

GENERAL REQUIREMENTS

DOC. NO.	OAB REDEVELOPMENT, NLSIU, BENGALURU	PROJECT NO.
PHE / 002	MATERIAL SPECIFICATION – GENERAL REQUIREMENTS	AD/0123

1. SCOPE

This specification covers the requirements of supply, installation, testing and commissioning of Water Supply, Sewerage and Rainwater system for the proposed **OAB REDEVELOPMENT, BENGALURU.**

Scope of work generally includes Supply, fixing, testing, and commissioning of the following:

- Internal Sanitary Fixtures.
- Internal and External Water Supply system.
- Internal and External Drainage system.
- Rainwater disposal system

The General character and the scope of work to be carried out under this section is illustrated in the drawings and specifications attached herewith. The contractor shall carry out and complete the said work under this contract in every respect in conformity with the rules and regulations of the local authority. The Contractor shall furnish all labour, materials, appliances, tools and equipment necessary for the work for plumbing services installation including testing and commissioning as specified herein, and as per the relevant Bureau of Indian Standards (BIS), British Standards (BS) codes and as shown on the drawings. This also includes any material, appliances and equipment not specifically mentioned herein or noted on the drawings as being furnished or installed which are necessary and customary to make a complete installation properly connected and in working order.

Carryout all incidental works connected with plumbing services installation, such as excavation in trenches and backfilling. Cutting and chasing in concrete or brick and making good, cutting / drilling holes through walls, floors, and grouting for embedding of fixing of fixtures / equipment and so forth.

Furnish and install complete workable, plumbing services installation as shown on the drawings and described in this specification and as per the latest Bureau of

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Indian Standards (BIS), British Standards (BS) specifications including all that which is reasonably inferred to all the buildings, internally and externally.

Complete installation of the sewerage and sewerage appurtenances internally as well as around the building.

Complete installation of all sanitary and plumbing fixtures in all the floors of the building including basement floor.

Co-operation with other trades in putting the installation in place. Any work done without regard or consultation with other trades, shall be removed by the contractor without additional cost to the Employer, to permit proper installation of all other work, as desired by the Engineer.

Repair all damage done to the premises because of this installation and remove all debris left by those engaged for this installation to the satisfaction of Engineer.

Cleaning of all plumbing and sanitary fixtures, testing and proving the satisfactory performance of all fixtures at the time the buildings are handed over to the Employer.

It is the responsibility of the contractor to take care of all the fixtures fitted until the time of handing over to the Employer.

Painting of all concealed and exposed pipes as specified.

Wrapping and coating of all underground GI pipes.

Assume full responsibility for getting the entire installation duly approved by the authorities concerned and for all expenses in connection with the same. Assume responsibility for obtaining and delivering to the Employer certificate of final inspection and approval by the concerned authorities.

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2. SITE CONDITIONS

Temperature : Maximum 41.8°C.

Altitude : 920 mts.

3. LICENSED PLUMBER

All work performed by the contractor shall be through licensed plumbing supervisor possessing a valid plumbing contractor's license employing Engineers, Technicians, Foremen, Plumbers, Masons, Helpers, etc., as required.

REGULATIONS AND STANDARDS

IS 7558 – 1974 : Code of practice for domestic hot water installation

IS 5329 – 1983 : Code of practice for sanitary pipe work above ground for buildings.

IS 12251 – 1987 : Code of practice for drainage of building basements

Is 2064 – 1973 : Code of practice for selection, installation, and maintenance of sanitary appliances

IS 1200 (Part 1) : Method of measurement of building earthwork

IS 1200 (Part 16) : Method of measurement of laying of water and sewer lines including appurtenant

IS 1200 (Part 19) : Method of measurement of Water supply, plumbing and drains.

