
NAVFAC IGS-15400 (MAY 2002)

Preparing Activity: LANTNAVFACENGCOM Base on UFGS-15400N

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 15400

PLUMBING SYSTEMS

05/02

NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

NOTE: This guide specification covers the requirements for building plumbing systems including aboveground and buried DWV piping and water piping within and under each building and within 1.50 meters outside of the building walls. When new exterior distribution systems are not in the project, specifications may include buried piping beyond 1.50 meters outside of the building walls and connections to existing exterior distribution systems. Plumbing systems requirements must conform to NAVFAC Design Manual 3.01, "Plumbing Systems" and Military Handbook MIL-HDBK-1190, "Facility Planning and Design Guide."

NOTE: The following information shall be shown on the project drawings:

1. Configuration and sizes of piping systems.
2. Locations of hot water and cold water shut-off gate valves for each toilet room.
3. Location and type of each plumbing fixture.
4. Typical details for attaching wall-hung fixtures to walls.
5. Whether piping is run above or below ground, floors, and ceilings and whether concealed or exposed.

6. Capacity and efficiency of each item of equipment.
7. Locations and details for special supports for piping.
8. Locations, sizes, and types of cleanouts
9. Locations, sizes, and typical details for extended rim floor drains.
10. Detail sections through each roof drain, floor sink, and grease interceptor (trap).
11. Location of acid-resistant DWV piping, cleanouts, traps, drains and accessories.
12. Cleanouts in crawl spaces or exterior of buildings shall be not less than one meter from building wall.
13. Exterior buried piping shall not be run parallel to and 1.50 meters from exterior building wall.
14. Location and size of water hammer arresters or air chambers.
15. Scale ranges for gages and thermometers.
16. Capacity, size, by-pass valves, and piping for water meters and detail of water meter box.
17. Locations and sizes of access panels for valves.
18. Details of pipe penetrations in outside walls.
19. Locations of fire walls and fire floors.
20. Location of wye strainer (with blow-off outlet, pipe nipple, and gate valve) in water supply to each building.

NOTE: Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ITALIAN LAWS AND NORMS (D.M.)(LAW)(CIRC.)

NOTE: Italian laws and normatives are the legislative regulations and decrees issued by the Italian government in the form of laws, norms, decrees, circulars, and letters. These Laws and Decrees concur together with Norms and Standards in forming the governing directives for construction.

- | | |
|-------------------------|---|
| CIRC. 21/11/1970 n. 190 | Potable Water Distribution in Buildings. Criteria for Controls and Prescriptions to Avoid Potable Water Contamination |
| DPR n. 1288 | (1967) Regulation for the Implementation of the Law 13/07/1966, Regarding Provision for Pollution of the Environment Limited to Thermal Plant Installation. |
| LAW 46/90 | (5 March 1990) Safety Norms for Plant Safety |

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI)

NOTE: A UNI Norm is a technical normative recognized as Italian Law, submitted by a private organization "Ente Nazionale Italiano di Unificazione" for Italy and is available only in the Italian language. It is the National Standard.

- | | |
|----------|--|
| UNI 663 | (1968) Unalloyed steel seamless tubes - Plain end tubes for general purposes - Quality, requirements and tests |
| UNI 1284 | (1971) Piping - Pressure-temperature ratings for iron and steel pipes |

UNI 4179 (1993) Metallic surface coatings - Methods for identification of the metallic coatings structure

UNI 4542 (1986) Sanitary appliances - Terminology and classification

UNI 5336 (1969) Pipes, fittings and special castings for grey cast iron pressure main lines - Qualities, requirements and tests

UNI 5340 (1969) Pipes, fittings and special castings for grey cast iron pressure main lines - Centrifugally or vertically sand cast socket and spigot pipes - Class B

UNI 6609 (1969) Metallic Pipe Flanges - Bolts - Types, materials and ratings

UNI 6884 (1987) Shutting and regulation valves for fluids - Supply and test conditions

UNI 7125/FA-109 (1972/82) Flanged gate valves for water pipelines - Technical conditions of delivery

UNI 7443/FA-178 (1985/87) Rigid (unplasticized) PVC pipes and fittings for discharge systems and ventilation inside buildings - Types, dimensions and requirements

UNI 7615 (1976) High density polyethylene pipes - Test methods

UNI 7773/2 (1984) Seamless copper tubes for general purposes - Dimensions

UNI 8349 (1982) Hot water meters for domestic use - Requirements and tests

UNI 8451 (1982) High density polyethylene pipes for discharge systems inside buildings - Types, dimensions and requirements

UNI 8452 (1982) High density polyethylene fittings for discharge systems inside buildings - Types, dimensions and requirements

UNI 9032/FA-1 (1988/94) Glass fibre reinforced (GFRP) thermosetting resins pipes with or without fillers - Types, dimensions and requirements

UNI 9054 (1986) Sanitary taps - Terminology and

classification

- UNI 9157 (1988) Water supply - Backflow preventer - Characteristics and tests
- UNI 9584 (1990) Pumps single stage - Centrifugal water pumps with axially arranged suction, PN 10 - Safety requirements
- UNI 9608 (1993) Face washing, eyes washing and emergency showers - Requirements and installation
- UNI 9760/1 (1990) Nuclear plants - Supports, attachments and anchors for piping - Nomenclature and definitions

ITALIAN/EUROPEAN HARMONIZATION STANDARDS (UNI EN)(UNI ENV)(CEI EN)
(UNI EN ISO)(UNI ISO)

NOTE: A UNI EN, UNI ENV, CEI EN, UNI EN ISO or UNI ISO is a European Standard with a coincident Italian National Standard or International Standard. The two standards are identical, with most (but not all) EN's available in the English language and the UNI available only in the Italian language.

