



Uhde India Limited

**SECTION-11
TECHNICAL SPECIFICATIONS
PLUMBING & SANITARY**

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CI-UCH-016-011

Rev. :R0

Page :1

Contents	Page
SCOPE	2
CODES	2
SANITARY WARES	4
G.I. PIPE & FITTINGS	7
C.I. PIPE & FITTINGS	8
LEAD PIPES	8
GLAZED STONEWARE PIPES	8
INSTALLATION	9
RCC PIPES	11
TESTING OF WATER SUPPLY SYSTEM	13
TESTING OF SEWER SYSTEM	14
INSPECTION CHAMBERS	15
TRAPS AND VENTILATING PIPES	15
SEPTIC TANK	16
MODE OF MEASUREMENT	18

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11.00 **SCOPE**

This section includes supply of all materials, labour and incidentals for plumbing and sanitary works for business, industrial and other types of buildings.

11.1 **CODES**

- IS:458 - Concrete pipes (with and without reinforcement)
- IS:651 - Salt glazed stoneware pipes & fittings.
- IS:772 - General requirements of enamelled cast iron sanitary appliances.
- IS:774 - Flushing cistern for water closets & urinals (valveless siphonic type).
- IS:775 - Cast Iron brackets & supports for wash basins and sinks.
- IS:783 - Code of practice for laying of concrete pipes.
- IS:784 - Prestressed concrete pipes.
- IS:1172 - Code of basic requirements for water supply drainage and sanitation.
- IS:1200 - Laying of water and sewer lines including appurtenant items.
Part XVI
- IS:1230 - Cast Iron rain water pipes and fittings.
- IS:1239 - Mild Steel Tubes and Mild Steel Tubulars and other wrought steel pipe fittings.



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Page :3

- IS:1536 - Centrifugally cast (Spun) iron pressure pipes for water gas & sewage.
- IS:1537 - Vertically cast iron pressure pipe for water, gas & sewage.
- IS:1538 - Cast Iron fittings for pressure pipes for water, gas & sewage.
- IS:1626 - Asbestos cement building pipes, gutters and fittings (spigot & socket types).
- IS:1726 - Cast Iron manhole covers & frames intended for use in drainage works.
- IS:1729 - Sand cast iron spigot & socket soil, waste and ventilating pipes & accessories.
- IS:1742 - Code of Practice for building drainage.
- IS:1771 - Glazed earthen-ware sanitary appliance.
- IS:2470 - Code of Practice for designs and construction of septic tank for small and large installations.
- IS:2548 - Plastic water closet seats & covers.
- IS:2556 - Specifications for vitreous sanitary appliances (vitreous Part I to XV China)
- IS:3076 - Low density polythelene pipes for potable water supplies
- IS:3486 - Cast Iron spigot and socket drain pipes
- IS:3889 - Centrifugally cast (spun) iron and socket soil waste and ventilating pipes, fittings and accessories.
- IS:4127 - Code of Practice for laying of glazed stoneware pipes.
- IS:4984 - High density polythene pipes for potable water supplies

IS:5219 - 'P' & 'S' traps

IS:5329 - Code of Practice for sanitary pipe work above ground for buildings.

IS:5961 - Cast Iron gratings for drainage purposes.

IS:7231 - Plastic flushing cisterns (valves siphonic type for water closets and urinals).

11.2 Sanitary Wares

All sanitary wares shall be of white or coloured glazed earthenware. The connections shall be of P.V.C. and fittings of C.P. brass as specified in B.O.Q. items.

The chromium plating shall conform to IS:4827 and shall be of grade 2 (thickness 10 micron).

11.2.1 Water Closets

380 to 400 high, double trap siphonic pattern 'P' or 'S' trap with PVC cover and toilet seat.

