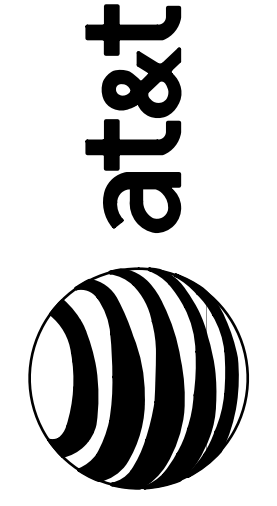




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REVISIONS

PLUMBING SPECIFICATIONS

SHEET NUMBER

M1.5

- C. PROTECTIVE SHIELDING GUARDS
  - 1. PROTECTIVE SHIELDING PIPE COVERS:
    - a. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
      - 1) ENGINEER BRASS CO.
      - 2) INSU-TECT PRODUCTS CO.; A SUBSIDIARY OF MVG MOLDED PRODUCTS.
      - 3) MCGUIRE MANUFACTURING CO., INC.
      - 4) PLUMBEREX SPECIALTY PRODUCTS INC.
      - 5) TOI PRODUCTS.
      - 6) TRUEBRO, INC.
      - 7) ZURN PLUMBING PRODUCTS GROUP; TUBULAR BRASS PLUMBING PRODUCTS OPERATION.
    - b. DESCRIPTION: MANUFACTURED PLASTIC WRAPS FOR COVERING PLUMBING FIXTURE HOT- AND COLD-WATER SUPPLIES AND TRAP AND DRAIN PIPING. COMPLY WITH AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS.
- D. FIXTURE SUPPORTS
  - 1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
    - a. JOSAM COMPANY.
    - b. MIFAB MANUFACTURING INC.
    - c. SMITH, JAY R. MFG. CO.
    - d. TYLER PIPE; WADE DIV.
    - e. WATTS DRAINAGE PRODUCTS INC.; A DIV. OF WATTS INDUSTRIES, INC.
  - 2. ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION.
- E. INSTALLATION
  - 1. ASSEMBLE PLUMBING FIXTURES, TRIM, FITTINGS, AND OTHER COMPONENTS ACCORDING TO MANUFACTURERS' WRITTEN INSTRUCTIONS.
  - 2. INSTALL OFF-FLOOR SUPPORTS, AFFIXED TO BUILDING SUBSTRATE, FOR WALL-MOUNTING FIXTURES:
    - a. USE CARRIER SUPPORTS WITH WASTE FITTING AND SEAL FOR BACK-OUTLET FIXTURES.
    - b. USE CARRIER SUPPORTS WITHOUT WASTE FITTING FOR FIXTURES WITH TUBULAR WASTE PIPING.
    - c. USE CHAIR-TYPE CARRIER SUPPORTS WITH RECTANGULAR STEEL UPRIGHTS FOR ACCESSIBLE FIXTURES.
  - 3. INSTALL FLOOR-MOUNTING FIXTURES ON CLOSET FLANGES OR OTHER ATTACHMENTS TO PIPING OR BUILDING SUBSTRATE.
  - 4. INSTALL WALL-MOUNTING FIXTURES WITH TUBULAR WASTE PIPING ATTACHED TO SUPPORTS.
  - 5. INSTALL COUNTER-MOUNTING FIXTURES IN AND ATTACHED TO CASEWORK.
  - 6. INSTALL FIXTURES LEVEL AND PLUMB ACCORDING TO ROUGHING-IN DRAWINGS.
  - 7. INSTALL WATER-SUPPLY PIPING WITH STOP ON EACH SUPPLY TO EACH FIXTURE TO BE CONNECTED TO WATER DISTRIBUTION PIPING. ATTACH SUPPLIES TO SUPPORTS OR SUBSTRATE WITHIN PIPE SPACES BEHIND FIXTURES. INSTALL STOPS IN LOCATIONS WHERE THEY CAN BE EASILY REACHED FOR OPERATION.
    - a. EXCEPTION: USE BALL, GATE, OR GLOBE VALVES IF SUPPLY STOPS ARE NOT SPECIFIED WITH FIXTURE.
  - 8. INSTALL TRAP AND TUBULAR WASTE PIPING ON DRAIN OUTLET OF EACH FIXTURE TO BE DIRECTLY CONNECTED TO SANITARY DRAINAGE SYSTEM.
  - 9. INSTALL TUBULAR WASTE PIPING ON DRAIN OUTLET OF EACH FIXTURE TO BE INDIRECTLY CONNECTED TO DRAINAGE SYSTEM.
