

TECHNICAL SPECIFICATIONS- SOIL, WASTE, VENT & RAIN WATER PIPES:

Unless specifically mentioned otherwise, all applicable codes and standards published by the Bureau of Indian Standard and all other such publication as may be published by them after construction work starts, shall govern in respect of design, workmanship, quality and properties of material and method of testing.

1.0 SCOPE OF WORK :

- 1.1 Work under this section shall consist of furnishing all labour, materials, equipments and appliances necessary and required to completely install all soil, waste, vent, AHU drain, Rain water pipes, drainage sump riser and fittings as required by the drawings and given in the Schedule of Quantities.
- 1.2 Without restricting to the generality of the foregoing, the soil, waste, vent pipe rain water system shall include the following :-
 - a) Horizontal and Vertical C.I. soil, waste and vent pipes, and fittings, Drip seal joint, clamps and connection to fixtures.
 - b) Floor and Urinal traps, Floor Drain, Cleanout plugs, G.I. inlet fittings and CP brass/stainless steel grating.
 - c) Waste pipe connection from all fixtures e.g wash basins, sinks, urinals, kitchen equipments and plant room equipment.
 - d) uPVC/CI Rain water pipes/CI(LA) Drainage/Sewage Sump Pump Riser.
 - e) uPVC sump vent pipe and fittings.

2.0 GENERAL :

- 2.1 All materials shall be new of the best quality conforming to IS codes and specifications and subject to the approval of Consultants.
- 2.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner.
- 2.3 Pipes shall be fixed in a manner as to provided easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.
- 2.4 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified.
- 2.5 Access doors for fittings and cleanouts shall be so located that they are easily accessible for repair and maintenance.

3.0 CENTRIFUGAL CAST IRON (SPUN) PIPE :

- 3.1 Soil, waste, vent and anti-siphonage pipes, fittings and accessories shall be centrifugal cast iron (spun). All pipes shall be straight and smooth and their inside free from irregular bore, blow holes, cracks and other manufacturing defects. Pipes shall be centrifugally cast (spun) iron soil pipes conforming to IS: 3989-1984.
- 3.2 Standard weight, dimensions and pig lead required for joints shall be as follows:

For pipes conforming to IS:3989-1984 (centrifugally spun C.I pipes)

S.No.	Nominal Diameter	Thickness	Approximate mass including mass of Socket for pipe length 1.80m	Internal diameter of socket	Depth of lead	Weight Of lead yarn
	Mm	mm	Kg	mm	Mm	Kg
1	75	3.5	12.5	99	25	0.600
2	100	4.0	18.8	126	25	0.850
3	150	5.0	34.9	178	25	1.300
4	200	6.0	51.0			2.00

3.3 Tolerance:

Acceptable tolerance for pipes to IS:3989 shall be as follows:

a)	Wall thickness	- 15%
b)	Length	+20 mm
c)	Weight	-10%

4.0 FITTINGS :

4.1 Fittings shall conform to the same Indian Standard (IS : 3989-1984) for pipes. Contractor shall use pipes and fittings of matching specifications.

4.2 Fittings shall be of the required degree of curvature with or without access door as detailed in the drawings or as directed.

4.3 Access door shall be made up with 3mm thick insertion rubber washer and white lead. The bolts shall be lubricated with grease or white lead for easy removal later. The fixing shall be air and water tight.

5.0 FIXING :

5.1 All vertical pipes shall be fixed by MS clamps truly vertical. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard).

5.2 Horizontal pipes running along ceiling shall be fixed on structural adjustable clamps of special design shown on the drawings or as directed. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully rest on them.

5.3 Contractor shall provide all sleeves, openings, hangers, inserts during the construction. He shall provide all necessary information to the building Contractor for making such provisions in the structure as necessary. All damages shall be made good by the Contractor at his own cost to restore the surfaces.

6.0 CLAMPS :

6.1 Holder bat clamps shall be of standard design fabricated from MS flats 40x3mm thick and 12mm dia MS rod and 6mm nuts and bolts; painted with two coats of black bitumen paint before fixing. The clamps shall be fixed in cement concrete 1:2:4 mix (1 cement : 2 sand : 4 stone aggregate 20mm nominal size) blocks 100x100x100mm deep.

