

## **SECTION 9**

### **PLUMBING**

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## **SECTION 9**

### **PLUMBING**

#### **901 SCOPE**

This section sets out the requirements for plumbing and drainage in buildings and the disposal of waste to a septic tank or main sewer where this exists. All installations must conform to the relevant legislation and to the requirements of the Ministry of Health

#### **902 GENERAL REQUIREMENTS**

##### **902.1 Prohibited fittings and connections**

- a) No soil or waste pipe shall be fitted with double hubs, double tees or double y's (without an access door).
- b) No waste pipe shall discharge into a bend attached to a water closet bowl.

##### **902.2 Dead Ends**

- a) Wherever a dead end exists or is proposed for a soil or waste system it shall be laid so as to prevent any accumulation of waste.
- b) All unconnected openings in a drainage system with the exception of a vent pipe shall be properly capped so as to be both air and water tight.

##### **902.3 Changes in Direction**

- a) All horizontal changes in direction of soil or waste pipes shall be provided with an accessible inspection chamber or clean out.
- b) 22-1/2 degree bends and sanitary tees should be used for changes in direction of flow in the horizontal plane.
- c) Bends, tees, y's and crosses may be used to effect changes in direction in vent and water distribution pipes.

##### **902.4 Supports and Hangers**

- a) All vertical piping shall be supported, anchored and adequately fixed with spacing not exceeding 5 feet.

- b) All horizontal piping shall be supported, anchored and adequately fixed to prevent sagging at each hub. For cast iron and copper piping, this shall be at 6 foot intervals, and for PVC and pitch fibre piping through-out its length.
- c) Pipe hangers shall be fixed to stone, brick work, block work or concrete by means of expansion type plugs.
- d) Hangers shall be of the same material as the pipe, or if of different material be insulated at areas of contact with the pipe to prevent electrolysis.
- e) Drains laid in unstable ground shall be adequately supported so as prevent fracture of the pipe or loosening of the joints in the event of ground movement.

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## **SOIL AND WASTE PIPES**

903.1

### **General**

Soil and waste pipes shall be located and fixed in accordance with the following requirements:

- (a) Branch pipes shall be located to provide for drainage of sanitary fixtures into vertical stacks or directly into manholes.
- (b) Vertical stacks shall be located to provide for drainage from branch pipes directly to manholes.
- (c) Connections to pipes shall be located to prevent cross flow from one connection to the other.
- (d) Connections to pipes and between pipes shall be made in direction of the flow.
- (f) Open ends shall terminate not less than one foot above the building eaves level nor less than three feet above the head of any window ten feet away or less and shall be protected with a wire balloon of durable material.
- (g) Pipes shall be fixed with suitable brackets or straps and at a minimum distance of 6 inches from the wall surface. At least one fixing shall be provided for each unit length of pipe.
- (h) Sufficient cleaning eyes and access points shall be provided to enable all pipe work to be cleaned by rodding. They shall be located to allow proper clearance for the easy entry of cleaning rods and be provided with suitable tight covers.

**903.2****Pipe Materials**

- a) Generally these shall be of suitable material, hard, smooth, impervious and non-corrosive, such as copper, PVC, cast iron or other material which may be approved by the Authority if there is evidence that the material is suitable.
- b) Black iron, galvanised iron or concrete pipes are not recommended for use as soil pipes.

**903.3****Pipe Sizes**

- a) The diameter of pipes shall be consistent with the maximum load, but soil pipes shall not be less than 3 inches in diameter.
- b) Waste water pipes shall not be less than 1-1/4 inches in diameter.
- c) Table 9-1 establishes the maximum fixture unit load permitted for a given size of waste pipe under various conditions and shall be used to determine the required size of waste or soil pipe provided that:
  - (1) The total unit load on the pipe is calculated from Table 9-2.
  - (2) Not more than one WC shall be connected to any one 3" diameter soil pipe.
  - (3) No branch pipe shall be smaller than the size of the fixture trap that it serves.
  - (4) No vertical stack shall be smaller than the largest branch pipe that it serves.
  - (5) The gradient of a branch pipe shall be not less than 1 in 48.
  - (6) Not more than 4 WCs shall be connected to a branch pipe of diameter less than 4 inches with a gradient less than 1 in 12.
  - (7) Not more than 4 WCs shall be connected to any 3" diameter branch pipe or vertical stack.
  - (8) Not more than 50% of the maximum discharge unit load permitted for vertical stacks serving more than 2 storeys shall be discharged into the stack from any one branch pipe or in any one storey height

**903.4****Fixture Unit Ratings**

Table 9-2 establishes the relative load value of various fixture units and shall be used in determining the required size of pipes for the fixtures being served.