  - 10. INSTALL TANKS FOR ACCESSIBLE, TANK-TYPE WATER CLOSETS WITH LEVER HANDLE MOUNTED ON WIDE SIDE OF COMPARTMENT.
  - 11. INSTALL TOILET SEATS ON WATER CLOSETS.
  - 12. INSTALL WATER-SUPPLY FLOW-CONTROL FITTINGS WITH SPECIFIED FLOW RATES IN FIXTURE SUPPLIES AT STOP VALVES.
  - 13. INSTALL TRAPS ON FIXTURE OUTLETS.
    - a. EXCEPTION: OMIT TRAP ON FIXTURES WITH INTEGRAL TRAPS.
    - b. EXCEPTION: OMIT TRAP ON INDIRECT WASTES, UNLESS OTHERWISE INDICATED.
  - 14. INSTALL ESCUTCHEONS AT PIPING WALL CEILING PENETRATIONS IN EXPOSED, FINISHED LOCATIONS AND WITHIN CABINETS AND MILLWORK. USE DEEP-PATTERN ESCUTCHEONS IF REQUIRED TO CONCEAL PROTRUDING FITTINGS.
  - 15. SET SERVICE BASINS IN LEVELING BED OF CEMENT GROUT.
- F. CONNECTIONS
  - 1. CONNECT FIXTURES WITH WATER SUPPLIES, STOPS, AND RISERS, AND WITH TRAPS, SOIL, WASTE, AND VENT PIPING. USE SIZE FITTINGS REQUIRED TO MATCH FIXTURES.
- G. FIELD QUALITY CONTROL
  - 1. INSPECT INSTALLED PLUMBING FIXTURES FOR DAMAGE. REPLACE DAMAGED FIXTURES AND COMPONENTS.
  - 2. TEST INSTALLED FIXTURES AFTER WATER SYSTEMS ARE PRESSURIZED FOR PROPER OPERATION. REPLACE MALFUNCTIONING FIXTURES AND COMPONENTS, THEN RETEST. REPEAT PROCEDURE UNTIL UNITS OPERATE PROPERLY.
- H. ADJUSTING
  - 1. OPERATE AND ADJUST FAUCETS AND CONTROLS. REPLACE DAMAGED AND MALFUNCTIONING FIXTURES, FITTINGS, AND CONTROLS.
  - 2. ADJUST WATER PRESSURE AT FAUCETS TO PRODUCE PROPER FLOW AND STREAM.
  - 3. ADJUST WATER COOLER TEMPERATURE SETTINGS.
  - 4. REPLACE WASHERS AND SEALS OF LEAKING AND DRIPPING FAUCETS AND STOPS.

- I. INSTALLATION
  - 1. INSTALL TEMPERATURE-ACTUATED WATER MIXING VALVES WITH CHECK STOPS OR SHUTOFF VALVES ON INLETS AND WITH SHUTOFF VALVE ON OUTLET.
  - 2. INSTALL WATER HAMMER ARRESTERS IN WATER PIPING ACCORDING TO PDI-WH 201.
  - 3. INSTALL SUPPLY-TYPE, TRAP-SEAL PRIMER VALVES WITH OUTLET PIPING PITCHED DOWN TOWARD DRAIN TRAP A MINIMUM OF 1 PERCENT, AND CONNECT TO FLOOR-DRAIN BODY, TRAP, OR INLET FITTING. ADJUST VALVE FOR PROPER FLOW.
  - 4. INSTALL CLEANOUTS IN ABOVEGROUND PIPING AND BUILDING DRAIN PIPING ACCORDING TO THE FOLLOWING INSTRUCTIONS UNLESS OTHERWISE INDICATED:
    - a. USE CLEANOUTS THE SAME SIZE AS DRAINAGE PIPING UP TO NPS 4 (DN 100). USE NPS 4 (DN 100) FOR LARGER DRAINAGE PIPING UNLESS LARGER CLEANOUT IS INDICATED.
    - b. LOCATE CLEANOUTS AT EACH CHANGE IN DIRECTION OF PIPING GREATER THAN 45 DEGREES.
    - c. LOCATE CLEANOUTS AT MINIMUM INTERVALS OF 50 FEET (15 M) FOR PIPING NPS 4 (DN 100) AND SMALLER AND 100 FEET (30 M) FOR LARGER PIPING.
    - d. LOCATE CLEANOUTS AT BASE OF EACH VERTICAL SOIL AND WASTE STACK.
    - 12. FOR FLOOR CLEANOUTS FOR PIPING BELOW FLOORS, INSTALL CLEANOUT DECK PLATES WITH TOP FLUSH WITH FINISHED FLOOR.
