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2.03 SPRINKLER SPECIALTY FITTINGS
A. SPRINKLER SPECIALTY FITTINGS SHALL BE UL LISTED OR FMG APPROVED, WITH 175-PSIG MINIMUM WORKING-PRESSURE RATING, AND MADE OF MATERIALS COMPATIBLE WITH PIPING. SPRINKLER SPECIALTY FITTINGS SHALL HAVE 300-PSIG MINIMUM WORKING-PRESSURE RATING IF FITTINGS ARE COMPONENTS OF HIGH-PRESSURE PIPING SYSTEM.
B. SPRINKLER DRAIN AND ALARM TEST FITTINGS: CAST- OR DUCTILE-IRON BODY; WITH THREADED OR LOCKING-LUG INLET AND OUTLET, TEST VALVE, AND ORIFICE AND SIGHT GLASS.
1. APPROVED MANUFACTURERS: TYCO FIRE & BUILDING PRODUCTS LP., FIRE-END AND CROKER CORP., VIKING CORP., VICTAULIC CO. OF AMERICA.
C. SPRINKLER BRANCH-LINE TEST FITTINGS: BRASS BODY WITH THREADED INLET, CAPPED DRAIN OUTLET, AND THREADED OUTLET FOR SPRINKLER.
1. APPROVED MANUFACTURERS: ELKHART BRASS MFG. CO., INC.
D. SPRINKLER INSPECTOR'S TEST FITTING: CAST- OR DUCTILE-IRON HOUSING WITH THREADED INLET AND DRAIN OUTLET AND SIGHT GLASS.
1. APPROVED MANUFACTURERS: AGF MANUFACTURING CO., TYCO FIRE & BUILDING PRODUCTS LP., G/J INNOVATIONS, INC., TRIPLE R SPECIALTY OF AJAX, INC.
E. DROP-NIPPLE FITTINGS: UL 1474, ADJUSTABLE WITH THREADED INLET AND OUTLET, AND SEALS.
1. APPROVED MANUFACTURERS: CECA, LLC. AND MERIT.
F. FLEXIBLE SPRINKLER DROP FITTINGS
1. APPROVED MANUFACTURERS: VICTAULIC CO. OF AMERICA; AQUAFLEX SPRINKLER FITTINGS; AH-2 WITH AB1 BRACKET ASSEMBLY OR FLEXHEAD INDUSTRIES, INC.
2. DESCRIPTION: UL LISTED AND FMG APPROVED FLEXIBLE HOSE FOR CONNECTION TO SPRINKLER, AND WITH BRACKET FOR CONNECTION TO COMMERCIAL CEILING GRID.
3. STANDARD: UL 2443.
4. PRESSURE RATING: 175 PSIG
5. SIZE: SAME AS CONNECTED PIPING, FOR SPRINKLER.
6. DRY-PIPE-SYSTEM FITTINGS: UL LISTED FOR DRY-PIPE SERVICE.

2.04 LISTED FIRE-PROTECTION VALVES
A. VALVES SHALL BE UL LISTED OR FMG APPROVED, WITH 175-PSIG (1200 KPA) MINIMUM PRESSURE RATING. VALVES SHALL HAVE 300-PSIG PRESSURE RATING IF VALVES ARE COMPONENTS OF HIGH-PRESSURE PIPING SYSTEM.
B. GATE VALVES: UL 262, CAST-IRON BODY, BRONZE MOUNTED, WITH SOLID DISC, NONRISING STEM, OPERATING NUT, AND FLANGED ENDS.
1. APPROVED MANUFACTURERS: NIBCO., CRANE CO.; CRANE VALVE GROUP; STOCKHAM VALVES., MCWANE, INC.; KENNEDY VALVE DIV.
2. INDICATOR POSTS: UL 789, HORIZONTAL-WALL TYPE, CAST-IRON BODY, WITH HAND WHEEL, EXTENSION ROD, LOCKING DEVICE, AND CAST-IRON BARREL.
C. BALL VALVES: COMPLY WITH UL 1091, EXCEPT WITH BALL INSTEAD OF DISC.
1. APPROVED MANUFACTURERS: NIBCO., VICTAULIC CO. OF AMERICA, MUELLER COMPANY, TYCO FIRE AND BUILDING PRODUCTS
2. NPS 1-1/2 AND SMALLER: BRONZE BODY WITH THREADED ENDS.
3. NPS 2 AND NPS 2-1/2 : BRONZE BODY WITH THREADED ENDS OR DUCTILE-IRON BODY WITH GROOVED ENDS.
4. NPS 3 : DUCTILE-IRON BODY WITH GROOVED ENDS.
D. BUTTERFLY VALVES: UL 1091.
1. APPROVED MANUFACTURERS: NIBCO., VICTAULIC CO. OF AMERICA, MUELLER COMPANY, TYCO FIRE AND BUILDING PRODUCTS
2. NPS 2-1/2 AND LARGER: BRONZE, CAST-IRON, OR DUCTILE-IRON BODY; WAFER TYPE OR WITH FLANGED OR GROOVED ENDS.
E. CHECK VALVES NPS 2 AND LARGER: UL 312, SWING TYPE, CAST-IRON BODY WITH FLANGED OR GROOVED ENDS.
1. APPROVED MANUFACTURERS: NIBCO., VICTAULIC CO. OF AMERICA, MUELLER COMPANY, TYCO FIRE AND BUILDING PRODUCTS, WATTS
F. GATE VALVES: UL 262, OS&Y TYPE.
1. APPROVED MANUFACTURERS: NIBCO., HAMMOND VALVE, CRANE CO.; CRANE VALVE GROUP, MILWAUKEE VALVE COMPANY, MUELLER COMPANY
2. NPS 2 AND SMALLER: BRONZE BODY WITH THREADED ENDS.
3. NPS 2-1/2 AND LARGER: CAST-IRON BODY WITH FLANGED ENDS.

