SECTION 15050
BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.01 DESCRIPTION
A. THIS SECTION DEFINES THE GENERAL PROVISIONS WHICH ARE COMMON TO ALL SECTIONS OF DIVISION 15.
B. FURNISH ALL LABOR, MATERIALS, TOOLS AND EQUIPMENT; FABRICATE, AND INSTALL COMPLETE AND IN PLACE, ALL THE FIXTURES, EQUIPMENT AND SYSTEMS AS SHOWN ON THE DRAWINGS, SPECIFIED HEREIN, AND AS REQUIRED FOR A COMPLETE AND OPERABLE INSTALLATION.
C. THE CONTRACTOR SHALL PAY FOR ALL PERMITS, FEES AND CHARGES REQUIRED FOR THIS WORK.

1.02 DRAWINGS AND SPECIFICATIONS
A. DESIGN DRAWINGS: THE DRAWINGS ACCOMPANYING THESE SPECIFICATIONS ARE GENERALLY DIAGRAMMATIC. ANY CHANGES FROM THE GENERAL ROUTING SHOWN ON THE DRAWINGS SUCH AS OFFSETS, BENDS OR CHANGES IN ELEVATION DUE TO COORDINATION WITH THE WORK OF OTHER TRADES AND THE BUILDING CONSTRUCTION SHALL BE DONE WITHOUT ADDITIONAL CHARGE TO THE OWNER.
B. SHOP DRAWINGS: SHOP DRAWINGS SHALL BE SUBMITTED FOR EACH AND EVERY ITEM OF MANUFACTURED MATERIAL AND EQUIPMENT.
C. RECORD DRAWINGS:
1. THE CONTRACTOR SHALL KEEP AN ACCURATE RECORD OF ALL CONCEALED PIPES, DUCTS, VALVES, CONDUITS, ETC. IN ADDITION, HE SHALL RECORD, IN A SPECIAL SET OF CONTRACT DRAWINGS, ALL CHANGES AND DEVIATIONS FROM THE DESIGN DRAWINGS THAT OCCURRED DURING THE INSTALLATION OF THE WORK.
2. AT COMPLETION OF THE JOB, THESE DRAWINGS ILLUSTRATING CHANGES OR DEVIATIONS SHOWING BY DIMENSION AND LOCATION THE EXACT POSITION OF ALL CONCEALED PIPES, VALVES, ETC., SHALL BE DELIVERED TO THE ARCHITECT/ENGINEER.
D. SPECIFICATIONS – REFER TO THE FOLLOWING GENERAL SPECIFICATIONS AS THEY ARE A PART OF ALL SECTIONS OF DIVISION 15.
1. DIVISION 1 – GENERAL REQUIREMENTS; REGARDING BUT NOT LIMITED TO: ALTERATION PROJECT PROCEDURES, SUBMITTALS, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS, CLEANING DURING CONSTRUCTION, AND PRODUCT OPTIONS AND SUBSTITUTIONS.
2. DIVISION 2 – SITEWORK; REGARDING BUT NOT LIMITED TO: SELECTIVE DEMOLITION, EARTHWORK, EXCAVATION AND BACKFILLING.
3. DIVISION 3 – CONCRETE; REGARDING BUT NOT LIMITED TO: CAST-IN-PLACE CONCRETE, FORMWORK AND REINFORCEMENT.
E. IT IS THE INTENTION OF THIS SPECIFICATION SECTION THAT ALL ITEMS OF MATERIAL AND EQUIPMENT HEREIN SPECIFIED OR SHOWN ON THE DRAWINGS FOR EACH SECTION SHALL BE FURNISHED BY THE CONTRACTOR FOR THAT SECTION, AND INSTALLED BY THAT CONTRACTOR, UNLESS IT IS SPECIFICALLY STATED IN THE SECTION SPECIFICATION, OR SHOWN ON THE DRAWINGS, THAT ANY ITEM OF MATERIAL OR EQUIPMENT IS TO BE FURNISHED BY THE CONTRACTOR OF A SECTION AND INSTALLED BY THE CONTRACTORS OF OTHER SECTIONS, OR FURNISHED BY OTHER SECTION CONTRACTORS AND INSTALLED BY THE CONTRACTOR OF THE SECTION.

1.03 CHASES AND RECESSES
A. ALL CHASES, RECESSES AND MAJOR MASONRY OPENINGS AS SHOWN ON THE DRAWINGS WILL BE PROVIDED BY THE ARCHITECTURAL TRADES.

1.04 LUBRICATION
A. PRIOR TO TESTING, ALL EQUIPMENT SHALL BE PROPERLY LUBRICATED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. ONE SET OF TOOLS NECESSARY FOR LUBRICATION SHALL BE DELIVERED TO OWNER. AFTER PROPER LUBRICATING, ALL UNITS SHALL BE STARTED AND SUCCESSFULLY OPERATED BY THE CONTRACTOR IN THE PRESENCE OF THE ARCHITECT AND/OR ENGINEER.
B. EXCEPT FOR SMALL ELECTRICAL MOTORS WHICH UNDER NEMA STANDARDS ARE EQUIPPED WITH LIFETIME LUBRICATION, ALL BEARINGS ON LARGE MOTORS AND MECHANICAL EQUIPMENT SHALL BE EQUIPPED WITH LUBRICATOR FITTINGS EXTENDED TO THE EXTERIOR OF THE HOUSING.

1.05 POWER WIRING
A. MOTORS UP TO AND INCLUDING 1/3 H.P. SHALL BE 120 VOLT, 60 HERTZ, SINGLE PHASE AND MOTORS 1/2 H.P. AND LARGER SHALL BE BUILT FOR 208 VOLTS, 60 HERTZ, THREE PHASE; UNLESS OTHERWISE INDICATED PER DRAWING SCHEDULES, PLANS AND DETAILS.
B. THE ELECTRICAL CONTRACTOR SHALL PROVIDE COMBINATION MAGNETIC STARTERS WITH H.O.A. SWITCH FOR EACH ITEM OF THREE PHASE EQUIPMENT AND UNFUSED DISCONNECTS FOR EACH ITEM OF SINGLE PHASE EQUIPMENT, EXCEPT WHERE STARTERS ARE FURNISHED AS A PART OF WIRED EQUIPMENT.
C. THE ELECTRICAL CONTRACTOR SHALL DO ALL POWER WIRING INCLUDING CONNECTIONS TO THE MOTORS FURNISHED BY THE CONTRACTORS OF THIS DIVISION.
D. REFER TO SECTION 15900 FOR THE WIRING TO BE PERFORMED BY THE TEMPERATURE CONTROL CONTRACTOR AND THE ELECTRICAL CONTRACTOR AS THEY RELATE TO TEMPERATURE CONTROLS.

1.06 FLUSHING AND TESTING
A. ALL NEW WATER PIPING SYSTEMS SHALL BE FLUSHED USING WATER. LOW POINT DRAINS SHALL BE OPENED AND THE SYSTEMS PROVED TO BE DRAINABLE.
B. ALL CLOSED SYSTEMS, OPERATING UNDER PRESSURE, SHALL BE TESTED, WITH WATER, AT 1 1/2 TIMES THEIR OPERATING PRESSURE.
C. ALL OPEN SYSTEMS, SEWERS, ETC., SHALL BE TESTED WITH WATER, AT A HEAD OF FIVE (5) FEET ABOVE FINISHED FLOOR OR GRADE.
D. GAS PIPING SHALL BE FLUSHED USING 100 PSIG COMPRESSED AIR. AFTER CLEANING, PIPING SHALL FIRST BE AIR TESTED AT 5 PSIG USING GAUGES WITH INCREMENTS OF NO MORE THAN 1" W.G. AND FINAL TESTED WITH A MERCURY MANOMETER AT 6" W.G. THE FIRST TEST SHALL BE APPLIED FOR A MINIMUM OF ONE (1) HOUR, THE SECOND TEST FOR A PERIOD OF 15 MINUTES.
E. ALL PIPING SYSTEMS SHALL BE TESTED. IF LEAKS OCCUR, THE PIPE OR FITTING SHALL BE REMOVED AND REPLACED AND THE SYSTEM RETESTED.
F. PIPING SHALL NOT BE BACKFILLED OR INSULATED UNTIL TESTED. TESTS MUST BE OBSERVED BY THE ARCHITECT/ENGINEER.

1.07 SUPPORTS
A. CONTRACTOR SHALL FURNISH AND INSTALL ALL ANGLES, CHANNELS, PLATES, OR BEAMS REQUIRED FOR THE SUPPORT OF THE EQUIPMENT OF EACH SECTION, WHETHER SHOWN ON THE DRAWINGS OR NOT.
B. FURNISH AND INSTALL ALL RODS, AUXILIARY STRUCTURAL STEEL FRAMES, ATTACHMENTS, BRACKETS AND PLATFORMS REQUIRED FOR SUPPORT OF EQUIPMENT FROM OVERHEAD CONSTRUCTION FOR THE RESPECTIVE SECTION.
C. VERTICAL PIPE RISERS SHALL BE ANCHORED MIDWAY OF THEIR HEIGHT, AND SHALL BE SUPPORTED AT EACH FLOOR BY 1-1/2" X 1/4" BAR CLAMPS ATTACHED TO PIPES AND RESTING ON THE FLOOR CONSTRUCTION.
D. HORIZONTAL PIPING SHALL BE SUPPORTED BY ADJUSTABLE, WROUGHT, CLEVIS TYPE HANGERS, FEE & MASON, ELCEN, OR CRAWFORD. WHERE PARALLEL PIPES ARE INSTALLED AT THE SAME LEVEL, PROVIDE TRAPEZE HANGERS; THE VARIOUS TRADES SHALL COOPERATE IN THE JOINT USE OF SUCH HANGERS. PIPE HANGERS SHALL BE OF SIZE TO SUIT PIPE COVERING PROTECTION SADDLES.
E. PIPES SHALL BE SUPPORTED ONLY FROM THE STRUCTURAL MEMBERS OF THE BUILDING. THEY SHALL BE SUPPORTED AT SUCH INTERVALS AS WILL PREVENT SAGGING, AND SO THAT EXCESSIVE LOADS WILL NOT BE PLACED UPON ANY ONE SUPPORT. SPACING AND ROD SIZES SHALL BE AS FOLLOWS:

PIPE SIZE	MAXIMUM SPACING	MINIMUM ROD SIZE
1/2"	6'-0" AND AT ALL TURNS	3/8"
3/4", 1"	7'-0" AND AT ALL TURNS	3/8"
1-1/4", 1-1/2", 2"	9'-0" AND AT ALL TURNS	3/8"
2-1/2", 3"	10'-0" AND AT ALL TURNS	1/2"
4", 5"	14'-0" AND AT ALL TURNS	5/8"
6"	16'-0" AND AT ALL TURNS	3/4"
8", 10", 12"	18'-0" AND AT ALL TURNS	7/8"

