CONTINUED FROM SHEET P703

5.8 ADJUSTMENT AND TESTING

A. NOTE ACCESS: DURING INSTALLATION OF EQUIPMENT, DRAWINGS FOR ACCESS AS NECESSARY FOR INSPECTION OF INSTALLATION AND NOISE CONTROL EQUIPMENT BY ENGINEER.

B. INSPECTION:
1. UPON COMPLETING INSTALLATION AND ADJUSTMENT FOR SUITABLE OPERATION OF ALL WORK SPECIFIED UNDER THIS SECTION, NOTIFY ENGINEER IN WRITING YEAR WELL SCHEDULE A REVIEW.
2. THE CONTRACTOR'S LETTER SHALL CERTIFY THAT ALL WORK SPECIFIED UNDER THIS SECTION IS COMPLETE, OPERATIONAL, AND ADJUSTED IN EVERY RESPECT, AND THAT ALL WORK UNDER THIS SECTION IS READY FOR THE COMPLETION INSPECTION.
3. FOR EACH INSPECTION, WORKMEN SHALL BE FURNISHED TO PERFORM SUCH FUNCTIONS AS ARE NECESSARY FOR INSPECTION OF THE EQUIPMENT.
4. MEASUREMENT OF BACKGROUND NOISE LEVELS BY THE ENGINEER REQUIRES THAT THERE BE A MINIMUM OF EXTRANEOUS NOISE.
5. SUCH MEASUREMENTS MUST BE SCHEDULED DURING LATE-NIGHT HOURS WHEN THERE IS NO WORK TAKING PLACE ON THE SITE.
6. WORKMEN SHALL BE EMPLOYED DURING THE TESTING PROCEDURE TO TURN ON AND OFF ALL MECHANICAL AND ELECTRICAL EQUIPMENT FOR SUCH BACKGROUND NOISE LEVEL TESTING.

END OF SECTION 22 05 48

SECTION 22 05 75 - TESTING AND CLEANING OF PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FURNISHING AND INSTALLATION OF PIPING INSULATION.

1.3 REFERENCES

A. EXCEPT AS HEREIN SPECIFIED OR AS INDICATED ON THE DRAWINGS, THE WORK OF THIS SECTION SHALL COMPLY WITH THE FOLLOWING:
1. ASTM SPECIFICATIONS:
a. B209 - ALUMINUM AND ALUMINUM ALLOY SHEET AND PLATE.
b. C534 - PREFORMED RIGID ELASTOMERIC CELLULAR THERMAL INSULATION IN SHEET AND TUBULAR FORM.
c. C547 - MINERAL FIBER PREFORMED PIPE INSULATION.
d. C552 - CELLULAR GLASS BLOCK AND PIPE THERMAL INSULATION.
2. ASTM STANDARD TEST METHODS: E84 - SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.
3. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) PUBLICATIONS: NFPA 255 - SURFACE BURNING CHARACTERISTIC OF BUILDING MATERIALS: 25, 50, 50 FLAME SPREAD, FUEL, SMOKE.
4. ASHRAE: 90A - ENERGY CONSERVATION IN NEW BUILDING DESIGN, CURRENT EDITION.

1.4 SUBMITTALS

A. MANUFACTURER'S LITERATURE: FOR PIPING INSULATION
1. NAME OF MANUFACTURER.
2. DETAILS OF CONSTRUCTION AND INSTALLATION.
3. MANUFACTURER'S DATA (DENSITY, K-FACTOR).
B. FOR EACH APPLICATION
1. THICKNESS.
2. TOTAL "R" VALUE.
3. JACKET MATERIAL.

1.5 QUALITY ASSURANCE

A. FABRICATION AND INSTALLATION PERSONNEL QUALIFICATIONS:
1. TRAINED AND EXPERIENCED IN THE FABRICATION AND INSTALLATION OF THE MATERIALS AND EQUIPMENT.
2. INCORPORATION OF THE DESIGN AND THE REVISED SHOP DRAWINGS.

1.6 DELIVERY, STORAGE AND HANDLING

A. DELIVER MATERIALS IN ORIGINAL UNBROKEN, BRAND MARKED CONTAINERS OR WRAPPING AS APPLICABLE. STORE MATERIALS IN A MANNER WHICH WILL PREVENT DETERIORATION AND CONTAMINATION. STORE MATERIALS IN A MANNER THAT WILL NOT BLOCK ACCESS TO OTHER WORK.