2.05 ALARM CHECK VALVES
A. APPROVED MANUFACTURERS: RELIABLE AUTOMATIC SPRINKLER CO., INC., VICTAULIC CO. OF AMERICA, VIKING CORP., TYCO FIRE AND BUILDING PRODUCTS
B. GENERAL REQUIREMENTS:
1. STANDARD: UL LISTED OR FMG APPROVED
2. STANDARD-PRESSURE VALVES: 175 PSIG MINIMUM.
3. BODY MATERIAL: CAST OR DUCTILE IRON.
4. SIZE: SAME AS CONNECTED PIPING.
5. END CONNECTIONS: FLANGED OR GROOVED.
C. DESCRIPTION: UL 193, DESIGNED FOR HORIZONTAL OR VERTICAL INSTALLATION, WITH BRONZE GROOVED SEAT WITH O-RING SEALS, SINGLE-HINGE PIN, AND LATCH DESIGN. INCLUDE TRIM SETS FOR BYPASS, DRAIN, ELECTRICAL SPRINKLER ALARM SWITCH, PRESSURE GAGES, RETARDING CHAMBER, AND FILL-LINE ATTACHMENT WITH STRAINER.
1. DRIP CUP ASSEMBLY: PIPE DRAIN WITHOUT VALVES AND SEPARATE FROM MAIN DRAIN PIPING.

2.11 SPRINKLERS
A. SPRINKLERS SHALL BE UL LISTED OR FMG APPROVED, WITH 175-PSIG MINIMUM PRESSURE RATING. SPRINKLERS SHALL HAVE 300-PSIG PRESSURE RATING IF SPRINKLERS ARE COMPONENTS OF HIGH-PRESSURE PIPING SYSTEM.
B. APPROVED MANUFACTURERS: RELIABLE AUTOMATIC SPRINKLER CO., INC., TYCO FIRE & BUILDING PRODUCTS., VICTAULIC CO. OF AMERICA., VIKING CORP.
C. AUTOMATIC SPRINKLERS WITH HEAT-RESPONSIVE GLASS BULB ELEMENT COMPLYING WITH THE FOLLOWING:
1. UL 199, FOR NONRESIDENTIAL APPLICATIONS.
2. UL 1626, FOR RESIDENTIAL APPLICATIONS.
3. UL 1767, FOR EARLY-SUPPRESSION, FAST-RESPONSE APPLICATIONS.
D. OPEN SPRINKLERS: UL 199, WITHOUT HEAT-RESPONSIVE ELEMENT.
1. ORIFICE: 1/2 INCH, WITH DISCHARGE COEFFICIENT K BETWEEN 5.3 AND 5.8.
2. ORIFICE: 17/32 INCH, WITH DISCHARGE COEFFICIENT K BETWEEN 7.4 AND 8.2.
E. SPRINKLER TYPES AND CATEGORIES: NOMINAL 1/2-INCH ORIFICE FOR 165 DEG F "ORDINARY", 212 DEG F "INTERMEDIATE", 286 DEG F "HIGH" TEMPERATURE CLASSIFICATION RATING, UNLESS OTHERWISE INDICATED OR REQUIRED BY APPLICATION.
F. SPRINKLER TYPES, FEATURES, AND OPTIONS AS FOLLOWS: CONCEALED CEILING SPRINKLERS, INCLUDING COVER PLATE; EXTENDED-COVERAGE SPRINKLERS; FLUSH CEILING SPRINKLERS, INCLUDING ESCUTCHEON; HIGH-PRESSURE SPRINKLERS; OPEN SPRINKLERS; PENDENT SPRINKLERS; PENDENT, DRY-TYPE SPRINKLERS; QUICK-RESPONSE SPRINKLERS; RECESSED SPRINKLERS, INCLUDING ESCUTCHEON; SIDEWALL SPRINKLERS; SIDEWALL, DRY-TYPE SPRINKLERS; UPRIGHT SPRINKLERS.
G. SPRINKLER FINISHES: CHROME PLATED, BRONZE, AND PAINTED. BY ARCH
H. SPRINKLER ESCUTCHEONS: MATERIALS, TYPES, AND FINISHES FOR THE FOLLOWING SPRINKLER MOUNTING APPLICATIONS. ESCUTCHEONS FOR CONCEALED, FLUSH, AND RECESSED-TYPE SPRINKLERS ARE SPECIFIED WITH SPRINKLERS. ESCUTCHEONS LISTED, SUPPLIED, AND APPROVED FOR USE WITH THE SPRINKLER BY THE SPRINKLER MANUFACTURER.
1. CEILING MOUNTING: CHROME-PLATED STEEL, 2 PIECE, WITH 3/4-INCH VERTICAL ADJUSTMENT.
2. SIDEWALL MOUNTING: CHROME-PLATED STEEL, ONE PIECE, FLAT.
I. SPRINKLER GUARDS: WIRE-CAGE TYPE, INCLUDING FASTENING DEVICE FOR ATTACHING TO SPRINKLER. SPRINKLER GUARDS LISTED, SUPPLIED, AND APPROVED FOR USE WITH THE SPRINKLER BY THE SPRINKLER MANUFACTURER.