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IS 783 – 1959	:	Code of practice for laying of concrete pipes
IS 13592 – 1992	:	Specification for unplasticized PVC pipes for soil and waste discharge system inside building including ventilation and rainwater.
IS 2527 – 1984	:	Code of practice for fixing rainwater gutters and down pipes for roof drainage.
IS 2685 – 1971	:	Code of practice for selection, installation, and maintenance of sluice valves.
IS 6784 – 1984	:	Method of performance testing of water meters (Domestic type).
IS 458 – 1988	:	Specification for precast concrete pipes (with or without reinforcement)
IS 2692 – 1989	:	Specification of ferrules for water services
IS 12701 – 1989	:	Specification for rotational moulded polyethylene water storage tanks.
IS 771 – (Part 3 to 6)	:	Specific requirements for urinals.
IS 2548 (Part 1&2)	:	Specification for plastic seats and covers for water closets.
IS 3004 – 1979	:	Specification for plug cocks for water supply purposes.

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IS 1711 – 1984	:	Specification for self-closing taps for water supply
IS 1703 – 1977	:	Specification for ball valves (Horizontal plunger type) including floats for water supply purposes.
IS 4038 – 1979	:	Specification for foot valves for water works purposes.
IS 1172 – 1983	:	Code of basic requirements for water supply, drainage & sanitation (revised).
IS 1239 – 1990 (Part I)	:	Specifications for mild steel tube, tubular and other steel pipe fittings.
IS 1239 – 1992 (Part II)	:	Specifications for mild steel tube, tubular and other steel pipe fittings.
IS 1726 – 1991	:	Code for cast iron manhole frame and cover (third revision).
IS 1742 – 1983	:	Code of practice for building drainage. (Second revision)
IS 2064 – 1973	:	Code of practice for selection, installation, and maintenance of sanitary appliances.
IS 2065 – 1983	:	Code of practice for water supply to buildings.
IS 4111 – 1986	:	Code of practice for Ancillary structures in sewerage system

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IS 4127 – 1983 : Code of Practice for laying glazed stoneware pipe.

BS 4515 : Specification for unplasticized PVC pipefittings.

IS 4985 – 1988 : Specification for unplasticized PVC pipes for portable water supplies (second revision)

IS 732 & IS 2274 -1963 : Indian Standard code of practice for electrical wiring & installation.

ASTM –D2846 : CPVC Hot and cold water distribution

ASTM – F493 : CPVC Solvent cement specifications

ASTM – F402 : Handling cement solvents

ASTM – F442 : CPVC Plastic pipe (SDR-PR)

ASTM – F437 : Threaded CPVC fittings Schedule 80

ASTM – F438 : CPVC Schedule 40 CPVC fittings

ASTM – F439 : CPVC Schedule 80 CPVC fittings

ASTM – F441 : CPVC Schedule 40 & 80 pipe

ASTM – D1784 : CPVC Compounds

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ISO – 727 : Dimensions of CPVC sockets

The installation shall conform in all respects to the following standards in general:

National building Code for Water Supply, drainage, and Sanitation. Part IX Plumbing services section 1 and 2.

The installation shall also be in conformity with the bylaws and requirements of the local authority in so far as these become applicable to the installation. Wherever this specification calls for, a higher standard of materials and / or workmanship than those required by any of the above regulations and standards, then this specification shall take precedence over the said regulations and standards.

Wherever drawings and specifications require something that may conflict with the regulations, the regulations shall govern. This shall be referred to the Engineer for arbitration.

4. EXECUTION OF WORK

The work shall be carried out in conformity with the water supply and sanitary drawings and within the requirements of architectural, Structural, Fire, HVAC, Electrical, and other specialized services drawings.

The contractor shall co-operate with all trades and agencies working on the site. He shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up or progress of the construction programme. Any work done without regard (or) consultation with other trades, shall be removed and rectified by the contractor without additional cost to the Employer.

On award of the work, contractor shall submit a construction programme in the form of a PERT chart or Bar chart for approval of the Engineer. All dates and time

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schedule agreed upon shall be strictly adhered to, within the stipulated time of completion/commissioning.

The contractor shall furnish and install a complete working, plumbing services installation as per approved drawings and as per the latest BIS codes of practice.

