

SPECIFICATIONS - PLUMBING (CONTINUED)

PART 3 - EXECUTION

- 3.1 DOMESTIC WATER HEATER INSTALLATION
 - A. INSTALL TANKLESS DOMESTIC WATER HEATERS AT LEAST 80 INCHES ABOVE FLOOR ON WALL BRACKET.
 - 1. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES.
 - 2. ARRANGE UNITS SO CONTROLS AND DEVICES THAT REQUIRE SERVICING ARE ACCESSIBLE.
 - 3. PLACE AND SECURE ANCHORAGE DEVICES. USE SETTING DRAWINGS, TEMPLATES, DIAGRAMS, INSTRUCTIONS, AND DIRECTIONS FURNISHED WITH ITEMS TO BE EMBEDDED.
 - 4. INSTALL ANCHOR BOLTS TO ELEVATIONS REQUIRED FOR PROPER ATTACHMENT TO SUPPORTED EQUIPMENT.
 - 5. ANCHOR DOMESTIC-WATER HEATERS TO SUBSTRATE.
 - B. INSTALL GAS-FIRED, DOMESTIC-WATER HEATERS ACCORDING TO NFPA 54.
 - 1. INSTALL GAS SHUTOFF VALVES ON GAS SUPPLY PIPING TO GAS-FIRED, DOMESTIC-WATER HEATERS WITHOUT SHUTOFF VALVES.
 - 2. INSTALL GAS PRESSURE REGULATORS ON GAS SUPPLIES TO GAS-FIRED, DOMESTIC-WATER HEATERS WITHOUT GAS PRESSURE REGULATORS IF GAS PRESSURE REGULATORS ARE REQUIRED TO REDUCE GAS PRESSURE AT BURNER.
 - 3. INSTALL AUTOMATIC GAS VALVES ON GAS SUPPLIES TO GAS-FIRED, DOMESTIC-WATER HEATERS IF REQUIRED FOR OPERATION OF SAFETY CONTROL.
 - C. INSTALL PRESSURE RELIEF VALVES IN WATER PIPING FOR DOMESTIC WATER HEATERS WITHOUT STORAGE. EXTEND COMMERCIAL-WATER-HEATER RELIEF-VALVE OUTLET, WITH DRAIN PIPING SAME AS DOMESTIC-WATER PIPING IN CONTINUOUS DOWNWARD PITCH, AND DISCHARGE BY POSITIVE AIR GAP ONTO CLOSEST FLOOR DRAIN.
 - D. INSTALL WATER-HEATER DRAIN PIPING AS INDIRECT WASTE TO SPILL BY POSITIVE AIR GAP INTO OPEN DRAINS OR OVER-FLOOR DRAINS. INSTALL HOSE-END DRAIN VALVES AT LOW POINTS IN WATER PIPING FOR DOMESTIC-WATER HEATERS THAT DO NOT HAVE TANK DRAINS.
 - E. INSTALL THERMOMETER ON OUTLET PIPING OF DOMESTIC-WATER HEATERS. COMPLY WITH REQUIREMENTS FOR THERMOMETERS SPECIFIED IN SECTION 220520 - "COMMON WORK RESULTS FOR PLUMBING".
- 3.2 FIELD QUALITY CONTROL
 - A. PERFORM TESTS AND INSPECTIONS.
 - 1. MANUFACTURER'S FIELD SERVICE ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS, AND TO ASSIST IN TESTING.
 - 2. LEAK TEST: AFTER INSTALLATION, CHARGE SYSTEM AND TEST FOR LEAKS. REPAIR LEAKS AND RETEST UNTIL NO LEAKS EXIST.
 - 3. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER OPERATION.
 - 4. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.
 - B. DOMESTIC-WATER HEATERS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.
 - C. PREPARE TEST AND INSPECTION REPORTS.
- 3.3 DEMONSTRATION
 - A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE, AND MAINTAIN COMMERCIAL, GAS-FIRED, STORAGE, DOMESTIC-WATER HEATERS.