2.13 FIRE DEPARTMENT CONNECTIONS
A. APPROVED MANUFACTURERS: ELKHART BRASS MFG. CO., INC., POTTER-ROEMER; FIRE-PROTECTION DIV., RELIABLE AUTOMATIC SPRINKLER CO., INC.
B. WALL-TYPE, FIRE DEPARTMENT CONNECTION: UL 405, 175-PSIG MINIMUM PRESSURE RATING; WITH CORROSION-RESISTANT-METAL BODY WITH BRASS INLETS, BRASS WALL ESCUTCHEON PLATE, BRASS LUGGED CAPS WITH GASKETS AND BRASS CHAINS, AND BRASS LUGGED SWIVEL CONNECTIONS. INCLUDE INLETS WITH THREADS ACCORDING TO NFPA 1963 AND MATCHING LOCAL FIRE DEPARTMENT SIZES AND THREADS, OUTLET WITH PIPE THREADS, EXTENSION PIPE NIPPLES, CHECK DEVICES OR CLAPPERS FOR INLETS, AND ESCUTCHEON PLATE WITH MARKING SIMILAR TO "AUTO SPKR & STANDPIPE."
1. TYPE: FLUSH, WITH TWO, THREE, OR FOUR INLETS AND SQUARE OR RECTANGULAR ESCUTCHEON PLATE.
2. TYPE: EXPOSED, PROJECTING, WITH TWO INLETS AND ROUND ESCUTCHEON PLATE.
3. FINISH: POLISHED CHROME-PLATED.
C. EXPOSED, FREESTANDING-TYPE, FIRE DEPARTMENT CONNECTION: UL 405, 175-PSIG MINIMUM OR 300-PSIG PRESSURE RATING; WITH CORROSION-RESISTANT-METAL BODY, BRASS INLETS WITH THREADS ACCORDING TO NFPA 1963 AND MATCHING LOCAL FIRE DEPARTMENT SIZES AND THREADS, AND BOTTOM OUTLET WITH PIPE THREADS. INCLUDE BRASS LUGGED CAPS, GASKETS, AND BRASS CHAINS; BRASS LUGGED SWIVEL CONNECTION AND DROP CLAPPER FOR EACH HOSE-CONNECTION INLET; 18-INCH HIGH, BRASS SLEEVE; AND ROUND, FLOOR, BRASS ESCUTCHEON PLATE WITH MARKING "AUTO SPKR & STANDPIPE."
1. FINISH INCLUDING SLEEVE: POLISHED CHROME-PLATED.

2.14 ALARM DEVICES
A. ALARM-DEVICE TYPES SHALL MATCH PIPING AND EQUIPMENT CONNECTIONS.
B. APPROVED MANUFACTURERS: POTTER ELECTRIC SIGNAL COMPANY.; SYSTEM SENSOR.
C. WATER-MOTOR-OPERATED ALARM: UL 753, MECHANICAL-OPERATION TYPE WITH PELTON-WHEEL OPERATOR WITH SHAFT LENGTH, BEARINGS, AND SLEEVE TO SUIT WALL CONSTRUCTION AND 10-INCH- (250-MM-) DIAMETER, CAST-ALUMINUM ALARM GONG WITH RED-ENAMEL FACTORY FINISH. INCLUDE NPS 3/4 (DN 20) INLET AND NPS 1 (DN 25) DRAIN CONNECTIONS.
1. APPROVED MANUFACTURERS: AFAC INC.; FIREMATIC SPRINKLER DEVICES, INC.; GLOBE FIRE SPRINKLER CORPORATION.; RELIABLE AUTOMATIC SPRINKLER CO., INC.; TYCO FIRE & BUILDING PRODUCTS.; VIKING CORP.
D. ELECTRICALLY OPERATED ALARM: UL 464, WITH 6-INCH MINIMUM DIAMETER, VIBRATING-TYPE, METAL ALARM BELL WITH RED-ENAMEL FACTORY FINISH AND SUITABLE FOR OUTDOOR USE.
E. WATER-FLOW INDICATOR: UL 346, ELECTRICAL-SUPERVISION, PADDLE-OPERATED-TYPE, WATER-FLOW DETECTOR WITH 250-PSIG (1725-KPA) PRESSURE RATING AND DESIGNED FOR HORIZONTAL OR VERTICAL INSTALLATION. INCLUDE TWO SINGLE-POLE, DOUBLE-THROW CIRCUIT SWITCHES FOR ISOLATED ALARM AND AUXILIARY CONTACTS, 7 A, 125-V AC AND 0.25 A, 24-V DC; COMPLETE WITH FACTORY-SET, FIELD-ADJUSTABLE RETARD ELEMENT TO PREVENT FALSE SIGNALS AND TAMPERPROOF COVER THAT SENDS SIGNAL IF REMOVED.
F. PRESSURE SWITCH: UL 753, ELECTRICAL-SUPERVISION-TYPE, WATER-FLOW SWITCH WITH RETARD FEATURE. INCLUDE SINGLE-POLE, DOUBLE-THROW, NORMALLY CLOSED CONTACTS AND DESIGN THAT OPERATES ON RISING PRESSURE AND SIGNALS WATER FLOW.
G. VALVE SUPERVISORY SWITCH: UL 753, ELECTRICAL, SINGLE-POLE, DOUBLE-THROW SWITCH WITH NORMALLY CLOSED CONTACTS. INCLUDE DESIGN THAT SIGNALS CONTROLLED VALVE IS IN OTHER THAN FULLY OPEN POSITION.
H. INDICATOR-POST SUPERVISORY SWITCH: UL 753, ELECTRICAL, SINGLE-POLE, DOUBLE-THROW SWITCH WITH NORMALLY CLOSED CONTACTS. INCLUDE DESIGN THAT SIGNALS CONTROLLED INDICATOR-POST VALVE IS IN OTHER THAN FULLY OPEN POSITION.

3.02 PIPING AND VALVE INSTALLATION
A. INSTALL SUPPRESSION SYSTEM IN ACCORDANCE WITH NFPA 13 OR 13R AND AUTHORITIES HAVING JURISDICTION.