B. REJECT DAMAGED, DETERIORATED, OR CONTAMINATED MATERIALS. IMMEDIATELY REMOVE FROM THE PREMISES AND REPLACE WITH MATERIALS AS NO ADDITIONAL COST TO OWNER.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. INSULATION:
1. OWENS-CORNING.
2. CERTAINTEED.
3. JOHNS-MANVILLE.
4. MANVILLE.
5. [illegible]
6. PROXIMITY.
7. OWENS-ILLINOIS.
8. CHALLENGER.
9. ZOTEFOAMS.
10. VARIOUS.
B. ADHESIVES:
1. BENJAMIN FOSTER.
2. CHALLENGER.
3. VARIOUS.

2.2 TYPES OF INSULATION MATERIALS

A. RIGID MOLDED GLASS FIBER - GENERAL USE:
1. ALL-SERVICE JACKET WITH FSK TABS FACTORY APPLIED JACKETING.
2. 3.1 LBS/CU FT MINIMUM DENSITY.
3. K-FACTOR OF 0.23 AT 75 DEGREES F MEAN.
4. 850 DEGREE F SERVICE TEMPERATURE.
5. OWENS-CORNING TYPE SSLII, OR EQUAL.
6. TYPICAL FOR APPLICATION ON PIPES 16 INCHES AND UP.
B. RIGID MOLDED GLASS FIBER - HIGH DENSITY (HPS):
1. ALL-SERVICE JACKET (ASJ), FACTORY APPLIED JACKETING.
2. 6 LBS/CU FT MINIMUM DENSITY.
3. K-FACTOR OF 0.29 MAXIMUM AT 100 DEGREES F MEAN.
4. 850 DEGREE F SERVICE TEMPERATURE.
5. OWENS-CORNING TYPE 650, OR EQUAL.
6. TYPICAL FOR APPLICATIONS ON PIPES BELOW 16 INCHES (NORMAL).
C. MODULAR ELASTOMERIC THERMAL PIPE INSULATION (E):
1. DENSITY OF 5.5 LBS/CU FT.
2. K-FACTOR OF 0.27 AT 70 DEGREES F MEAN.
3. MINIMUM WATER VAPOR TRANSMISSION OF 0.17 PERS INCH.
4. MUST BE LISTED FOR 25/50 FLAMESPREAD/SMOKE SPREAD FOR THICKNESS USED.
5. ARMACELL, ANDERSON AP OR EQUAL.

2.3 PIPE AND FITTING COVERS

A. POLYVINYL CHLORIDE (PVC) COVERS:
1. ULTRAVIOLET RESISTANT.
2. 0.030-INCH MINIMUM THICKNESS.
3. PREFORMED TO MATCH OUTER DIAMETER OF INSULATION.
4. PREFORMED FITTING COVERS, MINIMUM 10 MIL.
5. CDEL-TITE 826 OR EQUAL, BY TOPELINE CORPORATION.
B. ALUMINUM COVERS (A):
1. ASTM B209, ALLOY 3003 MINIMUM.
2. 0.016-INCH THICKNESS.
3. BRIGHT ANODIZED OR ACRYLIC-COATED SMOOTH FINISH ON EXPOSED SIDE.
4. 2-PIECE DYE AND IRONLESS ELBOW COVERS IN MINIMUM 0.016-INCH, PREFORMED.
5. PROVIDE MOISTURE BARRIER BACKING AND BUTT JOINT WITH MASTIC SEAL FOR JOINING OF ADJACENT SECTIONS.
6. CHELDES PRODUCTS COMPANY, OR AS APPROVED.

PART 3 - EXECUTION

3.1 INSTALLATION

A. GENERAL:
1. INSTALL PIPING INSULATION IN CONFORMANCE WITH THE DRAWINGS, THESE SPECIFICATIONS, AND THE MANUFACTURER'S RECOMMENDATIONS.
2. AFTER PIPING SYSTEM HAS BEEN SATISFACTORILY TESTED.
3. DRYWT ANODIZED OR ACRYLIC-COATED SMOOTH FINISH ON EXPOSED SIDE.
4. 2-PIECE DYE AND IRONLESS ELBOW COVERS IN MINIMUM 0.016-INCH, PREFORMED.
5. PROVIDE MOISTURE BARRIER BACKING AND BUTT JOINT WITH MASTIC SEAL FOR JOINING OF ADJACENT SECTIONS.
6. CHELDES PRODUCTS COMPANY, OR AS APPROVED.

