

SECTION-1

General Requirements of Plumbing Works

1. Scope of Work:

The work covered under this section consists of **Supply & Installation** of all materials and equipments and performing all the work necessary for successful completion of work including testing and commissioning of complete Plumbing systems as shown on the Drawings. Works to be executed are as follows:

- (i) Cold & Hot Water Supply System.
- (ii) Soil & Waste Water System.
- (iii) Natural Gas Supply System

Each of the above listed system shall be completed in every respects including connection of these internal systems with external systems (External Cold & Hot Water Supply, Sewerage & Gas) are not included in this scope of works and all services like cold water hot water soil waste and Fire Fighting pipes should be connected to main (Cold/Hot water, Soil & Waste, etc) services as per site conditions or as specified and shown on drawings, specified in specifications and Bill Of Quantity.

2. General:

The Tender Specifications and Drawings make reference to certain Standard Specifications and also to certain manufacturers and equipment Model Numbers. The object of these references is to ensure that the equipment and materials offered by the Tenderers and supplied by the Contractor are in accordance with the required standard of quality, workmanship and capacities, etc. The object is not to limit the selection of equipment to a particular manufacturer unless specifically mentioned in the tender documents that a particular equipment or material is to be supplied.

It is clarified that the equipment and the materials comply with various U.S. standards, BSS, DIN and VDE and of manufacturers other than mentioned in the tender documents shall be acceptable provided they meet the required capacities as specified and meet the intent of the specifications regarding quality and workmanship. In case there is any deviation between any item or material offered by the Tenderer from The Tender Specifications and Drawings, the Tenderer shall clearly draw attention to all such deviations and **No Such Item or Material** shall be supplied by the Contractor without prior written approval of the Consultants

These Specifications and accompanying Drawings are to be considered as supplementing each other and as such are intended to serve jointly as the basis upon which the Contractor shall establish a Contract Price, and upon which he shall base the performance of the required work.

It is the intent of these Specifications and Drawings to call for finished work, tested, complete, and ready for operation.

The work throughout shall be executed in the best and most thorough manner, under the direction of, and to the satisfaction of the Engineer, who will interpret the meaning of the drawings and specifications and shall have the power to reject any work and materials which in this judgement, are not in full accordance therewith.

Except for such changes as may be specifically approved by the Engineer, in accordance with alternates or options stated hereinafter, all work must be in full accordance with the intent of the plans and specifications, complete in every way and ready for satisfactory and efficient operation when delivered to the Employer.

If any item/speciality available best in the make is not in accordance with the specifications and/or as shown in the drawings, it is the responsibility of the contractor to import or manufacture it locally as per the requirements and standards.

The Contractor shall thoroughly acquaint himself with the work involved, and must verify at the building all measurements necessary for the proper installation of his work.

It is specifically intended, and must be agreed to by each Contractor submitting a bid under this specifications that anything (whether material or labour) which is usually furnished as a part of such equipment (and which is necessary for its proper completion and best operation), shall be furnished as a part of this Contract without additional cost, whether or not shown in the Specifications. This provision is in consideration of the fact that in many cases, the use of apparatus of different makes may be considered, which differs in detail from that described (although intended to fulfil the same function).

Certain equipment such as pumps, starters, motors valves etc., shall preferably be of the same make. Where the same type of equipment is used in the building this equipment must be of one manufacturer.

All special tools for proper operation and maintenance of the equipment provided under this Contract shall be delivered at no additional cost.

The Contractor shall allow in his bid for cost of all cutting, making holes and subsequent making it good of the desired finish as per approval of the Engineer. No separate payment shall be made for this item.

The Contractor shall allow in his bid for cost of providing protective painting or coating as specified in the relevant section and no claim shall be entertained for this item.

All pipes shall be properly installed as shown on the drawings and/or as directed by the Engineer, and shall be as straight as possible forming right angles and parallel lines with the walls and other pipes lines. The position, gradients, true alignment and inverts shall be as shown on the drawings and/or as directed in writing and set out by the Engineer.