3.02 SPRINKLER APPLICATIONS
A. USE THE FOLLOWING SPRINKLER TYPES:
1. ROOMS WITHOUT CEILINGS: UPRIGHT SPRINKLERS.
2. ROOMS WITH SUSPENDED CEILINGS: PENDENT, RECESSED, FLUSH, AND CONCEALED SPRINKLERS, AS INDICATED.
3. WALL MOUNTING: SIDEWALL SPRINKLERS.
4. SPACES SUBJECT TO FREEZING: UPRIGHT, PENDENT, DRY SPRINKLERS; AND SIDEWALL, DRY SPRINKLERS AS INDICATED.
5. SPECIAL APPLICATIONS: EXTENDED-COVERAGE, AND QUICK-RESPONSE SPRINKLERS WHERE INDICATED.
B. SPRINKLER FINISHES:
1. UPRIGHT, PENDENT, AND SIDEWALL SPRINKLERS: CHROME PLATED IN FINISHED SPACES EXPOSED TO VIEW; ROUGH BRONZE IN UNFINISHED SPACES NOT EXPOSED TO VIEW; WAX COATED WHERE EXPOSED TO ACIDS, CHEMICALS, OR OTHER CORROSIVE FUMES; WHITE POLYESTER FINISH IN NATATORIUMS.
2. CONCEALED SPRINKLERS: ROUGH BRASS, WITH FACTORY-PAINTED WHITE COVER PLATE.
3. FLUSH SPRINKLERS: BRIGHT CHROME, WITH PAINTED WHITE ESCUTCHEON.
4. RECESSED SPRINKLERS: BRIGHT CHROME, WITH BRIGHT CHROME ESCUTCHEON.
5. RESIDENTIAL SPRINKLERS: DULL CHROME.
6. SPRINKLER GUARDS: FOR EXPOSED SPRINKLER HEADS SUBJECT TO DAMAGE.

SECTION 22 05 23 AND 23 05 23 GENERAL VALVES FOR PLUMBING AND HVAC

2.01 VALVES, GENERAL
A. REFER TO PIPING APPLICATION SCHEDULES FOR SIZE, TYPE, AND CONNECTIONS.
B. VALVE PRESSURE RATING SHALL NOT BE LESS THAT INDICATED AS REQUIRED FOR SYSTEM TEMPERATURE AND PRESSURE RATINGS.
C. DOMESTIC WATER VALVES
a. REGULATORY REQUIREMENTS: COMPLY WITH REQUIREMENTS IN PUBLIC LAW 111-380, "REDUCTION OF LEAD IN DRINKING WATER ACT," ABOUT LEAD CONTENT IN MATERIALS THAT WILL BE IN CONTACT WITH POTABLE WATER FOR HUMAN CONSUMPTION.
b. NSF COMPLIANCE: NSF 61 AND NSF 372 FOR VALVE MATERIALS FOR POTABLE-WATER SERVICE.
c. BRONZE VALVES SHALL BE MADE WITH DEZINCIFICATION-RESISTANT MATERIALS. BRONZE VALVES MADE WITH COPPER ALLOY (BRASS) CONTAINING MORE THAN 15 PERCENT ZINC ARE NOT PERMITTED UNLESS OTHERWISE NOTED. WETTED SURFACES OF VALVES CONTACTED BY CONSUMABLE WATER SHALL CONTAIN NOT MORE THAN 0.25 PERCENT WEIGHTED AVERAGE LEAD CONTENT.
D. VALVE ACTUATORS:
a. CHAINWHEEL: FOR ATTACHMENT TO VALVES
b. GEAR DRIVE OPERATOR: FOR QUARTER-TURN VALVES 8 INCH AND LARGER.
c. HANDWHEEL: FOR VALVES OTHER THAN QUARTER-TURN TYPES.
d. LEVER HANDLE: FOR QUARTER-TURN VALVES 6 INCH AND SMALLER.
E. EXTENDED STEMS ON INSULATED VALVES.

2.02 BRONZE BALL VALVES
A. APPROVED MANUFACTURERS: APOLLO VALVES, HAMMOND, NIBCO, WATTS, MILWAUKEE VALVE CO.
B. BRONZE BALL VALVES SHALL COMPLY WITH MSS SP-110 AND HAVE BRONZE BODY COMPLYING WITH ASTM B 584, EXCEPT FOR CLASS 250 WHICH SHALL COMPLY WITH ASTM B 61, FULL-DEPTH ASME B1.20.1 THREADED OR SOLDER ENDS, AND BLOWOUT-PROOF STEMS.
C. TWO-PIECE, REGULAR PORT BRONZE BALL VALVES WITH STAINLESS-STEEL TRIM SHALL BE TYPE 316 STAINLESS-STEEL BALL AND STEM, REINFORCED TFE SEATS, BLOW-OUT-PROOF STEM, WITH ADJUSTABLE STEM PACKING, SOLDERED OR THREADED ENDS; AND 150 PSIG SWP AND 600-PSIG CWP RATINGS.
D. TWO-PIECE, FULL-PORT, BRONZE BALL VALVES WITH STAINLESS-STEEL TRIM SHALL BE TYPE 316 STAINLESS-STEEL BALL AND STEM, REINFORCED TFE SEATS, BLOW-OUT-PROOF STEM, WITH ADJUSTABLE STEM PACKING, SOLDERED OR THREADED ENDS; 150 PSIG SWP AND 600-PSIG CWP RATINGS.

2.04 BRONZE CHECK VALVES
A. APPROVED MANUFACTURERS: APOLLO VALVES, NIBCO, WATTS, MILWAUKEE VALVE CO.
B. CHECK VALVES SHALL COMPLY WITH MSS SP-80. CLASS 125, BRONZE, SWING CHECK VALVES WITH BRONZE DISC COMPLYING WITH ASTM B-62 BRONZE BODY AND SEAT WITH REGRINDING-TYPE BRONZE DISC, Y-PATTERN DESIGN, SOLDERED OR THREADED END CONNECTIONS, AND HAVING 200 PSIG CWP RATING.

