2 00 00 COMMON PLUMBING

1 GENERAL PERFORMANCE AND QUALITY
1.1 THESE SPECIFICATIONS ARE IN ADDITION TO AND IN CONJUNCTION WITH CONTRACT DOCUMENTS, WHERE CONFLICT BETWEEN THIS DOCUMENT AND OWNER REQUIREMENTS OCCURS, OWNER REQUIREMENTS TAKE PRECEDENT (EXCEPTION: WHERE OWNER REQUIREMENTS ARE NON-COMPLIANT WITH LOCAL, STATE OR FEDERAL CODE OR REGULATIONS)
1.2 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH LOCAL, STATE, FEDERAL AND INTERNATIONAL CODES AND REGULATIONS GOVERNING THE WORK PERFORMED. CODES INCLUDE BUT ARE NOT LIMITED TO:
1.2.1 INTERNATIONAL ELECTRICAL, MECHANICAL, PLUMBING, AND BUILDING CODE
1.2.2 INTERNATIONAL FUEL GAS CODE
1.2.3 ASHRAE REGULATIONS REGARDING EQUIPMENT, VENTILATION, ENERGY EFFICIENCY AND CONSTRUCTION MATERIAL COMPLIANCE
1.2.4 UL AND INTERNATIONAL TESTING LABORATORIES – EQUIPMENT, FLAME/SMOKE SPREAD, AND TESTING CRITERIA
1.3 ALL MATERIALS TO BE NEW AND FREE OF DEFECT. NO ADDITIONAL PAYMENT WILL BE RENDERED FOR POOR QUALITY MATERIALS OR REPLACEMENT MATERIALS. PROTECT ALL MATERIALS FROM WEATHER, DEBRIS, CONSTRUCTION DUST AND DEBRIS, IMPACT AND GENERAL PROTECTION ON CONSTRUCTION SITE AND DURING TRANSIT. PROTECT ALL WORK FROM DAMAGE DURING CONSTRUCTION WITHIN REASONABLE REQUIREMENTS OF THE SITE. NO ADDITIONAL PAY WILL BE RENDERED FOR MATERIALS, WORKMANSHIP OR REPLACEMENT PARTS DUE TO NEGLIGENCE IN PROTECTING WORK COMPLETED.
1.3.1 PROVIDE CAPS, SEALS, WEATHER PROOFING, AND TARPING FOR MATERIALS ON SITE IN UNCONDITIONED SPACE OR EXPOSED TO ELEMENTS.
1.3.2 COORDINATE ALL WORK WITH GENERAL TRADES, ALL OTHER DISCIPLINES PRESENT ON SITE, AND OWNER. THIS INCLUDES SCHEDULE OF WORK TO BE COMPLETED AND COMPLETED WORK LOCATIONS TO BE PROTECTED.
1.3.3 PROVIDE RIGGING, LIFTING, PERSONAL PROTECTION EQUIPMENT (PPE), TOOLS, AND, AS NEEDED, TEMPORARY UTILITIES TO COMPLETE WORK. COORDINATE DELIVERIES, RIGGING AND UTILITY NEEDS AND TIMES WITH GENERAL TRADES, OTHER DISCIPLINES PRESENT, AND OWNER.
1.4 EXECUTE ALL WORK WITH RESPECT TO OSHA AND OTHER LOCAL, STATE, AND FEDERAL SAFETY MANDATES AND CODES. ALL WORKERS TO BE CERTIFIED AND TRAINED FOR SKILLS PERFORMED ON JOB. REFER TO GENERAL TRADES DOCUMENTS, OWNER REQUIREMENTS, AND CONTRACT FOR DRUG-FREE POLICIES.
1.5 COORDINATE ROUTING OF PIPING, INSULATION, HANGERS, VALVES, EQUIPMENT, CONTROLS, AND ACCESSORIES WITH RESPECT TO ALL OTHER TRADES.
1.5.1 PROVIDE "AS-BUILT" DRAWINGS AT NO SMALLER THAN 1/8" = 1'-0" SCALE FOR EACH AREA OF WORK. "AS-BUILT" DRAWINGS TO BE DELIVERED TO OWNER, ARCHITECT, AND GENERAL TRADES CONTRACTOR FOR RECORD.
1.5.2 PROVIDE "IOM" MANUAL (INSTALLATION AND MAINTENANCE) CONTAINING ALL REQUIREMENTS FOR INSTALLATION, MAINTENANCE, WARRANTIES, AND TESTING REPORTS FOR ALL EQUIPMENT AND TEST REPORTS FOR ALL FLOW CONTROL DEVICES. A COPY OF IOM TO BE PROVIDED TO OWNER AND ARCHITECT.
1.5.3 PROVIDE "CONTRACTOR'S WARRANTY" TO WARRANT WORKMANSHIP, MATERIALS AND EQUIPMENT FOR A PERIOD OF NOT LESS THAN ONE-YEAR FROM DATE OF OCCUPANCY OF BUILDING ~OR~ AGREED UPON DATE OF SIGNIFICANT COMPLETION OF WORK (AGREED BETWEEN OWNER AND THIS CONTRACTOR IN WRITING AND TO BE ADDED TO IOM MANUAL)
1.5.4 REPORT ANY CONFLICT OF LOCATION TO GENERAL TRADES, OWNER, AND ARCHITECT IN WRITING AS SOON AS POSSIBLE. WHERE POSSIBLE, COORDINATE RESOLUTION WITH TRADE IN CONFLICT. NO ADDITIONAL PAY WILL BE MADE FOR COORDINATION CONFLICTS NOT REPORTED IN WRITING.