    - 13. FOR CLEANOUTS LOCATED IN CONCEALED PIPING, INSTALL CLEANOUT WALL ACCESS COVERS, OF PRESS. INDICATED, WITH FRAME AND COVER FLUSH WITH FINISHED WALL.
    - 14. INSTALL TEST TEES IN VERTICAL CONDUCTORS AND NEAR FLOOR.
    - 15. INSTALL WALL CLEANOUTS IN VERTICAL CONDUCTORS. INSTALL ACCESS DOOR IN WALL IF INDICATED.
    - 16. INSTALL FLOOR DRAINS AT LOW POINTS OF SURFACE AREAS TO BE DRAINED. SET GRATES OF DRAINS FLUSH WITH FINISHED FLOOR, UNLESS OTHERWISE INDICATED.
    - 17. INSTALL ROOF FLASHING ASSEMBLIES ON SANITARY STACK VENTS AND VENT STACKS THAT EXTEND THROUGH ROOF.
    - 18. INSTALL AIR-GAP FITTINGS ON DRAINING-TYPE BACKFLOW PREVENTERS AND ON INDIRECT-WASTE PIPING DISCHARGE INTO SANITARY DRAINAGE SYSTEM.
    - 19. INSTALL EXPANSION JOINTS ON VERTICAL STACKS AND CONDUCTORS. POSITION EXPANSION JOINTS FOR EASY ACCESS AND MAINTENANCE.
    - 20. INSTALL ESCUTCHEONS AT WALL, FLOOR, AND CEILING PENETRATIONS IN EXPOSED FINISHED LOCATIONS AND WITHIN CABINETS AND MILLWORK. USE DEEP-PATTERN ESCUTCHEONS IF REQUIRED TO CONCEAL PROTRUDING PIPE FITTINGS.
- K. ADJUSTING
  - 1. SET FIELD-ADJUSTABLE TEMPERATURE SET POINTS OF TEMPERATURE-ACTUATED WATER MIXING VALVES.
- 224100 PLUMBING FIXTURES
  - A. SUBMITTALS
    - 1. PRODUCT DATA: FOR EACH TYPE OF PLUMBING FIXTURE INDICATED. INCLUDE SELECTED FIXTURE AND TRIM, FITTINGS, ACCESSORIES, APPLIANCES, APPURTENANCES, EQUIPMENT, AND SUPPORTS. INDICATE MATERIALS AND FINISHES, DIMENSIONS, CONSTRUCTION DETAILS, AND FLOW-CONTROL RATES.
  - B. QUALITY ASSURANCE
    - 1. SOURCE LIMITATIONS: OBTAIN PLUMBING FIXTURES, FAUCETS, AND OTHER COMPONENTS OF EACH CATEGORY THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
      - a. EXCEPTION: IF FIXTURES, FAUCETS, OR OTHER COMPONENTS ARE NOT AVAILABLE FROM A SINGLE MANUFACTURER, OBTAIN SIMILAR PRODUCTS FROM OTHER MANUFACTURERS SPECIFIED FOR THAT CATEGORY.
    - 2. REGULATORY REQUIREMENTS: COMPLY WITH REQUIREMENTS IN ICC A117.1, "ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES", PUBLIC LAW 90-480, "ARCHITECTURAL BARRIERS ACT", AND PUBLIC LAW 101-336, "AMERICANS WITH DISABILITIES ACT" FOR PLUMBING FIXTURES FOR PEOPLE WITH DISABILITIES.
    - 3. REGULATORY REQUIREMENTS: COMPLY WITH REQUIREMENTS IN PUBLIC LAW 102-486, "ENERGY POLICY ACT," ABOUT WATER FLOW AND CONSUMPTION RATES FOR PLUMBING FIXTURES.
    - 4. NSF STANDARD: COMPLY WITH NSF 61, "DRINKING WATER SYSTEM COMPONENTS-HEALTH EFFECTS," FOR FIXTURE MATERIALS THAT WILL BE IN CONTACT WITH POTABLE WATER.
    - 5. PROVIDE PRODUCTS INDICATED ON DRAWINGS OR COMPARABLE PRODUCTS COMPLIANT WITH REQUIREMENTS OF THE PRODUCTS SPECIFIED.

- D. DRAIN VALVES
    - 1. BALL-VALVE-TYPE, HOSE-END DRAIN VALVES:
      - a. STANDARD: MSS SP-110 FOR STANDARD-PORT, TWO-PIECE BALL VALVES.
      - b. SIZE: NPS 3/4 (DN 20).
      - c. OUTLET: THREADED, SHORT NIPPLE WITH GARDEN-HOSE THREAD COMPLYING WITH ASME B1.20.7 AND CAP WITH BRASS CHAIN.