2.08 BRONZE GLOBE VALVES
A. APPROVED MANUFACTURERS: APOLLO VALVES, NIBCO, WATTS, MILWAUKEE VALVE CO., AND HAMMOND
A. VALVES SHALL COMPLY WITH MSS SP-80, WITH MALLEABLE-IRON HANDWHEEL. CLASS 125, TFE DISC, BRONZE GLOBE VALVES COMPLY WITH ASTM B-62 BRONZE BODY, BONNET, AND SEAT, TFE DISC, COPPER-SILICONE BRONZE STEM, UNION-RING BONNET, SOLDERED OR THREADED END CONNECTIONS; AND HAVING 200 PSIG CWP RATING.

SECTION 22 11 16 - DOMESTIC WATER PIPING

1.01 GENERAL
A. POTABLE-WATER PIPING AND COMPONENTS SHALL COMPLY WITH NSF 14 AND NSF 61 ANNEX G. PLASTIC PIPING COMPONENTS SHALL BE MARKED WITH "NSF-PW."
B. COMPLY WITH NSF STANDARD 372 FOR LOW LEAD.

2.01 COPPER TUBE AND FITTINGS
A. SOFT COPPER, TYPE K
a. TUBE SHALL BE IN ACCORDANCE WITH ASTM B 88, TYPE K (ASTM B 88M, TYPE A), WATER TUBE, ANNEALED TEMPER.
b. COPPER PRESSURE FITTINGS SHALL BE IN ACCORDANCE WITH ASME B16.18, CAST-COPPER-ALLOY OR ASME B16.22, WROUGHT-COPPER, SOLDER-JOINT FITTINGS.
c. BRONZE FLANGES SHALL BE IN ACCORDANCE WITH ASME B16.24, CLASS 150, WITH SOLDER-JOINT ENDS.
d. COPPER UNIONS SHALL BE IN ACCORDANCE WITH MSS SP-123, CAST-COPPER-ALLOY, HEXAGONAL-STOCK BODY, WITH BALL-AND-SOCKET, METAL-TO-METAL SEATING SURFACES, AND SOLDER-JOINT OR THREADED ENDS.
B. HARD COPPER, TYPE L
a. TUBE SHALL BE IN ACCORDANCE WITH ASTM B 88, TYPE L (ASTM B 88M, TYPE B), WATER TUBE, DRAWN TEMPER.
b. COPPER PRESSURE FITTINGS SHALL BE IN ACCORDANCE WITH ASME B16.18, CAST-COPPER-ALLOY OR ASME B16.22, WROUGHT- COPPER, SOLDER-JOINT FITTINGS.
c. BRONZE FLANGES SHALL BE IN ACCORDANCE WITH ASME B16.24, CLASS 150, WITH SOLDER-JOINT ENDS.
d. COPPER UNIONS SHALL BE IN ACCORDANCE WITH MSS SP-123, CAST-COPPER-ALLOY, HEXAGONAL-STOCK BODY, WITH BALL-AND-SOCKET, METAL-TO-METAL SEATING SURFACES, AND SOLDER-JOINT OR THREADED ENDS.

2.02 CROSSLINKED POLYETHYLENE PIPE
A. PEX DISTRIBUTION SYSTEM SHALL BE IN ACCORDANCE WITH ASTM F 876 AND ASTM F 877, SDR 9 TUBING. FITTINGS FOR PEX TUBE SHALL BE IN ACCORDANCE WITH ASTM F 1807, METAL-INSERT TYPE WITH COPPER CRIMP RINGS AND MATCHING PEX TUBE DIMENSIONS; OR PLASTIC-INSERT TYPE COLD EXPANSION FITTINGS AND CORRESPONDING RINGS, MATERIAL MEETING REQUIREMENTS OF ASTM F 1960.
a. MANIFOLD: MULTIPLE-OUTLET, PLASTIC OR CORROSION-RESISTANT-METAL ASSEMBLY COMPLYING WITH ASTM F 877 AND WITH PLASTIC OR CORROSION-RESISTANT-METAL VALVE FOR EACH OUTLET.
B. PEX PIPING JOINTS: JOIN ACCORDING TO ASTM F 1807.

2.07 WATER METER
A. DISPLACEMENT-TYPE WATER METERS 2 INCH AND SMALLER SHALL BE IN ACCORDANCE WITH AWWA C700, NUTATING-DISC TOTALIZATION METER WITH BRONZE CASE AND 150-PSIG MINIMUM WORKING-PRESSURE RATING; WITH REGISTRATION IN GALLONS OR CUBIC FEET AS REQUIRED BY UTILITY OR OWNER BUILDING MANAGEMENT SYSTEM; AND WITH THREADED END CONNECTIONS.
a. APPROVED MANUFACTURERS: AALIANT, BADGER METER, INC., SENSUS METERING SYSTEMS INC.

2.01 BACKFLOW PREVENTERS
A. APPROVED MANUFACTURERS: APOLLO VALVES, FEBCO, WATTS, AND ZURN
B. INTERMEDIATE ATMOSPHERIC-VENT BACKFLOW PREVENTERS
a. SHALL COMPLY WITH ASSE 1012 FOR CONTINUOUS-PRESSURE APPLICATIONS. BRONZE BODY WITH UNION SOLDER JOINTS AND SIZES UP TO 3/4 INCH.
C. DOUBLE-CHECK BACKFLOW-PREVENTION ASSEMBLIES
a. SHALL COMPLY WITH ASSE 1015 FOR CONTINUOUS-PRESSURE APPLICATIONS. BRONZE BODY WITH THREADED CONNECTIONS AND SIZES UP TO 2 INCH. CAST-IRON OR DUCTILE-IRON, WITH INTERIOR LINING COMPLYING WITH AWWA C550 OR THAT IS FDA APPROVED FOR SIZES 2-1/2 AND LARGER. DESIGNED FOR HORIZONTAL, STRAIGHT THROUGH FLOW
b. ACCESSORIES: PROVIDE BALL VALVE WITH THREADED ENDS ON INLET AND OUTLET OF 2 INCH AND SMALLER; GATE-TYPE WITH FLANGED ENDS ON INLET AND OUTLET OF 2-1/2 INCH AND LARGER.
c.