- UNI ISO 7-1 (1994) Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation
- UNI EN 26 (1997/AC 1998) Gas-fired instantaneous water heaters for sanitary uses production, fitted with atmospheric burners
- UNI EN 200 (1989) Sanitary tapware; General technical specifications for single taps and mixer taps (nominal size 1/2) PN 10; Minimum flow pressure of 0,05 MPa (0,5 bar)
- UNI EN 545 (1994) Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods
- UNI EN 1057 (1996) Copper and copper alloys - Seamless, round copper tubes for water and gas in sanitary and heating applications
- UNI EN 1092-2 (1997) Flanges and their joints - Circular flanges for pipes, valves, fittings and

	accessories - PN Designated Part 2: Cast iron flanges
UNI EN 1254-1	(1998) Copper and copper alloys - Plumbing fittings - Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes
UNI EN 1254-2	(1998) Copper and copper alloys - Plumbing fittings - Part 2: Fittings with compression ends for use with copper tubes
UNI EN 1254-3	(1998) Copper and copper alloys - Plumbing fittings - Part 3: Fittings with compression ends for use with plastic pipes
UNI EN 1254-4	(1998/AC) Copper and copper alloys - Plumbing fittings - Part 4: Fittings combining other end connections with capillary or compression ends
UNI EN 1254-5	(1998) Copper and copper alloys - Plumbing fittings - Part 5: Fittings with short ends for capillary brazing to copper tubes
UNI ISO 4179	(1985) Ductile iron pipes for pressure and non-pressure pipelines - Centrifugal cement mortar lining - General requirements
UNI ISO 5256	(1985) Steel pipes and fittings for buried or submerged pipelines - External and internal coating by bitumen or coal tar derived materials
UNI ISO 6594	(1983) Cast iron drainage pipes and fittings - Spigot series
UNI ISO/TR 7474	(1983) High density polyethylene pipes and fittings - Chemical resistance with respect to fluids
UNI EN 10242	(1994/A1:1999) Threaded pipe fitting in malleable cast iron
CEI EN 60730-2-1	(1998) Automatic electrical controls for household and similar use - Part 2: Particular requirements for electrical controls for electrical household appliances

ITALIAN INSTITUTES AND COMMITTEES

CTI Italian Thermotechnical Committee

1.2 RELATED REQUIREMENTS

Section 15050, "Basic Mechanical Materials and Methods," applies to this section with the additions and modifications specified herein.

1.3 SYSTEM DESCRIPTION

**NOTE: The design engineer should contact the EFA
 MED, Mechanical Design Branch, to determine which
 Plumbing Code applies to the project.**

Provide [new and modify existing] plumbing systems, complete and ready for operation. Plumbing systems include piping less than 1.50 meters outside of building walls [and piping beyond 1.50 meters outside of building walls including connections to existing exterior distribution systems].

1.4 SUBMITTALS

NOTE:
 Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item is required.
 A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.
 For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Codes following the "G" typically are not used for Navy projects.
 Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-03 Product Data

Pipe and fittings

Valves

Plumbing fixtures

Water heaters

Pipe hangers and supports

Pumps

Pressure gages

Water meters

Strainers

Water hammer arresters

Backflow preventers

Thermometers

For pumps, include certified pump test curves.

SD-06 Test Reports

Backflow Preventers Test Report

SD-10 Operation and Maintenance Data

Water heaters, Data Package 2

Pumps, Data Package 2

Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

Plumbing systems including fixtures, equipment, materials, installation, and workmanship shall be in accordance with the LAW 46/90 except as modified herein. In the LAW 46/90, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for the word "should" wherever it appears; reference to the "authority having jurisdiction," the Administrative Authority, the Plumbing Official, and the Design Engineer shall be interpreted to mean the Contracting Officer. Capacity of equipment shall be not less than that indicated.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Plumbing Products

The following manufacturers provide plumbing system materials and components that generally comply with these specifications:

ATE S.p.A.
Loc. Ceole, 3/c
38066 Riva del Garda (TN)
Tel: 0464/520520
Fax: 0464/521752

CHIBRO S.p.A.
Via Roscio, 19
22100 Como
Tel: 031/530390
Fax: 031/541411

GEBERIT
CH-6928 Manno/Svizzera
Tel: 0041/91/6119292
Fax: 0041/91/6119393

SANCO
EUROPA METALLI S.p.A.
Strada 4, Pal. A2
20090 Assago Milanofiori
Tel: 02/575531
Fax: 02/57500085

WILO ITALIA S.r.l.
via Sanzio, 1
2009 Segrate (MI)
Tel: 02/2131100
Fax: 02/2130912

2.2 DRAIN, WASTE, AND VENT (DWV) PIPE AND FITTINGS

Fittings shall be long radius fittings, except fittings in vent piping may be short radius fittings. Minimum size piping shall be 50 mm for buried piping and 40 mm for aboveground piping.

2.2.1 Buried Piping

Provide piping up to but not more than 150 mm aboveground or floor slab on grade.

2.2.1.1 Cast-Iron Hubless Pipe and Fittings

NOTE: Delete paragraph for localities where buried hubless fittings are considered inappropriate due to failure of clamps by corrosion.

UNI EN 545, UNI ISO 4179, UNI 5336, and UNI 5340 for couplings.

2.2.1.2 Cast-Iron Hub and Spigot Pipe and Fittings

UNI ISO 6594 rubber compression gasket joints.

2.2.1.3 Plastic Pipe, Fittings, and Solvent Cement

Polyvinyl Chloride (PVC) System: UNI 7443/FA-178.

2.2.2 Aboveground Piping

UNI ISO 7-1 and UNI EN 10242.

2.2.2.1 Cast-Iron Hubless Pipe and Fittings

UNI ISO 6594 and UNI EN 10242 couplings.

2.2.2.2 Cast-Iron Hub and Spigot Pipe and Fittings

UNI ISO 6594 rubber compression gasket joints.

2.2.2.3 Plastic Pipe, Fittings, and Solvent Cement

a. Polyvinyl Chloride (PVC) System: UNI 7443/FA-178[; do not use aboveground in more than two-story buildings].

b. High Density Polyethylene (HDPE) System: UNI 7615, UNI 8451, UNI 8452, and UNI ISO/TR 7474.

2.2.2.4 Copper Tubing

UNI EN 1057, UNI EN 1254-1, UNI EN 1254-2, UNI EN 1254-3, UNI EN 1254-4, and UNI EN 1254-5 copper. Solder joint fittings using tin-antimony or Grade Sn96 tin-silver solder, and flux containing not more than 0.2 percent lead.