1.6 PROVIDE ALL CONTROLS, CONTROL WIRING (LOW VOLTAGE), ACCESSORIES, HANGERS, VIBRATION ISOLATION, VALVES, FLOW CONTROL DEVICES, SHUTOFF VALVES, AND APPURTENANCES TO PROVIDE A COMPLETE, WORKING, AND CODE COMPLIANT SYSTEM REGARDLESS OF WHAT IS SHOWN ON PLANS.
1.6.1 PLANS ARE SCHEMATIC AND ARE TO BE READ AS SUCH. INSTALL PIPING AND EQUIPMENT TO PROVIDE ROUTING OF LOWEST COST AND MOST EFFICIENT SYSTEM.
1.6.2 PROVIDE HANGERS AT INTERVALS DICTATED BY CODE FOR SYSTEM, SIZE, AND MATERIAL INSTALLED. HANGERS TO BE DESIGNED TO ACCOMMODATE CONTINUOUS INSULATION THROUGH HANGER ASSEMBLY (WHERE PIPING IS INSULATED.)
1.6.3 PROVIDE EXPANSION JOINTS, EXPANSION LOOPS, THRUST AND BEARING BLOCKS, AND SUPPORTS FOR SYSTEM AS REQUIRED PER CODE AND PER SYSTEM INSTALLED. REFER TO EQUIPMENT MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR REQUIREMENTS.
1.7 INSTALL ALL EQUIPMENT, PIPING, VALVES, AND CONTROLS PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
1.8 SUBSTITUTIONS: ANY EQUIPMENT, PIPING, VALVES, AND CONTROLS REPLACED WITH ALTERNATE BRAND, MODEL, OR REVISION IS THE RESPONSIBILITY OF THE CONTRACTOR. ADDITIONAL RESPONSIBILITIES INCLUDE VERIFICATION OF CAPACITIES, UTILITY REQUIREMENTS, SHAPE AND SIZE, CLEARANCES AND CLEARANCE TO COMBUSTIBLES, INSTALLATION REQUIREMENTS, AND CONTROLS AND CONTROL POINTS. NO ADDITIONAL PAYMENT WILL BE RENDERED FOR CHANGES IN CONTROLS, PIPING, HANGERS, OR OTHER ITEMS DUE TO A SUBSTITUTION. IF A SUBSTITUTION FORCES ANOTHER CONTRACTOR TO PROVIDE ADDITIONAL MATERIAL OR SERVICES, IT IS THE RESPONSIBILITY OF THIS CONTRACTOR TO PAY FOR THOSE ADDITIONAL CHARGES.
1.8.1 SUBMITTALS ARE REVIEWED FOR GENERAL REQUIREMENTS ONLY, ALL INSTALLATION REQUIREMENTS ARE THE EXCLUSIVE RESPONSIBILITY OF THE CONTRACTOR. COORDINATE ALL REQUIREMENTS WITH GENERAL TRADES AND OTHER TRADES.
1.8.1.1 COORDINATE ELECTRICAL REQUIREMENTS PRIOR TO UNIT PURCHASE. VERIFY CORRECT VOLTAGE, PHASE, MCA AND MOCP.
2 TESTING, ADJUSTING AND BALANCING
2.1 PROVIDE TESTING, ADJUSTING AND BALANCING OF WATER, GAS, AIR, AND ALL OTHER SYSTEMS INSTALLED UNDER THIS CONTRACT. TESTER: FIRM CERTIFIED BY NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) OR ASSOCIATED AIR BALANCE COUNCIL (AABC) IN THOSE TESTING AND BALANCING DISCIPLINES SIMILAR TO THOSE REQUIRED FOR THIS PROJECT, WHO IS NOT INSTALLER OF SYSTEM TO BE TESTED AND IS OTHERWISE INDEPENDENT OF PROJECT.
2.2 INDUSTRY STANDARDS: COMPLY WITH ASHRAE RECOMMENDATIONS PERTAINING TO MEASUREMENTS, INSTRUMENTS AND TESTING, ADJUSTING AND BALANCING, EXCEPT AS OTHERWISE INDICATED.
2.3 TEST AND BALANCE ALL FIXTURES AND EQUIPMENT FOR COMPLIANCE WITH CODE, MANUFACTURER'S INSTRUCTIONS, AND SCHEDULED VALUES. PROVIDE TESTING AND BALANCING REPORT WITH IOM MANUAL.
2.3.1 TESTING AGENCIES TO BE CERTIFIED TO TEST SYSTEM INSTALLED.
2.3.2 PIPING TO BE TESTED FOR PRESSURE AND LEAKS PRIOR TO START UP OF EQUIPMENT. REFER TO GOVERNING CODES AND REGULATIONS FOR TESTING REQUIREMENTS.
2.3.3 CLEAN ALL PIPING PRIOR TO START UP OF EQUIPMENT. THIS MAY INCLUDE BUT NOT BE LIMITED TO PURGING, CHARGING, CHEMICAL TREATMENT, PRIMING, AND CLEANING DIRT SEPARATORS AND DIRT LEGS.