European or Western Closet

- a) as commode or hopper type pedestal type
- b) as commode or hopper with wall hung type
- c) water closet and cistern coupled as one set only

Indian (Pan or squatting) style with 'P' or 'S' siphonic trap:

- a) normal pan 630 x 580 size to be sunk into floor on 150 concrete cushion.
- b) Orissa pattern pan 580 x 440 to be sunk into floor on 150 mm thk. Concrete cushion.

With non-slippery foot rests arrangement.

Anglo Indian or Semi Western / Indian Style:

30 cm high with PVC toilet seat and cover.

CISTERN

5.0 litre capacity PVC cistern with PVC cover and valveless fittings with bottom / side inlet and outlet and overflow shall be mounted on C.I. brackets to walls, just below the window sill level suitably placed at a height convenient from operation point of view.

11.2.2

Urinal

White glazed earthen ware urinal shall be fixed and provided with 5 lit. capacity PVC automatic flushing cistern with all accessories as detailed in water closet description. Waste pipe shall be 750 long, 32 mm dia. G.I. with necessary unions and C.P. bottle trap. Anchor fasteners with C.P. brass screws shall be used for fixing the urinal. Flush pipe shall be 12 dia./C.P. brass pipe. Height of a bowl or lipped type urinal above foot level shall be 750 mm.

There are four types of urinals:

- i) Bowl type flat back and angle back
- ii) Slab type
- iii) Stall type
- iv) Squatting plate

They shall be provided as indicated in drawings or as directed by Engineer.

The foot rests or treads should be of the non-slippery type and slightly sloping towards bottom floor channels.

11.2.3

Wash Basin

White or coloured glazed earthenware wash basin with one side flat of size 630 x 450 or 510 x 400 shall be fixed on brackets. I) without pedestal, ii)

with pedestal, iii) as counter top as shown in drawings or as directed by Engineer. Top of wash basin shall be 800 mm above finished floor.

It shall be provided with (a) 32 mm dia. C.P. bottle trap with waste coupling, (b) 12 m dia. PVC connector and 12 mm dia. screw down C.P. brass stop cock (c) 12 mm dia. C.P. brass screw down type pillar tap.

While fixing above earthen ware utmost care shall be taken to avoid damage. Totally finished system shall be accepted after inspection and testing is done with satisfactory results.

11.3 Bevelled Edge Mirror

The mirror shall be of approved make and of size 600 x 450 mm and of thickness 8mm. It shall have asbestos sheet backing and fixed to wooden cleats with C.P. brass screws and CP washers in proper line.

11.4 Towel Rail

Towel rail shall be of Stainless steel or Chromium plated (CP) brass with stainless steel or CP brass brackets. The towel rail shall be 20 mm dia. and 600 mm long. It shall be fixed at specified place as shown in drawing or as directed by the Engineer.

11.5 Glass Shelf

Glass Shelf of size 450 x 110 x 4mm thick plain sheet glass shall be provided and fixed below mirror on suitable C.P. brass brackets with anchor fasteners and, C.P. brass screws. Edges of the glass shall be properly rounded or smoothed.

11.6 Marble Partition

The marble partition shall be of 5700 mm depth, 25 mm thick double polished from both the sides and approved by the engineer. Height of fixing shall be 670 mm above floor.

The edges of marble shall be got cut by machine to have proper smooth edges as per detailed drawing.

Vertical face shall be fixed in position with cement mortar 1:3 as directed by the Engineer for a minimum depth of 100 mm in the wall.

After fixing recesses shall be made good.

11.7 Floor trap

Floor trap shall be heavy cast iron with 100 mm inlet and 100 or 75 or 50 mm outlet with C.P pressed steel grating. It shall be either hinged or screwed down type as directed. It shall be fixed in M-15 grade concrete bed.

11.8 Bib and Stop Cock

Bib and stop cock of screw down type shall conform to IS:781. It shall be of heavy grade. The tap shall be of C.P. brass easy cleaning variety as specified. It shall be fixed with white zinc and spun yarn.

11.9 Gun Metal valve

All full way and globe valves shall be of heavy gun metal and tested at 21 kg/cm² and shall be approved by the Engineer-in-charge. Valves shall conform to IS:778.