F. HANGER RODS SHALL BE FULL-DIAMETER STEEL WITH THREADED ENDS FOR FIELD CUTTING AND THREAD EXTENDING AS REQUIRED. WHERE THREADED ROD IS SHORTER THAN 6" IT SHALL BE DIPPED IN RUST RESISTANT PAINT PRIOR TO INSTALLATION.
G. AT THE CONTRACTOR'S OPTION, HANGER RODS SHALL BE CONTINUOUS THREADED STEEL WITH GALVANIZED FINISH.
H. HANGER RODS SHALL NOT BE BENT OR ALTERED IN ANY MATTER AND SHALL BE INSTALLED PLUMB AND TRUE. THE ROD SUPPORTING THE HANGER SHALL BE NO LONGER THAN 1/2" BELOW THE LOWER NUT.
I. ALTERNATE WIRE ROPE HANGER SYSTEM (CONTRACTOR OPTION)
A. GENERAL: AT THE OPTION OF THE CONTRACTOR AND IF APPROVED BY AUTHORITIES HAVING JURISDICTION, WIRE ROPE SYSTEM MAY BE USED IN LIEU OF CONVENTIONAL HANGERS. MINIMUM LOAD SAFETY FACTOR OF 5:1.
B. WIRE ROPE HANGER SYSTEM AND LOCKING DEVICES TO BE ONE OF THE FOLLOWING MANUFACTURED SYSTEMS:
1. DUCTMATE INDUSTRIES, CHARLEROI, PA – CLUTCHER MECHANICAL HANGER SYSTEM WITH ZINC COATED STEEL AIRCRAFT QUALITY ROPE (FIELD CUT TO LENGTH). LOCKING DEVICE TO BE CLUTCHER CAST ZINC HOUSING WITH STAINLESS STEEL SPRINGS.
2. GRIPPLE, INC., BATAVIA, IL – HANG FAST WIRE ROPE HANGING SYSTEM WITH ZINC GALVANIZED STEEL WIRE ROPE. STANDARD LENGTHS OF 5, 10, 15 AND 30 FT WITH A PERFORATED LOOP AT ONE END. LOCKING DEVICE TO BE GRIPPLE ZINC HOUSING WITH STAINLESS STEEL SPRINGS.
3. ERICO, INC., SOLON, OH – CADDY SPEED LINK UNIVERSAL SUPPORT SYSTEM WITH GALVANIZED STEEL AIRCRAFT QUALITY WIRE ROPE. AVAILABLE IN 3.3, 6.6, 9.9, 16.4, AND 32.8 FT. LENGTHS WITH FACTORY HOOK AT ONE END. LOCKING DEVICE TO BE ERICO STAINLESS STEEL HOUSING WITH ALL STEEL LOCKING DEVICE.

1.08 VALVES
A. ALL CONNECTIONS SHALL BE PROPERLY VALVED: INSTALL VALVES IN THE DOMESTIC COLD WATER SUPPLY, HOT WATER SUPPLY, HOT WATER RETURN, AND NATURAL GAS SUPPLY AND ALL OTHER LOCATIONS AS MAY BE NECESSARY TO SHUT OFF A PORTION OF A SYSTEM WHETHER SHOWN ON THE DRAWINGS OR NOT, AND SPECIFICALLY WHERE HEREINAFTER SPECIFIED.
B. ALL VALVES SHALL COMPLY WITH THE SCHEDULE OR LEGEND ON THE DRAWINGS. WHERE VALVES ARE NOT SCHEDULED OR SHOWN IN THE LEGEND, THEY SHALL BE RATED FOR THE SERVICE.
C. ANY DOMESTIC HOT WATER SUPPLY OR COLD WATER SUPPLY SERVING TWO OR MORE FIXTURES SHALL BE SEPARATELY VALVED IN ADDITION TO THE SHUT OFF VALVE REQUIRED AT EACH FIXTURE.
D. MAKE PROVISIONS FOR DRAINING ALL LOW POINTS OF ALL PIPING SYSTEMS WHETHER INDICATED ON THE DRAWINGS OR NOT, USING A GLOBE VALVE AND IRON PIPE THREAD TO HOSE THREAD ADAPTER WITH CAP. DRAINS SHALL NOT BE LESS THAN 3/4".

1.09 VALVE TAGS
A. EACH VALVE ON EVERY PIPELINE SHALL BE PROVIDED WITH A NUMBERED BRASS TAG WHICH SHALL BE FASTENED TO THE VALVE OR LINE WITH NON-RUSTING WIRE. WHEN ALL WORK IS COMPLETE, DELIVER TO THE ARCHITECT/ENGINEER A FRAMED (UNDER GLASS) CHART WHICH SHALL INDICATE THE SERVICE AND LOCATION OF EACH VALVE. VALVES USED FOR LOCAL SHUT-OFF MAY BE OMITTED FROM THIS LIST.

1.10 EQUIPMENT IDENTIFICATION
A. ALL MECHANICAL EQUIPMENT SHALL BE CLEARLY IDENTIFIED WITH 2" HIGH STENCILED LETTERS, PAINTED ON THE EQUIPMENT (I.E. "WH-1"). THIS INCLUDES EXTERIOR EQUIPMENT WHERE THE PAINT SHALL BE WEATHER RESISTANT.

PART 2 – PRODUCTS

2.01 DESCRIPTION
A. THIS PART DEFINES THE PIPE AND FITTINGS TO BE USED FOR ALL SERVICES INSTALLED UNDER DIVISION 15.
B. REFER TO THE DRAWING LEGENDS AND SYMBOL SCHEDULES FOR DEFINITION OF THE DESIGNATORS USED IN THE FOLLOWING SPECIFICATION.

2.02 PIPE AND FITTINGS RELATED TO SECTION 15400
A. Piping designators: CWS, HWS, HWR, and TWS.
1. PIPING SHALL BE TYPE 'L' HARD COPPER TUBING MADE UP WITH WROUGHT COPPER FITTINGS USING 95-5 (LEAD FREE) SOLDER.
2. CWS AND HWS PIPING UNDER FLOOR SHALL BE TYPE 'K' HARD COPPER WITH FLARE FITTINGS.
B. WATER MAIN: REFER TO DIVISION 2 SPECIFICATIONS SECTIONS AND/OR CIVIL ENGINEERING DRAWINGS AND COMPLY WITH AUTHORITIES HAVING JURISDICTION.
C. SANITARY AND STORM: BELOW GRADES INSIDE BUILDING.
1. PIPING SHALL BE SERVICE WEIGHT CAST IRON SOIL PIPE, ASTM A74; WITH LEAD AND OAKUM JOINTS.
A. PREFORMED JOINTS MAY BE USED IF ACCEPTABLE TO THE LOCAL AUTHORITIES HAVING JURISDICTION.
2. POLYVINYL CHLORIDE (PVC), SCHEDULE 40 PIPE AND FITTINGS, ASTM D2665; WITH PRIMER AND SOLVENT CEMENT JOINTS MAY BE USED IF ACCEPTABLE TO THE LOCAL AUTHORITIES HAVING JURISDICTION.
D. SANITARY AND STORM: ABOVE GRADE INSIDE BUILDING.
1. 2-1/2" AND LARGER: PIPING SHALL BE SERVICE WEIGHT CAST IRON SOIL PIPE AND FITTINGS, ASTM A74, WITH LEAD AND OAKUM JOINTS.
A. CAST IRON NO-HUB PIPE, FITTINGS, AND JOINTS, CISPI 301, MAY BE USED IF ACCEPTABLE TO THE LOCAL AUTHORITIES HAVING JURISDICTION.
2. 2" AND SMALLER: PIPING SHALL BE SCHEDULE 40 GALVANIZED PIPE, ASTM 53 OR ASTM 120, WITH BLACK CAST IRON DRAINAGE FITTINGS.
A. CAST IRON NO-HUB PIPE, FITTINGS, AND JOINTS, CISPI 301, MAY USED IF ACCEPTABLE TO THE LOCAL AUTHORITIES HAVING JURISDICTION.
3. POLYVINYL CHLORIDE (PVC), SCHEDULE 40, PIPE AND FITTINGS, ASTM D2665; WITH PRIMER AND SOLVENT CEMENT JOINTS MAY BE USED IF ACCEPTABLE TO LOCAL AUTHORITIES HAVING JURISDICTION.
A. NO CELLULAR CORE OR FOAMED PIPING WILL BE PERMITTED.

2.03 PIPE AND FITTINGS RELATED TO SECTION 15350
A. GAS PIPING:
1. GAS PIPING ABOVE THE FLOOR SHALL BE BLACK, SCHEDULE 40, ASTM A120 STEEL PIPE. FITTINGS SHALL BE GALVANIZED, MALLEABLE CAST IRON FOR PIPING 2" AND SMALLER AND WELDING FITTINGS FOR PIPING 2-1/2" AND LARGER.
2. GAS PIPING BELOW GRADE SHALL BE BLACK, SCHEDULE 80, ASTM A120, ALL WELDED CONSTRUCTION, WRAPPED WITH ASPHALT IMPREGNATED KRAFT PAPER. FINISH JOINTS WITH BITUMASTIC #50 AND PAPER.

2.04 ACCESS DOORS
A. PROVIDE 24" X 24" ACCESS DOORS MANUFACTURED AS AN INTEGRAL UNIT COMPLETE WITH ALL PARTS AND READY FOR INSTALLATION AS MANUFACTURED BY ONE OF THE FOLLOWING:
1 .BIRMINGHAM ORNAMENTAL.
2. KARP.
3. MILORD, DIVISION OF INRYCO.
B. PROVIDE FLUSH PANEL DOORS, EXCEPT PROVIDE RECESSED PANEL DOORS WHERE ACCESS DOORS OCCUR IN PLASTER OR ACOUSTICAL TILE GLUED TO GYPSUM LATH.
C. PROVIDE UL "B" LABELED UNITS WHERE ACCESS DOORS OCCUR IN HOUR RATED-CONSTRUCTION.
D. PROVIDE SCREW DRIVER OPERATED CAM LOCKS OF NUMBER REQUIRED BY SIZE OF DOOR.
E. PROVIDE ANCHORAGE APPROPRIATE TO CONSTRUCTION.

PART 3 – EXECUTION

3.01 CUTTING AND PATCHING
A. ALL CUTTING, REPAIRING, FITTING AND REFINISHING OF IN PLACE CONSTRUCTION REQUIRED FOR THE INSTALLATION OF THE WORK OF A SECTION SHALL BE DONE AT THE EXPENSE OF THE CONTRACTOR OF THE SECTION, EXCEPT AS SPECIFICALLY SHOWN ON THE DRAWINGS OR HEREINAFTER SPECIFIED.
B. WORK SHALL BE PERFORMED BY CRAFTSMEN SKILLED IN THEIR RESPECTIVE TRADES.

3.02 EXCAVATING
A. THE CONTRACTOR OF EACH SECTION SHALL DO ALL EXCAVATING AND BACKFILLING AS REQUIRED FOR THE INSTALLATION OF HIS WORK.
B. THE WORK SHALL BE PERFORMED IN ACCORDANCE WITH DIVISION 2 SPECIFICATION SECTIONS AND AS HEREINAFTER SPECIFIED.
C. EXCESS EARTH FROM THE EXCAVATIONS SHALL BE DEPOSITED ON THE SITE WHERE DIRECTED.
D. ALL EXCAVATIONS SHALL BE BACKFILLED AS FOLLOWS:
1. WITHIN THE BUILDING WALLS AND UNDER ALL PAVED AREAS: BANK RUN GRANULAR FILL COMPACTED TO 95% MODIFIED PROCTOR.
2. UNDER CONCRETE AREAS AND PAVED AREAS, FILL AS WITHIN THE BUILDINGS.
3. IN GRASSY AREAS, FILL WITH BANK RUN GRANULAR FILL TO A DEPTH OF 12 INCHES OVER THE HIGHEST PART OF THE PIPING AND FINISH WITH ACCEPTABLE EXCAVATED MATERIAL.