2.3.4 PROVIDE ALL CHEMICAL TREATMENT REQUIRED FOR PIPING SYSTEMS.
2.4 ADJUST AND BALANCE ALL FLOW CONTROL DEVICES AND PROVIDE REPORT IN IOM MANUAL.

SECTION 22 15 00 - PLUMBING PIPING AND INSULATION

PART 1 - GENERAL

1 QUALITY ASSURANCE
1.1 PERFORM ALL WORK IN ACCORDANCE WITH ASME AND WELDING STANDARDS. ALL MATERIAL TO BE NEW AND FREE OF DEFECT.
1.2 PROVIDE END CAPS ON EACH LENGTH OF PIPING AND PREVENT DAMAGE TO PIPING DURING STORAGE AND INSTALLATION.
1.3 PROVIDE VALVES AND FITTINGS FOR A COMPLETE SYSTEM, ENSURE VALVES ARE CLEAN, DRY AND FREE OF DEBRIS.
1.4 RIG ALL LARGER PIPING WITH APPROPRIATE HANGERS TO PREVENT DAMAGE.
1.5 PROVIDE HANGERS ON PIPING PER OPC, OMC, AND OBC.
1.6 PROVIDE EXPANSION JOINTS AND THRUST BEARINGS AS REQUIRED TO PREVENT DAMAGE TO PIPING OR BUILDING.
2 PROVIDE FLEXIBLE CONNECTIONS WHERE PIPING CONNECTS TO MOTOR DRIVEN EQUIPMENT. (EXCEPTION - REFRIGERANT PIPING)
3 PROVIDE BALANCE VALVES, FLOW CONTROL DEVICES, SHUT OFF VALVES AND RELIEF VALVES AS REQUIRED BY CODE, PER MANUFACTURER'S INSTRUCTIONS, AND FOR A COMPLETE AND WORKING SYSTEM REGARDLESS OF DETAILS OR DRAWINGS.
4 COORDINATE ROUTING WITH OTHER TRADES PRIOR TO INSTALLATION.
5 SUBMIT PIPING MATERIALS, HANGERS, VALVES, AND INSULATION.

PART 2 - MATERIALS AND APPLICATION

1 THE OUTLINE BELOW DESCRIBES PIPING MATERIALS ACCEPTABLE TO APPLICATIONS. NOT ALL APPLICATIONS MAY APPLY. PROVIDE ALTERNATE PRICING WHEN REQUESTED (PER CONTRACT) WHERE MULTIPLE MATERIALS ARE LISTED. REFER TO MANUFACTURER'S INSTRUCTIONS FOR ADDITIONAL MATERIAL REQUIREMENTS
2 DOMESTIC WATER PIPING (DOMESTIC COLD WATER DCW, DOMESTIC HOT WATER DHW, DOMESTIC HOT WATER 140 DHW 140). PIPING AND VALVES ARE A GUIDELINE. PROVIDE PRODUCTS COMPLIANT TO CODE REQUIREMENTS AND INDUSTRY RATINGS. EQUIPMENT LISTED BELOW TO BE SUPPLEMENTED WITH ADDITIONAL ACCESSORIES, VALVES, HANGERS AND SUPPORTS AS REQUIRED. THERMOMETERS, PRESSURE GAUGES, AND CONTROLS TO BE OF SIMILAR MATERIAL TO PIPING AND PROVIDED WITH LEAK PROOF PORTS.
2.1 BASE BID MATERIALS:
2.1.1 PIPING TO BE ASTM B88 RATED TYPE 'L' HARD DRAWN COPPER TUBING. PIPING TO BE LEAD FREE.
2.1.2 FITTINGS TO BE ASME B16.18 RATED CAST BRASS ~OR~ ASME B16.22 SOLDER-WROUGH COPPER. FULL BODY FITTINGS OF SOLID MATERIAL. PROVIDE DIELECTRIC UNION WHERE DISSIMILAR MATERIALS ARE JOINED. FITTINGS TO BE LEAD FREE.
2.1.3 JOINING METHOD TO BE LEAD FREE, 95-5 TIN-ANTIMONY OR TIN AND SILVER SOLDER. MELTING RANGE TO BE ABOVE 430 F (220 C)
2.1.4 SHUTOFF VALVES (2" TO 4") TO BE FULL PORT BALL VALVE, BRONZE BODY WITH TEFLON SEAT. VALVE TO BE PROVIDED WITH BLOW OUT PROOF STEM AND LEVER HANDLE. CONFORM TO MSS-SP-110 AND ASTM B62 (85/5/5/5). VALVE TO BE FULL SIZE OF PIPING SERVING. 2" AND SMALLER TO BE THREADED, 2-1/2" AND LARGER TO BE SECURED WITH FLANGE AND BOLTS WITH SEALING RING.
2.1.5 SHUTOFF VALVE (4" AND LARGER) TO BE LUG TYPE FLANGE FACING CAST IRON BODY BUTTERFLY VALVE. VALVE TO BE ALUMINUM BRONZE DISC AND STAINLESS STEEL BLOW OUT PROOF STEM. PROVIDE WITH LEVER HANDLE AND EDPM LINER. VALVE TO BE RATED UP TO 1.5X SERVICE PRESSURE (3X SERVICE PRESSURE IN CRITICAL SPACES).
2.1.6 PROVIDE SHUT OFF VALVE AT ALL TAKE OFFS FROM MAIN BRANCH PIPING AND AT INLET OF EACH FIXTURE UNLESS OTHERWISE DIRECTED BY EQUIPMENT MANUFACTURER.
2.1.7 BALANCING & CONTROL VALVE TO BE SIMILAR TO SHUT OFF VALVE AND PROVIDED WITH BALANCING LEVER AND LOCK. PROVIDE DYNAMIC BALANCING, SOLENOID VALVE CONTROL, AND/OR PRESSURE CONTROL ACCESSORIES FOR PROPER CONTROL.
2.1.8 CHECK VALVES TO BE HORIZONTAL SWING TYPE BRONZE BODY RATED FOR 1.5X WORKING PRESSURE. PROVIDE 2" AND SMALLER WITH THREADED ENDS AND 2-1/2" AND LARGER WITH FLANGED CONNECTIONS.