PART 3 - EXECUTION

3.1 INSTALLATION

A. GENERAL:
1. INSTALL PIPING INSULATION IN CONFORMANCE WITH THE DRAWINGS, THESE SPECIFICATIONS, AND THE MANUFACTURER'S RECOMMENDATIONS.
2. AFTER PIPING SYSTEM HAS BEEN SATISFACTORILY TESTED.
3. SHEET CLEAN, DRY PIPING SYSTEM.
4. TO THE FOLLOWING THICKNESS:
a. AS SPECIFIED HEREIN OR AS INDICATED ON THE DRAWINGS.
b. IF NOT SPECIFIED HEREIN OR INDICATED ON THE DRAWINGS, IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS FOR THE SPECIFIC APPLICATION.
5. CONTINUOUS THROUGH WALLS, CEILINGS AND SLEEVES EXCEPT AT FIRE STOPS.
2. FILL ALL CRACKS AND VOIDS WITH INSULATING CEMENT CHELDES'S TROWELED TO LEAVE A SMOOTH FINISH.
3. REPAIR OR REPLACE INSULATION DAMAGED BY:
a. CONDUCTION.
b. MAKING CONNECTIONS TO PIPING OR EQUIPMENT.
c. WATER OR BLOWN.
4. INSULATE BUNDLES OF PIPES OUT-OF-DOORS WITH COMPLETE WRAP OF INSULATION 1-1/2 INCHES THICK AND OF SUITABLE DIAMETER TO CONTAIN BUNDLE, WITH OUTER WRAP.
5. PIPE SIZES 12-INCH AND LARGER: HOLD EACH INFOOT SECTION OF INSULATION IN PLACE WITH AT LEAST 3 SEPARATE WIRES OF 16 AWG STRANDED ANNEALED WIRE.
B. JOINTS AND FITTINGS:
1. BLOCK INSULATE VALVES AND FLANGES WITH REUSABLE INSULATION SYSTEM.
2. INSULATED ELBOWS, TEES, TURNS, BENDS AND SIMILAR WITH MITERED SECTIONS OR PREMOLDED FITTINGS. MATCH PIPE COVERING MATERIAL WHERE USED.
3. FIT JOINTS TIGHTLY TOGETHER.
4. SEAL JOINTS WITH SEALING COMPOUND AND PREFORMED ALUMINUM SANDS.

3.2 JACKETS AND FINISH

A. GENERAL:
1. PROVIDE MOISTURE BARRIER BETWEEN THE INSULATION AND THE JACKETING IN A CONTINUOUS, UNBROKEN SEAL.
2. PLAN JACKETTING IN PLACE IN A CONTINUOUS SEALED JOINT, PROVIDING A POSITIVE WEATHERPROOF SEAL ALONG THE ENTIRE LENGTH OF THE JACKET.
3. CAP OFF ENDS WITH CAPS.
4. ON CURVED LINES, CUT EARS TO THE EXACT SIZE OF THE PIPE AND SEAL WITH 2 RECOMMENDED SILICONE CAULKING.
5. PROVIDE SUN JOINTS A MINIMUM OF EVERY 20 FEET OR AS NEEDED FOR EXPANSION.
6. LOCATE LONGITUDINAL JACKET SEAMS ON INDOOR EXPOSED PIPING OUT OF VIEW.
B. PVC:
1. CENTER A PREFORMED STRAP (SNAP-STRAP) CONTAINING A PERMANENTLY WEATHERPROOF PLASTIC SEALANT OVER EACH CIRCUMFERENTIAL JOINT AND SECURE BY TIGHTENING ON A CLIP, OR BY USE OF A SEPARATE STAINLESS STEEL BANDING.
2. DESIGN SNAP-STRAP TO TAKE CARE OF NORMAL EXPANSION.
3. COVER ALL PIPE INSULATION AND PREFORMED INSULATION FITTINGS.
4. WELD LONGITUDINAL SEAMS TOGETHER WITH WELDING ADHESIVE AS SUPPLIED BY COVER MANUFACTURER.
5. OVERLAP ADJACENT JACKETING SEAMS AND SHED CIRCUMFERENTIAL SEAMS TOGETHER WITH WELDING ADHESIVE.
6. OVERLAP FITTING COVERS TO ADJACENT PIPE INSULATION JACKETING. WELD LONGITUDINAL AND CIRCUMFERENTIAL SEAMS TOGETHER WITH ADHESIVE.
C. ATTACHMENT:
1. FOR SYSTEMS OPERATING AT 50 DEGREES F AND ABOVE: MAY BE STAPLED USING OUTWARD CLINCH STAPLES SPACED 3 INCHES APART AT LEAST 12-INCH FROM THE LAP STRIP.
2. FOR SYSTEMS OPERATING BELOW 50 DEGREES F: VAPOR SEAL LAP'S USING SELF-SEALING LAP, LAP SEAL TAPE OVER AN ADHESIVE SUCH AS BENJAMIN FOSTER 520.
D. DAMPER AND SEAL INSULATION ENDS REGARDLESS OF SERVICE.
E. FITTING AND PIPE JACKETS TO HAVE SMOOTH END FINISHES READY FOR PAINTING.
F. FOR INSULATION WITHOUT FACTORY APPLIED JACKET:
1. FINISH WITH ACOUSTICAL GLASS MESH AND MASTIC.
2. USE BREATHER MASTIC ON PIPING OPERATING AT TEMPERATURES GREATER THAN 50 DEGREES F.