6.2 Where holder bat clamps are to be fixed in RCC column or slotted angles, walls or beam they shall be fixed with 40x3mm flat iron "U" type clamps with anchor fasteners of approved design.

6.3 Structural clamps shall be fabricated from MS structural members e.g. rods, angles, channels, flats as per detailed drawing or as directed. Contractor shall provide all nuts, bolts, welding material and paint the clamps with one coat of red oxide and two or more coats of black enamel paint to give an even shade.

6.4 Wherever MS clamps are required to be anchored directly to brick walls, concrete slabs, beams or columns, nothing extra shall be payable for clamping arrangement, RCC block and making good with cement concrete 1:2:4 mix (1 cement : 2 sand : 4 stone aggregate 20mm nominal size) as directed by the Architect/Consultants.

7.0 JOINTING :

Soil, waste, vent and anti-siphonage pipes shall be jointed with Lead joint/Drip seal joint as mentioned in the BOQ.

The following minimum procedures shall be complied with while making the pipe joints :-

- a) Ensure that the pipes are clean internally and undamaged.
- b) The pipes shall be cut square with sharp tools.
- c) The cut ends of the pipes shall be filed/ reamed and finished smooth.
- d) Any deformed ends shall be re-rounded.
- e) It shall be ensured that the pipe ends shall enter the fittings and sockets to full depth of the jointing area.
- f) The pipe work shall be assembled in a manner such that it does not entail making of joints in restricted locations.
- g) Each metal pipe spigot shall be centered with three lightly wedged pieces of hardwood or folded lead.
- h) The jointing surfaces shall be cleaned to remove any coatings or cutting oils, etc.

8.0 PAINTING :

8.1 Soil, waste, vent and anti-siphonage pipes in any exposed location in shafts, pipe spaces etc. shall be painted with two coats of primer and two or more coats of synthetic enamel paint of colour as specified to give an even shade.

8.2 Pipes shall be painted with paint of approved quality and shade in accordance with approved pipe colour code.

9.0 TESTING :

- 9.1 Testing shall be done in accordance with IS : 1172 and IS:5329 except as may be modified hereinunder.
- 9.2 Before use at site all CI pipes shall be tested by filling up with water for at least 30 minutes. After filling, pipes shall be struck with a hammer and inspected for blow holes and cracks. All defective pipes shall be rejected and removed from the site within 48 hours.

10.0 UPVC PIPES & FITTINGS:

10.1 UPVC PIPE AND FITTINGS FOR RAIN WATER DISPOSAL SYSTEM :

10.1.1 Rain water pipe shall be UPVC SWR Type A conforming to IS : 13592-1992.

10.1.2 Dimension of SWR Pipe Fittings shall be as per DIN 19531 and DIN 19534 and conforms to IS : 14735-1999. Rubber ring shall be conforming to IS : 5382.

10.1.3 Rubber ring shall be of make and type approved by Pipe and fitting manufacturer. Rubber ring joint shall be made in an approved manner as recommended by the manufacturer.

10.1.4 For testing, seal hermetically at all opening below the top of the section to be tested. The water level shall then be raised to a height of not less than 3m above the highest point of the section being tested or as the inspection offer may direct. Every joint shall be carefully examined for leaks.

11.1. TECHNICAL DETAIL :

- [1] Dimension of Unplasticized PVC Pressure Pipes [Ring Fit/Ring Tight Rigid PVC Pipes [As per IS : 4985-2000].

Nominal outside Diameter (Nominal Size)	Mean Outside Diameter		WALL THICKNESS											
			Class 1 0.25 Mpa		Class 2 0.4 Mpa		Class 3 0.6 Mpa		Class 4 0.8 Mpa		Class 5 1.0 Mpa		Class 6 1.25 Mpa	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
20	20.0	20.3	-	-	-	-	-	-	-	-	1.1	1.5	1.4	1.8
25	25.0	25.3	-	-	-	-	-	-	1.2	1.6	1.4	1.8	1.7	2.1
32	32.0	32.3	-	-	-	-	-	-	1.5	1.9	1.8	2.2	2.2	2.7
40	40.0	40.3	-	-	-	-	1.4	1.8	1.8	2.2	2.2	2.7	2.8	3.3
50	50.0	50.3	-	-	-	-	1.7	2.1	2.3	2.8	2.8	3.3	3.4	4.0
63	63.0	63.3	-	-	1.5	1.9	2.2	2.7	2.8	3.3	3.5	4.1	4.3	5.0
75	75.0	75.3	-	-	1.8	2.2	2.6	3.1	3.4	4.0	4.2	4.9	5.1	5.9

