TECHNICAL SPECIFICATIONS
(PLUMBING & SANITARY WORKS FOR Agriculture training cneter in Anbar)

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TECHNICAL SPECIFICATIONS
(PLUMBING & SANITARY WORKS)

1. GENERAL

(a) All fixtures shall be free from imperfections, true as to line, angles, curves and colors, smooth, water tight and complete in every respect.

(b) All fixtures specified to be of vitreous ware, shall be fired According to Vitreous China method ware of the best quality, non-absorbent and burned so that the whole mass is thoroughly fused and vitrified producing a material white or colored, which when manufactured will show a homogeneous mass, close drained and free from pores. The glazing and vitreous china fixtures shall be of color approved by the ARCHITECT / PROJECT MANAGER, thoroughly fused, and united to the body, without discoloration, ships, or flaws and shall be free from craze. Wrapped or other imperfect fixtures will not be accepted.

All plumbing fixtures proposed to be supplied shall clearly be indicated at the time of tendering, and all fixtures should be approved by the ARCHITECT / PROJECT MANAGER prior to installation at site.

(c) All fixtures shall be furnished by one and the same manufacturer unless otherwise specified.

(d) All fittings, cast brass set screws, escutcheons faucets, traps, exposed piping etc. shall be of brass, chrome plated over nickel plate with polished finished. All supports nut, etc. visible shall likewise to chrome plate over nickel plate.

(e) After insulation of plumbing accessories, the Contractor shall ensure their protection against damage, misuse and general deterioration. Fixture outlets shall be plugged with suitable material to prevent entry of external debris. All chrome plated and other metallic fittings shall be provided with a copper of grease to prevent their deterioration. All items prior to handing over must be in perfect condition in the visual and operational sense.

(f) All fixtures and accessories shall be of first quality, locally manufactured, unless otherwise indicated.

1.1 COUNTER TOP

Material	:	According to Vitreous China method
Color	:	Colored as approved.
Accessories	:	Cold water pillar cock tee stop cocks with CP flexible connection, wall flanges, cast iron wall brackets, 32mm dia. CP bottle trap, waste fittings with drain plug, dia. 32mm PVC drain pipe, all exposed fittings chromium plated.

Installation Specs	:	Seal crack between lavatory and wall using approved silicon sealant.
Selected	:	Prime quality, light colored, as approved by Consultant/ PROJECT MANAGER.

1.2 EASTERN TYPE WATER CLOSET

Material	:	According to Vitreous China method for both closet and cistern P or S traps.
Color	:	Colored as approved by the PROJECT MANAGER/ consultant.
Accessories	:	Best quality solid acrylic seal of approved color, tee stop cock, with C P brass flexible connection.
Installation	:	Use thimble when connecting W C to drain pipe.
Selected Model	:	Prime quality, light colored/as approved by Consultant/ PROJECT MANAGER.

1.3 TOILET FITTINGS

1. Lavatory hot/cold tabs Faucet valves with removable seats on 4.0 inch centers with color indexed handles, 0.5-inch male threaded inlets, couplings nuts, 3.5-inch spout, with aerator with 2½ US gpm (9.51min) flow restrictions, all chromium plated (selected model Master).

2. Lavatory Faucet valve with removable seat; 9.5-inch male threaded inlet with coupling nut, 3.5-inch spout with aerator and 2.5 gpm (9.5 Lpm) flow restriction, all chrome plated (selected model Master).

3. Tee stopcocks shall be of dia. 0.5-inch size of C P brass, colored indexed. (Selected model Master).

4. Bibcock shall be of dia. 0.5-inch C P brass color indexed. (Selected model Master).

5. Flexible pipe shall be of C P brass dia. 6mm.

6. Bottle trap shall be of C P brass, dia. 1.25 inch. (Selected model Master).

1.4 TOILET ACCESSORIES

Toilet Paper	:	C P brass / Stainless steel / Best Quality.
Soap Dish	:	C P brass / Stainless steel / Best Quality.
Towel Bar	:	C P brass / Stainless steel / Best Quality.
Cloths Hook	:	C P brass / Stainless steel / Best Quality.