3.03 OPERATING INSTRUCTIONS
A. THE CONTRACTOR FOR THE SECTION SHALL, WHEN DIRECTED BY THE ARCHITECT/ENGINEER, PROVIDE THE OWNER WITH A COMPETENT TRADESMAN TO INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT HE HAS INSTALLED.
B. PROVIDE COPIES OF OPERATING INSTRUCTIONS, EQUIPMENT MANUALS, AND CONTROL DIAGRAMS PER DIVISION-1 CONTRACT CLOSE-OUT.
C. CONTROL DIAGRAMS AND WRITTEN INSTRUCTIONS SHALL BE FRAMED UNDER GLASS.

3.04 CODES AND STANDARDS
A. PIPING AND APPURTENANCES INSTALLED UNDER THIS DIVISION OF THE SPECIFICATIONS SHALL COMPLY WITH THE REQUIREMENTS OF THE FOLLOWING, WHERE APPLICABLE:
ANSI CODES FOR PRESSURE PIPING
ANSI STANDARDS FOR PIPE AND FITTINGS
ASME CODE FOR UNFIRED PRESSURE VESSELS
FACTORY INSURANCE ASSOCIATION
AMERICAN WATER WORKS ASSOCIATION
B. IN ADDITION, THE WORK SHALL CONFORM TO ALL APPLICABLE STATE AND LOCAL CODES AND ORDINANCES.

3.05 WORK CLEANLINESS
A. CONTRACTOR SHALL KEEP STORED MATERIALS, STORAGE AREAS, AND INSTALLED SYSTEMS FREE OF DIRT AND DEBRIS.
B. ALL EXPOSED ENDS OF INCOMPLETE OR UNCOVERED WORK SHALL BE TEMPORARILY PLUGGED AS EACH PHASE OF PIPING WORK AND DUCTWORK IS COMPLETED.
C .PIPING AND EQUIPMENT TO BE PAINTED (EXPOSED TO VIEW IN COMPLETED STRUCTURE) SHALL BE CLEANED BY REMOVING RUST, PLASTER, AND DIRT BY WIRE BRUSHING. GREASE, OIL AND SIMILAR MATERIALS SHALL BE REMOVED BY WIPING WITH CLEAN RAGS AND SUITABLE SOLVENTS.
D. MOTOR, PUMPS, AND OTHER ITEMS WITH FACTORY FINISH SHALL BE REMOVED OF GREASE AND OIL AND LEAVE WITH ALL SURFACES CLEANED AND POLISHED.

3.06 ARRANGEMENT AND ALIGNMENT
A. ALL PIPING SHALL BE ARRANGED AND ALIGNED IN ACCORDANCE WITH THE DRAWINGS. ELEVATIONS AS GIVEN MUST BE HELD. FLOOR ELEVATIONS WHERE GIVEN ARE TO HIGH POINTS OF FLOOR. DIMENSIONS MUST BE HELD AS CLOSELY AS POSSIBLE. ALL DIMENSIONS ARE TO BE FIELD CHECKED FOR ACCURACY BEFORE PIPE IS FABRICATED.
B. INSTALL ALL PIPING STRAIGHT AND DIRECT AS POSSIBLE, GENERALLY FORMING RIGHT ANGLES WITH, OR RUNNING PARALLEL WITH, WALLS OR ADJACENT PIPING. ALL PIPING SHALL BE NEATLY SPACED WITH RISERS AND DROPS RUNNING PLUMB AND TRUE.
C. RUN PIPING IN WALL CHASES, PIPE SHAFTS, HUNG CEILINGS, RECESSES, ETC., WHERE SAME ARE PROVIDED. DO NOT RUN SERVICE PIPING IN FLOOR SLAB FILL UNLESS SPECIFICALLY SO NOTED ON DRAWINGS. PIPING SHALL NOT BE COVERED OR CLOSED UNTIL TESTING IS COMPLETED.
D. DRAWINGS, IN GENERAL, ARE MADE TO SCALE. ALL DIMENSIONS SHALL BE CHECKED IN THE FIELD BY THE CONTRACTOR BEFORE FINAL CONNECTIONS ARE FABRICATED
E. DRAWINGS FOR SMALL PIPING ARE, IN GENERAL, DIAGRAMMATIC AND THE EXACT LOCATION OF THESE LINES SHALL BE DETERMINED BY THE CONTRACTOR FROM FIELD MEASUREMENTS TAKEN BY HIM. THE ACTUAL ARRANGEMENT OF THE SMALL SIZE PIPING, WHEN ERECTED, SHALL FOLLOW THE GENERAL LOCATIONS SHOWN ON THE DRAWINGS AS FAR AS PRACTICABLE. THE INSTALLATION MADE IN THIS WAY SHALL BE NEAT IN APPEARANCE AND CONVENIENT TO OPERATE, AND SHALL PROVIDE FOR PROPER EXPANSION AND DRAINAGE.
F. INSTALLATION OF PIPING SYSTEMS SHALL BE COORDINATED WITH OTHER WORK TO AVOID BLOCKING BUILDING OPENINGS, LIGHT FIXTURES, ETC. PIPING SHALL NOT INTERFERE WITH ACCESS TO VALVES OR EQUIPMENT AND SHALL NOT OBSTRUCT PASSAGEWAYS. PIPING SHALL BE INSTALLED TO PROVIDE WORKING CLEARANCE FOR OPERATION AND MAINTENANCE.

3.07 MODIFICATIONS AND INTERFERENCES
A. CONTRACTOR SHALL CAREFULLY CHECK AND BECOME FAMILIAR WITH THE ARCHITECTURAL, STRUCTURAL, ELECTRICAL AND ALL MECHANICAL DRAWINGS AND DETAILS, AND MAKE NOTE OF ALL LOCATIONS WHERE WALLS, PARTITIONS, CEILINGS, STRUCTURAL MEMBERS, ETC., ARE CALLED FOR TO BE FURRED OR CLOSED-IN.
B. MODIFICATIONS TO THE ARRANGEMENT OF THE PIPING SYSTEM MAY BE REQUIRED TO SUIT STRUCTURAL CONDITIONS, OR TO AVOID INTERFERENCE WITH THE WORK OF OTHER TRADES. CONTRACTOR SHALL FURNISH ALL OFFSETS, ADDITIONAL FITTINGS, ETC., AS REQUIRED TO MEET INSTALLATION CONDITIONS WHETHER DETAILED ON THE DRAWINGS OR NOT.
C. ANY QUESTIONABLE INFORMATION IN THE SPECIFICATIONS OR ON THE DRAWINGS SHALL BE CALLED TO THE ATTENTION OF THE ARCHITECT AND/OR ENGINEER FOR CLARIFICATION BEFORE PROCEEDING WITH FABRICATION OR ERECTION OF THE PARTS AFFECTED. IF, IN THE OPINION OF THE CONTRACTOR, ANY ADDITIONAL DETAIL DRAWINGS ARE NECESSARY, HE SHALL PREPARE THEM AT HIS OWN EXPENSE, TOGETHER WITH ALL BILLS OF MATERIAL.

3.08 PIPE CLEARANCES
A. INSTALL PIPING TO PROVIDE MINIMUM CLEARANCE OF AT LEAST ONE INCH BETWEEN EXTREME PROJECTIONS OF PIPING, FLANGES, FITTINGS, VALVES, ALLOWING FOR INSULATION, PIPE EXPANSION AND THE LIKE.

3.09 PIPING EXPANSION
A. SPECIAL ATTENTION SHALL BE GIVEN TO THE INSTALLATION OF HOT AND COLD LINES WHICH HAVE AN APPRECIABLE MOVEMENT SO THAT THEY WILL NOT HIT OTHER PIPES, STRUCTURAL MEMBERS AND THE LIKE WHEN THEY HEAT UP OR COOL.
B. INSTALL ANCHORS WHERE SHOWN ON THE DRAWINGS AND WHERE REQUIRED.
C. GUIDES ARE TO BE FURNISHED ON EACH SIDE OF ALL EXPANSION LOOPS, OFFSETS, SWING JOINTS AND EXPANSION JOINTS WHETHER OR NOT DETAILED ON THE DRAWINGS.
D. COLD SPRINGING WHERE REQUIRED SHALL BE DONE WITH ANCHORS, HANGERS AND SLIDING SUPPORTS IN PLACE.

3.10 LOCATION OF VALVES, ETC.
A. SYSTEM COMPONENTS WHICH REQUIRE OBSERVATION, OPERATION OR MAINTENANCE – SUCH AS VALVES, GAUGES, CONTROLS, STRAINERS, DIRT POCKETS, CLEANOUTS, UNIONS AND FLANGES, ETC. – SHALL BE LOCATED WHENEVER POSSIBLE SO AS TO BE READILY ACCESSIBLE. THEY SHALL NOT BE CONCEALED IN CHASES OR ABOVE CEILINGS WITHOUT PROVISION FOR ACCESS. VALVES WHICH REQUIRE FREQUENT OPERATION, OR WHICH MAY REQUIRE EMERGENCY OPERATION, AND WHICH ARE NOT ACCESSIBLE FROM NORMAL WORKING LEVEL, SHOULD BE INSTALLED WITH APPROPRIATE PROVISIONS SUCH AS CHAIN WHEELS OR EXTENSION STEMS.
B. INSTALL ALL VALVES WITH STEMS IN EITHER AN UPRIGHT (PREFERRED) OR HORIZONTAL POSITION. CONTROL VALVES SHALL BE INSTALLED WITH TOP WORKS UPWARD UNLESS SPECIFICALLY SHOWN OTHERWISE.
C. GLOBE VALVES SHOULD BE INSTALLED TO SEAT AGAINST THE DIRECTION OF FLOW.

3.11 DRAINAGE AND VENTING
A. WHERE LINES ARE PURPOSELY PITCHED FOR DRAINAGE OR VENTING, AN ACCURATE GRADE SHALL BE MAINTAINED. LINES SHALL BE SUPPORTED IN SUCH A MANNER AS TO PREVENT DEFLECTION OF THE PIPING SUFFICIENT TO POCKET THE LINES.