3.3 PIPING INSULATION APPLICATION SCHEDULE

A. BASIS OF THICKNESS CHART:
1. THICKNESSES SHOWN ARE BASED ON PRODUCTS HAVING A MAXIMUM "K" FACTOR OF 0.28 AT A MEAN TEMPERATURE OF 75 DEGREES F.
2. THESE THICKNESSES:
a. CAN BE REDUCED FOR PRODUCTS HAVING SIGNIFICANTLY LOWER "K" VALUES.
b. SHALL BE INCREASED FOR PRODUCTS HAVING HIGHER "K" VALUES IN ORDER TO PRODUCE EQUIVALENT OR GREATER THERMAL RESISTANCE.
B. FLAMESPREAD RATINGS: LOCAL REQUIREMENTS FOR FLAME AND SMOKE RATINGS MUST BE MET AND MAY EXCLUDE SOME OPTIONS LISTED HEREIN.
C. JACKETS AND FINISH APPLICATION:
1. PROVIDE PVC JACKET ON INSULATED EXPOSED PIPING WITHIN 7 FEET OF THE FLOOR.
2. PROVIDE PVC JACKET ON INSULATED PIPING LOCATED OUTSIDE.
D. THICKNESS CHART (IN INCHES):
1. KEY: INSULATION TYPE (REFER TO PARAGRAPH 2.2 OF THIS SECTION):
a. FG = FIBERGLASS.
b. HPG = HIGH DENSITY RIGID FIBERGLASS.
c. E = FLEXIBLE ELASTOMERIC.

PIPING SYSTEM	TYPE	PIPE SIZE 1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	TYPE OF INSULATION
1. DOMESTIC COLD WATER		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	FG, HPG, E
2. DOMESTIC HOT WATER		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	FG, HPG, E
3. DOMESTIC HOT WATER RECIRCULATING		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	FG, HPG, E
4. DRAINS		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	FG, HPG, E
5. NON-POTABLE COLD WATER		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	FG, HPG, E
6. COOLING TOWER BLOWDOWN		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	FG, HPG, E

* SEE "PART 3 - EXECUTION" ARTICLE 3.3 FOR ADDITIONAL INSULATION. TYPE HPG TO BE USED FOR ALL TYPE PIG OR HPG IS INDICATED.
** DOWNSPOUTS, BUILDING SUMP, HORIZONTAL PIPING AND FIRST 2 FEET OF VERTICAL.

END OF SECTION 22 07 19

SECTION 22 10 05 - PLUMBING PIPING AND PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FURNISHING AND INSTALLATION OF PLUMBING PIPING, VALVES, EQUIPMENT, SUPERVISION, PIPE, AND SERVICES INCIDENTAL TO PROPER COMPLETION OF ALL PLUMBING SYSTEM WORK:
1. DOMESTIC COLD WATER SYSTEM.
2. DOMESTIC HOT WATER SYSTEM.
3. INTERIOR WASTE AND VENT PIPING TO 5'-0" OUTSIDE BUILDING.