2.03 TEMPERATURE ACTUATED MIXING VALVES (TMV)
A. APPROVED MANUFACTURERS: APOLLO VALVES, BRADLEY, LAWLER, LEONARD, WATTS, AND ZURN
B. WATER TEMPERATURE LIMITING DEVICE (FIXTURE)
a. SHALL COMPLY WITH ASSE 1070 WITH MINIMUM PRESSURE RATING OF 125 PSIG. THERMOSTATICALLY CONTROLLED WITH BRONZE BODY CHROME PLATED. 1/2 INCH UNION OR 3/8 COMPRESSION WITH INTEGRAL CHECK VALVES AND TEMPERATURE ADJUSTMENT.

2.04 HOSE BIBBS (HB-1)
A. APPROVED MANUFACTURERS: JOSAM, MIFAB, ZURN, WOODFORD, WATTS
B. SHALL COMPLY WITH ASME A112.18.1 AND HAVE BRONZE BODY, BRONZE REPLACEABLE SEAT, VACUUM BREAKER INTEGRAL AND NONREMOVABLE, 1/2 OR 3/4 INCH THREADED OR SOLDERED CONNECTIONS, OUTLET SHALL BE A GARDEN HOSE CONNECTOR, PRESSURE RATING SHALL BE 125 PSIG.

2.05 WALL HYDRANT (WH-1)
A. APPROVED MANUFACTURERS: JOSAM, MIFAB, ZURN, WOODFORD, WATTS
B. SHALL COMPLY WITH ASSE 1019, TYPE B OR ASME A112.21.3M FOR SELF DRAINING WALL HYDRANTS, 125 PSIG PRESSURE RATING, LOOSE KEY OPERATOR, CASING AND OPERATOR ROD TO MATCH WALL THICKNESS, INLCUDE A CLAMP, INLET SIZE 1/2 OR 3/4 INCH, OUTLET SHALL BE EXPOSED WITH INTEGRAL VACUUM BREAKER AND GARDEN HOSE THREAD ASME B1.20.7, POLISHED NICKEL BRONZE OR CHROME PLATED, LOOSE KEY.

2.07 WATER HAMMER ARRESTORS
A. APPROVED MANUFACTURERS: MIFAB, SIOUX CHIEF, WATTS, PPP
B. COMPLY WITH ASSE 1010 OR PDI-WH 201. ARRESTORS SHALL BE COPPER TUBE WITH PISTON. SIZE PER ASSE 1010.

SECTION 22 13 16 DRAINAGE PIPING

2.01 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS
A. PIPE AND FITTINGS SHALL COMPLY WITH ASTM A 888 OR CISPI 301.
B. CAST-IRON SOIL PIPE, HUBLESS-PIPING COUPLINGS SHALL BE NSF CERTIFIED FOR COMPLIANCE WITH CISPI 310. STAINLESS-STEEL CORRUGATED SHIELD WITH STAINLESS-STEEL BANDS AND TIGHTENING DEVICES; AND ASTM C 564, RUBBER SLEEVE WITH INTEGRAL, CENTER PIPE STOP.
C. HEAVY DUTY CAST-IRON SOIL PIPE, HUBLESS-PIPING COUPLINGS SHALL COMPLY WITH ASTM C 1277 AND ASTM C 1540, OR ASTM C 1277 AND FM 1680 CLASS I. STAINLESS-STEEL SHIELD WITH STAINLESS-STEEL BANDS AND TIGHTENING DEVICES; AND ASTM C 564, RUBBER SLEEVE WITH INTEGRAL, CENTER PIPE STOP.
D. APPROVED MANUFACTURERS: ANACO-HUSKY, FERGUSON ENTERPRISES, INC., IDEAL-TRIDON., MISSION RUBBER COMPANY, TYLER PIPE, FERNCO INC.

2.02 COPPER PIPE AND FITTINGS
A. DRAIN WASTE AND VENT (DWV) COPPER
a. TUBE SHALL COMPLY WITH ASTM B 306, DRAINAGE TUBE, DRAWN TEMPER.
b. FITTINGS SHALL COMPLY WITH ASME B16.23, CAST COPPER OR ASME B16.29, WROUGHT COPPER, SOLDER-JOINT FITTINGS.
B. HARD COPPER, TYPE L
a. TUBE SHALL BE IN ACCORDANCE WITH ASTM B 88, TYPE L (ASTM B 88M, TYPE B), WATER TUBE, DRAWN TEMPER.
b. COPPER PRESSURE FITTINGS SHALL BE IN ACCORDANCE WITH ASME B16.18, CAST-COPPER-ALLOY OR ASME B16.22, WROUGHT- COPPER, SOLDER-JOINT FITTINGS.
c. BRONZE FLANGES SHALL BE IN ACCORDANCE WITH ASME B16.24, CLASS 150, WITH SOLDER-JOINT ENDS.
d. COPPER UNIONS SHALL BE IN ACCORDANCE WITH MSS SP-123, CAST-COPPER-ALLOY, HEXAGONAL-STOCK BODY, WITH BALL-AND-SOCKET, METAL-TO-METAL SEATING SURFACES, AND SOLDER-JOINT OR THREADED ENDS.