2.1.9 PROVIDE CHECK VALVE AT EACH FIXTURE REQUIRING LOCAL BACKFLOW PREVENTION
2.1.10 PROVIDE DOUBLE CHECK VALVE ASSEMBLY FOR SERVICE ENTRANCE (WHERE REDUCED PRESSURE BACKFLOW IS NOT REQUIRED)
2.1.11 PROVIDE REDUCED PRESSURE BACKFLOW ASSEMBLY CONSISTING OF TWO CHECK VALVES, TWO SHUT OFF VALVES AND A PRESS RELIEF VALVE OF SIMILAR CONSTRUCTION FOR SERVICE ENTRANCE.
2.1.12 HANGERS TO BE ASME B3 MSS SP89 MSS SP58 RATED MATERIALS. HANGERS TO BE SIZED FOR FULL PIPING, MATERIAL, AND INSULATION LOADING WITH 1.5X SAFETY FACTOR (3X IN CRITICAL AREAS).
2.1.13 HANGERS TO BE INSTALLED NO MORE THAN 10 FEET ON CENTER (HORIZONTAL) AND 8 FEET ON CENTER (VERTICAL) AND PROVIDED AT EACH CHANGE IN DIRECT.
2.1.14 HANGERS TO BE CLEVIS TYPE SIZED FOR PIPING AND INSULATION (CONTINUOUS THROUGH HANGER) ~OR~ FOR MULTIPLE PIPING TO BE TRAPEZE TYPE HANGER.
2.1.15 INSULATION TO BE RATED PER ASTM E84, NFPA 255 AND UL 723 FOR FLAME/SMOKE RATING OF LESS THAN 50/25. INSULATION TO CONTAIN NO PBDE FLAME RETARDANTS. INSULATION TO BE KEPT DRY AND CLEAN PRIOR TO INSTALLATION. INSTALL IN HEATED SPACE OR DURING WEATHER TEMPERATURE ABOVE 50 F OR AS RATED BY THE ADHESIVE MANUFACTURER.
2.1.16 INSULATION TO BE GLASS FIBER RATED PER ASTM C547 WITH A 'K' VALUE OF 0.24 AT 75 F. PROVIDE WITH VAPOR BARRIER JACKET OF REINFORCED FOIL AND SELF ADHERING JOINTS. FULLY JACKET INSULATION. PROVIDE SHIELDS WHERE NEEDED TO PREVENT DAMAGE FROM HANGERS AND OTHER ACCESSORIES.
2.1.17 DOMESTIC COLD WATER PIPING TO BE PROVIDED WITH 1/2" THICKNESS.
2.1.18 DOMESTIC HOT WATER (120 F) TO BE PROVIDED WITH 1" THICKNESS.
2.1.19 DOMESTIC HOT WATER 140 (OR HOTTER) TO BE PROVIDED WITH 2" THICKNESS.
2.1.20 PROVIDE INSULATION (THICKNESS ABOVE) AND PVC OR CPVC JACKET FOR PIPING EXPOSED BELOW ADA COMPLIANT FIXTURES (LAVATORIES, DRINKING FOUNTAINS, ETC.)
2.1.21 INSULATION TO BE CONTINUOUS THROUGH AND AROUND VALVES (LEAVE ACCESSIBLE LEVER), CONTROLS, HANGERS, AND FITTINGS.
2.1.22 PROVIDE CUTTING AND PATCHING, RIGGING, LIFTING, AND PAINTING FOR ALL PIPING UNDER THIS CONTRACT. WHERE PIPING IS EXPOSED TO ELEMENTS PROVIDE WEATHER PROOF JACKETING AND UV RESISTANT COVERING. WHERE INSTALLED BELOW GRADE, PROVIDE CORROSION RESISTANCE AND JACKETING RATED FOR SUBTERRANEAN INSTALLATION.
3 SANITARY AND VENT PIPING
3.1 PIPING TO BE SERVICE WEIGHT CAST IRON WITH HUBLESS FITTINGS.
3.2 ALTERNATE #1 - WHERE NOT IN PLENUM SPACE, AND ONLY ABOVE GRADE PROVIDE ALTERNATE PRICING FOR SCHEDULE 40 PVC ASTM 2665 PIPING FULLY GLUED JOINTS
3.3 HANG ALL SANITARY PIPING WITH CLEVIS OR TRAPEZE TYPE HANGERS
3.4 TRENCH AND FILL FOR UNDERGROUND PIPING (PER CONTRACT), PROVIDE UNSPOILED BACKFILL.

SECTION 23 00 00 - HVAC GENERAL CONDITIONS

PART 1 - GENERAL CONDITIONS

1. PROVIDE ALL LABOR, MATERIALS, ACCESSORIES, CONTROLS (PER CONTRACT), FLASHING, OPENINGS, CLEANING AND PATCHING, BALANCING AND TESTING, AND EQUIPMENT INDICATED ON DRAWINGS, REQUIRED FOR A PROPER WORKING AND BALANCED SYSTEM, AND AS REASONABLY IMPLIED. ALL WORK TO BE TESTED, CLEANED AND READY FOR USE BY OWNER AT CONCLUSION OF CONSTRUCTION.
1.1 ALL WORK TO BE PURCHASED, INSTALLED, COMMISSIONED, AND STARTED IN ACCORDANCE WITH AND COMPLIANCE WITH ALL LOCAL, CITY, STATE, FEDERAL AND INDUSTRY CODES AND STANDARDS APPLICABLE.
1.2 CLEAN ALL DIFFUSERS, REGISTERS, FILTERS AND DUCTWORK EXPOSED TO CONSTRUCTION DUST AT CONCLUSION OF CONSTRUCTION. REPLACE DIRTY FILTERS IF UNITS EXPOSED TO CONSTRUCTION DUST.