    - 2. STOP-AND-WASTE DRAIN VALVES:
      - a. STANDARD: MSS SP-110 FOR BALL VALVES OR MSS SP-80 FOR GATE VALVES.
      - b. SIZE: NPS 3/4 (DN 20).
      - c. DRAIN: NPS 1/8 (DN 6) SIDE OUTLET WITH CAP.
  - E. WATER HAMMER ARRESTERS
    - 1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
      - a. AMTRCO, INC.
      - b. JOSAM COMPANY.
      - c. MIFAB, INC.
      - d. PPP INC.
      - e. SIOUX CHIEF MANUFACTURING COMPANY, INC.
      - f. SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
      - g. TYLER PIPE; WADE DIV.
      - h. WATTS DRAINAGE PRODUCTS INC.
      - i. ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION.
    - 2. STANDARD: ASSE 1010 OR PDI-WH 201.
    - 3. TYPE: METAL BELLOWS.
    - 4. SIZE: ASSE 1010, SIZES AA AND A THROUGH F OR PDI-WH 201, SIZES A THROUGH F.
  - F. CLEANOUTS
    - 1. EXPOSED METAL CLEANOUTS:
      - a. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
        - 1) JOSAM COMPANY; JOSAM DIV.
        - 2) MIFAB, INC.
        - 3) SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
        - 4) TYLER PIPE; WADE DIV.
        - 5) WATTS DRAINAGE PRODUCTS INC.
      - b. ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION.
    - 2. STANDARD: ASME A112.36.2M FOR CAST IRON, ASTM A74 OR CISPI 301 FOR CLEANOUT TEST TEE.
    - c. SIZE: SAME AS CONNECTED DRAINAGE PIPING.
    - d. BODY MATERIAL: HUB-AND-SPIGOT, CAST-IRON SOIL PIPE OR T-BRANCH HUBLESS, CAST-IRON SOIL PIPE TEST TEE AS REQUIRED TO MATCH CONNECTED PIPING.
    - e. CLOSURE: COUNTERSUNK OR RAISED-HEAD, BRASS PLUG.
    - f. CLOSURE PLUG SIZE: SAME AS OR NOT MORE THAN ONE SIZE SMALLER THAN CLEANOUT SIZE.
  - 2. FLOOR CLEANOUTS:
    - a. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
      - 1) JOSAM COMPANY.
      - 2) DATEY.
      - 3) SIOUX CHIEF MANUFACTURING COMPANY, INC.
      - 4) SMITH, JAY R. MFG. CO.
      - 5) TYLER PIPE.
      - 6) WATTS WATER TECHNOLOGIES, INC.
      - 7) ZURN PLUMBING PRODUCTS GROUP; LIGHT COMMERCIAL PRODUCTS OPERATION.
      - 8) ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION.
    - b. STANDARD: ASME A112.36.2M.
    - c. SIZE: SAME AS CONNECTED BRANCH.
    - d. TYPE: CAST-IRON SOIL PIPE WITH CAST-IRON FERRULE.
    - e. BODY OR FERRULE MATERIAL: CAST IRON.
    - f. CLOSURE: BRASS PLUG WITH STRAIGHT THREADS AND GASKET.
    - g. ADJUSTABLE HOUSING MATERIAL: CAST IRON.
    - h. RISER: ASTM A 74, SERVICE CLASS, CAST-IRON DRAINAGE PIPE FITTING AND RISER TO CLEANOUT.
  - 3. WALL CLEANOUTS:
    - a. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
      - 1) JOSAM COMPANY.
      - 2) MIFAB, INC.
      - 3) SMITH, JAY R. MFG. CO.
      - 4) TYLER PIPE.
      - 5) WATTS WATER TECHNOLOGIES, INC.
      - 6) ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION.
    - b. STANDARD: ASME A112.36.2M FOR CAST IRON, ASTM A74 OR CISPI 301 FOR CLEANOUT TEST TEE. INCLUDE WALL ACCESS.
    - c. SIZE: SAME AS CONNECTED DRAINAGE PIPING.
    - d. BODY: HUB-AND-SPIGOT, CAST-IRON SOIL PIPE T-BRANCH OR HUBLESS, CAST-IRON SOIL PIPE TEST TEE AS REQUIRED TO MATCH CONNECTED PIPING.
    - e. CLOSURE: COUNTERSUNK OR RAISED-HEAD, DRILLED-AND-THREADED BRASS PLUG.
    - f. CLOSURE PLUG SIZE: SAME AS OR NOT MORE THAN ONE SIZE SMALLER THAN CLEANOUT SIZE.