The arrangement, positions, and connections of pipe fittings and appurtenances shall be as shown on the drawings but the Engineer reserves the right to change the location etc. Special precautions shall be taken for the installation of the concealed pipes as shown on the drawings and/or as required. Should it be necessary to correct piping so installed, the Contractor shall be held liable for any injury caused to other works in the correction of piping.

3. Codes, Permits and Inspection:

All work shall meet or exceed the latest requirements of all authorities exercising jurisdiction over construction work at the project Site.

All required permits and inspection certificates shall be obtained, paid for, and made available at the time of completion of the Works.

All plumbing work shall be carried out in accordance with the Uniform Plumbing Code (UPC) and the Installation of the Fire Protection System shall be in accordance with BS standards or NFPA Code.

4. Interpretation of the Drawings and Specifications:

Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the drawings or specifications or both, carries with it the instructions to furnish and install the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.

It shall be understood that the specifications and drawings are complimentary and are to be taken together for a complete interpretation of the work. Exceptions are that notes on the drawings, which refer to an individual element of work that takes precedence over the Specifications where they conflict with the same.

No exclusions from, or limitations, in the language used in the Drawings or Specifications shall be interpreted as meaning that the appurtenances or accessories necessary to complete any required system or item of equipment are omitted.

The necessary Drawings utilize symbols and schematic diagrams to indicate various items of work. Neither of these have any dimensional significance nor do they delineate every item required for the intended installations. The work shall be installed in accordance with the diagrammatic intent expressed on the electrical and mechanical drawings, and in conformity with the dimensions indicated on final Architectural and Structural working Drawings and on equipment shop drawings.

No interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for complete work are excluded.

Certain details appear on the Drawings which are specific with regard to the dimensions and positioning of the work. These details are intended only for the purpose of establishing general feasibility. They do not obviate field co-ordination for the indicated work.

Information as to the general construction not evident in this specifications and drawings shall be derived from structural and architectural drawings and specifications.

5. As Built Drawings by the Contractor:

The Contractor shall keep a complete record of all piping and accessories installed within the building, and shall mark any deviations adopted on the **Shop Drawings**.

After the completion of the project, the Contractor shall transfer all the relevant record on the shop drawings and submit 3 copies for approval to the Consultants.

After receipt of approval the Contractor shall submit six copies each of the Approved "As Built" and one copy of Reproducible tracings shall be intact and on imported reproducible paper to the satisfaction of the Consultant. Alternately original tracings on good quality tracing paper shall be acceptable.

6. Approval for Material and Equipment:

General: All the general and equipment shall be of the specificity's mentioned herein and the Contractor shall submit the sample, necessary catalogues, sketches, the name of manufacturer and guarantee if necessary, before installation and shall be installed after the **CONSULTANT** approves it. All material and equipment shall be new and unused.

Approval of material and equipment by the **CONSULTANT** shall not absolve the Contractor of this responsibility of furnishing the same of proper size, quantity, quality all performance characteristics to efficiently perform the requirements and intent of the Contract Documents.

Approval of Imported / Local Equipment: For approval of all equipment, the Contractor shall be required to submit, within two weeks of the signing of the Contract, detailed submittals stating the equipment proposed to be supplied and providing supporting Literature/Brochures etc., to enable the **CONSULTANT** to check conformance to the specifications. Performance curves and charts shall be submitted with the operating points clearly marked. All equipment submittals shall be accompanied with a certificate stating that the equipment proposed to be supplied fit into the space allocated for it with sufficient clearance around it to allow for installation of related ducting, piping etc., and provides for maintenance clearance as required by the manufacturer of the equipment, and that all special requirements of the equipment have been accounted for.

Any additional information, test reports etc., required by the Engineer shall be furnished by the Contractor. All work related to the equipment shall only be commenced after receipt of written approval from the Engineer.

Approval of Imported/Local Material: All Imported/Local material to be used in the works shall be submitted to the **CONSULTANT** and approval obtained. Manufacturers literature/brochure etc., that provide complete information on the material specifications, to enable the Engineer to check conformance to specifications, shall be submitted. If manufacturer's literature is not available, a sample of the material shall be submitted along with type written notes indicating relevant source data and specification on the material. Any other samples, information, test reports etc., required by the **CONSULTANT** shall be submitted. Any additional information test reports etc., required by the **CONSULTANT** shall be supplied by the Contractor.