3.12 PIPE AND FITTINGS
A. ALL PIPE SIZES REFERRED TO IN THESE SECTIONS SHOULD BE INTERPRETED AS IPS (IRON PIPE SIZE) UNLESS SPECIFICALLY DESIGNATED OTHERWISE, SUCH AS "O.D." FOR TUBING.
B. FULL LENGTHS OF PIPE SHALL BE USED WHEREVER POSSIBLE. SHORT LENGTHS OF PIPE WITH COUPLINGS WILL NOT BE PERMITTED.
C. ALL PIPE SHALL BE CUT TO EXACT MEASUREMENT TO BE INSTALLED WITHOUT FORCING (EXCEPT WHERE COLD SPRINGING IS SPECIFICALLY CALLED FOR). AFTER CUTTING, ENDS SHALL BE REAMED AND CLEANED TO ELIMINATE FOREIGN MATTER.
D. CUTTING OR OTHER WEAKENING OF THE BUILDING STRUCTURE TO FACILITATE PIPING INSTALLATION WILL NOT BE PERMITTED.
E. ALL PIPE AND FITTINGS SHALL BE MARKED BY THE MANUFACTURER IN ACCORDANCE WITH THE MARKING SECTIONS OF THE STANDARDS TO WHICH REFERENCE IS MADE IN THIS SPECIFICATION MANUAL. STANDARD MARKING SYSTEM FOR VALVES, FITTINGS, FLANGES AND UNIONS OF THE MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY.
F. MAKE ALL CHANGES IN SIZE AND DIRECTION OF PIPING WITH FITTINGS. DO NOT USE BENDS, MITER FITTINGS, FACE OR FLUSH BUSHINGS, STREET ELBOWS OR FIELD-FABRICATED REDUCERS.
G. CLOSE NIPPLES SHALL NOT BE PERMITTED; USE ONLY SHOULDER NIPPLES. SHOULDER NIPPLE WITH SHOULDER LENGTH LESS THAN 1-1/2" SHALL BE OF HEAVY WALL PIPE; NIPPLES HAVING SHOULDER LENGTH OF 1-1/2" OR GREATER SHALL BE OF SAME SCHEDULE AS CONNECTED PIPE.
H. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, INSTALL ALL SUPPLY PIPING TO COILS, PUMPS AND OTHER EQUIPMENT INCLUDING VALVES AND STRAINERS THEREIN FULL SIZE. IF A REDUCTION IS REQUIRED AT A PUMP OR CONTROL VALVE, THE REDUCER SHALL BE INSTALLED ABUTTING THE INLET AND/OR OUTLET OF THE PUMP OR VALVE.

3.13 WELDING FITTINGS
A. BUTT-WELDING FITTINGS SHALL BE MANUFACTURED ACCORDING TO ANSI STANDARD B16.9 (LATEST EDITION). MITERED JOINT ELBOWS AND FIELD FABRICATED REDUCERS ARE NOT PERMITTED.
B. MAKE ALL BRANCH CONNECTIONS WITH TEES, EXCEPT THAT ON STEEL PIPING, FORGED STEEL "WELDOLETS" AS MANUFACTURED BY BONNEY FORGE MAY BE USED WHERE THE BRANCH PIPE IS NOT GREATER THAN ONE HALF THE SIZE OF THE MAIN PIPE (NOMINAL SIZES).

3.14 REDUCING FITTINGS
A. USE ECCENTRIC REDUCING FITTINGS OR ECCENTRIC REDUCING COUPLINGS WHERE REQUIRED TO PREVENT POCKETING OF LIQUID.
B. WHERE ECCENTRIC REDUCERS ARE USED, THE STRAIGHT SIDE SHOULD BE INSTALLED ON TOP FOR PUMP SUCTION AND ON THE BOTTOM FOR ALL OTHER LINES.

3.15 CONNECTIONS TO EQUIPMENT AND SPECIALTIES
A. PIPING SYSTEMS SHALL BE INSTALLED COMPLETE TO EQUIPMENT CONNECTIONS OR TERMINAL USE POINTS.
B. PIPING SHALL BE FABRICATED CAREFULLY AND ACCURATELY TO MEET CONNECTIONS ON EQUIPMENT WITHOUT SPRINGING THE PIPE.
C. PROVIDE UNIONS OR FLANGES AT ALL PIPING CONNECTIONS TO COILS, EQUIPMENT, CONTROL VALVES, PRESSURE REDUCING VALVES, STEAM TRAPS, ETC., AT ALL LOCATIONS AS SHOWN ON THE DRAWINGS, AND GENERALLY AS REQUIRED TO DISCONNECT PIPING FROM EQUIPMENT AND APPARATUS. ARRANGE CONNECTIONS SO THAT THE EQUIPMENT SERVED MAY BE REMOVED WITHOUT DISTURBING THE PIPING. WHERE VALVES SERVE TO ISOLATE EQUIPMENT OR SPECIALTIES, THE UNIONS OR FLANGES SHALL BE LOCATED BETWEEN VALVES AND EQUIPMENT OR SPECIALTIES. UNIONS SHALL GENERALLY BE USED FOR PIPE SIZES 2" AND SMALLER AND FLANGES FOR PIPE SIZES 2-1/2" AND LARGER.

3.16 DIELECTRIC CONNECTIONS
A. PROVIDE DIELECTRIC FITTINGS BETWEEN FERROUS AND COPPER PIPING.

3.17 PIPE SLEEVES
A. PROVIDE ALL PIPE OPENINGS THROUGH WALLS, PARTITIONS AND SLABS WITH SLEEVES HAVING AN INTERNAL DIAMETER AT LEAST 1" LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE FOR UNINSULATED LINES OR OF THE THICKNESS OF THE INSULATION FOR INSULATED SERVICES.
B. INSTALL SLEEVES THROUGH INTERIOR WALLS AND PARTITIONS FLUSH WITH FINISHED SURFACES; SLEEVES THROUGH OUTSIDE WALLS ARE TO PROJECT 1/2" ON OUTSIDE OF THE FINISHED WALL. FLOOR SLEEVES ARE TO PROJECT 2" ABOVE FINISHED FLOORS.
C. SET SLEEVES IN PLACE BEFORE POURING CONCRETE OR SECURELY FASTEN AND GROUT IN WITH CEMENT.
D. SLEEVE CONSTRUCTION:
1. INTERIOR PARTITIONS: NO. 22 GAUGE GALVANIZED SHEET STEEL WITH SOLDERED JOINT.
2. INTERIOR MASONRY WALLS AND FLOORS: SCHEDULE 40 GALVANIZED STEEL PIPE.
E. INTERIOR WALLS: FILL THE SPACE BETWEEN OUTSIDE OF PIPE OR INSULATION AND THE INSIDE OF THE SLEEVE OR FRAMED OPENING WITH FIBER GLASS.
F. EXTERIOR WALLS: PACK WITH OAKUM, SEAL WITH LEAD AND WATERTIGHT MASTIC OR ASPHALT.
G. PROVIDE ESCUTCHEONS ON BOTH SIDES OF THE PENETRATION THROUGH THE STRUCTURE FOR ALL PIPES EXPOSED TO VIEW PASSING THROUGH WALLS, FLOORS, CEILINGS, AND PARTITIONS, WHETHER OR NOT INSULATED. FOR PIPES PASSING THROUGH FLOORS, ESCUTCHEONS SHALL FIT OVER THE SLEEVES.
H. FIRE-STOPPING SHALL BE PROVIDED AT ALL OPENINGS TO INCLUDE THE ANNULAR SPACE AROUND DUCTS, PIPING, CONDUITS, ETC. AND SHALL BE U.L. RATED MATERIALS AND METHODS PER THE ARCHITECTURAL SPECIFICATION SECTIONS. SUBMIT THROUGH PENETRATION PROTECTION SYSTEMS FOR ALL FIRE RATED ASSEMBLIES TO THE LOCAL AUTHORITIES AND THE ARCHITECT/ENGINEER FOR REVIEW.

3.18 SCREWED JOINTS
A. CUT THREADS FULL AND CLEAN WITH SHARP DIES.
B. REAM ENDS OF PIPE AFTER THREADING AND BEFORE ASSEMBLY, TO REMOVE BURRS.
C. LEAVE NOT MORE THAN THREE PIPE THREADS EXPOSED AT EACH CONNECTION.
D. USE JOINT SEALANT OR TAPE ON MALE THREADS ONLY.

3.19 FLANGED JOINTS
A. USE STEEL BOLTS WITH SQUARE HEADS AND HARD-PRESSED STEEL HEXAGON NUTS (THREADED TO THE ANSI STANDARD COARSE THREAD SERIES #2 FIT).
B. ALL BOLT HOLES ARE TO BE SPOT-FACED.
C. FLANGE DIMENSIONS AND DRILLING ARE TO CONFORM TO ANSI STANDARDS FOR THE PRESSURE CLASSES INVOLVED.
D. WHERE A CAST IRON, FLAT-FACED FLANGE JOINS A STEEL FLANGE, THE STEEL FLANGE MUST ALSO HAVE FULL, FLAT FACE. USE FULL FACE GASKET.
E. MATE RAISED-FACED FLANGES TO RAISED-FACED. USE RING TYPE GASKET.

3.20 SOLDERED AND BRAZED JOINTS
A. ALL SOLDERED AND/OR BRAZED JOINTS SHALL BE MADE IN ACCORDANCE WITH GOOD PRACTICE. TUBE ENDS SHALL BE SQUARE CUT AND REAMED, STRAIGHTENED AND ROUNDED WITH STRAIGHTENING TOOLS AS NECESSARY.
B. FITTING AND TUBE SURFACES SHALL BE PROPERLY CLEANED WITH STEEL WOOL OR EMERY CLOTH AND A SUITABLE FLUX SHALL BE USED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. UNIFORM HEAT SHALL BE APPLIED BY THE USE OF BLOW TORCH, ELECTRIC JOINT HEATER, OR OXYACETYLENE TORCH. ADEQUATE COOLING TIME SHALL BE ALLOWED BEFORE WASHING OR QUENCHING. APPURTENANCES THAT ARE FRAGILE OR HEAT SENSITIVE SHALL BE PROTECTED AGAINST OVERHEATING, OR THE SENSITIVE PARTS SHALL BE REMOVED DURING THIS APPLICATION OF HEAT.
C. ALL SOLDERED JOINTS SHALL BE MADE USING 95-5 SOLDER.
D. ALL BRAZED JOINTS SHALL BE MADE USING SILFOSS OR SILVER SOLDER.

3.21 WELDED JOINTS
A. IN GENERAL, ALL WELDING ON CARBON STEEL PIPE AND FITTINGS SHALL BE DONE BY THE METAL ARC PROCESS.
B. WELDING OPERATIONS SHALL CONFORM TO CHAPTER V, OF THE CODE FOR PRESSURE PIPING, ANSI B31.3, LATEST EDITION.
C. WELDERS AND WELDING PROCEDURES SHALL BE CERTIFIED WHERE REQUIRED BY SECTION IX OF THE ASME BOILER AND PRESSURE VESSEL CODE, LATEST EDITION.
D. TACK WELDS USED IN ASSEMBLY PIPE, FITTINGS, ETC., SHALL BE MADE BY A QUALIFIED WELDER OR SHALL BE REMOVED. TACK WELDS, WHICH ARE NOT REMOVED, SHALL BE MADE WITH AN ELECTRODE WHICH IS THE SAME AS OR EQUIVALENT TO THE ELECTRODE TO BE USED FOR THE FIRST PASS. TACK WELDS MUST BE THOROUGHLY CLEANED, GROUND SMOOTH, CAREFULLY EXAMINED FOR CRACKS, AND ALL CRACKS REMOVED BEFORE ADDITIONAL METAL MAY BE DEPOSITED. NO METAL SHALL BE TACK-WELDED INSIDE PIPE FOR ALIGNMENT PURPOSES.

3.22 CAULKED JOINTS
A. JOINTS IN CAST IRON BELL AND SPIGOT PIPING SHALL BE FIRMLY PACKED WITH OAKUM AND SHALL BE FILLED WITH PURE LEAD, MINIMUM 1" DEEP. JOINT SHALL THEN BE CAULKED. PROVIDE 'PUSH-ON' GASKET JOINTS WHERE ALLOWED BY CODE.