**903.5****Workmanship**

- a) All plumbing shall be installed in a workmanlike manner.
- b) After laying, soil and ventilating pipes shall be capable of withstanding smoke or air tests under pressure, have no bends, except where unavoidable, in which case bends shall be as obtuse as possible so as not to reduce the internal diameter of the pipe.
- c) Soil/waste pipes shall not discharge effluent so as to cause dampness to any foundation or wall of a building.

**903.6****Gradients and Self Cleaning Velocities**

- a) Soil pipes shall be laid at a minimum gradient of 1:48 for 4 inch pipes and 1:60 for 6 inch pipes.
- b) Waste pipes shall be laid at a minimum gradient of 1:30.
- c) Self cleaning velocities would be achieved if velocities are approx. 2.5 feet per second with the pipe flowing 1/4 full.

**903.7****Joints and Connections**

- a) All joints and connections shall be of the same material as the main pipe and shall be air and water tight. They shall be constructed so as to allow the free flow of waste, and before commissioning, be swabbed and cleaned inside to avoid obstructions of the bore.
- b) In joining soil pipes the spigot or plain end of the pipe shall be laid in the direction of the flow or downstream.
- c) Joints to soil pipes shall be as follows:
  - i) for lead - wiped or burned.
  - ii) for cast iron - socket made with hemp or yarn and metallic lead properly caulked.
  - iii) for pitch fibre - tapered couplings.
  - iv) for PVC - with a suitable rubber joint fitting or welded with solvent cement.
  - v) for vitrified clay/salt glazed ware - socket made with tarred hemp or gasket and the remaining space filled with cement/sand mixture.
- d) No coating or paint shall be applied before testing.
- e) Where waste pipes are connected to soil pipes, all pipes are to be constructed in the same way as specified for soil pipes.

**PLUMBING FIXTURES****904.1 General**

Generally these shall be of smooth, hard, durable impervious and corrosion resistant materials free from flaws and blemishes.

**904.2 Water Closets**

- a) Water closet bowls shall be of vitreous china, vitreous glazed earthenware or other suitable material.
- b) Water closet bowls shall be attached to the floor and/or wall and be fitted with a seat of smooth non-absorbent material.
- c) The use of a separate well flushing system will reduce the use of fresh water from the cistern. All components of the salt water system shall be plastic or other suitable material non-corrosive.

**904.3 Flushing Cisterns**

Water closet systems shall have flush valves which are easily accessible for repairs, and flush pipes of not less than 1-1/4 inches in diameter. When low level cisterns are used, larger flush pipes are necessary.

**904.4 Lavatory Basin/Sinks**

- a) The top edge of every lavatory basin or sink shall be fixed at a height above finished floor level suitable for the persons using the fixtures.
- b) Fixtures for special use, such as for handicaps and for children, shall be mounted at the appropriate height for the particular application.
- c) Every lavatory basin shall be provided with an overflow, connected to the building or inlet side of the trap.

**904.5 Shower Baths**

Shower and tub outlets must be not less than 1-1/2 inches in diameter and be fitted with removable strainers. Shower outlets are normally 2". The use of "water saver" shower heads is encouraged.

**904.6 Drinking Fountains**

Drinking fountains shall have orifices located above the highest overflow level of the receptacle and be shielded so that the drinker cannot put his/her lips on the orifice.

**904.7 Traps**

- a) Traps forming an integral part of plumbing fixtures shall be supplied with the fittings to which they are to be attached.

- b) All fixtures connected to foul drainage shall be trapped as closely as possible to the fixture outlet.
- c) No trap with partitions shall be used, and crown venting off the upper curve of an "S" trap is not permitted as this results in accumulations in the vent.

#### **904.8 Water Seals**

All traps shall have a minimum water seal of 3 inches for soil and 2 inches for waste and be not less than 3 inches diameter for soil fixtures and 1-1/4 inches for waste water.

#### **904.9 Clean-outs**

Every clean-out shall be equal in wall thickness to that of the pipe, be readily accessible, shall open opposite to the direction of flow or at right angles to it, and shall provide adequate space for cleaning.

#### **904.10 Venting Systems**

- a) All water closets shall have a vent pipe of not less than 1-1/2 inches in diameter. Vent pipes shall also be used when two or more waste fittings are connected to a soil or waste pipe.
- b) Vent pipes shall be installed in accordance with 903.1(f) or extend to a greater distance as may be prescribed by the Director for unusual situations such as roof gardens. Vent pipes shall be connected above the flood level rim of the highest fixture served and graded to drip back to the soil or waste pipe.
- c) Venting systems shall be in accordance with the National Plumbing Code approved by the American Standards Association ASA A 40-8-1955 or any other Code approved by the Authority.
- d) Flashings at vent terminals shall be water tight. Vents shall preferably be fitted with a wire cage so as to permit free passage of air.
- e) Drains shall be ventilated to prevent the accumulation of foul air and to maintain equal pressure inside and outside the system.