2.2.2.5 Grooved-End Steel Piping for Roof Drainage Only

UNI 663 hot-dip galvanized, cut grooved-end steel pipe; hot-dip galvanized, grooved-end fittings, and mechanical couplings; UNI 6609 coupling nuts and bolts; rubber gaskets for water service. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer.

2.2.3 Cleanouts

Provide threaded bronze or thermoplastic or PVC plastic cleanout plugs.

2.2.3.1 Floor Cleanouts

Provide cast-iron or ductile-iron floor cleanout with [anchor] flange, adjustable height polished bronze, nickel bronze, stainless steel, or chromium-plated copper alloy rim and scoriated floor plate with "CO" cast in the plate, and countersunk screws for installing floor plate flush with finished floor.

2.2.3.2 Wall Cleanouts

Provide polished stainless steel or chromium-plated copper alloy cover plate and secure to cleanout plug with countersunk stainless steel screw.

2.2.3.3 Cleanouts Exterior to Buildings

Provide cast-iron or polyvinyl chloride (PVC) cleanouts and countersunk plugs. [Provide 600 by 600 by 100 mm thick concrete slab with top 25 mm above grade with cleanout located in center of slab.] [Provide cast-iron cleanout box with cover.] [Provide cleanouts flush with finished grade or concrete slab.]

2.2.4 Grease Interceptors (Traps)

DPR n. 1288.

2.2.5 Oil Interceptors

Cast iron or welded steel, coated inside and outside with white acid resistant epoxy, with internal air relief bypass, bronze cleanout plug, double wall trap seal, removable combination pressure equalizing and flow diffusing baffle and sediment bucket, horizontal baffle, adjustable oil draw-off and vent connections on either side, gas and watertight gasketed nonskid cover, and flow control fitting.

2.2.6 Acid Resistant DWV Pipe, Fittings, and Couplings

**NOTE: For medical facility laboratories, do not use
PVC pipe for waste disposal piping and vents.**

Provide acid-resistant DWV pipe, fittings, and couplings of the mechanical, bell and spigot, or fusion type joints. Material for buried piping and aboveground piping shall be silicon-iron composition. UNI 9032/FA-1, borosilicate glass pipe and fitting may be provided for aboveground piping, except vent piping through and above roofs shall be silicon-iron composition. Provide cleanouts and drains as specified for DWV piping, except material shall be silicon-iron composition. [UNI 7443/FA-178, PVC plastic pipe, fittings, and solvent cement may be provided for buried piping and aboveground piping.]

2.3 DOMESTIC WATER PIPING

2.3.1 Buried Piping and Aboveground Piping

2.3.1.1 Copper Tubing

UNI 7773/2 Type K or L for aboveground piping, Type K for buried piping, with UNI EN 1254-1, UNI EN 1254-2, UNI EN 1254-3, UNI EN 1254-4, and UNI EN 1254-5 solder joint fittings; or with UNI EN 1254-1, UNI EN 1254-2, UNI EN 1254-3, UNI EN 1254-4, and UNI EN 1254-5 flared joint fittings. Provide UNI 7773/2 copper pipe nipples with threaded end connections. Provide UNI 7773/2, 95-5 tin-antimony solder, or provide Plumbing Code approved lead-free solder. Provide copper tubing for pipe sizes 100 mm or smaller.

[2.3.1.2 CPVC Plastic Pipe, Fittings, and Solvent Cement

UNI 7443/FA-178, may be provided for sizes 50 mm and smaller. Provide transition union connections or threaded gate valve between copper tubing and chlorinated polyvinyl chloride (CPVC) piping. Provide male threaded adapters with PTFE (polytetrafluoroethylene) pipe thread paste for threaded connections to valves, strainers, and equipment. [Provide CPVC piping for salt water flushing system.]

]2.3.1.3 Cast Ductile-Iron Piping

Sizes larger than 100 mm, outside coated, UNI 4179 cement mortar lined, ductile-iron pipe, rubber gasket joints, and UNI EN 10242 fittings. Provide concrete thrust blocks at the elbow where the buried piping turns up toward the floor, and restrain the pipe riser with steel rods from the elbow to the flange above the floor. Aboveground piping shall have flanged end connections conforming to UNI EN 1092-2 for flanged pipe and UNI EN 10242 for flanged fittings.

2.3.2 Water Valves

Provide valves suitable for minimum of [860] [690] kPa (gage) and minimum of 82 degrees C hot water. Valves shall have [flanged end connections, except sizes smaller than 65 mm may have] threaded end connections with a union on all but one side of the valve, or solder end connections for connections between bronze valves and copper tubing. Ball valves may be provided in lieu of gate valves. [Provide blue finish and red finish on handwheels for valves in cold domestic water piping and hot domestic water piping, respectively.]

2.3.2.1 Gate Valves

UNI 7125/FA-109[, except sizes 65 mm and larger shall conform to UNI 1284].

2.3.2.2 Globe and Angle Valves

UNI 6884.

2.3.2.3 Check Valves

UNI 6884, swing check.

2.3.2.4 Ball Valves

Full port design, copper alloy[, except sizes 65 mm and larger shall be ductile-iron body or cast-iron body]. Valves shall have two-position lever handles.

2.3.2.5 Hose Bibbs

Provide angle type copper alloy hose bibb with lockshield and [removable] handwheel [or tee-handle]. Inlet shall have internal threads. Outlet shall have vacuum breaker with 20 mm external hose threads.

2.3.2.6 Nonfreeze Wall Hydrant

Cast bronze, with lockshield and [removable] handwheel [or tee-handle], 25 mm external thread inlet, 20 mm external hose thread outlet with automatic draining vacuum breaker. Hydrant shall be of sufficient length to extend through walls and place the valve seat inside the building or in the crawl space. Bonnet and valve stem shall be removable from outside of the building.

2.3.2.7 Combination Pressure and Temperature Relief Valves

ISPESL [copper alloy body, automatic reseating,] test lever, and discharge capacity based on AGA temperature steam rating.