2. REFER TO ALL DRAWINGS INCLUDING ARCHITECTURAL, SITE, CIVIL, ELECTRICAL, PLUMBING, AND STRUCTURAL FOR SCOPE OF PROJECT. COORDINATE MECHANICAL WORK WITH WORK OF ALL OTHER TRADES. NO ADDITIONAL FEES WILL BE PAID FOR CHANGES DUE TO LACK OF KNOWLEGE OF PROJECT OR SPACE REQUIREMENTS.
3. SHOULD DISCREPANCIES BE FOUND BETWEEN DRAWINGS, SPECIFICATIONS, SCHEDULES, OR SCOPES OF TRADES, THEY ARE TO BE BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER IN WRITING PRIOR TO BID.
4. MECHANICAL SCOPE OF WORK INCLUDES BUT IS NOT LIMITED TO: MECHANICAL DUCTWORK, SERVICE PIPING, AIR DISTRIBUTION, EQUIPMENT, TESTING AND BALANCING, FANS, ROOF CURBS AND PENETRATIONS, MECHANICAL DUCTWORK AND PIPING INSULATION, HANGERS AND VIBRATION CONTROL, CONTROLS (PER CONTRACT), AND GENERAL TRADES ITEMS PERTAINING TO THE INSTALLATION OF MECHANICAL EQUIPMENT (PER CONTRACT).
4.1. COORDINATE ALL ITEMS WITH OTHER TRADES INCLUDING BUT NOT LIMITED TO COREDRILLS AND PENETRATIONS, DUCT AND PIPE LOCATIONS AND HANGERS, AND EQUIPMENT LOCATIONS. PROVIDE COORDINATION DRAWINGS TO GC AT MINIMUM 1/8" = 1'-0" PRIOR TO INSTALLATION. (PER CONTRACT)
5. SUBMITTALS SHALL BE PROVIDED FOR: EQUIPMENT, INSULATION, DUCT AND PIPING MATERIALS, VALVES, DAMPERS, FANS, CONTROLS (INCLUDING WIRING DIAGRAMS AND/OR PROGRAMMING SCHEDULES), AIR AND/OR WATER BALANCE REPORTS, WATER QUALITY TESTING, GLYCOL TESTING, HANGERS AND SUPPORTS, VIBRATION ISOLATION EQUIPMENT, AND ALL EQUIPMENT AND ACCESSORIES AS SCHEDULED.
5.1. SUBMITTALS ARE REVIEWED FOR GENERAL COMPLIANCE AND QUALITY. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY AND COORDINATE ELECTRICAL SERVICE AND SIZE, DIMENSIONS, QUANTITIES, INSTALLATION REQUIREMENTS AND ACCESSORIES, AND CONTROLS. IT IS THE CONTRACTORS RESPONSIBILITY TO PROVIDE EQUIPMENT AND CONTROLS IN A TIMELY FASHION, NOTIFY OWNER AND GENERAL TRADES CONTRACTOR OF ANY LONG LEAD TIME ITEMS.
5.2. SUBMITTALS ARE TO BE SENT TO ARCHITECT, OWNER, AND ENGINEER OF RECORD MINIMUM 2 WEEKS PRIOR TO PURCHASE DATE REQUIRED TO KEEP PROJECT SCHEDULE. IF THIS IS NOT POSSIBLE, NOTIFY OWNER AND ENGINEER AND SUBMIT AS EARLY AS POSSIBLE.
6. PROVIDE RECORD DRAWINGS TO OWNER AND GC AT MAJOR MILESTONES IN PROJECT AND AT CONCLUSION. DRAWINGS TO BE PROVIDED AT NO SMALLER THAN 1/8" = 1'-0" SCALE UNLESS DIRECTED BY OWNER/GC. A SET OF RECORD MECHANICAL PRINTS IS TO BE SENT TO ENGINEER AT CONCLUSION OF CONSTRUCTION.
7. SECURE AND PAY FOR PERMITS, INSPECTIONS, UTILITIES, AND ANY REVIEWS OR PAPERWORK REGARDING THE MECHANICAL SCOPE OF WORK. SCHEDULE INSPECTIONS WITH LOCAL AUTHORITY AND WITH GENERAL CONTRACTOR OR OWNER (WHOMEVER HOLDS THE MECHANICAL CONTRACT).
8. SUBMISSION OF BID, PRICE, OR CONTRACT REQUEST ASSUMES KNOWLEDGE OF ALL DOCUMENTS, SPECIFICATIONS, AND FIELD CONDITIONS (UNLESS OTHERWISE AGREED UPON BY CONTRACT PARTIES). ALL FIELD CONDITIONS, INTERFERENCES, INSTALLATION INTERFERENCES, OR ADDITIONAL WORK REQUIRED TO COMPLETE PROJECT ARE TO BE THE RESPONSIBILITY OF THIS CONTRACTOR UNLESS AGREED UPON BY OWNER/GC AND THIS CONTRACTOR.
9. DEFINITIONS
9.1. PROVIDE - PURCHASE, SECURE, AND INSTALL ITEM AND ASSOCIATED ACCESSORIES AND CONTROLS (PER CONTRACT)
9.2. FURNISH - PURCHASE AND SECURE ITEM FOR OTHERS TO INSTALL
9.3. EXTEND - PROVIDE ADDITIONAL PIPING/DUCTWORK TO ITEM INDICATED, PROVIDE OFFSETS, ELBOWS, AND TRANSITIONS AS NEEDED.
9.4. HOOK-UP - PROVIDE MEANS OF BALANCE, FINAL CONNECTION (INCLUDING VIBRATION ISOLATION FOR MOTORIZED ITEMS), AND MEANS OF SHUT OFF (HYDRONIC OR GAS ONLY).