    - g. WALL ACCESS: ROUND, FLAT, CHROME-PLATED BRASS OR STAINLESS-STEEL COVER PLATE WITH SCREW.
- G. ROOF FLASHING ASSEMBLIES
  - 1. ROOF FLASHING ASSEMBLIES:
    - a. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
      - 1) ACORN ENGINEERING COMPANY; ELMODOR/STONEMAN DIV.
      - 2) THALER METAL INDUSTRIES LTD.
    - 2. DESCRIPTION: MANUFACTURED ASSEMBLY MADE OF 6.0-LB./SQ. FT. (30-KG./SQ. M), 0.0938-INCH- (2.4-MM-) THICK, LEAD FLASHING COLLAR AND SKIRT EXTENDING AT LEAST 8 INCHES (200 MM) FROM PIPE, WITH GALVANIZED-STEEL BOOT REINFORCEMENT AND COUNTERFLASHING FITTING.
- H. MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES
  - 1. AIR-GAP FITTINGS:
    - a. STANDARD: ASME A112.1.2, FOR FITTING DESIGNED TO ENSURE FIXED, POSITIVE AIR GAP BETWEEN INSTALLED INLET AND OUTLET PIPING.
    - b. BODY: BRONZE OR CAST IRON.
    - c. INLET: OPENING IN TOP OF BODY.
    - d. OUTLET: LARGER THAN INLET.
    - e. SIZE: SAME AS CONNECTED WASTE PIPING AND WITH INLET LARGE ENOUGH FOR ASSOCIATED INDIRECT WASTE PIPING.
  - 2. EXPANSION JOINTS:
    - a. STANDARD: ASME 1112.21.2M.
    - b. BODY: CAST IRON WITH BRONZE SLEEVE, PACKING, AND GLAND.
    - c. END CONNECTIONS: MATCHING CONNECTED PIPING.
    - d. SIZE: SAME AS CONNECTED SOIL, WASTE, OR VENT PIPING.

- I. CONNECTIONS
  - 1. DRAWINGS INDICATE GENERAL ARRANGEMENT OF PIPING, FITTINGS, AND SPECIALTIES.
  - 2. INSTALL PIPING ADJACENT TO EQUIPMENT AND MACHINES TO ALLOW SERVICE AND MAINTENANCE.
  - 3. CONNECT DOMESTIC WATER PIPING TO WATER-SERVICE PIPING WITH SHUTOFF VALVE, EXTEND AND CONNECT TO THE FOLLOWING:
    - a. WATER HEATERS: COLD-WATER INLET AND HOT-WATER OUTLET PIPING IN SIZES INDICATED, BUT NOT SMALLER THAN SIZES OF WATER HEATER CONNECTIONS.
    - b. PLUMBING FIXTURES: COLD- AND HOT-WATER SUPPLY PIPING IN SIZES INDICATED, BUT NOT SMALLER THAN REQUIRED BY PLUMBING CODE. COMPLY WITH REQUIREMENTS IN DIVISION 22 PLUMBING FIXTURE SECTIONS FOR CONNECTION SIZES.
    - c. EQUIPMENT: COLD- AND HOT-WATER SUPPLY PIPING AS INDICATED, BUT NOT SMALLER THAN EQUIPMENT CONNECTIONS. PROVIDE SHUTOFF VALVE AND UNION FOR EACH CONNECTION. USE FLANGES INSTEAD OF UNIONS FOR NPS 2-1/2 (DN 65) AND LARGER.
- J. ESCUTCHEON INSTALLATION
  - 1. INSTALL ESCUTCHEONS FOR PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.
- K. FIELD QUALITY CONTROL
  - 1. DURING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST 24 HOURS BEFORE INSPECTION MUST BE MADE. PERFORM TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.
    - a. ROUGHING-IN INSPECTION: ARRANGE FOR INSPECTION OF PIPING BEFORE CONCEALING OR CLOSING-IN AFTER ROUGHING-IN AND BEFORE SETTING FIXTURES.
    - b. FINAL INSPECTION: ARRANGE FOR FINAL INSPECTION BY AUTHORITIES HAVING JURISDICTION TO OBSERVE TESTS SPECIFIED BELOW AND TO ENSURE COMPLIANCE WITH REQUIREMENTS.
  - 2. REINSPECTION: IF AUTHORITIES HAVING JURISDICTION FIND THAT PIPING WILL NOT PASS TEST OR INSPECTION, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION.
  - 3. REPORTS: PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.
  - 4. PIPING TESTS:
    - a. FILL DOMESTIC WATER PIPING. CHECK COMPONENTS TO DETERMINE THAT THEY ARE NOT AIR BOUND AND THAT PIPING IS FULL OF WATER.