3.23 PREFORMED JOINTS
A. WHERE ASTM C425 JOINTS ARE USED, THEY SHALL BE WIPED CLEAN AND THE SOLVENT APPLIED IN ACCORDANCE WITH ASTM PROCEDURES.

3.24 MECHANICAL JOINTS
A. CLEAN SPIGOT AND BELL WITH WIRE BRUSH. BRUSH SURFACES AND GASKET WITH SOAPY WATER. WITH GLAND AND GASKET IN PLACE ON SPIGOT, INSERT INTO BELL. SEAT SPIGOT IN BELL AND PRESS GASKET INTO BELL AND PULL GLAND AGAINST BELL. INSTALL BOLTS AND NUTS FINGER TIGHT. FINISH WITH A TORQUE WRENCH, RANGE 60 TO 90 FOOT POUNDS.

SECTION 15250
INSULATION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS
A. SECTION 15050, "BASIC MATERIALS AND METHODS", APPLIES TO THE WORK SPECIFIED IN THIS SECTION.
B. IN ADDITION, THE FOLLOWING APPLY: SECTION 15400.

PART 2 – PRODUCTS

2.01 INSULATION – HOT PIPING
A. INSULATION FOR DOMESTIC WATER PIPING SYSTEMS SHALL BE 1" THICK GLASS FIBER.
B. GLASS FIBER INSULATION SHALL BE UL RATED, NONCOMBUSTIBLE, SECTIONAL PIPE INSULATION OF HEAVY DENSITY GLASS FIBER WITH ALL SERVICE JACKET HAVING A COMPOSITE RATING NOT TO EXCEED 25 FLAME SPREAD AND 50 SMOKE DEVELOPED. INSULATION SHALL BE AS SUPPLIED BY CERTAINTEED, OWENS/CORNING, OR KNAUF.
C. EVERY PACKAGE OR STANDARD CONTAINER OF COVERING, ADHESIVE AND COATING DELIVERED AT THE BUILDING FOR USE MUST HAVE THE MANUFACTURER'S STAMP OR LABEL ATTACHED, GIVING NAME OF MANUFACTURER AND BRAND.
D. JACKET LAPS AND BUTT STRIPS SHALL BE SELF-SEALING TYPE.
E. PROVIDE HALF ROUND GALVANIZED 18 GAUGE SHEET METAL HANGER SHIELDS. SHIELDS SHALL BE 12" LONG FOR PIPE SIZES UP TO 3", 18" FOR PIPE SIZES OVER 3" AND UP TO 6", AND 24" LONG FOR PIPE SIZES OVER 6".

2.02 INSULATION – COLD PIPING
A. INSULATION FOR DOMESTIC WATER PIPING SYSTEMS SHALL BE 1" THICK GLASS FIBER.
B. INSULATION FOR DRAINAGE PIPING SYSTEMS SHALL BE 1" THICK GLASS FIBER.
C. GLASS FIBER INSULATION SHALL BE UL RATED, NONCOMBUSTIBLE, SECTIONAL PIPE INSULATION OF HEAVY DENSITY GLASS FIBER WITH ALL SERVICE JACKET HAVING A COMPOSITE RATING NOT TO EXCEED 25 FLAME SPREAD AND 50 SMOKE DEVELOPED. INSULATION SHALL BE AS SUPPLIED BY CERTAINTEED, OWENS/CORNING, OR KNAUF.
D. EVERY PACKAGE OR STANDARD CONTAINER OF COVERING, ADHESIVE AND COATING DELIVERED AT THE BUILDING FOR USE MUST HAVE THE MANUFACTURER'S STAMP OR LABEL ATTACHED, GIVING NAME OF MANUFACTURER AND BRAND.
E. JACKET LAPS AND BUTT STRIPS SHALL BE SELF-SEALING TYPE.
F. PROVIDE HALF ROUND GALVANIZED 18 GAUGE SHEET METAL HANGER SHIELDS. SHIELDS SHALL BE 12" LONG FOR PIPE SIZES UP TO 3", 18" FOR PIPE SIZES OVER 3" AND UP TO 6", AND 24" LONG FOR PIPE SIZES OVER 6".

PART 3 – EXECUTION

3.01 INSULATED PIPING SYSTEMS
A. PROVIDE INSULATION ON PIPING SYSTEMS AS FOLLOWS:
1. HOT PIPING.
2. COLD PIPING.
3. SANITARY DRAINAGE LINES RECEIVING COLD CONDENSATE, AS PER COLD PIPING.
4. HOT WATER SUPPLY AND WASTE LINES AT LAVATORIES INTENDED FOR HANDICAPPED ACCESSIBILITY.

3.02 PIPE HANGER SHIELDS
A. EACH CONTRACTOR INSTALLING HOT OR COLD PIPING SHALL SET THE PIPING UP ON WOOD BLOCKING AT EACH HANGER.
B. THE WOOD BLOCKING THICKNESS SHALL BE THE SAME AS THAT OF THE PIPE INSULATION.
C. THIS CONTRACTOR SHALL REPLACE THE WOOD BLOCKING WITH A FULL SECTION OF HIGH DENSITY PIPE INSULATION AND A HANGER SHIELD.

3.03 INSTALLATION, GENERAL – HOT PIPING
A. ALL SURFACES MUST BE CLEAN AND DRY AND PIPE LINES TESTED BEFORE APPLYING PIPE INSULATION. IF COVERING IS APPLIED AT THE PIPE COVERER'S OPTION PRIOR TO TESTING, AND DEFECTS IN COVERED WORK APPEAR AT OR BEFORE THE TIME OF INSPECTION AND TESTS, THE COVERING MUST BE REMOVED, AND AFTER DEFECTS HAVE BEEN CORRECTED, MUST BE REINSTALLED WITHOUT EXPENSE TO THE OWNER.
B. COVERING SHALL BE DRY WHEN INSTALLED AND BEFORE AND DURING THE APPLICATION OF ANY FINISH. SURFACES OF COVERING SHALL BE SMOOTH, EVEN AND SUBSTANTIALLY FLUSH WITH ADJACENT PIPE COVERING.
C. MANUFACTURER'S APPLICATION INSTRUCTIONS FOR ALL MATERIALS SHALL BE FOLLOWED.
D. INSULATION SHALL NOT BE APPLIED OVER PIPE PLUGS, BLIND NIPPLES, NAMEPLATES, INSPECTION STAMPS, OR IDENTIFICAON TAGS.
E. INSULATOR MUST EXERCISE EXTREME CAUTION IN THE STORAGE OF FLAMMABLE ADHESIVES AND DURING THEIR APPLICATION.

3.04 INSULATION OF PIPING – HOT PIPING
A. BUTT JOINTS FIRMLY TOGETHER. OVERLAP SEAM SHALL BE DOWNWARD ON SIDE OF PIPE, SEALED TIGHT AND SMOOTH. STAPLE OVERLAP ON 6" SPACING.
B. INSTALL BUTT STRIPS WITH 2" OVERLAP DOWNWARD STAPLE END OF OVERLAP.
C. INSULATION SHALL BE FASTENED WITH 9/16" FLARE TYPE STAPLES.

3.05 INSULATION OF FITTINGS, VALVES, ETC. – HOT PIPING
A. FITTINGS AND VALVES 3" AND LESS SHALL BE INSULATED BY WRAPPING WITH PRE-CUT FIBER GLASS BLANKET INSULATION AND SECURING WITH JUTE TWINE. A PREFORMED, MOLDED PVC JACKET COVER SHALL BE INSTALLED OVER THE BLANKET INSULATION. THE JACKET SHALL BE FASTENED WITH STAINLESS STEEL TACKS AND BUTT STRIPS OVERLAPPING ONTO THE ADJOINING PIPE INSULATION.
B. FITTINGS 4" IPS AND LARGER SHALL BE INSULATED WITH NESTED AND/OR MITERED SECTIONAL PIPE COVERING OF THE SAME MATERIAL AND THICKNESS AS THE ADJACENT PIPE INSULATION. INSULATION SHALL THEN RECEIVE ONE COAT OF FINISHING CEMENT WITH GLASS FIBER REINFORCING CLOTH APPLIED TO FORM A SMOOTH FINISH IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
C. VALVES 4" IPS AND LARGER SHALL HAVE BODIES UP TO THE BONNETS INSULATED WITH NESTED AND/OR MITERED SECTIONAL PIPE COVERING OF THE SAME MATERIAL AND THICKNESS AS THE ADJACENT PIPE INSULATION. INSULATION SHALL RECEIVE ONE COAT OF FINISHING CEMENT WITH GLASS FIBER REINFORCING CLOTH APPLIED TO FORM A SMOOTH FINISH IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PACKING NUTS OF VALVES SHALL NOT BE INSULATED.
D. FLANGES SHALL BE INSULATED WITH NESTED PIPE INSULATION. THE FLANGE INSULATION SHALL EXTEND NOT LESS THAN 2" OVER THE ADJACENT PIPE INSULATION ON EACH SIDE OF THE FLANGE. INSULATION ON PIPES SHALL BE STOPPED SHORT OF FLANGES TO PERMIT REMOVAL OF FLANGE BOLTS. THE FLANGE INSULATION SHALL BE APPLIED IN SUCH A MANNER THAT IT MAY BE REMOVED WITHOUT DAMAGE TO THE ADJACENT PIPE INSULATION.
E. STRAINERS 1-1/2" AND LARGER SHALL BE INSULATED WITH NESTED PIPE INSULATION AND FILLING VOIDS WITH CEMENT AS DESCRIBED ABOVE FOR 4" AND LARGER FITTINGS AND VALVES. CLEAN-OUT PLUGS SHALL BE LEFT ACCESSIBLE SO THAT INSULATION WILL NOT BE DAMAGED BY THEIR REMOVAL. STRAINERS SMALLER THAN 1-1/2" SHALL NOT BE INSULATED.
F. WHEREVER NESTING SIZE SECTIONAL COVERING IS USED, IT SHALL BE CUT TO FIT IN A NEAT WORKMANLIKE MANNER WITH ALL JOINTS BUTTED AND HELD SECURELY IN PLACE.
G. UNIONS SHALL NOT BE INSULATED.
H. FITTINGS, VALVES, STRAINERS, UNFINISHED ENDS OF SECTIONAL INSULATION, AND COLOR DAMAGED JACKETS SHALL BE SEALED AND PAINTED WITH CHILDERS NO. CP-35 (WHITE) AT THE RATE OF 85-100 SQ. FT. PER GALLON.