2.03 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS
A. SOLID-WALL PVC PIPE SHALL BE SCHEDULE 40, ASTM D 2665, DRAIN, WASTE, AND VENT.
B. PVC SOCKET FITTINGS SHALL BE ASTM D 2665, SOCKET TYPE, MADE TO ASTM D 3311, DRAIN, WASTE, AND VENT PATTERNS AND TO FIT SCHEDULE 40 PIPE.

SECTION 22 13 19 DRAINAGE PIPING SPECIALTIES

2.01 CLEANOUTS
A. APPROVED MANUFACTURERS: JOSAM, MIFAB, JAY R. SMITH, ZURN
B. CLEANOUTS SHALL BE THE SAME NOMINAL SIZE AS PIPE THEY SERVE UP TO 4 INCHES. PIPES LARGE THAN 4 INCHES SHALL HAVE A CLEANOUT OF 4 INCHES MINIMUM.
C. BODY SHALL BE HUB-AND-SPIGOT, CAST-IRON SOIL PIPE T-BRANCH OR HUBLESS, CAST-IRON SOIL PIPE TEST TEE AS REQUIRED TO MATCH CONNECTED PIPING. CLOSURE SHALL BE COUNTERSUNK OR RAISED-HEAD, DRILLED-AND-THREADED BRONZE OR BRASS PLUG WITH TAPERED THREADS.
D. CLEANOUTS IN FINISHED FLOOR SHALL HAVE A NICKEL-BRONZE, COPPER ALLOY WITH SCORIATED COVER IN SERVICE AREAS, AND RECESSED COVER TO ACCEPT FLOOR FINISH MATERIAL IN FINISHED FLOOR AREAS.
E. CLEANOUTS IN FINISHED WALL SHALL HAVE A ROUND, CHROME-PLATED BRONZE FLAT, CHROME-PLATED BRASS OR STAINLESS-STEEL COVER PLATE WITH SCREW.
F. A CLEAN-OUT SHALL BE INSTALLED AT THE BASE OF EACH SOIL AND WASTE STACK, AND AT NOT MORE THAN 100'-0" INTERVALS ON HORIZONTAL RUNS AND AS REQUIRED BY CODE.

2.02 FLOOR DRAINS, SINKS, AND TRENCH DRAINS
A. APPROVED MANUFACTURERS: JOSAM, MIFAB, JAY R. SMITH, ZURN
B. REFER TO PLUMBING SCHEDULES.

2.05 DOWNSPOUT NOZZLE
A. APPROVED MANUFACTURES: JOSAM, MIFAB, JAY R. SMITH, ZURN
B. ALL NICKEL BRONZE BODY, OPTIONAL THREADED OR NO-HUB INLET AND DECORATIVE FACE OF WALL FLANGE AND OUTLET NOZZLE, WITH REMOVABLE STAINLESS STEEL SCREEN.

SECTION 22 33 00 ELECTRIC WATER HEATERS

2.01 LIGHT COMMERCIAL ELECTRIC WATER HEATERS
A. APPROVED MANUFACTURERS: LOCHINVAR CORPORATION, BRADFORD WHITE, STATE, A.O. SMITH, AND PVI
B. STORAGE-TANK CONSTRUCTION SHALL BE STEEL, VERTICAL ARRANGEMENT. TAPPINGS SHALL COMPLY WITH ASME B1.20.1 PIPE THREAD. 150 PSIG PRESSURE RATING. INTERIOR FINISH SHALL COMPLY WITH NSF 61 BARRIER MATERIALS FOR POTABLE-WATER TANK LININGS, INCLUDING EXTENDING LINING MATERIAL INTO TAPPINGS. FACTORY-INSTALLED STORAGE-TANK APPURTENANCES: REPLACEABLE MAGNESIUM ANODE ROD REQUIRED FOR GLASS LINED TANKS; DIP TUBE UNLESS COLD-WATER INLET IS NEAR BOTTOM OF TANK; ASSE 1005 DRAIN VALVE; INSULATION SHALL COMPLY WITH ASHRAE/IESNA 90.1; STEEL JACKET WITH ENAMELED FINISH; HEAT TRAP FITTINGS SHALL BE INLET TYPE IN COLD-WATER INLET AND OUTLET TYPE IN HOT-WATER OUTLET; TWO ELECTRIC SCREW-IN IMMERSION TYPE HEATING ELEMENTS THATARE WIRED FOR SIMULTANEOUS OPERATION, UNLESS OTHERWISE INDICATED; ADJUSTABLE THERMOSTAT FOR EACH ELEMENT; HIGH-TEMPERATURE-LIMIT CUTOFF DEVICE OR SYSTEM; RELIEF VALVE SHALL BE ASME RATED AND STAMPED AND COMPLYING WITH ASME PTC 25.3 FOR COMBINATION TEMPERATURE AND PRESSURE RELIEF VALVES. INCLUDE RELIEVING CAPACITY AT LEAST AS GREAT AS HEAT INPUT, AND INCLUDE PRESSURE SETTING LESS THAN WATER HEATER WORKING-PRESSURE RATING. SELECT RELIEF VALVE WITH SENSING ELEMENT THAT EXTENDS INTO STORAGE TANK.
C. REFER TO SCHEDULES ON DRAWINGS FOR CAPACITY.