1.3 REFERENCES

A. EXCEPT AS HEREIN SPECIFIED OR AS INDICATED ON THE DRAWINGS, THE WORK OF THIS SECTION SHALL COMPLY WITH THE FOLLOWING:
1. ASME STANDARDS:
a. A112.18.1 - FOR SANITARY PLUMBING FITTINGS.
b. A112.18.2 - FOR SANITARY PLUMBING FITTINGS.
c. A112.21.1 - FLOOR DRAINS.
d. A112.36.2M - CLEANOUTS.
e. A112.26.1 - WATER HAMMER ARRESTERS.
2. ASSE (AMERICAN SOCIETY OF SANITARY ENGINEERING) STANDARDS:
a. 1001 - PRESSURE TYPE VACUUM BREAKERS.
b. 1003 - WATER PRESSURE REDUCING VALVES.
c. 1011 - HOSE CONNECTION VACUUM BREAKERS.
d. 1012 - BACKFLOW PREVENTERS WITH INTERMEDIATE ATMOSPHERIC VENT.
e. 1013 - REDUCED PRESSURE PRINCIPAL BACKFLOW PREVENTER.
f. 1016 - PERFORMANCE REQUIREMENTS FOR PRESSURE BALANCING AND TEMPERATURE BALANCING VALVES FOR INDIVIDUAL FIXTURE FITTINGS.
g. 1017 - TEMPERATURE ACTUATED MIXING VALVES FOR HOT WATER DISTRIBUTION SYSTEMS.
h. 1018 - TRAP SEAL PRIMER VALVES - POTABLE WATER SUPPLIED.
i. 1044 - TRAP SEAL PRIMER VALVES - DRAINAGE TYPE.
3. ASTM STANDARDS:
a. A53 - STEEL PIPE, BLACK AND HOT-DIPPED, ZINC-COATED, WELDED AND SEAMLESS.
b. A74 - CAST IRON SOIL PIPE AND FITTINGS.
c. A183 - CARBON STEEL FITTINGS FOR GENERAL PURPOSE PIPING.
d. A194 - CARBON AND ALLOY STEEL NUTS FOR BOLTS FOR HIGH PRESSURE AND HIGH TEMPERATURE SERVICE.
e. A234 - PIPING FITTINGS OF WROUGHT CARBON STEEL AND ALLOY STEEL FOR MODERATE AND ELEVATED TEMPERATURES.
f. A307 - CARBON STEEL BOLTS AND STUDS, 60,000 PSI TENSILE STRENGTH.
g. A395 - FERRITIC DUCTILE IRON PRESSURE-RETAINING CASTINGS FOR USE AT ELEVATED TEMPERATURES.
h. A536 - CONDITION ASSESSMENT HIGH SILICON IRON CASTINGS.
i. B88 - SEAMLESS COPPER WATER TUBE.
j. B306 - COPPER DRAINAGE TUBE (DWV).
k. C76 - REINFORCED CONCRETE CULVERT, STORM DRAIN, AND SEWER PIPE.
l. C564 - RUBBER GASKETS FOR CAST IRON SOIL PIPE AND FITTINGS.
m. D2136 - TEST METHOD FOR COATED FABRICS - LOW TEMPERATURE BEND TEST.
n. D2657 - PRACTICE FOR HEAT FUSION JOINING OF POLYOLEFIN PIPE AND FITTINGS.
o. D2665 - POLYVINYL CHLORIDE (PVC) PLASTIC DRAIN, WASTE, AND VENT PIPE AND FITTINGS.
p. D2751 - ACRYLONITRILE-BUTADIENE-STYRENE (ABS) SEWER PIPE AND FITTINGS.
q. D3034 - TYPE PSM POLYVINYL CHLORIDE (PVC) SEWER PIPE AND FITTINGS.
r. D4101 - PROPYLENE PLASTIC INJECTION AND EXTRUSION MATERIALS.
s. F789 - TYPE PS-46 AND PS-115 POLYVINYL CHLORIDE (PVC) PLASTIC GRAVITY FLOW SEWER PIPE AND FITTINGS.
4. AWWA STANDARDS:
a. C651 - DRINKING WATER SYSTEMS AND BEVERAGE SYSTEMS.
5. MSS - WATER CHLORINATION PRINCIPLES AND PRACTICES.
6. PDI (PLUMBING AND DRAINAGE INSTITUTE) STANDARD: WH-201 - WATER HAMMER ARRESTERS.
7. ARI STANDARD: 1010 - DRINKING FOUNTAINS AND MECHANICALLY REFRIGERATED DRINKING WATER COOLERS.

1.4 DEFINITIONS

A. MANUFACTURER'S LITERATURE: FOR ALL PRODUCTS REQUIRED IN PART 2 OF THIS SECTION
1. REQUIRED INFORMATION:
a. GENERAL:
- NAME OF MANUFACTURER.
- MODEL NUMBER.
- SIZE.
b. DETAILS OF CONSTRUCTION AND INSTALLATION.
c. PERFORMANCE DATA:
- HEAT TRANSFER DEVICES.
- PUMPS.
2. NOT REQUIRED FOR PIPING OR HANGERS AND SUPPORTS.