9.5. TEST - PROVIDE INDUSTRY APPROVED (NEBB FOR DUCTWORK) TESTING AND BALANCING OF SYSTEMS.
9.6. CLEAN - PROVIDE CLEANING FOR ITEMS PER INDUSTRY STANDARDS AND IF AVAILABLE, PER MANUFACTURER'S RECOMMENDATIONS
9.7. PER CONTRACT - REFER TO CONTRACT PROVIDED BY OWNER OR GC. CONFORM TO REQUIREMENTS OF CONTRACT. ITEMS IN THIS SPECIFICATION MAY INCLUDE ITEMS BEYOND SCOPE OF WORK. CONTRACT WITH OWNER OR GC SUPERCEDES THIS SPECIFICATION WHERE CONFLICT OCCURS.
10. ALL MATERIALS, EQUIPMENT, ACCESSORIES, AND CONTROLS ARE TO BE NEW AND FREE OF DEFECT. ITEMS TO BE STORED IN A SAFE AND ORDERLY ENVIRONMENT BOTH PRIOR TO DELIVERY TO SITE AND DURING CONSTRUCTION. DUCTWORK AND PIPING TO BE PROTECTED FROM DIRT AND DEBRIS ENTERING PRIOR TO INSTALLATION. SECURE AND PAY FOR ANY ADDITIONAL GUARANTIES AND WARRANTIES REQUIRED ON DRAWINGS AND IN SPECIFICATIONS.
11. PROVIDE MATERIALS AND INSTALL ITEMS PER ALL LOCAL, STATE, AND FEDERAL CODES, REGULATIONS AND REQUIREMENTS. SHOULD THE OWNER ELECT TO HAVE THE PROJECT CONFORM TO LEED, GREEN BUILDING COUNCIL, OR OTHER SIMILAR ADDITIONAL REQUIREMENTS, PROVIDE ITEMS THAT CONFORM TO REQUIREMENTS. NO ADDITIONAL FEE WILL BE PAID DUE TO LACK OF KNOWLEDGE OF REQUIREMENTS AND CODES.
12. ALL LABOR AND MATERIALS SHALL CONFORM TO INDUSTRY STANDARDS INCLUDING BUT NOT LIMITED TO: ANSI, ASHRAE, ASME, ASTM, ENERGY CODES (ICC OR ASHRAE), MMS, NEC, NFPA, OSHA, AND UL.
13. ALL MATERIALS SHALL BE PROVIDED SUCH THAT THEY CONFORM TO FIRE SAFETY REQUIREMENTS. PROVIDE MATERIALS RATED FOR ENVIRONMENT IN WHICH THEY ARE INSTALLED. FLASH AND SEAL ANY PENETRATIONS SUCH AS TO MAINTAIN FIRE/SMOKE RATINGS. PROVIDE FIRE AND SMOKE DAMPERS PER LOCAL, STATE AND FEDERAL CODES AND REQUIREMENTS.
14. ALL LABOR TO BE PERFORMED IN A PROFESSIONAL MANNER. ALL WORK TO BE PERFORMED WITHIN THE OHSA GUIDELINES, AND SAFETY REQUIREMENTS PER THE OWNER/GC, AND ALL ITEMS WITHIN CONSTRUCTION SITE TO BE PROTECTED FROM DUST, DEBRIS, PAINT OVERSPRAY, AND DAMAGE FROM CONSTRUCTION ACTIVITIES. IT IS THE RESPONSIBILITY OF THIS CONTRACTOR TO PROTECT WORK UNDER SCOPE OF CONTRACT.
15. PROVIDE TEMPORARY HEATING (TO MINIMUM 45F), COOLING (TO MAXIMUM 80F), HUMIDIFICATION (TO 30% RH) AND/OR DEHUMIDIFICATION (TO 60%RH) IF REQUIRED BY CONTRACT AND/OR OWNER/GC.
16. ALL DRAWINGS ARE TO BE CONSIDERED SCHEMATIC IN NATURE. EXACT DIMENSIONS AND LOCATIONS OF PIPING TO BE FIELD VERIFIED. COORDINATE LOCATIONS WITH OWNER, GC, AND OTHER TRADES PRIOR TO INSTALLATION.

SECTION 23 30 00 - AIR DISTRIBUTION AND DUCTWORK

PART 1 - GENERAL, CONSTRUCTION, AND HANDLING

1. SHOP DRAWINGS: SUBMIT DUCT FABRICATION SHOP DRAWINGS, DRAWN TO SCALE NOT SMALLER THAN 1/4 INCH EQUALS 1 FOOT, ON DRAWING SHEETS SAME SIZE AS CONTRACT DOCUMENTS, DETAILING:
1.1. FABRICATION, ASSEMBLY, AND INSTALLATION DETAILS, INCLUDING PLANS, ELEVATIONS, SECTIONS, DETAILS OF COMPONENTS, AND ATTACHMENTS TO OTHER WORK.
1.2. DUCT LAYOUT, INDICATING PRESSURE CLASSIFICATIONS AND SIZES IN PLAN VIEW. FOR EXHAUST DUCT SYSTEMS, INDICATE CLASSIFICATION OF MATERIALS HANDLED AS DEFINED IN THIS SECTION.
