtures	No. of males	No. of fixtures	No. of persons	No. of fixtures					
1.0 Residence 1.1 Dwelling or apartment building	1 for each dwelling or apartment unit.		-----		1 for each dwelling or apartment unit.		1 for each dwelling or apartment unit.	-----	1 compartment for each dwelling or apartment unit, or 2 compartments for each ten (10) apartments.	1 for each dwelling or apartment unit.	-----
2.0 Schools Staff	No. of persons	No. of fixtures	No. of males	No. of fixtures	No. of persons	No. of fixtures	-----	1 for each floor	-----	-----	1 for each floor
	1-15	1-1	1-15	1	1-15	1					
	16-35	2-2	16-35	1	16-35	2					
	36-60	3-4	36-60	1	36-90	3					
	61-90	4-5	61-90	1	61-90	4					
2.1 Nursery schools 2.1.1 Pupils	1 to 15 pupils, a minimum of 2 to be provided.		-----		1 to 10 pupils, a minimum of 2 to be provided.		-----	1 for 40 pupils	-----	-----	At least 1 per floor .

Table 11 - (cont'd.)

Type of building or occupancy	Water closets		Urinals		Lavatories		Showers	Drinking fountains	Laundry tubs	Kitchen sinks	Cleaner sinks
	No. of persons	No. of fixtures	No. of males	No. of fixtures	No. of persons	No. of fixtures					
6.0 Office buildings or public buildings	1-15	1-1	1-15	0	1-15	1	-----	1 for each floor.	-----	-----	1 for each floor.
	16-35	2-2	16-35	1	16-35	2					
	36-60	3-4	36-60	1	36-60	3					
	61-90	4-5	61-90	1	61-90	4					
	91-120	5-7	91-120	2	91-120	4					
	121-150	6-8	121-150	2	121-150	5					
	151-190	6-9	151-190	3	151-190	5					
	191-240	8-11	191-240	4	191-240	6					
	241-300	9-12	241-300	4	241-300	7					
	Over 300	1 for each additional 35-25.	Over 300	1 for each additional 75 persons	Over 300	1 for each additional 45 persons					
7.0 Cinemas, concert halls, art gallery, theatres, libraries, auditoriums and other public rooms.	1-100	1-1	1-200	1	1-100	1-1	-----	1 for each 500 persons	-----	-----	1 for each floor.
	101-200	2-2	201-750	2	101-200	1-1					
	201-400	3-3	Over 750	1 for each additional 300 persons	201-400	2-2					
	401-750	3-4			401-750	3-3					
	Over 750	1 for each additional 500 persons									

Table 11 (Cont'd.)

Type of building or occupancy	Water closets		Urinals		Lavatories		Showers		Drinking fountains	Laundry tubs		Kitchen sinks	Cleaner sinks
	No. of persons	No. of fixtures	No. of males	No. of fixtures	No. of persons	No. of fixtures	No. of persons	No. of fixtures		No. of persons	No. of fixtures		
2.2 Boarding schools													
2.2.1 University	1-15	1-1	1-30	1	1-15	1-2	1-15	1	1 for each	1-30	1	1 for each	1 for each
2.2.2 Residences and youth camps	16-30 31-50 51-75 76-100 101-150	2-2 3-4 4-6 6-8 8-10	31-50 51-100 101-150 Over 150	2 3 4 1 for each additional 50 persons	16-30 31-50 51-75 76-100 101-150 Over 150	2-2 3-4 4-6 6-8 8-10 1 for each additional 15-20	16-30 31-45 46-60 61-100 101-150 Over 150	2 3 6 10 12 1 for each additional 20.	1 for each 75 persons	31-75 76-125	2 3	1 for each utility kitchen provided.	1 for each floor
2.3 Other schools													
2.3.1 Boys	1-25 26-50 51-75 76-100 101-125 126-150 151-175 176-200 Over	2 2 3 4 5 6 7 8 1 for each	1-25 26-50 51-75 76-100 101-150 151-200 Over 200	1 for each additional 50 pupils	1-30 31-55 56-80 81-110 111-150 151-200 Over 200	1 2 2 3 4 4 1 for each additional 50 pupils.	None required except for gyms and special purposes.	1 for each 75 pupils (or drinking water for each 40 pupils)	-----	-----	-----	At least 1 per floor	

	200	additional 30 pupils.									
--	-----	--------------------------	--	--	--	--	--	--	--	--	--

Table 11 (Cont'd.)

Type of building or occupancy	Water closets		Urinals	Lavatories		Showers	Drinking fountains	Laundry tubs	Kitchen sinks	Cleaner sinks
	No. of pupils	No. of fixtures		No. of pupils	No. of fixtures					
2.3.2 Girls	1-20	2	-----	1-20	1	None required except for gyms and special purposes.	1 for each 75 pupils (or drinking water taps, 1 for each 40 pupils).	-----	-----	At least 1 per floor.
	21-40	2		21-40	2					
	41-60	3		41-60	3					
	61-80	4		61-80	4					
	81-100	5		81-100	5					
	101-120	6		101-120	6					
	121-140	8		121-140	7					
	141-180	9		141-160	8					
	181-200	10		161-180	9					
	Over 200	1 for each additional 30 pupils.		181-200	10					
		Over 200	1 for each additional 50 pupils.							
3.0 Hotel	1 per 9 persons (omitting occupants with W.C's with suites).		-----	1 per bedroom		1 per 9 persons (omitting occupants of rooms with baths in suites).	-----	-----	-----	1 per 30 bedrooms. Minimum, 1 per floor.
3.1 Residential public and staff										