11.10 Galvanised Iron Pipes & Fittings

Galvanised iron (GI) pipes and fittings shall be of Heavy grade ('C' Class), and shall conform to IS:1239. The jointing shall be done using screwed fittings as specified in IS:554.

All G.I. pipes internal or external shall be fixed by means of approved pattern holder bat clamps @ 1.2 m c/c.

Each galvanised pipe shall be hydraulically tested after galvanising to withstand a test pressure of 50 kg/sq.cm. without showing any defects at the manufacturer's work.

Fitting in G.I. Pipes, include all couplings, elbows, tees, bends, unions, nipples, reducers, flanges with nuts and bolts and rubber insertions, bushes and all other fittings to make a complete job. White lead with few strands of fine hemp shall be applied while tightening. Compounds containing red lead shall not be used.

No extra payment shall be made for clamps, hooks, cutting holes in walls, chasing and making them good.

11.11 Cast Iron Pipes & fittings

All C.I pipes and fittings shall be of approved make conforming to Indian standards and subject to approval of the Engineer, free from flaw and with clean and smooth interior. The fittings shall be of proper design, provided with 3.2 mm rubber insertion so as not to form cavities. The spigot end shall be above the shoulder of the socket end and leave no annular space in between.

Each head of the drain shall be ventilated by means of 100 mm C.I guards at terminals and the pipe fixed to the wall with standard 100 mm holder clamps. The pipes shall be bitumen painted smooth inside and outside shall be painted with aluminium or other paint as desired by the Engineer.

11.12 Lead Pipes

Lead pipes used for branch waste pipes from fittings to main stock shall conform to IS:404. The pipes shall be sound and free from laminations, flaws, pronounced extrusion marks or other imperfections and shall, as far as possible, be circular in cross section, smooth and of uniform wall thickness throughout. Lead pipes should be used only for short branches of soil, waste or vent connections.

11.13 Glazed Stoneware Pipes

Glazed stoneware pipe shall be as per I.S. Specifications made by the approved manufacturer, absolutely smooth finished from inside, well burnt and non-porous. The line shall be laid in the required gradient, socket facing upstream direction, and joints filled up with dry cement mortar of 1:1

proportion, and caulked well inside and edges outside the socket splayed off well at 45 deg.c. The spigot end shall be inserted into the socket to the full length. No change in directions shall be allowed by partial insertion of the spigot. The joints shall be well watered and kept moist by wet gunny bags for at least a week's period.

11.14 All sanitary wares, fittings, pipes etc. shall be of approved make. Samples of all fixtures, fittings, pipes etc. shall be submitted by contractor for approved by Engineer in advance.

11.15 Installation of Pipes

11.15.1 Licensed Plumbers

The work required to be carried out under the provision of these specifications shall only be executed by the licensed plumber or by a person whose qualification has been approved by the Engineer.

11.15.2 Excavation

Excavation shall be done in accordance with Technical specifications Section No.1

11.15.3 Concreting

Concreting shall be done in accordance with Technical specification Section No.2.

11.15.4 Laying of Pipes

The pipes shall be laid with the sockets facing upstream and shall rest on solid and even foundations for the full length of the barrel. Socket holes be formed in the foundation sufficiently deep to allow sufficient space for the

pipe jointer to work right around the pipes and as short as is practicable to accommodate the socket in the proper position and allow the joint to be made.

Where pipes are not bedded on concrete, the trench shall be left slightly high and carefully bottomed up as pipe laying proceeds so that the pipe barrels rest on firm and undisturbed ground. If the excavation has been carried too low, packing done shall be in concrete.

All vertical pipe shafts, soil pipes or ventilation pipes shall be strongly supported at the foot upon a bed of concrete and firmly attached to the walls. It shall be fixed at least 5 cms. clear of the finished surface of the wall by means of suitable clamps of approved type.

Each separate pipe shall be individually set for line and for level using one of the standard procedure as approved by the Engineer.