2.03 EXPANSION TANKS
A. APPROVED MANUFACTURERS: AMTROL INC., ARMSTRONG PUMPS, BELL & GOSSETT, TACO
B. STEEL, PRESSURE-RATED TANK, ASME-CODE CONSTRUCTED WITH WELDED JOINTS AND FACTORY-INSTALLED, BUTYL-RUBBER DIAPHRAGM. INCLUDE AIR PRECHARGE TO MINIMUM SYSTEM-OPERATING PRESSURE AT TANK. FACTORY-FABRICATED STEEL TAPS WELDED TO TANK BEFORE TESTING AND LABELING. INCLUDE ASME B1.20.1 PIPE THREAD. INTERIOR FINISH SHALL COMPLY WITH NSF 61 BARRIER MATERIALS FOR POTABLE-WATER TANK LININGS, INCLUDING EXTENDING FINISH INTO AND THROUGH TANK FITTINGS AND OUTLETS. PROVIDE AIR CHARGING VALVE.
C. CONTRACTOR SHALL ADJUST THE PNEUMATIC PRESSURE INTERNAL TO EXPANSION TANK PRIOR TO SYSTEM CONNECTION. TANK PRESSURE SHALL MATCH SYSTEM PRESSURE..

SECTION 22 42 00 PLUMBING FIXTURES

1.01 GENERAL
A. OBTAIN PLUMBING FIXTURES, FAUCETS, AND OTHER COMPONENTS OF EACH CATEGORY THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER. IF FIXTURES, FAUCETS, OR OTHER COMPONENTS ARE NOT AVAILABLE FROM A SINGLE MANUFACTURER, OBTAIN SIMILAR PRODUCTS FROM OTHER MANUFACTURERS SPECIFIED FOR THAT CATEGORY.
B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
C. FIXTURES WITH ADA NOTED SHALL 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.
D. COMPLY WITH REQUIREMENTS IN PUBLIC LAW 102-486, "ENERGY POLICY ACT," ABOUT WATER FLOW AND CONSUMPTION RATES FOR PLUMBING FIXTURES.
E. COMPLY WITH REQUIREMENTS IN PUBLIC LAW 111-380, "REDUCTION OF LEAD IN DRINKING WATER ACT," ABOUT LEAD CONTENT IN MATERIALS THAT WILL BE IN CONTACT WITH POTABLE WATER FOR HUMAN CONSUMPTION.
F. COMPLY WITH NSF 61, "DRINKING WATER SYSTEM COMPONENTS - HEALTH EFFECTS; SECTIONS 1 THROUGH 9," AND NSF 372 DRINKING WATER SYSTEM COMPONENTS – LEAD CONTENT FOR POTABLE DOMESTIC WATER PIPING AND COMPONENTS.
G. SELECT COMBINATIONS OF FIXTURES AND TRIM, FAUCETS, FITTINGS, AND OTHER COMPONENTS THAT ARE COMPATIBLE.
H. COMPLY WITH APPLICABLE ANSI, ASME, ASSE, ASTM, ICC, NSF, AND UL STANDARDS AND OTHER REQUIREMENTS SPECIFIED FOR PLUMBING FIXTURES, TRIM, FITTINGS, COMPONENTS, AND FEATURES.
I. REFER TO PLUMBING FIXTURE SCHEDULES FOR BASIS OF DESIGN AND REQUIREMENTS.

2.01 PLUMBING FIXTURES
A. APPROVED WATER CLOSET MANUFACTURES: AMERICAN STANDARD, KOHLER, SLOAN, AND ZURN
B. APPROVED WATER CLOSET FLUSH VALVE MANUFACTURES: AMERICAN STANDARD, MOEN, DELTA, SPEAKMAN, KOHLER, SLOAN, AND ZURN
C. APPROVED TOILET SEAT MANUFACTURES: AMERICAN STANDARD, BEMIS, PROFLO, ZURN, AND KOHLER
D. APPROVED URINAL MANUFACTURES: AMERICAN STANDARD, KOHLER, SLOAN, AND ZURN
E. APPROVED URINAL FLUSH VALVE MANUFACTURES: AMERICAN STANDARD, MOEN, DELTA, SPEAKMAN, KOHLER, SLOAN, AND ZURN
F. APPROVED LAVATORY MANUFACTURES: AMERICAN STANDARD, KOHLER, SLOAN, AND ZURN
G. APPROVED LAVATORY FAUCET MANUFACTURES: AMERICAN STANDARD, MOEN, DELTA, SPEAKMAN, KOHLER, SLOAN, T&S BRASS AND BRONZE WORKS, AND ZURN
H. APPROVED SINK MANUFACTURES: ELKAY, JUST MFG., KOHLER, AND MOEN,
I. APPROVED SINK FAUCET MANUFACTURES: AMERICAN STANDARD, MOEN, DELTA, SPEAKMAN, KOHLER, CHICAGO FAUCET, T&S BRASS AND BRONZE WORKS, AND ZURN
J. APPROVED SERVICE SINK MANUFACTURES: AMERICAN STANDARD, KOHLER, AND ZURN
K. APPROVED SERVICE SINK FAUCET MANUFACTURES: AMERICAN STANDARD, KOHLER, T&S BRASS AND BRONZE WORKS, AND ZURN
L. APPROVED SHOWER MANUFACTURES: AMERICAN STANDARD, KOHLER, CRANE, AND STERLING
M. APPROVED SHOWER TRIM AND VALVE MANUFACTURES: AMERICAN STANDARD, KOHLER, HANSGROHE, DELTA, SPEAKMAN, CHICAGO FAUCET, ZURN, AND MOEN
N. APPROVED DRINKING FOUNTAIN MANUFACTURES: ELKAY AND FILTRINE
O. APPROVED ELECTRIC WATER COOLER MANUFACTURES: ELKAY AND FILTRINE
P. APPROVED DISPOSER MANUFACTURES: AMERICAN STANDARD, MAYTAG, IN-SINK-ERATOR, AND MOEN
Q. APPROVED FIXTURE SUPPLY MANUFACTURES: ANY APPROVED FIXTURE MANUFACTURE

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#	ISSUANCE	DATE
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