    - b. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, TEST EACH SEGMENT SEPARATE. FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
    - c. LEAVE NEW, ALTERED, EXTENDED, OR REPLACED DOMESTIC WATER PIPING UNCOVERED AND UNCONCEALED UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
    - d. CAP AND SUBJECT PIPING TO STATIC WATER PRESSURE OF 50 PSIG (345 KPA) ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.
    - e. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
      - 1) PREPARE REPORTS FOR TESTS AND FOR CORRECTIVE ACTION REQUIRED.
  - 5. DOMESTIC WATER PIPING WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.
  - 6. TEST DRAINAGE AND VENT PIPING ACCORDING TO PROCEDURES OF AUTHORITIES HAVING JURISDICTION OR, IN ABSENCE OF PUBLISHED PROCEDURES, AS FOLLOWS:
    - a. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
    - b. LEAVE UNCOVERED AND UNCONCEALED NEW, ALTERED, EXTENDED, OR REPLACED DRAINAGE AND VENT PIPING UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
    - c. ROUGHING-IN PLUMBING TEST PROCEDURE: TEST DRAINAGE AND VENT PIPING, EXCEPT OUTSIDE LEADERS, ON COMPLETION OF ROUGHING-IN. CLOSE OPENINGS IN PIPING SYSTEM AND FILL WITH WATER TO POINT OF OVERFLOW, BUT NOT LESS THAN 10-FOOT HEAD OF WATER (30 KPA). FROM 15 MINUTES BEFORE INSPECTION STARTS TO COMPLETION OF INSPECTION, WATER LEVEL MUST NOT DROP. INSPECT JOINTS FOR LEAKS.
    - d. FINISHED PLUMBING TEST PROCEDURE: AFTER PLUMBING FIXTURES HAVE BEEN SET AND TRAPS FILLED WITH WATER, TEST CONNECTIONS AND PROVE THEY ARE GASTIGHT AND WATERTIGHT. PLUG VENT-STACK OPENINGS ON ROOF AND BUILDING DRAINS WHERE THEY LEAVE BUILDING. INTRODUCE AIR INTO PIPING SYSTEM EQUAL TO PRESSURE OF 1-INCH WG (250 PA). USE U-TUBE OR MANOMETER INSERTED IN TRAP OF WATER CLOSET TO MEASURE TEST PRESSURE. AIR PRESSURE MUST REMAIN CONSTANT WITHOUT INTRODUCING ADDITIONAL AIR THROUGHOUT PERIOD OF INSPECTION. INSPECT PLUMBING FIXTURE CONNECTIONS FOR GAS AND WATER LEAKS.
    - e. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING, OR PORTION THEREOF, UNTIL SATISFACTORY RESULTS ARE OBTAINED.
    - f. PREPARE REPORTS FOR TESTS AND REQUIRED CORRECTIVE ACTION.
- L. ADJUSTING
  - 1. PERFORM THE FOLLOWING ADJUSTMENTS BEFORE OPERATION:
    - a. CLOSE DRAIN VALVES, HYDRANTS, AND HOSE BIBBS.
    - b. OPEN SHUTOFF VALVES TO FULLY OPEN POSITION.
    - c. OPEN THROTTLING VALVES TO PROPER SETTING.
    - d. CHECK PLUMBING SPECIALTIES AND VERIFY PROPER SETTINGS, ADJUSTMENTS, AND OPERATION.

- H. MINERAL-FIBER INSULATION INSTALLATION
  - 1. INSULATION INSTALLATION ON STRAIGHT PIPES AND TUBES:
    - a. SECURE EACH LAYER OF PREFORMED PIPE INSULATION TO PIPE WITH WIRE OR BANDS AND TIGHTEN BANDS WITHOUT DEFORMING INSULATION MATERIALS.
    - b. WHERE VAPOR BARRIERS ARE INDICATED, SEAL LONGITUDINAL SEAMS, END JOINTS, AND PROTRUSIONS WITH VAPOR-BARRIER MASTIC AND JOINT SEALANT.
    - c. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON ABOVE AMBIENT SURFACES, SECURE LAPS WITH OUTWARD CLINCHED STAPLES AT 6 INCHES (150 MM) O.C.
    - d. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON BELOW AMBIENT SURFACES, DO NOT STAPLE LONGITUDINAL TABS BUT SECURE TABS WITH ADDITIONAL ADHESIVE, AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER, AND SEAL WITH VAPOR-BARRIER MASTIC AND FLASHING SEALANT.
  - 2. INSULATION INSTALLATION ON PIPE FITTINGS AND ELBOWS:
    - a. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE.