#### **904.11 Floor Drains**

Floor drains connected to sanitary sewers shall be equipped with extra deep traps to prevent the seal from drying out. Drains in seldom used areas shall be equipped with an automatic filling device to keep the trap filled with water.

#### **904.12 Number of Sanitary Fixtures Required**

Tables 9-4 and 9-5, shall determine the minimum number of sanitary fittings required in a building provided that:

- a) Where separate facilities are required for employees and public use the total number of persons to be provided for shall be proportioned on the most realistic basis possible.



- b) The number of public facilities to be provided by drive in cinemas, drive-in restaurants or similar establishments shall be based on 3 persons for each parking bay.
- c) For any residence or apartment the minimum provision shall be 1 water closet (WC), 1 lavatory basin and 1 bath or shower and 1 sink or tub.
- d) For any building providing sleeping accommodation the minimum provision shall be 1 WC, 1 lavatory basin and 1 bath or shower for each 10 beds or each 10 persons accommodated.
- e) For any building where the use or occupancy involves the employment of staff, facilities shall be provided for employees in accordance with Table 9-4 except that where the total number of employees is less than 10 the minimum provision shall be for 1 WC and 1 lavatory basin. serving both sexes where facilities are accessible only through private offices and shall be additional to the required minimum provision.
- f) Where facilities for the public are required they shall be additional to and separate from facilities required for employees, and shall be provided and maintained in clean condition in accordance with Table 9-5 for:
  - (i) Any place of public assembly as defined in Section 2 of this Code.
  - (11) Any building or part of a building where the major use or occupancy is the regular provision of food or drink for consumption by the public on the premises or on drive - in service system.
  - (111) Any shop, store or market with more than 5,000 sq.ft of sales area.
  - (iv) Any building providing more than 500 sq.ft of public waiting space.
  - (v) Gas stations with 4 or more service pumps.
- (g) In any building of Group A, B, D, E,(b) and E(c) (Table 3-1) of more than 5,000 sq.ft. in total area, at least one cleaner's sink shall be provided for each floor of more than 2,500 sq.ft in area.
- (h) For buildings of Group B such additional facilities shall be provided as may be required by the Ministry of Health.
- (i) For buildings of Group C such additional facilities shall be provided as may be required by the Ministry of Health.
- (j) For schools, colleges or other educational buildings such additional facilities shall be provided as may be required by the Ministry of Health.
- (k) Except for private residences a minimum of one facility for male and one for female must be provided for handicapped persons.

**PIPES UNDER FLOORS AND WALLS**

- a) No part of a drain shall be laid under a building unless approved by the Authority.
- b) Where a drain is laid under a floor, not being a suspended floor, it shall be laid in a straight line for its entire length beneath the building. But in no case shall the drain under the building be longer than 40 ft.
- c) Where drains are laid on piers, care must be taken to ensure that the piers are on sound foundation and be spaced not more than eight feet apart.
- d) Rodding and flushing eyes shall be easily accessible, shall open opposite to the direction of flow, and adequate space for rodding and flushing shall be provided.

**Table 9-1****Capacity of Pipes in Fixture Units**

Size of pipe (diameter in inches)	Each horizontal branch (capacity)	Each vertical stack serving 2 storeys in height	Each vertical stack serving more than 2 storeys in height
1 - 1/4	1	2	-
1 - 1/2	4	4	-
2	8	10	20
2 - 1/2	12	20	40
3	24	30	60
4	200	240	500
5	400	540	1,100
6	800	960	1,900

**Table 9-2****Fixture Unit Ratings**

Description of Fixture	Unit Rating	Description of Fixture	Unit Rating
Bathtub (with or without shower)	2	Lavatory basin (over 1-1/4" trap)	2
Bidet	2	Showers (per shower head)	2
Drinking fountain	1	Urinal (flush valve operated)	6
Flushing sink (cistern operated)	3	Water closet (cistern operated)	4
Floor Drain	3	Water closet (flush valve operated)	6
Kitchen sink (up to 1-1/2" trap)	1-1/2	Washing machine (domestic)	4
Kitchen sink (commercial)	2	Continuous flow fixture for each gal. per min.	2
Laundry tub	2	Unspecified to 2" trap or drain	3
Lavatory basin (up to 1-1/4" trap)	1	Unspecified to 3" drain or trap	5

**Table 9-3.****Minimum Sizes of Traps (inches)**

Bathrub	1-1/2	Shower (with accessible trap)	1-1/2
Bidet	1-1/4	Shower (with concealed trap)	2
Drinking fountain	1-1/4	Shower stall (2 to 4 heads)	2-1/2
Flushing sink	3	Shower stall 5 to 12 heads	3
Floor drain	3	Shower stall (over 12 heads)	4
Kitchen sink	1-1/2	Urinal	1-1/2
Kitchen sink (commercial)	2	Water closet (siphonic action)	3
Laundry tub	1-1/2	Water closet (wash down bowl)	3-1/2
Lavatory basin (domestic)	1-1/4	Washing machine	1-1/2
Lavatory basin (commercial)	1-1/2		