Execution of work by the contractor includes complete installation of internal & external water supply system, sewerage and sewerage appurtenances internally as well as around the building, controllers, valves and power control wiring for controller etc. complete installation of all sanitary and plumbing fixtures.

It is the responsibility of the contractor to protect all the installed fixtures and fittings until the time of handing over to the EMPLOYER.

The Contractor shall set out the drainage, soil, waste and water pipelines and other fittings and fixtures in accordance with the Drawings and instructions of the Engineer. The contractor shall be responsible for the correctness of the above and any incorrectness shall be rectified at his own cost. He will be responsible for taking levels at site before setting out and putting them on record without extra charge.

The contractor shall always provide during the progress of the works and during maintenance period proper facilities and necessary attendance for inspection or measurement of the works by the Engineer or their representatives.

5. FEES, PERMITS AND NOTICES

Contractor shall comply with all bye laws and regulations of local and other statutory authorities having jurisdiction over the works and shall be responsible for the payment of all fees and other charges and giving and receiving of all necessary notices. Contractor shall keep the Engineer timely informed about regulations and requirements of statutory authorities and shall obtain the final certificates of inspection and approval from the authorities.

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6. DRAWINGS & SPECIFICATIONS

The drawings and specifications shall be considered as part of this contract and any work or materials shown on the drawings and not called for in the specifications or vice versa shall be executed as if specifically called for in both. Contractor shall be responsible for getting authorities approval on both design and shop drawings.

The tender drawings indicate the extent and general arrangement of the fixtures, drainage system etc., and are essentially diagrammatic. The tender drawings indicate the points of supply and termination of work and broadly suggest the routes to be followed. The works shall be executed as indicated on the drawings. However, any changes found essential to co-ordinate with this work and other trades shall be made without any additional cost. The drawings and specifications are meant for the assistance and guidance of the contractor, and exact location, distance and levels will be governed by the building and site conditions. Therefore, approval of the Engineer shall be obtained before commencement of work.

7. SHOP DRAWINGS

The contractor shall submit to the EMPLOYER NINE copies of the shop drawings. Shop drawings shall be submitted as follows.

- Drawings showing any change in layout in the contract drawings.
- Floor plans, enlarged toilet details, schematic showing water supply and sanitary installation works.
- Manufacturers or Contractor's fabrication drawings for any materials or equipment.
- The contractor shall submit four copies of catalogues, manufacturer's drawings, equipment characteristic data or performance charts as required by the EMPLOYER.

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8. AS BUILT DRAWINGS

On completion of works, the Contractor shall submit one complete set of original tracings and SIX prints of “As built” drawings to the EMPLOYER. He shall also submit all drawings / information in AutoCAD latest version. These drawings shall have the following information:

- Exact run and sizes of all piping on all floors and vertical stacks.
- Ground and invert levels of all drainage pipes together with location of all manholes and connections up to outfall.
- Run of all water supply lines with diameters, location of control valves, access panels.
- Location of all mechanical equipment with layout and piping connections.
- Contractor shall provide four sets of product catalogues, performance data and list of spare parts together with the name and address of the manufacturer for all electrical and mechanical equipment provided by him.
- All “Warranty Cards” given by the manufacturers shall be handed over to the Engineer.
- Four sets of Operation and maintenance manuals in the desired format shall be handed over to the Employer.

9. MANUFACTURER’S INSTRUCTION

Where manufacturers have furnished specific instructions relating to the materials used in this job and methods of construction that are not specifically mentioned in these documents, such instructions shall be followed in all cases. The contractor shall also furnish detailed instruction and operation manuals in triplicate including detailed completion drawings on a tracing paper to an approved scale. Further it is the responsibility of the contractor to train the EMPLOYER's personnel in the operation and maintenance of the system.

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1. MATERIALS

Materials shall be of approved make and quality specified. They shall conform to the respective Bureau of Indian Standards, British Standards Specifications and supported by Manufacturing Certificate / test certificate.