1.5 INSTALLATION

a) All screws, bolts and other anchoring devices shall be of stainless steel of chrome plated brass.

b) Install toilet fixtures, fitting and accessories units in accordance with manufacturer's instructions, using fasteners, which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored with brass screws any nylon anchors as locations and at heights indicated in drawings.

c) Set accessories plumb, level, and square at locations approved, in accordance with manufacturers instructions for type of sub-strata involved.

d) Adjust toilet accessories for proper operation and verify that mechanism function smoothly. Replace damaged or defective times.

e) Remove and replace accessories which are broken, chipped, backed, abraded or damaged in other ways during construction period, including natural causes, accident and vandalism.

f) Clean and polish all exposed surfaces after removing temporary labels, and protective coatings.

2. SCOPE OF WORK

The work to be done under this section of the specifications consists of:

a) Providing all materials and labor for proper installation of pipes, pipe fittings including jointing, clamping, cleaning, painting etc. both above ground and under ground as shown on the drawing or as specified herein.
b) Providing all material and labor, equipment, appliances etc. for proper installation

3. PIPE AND FITTINGS`

Water supply cold and hot water shall be of POLYPROPYLENE OF `POLYDEX` MADE by M/S DADEX ETERNIT LTD. With their specialist fittings & accessories complete in all respects as per B.O.Q & drawings.

4. VALVES AND STAINERS

a) Gate Valves: All valves of 75mm dia and below shall be of copper, alloy confirming to BS 5154 and valve of over 3"dia and above all be cast iron confirm to BS 5150.

Valve shall be of non-rising stem and double wedge or disc type and ends may be screwed or flanged. Make: Hattersley, Overtop

b) Swing Check Valves: All valves of 75mm dia and below shall be of copper alloy confirming to BS 5154, and valve of over 3" dia and above shall be cast iron confirming to BS 5152. Make: Hattersley, Overtop

5. PIPE SUPPORTS

General:

Pipe hangers, brackets saddles, inserts, clamps and pipe rolls including rods, bolts, turn buckles, bases and protection shields shall confirm to standard recommended engineering practice. Design generally accepted as exemplifying good engineering practice, using stock or production parts, shall be utilized wherever possible chain, wire, strap or other make shift devices will not be permitted as hangers, or supports. Pipe hangers shall be capable of supporting the pipe in all conditions of operations. Hangers shall be supported with from beams, clamps, concrete inserts pins. Concrete inserts when used shall be installed in the exact location prior to the pouring of the concrete.

Nominal pipe size	! 0.5: 0.75 : 1.0 : 2.0 : 2.5 : 3.0 : 4.0 : 5.0 : 6.0 : 8.0 : 9.0 : 10.0 :
Inches (mm)	! (13): (20) :(25):(40) :(50):(65):(75): (100):(125):(150):(150):(250):
	!(13): (20) :(25):(40) :(50):(65):(75): (100):(125):(150):(150):(250):

Pipe Sleeves:

Pipes passing through concrete or masonry walls or concrete floors or roofs shall be providing with pipe sleeves fitted into place at the time of construction. Each sleeve shall extend through its respective wall, floor or roof and shall be cut flush with each surface. Sleeves shall be of such size as to provide a minimum of ¼" all around clearance between bare pipe and sleeve, or between jacket over insulation and sleeve. Sleeves in non-bearing walls, floor, or ceilings may be steel pipe, cast iron pipe or GI sheet metal 14 gauge 2.03mm with lock type longitudinal seam. Sleeves in bearing walls shall be steel or cast iron pipe. Sleeves in exterior walls and pits shall be of steel and shall have anchor flanges with the space between the pipe and the sleeve caulked watertight in concrete it shall be filled with non-shrink grout.

6. **TESTING**

The test pressure should be 150 psi and to be maintained for 4 hours.