END OF SECTION

SECTION 224020 - PLUMBING FIXTURES

PART 1 - GENERAL

- 1.1 SECTION REQUIREMENTS
 - A. SUBMITTALS:
 - 1. PRODUCT DATA FOR EACH TYPE OF PLUMBING FIXTURE, INCLUDING TRIM, FITTINGS, ACCESSORIES, APPLIANCES, AFFURTENANCES, EQUIPMENT, AND SUPPORTS.
 - 2. DOCUMENTATION INDICATING FLOW AND WATER CONSUMPTION REQUIREMENTS.

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
 - A. REGULATORY REQUIREMENTS: COMPLY WITH REQUIREMENTS IN ICC A117.1, "ACCESSIBILITY AND USABLE BUILDINGS AND FACILITIES"; PUBLIC LAW 92-492, "ARCHITECTURAL BARRIERS ACT AND PUBLIC LAW 101-336, "AMERICANS WITH DISABILITIES ACT" FOR PLUMBING FIXTURES FOR PEOPLE WITH DISABILITIES.
 - B. REGULATORY REQUIREMENTS: COMPLY WITH REQUIREMENTS IN 40CFR 102-486, "ENERGY POLICY ACT," ABOUT WATER FLOW AND CONSUMPTION RATES FOR PLUMBING FIXTURES.
 - C. NSF STANDARD: COMPLY WITH NSF 61, "DRINKING WATER SYSTEM COMPONENTS - HEALTH EFFECTS," FOR FIXTURE MATERIALS THAT WILL BE IN CONTACT WITH POTABLE WATER.
 - D. FIXTURES SHALL BE PROVIDED AS SCHEDULED ON THE DRAWINGS.

PART 3 - EXECUTION

- 3.1 INSTALLATIONS
 - A. INSTALL FITTING INSTALLATION UNITS ON FIXTURES FOR PEOPLE WITH DISABILITIES.
 - B. INSTALL FIXTURES WITH FLANGES AND GASKET SEALS.
 - C. INSTALL TANKS FOR ACCESSIBLE, TANK-TYPE WATER CLOSETS WITH LEVER HANDLE MOUNTED ON WIDE SIDE OF COMPARTMENT.
 - D. FASTEN WALL-HANGING PLUMBING FIXTURES SECURELY TO SUPPORTS ATTACHED TO BUILDING SUBSTRATE WHEN SUPPORTS ARE SPECIFIED, AND TO BUILDING WALL CONSTRUCTION WHERE NO SUPPORT IS INDICATED.
 - E. FASTEN FLOOR-MOUNTED FIXTURES TO SUBSTRATE. FASTEN FIXTURES HAVING HOLES FOR SECURITY FIXTURE TO WALL CONSTRUCTION, TO REINFORCEMENT BUILT INTO WALLS.
 - F. FASTEN WALL-MOUNTED FITTINGS TO REINFORCEMENT BUILT INTO WALLS.
 - G. FASTEN COUNTER-MOUNTING PLUMBING FIXTURES TO CABEWORK.
 - H. SECURE SUPPLIES TO SUPPORTS OR SUBSTRATE WITHIN PIPE SPACE BEHIND FIXTURE.
 - 1. SET MOP BASINS IN LEVELING BED OF CEMENT GROUT.
 - J. INSTALL INDIVIDUAL SUPPLY INLETS, SUPPLY STOPS, SUPPLY RISERS, AND TUBULAR BRASS TRAPS WITH CLEANOUTS AT FIXTURE.
 - K. INSTALL WATER-SUPPLY STOP VALVES IN ACCESSIBLE LOCATIONS.
 - L. INSTALL TRAPS ON FIXTURE OUTLETS. OMIT TRAPS ON FIXTURES HAVING INTEGRAL TRAPS. OMIT TRAPS ON INDIRECT WASTES UNLESS OTHERWISE INDICATED.
 - M. INSTALL ESCUTCHEONS AT WALL, FLOOR, AND CEILING PENETRATIONS IN EXPOSED, FINISHED

- LOCATIONS AND WITHIN CABINETS AND MILLWORK. USE DEEP-PATTERN ESCUTCHEONS WHERE REQUIRED TO CONCEAL PROTRUDING PIPE FITTINGS.
- N. SEAL JOINTS BETWEEN FIXTURES AND WALLS, FLOORS, AND COUNTERS USING SANITARY-TYPE, ONE-PART, MILDEW-RESISTANT, SILICONE SEALANT. MATCH SEALANT COLOR TO FIXTURE COLOR.
- O. INSTALL PIPING CONNECTIONS BETWEEN PLUMBING FIXTURES AND PIPING SYSTEMS AND PLUMBING EQUIPMENT. INSTALL INSULATION ON SUPPLIES AND DRAINS OF FIXTURES FOR PEOPLE WITH DISABILITIES.