11.15.5

Jointing of Pipes

The spigot and socket joints of cast iron pipes shall be fitted with jute or yarn mixed with linseed oil and cement slurry, and then the entire joint shall be covered by cement all round to ensure complete leak proof joint.

Screwed wrought iron or steel piping shall be jointed with screwed and socketed joints, using screwed fittings of wrought iron, steel or malleable cast iron. Care shall be taken to remove any burr from the ends of pipes after screwing.

A joint compound may be used according to the manufacturer's instructions together with a grummet of a few strands of fine yarn, but compounds containing red lead shall not be used. Any threads exposed after jointing shall be painted or in case of underground piping, thickly coated with bituminous or other suitable composition to prevent corrosion.

Lead to Lead, Copper or brass joints shall be made as wiped solder joints. The minimum and the maximum length of the wiped solder joints shall be 8 mm and 9 cm respectively. The solders shall consist of two parts of Portland cement and one part of clean sharp sand.

All pipes shall be fixed 25 mm clear off the wall with M.S Holder bat clamps or as approved by the Engineer. Where any water closet pan or earthenware trap connected to such pan is to be jointed with a cast iron pipe, the joint between the stoneware spigot and the cast iron socket shall always be of a flexible (non-rigid) nature, such joints shall be made with a mixture of bitumen and chopped asbestos fibre (nut dust).

11.16 R.C.C PIPE

11.16.1 Materials

For pipe materials, the following specifications shall apply :

RCC Pipes & Collars IS:458

Laying of Pipes IS:783.

For cement sand, mortar, water etc. the specifications laid down for concrete works shall apply.

All pipes must be new and perfectly sound, free from cracks, cylindrical, straight, and of standard nominal diameter and length with even texture. Each pipe shall have one collar with it.

The contractor shall submit manufacturer's test certificate on demand by Engineer. Spun yarn for pipe joints shall be of best quality. It shall be clean and free from dust etc.

11.16.2 Transportation and Stacking

The transportation of materials to the work site and stacking shall be done in a manner to cause minimum inconvenience to the traffic and other construction works. The pipe shall be protected during handling against impact; shocks and free fall to avoid cracks and damage.

The contractor shall be fully responsible for the safety and security of materials transported and stacked in the field.

11.16.3 Lowering and Laying of Pipes

General

The laying and jointing of pipes shall conform to IS:783. The trench shall be checked for proper level, gradient and alignment before lowering the pipes.

Lowering

The pipes shall be lowered cautiously to prevent disturbance of the bed and sides of the trench. The heavy pipes shall be lowered by means of proper shear legs, chain pulley blocks or as directed by Engineer. Great care should be taken to prevent sand etc. from entering the pipes.

Laying

Laying of pipes shall proceed up grade of slopes. The error of grade shall not be rectified by packing up earth underneath the pipes. If required, concrete shall be used for packing.

The ends of the pipes shall be kept closed to keep out dirt, mud and foreign materials, out. Adequate provision shall be made to prevent floating of pipe in the event of flooding of trenches.

The body of the pipe for its entire length shall rest on an even bed in the trench and collar location shall be excavated to receive the collar for the purpose of jointing.

11.16.4 Jointing of Pipes

A few skeins of spun yarn soaked in neat cement shall be inserted in the groove at the end of the pipe and the two adjoining pipes butted against each other. Collar shall be slipped over the joint covering equally both the pipes. Spun yarn soaked in neat cement shall be passed round the pipes and inserted in the joint by means of caulking tools from both ends of the collar. More skeins of yarn shall be added & well rammed home. The object of the yarn is to centre the two ends of the pipes within the collar and to prevent pipes becoming loose.

Cement mortar 1:2(1 cement :2 sand) shall be slightly moistened and must on no account be soft or sloppy and shall be carefully inserted by hand into the joint. The mortar shall then be punched and caulked into the joint and more cement mortar added until the space of the joint has been filled completely with tightly caulked mortar. The joint shall be finished off neatly outside the collar on both side at an angle of 45 Deg.