7. **MEASUREMENT AND PAYMENT**

a) Pipes:

Measurement for pipes shall be in running length and the work to be done shall include providing and fixing of pipe, pipe fittings, jointing hangers, clamps, and brackets, sleeves, insulation, cutting and making it good, applying protection painting, coating, cleaning, testing and disinfecting etc. and the measurement will be for the full work specified herein.

Payment will be made for the actual quantity installed at the unit rate of bid per running foot length of pipe. The amount bid will be the full payment for completion of the work in all respects as specified herein.

8. SOIL AND WASTE PIPING SPECIALITIES

8.1 <u>Scope of Work</u>

The work includes in general the following:

a) Internal Soil, Wastewater, Vent.
b) External soil and waste water piping.
c) All specials shown, specified or needed.
d) Other item specified, or shown on drawings.

9. PIPING MATERIAL

a) UPVC (rubber ring) shall be manufactured by the extruded process and shall confirm to standard BS 4514, heavy duty, of the bell & spigot type. Each pipe and fitting shall be tested at the manufacturer's works and shall show no leakage, sweating or other defects. Pipes supplied shall be accompanied by a test certificate and each pipe shall be so stamped. Pipe shall be Type B

b) U.P.V.C PIPES SHALL BE USED FOR MANHOLE-TO-MANHOLE CONNECTIONS OF THE SIZES AS PER B.O.Q & DRAWINGS.

10. **PIPE SUPPORTS**

i) All soil and waste lines hung from the ceiling shall be supported at not more than 3 Ft centers for horizontal pipe and 3 Ft for vertical pipes. Provide supports at all special fittings.

11. **TESTING AND INSPECTIONS.**

a) The entire drainage and vent system and building sever shall be subjected to testing after installation to ensure a leak-proof installation under operation conditions.

All the openings in the piping system shall be tightly closed by inserting test plug so that heavy rubber gasket fits snugly all around the opening. The highest point will be left open to supply water and may be raised if necessary by temporary jointing to develop a minimum head of one pipe length of water at each section of the system. Water is filled to the point of overflow and any drop in the level of water will indicate a leak that will be found by inspection. The water level will be checked for no drop for at least 15 to 30 minutes. Stacks will be tested in section, starting from the top section and then connecting top section to next lower section.

13 SCOPE OF WORK

a) The Contractor shall provide all material and equipment and perform all the work necessary for the complete execution and completion, including testing and commissioning of all systems of the plumbing works as shown on the Plumbing drawings and general construction drawings and as specified herein and shall include the following system:

i) Cold and Hot Water Supply System
ii) Sanitary Drainage, Sewerage, vent & rain water systems.
iii) Fire Fighting systems

b) Each of the hereinbefore listed systems shall be completed in every respect including connection of these internal systems with external systems of the Fire, Gas, water supply and sewerage are included in the scope and shall be as shown on the drawings and as hereinafter specified.

c) Various U.S. Standards, BSS and DIN Standards.

14 INSTRUCTIONS TO TENDERERS

a) 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 and/or material is to be supplied.

b) It is clarified that the equipment and the materials complying with various U.S. Standards, BSS and DIN Standards, 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.

c) 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 INTERIOR DESIGNER / CONSULTANT / PROJECT MANAGER.

d) 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.

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

f) These Drawings and Specifications are presented to the Tenderer with the understanding that he is expert and is competent is the preparation of Contract Bid Price on the basis of information such as is contained in these documents, which do not include assurance as their complete accuracy and validity, in all details, and which may depend, for proper execution, upon interpretation by Representative Engineers and other Authorities, during the course of construction

g) For the above reasons, the Tenderer shall understand that his submission of an unqualified proposal commits him to perform all work expressed and implied in the Drawings and Specifications without additional compensation. He shall further understand such submission commits him without extra compensation, and within the scope of the Contract, to the following:

   i) To provide, any small items of work not specifically called for, but required to complete the intended installations.

   ii) To provide if required by the Representative Engineer, the items or arrangements of greater quantity, better quality, or higher cost in the event that a disagreement with regard to such items occurs between the drawing and specifications, or within one.

   iii) To co-ordinate his work or adjust the same so that conflicts in space do not occur with other trades involved at the project.

   iv) To co-ordinate his work or adjust the same to suit site or any other existing conditions.

