SECTION 13

PIPE, TUBE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Extent of Work: The requirements of this section apply to the piping systems specified elsewhere in these specifications.

1.02 QUALITY ASSURANCE

A. Manufacturer: Firms regularly engaged in the manufacture of piping products of types and sizes required and which have been in satisfactory use for not less than 5 years in similar service.

1.03 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's product data including dimensions, sizes, weights, installation, instructions, storage instructions, and code compliance reports.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. General: Provide pipe and tube of the type, joint type, grade, size and weight (wall thickness or quality) indicated for each service. Where type, weight or quality is not indicated, provide proper selection as recommended by manufacturer for installation requirements, and comply with governing regulations and industry standards.

B. Domestic cold water pipes: PVC pressure pipe complying with ASTM D 1785 schedule 40. Fittings shall comply with ASTM D 2466 schedule 40 threaded and solvent weld socket pressure fittings.

C. Domestic Hot water pipes: CPVC pressure pipe complying with ASTM F 441 schedule 80. Fittings shall comply with ASTM F 439 for schedule 80 solvent welded joints.

D. Condensate Drains: Exposed condensate piping shall be butt-welded galvanized steel pipe schedule 40 to ASTM A53 grade B with screwed joints. Fittings will be screw type forged. Concealed condensate drain piping shall be UPVC pressure pipe to ASTM D1785 schedule 40 with solvent welded joints.

E. Drainage (for Sanitary, Storm Drainage and Venting): UPVC un-plasticized polyvinyl chloride pipe and fittings complying with BS 4514. Waste pipes shall be UPVC to 5255. Soil, waste and rain water pipes buried under the buildings up to manholes shall be of UPVC to BS 4660, protected with concrete as necessary, except the joints which shall be left flexible. Pipes larger than 160 mm shall be to BS 5481. Equivalently UPVC drainage pipes shall be to the following European standard for non-pressure drainage pipes:

- Pipes installed above ground shall be to EN 1329 type B and BD (SDR41-S20) CR4 designation.

- Pipes installed underground up to 6m depth shall be to EN 1401 (SDR 41-S20) SN4 designation.

- Pipes installed deeper than 6m shall be to EN 1401 (SDR34 – S16.7) SN8 designation.

1. Fittings: UPVC socketed and solvent weld and push fit seal ring connections.

2. Joints: Solvent welded joints, and push fit seal ring connectors. Sealing rings shall be rubber to BS 2494 – Part 2 or alternatively to EN 681.

3. Design Temperature: 50 degrees C.

4. Non-pressure type.

F. Copper Pipes and fittings:

1. Pipe- Complying with ASTM – B: 88. All pipes shall be seamless hard drawn tubing type. Type L shall be used within the building and type K for underground installation.

   Joints in copper tubing installed under a concrete slab resting on the ground.

2. Soldered joint fittings shall be cast brass or bronze and shall be made in accordance with ASA B 16.22 and ASA B 16.18.

   Soldered joint fittings supply applications subjected to maximum water temperature of 65^0 C shall be made with 50-60 tin-lead solder and those applications up to 121^0 C. Water temperature shall be made with 95-5 tin-antimony solder.

   Heating and finishing of the joint shall be done in accordance with the recommendations of the manufacturer of the fittings.

G. Drainage pipework receiving high temperature water discharge: Cast iron pipes and fittings.

1. The systems shall be designed and installed in accordance with BS 5572, BS 8301 and the relevant sections of the Building Regulations.

2. Pipework of nominal diameters, 50mm to 300mm shall be installed using lightweight cast iron socketless soil pipe and fittings conforming to a British Board Agrément Certificate and meet with pr EN877.

3. Pipes shall be coated as follows:

   Pipes:

   Externally – One coat of red/brown acrylic based paint. Giving an average thickness of 40 microns.

   Internally – A 2 two part epoxy lining ochre in colour, giving an average thickness of 130 microns. This comprises two components of epoxy resin to give internal protection and anticorrosive features.

   Fittings: Shall be protected internally and externally with a single coat of red powder epoxy resin electrostatically applied. This gives an average thickness of 70 microns with a minimum thickness of 40 microns.

   Couplings: Shall be stainless steel/chrome nickel steel or optional ductile iron protected with a red water based semi-gloss paint with an average thickness of 40 microns.

   Brackets: (Ductile Iron) Protected with a red water based semi-gloss paint, average thickness of 40 microns. (Or equivalent optional mild steel galvanized). Additional anti-corrosive wrapping shall be required for below ground drains pipework with either:

   - Polyethylene sleeving in accordance with ISO 8180.
   - Adhesive tapes, e.g. “Densotape”, Long Maflowrap” or similar.

4. Where pipes are cut on site, ends shall be cut clean and square with burrs removed. All cut ends shall be made good/re-coated strictly in accordance with the manufacturers’ recommendations.

5. All pipes and fittings shall be jointed by means of stainless steel/chrome nickel steel couplings, including setscrews and nuts, or optional ductile iron couplings. The couplings shall incorporate a synthetic EPDM rubber gasket as standard or Nitrile to special order. Earth continuity shall be provided for.

6. Joints to cast iron drainpipe and to other materials shall be made using standard couplings or step couplings as described in clause (e), or traditional joint connectors.

7. Connection to small diameter waste and ventilating pipe work or other materials shall be made using mechanical "compression-fit" boss pipes or push–fit manifold or blank ends.

8. Products when embedded in concrete shall use only an all stainless steel coupling inclusive of stainless steel nuts and bolts, or ductile iron couplings.

2.02 PIPE FITTINGS

A. Unless otherwise specified or directed, provide pipe fittings that are of the type and class of material as that of the pipes where such fittings are installed.

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PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install pipe, tube and fittings in accordance with recognized industry practices which will achieve permanently - leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with a minimum of joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1-1/2 mm misalignment tolerance.

B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in the shortest route which does not obstruct usable space or block access for servicing the building and its equipment. Hold piping close to walls overhead construction columns and other structural and permanent - enclosure elements of the buildings; limit clearance to 12 mm where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 25mm clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view, by locating in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.

C. Reducers on all vertical pipework shall be concentric. In all other positions eccentric reducers shall be fitted in a manner to maintain a level bottom and ensure that fluids are not collected at that point in the system. Where it is not possible to fit eccentric reducers the Consultant's approval shall be obtained

before fitting concentric reducers. Reductions in all cases shall be made by the use of factory made fittings.

D. Waste Systems Piping: Install waste piping pitched to drain with a minimum slope of 1% for pipes running in suspended ceilings. Buried pipes shall be pitched to drain with a minimum slope of 2%. All pipes subject to traffic especially under roads shall be protected with reinforced concrete.

3.02 PIPING TESTS

A. General: Provide temporary equipment for hydrostatic testing, including pumps and gauges. Test piping system before insulation is installed and remove control devices before testing. Test each section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating.

Unless otherwise specified, test each piping system at 150% of operating pressure indicated, but not less than 2 bar test pressure.

Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.

Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

Re-tests shall have to be carried out after completion of remedial works arising from initial test failures.

B. Domestic Cold and Hot Water: Comply with British Standards Institution CP 342, Part 2.

C. Waste System Piping: Test waste system in accordance with BS 5572.

END OF SECTION