2.3.2.8 Pressure Relief Valves

ISPESL [copper alloy body, automatic reseating with test lever].

2.3.2.9 Water Temperature Regulating Valves

Provide copper alloy or cast-iron body valve with adjustable range to allow settings between 43 and [71] [82] degrees C.

2.3.2.10 Water Temperature Mixing Valves

Provide copper alloy [or cast-iron] body valve of the pressure equalizing type. Valve shall be of the adjustable thermostatic type and shall mix the hot water and cold water to deliver hot water at set temperature.

2.3.2.11 Water Pressure Reducing Valves

UNI 6884.

2.3.3 Water Meters

CTI or UNI 8349 turbine type, with register reading in liters.

2.3.4 Strainers

Strainers shall have blow off outlet with pipe nipple and gate valve and discharge pipe nipple. Copper alloy or cast-iron body. Provide stainless steel strainer element with perforations of 1.20 mm.

2.3.5 Pressure Gages

Provide single style pressure gage for water with 113 mm diameter dial, brass or aluminum case, bronze tube, gage cock, pressure snubber, and syphon. Provide scale range suitable for the intended service.

2.3.6 Thermometers

Provide bi-metal dial type thermometers with stainless steel case, stem, and fixed thread connection; 125 mm diameter dial with glass face gasketed within the case; accuracy within 2 percent of scale range. Provide scale range suitable for the intended service.

2.3.7 Dielectric Connections

Provide at connections between copper and ferrous metal piping materials. UNI 7443/FA-178, CPVC threaded pipe nipples, 100 mm minimum length, may be provided for dielectric connections in pipe sizes 50 mm and smaller.

2.3.8 Water Hammer Arresters

CTI.

2.3.9 Valve Boxes

For each buried valve provide cast-iron, ductile-iron, or plastic box of a suitable size. Provide cast-iron, ductile-iron, or plastic cover for the box with the word "WATER" cast on the cover. Plastic boxes shall be constructed of ABS plastic or inorganic fiber-reinforced black polyolefin plastic. Coat cast-iron and ductile-iron boxes with bituminous paint.

2.3.10 Backflow Preventers

Reduced pressure principle type. Furnish proof that each make, model/design, and size of backflow preventer being furnished for the project is approved by and in accordance with UNI 9157. Listing of the particular make, model/design, and size in [UNI 9157] will be acceptable as the required proof.

2.4 MISCELLANEOUS PIPING MATERIALS

2.4.1 Flanges

UNI EN 1092-2 for use in ferrous piping; UNI EN 1254-1, UNI EN 1254-2, UNI EN 1254-3, UNI EN 1254-4, and UNI EN 1254-5 for use in copper tubing; with full face flat type synthetic rubber gaskets.

2.4.2 Escutcheon Plates

Provide one piece or split hinge metal plates for piping entering floors, walls, and ceilings in exposed spaces. Provide chromium-plated or polished stainless steel finish on copper alloy plates in finished spaces. Provide paint finish on metal in unfinished spaces.

2.4.3 Pipe Sleeves

2.4.3.1 Sleeves in Masonry and Concrete Walls, Floors, Roofs

UNI 663 Standard Weight, hot-dip galvanized steel [, ductile-iron or cast-iron] pipe sleeves.

2.4.3.2 Sleeves in Non-Masonry or -Concrete Walls, Floors, and Roofs

Provide 0.56 mm thick hot-dip galvanized steel sheet.

2.4.4 Pipe Sleeves

Provide where piping passes entirely through walls, ceilings, roofs, and floors. Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors. Provide 25 mm minimum clearance between exterior of piping or pipe insulation, and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal both ends of sleeves or core-drilled holes with fill, void, or cavity material.

- a. Sleeves in masonry and concrete walls, floors, and roofs: Provide steel pipe sleeves. Sleeves are not required where drain, waste, and vent (DWV) piping passes through concrete floor slabs located on grade. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth.
- b. Sleeves in other than masonry and concrete walls, floors, and roofs: Provide 0.56 mm thick galvanized steel sheet.

2.4.5 Pipe Hangers and Supports

Provide UNI 9760/1 with adjustable type steel support rods, except as specified or indicated otherwise. Attach to steel joists with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor. Provide Type 40 insulation protection shield for insulated piping.

2.4.6 Access Doors

Provide 300 by 300 mm factory prefabricated and primed flush face steel access doors including steel door frame with continuous hinges and turn-screw-operated latch. Door frame shall be for installation in plaster and masonry walls. Furnish doors under this section to provide proper access to concealed valves; install doors under the appropriate section of

this specification.

2.4.7 Washing Machine Connector Box

Provide recessed wall box fabricated of aluminum, [PVC plastic] stainless steel, or hot-dip galvanized steel. Provide hot-dip galvanized steel with epoxy or baked-on enamel finish. Provide drain nipple and locknut with cover nut for locking drain outlet to box. Provide brass pipe fittings for connecting each supply pipe to valve and locking to box. Provide hot water and cold water supply valves similar to hose bibbs[, except valve inlet connections shall be of the compression type or union type].

2.5 PLUMBING FIXTURES

NOTE: The following conforms to LAW 46/90 (5 March 1990) Safety Norms for Plant Systems.

Provide the following types of plumbing fixtures as indicated.

2.5.1 Flush Valve Water Closets

2.5.1.1 Flush Valve Water Closet - Wall Hung

UNI 4542, white vitreous china wall hung, wall outlet, siphon jet, elongated bowl, white solid plastic elongated open front seat. Flush valve shall be constructed of chrome plated cast brass, concealed time limited self closing push button control, adjustable elbow, union nut and wall plate. The water flush volume of the flush valve and water closet combination shall not exceed 6.1 liters per flush. Provide concealed floor mounted carrier with feet. Water closet mounting height shall be as indicated on contract drawings.