1.5 QUALITY ASSURANCE

A. FABRICATION AND INSTALLATION PERSONNEL QUALIFICATIONS:
1. TRAINED AND EXPERIENCED IN THE FABRICATION AND INSTALLATION OF THE MATERIALS AND EQUIPMENT.
2. WORKMANSHIP OF THE DESIGN AND THE REVISED SHOP DRAWINGS.
B. INSTALLATION PERSONNEL QUALIFICATIONS:
1. ALL STATE AND LOCAL CODE AND ORDINANCE SHALL HAVE JURISDICTION.
2. ALL RELATED ELECTRICAL DEVICES SHALL BE HOUSED IN SUITABLE ENCLOSURES AS DEFINED BY THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA).
3. ALL GAS FIRED APPLIANCES AND INSTALLATION SHALL BE IN ACCORDANCE WITH AMERICAN GAS ASSOCIATION (AGA) GUIDELINES.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. COMPLY WITH THE REQUIREMENTS OF DIVISION 22 SECTIONS "CAST IRON PIPE AND FITTINGS FOR PLUMBING", "PLASTIC PIPE AND FITTINGS FOR PLUMBING" (BELOW FLOOR SLAB ONLY), AND "COPPER PIPE AND FITTINGS FOR PLUMBING".
B. REFER TO SCHEDULES IN PART 3 OF THIS SPECIFICATION FOR SPECIFIC APPLICATIONS OF PIPE MATERIALS TO PLUMBING SYSTEMS.
C. REFER TO DIVISION 22 SECTION "HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT" AND SCHEDULES IN PART 3 OF THIS SECTION FOR HANGER AND SUPPORT REQUIREMENTS FOR PLUMBING SYSTEM.

2.2 VALVES

A. ABOVE GROUND VALVES: REFER TO DIVISION 22 SECTION "GENERAL DUTY VALVES FOR PLUMBING" FOR VALVE CONSTRUCTION AND MATERIAL REQUIREMENTS.
B. ASSE 1019 POINT OF USE THERMOSTATIC CONTROL VALVE:
1. CERTIFIED FOR COMPLIANCE WITH ASSE 1070 FOR INDIVIDUAL FIXTURE TEMPERATURE.
2. SHALL USE A WAX FILLED THERMOSTATIC ELEMENT TO SENSE INCOMING TEMPERATURE AND ADJUST MIXING AND MAINTAIN LEAVING WATER TEMPERATURE ± 2 DEGREES F OF SETPOINT FOR FLOWS DOWN TO 0.5 GPM.
3. CONSTRUCTION:
a. CAST BRONZE BODY.
b. STAINLESS STEEL INTERNAL COMPONENTS.
c. 125 PSIG RATED WORKING PRESSURE.
4. PROVIDE TAMPER SAFE HOT SETPOINT ADJUSTMENT.
5. PROVIDE WITH INTEGRAL CHECK VALVES.
6. WATTS USED:
C. WATER PRESSURE REDUCING VALVES:
1. MANUFACTURERS:
a. CLEAVER-BROOKS.
b. DONGHWA INDUSTRIES.
c. FLOWATCH CORPORATION.
d. HONEYWELL BRAUKMANN.
e. WATTS INDUSTRIES, INC., WATER TECHNOLOGIES DIVISION.
f. ZURN INDUSTRIES, INC., WILKINS DIVISION.
2. GENERAL: ASSE 1003 WATER PRESSURE REDUCING VALVE RATED FOR INITIAL INLET PRESSURE OF 250 PSIG MINIMUM, INCLUDES INTEGRAL STRAINER, ADJUSTABLE PRESSURE DIAL, AND TAMPER PROOF SEAL.
3. NPS 2 AND SMALLER: BRONZE BODY WITH THREADED ENDS, UNLESS OTHERWISE INDICATED.
4. NPS 2-1/2 AND LARGER: DUCTILE IRON BODY, SINGLE SEATED, DIAPHRAGM OPERATED, UNLESS OTHERWISE INDICATED.
5. SOLDERED VALVE BODY CONSTRUCTION: BRONZE BODY, DIAPHRAGM OPERATED, WITH INTERNAL BYPASS.
6. NPS 2-1/2 AND LARGER: BRONZE BODY, SOLDERED CONSTRUCTION WITH FLANGED ENDS. INCLUDE AWWA C500 OR FDA APPROVED INTERIOR EPOXY COATING. INCLUDE STRAINER FLANGED WITH CAST IRON BODY.
TYPE: SINGLE SEATED, DIRECT OPERATED.
INTERIOR COMPONENTS: CORROSION RESISTANT MATERIALS.
EXTERIOR FINISH: POLISHED CHROME PLATE IF USED IN CHROME PLATED PIPING SYSTEM.