Samples of all materials shall be as per the first choice of the list of approved brand manufacture, the sample of which shall be approved by the Engineer before placing the order.

In any case of non-availability of materials in metric sizes, the nearest size of FPS units shall be provided with prior approval of the Engineer at no extra cost to the Employer.

Colour code shall be used to identify pipe material. The CONTRACTOR shall be able to identify on request all random piping prior to any field installation.

As far as possible materials bearing I.S. certification marks shall be used with the approval of the Engineer.

Unless otherwise specified and expressly approved in writing by the Engineer, materials of makes and specifications mentioned in this document/BOQ shall be used.

The CONTRACTOR shall furnish two (2) copies of certificates for piping for –
Dimensions and Hydrostatic test

Samples of all materials shall be got approved before placing order and the approved samples shall be deposited with the Engineer.

If directed, materials shall be tested in an approved testing laboratory and the contractor shall produce the test certificate in original to the Engineer and the entire charges for original as well as repeated tests shall be borne by the Contractor. If required by the Engineer, the Contractor shall arrange to test portions of the work at his own cost to prove their soundness and efficiency. If after any such test the work or portions of work is found in the opinion of the Engineer, to be defective or unsound, the Contractor shall pull down and re-do the same at his own cost. Defective materials shall be removed from site.

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It shall be obligatory for the Contractor to furnish certificates if demanded by the Engineer from manufactures or materials suppliers, that the work has been carried out by using their material and installed/fixed as per their recommendations.

2. CEMENT

Cement required, for the plumbing work shall be supplied to the Contractor through the Civil Contractors. However, the contractor will have to make his own arrangement to lift the cement from the go-down to the site. Cost of cement issued will be recovered from contractor.

Cement shall be stored in weatherproof shed with raised wooden plank flooring to prevent deterioration by dampness or intrusion by foreign matter.

3. SAND

Sand shall be clean, shells, free from silt, clay, loam, shells, and vegetable matter and be as approved by the Engineer.

4. COARSE AGGREGATE

Shall be angular, tough, and sharp and well graded stone metal, Basalt from approved source.

5. BRICKS

Bricks shall be local best quality obtainable and shall be table moulded. Well burnt, but not over burnt and shall be free from cracks, chips, flaws, and stones. It shall not absorb water more than 20% of its own weight when dry. The crushing strength of bricks shall not be less than 35 kg./sq.cm.

6. CEMENT CONCRETE

P.C.C shall be of the proportion specified in the item in the schedule of quantities. Sand and Metal shall be measured in suitable measuring boxes and correct quantity of cement shall be added. The materials shall be mixed dry on a clean platform. Clean water is then added and mixed thoroughly. It shall be prepared in such quantity as can be readily used up. P.C.C which has partially set shall under no circumstances be used and shall be removed away from the site.

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7. REINFORCED STEEL

Reinforced steel shall be ribbed to steel. Steel required for plumbing work shall be supplied to the Contractor Free of Cost' through Civil Contractor. However, the Contractor shall make his own arrangements to lift the steel from the go-down to the site.

8. WATERPROOF

Both sides of the chamber / manholes / gully traps must be waterproofed with FOSROC water proofing material

10. CONTRACTOR RATES

The rates quoted by the contractor shall be inclusive of cost of materials, accessories, labour, supervision, erection, tools, tackles, plant, scaffolding, pipe hangers, supports, clamps, brackets, service connection, transport to site, storing at site, taxes, octroi and levies, breakage, wastage and all such expenses as may be necessary and required for complete installation of all the items of work as described in the specifications, drawings and to the satisfaction of the Engineer.

The rates quoted are for all heights and depths as required for the work.

All rates quoted shall be for complete items inclusive of all the required accessories, fixtures and fixing arrangements, nuts, bolts, hangers, supports etc. are part of the item except where specifically mentioned otherwise.

All rates quoted are inclusive of making holes and chases in walls and floors and making good the same with cement mortar/concrete of appropriate mix and strength as directed by the Engineer. Contractor shall provide necessary holes, sleeves, puddle flanges, recesses parallel in the concrete and masonry work as the work proceeds.