7. Cleaning and Protection:

The Contractor shall be responsible for his work until its completion and final acceptance and shall replace any of the same which may be damaged, lost or stolen; without any additional cost to the Employer.

All openings left in floor for passage of lines of soil, drain, waste, vent, and supply pipes shall be covered and protected. All set traps shall be sealed with oil or molasses. Due precautions shall be taken against freezing during Cold Weather. All open ends of pipes shall be closed by a plug fitting to prevent obstruction and damage.

The use of new permanent water closets and other new plumbing fixtures during the progress of the work is prohibited.

As soon as is installed, all metal fixtures and trimmings shall be thoroughly covered by the Contractor with noncorrosive grease which shall be maintained until all construction work is completed.

Upon the completion of the work, all fixtures and trimmings shall be thoroughly cleaned and polished and left in first class condition.

Prior to delivering the works to the Employer the Contractor shall thoroughly clean all equipment fixtures, fittings etc.

Before final connections are made and before operation of equipment and piping, all piping interior and exterior shall be thoroughly blown out, rod out, or washed out at least twice in a manner as directed and/or approved by the Engineer, to remove all accumulation of dirt, chips or other deleterious material. The Contractor shall make all temporary connections and furnish all appliances required for the purpose of cleaning at no extra expense to the Employer.

Before erection, all pipes, tubing, valves and fittings shall be thoroughly cleaned of oil, grease or other combustible materials by washing in a hot solution of sodium carbonate or tri-sodium phosphate mixed in the proportions of one pound to three gallons of water.

Scrubbing and continuous agitation of the parts shall be employed where necessary to remove all deposits and ensure complete cleaning. After washing, all materials shall be rinsed thoroughly with clean hot water.

After cleaning, great care must be exercised in the storage and handling of all materials and in the conditions of tools used in cutting and reaming to prevent oil or grease being introduced into the tubing. Where such contamination is known to have occurred the materials affected must be re-washed and rinsed.

8. Painting, Coating and Stencilling:

General: Painting shall include furnishing labour, materials equipment, ladders, scaffolding, protective covers, other items required to prepare and finish surfaces of work specified herein or in any of the other sections. Paint colour scheme shall be specified at the time of painting or earlier and shall be based on American Standard "Scheme for Identification of Piping System" ASA A-13.1 of 1975.

Surface Preparation:

- (a) Surface to be painted shall be dry and free from burrs, weld spatter, dirt, dust, rust, loose mill scale, grease, oil and other foreign matter before any paint is applied.
- (b) All rust and loose mill scale etc., shall be removed by thoroughly chipping, scraping and wire brushing. Oil, grease, dust etc., shall be removed by washing down with a suitable solvent, as recommended by the paint manufacturer, and wiping with clean rags.

- (c) All tools shall be used in such a manner so as not to leave rough or sharp surfaces. No cuts shall be made on steel surfaces.
- (d) Before applying the finish coat the primed surface shall be scuffed lightly with sandpaper recommended by the paint manufacturer.

Applications:

- (a) All material shall be applied in strict accordance with the paint manufacturer's directions unless otherwise specified.
- (b) Paint shall be applied by brush, spray or any other paint manufacturers approved method in such a manner that a uniform thickness (as per manufacturer's recommendation) is maintained in each coat and no defects are produced in the previous coats.
- (c) Each coat shall preferably be of different colour so as to produce a contrast assuring complete covering by the next coat. Sufficient time shall be allowed between coats to permit drying. A minimum of 24 hours between application on any one surface shall be allowed unless otherwise specified by the manufacturer.
- (d) No painting work shall be done on exterior surfaces during rainy, damp, foggy or dust weather and no painting material shall be applied if the temperature is above 50 C or below 5 C. Painting work shall be avoided in cases where the surface is damp or blowing winds. The Engineer shall determine whether the conditions are suitable for painting or not.
- (e) The primer coat of paint shall be applied as soon as possible after the surface preparation but, in any case, on the same day.
- (f) Before application of painting material, the Employer representative shall inspect and approve the quality of surface preparation and the preparation of painting material.