  - 3. INSULATION INSTALLATION ON VALVES AND PIPE SPECIALTIES:
    - a. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE.
    - b. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.
  - I. PIPING INSULATION SCHEDULE, GENERAL
    - 1. ITEMS NOT INSULATED: UNLESS OTHERWISE INDICATED, DO NOT INSTALL INSULATION ON THE FOLLOWING:
      - a. DRAINAGE PIPING LOCATED IN CRAWL SPACES.
      - b. UNDERGROUND PIPING.
      - c. CHROME-PLATED PIPES AND FITTINGS UNLESS THERE IS A POTENTIAL FOR PERSONNEL INJURY.
    - J. INDOOR PIPING INSULATION SCHEDULE
      - 1. REFER TO DRAWINGS FOR PIPING INSULATION SCHEDULE.
  - 221316 PLUMBING PIPING
    - A. SUBMITTALS
      - 1. PRODUCT DATA: FOR PIPE, TUBE, FITTINGS, AND COUPLINGS.
    - B. PROJECT CONDITIONS
      - 1. INTERRUPTION OF EXISTING WATER SERVICE: DO NOT INTERRUPT WATER SERVICE TO FACILITIES OCCUPIED BY OWNER OR OTHERS UNLESS PERMITTED UNDER THE FOLLOWING CONDITIONS AND THEN ONLY AFTER ARRANGING TO PROVIDE TEMPORARY WATER SERVICE ACCORDING TO REQUIREMENTS INDICATED:
        - a. NOTIFY ARCHITECT OR OWNER NO FEWER THAN TWO DAYS IN ADVANCE OF PROPOSED INTERRUPTION OF WATER SERVICE.
        - b. DO NOT PROCEED WITH INTERRUPTION OF WATER SERVICE WITHOUT ARCHITECT'S OR OWNER'S WRITTEN PERMISSION.
    - C. PIPING MATERIALS
      - 1. REFER TO DRAWINGS FOR PIPING MATERIALS.
    - D. PIPING APPLICATIONS
      - 1. REFER TO DRAWINGS FOR PIPING APPLICATIONS.
    - F. VALVE INSTALLATION
      - 1. GENERAL-DUTY VALVES: COMPLY WITH REQUIREMENTS IN DIVISION 22 SECTION "GENERAL-DUTY VALVES FOR PLUMBING PIPING" FOR VALVE INSTALLATIONS.
      - 2. INSTALL SHUTOFF VALVE CLOSE TO WATER MAIN ON EACH BRANCH AND RISER SERVING PLUMBING FIXTURES OR EQUIPMENT, ON EACH WATER SUPPLY TO EQUIPMENT, AND ON EACH WATER SUPPLY TO PLUMBING FIXTURES THAT DO NOT HAVE SUPPLY STOPS. USE BALL OR GATE VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE BUTTERFLY OR GATE VALVES FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
      - 3. INSTALL DRAIN VALVES FOR EQUIPMENT AT BASE OF EACH WATER RISER, AT LOW POINTS IN HORIZONTAL PIPING, AND WHERE REQUIRED TO DRAIN WATER PIPING. DRAIN VALVES ARE SPECIFIED IN DIVISION 22 SECTION "PLUMBING PIPING SPECIALTIES"
        - a. HOSE-END DRAIN VALVES: AT LOW POINTS IN WATER MAINS, RISERS, AND BRANCHES.
        - b. STOP-AND-WASTE DRAIN VALVES: INSTEAD OF HOSE-END DRAIN VALVES WHERE INDICATED.
    - G. JOINT CONSTRUCTION
      - 1. JOIN HUB-AND-SPIGOT, CAST-IRON SOIL PIPING WITH GASKET JOINTS ACCORDING TO CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK" FOR COMPRESSION JOINTS.
      - 2. JOIN HUB-AND-SPIGOT, CAST-IRON SOIL PIPING WITH CALKED JOINTS ACCORDING TO CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK" FOR LEAD AND OAKUM CALKED JOINTS.
      - 3. JOIN HUBLESS CAST-IRON SOIL PIPING ACCORDING TO CISPI 310 AND CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK" FOR HUBLESS-COUPLING JOINTS.
      - 4. SOLDERED JOINTS: USE ASTM B 813, WATER-FLUSHABLE, LEAD-FREE FLUX; ASTM B 32, LEAD-FREE-ALLOY SOLDER; AND ASTM B 828 PROCEDURE, UNLESS OTHERWISE INDICATED.
    - H. HANGER AND SUPPORT INSTALLATION
      - 1. PIPE HANGERS AND SUPPORTS ARE SPECIFIED IN DIVISION 22 SECTION "HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT." INSTALL THE FOLLOWING:
        - a. VERTICAL PIPING: MSS TYPE 8 OR TYPE 42, CLAMPS.