END OF SECTION
SECTION 221623 - FACILITY NATURAL-GAS PIPING

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
 - A. MINIMUM OPERATING-PRESSURE RATINGS:
 - 1. PIPING AND VALVES: 100 PSIG MINIMUM UNLESS OTHERWISE INDICATED.
 - B. NATURAL-GAS SYSTEM PRESSURE WITHIN BUILDING: ONE DISTRIBUTION PRESSURE, 14" W.C. BUT NOT MORE THAN 2.0 PSIG.
- 2.2 PIPES, TUBES, AND FITTINGS
 - A. STEEL PIPE: ASTM A 53/A 53M, BLACK STEEL, SCHEDULE 40, TYPE E OR S, GRADE B.
 - 1. MALLEABLE-IRON THREADED FITTINGS: ASME B16.3, CLASS 150, STANDARD PATTERN.
 - 2. WROUGHT-STEEL WELDING FITTINGS: ASTM A 234/A 234M FOR BUTT WELDING AND SOCKET WELDING.
 - 3. UNIONS: ASME B16.33, CLASS 150, MALLEABLE IRON WITH BRASS-TO-IRON SEAT, GROUND JOINT, AND THREADED ENDS.
 - 4. PROTECTIVE COATING FOR UNDERGROUND PIPING: FACTORY-APPLIED, THREE-LAYER COATING OF EPOXY, ADHESIVE, AND PE.
 - B. CORRUGATED, STAINLESS-STEEL TUBING: COMPLY WITH ANSI/AIS I 12. INCLUDE FLAME-RETARDANT PE COATING, COPPER-ALLOY THREADED ENDS, AND STRIKER PLATES.
- 2.3 SPECIALTIES
 - A. APPLIANCE FLEXIBLE CONNECTORS:
 - 1. INDOOR, FIXED-APPLIANCE FLEXIBLE CONNECTORS: COMPLY WITH ANSI Z12.4.
 - 2. INDOOR, MOVABLE-APPLIANCE FLEXIBLE CONNECTORS: COMPLY WITH ANSI Z16.9.
 - 3. OUTDOOR, APPLIANCE FLEXIBLE CONNECTORS: COMPLY WITH ANSI Z12.15.
 - 4. CORRUGATED STAINLESS-STEEL TUBING WITH POLYMER COATING.
 - B. STRAINERS: ASTM A 126, CLASS B, CAST-IRON BODY, Y-PATTERN, FULL SIZE CONNECTING PIPING, CUP RATING OF 125 PSIG. INCLUDE 40-MESH STARTUP STRAINER AND INTEGRATED STAINLESS-STEEL BASKET.
 - C. WEATHERPROOF VENT CAP: CAST- OR MALLEABLE-IRON, BRASS FITTING WITH CORROSION-RESISTANT WIRE SCREEN WITH FREE AREA AT LEAST EQUAL TO CROSS-SECTIONAL AREA OF CONNECTING PIPE AND THREADED-END CONNECTION.
- 2.4 VALVES
 - A. GENERAL REQUIREMENTS FOR METALLIC MANUAL GAS SHUTOFF VALVES: COMPLY WITH ASME B16.33.
 - 1. CUP RATING: 125 PSIG.
 - B. ONE-PIECE, BRONZE BALL VALVE WITH BRONZE TRIM: MSS SP-110.
 - 1. BODY: BRONZE, COMPLYING WITH ASTM B 584.
 - 2. BALL: CHROME-PLATED BRASS.
 - 3. STEM: BRONZE+ BLOWOUT PROOF.
 - 4. SEATS: REINFORCED TFE+ BLOWOUT PROOF.
 - 5. PACKING: SEPARATE PACKING WITH ADJUSTABLE STEM PACKING THREADED ENDS.
 - 6. CUP RATING: 600 PSIG.
 - 7. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
 - C. TWO-PIECE, FULL-PORT, BRONZE BALL VALVES WITH BRONZE TRIM: MSS SP-110.
 - 1. BODY: BRONZE, COMPLYING WITH ASTM B 584.
 - 2. BALL: CHROME-PLATED BRONZE.
 - 3. SEAT: BRONZE+ BLOWOUT PROOF.
 - 4. SEATS: REINFORCED TFE+ BLOWOUT PROOF.
 - 5. PACKING: THREADED BODY PACKNUT DESIGN WITH ADJUSTABLE STEM PACKING.
 - 6. CUP RATING: 600 PSIG.
 - 7. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
 - D. BRONZE PLUG VALVES: MSS SP-18.
 - 1. BODY: BRONZE, COMPLYING WITH ASTM B 584.
 - 2. FLUG: BRONZE.
 - 3. OPERATOR: SQUARE HEAD OR LUG TYPE WITH TAMPERPROOF FEATURE WHERE INDICATED.
 - 4. PRESSURE CLASS: 125 PSIG.
 - 5. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
 - E. CAST-IRON, NONLUBRICATED PLUG VALVES: MSS SP-18.
 - 1. BODY: CAST IRON, COMPLYING WITH ASTM A 126, CLASS B.
 - 2. FLUG: BRONZE OR NICKEL-PLATED CAST IRON.
 - 3. SEAT: COATED WITH THERMOPLASTIC.
 - 4. STEM SEAL: COMPATIBLE WITH NATURAL GAS.
 - 5. OPERATOR: SQUARE HEAD OR LUG TYPE WITH TAMPERPROOF FEATURE WHERE INDICATED.
 - 6. PRESSURE CLASS: 125 PSIG.
 - 7. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
 - F. ELECTRICALLY OPERATED, AUTOMATIC GAS VALVES: COMPLY WITH UL 429.
- 2.5 PRESSURE REGULATORS