3.06 INSTALLATION, GENERAL – COLD PIPING
A. ALL SURFACES MUST BE CLEAN AND DRY AND PIPE LINES TESTED BEFORE APPLYING PIPE INSULATION. IF COVERING IS APPLIED AT THE PIPE COVERER'S OPTION PRIOR TO TESTING, AND DEFECTS IN COVERED WORK APPEAR AT OR BEFORE THE TIME OF INSPECTION AND TESTS, THE COVERING MUST BE REMOVED, AND AFTER DEFECTS HAVE BEEN CORRECTED, MUST BE REINSTALLED WITHOUT EXPENSE TO THE OWNER.
B. COVERING SHALL BE DRY WHEN INSTALLED AND BEFORE AND DURING THE APPLICATION OF ANY FINISH. SURFACES OF COVERING SHALL BE SMOOTH, EVEN AND SUBSTANTIALLY FLUSH WITH ADJACENT PIPE COVERING.
C. MANUFACTURER'S APPLICATION INSTRUCTIONS FOR ALL MATERIALS SHALL BE FOLLOWED.
D. INSULATION SHALL NOT BE APPLIED OVER PIPE PLUGS, BLIND NIPPLES, NAMEPLATES, INSPECTION STAMPS, OR IDENTIFICATION TAGS.
E. INSULATOR MUST EXERCISE EXTREME CAUTION IN THE STORAGE OF FLAMMABLE ADHESIVES AND DURING THEIR APPLICATION.

3.07 INSULATION OF PIPING – COLD PIPING
A. BUTT JOINTS FIRMLY TOGETHER. OVERLAP SEAM SHALL BE DOWNWARD ON SIDE OF PIPE, SEALED TIGHT AND SMOOTH. STAPLE OVERLAP ON 6" SPACING.
B. INSTALL BUTT STRIPS WITH 2" OVERLAP DOWNWARD STAPLE END OF OVERLAP.
C. INSULATION SHALL BE FASTENED WITH 9/16" FLARE TYPE STAPLES.
D. SEAL OVER STAPLES WITH VAPOR-BARRIER MASTIC, CHILDERS NO. CP-35 (WHITE).

3.08 INSULATION OF FITTINGS, VALVES, ETC. – COLD PIPING
A. FITTINGS AND VALVES 3" AND LESS SHALL BE INSULATED BY WRAPPING WITH PRE-CUT FIBER GLASS BLANKET INSULATION AND SECURING WITH JUTE TWINE. A PREFORMED, MOLDED PVC JACKET COVER SHALL BE INSTALLED OVER THE BLANKET INSULATION. THE JACKET SHALL BE FASTENED WITH STAINLESS STEEL TACKS AND BUTT STRIPS OVERLAPPING ONTO THE ADJOINING PIPE INSULATION. A VAPOR-BARRIER MASTIC, CHILDERS NO. CP-35 (WHITE), SHALL BE USED TO SEAL THE JACKET THROAT AND JACKET TO THE PIPE INSULATION PRIOR TO TACK AND BUTT STRIP INSTALLATION.
B. FITTINGS 4" IPS AND LARGER SHALL BE INSULATED WITH NESTED AND/OR MITERED SECTIONAL PIPE COVERING OF THE SAME MATERIAL AND THICKNESS AS THE ADJACENT PIPE INSULATION.
C. VALVES 4" AND LARGER SHALL HAVE BODIES UP TO THE BONNETS INSULATED WITH NESTING PIPE INSULATION OF APPROPRIATE SIZE AND OF THE SAME MATERIAL AND THICKNESS AS THE ADJACENT PIPE INSULATION.
D. FLANGES SHALL BE INSULATED WITH NESTING PIPE INSULATION. THE FLANGE INSULATION SHALL EXTEND NOT LESS THAN 2" OVER THE ADJACENT PIPE INSULATION ON EACH SIDE OF THE FLANGE. INSULATION ON PIPES IS TO BE STOPPED SHORT OF FLANGES TO PERMIT REMOVAL OF FLANGE BOLTS. THE FLANGE INSULATION SHALL BE APPLIED IN SUCH A MANNER THAT IT MAY BE REMOVED WITHOUT DAMAGE TO THE ADJACENT PIPE INSULATION.
E. UNIONS SHALL BE COVERED WITH NESTING PIPE INSULATION AS SPECIFIED FOR FLANGES.
F. STRAINERS SHALL BE INSULATED AS DESCRIBED ABOVE FOR SMALL VALVES AND FITTINGS. CLEAN-OUT PLUGS SHALL BE LEFT ACCESSIBLE SO THAT THE INSULATION IS NOT DAMAGED BY THEIR REMOVAL.
G. WHEREVER NESTING SIZE SECTIONAL COVERING IS USED, IT SHALL BE CUT TO FIT IN A NEAT WORKMANLIKE MANNER WITH ALL JOINTS BUTTED AND HELD SECURELY IN PLACE WITH JUTE OR GLASS FIBER TWINE. JOINTS SHALL BE POINTED UP WITH INSULATING CEMENT PRIOR TO RECEIVING SURFACE FINISH.
H. FITTINGS, VALVES, STRAINERS, WHERE VAPOR-BARRIER JACKET OR CLOTH TAPE HAS BEEN FITTED FOR NESTED/MITERED APPLICATIONS, AND COLOR DAMAGED JACKETS SHALL BE SEALED AND PAINTED WITH CHILDERS NO. CP-35 (WHITE) AT THE RATE OF 85-100 SQ. FT. PER GALLON.

3.09 METAL JACKETING
A. PROVIDE ALUMINUM JACKETING FOR PROTECTION OF INSULATION WHERE EXPOSED.
B. ALUMINUM JACKETING SHALL BE FITTED OVER PIPE AND FITTINGS FOR ALL INSULATION UP TO 8'-0" ABOVE FLOOR OR MEZZANINE LEVELS.

SECTION 15350
NATURAL GAS PIPING SYSTEMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS
A. THE FOLLOWING SECTIONS APPLY TO THE WORK OF THIS SECTION: SECTION 15050.
B. IN ADDITION: THE FOLLOWING APPLY: 15400, AND 15800.

1.02 DESCRIPTION
A. THIS SECTION PROVIDES FOR THE INSTALLATION OF NATURAL GAS PIPING SYSTEMS.

1.03 SHOP DRAWINGS
A. PROVIDE 1/4" SCALE SHOP DRAWINGS FOR ALL PIPING SYSTEMS.

PART 2 – PRODUCTS

2.01 PROVIDE GAS PIPING SYSTEM PRODUCTS
A. GAS COCKS AND UNIONS.
B. PIPE, FITTINGS AND PIPING SPECIALTIES.
C. PROTECTIVE COATINGS.
D. PRESSURE REGULATORS.
E. GAS SERVICE METER AND APPARATUS SUPPORT.

PART 3 – EXECUTION

3.01 CODE COMPLIANCE
A. CURRENT NFPA #54-NATIONAL FUEL GAS CODE.
B. UNDERWRITER'S LABORATORIES, INC.
C. AMERICAN GAS ASSOCIATION.
D. ALL CURRENT LOCAL, STATE AND FEDERAL APPLICABLE.

3.02 NATURAL GAS SERVICE
A. THE GAS UTILITY WILL PROVIDE A GAS SERVICE AND METER.
B. PROVIDE A CONCRETE PAD AND STEEL PIPE STANDS/PLATFORMS FOR METER, PER DRAWINGS.

3.03 NATURAL GAS DISTRIBUTION
A. PROVIDE A GAS DISTRIBUTION SYSTEM FROM THE METER TO THE GAS-FIRED EQUIPMENT AND APPLIANCES, PER DRAWINGS.

3.04 NATURAL GAS PIPING INSTALLATION
A. EXTEND VENTS FROM PRESSURE REGULATIONS TO THE OUTSIDE WITH SCREENED VENT CAP.
B. REFER TO BASIC MATERIALS AND METHODS SECTION FOR CLEANING, TESTING AND OTHER INSTALLATION REQUIREMENTS.

SECTION 15400
PLUMBING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS
A. SECTION 15050, BASIC MATERIALS AND METHODS, APPLIES TO THE WORK SPECIFIED IN THIS SECTION.
B. IN ADDITION, THE FOLLOWING APPLY: 15250 AND 15350.

1.02 DESCRIPTION
A. THIS SECTION PROVIDES FOR THE INSTALLATION OF PLUMBING SYSTEMS, FIXTURES, EQUIPMENT AND ACCESSORIES.

1.03 SHOP DRAWINGS
A. PROVIDE 1/8" SCALE SHOP DRAWINGS FOR ALL PIPING SYSTEMS.

PART 2 – PRODUCTS

2.01 PLUMBING FIXTURES AND ACCESSORIES
A. PROVIDE PLUMBING FIXTURES AND ACCESSORIES AS SCHEDULED AND NOTED.

2.02 VACUUM BREAKERS
A. PROVIDE VACUUM BREAKERS FOR PLUMBING FIXTURES AND SUPPLY FITTINGS HAVING A SUBMERGED OUTLET OR HOSE END.

2.03 CLEANOUTS
A. PROVIDE CLEANOUTS FOR SANITARY SYSTEMS AS SCHEDULED OR NOTED.

2.04 DRAINS AND ACCESSORIES
A. PROVIDE FLOOR DRAINS AND ACCESSORIES AS SCHEDULED, NOTED AND DETAILED.

2.05 FLASHINGS
A. PROVIDE 4 POUND SHEET LEAD FLASHINGS FOR VENTS OR MOLDED PIPE BOOT-FLASHINGS. REFER TO ARCHITECTURAL DRAWING DETAILS.

2.06 TRANSITION COUPLINGS
A. PROVIDE TRANSITION COUPLINGS BETWEEN CHANGE OF MATERIALS OF PIPING SYSTEMS.

2.07 THERMOMETERS AND GAUGES
A. PROVIDE THERMOMETER AND GAUGES PER DRAWING LEGENDS.
B. THEY SHALL BE SEPARABLE SOCKET, ADJUSTABLE ANGLE TYPE.
C. MANUFACTURERS: TRERICE, MARSH, MARSHALLTOWN.

2.08 HOT WATER GENERATORS
A. PROVIDE HOT WATER GENERATORS PER DRAWING LEGEND.
B. FLUES PROVIDED UNDER SECTION 15800.

2.09 CIRCULATING PUMPS
A. PROVIDE HOT WATER RECIRCULATION PUMP PER DRAWING LEGEND.

2.10 BACKFLOW PREVENTERS
A. PROVIDE BACKFLOW PREVENTERS WHERE SHOWN AND WHERE REQUIRED BY CODE.

2.11 FLOW CONTROLS
A. PROVIDE WATER CONSERVATION FLOW RESTRICTORS IN THE SUPPLIES FOR ALL FIXTURES TO COMPLY WITH FEDERAL, STATE AND LOCAL CODE.
B. PROVIDE PRESSURE REDUCING VALVE FOR MAXIMUM WATER PRESSURE OF 80 PSIG.

2.12 THERMOSTATIC MIXING VALVES
A. PROVIDE THERMOSTATIC MIXING VALVES WHERE SHOWN AND REQUIRED BY CODE.

PART 3 – EXECUTION

3.01 SEWER SYSTEMS
A. PROVIDE SANITARY AND STORM SYSTEMS PER THE DRAWINGS.
B. PROVIDE CLEANOUTS IN THE SANITARY AND STORM SYSTEMS PER THE DRAWINGS.
C. PROVIDE CLEANOUTS AT THE BASE OF RISERS, ENDS OF HORIZONTAL MAINS, CHANGES IN DIRECTION AND MAXIMUM OF FIFTY (50) FEET CENTERS IN MAIN RUNS.