Table 11 (Cont'd)

Type of building or occupancy	Water closets		Urinals		Lavatories		Showers	Drinking fountains	Laundry tubs	Kitchen sinks	Cleaner sinks
	No. of persons	No. of fixtures	No. of persons	No. of fixtures	No. of persons	No. of fixtures					
3.2 Non- 3.2.1 Male staff	1-15 16-35 36-65 66-100	1 2 3 4	1 - 6 7 -20 21-45 46-70 71-100	0 1 2 3 4	1-15 16-35 36-65 66-100	1 2 3 4	-----	-----	-----	-----	1 for each floor.
3.2.2 Female staff	1-12 13-25 26-40 41-57 58-77 78-100	1 2 3 4 5 6	----- -----	----- -----	1-12 13-25 26-40 41-57 58-77 78-100	1 2 3 4 5 6	-----	-----	-----	-----	1 for each floor.
4.0 Hospitals 4.1 Administrative buildings 4.1.1 Male personnel	1-15 16-35 36-65 66-100	1 2 3 4	1 - 6 7 - 20 21 - 45 46 - 70 71-100	0 1 2 3 4	1-15 16-35 36-65 56-100 4	1 2 3 4	-----	-----	-----	-----	1 for each floor.

Table 11 (Cont'd)

Type of building or occupancy	Water closets		Urinals	Lavatories		Showers	Drinking fountains	Laundry tubs	Kitchen sinks	Cleaner sinks
	No. of persons	No. of fixtures		No. of persons	No. of fixtures					
4.1.2 Female personnel	1-12 13-25 26-40 41-57 58-77 78-100	1 2 3 4 5 6	-----	1-12 13-25 26-40 41-57 58-77 78-100	1 2 3 4 5 6	-----	-----	-----	-----	1 for each floor
4.2 Medical staff quarters	1 per 4 persons		-----	1 in each bedroom		1 per 4 persons	-----	-----	-----	At least one per floor. At least one per floor. At least one per floor.
4.2.1 Male staff	1 per 4 persons			1 in each bedroom		1 per 4 persons				
4.2.2 Female staff 4.2.3 Nurses staff	1 per 8 persons			1 in each bedroom		1 per 8 persons				
5.0 Restaurants 5.1 Public 5.1.1 Male	1- 50 51-150 151-250 251-350 Over 350	1 2 3 4 1 for each additional 250 persons	1 for each 40 persons	1-15 16-50 51-100 Over 100	1 2 3 1 for each additional 60 persons	-----	-----	-----	-----	1 for each 40 persons .

Table 11 (Cont'd)

Type of building	Water closets	Urinals	Lavatories	Showers	Drinking fountains	Laundry tubs	Kitchen sinks	Cleaner sinks
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or occupancy												
5.1.2	Female	No. of persons 1-50 51-100 101-150 151-250 Over 250	No. of fixtures 1 2 3 4 1 for each additional 200 persons	-----	No. of persons 1-15 16-50 51-100 Over 100	No. of fixtures 1 2 3 1 for each additional 60 persons	-----	-----	-----	-----	1 for each floor	
5.2	Staff	No. of persons	No. of fixtures	No. of persons	No. of fixtures	No. of persons	No. of fixtures					
5.2.1	Male	1-15 16-50 51-100	1 2 3	1-6 7-45 46-100	0 1 2	1-15 16-36 37-65 66-100 Over 100	1 2 3 4 1 for each additional 35 persons	-----	-----	-----	-----	1 for each floor
5.2.2	Female	No. of persons 1-12 13-40 41-60 61-100	No. of fixtures 1 2 3 4	-----	No. of persons 1-15 16-35 36-65 66-100 Over 100	No. of fixtures 1 2 3 4 1 for each additional 35 persons	-----	-----	-----	-----	80 1 for each floor	

Table 11 (Cont'd)

Type of building or occupancy	Water closets		Urinals		Lavatories		Showers	Drinking fountains	Laundry tubs	Kitchen sinks	Cleaner sinks
	No. of persons	No. of fixtures	No. of males	No. of fixtures	No. of persons	No. of fixtures					
8.0 Manufacturing warehouse, factories, workshops, foundries, laundries and other similar types of buildings 8.1 Male	1-15 16-35 36-65 66-100 Over 100	1 2 3 4 1 for each additional 50 persons	1-20 21-45 46-70 71-100 Over 100	1 2 3 4 1 for each additional 50 persons	1-15 16-35 36-65 66-100 Over 100	1 2 3 4 1 for each additional 50 persons	Where necessary 1 per 20 persons * Emergency	1 for each 50 persons	-----	-----	1 for each floor.
8.2 Female	1-12 13-25 26-40 41-57 58-77 78- 100 Over 100	1 2 3 4 5 6 1 for each additional 30 persons	-----	-----	1-12 13-25 26-40 41-57 58-77 78-100 Over 100	1 2 3 4 5 6 1 for each additional 30 persons	Where necessary 1 per 20 persons * Emergency	1 for each 50 persons	-----	-----	1 for each floor

Note: * Emergency: 1 for every person who may be exposed to excessive heat or skin contamination with poisonous or irritating material.