Paint System

- (a) Materials and Equipment: All materials and equipment factory fabricated, imported or otherwise shall be provided with a fresh coat of paint, of same colour as the original factory paint, if in the opinion of the Engineer the same has deteriorated to an extent to require fresh painting. Paint shall be applied as per the accepted norms and as directed by the Engineer.

Uninsulated Surfaces: including piping valves, and fittings shall be painted with two coats of primer followed by the two coats of enamel paint.

- (c) Insulated Surfaces shall be painted with one coat of primer and one coat of enamel paint.
- (d) Underground Galvanised Iron or Black Steel Piping: or piping concealed in wall chase and concrete, shall be wrapped with approved polyethylene anticorrosive tape, also refer section 4 para 11 for underground piping protection.
- (e) Extent of Painting on Pipes: All exposed interior utility piping and all piping readily serviceable in walk-in utility spaces, and in serviceable spaces, shall be painted as noted above and specified herein.

Paint:

- (a) Primer for Iron Surfaces: shall be "KROMIC" steel protective primer as manufactured by Johnson & Nicholson or equivalent.
- (b) Primer for Galvanised Surfaces: shall "KROMIC" galvanised Iron Primer as manufactured by Johnson & Nicholson or equivalent.
- (c) Finishing Paint: shall be generally enamel paint, unless the application requires special paint, in which case suitable special paint manufactured by Johnson & Nicholson shall be used or equivalent.

Stencilling:

- (a) Piping: The Contractor shall attach a sheet metal label near each valve on the pipe, indicating the name of the fluid. Also an arrow should be painted next to the legend indicating the direction of flow in pipe. The legend shall be placed in a location so that it can be easily read from the floor. The legend shall conform in size of letters and colour to ASA A-13.1 of 1975, "Scheme for the Identification of piping system".
- (b) Equipment: All equipment shall be provided with rating shields to be fixed at a suitable external location of the equipment. Rating shields shall be of laminated plastic of suitable size with the ratings painted on. The shields shall generally display the following data:
 - (i) Fluid Flow Rates.
 - (ii) Pressures, Pressure Drops.
 - (iii) Capacities.
 - (iv) Motor Data.

Laminated Plastic shall have white core with black outer layers, which when engraved will produce white letters and/or numerals on a black background.

Identification Tags: shall be installed on all Valves, controls, and other parts of the system. Tags shall be of laminated engraved plastic 50mm round or square with letters or numbers 12mm high and fastened securely with brass "S" hooks or chains indicating system, pressure & diameter of valve.

The Contractor shall further provide charts, diagrams, of size and type as approved designated numbers, service or function and location of each tagged item.

9. Cutting and Patching:

Cutting will be done under Specifications of Other trades. This Contractor is called upon to set openings and sleeves for pipes accurately before the concrete floors are poured or may set boxes on the forms so as to leave openings in the floors in which the required sleeves can be subsequently located in which case he is called upon to fill in the concrete voids around the sleeves, water tight.

All patching will be done under Specifications of other trades. Should the Contractor neglect to perform his preliminary work and should cuttings be required in order to install the piping or equipment, then the expense of the cutting and restoring of surface to their original condition shall be borne by the Contractor.

10. Operating and Maintenance Instructions:

Three sets of operating and maintenance instructions covering completely, the operation and maintenance of all plumbing equipment, pumps and the like shall be furnished to the Employer. Three sets of lubricating charts and manuals for each item of equipment shall be furnished to the Employer.

11. Standards Abbreviations:

NFPA	-	National Fire Protection Association.
ASA	-	American Standards Association.
ANSI	-	American National Standards Institute.
IEC	-	International Electrotechnical Commission.
ASTM	-	American Society for Testing Material.
DIN	-	Deutsche Institute for Normung.
BSS	-	British Standards Specification.