**Table 9-4****Number of Sanitary Fixtures Required for Employees**

<b>A. Male Employees</b>				
<b>Number of employees</b>	<b>WCs</b>	<b>Urinals</b>	<b>Lavatory basins</b>	<b>Showers</b>
1 - 10	1	-	1	-
11 - 30	1	1	2	-
31 - 45	2	1	3	1
46 - 90	2	2	4	1
91 - 120	3	3	6	1
121 - 150	4	3	7	2
Plus: 1 urinal for each additional 1 to 60 males				
Plus: 1 WC for each additional 1 to 60 males				
Plus 1 lavatory basin for each additional 1 to 60 males				

**Table 9-4 (Cont'd)**

**Number of Sanitary Fixtures Required for Employees**

<b>B. Female Employees</b>			
<b>Number of employees</b>	<b>Showers</b>	<b>WCs</b>	<b>Lavatory basins</b>
1 - 10	1	1	1
11 - 30	1	2	2
31 - 45	2	3	3
46 - 90	2	4	4
91 - 120	2	6	6
121 - 150	2	7	7
Plus: 1 WC for each additional 1 to 30 females			
Plus: 1 lavatory basin for each additional 1 to 60 females			

**Table 9-5**

**Minimum Requirements for Sanitary Facilities**

<b>A. General use or occupancy (males)</b>			
<b>Number</b>	<b>WCs</b>	<b>Urinals</b>	<b>Lavatory basins</b>
1 - 30	1	1	1
31 - 120	2	2	1
121 - 240	3	3	2
241 - 360	4	3	3
361 - 480	4	4	4
Plus 1 urinal for each additional 1 to 200 males			
Plus: 1 WC for each additional 1 to 200 males			
Plus: 1 Lavatory basin for each additional 1 to 300 males			

**Table 9-5 (Cont'd)**

**Minimum Requirements for Sanitary Facilities**

<b>B. General use or occupancy (females)</b>		
<b>Number</b>	<b>WCs</b>	<b>Lavatory basins</b>
1 - 15	1	1
16 - 30	2	2
31 - 120	4	3
121 - 240	5	3
241 - 360	6	3
Plus: 1 WC for each additional 1 to 100 females		
Plus: 1 lavatory basin for each additional 1 to 200 females		

<b>C. Service of food or drink (males)</b>			
<b>Number</b>	<b>WCs</b>	<b>Urinals</b>	<b>Lavatory basins</b>
1 - 30	1	-	1
31 - 60	1	1	2
61 - 90	2	2	2
91 - 120	3	3	3
120 - 180	3	3	3
Plus: 1 Urinal for each additional 1 to 240 persons			
Plus: 1 WC for each additional 121 to 240 persons			
Plus: 1 Lavatory basin for each additional 1 to 240 persons			

**Table 9-5 (Cont'd)**

**Minimum Requirements for Sanitary Facilities**

<b>D. Service of food or drink (females)</b>		
<b>Number</b>	<b>WCs</b>	<b>Lavatory basins</b>
1 - 15	1	1
16 - 30	2	1
31 - 60	2	2
61 - 90	3	2
91 - 120	4	3
121 - 180	5	3
Plus: 1 WC for each additional 1 to 120 females		
Plus: 1 Lavatory basin for each additional 1 to 240 persons		

<b>E. Shops, Stores, Markets (males)</b>	
<b>Area of sales space in square feet</b>	<b>Number of fixtures</b>
1,000 - 10,000	1 WC 1 Lavatory basin
10,000 - 15,000	1 WC 1 Urinal 1 Lavatory basin
15,000 - 20,000	2 WCs 1 Urinal 1 Lavatory basin
Over 20,000	2 WCs 2 Urinal 2 Lavatory basins

**Table 9-5 (Cont'd)**

**Minimum Requirements for Sanitary Facilities**

<b>F. Shops, Stores, markets. (females)</b>	
<b>Area of sales space in square feet</b>	<b>Number of fixtures</b>
1,000 - 10,000	1 WC 1 Lavatory basin
10,000 - 15,000	2 WCs 1 Lavatory basin
15,000 - 20,000	3 WCs 2 Lavatory basins
Over 20,000	4 WCs 2 Lavatory basins

<b>G. Gas Stations (males)</b>		<b>Gas Stations (females)</b>	
<b>Equipment</b>	<b>Fixtures</b>	<b>Equipment</b>	<b>Fixtures</b>
2 or more pumps	1 WC 1 Lavatory basin	2 or more pumps	1 WC 1 lavatory basin