- A. GENERAL REQUIREMENTS: SINGLE STAGE, STEEL JACKETED, AND CORROSION RESISTANT. INCLUDE ELEVATION COMPENSATOR.
- B. LINE PRESSURE REGULATORS: ANSI Z1120.2 2-PSIG MAXIMUM INLET PRESSURE. FACTORY- OR FIELD-INSTALLED, STAINLESS-STEEL SCREEN IN VENT OPENING IF NOT CONNECTED TO VENT PIPING.
- C. APPLIANCE PRESSURE REGULATORS: ANSI Z112.1 2-PSIG MAXIMUM INLET PRESSURE. REGULATOR MAY INCLUDE VENT LIMITING DEVICE, INSTEAD OF VENT CONNECTION, IF APPROVED BY AUTHORITIES HAVING JURISDICTION.

PART 3 - EXECUTION

- 3.1 INDOOR PIPING INSTALLATION
 - A. COMPLY WITH REQUIREMENTS IN SECTION 220520 "COMMON WORK RESULTS FOR PLUMBING" FOR BASIC PIPING INSTALLATION REQUIREMENTS.
 - B. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
 - C. INSTALL ESCUTCHEONS AT PENETRATIONS OF INTERIOR WALLS, CEILINGS, AND FLOORS.
 - D. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRESTOP MATERIALS. COMPLY WITH REQUIREMENTS IN SECTION 078415 "PENETRATION FIRESTOPPING".
 - E. INSTALL GAS STOPS FOR SHUTOFF TO APPLIANCES WITH LOW-PRESSURE GAS SUPPLIES.
 - F. INSTALL NATURAL-GAS PIPING AT UNIFORM GRADE OF 2 PERCENT DOWN TOWARD DRIP AND SEDIMENT TRAPS.
 - G. USE ECCENTRIC REDUCER FITTINGS TO MAKE REDUCERS IN PIPE SIZES. INSTALL FITTINGS WITH LEVEL SIDE DOWN.
 - H. CONNECT BRANCH PIPING TO MAIN OR SIZE OF HORIZONTAL PIPING.
 - I. INSTALL UNIONS IN LINES NPS 2 AND SMALLER, ADJACENT TO EACH VALVE, AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT. UNIONS ARE NOT REQUIRED AT FLANGED CONNECTIONS.
 - J. INSTALL STRAINER OR INLET OF EACH LINE PRESSURE REGULATOR AND AUTOMATIC OR ELECTRICALLY OPERATED VALVE.
 - K. INSTALL PRESSURE GAUGE PLUG UPSTREAM AND DOWNSTREAM FROM EACH LINE REGULATOR.
 - L. CONNECT GAS PIPING TO EQUIPMENT AND APPLIANCES WITH SHUTOFF VALVES AND UNIONS. INSTALL GAS VALVE UPSTREAM FROM AND WITHIN 12 INCHES OF EACH APPLIANCE USING GAS-STOP BALL UNION OR FLANGED CONNECTIONS DOWNSTREAM FROM VALVES.
 - M. EXTEND RELIEF VENT CONNECTIONS FOR SERVICE REGULATORS, LINE REGULATORS, AND OVERPRESSURE PROTECTION DEVICES TO THE OUTDOORS AND TERMINATE WITH WEATHER-RESISTANT VENT CAP.