3.02 TRAPS
A. PROVIDE TRAPS FOR EACH FIXTURE AND DRAIN.
B. TRAP SHALL BE SAME SIZE AS FIXTURE OF DRAIN OUTLET.

3.03 FLASHINGS
A. PROVIDE 24 INCH SQUARE FLASHING FOR VENTS.
B. TURN VENT FLASHINGS DOWN INTO VENT PIPE.

3.04 COLD WATER SYSTEM
A. PROVIDE A COLD WATER DISTRIBUTION SYSTEM, INCLUDING METER, AS SHOWN, SCHEDULED AND DETAILED.

3.05 HOT WATER SYSTEM
A. PROVIDE A HOT WATER SUPPLY AND RETURN DISTRIBUTION SYSTEM AS SHOWN, SCHEDULED AND DETAILED.

3.06 AIR CHAMBERS
A. PROVIDE MINIMUM 12" LONG AIR CHAMBERS FOR HOT AND COLD WATER CONNECTIONS TO A SUPPLY FITTING.

3.07 DISINFECTION OF DOMESTIC WATER PIPING
A. THE DISINFECTING AGENT SHALL BE ONE OF THE FOLLOWING: SODIUM HYPOCHLORITE SOLUTION (COMMERCIALLY AVAILABLE BLEACH), CALCIUM HYPOCHLORITE GRANULES OR TABLETS, OR CHLORINE GAS. THE CHOICE FOR A PARTICULAR JOB WILL DEPEND ON THE CONFIGURATION OF THE SYSTEM TO BE TREATED, THE CONVENIENCE AND SAFETY FACTORS INVOLVED, ETC.
B. PROVIDE NIPPLES AND VALVES AS REQUIRED TO INTRODUCE DISINFECTANT AND WATER, TO VENT AIR AND TO DRAIN THE SOLUTION, WHETHER OR NOT THESE CONNECTIONS ARE SHOWN ON THE DRAWINGS.
C. FILL THE SYSTEM UNIFORMLY WITH A DISINFECTION SOLUTION OF 100 PPM AVAILABLE CHLORINE. THE DISINFECTANT SHALL BE RETAINED NOT LESS THAN 24 HOURS. AS AN ALTERNATE, A SOLUTION OF 300 PPM HELD FOR 3 HOURS IS ALSO ACCEPTABLE. AFTER THE HOLDING PERIOD, A TEST FOR RESIDUAL CHLORINE SHALL BE MADE. IF NONE IS FOUND, THE SYSTEM SHALL BE DRAINED AND THE DISINFECTION PROCEDURE REPEATED. WHEN A POSITIVE RESIDUAL CHLORINE TEST IS ACCOMPLISHED, THE SYSTEM SHALL BE FLUSHED WITH POTABLE WATER AND PUT INTO OPERATION.
D. WORK SHALL COMPLY WITH REQUIREMENTS OF STATE AND LOCAL AUTHORITIES.

3.08 THERMOMETERS
A. PROVIDE THERMOMETERS AND GAUGES PER DRAWING DETAILS.

3.09 HOT WATER GENERATORS
A. PROVIDE GENERATORS, ACCESSORIES AND TRIM PER DRAWING DETAILS.

3.10 CIRCULATING PUMPS
A. PROVIDE PUMPS PER DRAWING.
B. ELECTRIC WIRING BY ELECTRICAL CONTRACTOR TO EXTENT SHOWN ON ELECTRICAL DRAWINGS. ALL OTHER WIRING BY THIS CONTRACTOR.

3.11 INSULATION
A. PROVIDE PLUMBING PIPING AND EQUIPMENT INSULATION PER SECTION 15250.

3.12 INTERFACE CONNECTIONS
A. PROVIDE INTERFACE CONNECTIONS TO THE WORK OF OTHER TRADES PER DRAWINGS.

3.13 PIPING IDENTIFICATION
A. ALL NEW PIPING, INSTALLED UNDER THIS CONTRACT, SHALL BE IDENTIFIED AS TO THE TYPE OF SERVICE, AND THE DIRECTION OF FLOW, USING A SYSTEM CURRENTLY IN USE BY THE OWNER.
B. WHERE PIPING IS INSULATED, PIPE IDENTIFICATION MARKERS SHALL BE INSTALLED AFTER THE INSULATION HAS BEEN INSTALLED.
C. PIPE IDENTIFICATION MARKERS SHALL BE INSTALLED AT EACH EQUIPMENT CONNECTION AND ON TWENTY (20) FOOT CENTERS FOR RUNS OF STRAIGHT PIPING.

3.14 ACCESS DOORS
A. INSTALL ACCESS DOORS IN THE BUILDING CONSTRUCTION WHERE SHOWN ON THE DRAWINGS OR WHERE REQUIRED TO ACCESS VALVES AND CLEANOUTS.
B. COORDINATE INSTALLATION WITH THE GENERAL CONTRACTOR.

3.15 BACKFLOW PREVENTERS
A. INSTALL PREVENTERS COMPLETE WITH DRAIN. ALL PIPING IN ACCORDANCE WITH MANUFACTURER'S LITERATURE.

SECTION 15500
AUTOMATIC SPRINKLER SYSTEM

PART 1 – GENERAL

1.01 GENERAL CONDITIONS AND SPECIAL CONDITIONS
A. SECTION 15050, BASIC MATERIALS AND METHODS, APPLIES TO THE WORK SPECIFIED IN THIS SECTION.
B. GENERAL AND SPECIAL CONDITIONS APPLY TO THE WORK UNDER THIS SECTION.
C. A PRE-CONSTRUCTION MEETING BEFORE THE SHOP DRAWING PROCESS. A MEETING WILL BE HELD TO DISCUSS THE SENSITIVITY OF THE PIPING AND SPRINKLERS IN THE FACILITY AND ESPECIALLY THE SPECIAL CEILINGS. LOCATION OF AUTOMATIC SPRINKLES SHALL BE APPROVED THE ARCHITECT/OWNER.

1.02 SCOPE OF WORK
A. AUTOMATIC WET PIPE SPRINKLER SYSTEM AND COMPONENTS AS SPECIFIED HEREIN AND AS MIGHT BE SHOWN ON DRAWINGS, INCLUDING PIPING, HANGERS, VALVES, ALARMS, SUPPORTS AND SPRINKLER HEADS, NECESSARY AND AS REQUIRED FOR INSTALLATION OF COMPLETE AND APPROVED FIRE PROTECTION SYSTEMS.
B. WORK UNDER THIS SECTION SHALL BE PERFORMED BY AN APPROVED AND AUTOMATIC FIRE SPRINKLER CONTRACTOR. SHOP DRAWINGS AND CALCULATIONS SHALL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER. APPROVED CONTRACTOR AND THE CONTRACTOR'S REGISTERED ENGINEER SHALL BE LICENSED WITH THE PROPER AUTHORITIES FOR THE LOCATION OF THIS PROJECT.
C. WORK SHALL BE DONE IN A FIRST CLASS AND WORKMANLIKE MANNER, COMPLETE IN ALL RESPECTS INCLUDING ITEMS OF WORK SPECIFIED HEREIN OR OUTLINED AND ILLUSTRATED ON DRAWINGS AND NECESSARY TO ACCOMPLISH A COMPLETE, FULLY OPERATING, SATISFACTORY AND APPROVED INSTALLATION.

1.03 APPLICABLE STANDARDS
A. LOCAL AND STATE FIRE MARSHAL CODES.
B. NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS.
C. NFPA-13 – SPRINKLER SYSTEMS.
D. UNDERWRITERS LABORATORIES STANDARDS.
E. OWNER'S OR TENANT'S INSURANCE UNDERWRITER.
F. MATERIALS AND EQUIPMENT SHALL BE U.L. INC. APPROVED AND LISTED AND APPROVED BY FACTORY MUTUAL.

1.04 SHOP DRAWINGS
A. UPON AWARD OF CONTRACT, FIRE PROTECTION CONTRACTOR SHALL IMMEDIATELY PREPARE WORKING DRAWINGS, HYDRAULIC CALCULATIONS, AND MANUFACTURER'S DATA SHEETS FOR EACH AND EVERY ITEM OF EQUIPMENT AND MATERIAL; AND SUBMIT THE SAME FOR APPROVAL TO:
1. LOCAL FIRE PREVENTION BUREAU.
2. OWNER'S OR TENANT'S INSURANCE UNDERWRITER.
3. ARCHITECT/ENGINEER.
B. AFTER APPROVAL, FIRE PROTECTION CONTRACTOR SHALL SUBMIT APPROVED WORKING DRAWINGS BEARING SEAL OR STAMP OR APPROVAL FROM THE FIRE PREVENTION BUREAU AND THE OWNER'S/TENANT'S INSURANCE UNDERWRITER, IF REQUIRED. SUBMIT ONE (1) REPRODUCIBLE SEPIA AND THREE (3) BLUELINE PRINTS OF COMPLETE SHOP DRAWINGS, AND SIX (6) SETS OF MANUFACTURER'S DATA ON DEVICES AND (4) SETS OF CALCULATIONS.
C. CONTRACTOR SHALL SUBMIT COMPLETE PACKAGES. PARTIAL SUBMITTALS SHALL BE AVOIDED.
D. FIRE PROTECTION WORK, INCLUDING ORDERING OF MATERIALS, SHALL NOT BE DONE UNTIL AFTER REQUIRED APPROVALS HAVE BEEN OBTAINED.
E. PREPARE SHOP DRAWINGS AT MINIMUM SCALE OF 1/8"=1'-0" FOR PLANS, AND 1/4"=1'-0" FOR DETAILS. SHOW ALL PIPING, SPRINKLERS, HANGERS, FLEXIBLE COUPLINGS, ROOF CONSTRUCTION AND OCCUPANCY OF EACH AREA, INCLUDING CEILING AND ROOF HEIGHTS AS REQUIRED BY NFPA-13. WHEN WELDING IS PLANNED, SHOP DRAWINGS SHALL INDICATE THE SECTIONS TO BE SHOP WELDED AND THE TYPE OF WELDED FITTINGS TO BE USED.
F. INSTALLATION SHALL BE BASED ON THE LATEST ARCHITECTURAL, STRUCTURAL, HEATING AND VENTILATING, PLUMBING AND ELECTRICAL DRAWINGS.
G. SPRINKLER SYSTEM CONTROLS, VALVING, DEVICES, PIPE ROUTING, SPRINKLER HEAD LOCATIONS AND SPACING IF SHOWN ARE A CRITERIA FOR CONTRACTOR TO PREPARE FINAL SHOP DRAWINGS. FIRE PROTECTION CONTRACTOR SHALL FIELD VERIFY EXACT REQUIREMENTS FOR BUILDING REGARDING PIPE SIZES, ADEQUATE PRESSURES, SERVICE LOCATIONS, ZONING AND SUBMIT SHOP DRAWING TO THE AUTHORITIES FOR APPROVAL PRIOR TO FABRICATION OR INSTALLATION OF FIRE PROTECTION WATER SERVICE AND SYSTEMS.

1.05 AS-BUILT DRAWINGS
A. MAINTAIN AT THE SITE AN UP-TO-DATE MARKED SET OF AS-BUILT DRAWINGS, WHICH SHALL BE CORRECTED AND DELIVERED TO THE ARCHITECT UPON COMPLETION OF THE WORK.
B. FURNISH THE ARCHITECT WITH ONE (1) REPRODUCIBLE SEPIA PRINT OF EACH APPROVED SHOP DRAWINGS, REVISED TO SHOW "AS-BUILT" CONDITIONS.