The quoted rates shall be inclusive of cost incurred in testing, erection and commissioning of works and materials.

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The contractor shall have full responsibility for all required liaison work including getting the sanction letter from the concerned authority for getting the service connections. The statutory charges will be paid by the Employer.

The contractor shall furnish the Engineer with voucher on request to prove that the materials are as specified and to indicate the rates at which the materials are purchased to work out the rate analysis for the non-tendered items, which he may be called upon to carryout.

11. PIPE HANGERS, SUPPORTS, CLAMPS, BRACKETS ETC.

GENERAL:

Provided proper solid angle iron/channel section, supports for all pipes complete with clamps. Wherever comes, provided wooden guide to support pipe on the angle iron hangers/supports. For attachment in concrete, use Hi-Tech fasteners or anchor plug type inserts of equipment. Provide hangers within 900 mm of all changes in direction of pipes. A minimum of three hangers per expansion band wherever shown in drawing.

Provided all additional structural steel angles, channels of the members whether specifically shown or not but are required for proper support.

Where necessary additional hangers to be provided to arrest water hammers or hydraulic resonance with proper rubber padding.

Space hangers as noted below, except on all soil pipes which shall have a hanger of multiple fittings.

Sufficient hangers shall be provided to maintain proper slope without sagging. In case of angle suspended line, the following is suggested.

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Standard sizes of Hanger rods

Sl. No	Pipe Sizes	Hanger Rod Dia.
1	20 through 50 mm	6 mm
2	65 through 125 mm	10 mm
3	150 and above	15 mm

Sl. No	Pipe size	Spacing of supports
1	12 to 40 mm	1.0 m apart
2	50 and above	1.5 m apart or as per IS

Provide floor stands, wall brackets of masonry pillars etc. for all lines running near the floor or near walls for those lines which cannot be properly supported or suspended from the walls or floors. Pipelines near concrete or masonry walls may be hung also by hangers carried from wall brackets at a higher level than pipes. Hanging of any pipe from another pipe is prohibited.

Band type hangers shall be provided. Hot water piping is to be provided with suspended supports as far as possible. Note that straphangers are not permitted, and clamps should be of removable type.

All vertical pipes shall be fixed by M.S. galvanised Clamps truly vertical.

Inclined pipes running along ceiling shall be fixed on M.S adjustable hangers of special design as directed. Pipes shall be laid to uniform slope and the hangers adjusted to the proper levels so that the pipes fully rest on them.

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Structural clamps shall be fabricated from M.S. structural members e.g., rods, angles, channels, flats as per detailed drawing or as directed. Contractor shall provide all nuts, bolts, welding and paint the clamps with two coats of zinc chromate primer and two coats of approved enamel paint. Wooden saddles shall be provided free of cost.

Slotted angle/channel supports on walls shall be provided wherever shown on drawings or as required. Angles/channels shall be fixed to brick walls and bolts embedded in cement concrete blocks and to RCC walls with suitable anchor fasteners. Holes required in RCC walls shall be neatly drilled by electric drills and no manual chiselling will be allowed. The spacing of supports horizontally shall not exceed 1.8 M.

Wherever M.S. clamps are required to be anchored directly to brick walls, concrete slabs, beams or columns, nothing extra shall be payable for clamping arrangement and for making good with cement concrete 1:2:4 as directed by the Engineer.

12. CORE CUTTING.

Wherever required to run the water supply pipes and sanitary pipes in RCC slabs/ beams/retaining walls/masonry walls, the core cutting shall be done by the contractor at his own cost using core-cutting machine. Manual breaking of holes in the RCC structure shall be not allowed. Contractor to mark the positions of core cutting at site and get the approval from the Engineer before cutting the holes

13. INSERTS AND SLEEVES.

Layout work in advance of placing of concrete slabs or construction of walls, furnish and set inserts and sleeves necessary to complete the work. Cost of cutting or patching made necessary because of this operation shall be at no expense to the Employer Opening shall be as per structural Engineers approval.