2.3 [illegible]

A. SHOCK ABSORBERS:
1. FURNISH AND INSTALL WHERE INDICATED OR WHEREVER QUICK CLOSING VALVES (INCLUDING FLUSH VALVES) ARE UTILIZED. SHOCK ABSORBERS SHALL BE LOCATED AND SIZED IN ACCORDANCE WITH STANDARD PDI-WH-201.
2. MANUFACTURER: JOSAM, WADE, OR ZURN.
B. TRAP SEAL PRIMER VALVES:
1. FOR APPLICATIONS WITH INFREQUENT FAUCET OR FLUSH VALVE CYCLES, MOUNT REMOTE FROM TRAPS.
a. EPR-1: PROVITE PRECISION PLUMBING PRODUCTS (PPP) MODEL PT-4 FLUSH MOUNTED CONTROLLER.
b. EPR-2: PROVITE PRECISION PLUMBING PRODUCTS (PPP) MODEL PT-12 FLUSH MOUNTED CONTROLLER.
c. TPPV: INCLUDING SOLENOID VALVE, REQUIRED DISTRIBUTORS, TIMER, AIR GAP, CONTROL PANEL.
d. MUST COMPLY WITH ASSE 1044.

2.4 BACKFLOW PREVENTER

A. DESCRIPTION: FURNISH AND INSTALL APPROVED BACKFLOW PREVENTERS AS INDICATED ON DRAWINGS. INCLUDE A SAFE WASTE DRAIN FOR DRIP FROM PREVENTER VALVES PIPED TO FLOOR DRAIN AND INSTALL STRAINERS AHEAD OF FRONT GATE VALVE.

2.5 CLEANOUTS

A. DESCRIPTION:
1. FURNISH AND INSTALL CLEANOUTS WHERE INDICATED ON DRAWINGS IN ACCORDANCE WITH THE FOLLOWING TABLE. WHERE MODEL NUMBERS ARE FOR REFERENCE ONLY.
2. SERIES FLOOR CLEANOUT WITH 1M SPIGOT OUTLET OR 7F SEAL OUTLET CONNECTION, THREADED ADJUSTABLE HOUSING, FLANGED FINISHED SCORIATED WITH TAPERED BRASS PLUG AND ROUND OR SQUARE NICKEL BRASS OR DUCTILE IRON VARIFIX, REGISTERED DECORATED TOP FOR FLOOR FINISHES AS FOLLOWS:

LOCATION	CLEANOUTS MODEL NUMBER
UNFINISHED CONCRETE (SCORIATED NR DI TOP)	W-6000-U
CARPET (TEXTURED NR TOP WITH CARPET MARKER)	W-6000-CM
ASPHALT AND VINYL TILE (RECESSED NR TOP)	W-6000-T5
CERAMIC AND QUARRY TILE (SCORIATED NR TOP)	W-6000-S2
TERRAZZO (DEEP RECESSED NR TOP)	W-6000-V
OTHER LIT DUTY FINISHES (TEXTURED NR TOP)	W-6000
OTHER HEAVY DUTY FINISHES (SCORIATED NR TOP)	W-6000-X
EXTERIOR AREAS (SCORIATED NR DI TOP)	W-6000-U
VERTICAL ROUGH PIPING (EXPOSED)	W-5000-E
CONCEALED PIPING IN WALLS	W-5000-E (WITH -M80 - ROUND S.S. COVER)

2.6 FLOOR DRAINS AND SINKS

A. FURNISH AND INSTALL FLOOR DRAINS AT LOW POINT OF SLOPED FLOOR.
1. PROVIDE 4-INCH DEEP SEAL TRAPS ON FLOOR DRAINS.
2. PROVIDE TAPPING FOR CONNECTION OF WASTE LINE. PRIMER VALVE ON FLOOR DRAINS.
3. REFER TO PLUMBING FIXTURE SCHEDULE FOR SPECIFICATIONS.

2.7 GREASE INTERCEPTOR OR TRAP:

A. PROVIDE AND INSTALL ORGANIC INTERCEPTOR OR TRAP: PER FLOOR PLANS AND SCHEDULE.
B. INTERCEPTOR SHALL BE TESTED AND CERTIFIED TO THE P D I STANDARD PDI-G101 AND ALSO BE MARKED.
C. FIELD VERIFY AND MATCH EXISTING GREASE INTERCEPTOR FLOW RATE AND GREASE HOLDING CAPACITY.

PART 3 - EXECUTION

3.1 WATER SUPPLY SERVICE SYSTEM:

A. DESCRIPTION: INTERCONNECT WITH WATER SERVICE MAIN TERMINATING OUT OUTSIDE BUILDING AND EXTEND INTO BUILDING AS INDICATED. FURNISH AND INSTALL WATER METERS OF SIZE INDICATED ON THE DRAWINGS.
B. FEES, PERMITS, INSPECTION AND TESTS: PAY FOR ALL FEES, PERMITS, INSPECTIONS, AND TESTS RELATED TO THE WATER METER INSTALLATION.
C. PIPE AND FITTINGS: CAST IRON IN ACCORDANCE WITH DIVISION 22 SECTION "CAST IRON PIPE AND FITTINGS FOR PLUMBING."