Any surplus mortar projecting inside the joint is to be removed and to guard against any such projections, sack or gunny bags shall be drawn past each joint after completion.

11.16.5 Curing

The cement mortar joints shall be cured at least for seven days.

11.16.6 Testing

All joints in the pipes shall be tested to a head of 1.5 metres of water above the top of the highest pipe.

11.17 Testing of pipes

All tests shall be conducted by the contractor at his own expense in the presence of the Engineer and as guided by the Engineer.

11.17.1 Testing for water supply system

When the service is complete, it shall be slowly and carefully charged with water, allowing all air to escape and avoiding all shock or water hammer. The services shall then be inspected under working conditions of pressure.

When all draw off points are closed, the service pipe shall be absolutely water tight. All piping, fittings and appliances will be checked over for satisfactory support, and protection from damage and corrosion. In view of

the possibility of damage in transit, cisterns shall be retested for water tightness on arrival at the site, before fixing.

11.17.2 Testing for Sewer System

Comprehensive tests of all appliances shall be carried out by simulating conditions of use before the final approval. Over flow shall also be examined for any obstruction.

11.17.3 Smoke Test

All soil pipes, waste pipes, vent pipes and rain water drain pipes and all other pipes which are above ground shall be gas-tight. To ensure gas-tightness, smoke test shall be conducted. The smoke can be produced by burning oily waste or tar paper or similar material in the combustion chamber of smoke machine.

11.17.4 Water Test

The drains pipes shall be subject to test pressure of at least 1.5 M head of water at the highest point of the section under test. The tolerance figure of two litres per centimeter of diameter per kilometer (or one gallon per inch of diameter per mile) shall be allowed during a water filled period of ten minutes. The test shall be carried out by suitably plugging the low end of the drain and the ends of connections if any and then filling the system with water.

11.17.5 Sterilization

All building water supply system before connected to the street main shall be thoroughly and efficiently disinfected by the contractor under the supervision of Engineer. The system shall be first flushed out with water having a does of 50 parts of chlorine to one Million parts of water (50 ppm). If chlorine powder is used, the proportions shall be 150 grams to 1000 litres of water.

11.18 Stoneware Gully Trap with Chamber

The square mouth gully trap shall be of 100 mm dia, conforming to IS:651 or as specified and of approved quality stoneware, complete with heavy cast iron grating, and shall be got approved by the Engineer. The size of C.I.

frame and hinged cover shall be of 300 mm x 300 mm. It shall be properly fixed as directed by Engineer.

The size of chamber shall be min. 300 mm x 300 mm x 600mm deep (internal). It shall be constructed of brick masonry walls of 115 mm thick in CM 1:5 (1 cement : 5 sand) resting on 100 mm thick M-10 concrete. Inside and outside face of masonry walls shall be plastered with 1:3 cement mortar with cement finish.

11.19 Inspection Chambers

Inspection chambers will be constructed as per drawing at indicated intervals and elevations. These will be generally in 230 thick Brick masonry unless otherwise mentioned resting on 100 mm thick M-10 concrete. The minimum internal size shall be 1200 mm x 900 mm. Inside faces shall be with waterproof plaster and bottom face shall be with smooth finish and half-tunnelling for easy flow. Inspection chambers are provided at every change of direction or gradient and at the point where the vertical soil pipe joins the house drain.

11.20 Traps and Ventilating Pipes

Pipes carrying the waste from water closets and waste water and overflow water from baths, wash basins, sinks to drains shall be trapped immediately beneath such fixtures. Traps shall have minimum water seal of 50 mm and shall be ventilated whenever such ventilation is necessary to maintain water seal of the trap.

Ventilating pipes shall be carried up vertically from the drain to a height of at least 600 mm above the outer covering of the roof of the building or as shown on drawings. All vertical ventilating, anti-siphonage and similar pipe shall be covered on top with a cowl. The cowl shall be made of C.I. unless desired otherwise by the engineer.