1.3. FITTINGS.
1.4. REINFORCING DETAILS AND SPACING.
1.5. SEAM AND JOINT CONSTRUCTION DETAILS.
1.6. PENETRATIONS THROUGH FIRE RATED AND OTHER WALLS.
1.7. TERMINAL UNIT, COIL, AND HUMIDIFIER INSTALLATIONS.
1.8. HANGERS AND SUPPORTS, INCLUDING METHODS FOR BUILDING ATTACHMENT, VIBRATION ISOLATION, AND DUCT ATTACHMENT.
1.9. QUALITY ASSURANCE
1.10. PERFORM WORK IN ACCORDANCE WITH SMACNA – HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.
1.11. FIRE DAMPERS, SMOKE DAMPERS, AND COMBINATION FIRE AND SMOKE DAMPERS TESTED, RATED AND LABELED IN ACCORDANCE WITH THE LATEST UL REQUIREMENTS.
1.12. DAMPER PRESSURE DROP RATINGS BASED ON TESTS AND PROCEDURES PERFORMED IN ACCORDANCE WITH AMCA 500.
2. REGULATORY REQUIREMENTS
2.1. CONSTRUCT DUCTWORK TO [NFPA 90A] [AND] [NFPA 96] STANDARDS.
2.2. ENVIRONMENTAL REQUIREMENTS
2.3. DO NOT INSTALL DUCT SEALANTS WHEN TEMPERATURES ARE LESS THAN THOSE RECOMMENDED BY SEALANT MANUFACTURERS.
2.4. MAINTAIN TEMPERATURES DURING AND AFTER INSTALLATION OF DUCT SEALANTS.
3. DELIVERY, STORAGE, AND HANDLING
3.1. PROTECT DAMPERS FROM DAMAGE TO OPERATING LINKAGES AND BLADES.
3.2. DELIVERY: DELIVER MATERIALS TO SITE IN MANUFACTURER'S ORIGINAL, UNOPENED CONTAINERS AND PACKAGING, WITH LABELS CLEARLY INDICATING MANUFACTURER AND MATERIAL.
3.3. STORAGE: STORE MATERIALS IN A DRY AREA INDOOR, PROTECTED FROM DAMAGE.
3.4. HANDLING: HANDLE AND LIFT DAMPERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. PROTECT MATERIALS AND FINISHES DURING HANDLING AND INSTALLATION TO PREVENT DAMAGE.
4. EXTRA MATERIALS (PER CONTRACT)
4.1. FURNISH TWO OF EACH SIZE AND TYPE OF FUSIBLE LINK
4.2. FURNISH ONE OF EACH SIZE FILTER (WHERE ADDITIONAL FILTRATION IS PROVIDED BEYOND EQUIPMENT)
4.3. FURNISH 5% ADDITIONAL DIFFUSERS, GRILLES, AND REGISTERS WHERE AIR DISTRIBUTION DEVICE IS EXPOSED TO PUBLIC OR HAZARDOUS ENVIRONMENT.
4.4. COORDINATE EXTRA MATERIALS WITH OWNER/ARCHITECT AND G.C. PRIOR TO BID.

PART 2 - DUCTWORK

1. MATERIALS
1.1. GALVANIZED STEEL DUCTS: ASTM A525 AND ASTM A527 GALVANIZED STEEL SHEET, LOCK-FORMING QUALITY, HAVING G60 ZINC COATING IN CONFORMANCE WITH ASTM A90.
1.2. FOR HAZARDOUS ENVIRONMENTS INCLUDING POOLS, CHEMICAL AREAS AND PER OWNER REQUIREMENTS PROVIDE ALUMINUM DUCTS: ASTM B209; ALUMINUM SHEET, ALLOY 3003-H14. ALUMINUM CONNECTORS AND BAR STOCK: ALLOY 6061- T6 OR OF EQUIVALENT STRENGTH.
2. INSULATED FLEXIBLE DUCTS:
2.1. TWO PLY VINYL FILM SUPPORTED BY HELICALLY WOUND SPRING STEEL WIRE; FIBERGLASS INSULATION; POLYETHYLENE OR ALUMINIZED VAPOR BARRIER FILM.
2.2. PRESSURE RATING: 10 INCHES WATER GAGE POSITIVE AND 1.0 INCHES WATER GAUGE NEGATIVE. MAXIMUM VELOCITY: 4000 FPM. TEMPERATURE RANGE: -10 DEGREES F TO 160 DEGREES F. UL 181, CLASS 1, CONSTRUCTED WITH INTERIOR LINER OF ROUND CORRUGATED STEEL OR ALUMINUM DUCT WITH EXTERIOR FIBERGLASS INSULATION OF 1 INCH BY 1 POUND PER CUBIC FOOT AND VINYL FILM VAPOR BARRIER.
2.3. JOIN EACH FLEXIBLE DUCT SECTION TO MAIN TRUNK DUCT THROUGH SHEET METAL FITTINGS. CONSTRUCT FITTINGS OF GALVANIZED STEEL AND EQUIP WITH FACTORY INSTALLED VOLUME DAMPER HAVING POSITIVE LOCKING REGULATOR. PROVIDE FITTINGS INSTALLED IN LINED DUCTWORK WITH INSULATION GUARD.
HANGER ROD: ASTM A36; STEEL; THREADED BOTH ENDS, THREADED ONE END, OR CONTINUOUSLY THREADED.
3. KITCHEN HOOD EXHAUST DUCTWORK (WHERE REQUIRED)
3.1. FABRICATE IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE AND NFPA 96.
3.2. EXPOSED KITCHEN HOOD EXHAUST DUCTS: STAINLESS STEEL, ASTM A167, TYPE 304 OR PER OWNER REQUIREMENTS
3.3. CONCEALED KITCHEN HOOD EXHAUST DUCTS: 16 GAGE CARBON STEEL USING CONTINUOUS EXTERNAL WELDED JOINTS.
4. PREFABRICATED GREASE DUCT (WHERE REQUIRED)
4.1. FACTORY FABRICATED DOUBLE WALL TYPE, UL LISTED, GREASE DUCT FOR USE WITH COMMERCIAL COOKING EQUIPMENT AS DESCRIBED IN NFPA 96.