        - b. INSTALL INDIVIDUAL, STRAIGHT, HORIZONTAL PIPING RUNS ACCORDING TO THE FOLLOWING:
          - 1) 100 FEET (30 M) AND LESS: MSS TYPE 1, ADJUSTABLE, STEEL CLEVIS HANGERS.
          - 2) LONGER THAN 100 FEET (30 M): MSS TYPE 43, ADJUSTABLE ROLLER HANGERS.
          - 3) LONGER THAN 100 FEET (30 M), IF INDICATED: MSS TYPE 49, SPRING CUSHION ROLLS.
        - c. MULTIPLE, STRAIGHT, HORIZONTAL PIPING RUNS 100 FEET (30 M) OR LONGER: MSS TYPE 44, PIPE ROLLS. SUPPORT PIPE ROLLS ON TRAPEZE.
        - d. BASE OF VERTICAL PIPING: MSS TYPE 52, SPRING HANGERS.
      - 2. INSTALL SUPPORTS ACCORDING TO DIVISION 22 SECTION "HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT."
      - 3. SUPPORT VERTICAL PIPING AND TUBING AT BASE AND AT EACH FLOOR. ROD DIAMETER MAY BE REDUCED 1 SIZE FOR DOUBLE-ROD HANGERS, WITH 3/8-INCH (10-MM) MINIMUM RODS.
      - 5. INSTALL HANGERS FOR CAST-IRON SOIL PIPING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
        - a. NPS 1-1/2 AND NPS 2 (DN 40 AND DN 50): 60 INCHES (1500 MM) WITH 3/8-INCH (10-MM) ROD.
        - b. NPS 3 (DN 80): 60 INCHES (1500 MM) WITH 1/2-INCH (13-MM) ROD.
        - c. NPS 4 AND NPS 5 (DN 100 AND DN 125): 60 INCHES (1500 MM) WITH 5/8-INCH (16-MM) ROD.
        - d. NPS 6 (DN 150): 60 INCHES (1500 MM) WITH 3/4-INCH (19-MM) ROD.
        - e. NPS 8 TO NPS 12 (DN 200 TO DN 300): 60 INCHES (1500 MM) WITH 7/8-INCH (22-MM) ROD.
      - 6. INSTALL SUPPORTS FOR VERTICAL CAST-IRON SOIL PIPING EVERY 15 FEET (4.5 M).
      - 7. INSTALL HANGERS FOR COPPER TUBING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
        - a. NPS 3/4 (DN 20) AND SMALLER: 60 INCHES (1500 MM) WITH 3/8-INCH (10-MM) ROD.
        - b. NPS 1 AND NPS 1-1/4 (DN 25 AND DN 32): 72 INCHES (1800 MM) WITH 3/8-INCH (10-MM) ROD.
        - c. NPS 1-1/2 AND NPS 2 (DN 40 AND DN 50): 96 INCHES (2400 MM) WITH 3/8-INCH (10-MM) ROD.
        - d. NPS 2-1/2 (DN 65): 108 INCHES (2700 MM) WITH 1/2-INCH (13-MM) ROD.
        - e. NPS 3 TO NPS 5 (DN 80 TO DN 125): 10 FEET (3 M) WITH 1/2-INCH (13-MM) ROD.
        - f. NPS 6 (DN 150): 10 FEET (3 M) WITH 5/8-INCH (16-MM) ROD.
        - g. NPS 8 (DN 200): 10 FEET (3 M) WITH 3/4-INCH (19-MM) ROD.
      - 8. INSTALL SUPPORTS FOR VERTICAL COPPER TUBING EVERY 10 FEET (3 M).
      - 9. SUPPORT PIPING AND TUBING NOT LISTED ABOVE ACCORDING TO MSS SP-69 AND MANUFACTURER'S WRITTEN INSTRUCTIONS.

- 221317 PLUMBING SPECIALTIES
  - A. SUBMITTALS
    - 1. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
  - B. QUALITY ASSURANCE
    - 1. NSF COMPLIANCE:
      - a. COMPLY WITH NSF 61, "DRINKING WATER SYSTEM COMPONENTS - HEALTH EFFECTS; SECTIONS 1 THROUGH 9."
      - 2. UNLESS OTHERWISE INDICATED IN OTHER SECTION 2 ARTICLES, PROVIDE PRODUCTS INDICATED ON DRAWINGS OR COMPARABLE PRODUCTS COMPLIANT WITH REQUIREMENTS OF THE PRODUCTS SPECIFIED.