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			Class 1 0.25 Mpa		Class 2 0.4 Mpa		Class 3 0.6 Mpa		Class 4 0.8 Mpa		Class 5 1.0 Mpa		Class 6 1.25 Mpa	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
90	90.0	90.3	1.3	1.7	2.1	2.6	3.1	3.7	4.0	4.6	5.0	5.7	6.1	7.1
110	110.0	110.4	1.6	2.0	2.5	3.0	3.7	4.3	4.9	5.6	6.1	7.1	7.5	8.7
125	125.0	125.4	1.8	2.2	2.9	3.4	4.3	5.0	5.6	6.4	6.9	8.0	8.5	9.8
140	140.0	140.5	2.0	2.4	3.2	3.8	4.8	5.5	6.3	7.3	7.7	8.9	9.5	11.0

Notes :

1. The table is based on metric series of pipe dimension given in ISO 161/1 in respect of pipe dimensions and ISO DIS 4422.
2. The wall thickness of pipe is based on a safe working stress of 8.6 MPa at 27°C. The working pressure gets reduced at sustained higher temperatures. Occasional rise in temperature, as in summer, with concurrent corresponding reduction in temperature during nights has no deleterious effect on the working pressure of the pipes considering the total life of pipe.

12.0 MEASUREMENT AND RATES :

12.1 General :

- a) Rates for all items shall be inclusive of all work and items called for in the specifications given above and the Schedule of Quantities as applicable for the work under floors, in shafts or at ceiling level at all heights and depths.
- b) All rates are inclusive of cutting holes and chases in RCC and masonry work and making good the same.
- c) All rates are inclusive of pre testing at site and final testing of the installations, materials and commissioning.

12.2 Pipes :

- a) The unit of measurement shall be linear metre to the nearest centimeter.
- b) All UPVC & CI soil, waste, vent, anti-siphonage and rain water pipes, AHU Drainage & sump riser shall be measured net, when fixed correct to a centimeter, including all fittings along their length after fixing. The length shall be taken along center line of the pipes and fittings. No allowance shall be made for the portions of pipe lengths entering the sockets of the adjacent pipes or fittings. The above shall apply to all cases i.e. whether pipes are fixed on wall face or pillars or embedded in masonry or pipes running at ceiling level. The quoted rate shall include lead jointing.
- c) GI pipes shall be measured in running metre correct to a centimeter for the finished work which shall include fittings e.g. bends, tees, elbows, reducers, crosses, sockets, nipples, nuts, unions etc. The length shall be taken along center line of the pipes and fittings. All pipes and fittings shall be classified

according to their diameter, method of jointing and fixing substance, quality and finish. The diameters shall be nominal diameter of internal bore. In case of fittings of unequal bore, the largest bore shall be considered.

12.3 Pipe Encasing/ Supports :

Cement concrete around pipes shall be measured along the center of the pipe line measured per linear metre and include any masonry supports, shuttering and centering, curing, cutting etc. complete as described in the relevant specifications.

BIS : 12251	Code of practice for drainage of building basements.
BIS : 5572	Code of practice for sanitary pipe work.
BIS : 6700	Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.

Pipes and Fittings

BIS : 651	Salt glazed stone ware pipes and fittings.
BIS : 1536	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage.
BIS : 1537	Vertically cast iron pressure pipes for water, gas and sewage.
BIS : 1538	Cast Iron fittings for pressure pipes for water, gas and sewage.
BIS : 1729	Sand Cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
BIS : 1879	Malleable cast iron pipe fittings.
BIS : 3989	Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
BIS : 4346	Specifications for washers for use with fittings for water services.
BIS : 4711	Methods for sampling steel pipes, tubes and fittings.
BIS : 6392	Steel pipe flanges
BIS : 6418	Cast iron and malleable cast iron flanges for general engineering purposes.
BIS : 7181	Specification for horizontally cast iron double flanged pipe for water, gas and sewage.