2.5.1.2 Flush Valve Water Closet - Wall Hung (Accessible)

UNI 4542, white vitreous china wall hung, wall outlet, siphon jet, elongated bowl, white solid plastic elongated open front seat. Flush valve shall be constructed of chrome plated cast brass, concealed time limited self closing push button control, adjustable elbow, union nut and wall plate. The water flush volume of the flush valve and water closet combination shall not exceed 6.1 liters per flush. Provide concealed floor mounted carrier with feet. Water closet mounting height shall be as indicated on contract drawings. Flush valve push button shall be mounted no higher than 1120 mm above finished floor.

2.5.1.3 Flush Valve Water Closet - Floor Mounted

UNI 4542, white vitreous china floor mounted, floor outlet, siphon jet, elongated bowl, white solid plastic elongated open front seat. Flush valve shall be constructed of chrome plated cast brass, concealed time limited self closing push button control, adjustable elbow, union nut and wall plate. Top of seat shall be 356 mm to 381 mm above finished floor. Provide wax bowl ring including plastic sleeve. The water flush volume of

the flush valve and water closet combination shall not exceed 6.1 liters per flush.

2.5.1.4 Flush Valve Water Closet - Floor Mounted (Accessible)

UNI 4542, white vitreous china floor mounted, floor outlet, siphon jet, elongated bowl, white solid plastic elongated open front seat. Flush valve shall be constructed of chrome plated cast brass, concealed time limited self closing push button control, adjustable elbow, union nut and wall plate. Top of seat shall be 432 mm to 483 mm above finished floor. Provide wax bowl ring including plastic sleeve. The water flush volume of the flush valve and water closet combination shall not exceed 6.1 liters per flush. Flush valve push button shall be mounted no higher than 1120 mm above finished floor.

2.5.2 Flush Tank Water Closets

2.5.2.1 Flush Tank Water Closet

UNI 4542, white vitreous china, floor mounted, floor outlet, siphon jet, elongated bowl, white solid plastic elongated closed front seat, and trim. Top of seat shall be 356 mm to 381 mm. Provide wax bowl ring including plastic sleeve. Water flush volume of the water closet shall not exceed 6.1 liters per flush.

2.5.2.2 Flush Tank Water Closet (Accessible)

UNI 4542, flush tank, white vitreous china, floor mounted, floor outlet, siphon jet, elongated bowl, white solid plastic elongated closed front seat, and trim. Top of seat shall be 432 mm to 483 mm above finished floor. Provide wax bowl ring including plastic sleeve. Water flush volume of the water closet shall not exceed 6.1 liters per flush. Flush valve push button shall be mounted no higher than 1120 mm above finished floor.

2.5.3 Urinals

2.5.3.1 Flush Valve Urinal

UNI 4542, white vitreous china, wall mounted, wall outlet. Flush valve shall be constructed of chrome plated cast brass, concealed time limited self closing push button control, adjustable elbow, union nut and wall plate. The water flush volume of the flush valve and urinal combination shall not exceed 3.8 liters per flush. Provide concealed floor mounted carrier with feet. Urinal mounting height shall be as indicated on contract drawings.

2.5.3.2 Flush Valve Urinal (Accessible)

UNI 4542, white vitreous china, wall mounted, extended rim, wall outlet. Flush valve shall be constructed of chrome plated cast brass, concealed time limited self closing push button control, adjustable elbow, union nut and wall plate. The water flush volume of the flush valve and urinal combination shall not exceed 3.8 liters per flush. Provide concealed floor mounted carrier with feet. Urinal mounting height shall be as indicated on

contract drawings. Flush valve push button shall be mounted no higher than 1120 mm above finished floor.

2.5.4 Lavatories

2.5.4.1 Countertop Lavatories with Faucet Set

UNI 4542, UNI 9054, and UNI EN 200 listed white vitreous china, countertop, maximum dimensions of 483 mm wide by 406 mm front to rear, with 3 supply openings on for use with single lever, pressure balance center-set faucets.

Fittings shall include; center-set mixing faucet with single lever handle and grid strainers. Chrome plated brass P-trap with escutcheon supplies with escutcheons and chrome plated angle stop valves. Lavatory mounting height shall be as indicated on contract drawings.

2.5.4.2 Wall Hung Lavatories with Faucet Set

UNI 4542, UNI 9054, and UNI EN 200 listed white vitreous china, ledge back type, maximum dimensions of 500 mm wide by 450 mm front to rear, with 3 supply openings on for use with top mounted, single lever, pressure balance center-set faucets. Concealed wall carrier installation. Fittings shall include; center-set mixing faucet with single lever handle and grid strainers. Chrome plated brass P-trap with escutcheon, supplies with escutcheons and chrome plated angle stop valves. Lavatory mounting height shall be as indicated on contract drawings.

2.5.4.3 Wall Hung Lavatories with Faucet Set (Accessible)

UNI 4542, UNI 9054, and UNI EN 200 listed white vitreous china, ledge back type, maximum dimensions of 500 mm wide by 450 mm front to rear, with 3 supply openings for use with chrome plated brass faucet with rigid/swing gooseneck spout and 100 mm wrist blade handles, chrome plated brass P-trap, supplies with escutcheons and chrome plated angle stop valves. Faucets with wrist blade handles shall open completely within one-quarter turn in opposite directions. Lavatory mounting height shall be as indicated on contract drawings.

2.5.5 Sinks

2.5.5.1 Single Compartment Sink with Faucet Set

Single compartment 1.0 mm stainless steel sink with integral mounting rim for flush installation. Maximum overall dimensions shall be 500 mm wide by 450mm front to back by 175 mm deep. Entire unit shall have sound proofing undercoating. Provide stainless steel drain outlet and stainless steel cup strainer. Provide unit mounted chrome plated brass faucet with rigid/swing gooseneck spout and 100 mm wrist blade handles, chrome plated brass P-trap, supplies with escutcheons and chrome plated angle stop valves. Faucets with wrist blade handles shall open completely within one-quarter turn in opposite directions.