15 CODES, PERMITS AND INSPECTIONS.

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

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

c) 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 Uniform Fire Codes (UFC) and NFPA/ F.P.A Codes.

16 INTERPRETATION OF THE DRAWINGS AND SPECIFICATIONS

a) Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any time, 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.

b) 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.

c) 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.

d) 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 very item required for the intended installations. The work shall be installed in accordance with the diagrammatic intent expressed on the mechanical drawings, and in conformity with the dimensions indicated on final Architectural and Structural Working Drawings and on equipment shop drawings.

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

f) 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.

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

17 SHOP DRAWINGS BY THE CONTRACTOR

a) Prior to commencement of works on Site, and at least 3 (three) weeks in advance of all the drawings being required for actual execution, the CONTRACTOR shall submit Shop Drawings in triplicate for approval to the Consultants. The Consultants shall review the drawings (i) approve the drawing or (ii) approve the drawing with comments, or (iii) disapprove the drawing with comments or, (iv) disapprove the drawings with comments for rectifications. The Contractor shall then revise the drawings and resubmit 3 copies to the PROJECT MANAGER for Approval. On a drawing being approved, the CONTRACTOR shall submit 6 copies for formal approval and distribution to relevant offices.

b) All drawings shall have plans and sections carrying sufficient details to clearly reflect the installation of the plant. All material specifications shall be provided on the drawings. All information required for preparing suitable foundation, for providing suitable access to the plant, for making openings in building structure, for co-ordination with electrical, air-conditioning and other designs etc. shall be clearly provided.

c) Installation shall not be allowed to commence unless approved shop drawings are in possession of the Contractors, for which purpose shop drawings will be submitted by the Contractor to the Consultant sufficiently in advance of actual requirements to allow for ample time in checking and approval and no claim for extension of the Contract time will be considered by reason of the Contractor's failure to submit the drawing on time.

d) Each shop drawing submitted by the CONTRACTOR shall include a certificate by the CONTRACTOR that all related conditions on site relevant to that particular installations have been checked and that no conflict exists.

e) Any expenses resulting from an error, mistake or omission in or delay in delivery of the drawings and information mentioned in Sub-Clause 1.5(b) of this Clause shall be borne by the CONTRACTOR.

f) Drawings approved shall not be departed from except on the instructions of the Consultants.

g) The approval of the, on any submitted data, working drawings, performance curves, test certificates for any items, arrangements and/or layout shall not relieve the CONTRACTOR from any responsibility regarding the performance of the Contract. Such approval shall not also relieve the CONTRACTOR from responsibility

or any error in the submitted data and drawings, brought to light at any time subsequent to any approvals.

18 AS BUILT DRAWINGS BY THE CONTRACTOR

a) 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.

b) 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 INTERIOR DESIGNER / CONSULTANT / PROJECT MANAGER.

c) After receipt of approval the CONTRACTOR shall submit six copies each of the Approved "As Built" drawing and one copy of reproducible. Reproducible tracings shall be intact and on imported reproducible paper to the satisfaction of the INTERIOR DESIGNER / CONSULTANT / PROJECT MANAGER. Alternately original tracings on good quality tracing paper shall be acceptable.

19 APPROVAL FOR MATERIAL AND EQUIPMENT

a) General: All equipment and material to be used in the works shall be subject to approval by the INTERIOR DESIGNER / CONSULTANT / PROJECT MANAGER and approval shall be obtained prior to delivery of the same on site. It is to be specifically noted that any approval given by the PROJECT MANAGER shall not relieve the CONTRACTOR of his obligations under the Contract.

b) Approval of Imported Equipment: For approval of all imported 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 PROJECT MANAGER 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 fits into the space allocated for it, with sufficient clearance around it, to allow for installation of related ducting, piping etc. and provide for maintenance clearance as required by the equipment manufacturer, and that all special requirements of the equipment have been accounted for. Any additional information, test reports etc. required by the INTERIOR DESIGNER / CONSULTANT / PROJECT MANAGER shall be furnished by the CONTRACTOR all work related to the equipment shall only be commenced after receipt of written approval from the PROJECT MANAGER.

c) Approval of Imported Material: All imported material to be used in the works shall be submitted to the PROJECT MANAGER and approval obtained.