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14. CLEANTOUT PLUGS.

Cleanout plugs at the head of horizontal pipes under the floor, ceiling level, on floor and vertical pipes on wall/pipe shaft, cleanout on paved area including CI frame and cover shall be provided as per the standard drawings and as per the instructions of the Engineer. The cost of supply and installation of cleanout plug, CI frame, cover etc, shall not be paid separately and the same shall be measured as part of the piping item.

Internal toilet floor and wall cleanouts shall be fitted with brass cleanout cover and screwed cap. The cost of supply and installation of brass items for floor and wall cleanout shall be paid as per the bill of quantities.

15. SITE FACILITIES.

An open area shall be made on the plot to enable the contractor to put up the site office and store at his own cost.

Water supply will be provided by EMPLOYER at one point during the construction period and the necessary piping shall be done by the contractor to the required point at his own cost.

Electric power supply will be provided at by the EMPLOYER at one point. The contractor can use the electricity on chargeable basis by providing an energy meter at his own cost

16. SITE CLEARANCE & CLEANUP.

The contractor shall, from time to time clear away all the debris and excess materials accumulated at site.

After the equipment and appliances have been installed and commissioned, contractor shall clear-up the same and remove all plaster, paint stains, stickers and other foreign matter of discolouration leaving the same in a ready to use condition.

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On completion of all the works, contractor shall demolish all the temporary structures, remove all surplus material on written permission of the Engineer, and leave the site in a room clean condition.

17. CUTTING AND MAKING GOOD.

Structural member shall not be chased or cut without the written permission of the Engineer.

Any tiles or finished surfaces or floors damaged by the contractor while doing his work shall be made good with new tiles or other finishing material as approved by the Engineer at his own cost.

In case the plumbing contractor fails to get the work done to the satisfaction of the Engineer, the same shall be repaired by other agencies and debit the cost of such repair to the plumbing contractor.

18. RECOVERY OF COST OF MATERIALS DAMAGED BY THE CONTRACTOR, ISSUED FREE OF COST TO THEM

If any materials issued to the contractor at free of cost by the EMPLOYER, is damaged or pilfered. The cost of the same shall be recovered from the contractor based on actual cost to the Employer, which shall include basic cost of material and all freight and transportation, excise duty, sales tax, octroi, import duty etc. The derivation of the actual cost given by the Employer shall be final and binding on the contractor.

19. ANNUAL MAINTAINANCE CONTRACT

Annual maintenance contract requirement after the defect liability period (DLP) is detailed elsewhere in the specification. This requirement shall be included.

The entire scope of plumbing and sanitary work as described in this specification should preferably be executed by one of the firms well established and proven in

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the field of design and installation of plumbing and sanitary systems to be approved by the Consultant.

20. TAKING OVER CERTIFICATE

As soon as the Works have been completed in accordance with the Contract and have passed the tests on completion, the Consulting ENGINEER will issue a provisional certificate (hereinafter called the provisional Taking over Certificate) in which he shall certify the date on which the Works have been successfully commissioned.

21. MAKE OF MATERIAL

For the entire plumbing and sanitary system TENDERERS are required to offer only the 'Brand' Make / as indicated in the specification of to ensure fair evaluation of proposal. It is to be noted by the contractor that materials / equipment, for which brand / make has not been specified, the contractor shall use only reputed makes. The contractor shall submit a list of such brands / makes to the engineer along with his offer for approval.

22. GUARANTEE

The contractor shall guarantee for the materials, equipment's and accessories supplied by him against the manufacturing defects, malfunctioning or under capacity, functioning and workmanship of first-class quality corresponding to standard engineering practice. Any defective materials / workmanship shall be rejected; the contractor must rectify / replace at his own cost. Guarantee certificate of the materials supplied shall be handed over to the Employer.

The warranty period shall be valid for a period of one year from the date of commissioning and handing over.