3.2 DOMESTIC COLD AND HOT WATER SYSTEMS

A. DESCRIPTION: PROVIDE AS INDICATED ON THE DRAWINGS AND AS REQUIRED TO COMPLY WITH ALL APPLICABLE CODES AND REGULATIONS. COMPLETE SYSTEM OF PIPING, FITTINGS, VALVES, AUXILIARIES AND ACCESSORIES AS REQUIRED TO CONNECT COLD AND HOT WATER TO ALL ITEMS REQUIRING COLD OR HOT WATER.
B. PIPE AND FITTINGS:
1. ABOVE GRADE: TYPE L AND DRAWN COPPER IN ACCORDANCE WITH ASTM B88. EXPOSED PIPE AND FITTINGS AT FIXTURES SHALL BE CHROME PLATED.
2. BELOW GRADE: DUCTILE IRON IN ACCORDANCE WITH AWWA 110 & ASTM A74 AND DIVISION 22 SECTION "CAST IRON PIPE AND FITTINGS FOR PLUMBING." TYPE K SOFT TEMPER COPPER IN ACCORDANCE WITH ASTM B88 AND DIVISION 22 SECTION "COPPER PIPE AND FITTINGS FOR PLUMBING."
3. PROVIDE UNIONS AT EACH SCREWED VALVE, UNIONS, AND AT ALL POINTS IN THE PIPING SYSTEM WHERE NECESSARY TO FACILITATE DISMANTLING.
C. INSTALLATION:
1. ALL INTERIOR PIPING SHALL BE RUN SQUARE AND STRAIGHT WITH THE BUILDING.
2. PIPING IN FINISHED AREAS SHALL BE CONCEALED WITHIN WALLS, CHASES, ENCLOSURES, ETC.
3. PIPING IN EXPOSED AREAS SHALL BE RUN AS HIGH AS POSSIBLE WITH JOISTS AND BEAM SPACES, OR BELOW THE FLOOR AS INDICATED ON THE DRAWINGS.
4. PIPING SHALL FOLLOW APPROVED PATHS AS SHOWN OR INDICATED ON THE DRAWINGS. CONNECT TO EXISTING LINES WHERE REQUIRED OR TO EQUIPMENT IN AN APPROVED MANNER. LOCATE VALVES AND EQUIPMENT ACCESSIBLE FOR MAINTENANCE. MINIMUM OBSTRUCTION OF PASSAGE AND WORK SPACES.
5. INSTALL CLEANOUTS AT ALL LOW POINTS IN PIPING SYSTEM.
6. INSTALL ALL REQUIRED DRAIN PIPINGS SYSTEMS AND PIPING.

3.3 BUILDING SANITARY DRAINAGE SYSTEM

A. DESCRIPTION: FURNISH AND INSTALL THE INTERIOR BUILDING SANITARY DRAINAGE SYSTEM AS INDICATED ON THE DRAWINGS. SYSTEM INCLUDES, BUT IS NOT NECESSARILY LIMITED TO, THE FOLLOWING ITEMS: WASTE AND VENT PIPING FOR ALL PLUMBING FIXTURES REQUIRING SAND, FLOOR DRAINS, CLEANOUTS.
B. MATERIAL:
1. ABOVE AND BELOW GROUND PIPING AS INDICATED IN PART 2 OF THIS SECTION.
C. DRAINS AND CLEANOUTS AS DEFINED IN PART 2 OF THIS SECTION.
D. INSTALLATION:
1. GENERAL RUNS OF SANITARY SEWER ARE INDICATED ON DRAWINGS DIAGRAMMATICALLY AND EVERY BEND, OFFSET, ETC. IS NOT NECESSARILY INDICATED, ALL OF WHICH MUST BE INSTALLED TO PROPERLY DRAIN ALL STACKS, FIXTURES, VENTS, ETC.
2. RUN HORIZONTAL WASTE LINES AT A MINIMUM SLOPE OF 1/8-INCH PER FOOT.
3. CONNECTIONS BETWEEN MARKS AND LATERALS SHALL BE MADE WITH WYES AND 1/8 BENDS.
4. CHANGES IN DIRECTION SHALL BE WITH LONG RADIUS ELLS EXCEPT IN STACKS WHERE SANITARY TEES