Manufacturer's literature/brochure etc. that provide complete information on the material specifications, to enable the PROJECT MANAGER to check conformance to specification, shall be submitted. Any additional information, test reports etc. required by the PROJECT MANAGER shall be supplied by the CONTRACTOR. The procedure shall be the same as specified in clause 1.7(b) above.

d) Approval of Locally Procured Material: All locally procured material shall be submitted to the PROJECT MANAGER for approval, and approval obtained prior to delivery of the same on site. The procedure for obtaining approval shall generally be the same as given in clause 1.7(b), except that where manufacturer's literature is not available, a sample of the material shall be submitted along with type written notes indicating relevant source data and specifications on the material. Any other samples information, test reports, etc. required by the ARCHITECT / CONSULTNAT shall be submitted.

20 CUTTING AND PATCHING

Cutting will be done under Specifications of other trades. This CONTRACTOR is called upon to set opening 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.

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 conditions shall be borne by the CONTRACTOR.

21 CLEANING AND PROTECTION

a) 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.

b) 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. 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.

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

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

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

f) 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 lease twice in a manner as directed and/or approved by the Engineer, to remove all accumulation of dirt, chips make all temporary connections and furnish all appliances required for the purpose of cleaning at no extra expenses to the Employer.

g) 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.

h) 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.

i) 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 in the materials affected must be re-washed and rinsed.

22 PAINTING, COATING AND STENCILING

General:

Painting shall include furnishing labor, materials equipment, ladders, scaffolding, protective covers, other items required to prepare and finish surface of work specified herein or in any of the other sections. Paint color 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 to 1973.

Surface Preparation

a) Surfaces 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, scrapping 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 surface.

d) Before applying the finish coat the primed surface shall be scuffed lightly with sand paper recommended by the paint manufacturer.

Applications:

a) All materials 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 color so as to produce a contacts assuring complete covering by the next coat. Sufficient time shall be allowed between coats to permit drying. A minimum of 24 hours between applications 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 materials, the Employer representative shall inspect and approve the quality of surface preparation and the preparation of painting material.

Paint System:

a) Material and Equipment: All materials and equipment factory fabricated, imported or otherwise shall be provided with a fresh coat of paint, of same color 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.

b) Uninsulated Surface: Including piping, valves, and fittings shall be painted with two coats 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 Galvanized Iron or Black Steel Piping: Or piping concealed in wall chase and concrete shall be wrapped with approved polyethylene anti-corrosive tape.

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 suitable steel protective prior best local make as approved by the Engineer.

b) Primer for Galvanized Surfaces: Shall be suitable galvanized iron primer best local make as approved by the Engineer.

c) Finishing Paint: Shall be generally enamel paint, unless the application requires special paint, in which case suitable special paint as approved by the Engineer.

23 PIPE SUPPORTS

All soil and waste lines hung from the ceiling shall be supported at not more than 90 cm centers for horizontal pipe and 90 cm for vertical pipes. Provide supports at all special fittings.

24 TESTING AND INSPECTION

a) The entire drainage and vent system and building sever shall be subjected to testing after installation to ensure a leak-proof installation under operation conditions.

All the openings in the piping system shall be tightly closed by inserting test plug so that heavy rubber gasket fits snugly all around the opening. The highest point will be left open to supply water and may be raised if necessary by temporary jointing to develop a minimum head of one pipe length of water at each section of the system. Water is filled to the point of overflow and any drop in the level of water will indicate a leak that will be found by inspection. The water level will be checked for no drop for at least 15 to 30 minutes. Stacks will be tested in section, starting from the top section and then connecting top section to next lower section.