2.5.5.2 Double Compartment Sink with Faucet Set

Double compartment 1.0 mm stainless steel sink with integral mounting rim

for flush installation. Maximum overall dimensions shall be 850 mm wide by 500mm front to back by 175 mm deep. Entire unit shall have sound proofing undercoating. Provide stainless steel drain outlets and stainless steel cup strainer. Provide unit mounted chrome plated brass, washerless, single lever mixing faucet, swing spout and pull out dish sprayer in spout, chrome plated brass P-trap, supplies with escutcheons and chrome plated angle stop valves.

2.5.6 Bathtubs and Showers

2.5.6.1 Bathtub

White enameled cast iron, recessed type, minimum dimensions of 1524 mm wide by 762 mm front to rear by 406 mm high with drain outlet for above-the-floor drain installation. Provide left or right drain outlet bathtub as indicated. Provide self-cleaning adjustable spray pattern shower head with 0.16 L/s flow control devices, concealed pipe, copper alloy pressure balance single control type mixing valve with front access integral screwdriver stops, bathtub spout, chrome plated pop-up drain and diverter valve. Anchor the mixing valve, diverter valve and the pipe in wall to prevent movement.

2.5.6.2 Bathtub (Accessible)

White enameled cast iron, recessed type, minimum dimensions of 1524 mm wide by 762 mm front to rear by 406 mm high with drain outlet for above-the-floor drain installation. Provide left or right drain outlet bathtub as indicated. Provide self-cleaning adjustable spray pattern shower head with 0.16 L/s flow control devices, concealed pipe, copper alloy pressure balance single control type mixing valve with front access integral screwdriver stops, hand held shower with 1725 mm stainless steel reinforced hose, chrome plate brass supply elbow and wall flange and 1100 mm slide bar with adjustable upper bracket and mounting screws, bathtub spout, chrome plated pop-up drain and diverter valve. Anchor the mixing valve, diverter valve and the pipe in wall to prevent movement.

2.5.6.3 Shower Fittings

Provide self-cleaning adjustable spray pattern shower head with 0.16 L/s flow control devices, concealed pipe, copper alloy pressure balance single control type mixing valve with front access integral screwdriver stops. Anchor the mixing valve and the pipe to each shower head in wall to prevent movement.

2.5.6.4 Shower Fittings (Accessible)

Provide self-cleaning adjustable spray pattern shower head with 0.16 L/s flow control devices, concealed pipe, copper alloy pressure balance single control type mixing valve with front access integral screwdriver stops. Anchor the mixing valve and the pipe to each shower head in wall to prevent movement. Hand held shower with 1725 mm stainless steel reinforced hose, chrome plate brass supply elbow and wall flange and 1100 mm slide bar with adjustable upper bracket and mounting screws.

2.5.7 Electric Water Coolers

2.5.7.1 Electric Water Cooler

Self contained, wall hung, mechanically refrigerated drinking water coolers, shall use one of the halogenated hydrocarbons as a refrigerant, and shall have a capacity to deliver a minimum of 20.3 liters per hour of 10 degree C water when supplied with 27 degree C inlet water and a 32 degree C room temperature. Provide chrome plated brass P-trap, supply with escutcheon and chrome plated angle stop valve.

2.5.7.2 Electric Water Cooler, Bi-level

Self contained, wall hung, mechanically refrigerated drinking water coolers, shall use one of the halogenated hydrocarbons as a refrigerant, and shall have a capacity to deliver a minimum of 20.3 liters per hour of 10 degree C water when supplied with 27 degree C inlet water and a 32 degree C room temperature. Provide chrome plated brass P-trap, supply with escutcheon and chrome plated angle stop valve.

2.5.8 Emergency Fixtures

2.5.8.1 Emergency Eyewash/Shower Station

UNI 9608, floor supported, free standing unit. Deluge shower head, stay-open ball valve operated by pull rod and ring. Self-cleaning, non-clogging eye and face wash with quick opening, full-flow valves, stainless steel eye and face wash receptor. Provide copper alloy stay-open valve activated by push handle.

2.5.8.2 Emergency Eyewash Station

UNI 9608, floor supported, free standing unit. Self-cleaning, non-clogging eye and face wash with quick opening, full-flow valves, stainless steel eye and face wash receptor. Provide copper alloy stay-open valve activated by push handle.

2.6.1 Service Sinks

2.6.1.1 Mop Sink (MS-1)

Pre-cast terrazzo shall be made of marble chips cast in white Portland cement to produce a compressive strength of not less than 20,670 kPa seven days after casting and is one piece item, 900 mm by 600 mm by 250 mm deep, brass body drains with nickel bronze strainers cast integral with terrazzo, stainless steel rim guard for janitor's sink. Provide a wall type polished chrome faucet with vacuum breaker, thread spout, pail hook, wall brace, loose key stops in shanks, rubber hose, hose bracket and mop hanger.

2.6.1.2 Janitors Sink (JS-1)

UNI 4542, white vitreous china with integral back and wall hanger supports, minimum dimensions of 559 mm wide by 508 mm front to rear, with two supply openings in 250 mm high back. Provide floor supported wall outlet cast

iron P-trap and stainless steel rim guards, a wall type polished chrome faucet with vacuum breaker, thread spout, pail hook, wall brace, loose key stops in shanks, rubber hose, hose bracket and mop hanger.

2.6.2 Drains

2.6.2.1 Floor Drain

Provide with double drainage flange, perforated or slotted cast bronze or nickel bronze, polished stainless steel or chromium-plated copper alloy strainer and adjustable collar. Drains of sizes 50, 80, and 100 mm shall have strainers with minimum free drainage area of 3225, 7100, 11,610 square mm respectively. Provide P-trap and trap primer connection where indicated on the drawings.

2.6.2.2 Floor Drain (With Funnel)

Provide with double drainage flange, perforated or slotted cast bronze strainer, funnel mounted to strainer, adjustable collar. Provide P-trap with floor drain.

2.6.2.3 Floor Drain (Shower Floor Drain)

Provide with double drainage flange, perforated cast nickel strainer, adjustable collar. Provide P-trap with floor drain.

2.6.2.4 Floor Drain

Provide cast iron body with white acid resisting porcelain enameled or epoxy interior, double drainage flange, nickel bronze rim and slotted grate, removable stainless steel or aluminum slotted buckets. Provide P-trap with floor drain.