 - N. DO NOT USE NATURAL-GAS PIPING AS GROUNDING ELECTRODE.
- 3.2 PIPE JOINT CONSTRUCTION
 - A. THREADED JOINTS: THREAD PIPE WITH TAPERED PIPE THREADS COMPLYING WITH ANSI B1.20.1.
 - B. WELDED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS D10.12M/D10.12, USING QUALIFIED PROCESSES AND WELDING OPERATORS.
 - C. JOINTS IN STEEL PIPING WITH PROTECTIVE COATING: APPLY JOINT COVER KITS TO PIPE AFTER JOINING TO COVER, SEAL, AND PROTECT JOINTS.
 - D. FLANGED JOINTS: INSTALL GASKET MATERIAL, SIZE, TYPE, AND THICKNESS APPROPRIATE FOR NATURAL-GAS SERVICE. INSTALL GASKET CONCENTRICALLY POSITIONED.
- 3.3 VALVE INSTALLATION
 - A. INSTALL MANUAL GAS SHUTOFF VALVE FOR EACH GAS APPLIANCE AHEAD OF CORRUGATED STAINLESS-STEEL TUBING, ALUMINUM, OR COPPER CONNECTOR.
 - B. INSTALL REGULATORS AND OVERPRESSURE PROTECTION DEVICES WITH MAINTENANCE ACCESS SPACE ADEQUATE FOR SERVICING AND TESTING.
- 3.4 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 1" W.C. AND LESS THAN 5 PSIG.
 - A. ABOVEGROUND, BRANCH PIPING NPS 1 AND SMALLER SHALL BE THE FOLLOWING:
 - 1. CORRUGATED STAINLESS-STEEL TUBING WITH MECHANICAL FITTINGS HAVING SOCKET OR THREADED ENDS TO MATCH ADJACENT PIPING.
 - 2. STEEL PIPE WITH MALLEABLE-IRON FITTINGS AND THREADED JOINTS.
 - B. ABOVEGROUND, DISTRIBUTION PIPING SHALL BE THE FOLLOWING:
 - 1. STEEL PIPE WITH MALLEABLE-IRON FITTINGS AND THREADED JOINTS.
 - C. UNDERGROUND, BELOW BUILDING, SHALL BE 1/2 ONE OF THE FOLLOWING:
 - 1. STEEL PIPE WITH MALLEABLE-IRON FITTINGS AND THREADED JOINTS.
 - 2. STEEL PIPE WITH WROUGHT-STEEL FITTINGS AND WELDED JOINTS.
 - D. CONTAINMENT CONDUIT: STEEL WITH WROUGHT-STEEL FITTINGS AND WELDED JOINTS. COAT PIPE AND FITTINGS WITH PROTECTIVE COATING FOR STEEL PIPING.
 - E. CONTAINMENT CONDUIT VENT PIPING: STEEL PIPE WITH MALLEABLE-IRON FITTINGS AND THREADED OR WROUGHT-STEEL FITTINGS WITH WELDED JOINTS. COAT UNDERGROUND PIPE AND FITTINGS WITH PROTECTIVE COATING FOR STEEL PIPING.

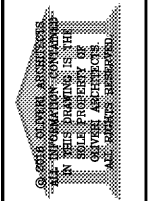
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