11.20.1 Manhole and Inspection Chambers

The maximum distance between manholes shall be 30 meter unless specially permitted otherwise. In addition, at every change of alignment gradient or diameter there shall be a manhole or inspection chamber. The distance between manhole or inspection chamber and gully chamber shall not exceed 6 metres unless desired otherwise. Manhole shall be constructed so as to be watertight under test. The bending at the sides shall be carried out in such a manner as to provide no lodgement for any splashing in case of accidental flashing of the chamber. The channel or drain at the bottom of chamber shall be plastered with 1:2 cement, sand mortar and finished smooth to the grade. The channels and drains shall be shaped and laid to provide smooth flow.

Connecting to existing sewer line shall be through a manhole.

Manholes shall be provided with standard C.I. covers. The covers shall be close fittings so as to prevent gases from coming out. Suitable heavy duty covers shall be used where necessary as decided by the Engineer.

11.22 Septic tank & effluent disposal**11.22.1 Septic tank**

Septic tank shall consist of the settling tank itself with inlet and outlets therefrom complete with all necessary earthwork and backfilling. The details of septic tank shall be as shown on drawings. This item shall also include ventilating pipe of at least 100 mm dia whose top shall be provided with a suitable mosquito proof wire mesh and cowl. Ventilating pipe shall extend to a height of about 2 metres when the septic tank is at least 15 metres away from the nearest building and at least 2 metres above the building when it is located closer than 15 metres. Ventilating pipes can be connected to the normal soil ventilating system of the building where allowed.

11.22.2 Effluent Disposal

The effluent from the septic tank shall be disposed by allowing it into an open channel or a body of water if the concerned authority approves or into a soak pit for absorption by soil or shall be allowed to be absorbed by soil through open jointed SW pipes laid in a trench filled with broken bricks.

11.22.3 Soak Pit

The soak pit shall be complete as shown on drawing. It shall consist of a 900 mm dia pit 1000 mm in depth below the invert level of the inlet pipe. The pit shall be lined with stone, brick or concrete blocks set in cement mortar (1:6) and filled with brick bats. Inlet pipe shall be taken down to a depth of 900 mm from the top as an anti-mosquito measure.

11.22.4 Open jointed SW Pipe/dispersion trenches

Minimum dia. of the SW pipes shall be 150 mm nominal. The trench for laying the pipes shall be minimum 600 x 600 mm. The joints of the pipes shall be left unsealed. The entire length of the pipe within the trench shall be buried in a 250 mm layer gravel or crushed stone of uniform size. On top of gravel/crushed stone layer 150 mm bed of well graded coarse aggregate shall be laid. Ordinary soil will be used for filling the top of trench.

11.22.5 Commissioning septic tank

After the septic tank has been proved watertight and the sewage system is checked the tank shall be filled with water to its outlet level before the sewage is let into the tank. It shall be seeded with well digested sludge obtained from septic tank or sludge digestion tank. In the absence of digested sludge a small quantity of decaying organic matter such as digested cow-dung may be introduced to start with.

11.22.6 Testing Septic Tank

The septic tank shall be tested for water-tightness. It shall be filled up with water and allowed to soak for 24 hrs. Then, it shall be topped up and allowed to stand again for 24 hrs and loss of level recorded. The fall shall not be more than 15 mm.

11.23 Mode of Measurement1) Sanitary Wares

The payment shall be on Unit number basis. The rate shall include all materials, fixing, labour, making all surfaces good, jointing, painting, testing etc. complete as specified.

2) For all other items which are to be quoted in unit number, the rate shall include for complete item including supply, fixing, labour, etc. all complete.

3) For A.C.. G.I.. C.I.. Stone-ware and R.C.C pipes The payment shall be on RM basis of finished length laid. The rate shall include all materials, fixtures, accessories, clamps, laying, fixing, jointing, labour, tools and tackles, painting etc. complete as specified.