2.6.2.5 Floor Sink

Provide cast iron body with white acid resisting porcelain enameled or epoxy interior, double drainage flange, nickel bronze rim and slotted grate, removable stainless steel or aluminum slotted buckets. Provide P-trap with floor sinks.

2.6.2.6 Trench Drain

Provide 152 mm wide pre-sloped trench drainage system. High density polyethylene structural composite drain channel with 0.75 percent bottom slope. All sections are 2000 mm modular lengths with integral top frame, interlocking ends and radiused bottom. Combination tie-down/leveling devices at 500 mm intervals. Provide stainless steel grate.

2.6.2.7 Area Drain

Provide hot-dip galvanized cast-iron or ductile iron drain, square satin finished bronze top grate set in square secured frame, frame support collar, non-puncturing clamp ring, large sump with roof flange and bottom outlet.

2.6.2.8 Roof Drain - Field

Provide hot-dip galvanized cast-iron or ductile iron drain, square satin finished bronze top grate set in square secured frame, frame support collar, perforated stainless steel extension filter, non-puncturing clamp ring, large sump with roof flange and bottom outlet.

2.6.2.9 Roof Drain - Parapet

Provide hot-dip galvanized cast-iron or ductile iron drain, parapet type, secured cast iron angle grate integral with flashing clamp, shallow sump with flashing flange and bottom outlet threaded connection.

[2.5 DOMESTIC WATER HEATERS

NOTE: Select the applicable paragraph(s) for water heaters from the following:

2.5.1 Storage Tanks

CTI, cement- or glass-lined vertical steel tanks, minimum of 862 kPa (gage) working pressure.

2.5.2 Water Heaters

NOTE: Choose one of the following options:

[CTI U-tube, two pass, with steam in the shell, designed to raise the temperature of a continuous flow of water from 4 to 82 degrees C.]

[Provide double wall copper tube domestic water heating elements constructed with air gap to atmosphere between the two walls using steam as the heating medium exterior of the heating elements. Provide posted operating instructions for water heaters.]

2.5.3 Water Temperature Regulating Valves

Copper alloy or cast-iron with adjustable range thermostat to allow hot water settings between 43 and 82 [71] degrees C.

][2.6 DOMESTIC WATER HEATERS ([ELECTRIC] [GAS] [OIL-FIRED])

[CEI EN 60730-2-1, electric water heaters with [single] [double] heating element,] [UNI EN 26, gas-fired water heaters,] [oil-fired water heaters] glass-lined steel tanks, high efficiency type [insulated with polyurethane foam insulation, replaceable anodes,] with adjustable range thermostat to allow hot water settings between 43 and 82 [71] degrees C. Provide posted operating instructions for water heaters.

2.6.1 Gas Vents

Prefabricated multi-wall type.

2.6.2 Gas Piping System

UNI ISO 5256. Provide threaded fittings and end connections.

2.6.2.1 Steel Pipe

UNI 663. Schedule 40, hot-dip galvanized.

2.6.2.2 Threaded Fittings

Hot-dip galvanized.

2.6.2.3 Gas Valves

Provide cast-iron or bronze body valves, with bronze plug or ball and two position lever handles. Valves shall be suitable for 862 kPa (gage) working pressure. Ball valves may be provided in lieu of plug valves.

]2.7 [ELECTRIC] [GAS] [OIL-FIRED] WATER HEATERS, COMMERCIAL TYPE

NOTE: Fuel oil systems are covered under Section 15192, "Fuel Oil Piping."

NOTE: Use for water heaters with over 58.6 kW heat input or over 455 liters storage.

[CTI for gas heaters] [for oil-fired heater requirements not covered by the boiler code] with heat input, recovery, and storage capacity as indicated. Tank shall be rated for a working pressure of 1034 kPa, and [nickel and] glass lined or cement lined. Provide thermometer in thermometer well. Insulate water heater with fiberglass insulation and trim with baked enamel finished steel sheet jacket. Water temperature shall be adjustable between 43 and 82 degrees C. Provide temperature and pressure relief valve.

2.8 PUMPS

Select the pump so that the operating point on the characteristic performance curve for the impeller size to be furnished will be to the left (shut-off side) of and not more than 5 percent below the point of maximum efficiency for the impeller to be furnished. Provide lifting attachments on pumps larger than 1.50 kW. Provide posted operating instructions for pumps.

2.8.1 Inline Water Pumps

UNI 9584, standard head capacity, service water distribution system.
[Provide factory assembled and tested pumps constructed of materials suitable for hot domestic water service.]

2.8.2 Base-Mounted Water Pumps

General service, mechanical seals and drip-proof electric motors.

2.8.3 Submersible Sump Pumps

Provide factory assembled and tested submersible type pumps for operation under water. Pump shall be complete with cast-iron casing, bronze impeller, stainless steel shaft, sealed heavy-duty ball bearings, water-cooled hermetically-sealed motor, built-in automatic reset thermal protection, float switches, and waterproof three-conductor cables and grounding plugs. Provide high water alarm [and check valve].

2.8.4 Sewage Pumps

[Single type] [Duplex type with automatic controls to alternate the operation from one pump to the other pump and to start the second pump in the event the first pump cannot handle the incoming flow]. Provide high water alarm [and check valve].

PART 3 EXECUTION

3.1 INSTALLATION

Installation of plumbing systems including fixtures, equipment, materials, and workmanship shall be in accordance with the Plumbing Code, except as modified herein. When fixtures require both hot water and cold water supplies, provide the hot water supply to the left of the cold water supply. Plastic piping shall not penetrate fire walls or fire floors and shall be used on one side of fire walls and fire floors not closer than 152 mm to the penetration. [Plastic DWV piping shall not be permitted in more than two-story buildings. Cast-iron DWV piping only shall be provided in more than two-story buildings.]

3.1.1 Threaded Connections

Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread paste, pipe cement and oil, or PTFE powder and oil; apply only on male threads. Provide exposed ferrous pipe threads with one coat of primer applied to a minimum dry film thickness of 0.025 mm. [Do not thread metal pipe into plastic piping.]