1.06 VALVE DIAGRAM AND OPERATING INSTRUCTIONS
A. AT THE COMPLETION OF THE WORK, PROVIDE A SMALL SCALE PLAN OF EACH BUILDING SYSTEM INDICATING THE LOCATIONS OF ALL CONTROL VALVES, LOW POINT DRAINS AND INSPECTOR'S TESTS. THE PLANS SHALL BE NEATLY DRAWN AND COLOR CODED TO INDICATE THE PORTION OF THE BUILDING PROTECTED BY EACH SYSTEM, FRAMED UNDER GLASS AND PERMANENTLY MOUNTED ON THE WALL ADJACENT TO THE SPRINKLER RISER VALVES.
B. FURNISH ONE (1) COPY OF NFPA-25, 'INSPECTION, TESTING AND MAINTENANCE OF WATER BASE PROTECTION SYSTEMS', AND BOUND SET(S) OF PRINTED OPERATING AND MAINTENANCE INSTRUCTIONS TO THE OWNER, AND ADEQUATELY INSTRUCT THE OWNER'S MAINTENANCE PERSONNEL IN PROPER OPERATION AND TEST PROCEDURES OF ALL FIRE PROTECTION COMPONENTS PROVIDED.

1.07 CHANGES
A. MAKE NO CHANGES IN INSTALLATION FROM LAYOUT AS SHOWN ON DRAWINGS, UNLESS CHANGE IS SPECIFICALLY APPROVED BY THE ARCHITECT. THIS DOES NOT INCLUDE MINOR REVISIONS FOR THE PURPOSE OF COORDINATION.
B. ANY CHANGES MADE, OTHER THAN AS ABOVE STATED, ARE AT THE CONTRACTOR'S OWN EXPENSE AND RESPONSIBILITY.

1.08 LEAK DAMAGE
A. THE CONTRACTOR SHALL BE RESPONSIBLE DURING THE INSTALLATION AND TESTING PERIODS OF THE SPRINKLER SYSTEM FOR ANY DAMAGE TO THE WORK OF OTHERS, TO THE BUILDING, ITS CONTENTS, ETC. CAUSED BY LEAKS IN ANY EQUIPMENT, BY UNPLUGGED OR DISCONNECTED PIPES, FITTINGS, ETC. OR BY OVERFLOW, AND SHALL PAY FOR THE NECESSARY REPLACEMENTS OR REPAIRS TO WORK OF OTHERS, DAMAGED BY SUCH LEAKAGE.

1.09 PERMITS AND FEES
A. THE CONTRACTOR SHALL PAY FOR ALL PERMITS, FEES AND CHARGES REQUIRED FOR THIS WORK.

PART 2 – PRODUCTS

2.01 GENERAL
A. THE NAMING OF MANUFACTURERS IN THE SPECIFICATIONS SHALL NOT BE CONSTRUED AS ELIMINATING THE MATERIALS, PRODUCTS OR SERVICES OF OTHER MANUFACTURERS AND SUPPLIERS HAVING APPROVED EQUIVALENT ITEMS.
B. "LISTED" SHALL REFER TO MATERIALS OR EQUIPMENT INCLUDED IN A LIST PUBLISHED BY A NATIONALLY RECOGNIZED TESTING LABORATORY THAT MAINTAINS PERIODIC INSPECTION OF PRODUCTION OF LISTED EQUIPMENT OR MATERIALS, AND WHOSE LISTING STATES EITHER THAT THE EQUIPMENT OR MATERIAL MEETS NATIONALLY RECOGNIZED STANDARD OR HAS BEEN TESTED AND FOUND SUITABLE FOR USE IN A SPECIFIED MANNER.

2.02 SPRINKLERS
A. SPRINKLERS FOR THE PROPOSED EQUIPMENT SHALL BE NEW AND OF THE LISTED AUTOMATIC, CONCEALED WITH WHITE COVER PLATE OR APPROVED EQUAL, AND SHALL BE DISTRIBUTED THROUGHOUT THE BUILDING, APPROXIMATE NUMBER OF SPRINKLERS AND TYPE SHOWN ON CONTRACTOR'S SHOP DRAWINGS. IF THE NUMBER OF SPRINKLERS INDICATED IN THE SPRINKLER COUNT SUMMARY DIFFERS FROM ACTUAL COUNT ON PLANS, THE ACTUAL COUNT SHALL BE PROVIDED.
B. INSTALL SPRINKLERS OF PROPER DEGREE RATING WHEREVER NECESSARY TO MEET REQUIREMENTS OF NFPA-13.

2.03 HOSE THREADS
A. HOSE THREADS FOR HYDRANTS AND FIRE DEPARTMENT SIAMESE CONNECTION SHALL MATCH THOSE OF THE LOCAL FIRE DEPARTMENT.

2.04 VALVES AND DEVICES
A. ALL SPRINKLER CONTROL VALVES, DEVICES, CHECK VALVES, ALARM VALVES, ETC. SHALL BE OF THE APPROVED AND LISTED TYPE.

2.05 PIPING
A. PIPE SHALL BE SCHEDULE 40, ASTM 53, BLACK STEEL WITH 125 & 250 WORKING PRESSURE CAST IRON FITTINGS, ANSI B16.4 OR 150 & 300 WORKING PRESSURE MALLEABLE IRON FITTINGS, ANSI B16.3. FITTINGS 2" & SMALLER SHALL BE STANDARD WEIGHT AND 2-1/2" & LARGER SHALL BE EXTRA HEAVY. CAST IRON FLANGED FITTINGS, ANSI B16.1, MAY BE USED FOR PIPING 3" & LARGER. NO THINWALL TYPE PIPE WILL BE PERMITTED.
B. SCHEDULE 10, ASTM 135 BLACK STEEL THINWALL PIPE WITH MECHANICAL PIPE COUPLING AND ROLL-GROOVED JOINTS MAY BE USED FOR 2-1/2" AND LARGER PIPING. NO "XL" TYPE PIPE WILL BE PERMITTED.
C. PIPING SHALL BE JOINTED BY THREADING AND/OR GROOVED JOINT MECHANICAL PIPE COUPLINGS. GROOVED JOINT COUPLINGS SHALL BE FOR 2-1/2" & LARGER ONLY AND SHALL BE EQUAL TO VICTAULIC STYLE 75 OR 77. NO THREADED THINWALL PIPE IS PERMITTED. WELDING WILL BE ACCEPTED WHEN IN ACCORDANCE WITH THE STANDARDS OF NFPA, AND WHERE APPROVED BY AUTHORITIES HAVING JURISDICTION; NO FIELD WELDING IS PERMITTED.

PART 3 – EXECUTION

3.01 HYDRANT FLOW TEST
A. HYDRANT FLOW TEST EXISTING SITE FIRE LOOP PIPING PRIOR TO MAKING ANY CONNECTIONS. NOTIFY ARCHITECT IF FLOW TEST IS UNSUCCESSFUL. SCHEDULE TESTING TO ALLOW SUFFICIENT TIME FOR REPAIRS TO BE MADE OR IF FIRE PUMP IS REQUIRED TO SUPPLEMENT THE REQUIRED PRESSURE AND DESIGN FLOW RATE.

3.02 TESTING OVERHEAD PIPE
A. TEST ALL SPRINKLER PIPING IN ACCORDANCE WITH NFPA-13 REQUIREMENTS. NOTIFY ARCHITECT'S REPRESENTATIVE, OWNER'S REPRESENTATIVE AND LOCAL FIRE DEPARTMENT, 72 HOURS IN ADVANCE REGARDING TIME AND DATE OF ALL TESTS. OWNER SHALL ALSO ARRANGE WITH INSURING AGENCY AUTHORITIES FOR THEM REPRESENTATIVE TO BE PRESENT.

3.03 DRAINS
A. PROVIDE ALL MAIN AND AUXILIARY DRAINS WHERE NECESSARY. PROVIDE MEANS FOR DRAINING ENTIRE SYSTEMS, DOWN STREAM OF ALL SHUT-OFF VALVES AND ALL LOW POINTS.

3.04 CEILING AND WALL PLATES
A. INSTALL CHROME FINISHED CEILING AND WALL PLATES WHEREVER EXPOSED SPRINKLER PIPING PASSES THROUGH CEILINGS AND WALLS.

3.05 SLEEVES
A. SET SLEEVES IN PLACE FOR ALL PIPES PASSING THROUGH FLOOR AND WALL OPENINGS.

3.06 WELDING
A. NO FIELD WELDING OF SPRINKLER PIPING SHALL BE PERMITTED.
B. JOIN ALL INSIDE PIPING BY MEANS OF SCREWED, FLANGED OR FLEXIBLE GASKETED JOINTS OR OTHER ACCEPTABLE FITTINGS.

3.07 INSPECTOR'S TEST
A. PROVIDE TEST CONNECTIONS AT MOST REMOTE POINT OF MAIN PORTION OF EACH SPRINKLER SYSTEM WITH 1-INCH PIPE AND VALVE. TEST PIPE SHALL BE CONNECTED TO SPRINKLER PIPE AT LEAST 1-1/4" DIAMETER AND SHALL DISCHARGE OUTSIDE BUILDING OR ADEQUATE FLOOR DRAIN THROUGH 1/2" SMOOTH BORE BRASS OUTLET WHERE IT CAN BE EASILY SEEN.
B. CONSULT WITH ARCHITECT'S REPRESENTATIVE AT JOB FOR EXACT LOCATION OF INSPECTORS TEST CONNECTIONS.

3.08 EXTRA SPRINKLERS
A. PROVIDE TWO SPARE SPRINKLER CABINETS COMPLETE WITH SPRINKLERS OF ASSORTED TEMPERATURE RATINGS OF THE TYPE NECESSARY AND IN USE THROUGHOUT THE INSTALLATION. EACH CABINET SHALL BE EQUIPPED WITH TWELVE (12) SPRINKLERS AND A SPECIAL SPRINKLER WRENCH FOR EACH TYPE OF SPRINKLER FURNISHED.
B. INSTALL SPRINKLER CABINETS ADJACENT TO THE RISER VALVES AND CONFER WITH ARCHITECT'S REPRESENTATIVE FOR EXACT LOCATION OF CABINET.

3.09 SPECIALTY DEVICES
A. INSTALLATION OF ALL SPECIALTY DEVICES SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS. WHERE THE INSTALLATION OF THOSE DEVICES REQUIRE USE OF A TORQUE WRENCH OR OTHER APPLIANCE, THE CONTRACTOR SHALL CERTIFY THAT THE MANUFACTURERS' INSTRUCTIONS HAVE BEEN COMPLIED WITH.

SEISMIC CONTROLS FOR MEPF SYSTEMS:

SEISMIC BRACING OF MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS SHALL BE INSTALLED AS REQUIRED BY LOCAL ADOPTED CODES. SEISMIC BRACING MEASURES TO BE APPLIED TO MECHANICAL/ELECTRICAL/PLUMBING EQUIPMENT AND SYSTEMS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE, AND/OR FEDERAL CODES AS WELL AS MANUFACTURER'S REQUIREMENTS. REFER TO ARCHITECTURAL AND/OR STRUCTURAL FOR ADDITIONAL BRACING DETAILS AND INFORMATION.

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