3.1.2 Solder End Valves

Remove stems and washers and other item subject to damage by heat during installation. Reassemble valve after soldering is completed. Valves without heat sensitive parts do not require disassembly but shall be opened at least two turns during soldering.

3.1.3 Pipe Supports (Hangers)

Provide additional supports at the concentrated loads in piping between supports, such as for inline water pumps and flanged valves.

3.1.3.1 Piping to Receive Insulation

Provide temporary wood spacers between the insulation protection shield and the pipe in order to properly slope the piping and to establish final elevations. Temporary wood spacers shall be of the same thickness as the insulation to be provided under Section 15080, "Mechanical Insulation."

3.1.3.2 Maximum Spacing Between Supports

- a. Vertical Piping: Support metal piping at each floor, but at not more than 3 meters intervals[, with pipe riser clamps or offset pipe clamps.] [Support plastic and glass piping at each floor and at midpoint between floors, but at not more than 1.50 meters intervals.]
- b. Horizontal Piping: Support cast-iron piping at 1.50 meters 5 foot intervals, except for pipe exceeding 1.50 meters length, provide supports at intervals equal to the pipe length but not exceeding 3 meters. [Support plastic and glass piping at 1.22 meters [1.50 meters] intervals and support plastic piping at each change of direction.] Support steel piping and copper tubing as follows:

MAXIMUM SPACING (METERS)

Nominal Pipe Size (mm)	25 and under	32	40	50	65	80	90	100	125	150
Steel Pipe	2	2.5	2.75	3	3.25	3.62	4	4.25	4.75	5
Copper Tube	1.75	2	2.50	2.50	2.75	3	3.25	3.62	4	4.25

3.1.4 Ductile Iron Pipe Aboveground

Provide flanged joints.

3.1.5 Encased Buried Piping

NOTE: Use polyethylene tube or sheet when electrical resistivity of soil is less than 2000 ohms-cm.

Completely encase buried copper water piping and cast iron DWV and water piping with polyethylene tube or sheet.

3.1.6 Installation of Pipe Sleeves

Provide pipe sleeves where piping passes through walls, floors, roofs, and

partitions. Secure sleeves in proper position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 6 mm [25 mm] space between exterior of piping or pipe insulation and interior of sleeve [or core-drilled hole]. Firmly pack space with [mineral wool] insulation. Seal at both ends of the sleeve [or core-drilled hole] with plastic waterproof cement which will dry to a firm but pliable mass, or provide a [mechanically adjustable] segmented elastomeric seal. Seal both ends of penetrations through fire walls and fire floors to maintain fire resistive integrity with fill, void, or cavity material. Extend sleeves in floor slabs 80 mm above the finished floor, except sleeves are not required where DWV piping passes through concrete floor slabs located on grade.

3.1.7 Copper Tube Extracted Joint

An extracted mechanical tee joint may be made in copper tube. Make joint with an appropriate tool by drilling a pilot hole and drawing out the tube surface to form a collar having a minimum height of three times the thickness of the tube wall. To prevent the branch tube from being inserted beyond the depth of the extracted joint, provide dimpled depth stops. Notch the branch tube for proper penetration into fitting to ensure a free flow joint. Braze extracted joints using a copper phosphorus classification brazing filler metal. Soldered joints shall not be permitted.

3.2 NAMEPLATES

Provide laminated plastic nameplates for equipment, gages, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 3 mm thick melamine plastic, black with white center core. Surface shall be a matte finish. Corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 25 by 65 mm. Lettering shall be minimum of 6 mm high normal block lettering. Key nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system. Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information:

- a. Manufacturer, type, and model number
- b. Contract number and accepted date
- c. Capacity or size
- d. System in which installed
- e. System which it controls

3.3 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS

Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around mains; bolt valve conforming to UNI 7125/FA-109 to the branch. Open valve, attach

drilling machine, make tap, close valve, and remove drilling machine, without interruption of service. Notify the Contracting Officer in writing at least [_____] [15] days prior to the date the connections are required; receive approval before any service is interrupted. Provide materials required to make connections into the existing water supply systems and perform excavating, backfilling, and other incidental labor as required. [Furnish] [Government will furnish only] the labor and the tapping or drilling machine for making the actual connections to the existing systems.

3.4 FIELD QUALITY CONTROL

3.4.1 Inspections

Prior to initial operation, inspect piping system for compliance with drawings, specifications, and manufacturer's submittals.

3.4.2 Field Testing

Before final acceptance of the work, test each system as in service to demonstrate compliance with the contract requirements. Perform the following tests in addition to the tests specified in the Plumbing Code, except as modified herein. Correct defects in the work provided by the Contractor, and repeat tests until work is in compliance with contract requirements. Furnish water, electricity, instruments, connecting devices, and personnel for performing tests.

3.4.2.1 Domestic Water Piping

Before applying insulation, hydrostatically test each piping system at not less than [690 kPa (gage)] [827 kPa (gage)] [system working pressure] with no leakage or reduction in gage pressure for 2 hours.

3.4.2.2 DWV Piping

Before the installation of fixtures, cap ends of each system, fill piping with water to the roof, and allow to stand until a thorough inspection has been made. If the system is tested in sections, each opening shall be plugged and each section tested with not less than a 30 kPa head of water. After plumbing fixtures have been set and their traps filled with water, subject the entire sanitary system to a final air pressure test of not more than 249 Pa [and a smoke or peppermint test]. Perform the air and smoke test with an approved smoke testing machine which shall show a clear passage of smoke and air throughout the entire system. The entire system shall be proven absolutely tight under such test.

3.4.2.3 Backflow Preventers Test Report

Backflow preventers shall be tested by a locally approved and certified backflow assembly tester. A copy of the test report shall be provided to the Contracting Officer prior to placing the domestic water system into operation, or no later than 5 days after the test.

3.5 DISINFECTION

Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with CIRC. 21/11/1970 n. 190. Fill piping systems with solution containing minimum of 50 milligram per kilogram (m/g) of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 to 0.5 m/g, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplied by non-potable water is not required.

-- End of Section --