4.2. INNER JACKET: TYPE 304 STAINLESS STEEL, 0.035 INCH THICK FOR ALL SIZES.
4.3. OUTER JACKET: STAINLESS STEEL, TYPE 316 OF THE FOLLOWING THICKNESS:
4.4. SIZE 5 TO 24 INCHES: 0.025 INCH THICK. SIZE 26 INCHES AND LARGER: 0.034 INCH THICK.
4.5. PROVIDE INSULATION FOR CLEARANCE TO COMBUSTIBLES PER FIELD CONDITIONS. WHERE CONDITIONS ARE UNKNOWN, PROVIDE ZERO CLEARANCE TO COMBUSTIBLE INSULATION.
4.6. JOINTS: V-BANDS AND HIGH TEMPERATURE JOINT CEMENT.
4.7. ACCESSORIES: UL LABELED TEES, ELBOWS, INCREASERS, METAL CAP, ADJUSTABLE ROOF FLASHING, STORM COLLAR, SUPPORT ASSEMBLY, THIMBLES, FIRE STOP SPACERS, AND FASTENERS, FABRICATED OF SIMILAR MATERIALS AND DESIGNS AS STRAIGHT SECTIONS.
4.8. MANUFACTURER: METALBESTOS OR SIMILAR BY DURA VENT, HART & COOLEY, OR METALVENT.
5. DUCTWORK FABRICATION
6. FABRICATE AND SUPPORT RECTANGULAR DUCTS IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE. PROVIDE DUCT MATERIAL, GAUGES, REINFORCING, AND SEALING FOR OPERATING PRESSURES INDICATED.
7. FABRICATE AND SUPPORT ROUND DUCTS WITH LONGITUDINAL SEAMS IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE (ROUND DUCT CONSTRUCTION STANDARDS). PROVIDE DUCT MATERIAL, GAUGES, REINFORCING, AND SEALING FOR OPERATING PRESSURES INDICATED.
7.1. INCREASE DUCT SIZES GRADUALLY, NOT EXCEEDING 15 DEGREES DIVERGENCE WHEREVER POSSIBLE; MAXIMUM 30 DEGREES DIVERGENCE UPSTREAM OF EQUIPMENT AND 45 DEGREES CONVERGENCE DOWNSTREAM.
7.2. FABRICATE CONTINUOUSLY WELDED ROUND AND OVAL DUCT FITTINGS TWO GAGES HEAVIER THAN DUCT GAGES INDICATED IN SMACNA STANDARD. JOINTS MINIMUM 4 INCH CEMENTED SLIP JOINT, BRAZED OR ELECTRIC WELDED. PRIME COAT WELDED JOINTS.
PROVIDE STANDARD 45 DEGREE LATERAL WYE TAKEOFFS UNLESS OTHERWISE INDICATED WHERE 90 DEGREE CONICAL TEE CONNECTIONS MAY BE USED.
8. SMOKE, FIRE, AND COMBINATION DAMPERS
9. PROVIDE SMOKE AND FIRE DAMPERS WHERE REQUIRED BY CODE. REFER TO ARCHITECTURAL DRAWINGS AND FIELD CONDITIONS FOR FIRE WALL LOCATIONS AND RATINGS. PROVIDE RUSKIN OR APPROVED EQUAL DAMPERS. DAMPERS TO BE RATED FOR ASSEMBLY PENETRATED AND TO BE UL LISTED AND TESTED.
10. FABRICATED IN ACCORDANCE WITH NFPA 90A, UL 555, AND UL 555S
11. COORDINATE SMOKE DETECTOR LOCATION AND WIRING WITH FIRE ALARM CONTRACTOR.
12. INSTALL AND TEST PER MANUFACTURER'S INSTRUCTIONS
13. INSTALLATION OF DUCT SYSTEMS
14. INSTALL AND SEAL DUCTS IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.
15. DUCT SIZES ARE INSIDE CLEAR DIMENSIONS. FOR LINED DUCTS, MAINTAIN SIZES INSIDE LINING.
16. INSTALL ROUND LONGITUDINAL SEAM DUCTWORK FOR SUPPLY AIR APPLICATIONS ONLY. DO NOT USE FOR RETURN AIR AND EXHAUST AIR APPLICATIONS.
17. PROVIDE OPENINGS IN DUCTWORK TO ACCOMMODATE THERMOMETERS AND CONTROLLERS. PROVIDE PILOT TUBE OPENINGS FOR TESTING OF SYSTEMS, COMPLETE WITH METAL CAN WITH SPRING DEVICE OR SCREW TO ENSURE AGAINST AIR LEAKAGE. WHERE OPENINGS ARE PROVIDED IN INSULATED DUCTWORK, INSTALL INSULATION MATERIAL INSIDE METAL RING.
18. LOCATE DUCTS WITH SUFFICIENT SPACE AROUND EQUIPMENT TO ALLOW NORMAL OPERATING AND MAINTENANCE ACTIVITIES.
19. SLOPE UNDERGROUND DUCTS TO PLENUMS OR LOW PUMP OUT POINTS AT L:500. PROVIDE ACCESS DOORS FOR INSPECTION.
20. PAINT BURIED METAL DUCTWORK WITHOUT FACTORY JACKET WITH ONE COAT [AND SEAMS AND JOINTS WITH ADDITIONAL COAT] OF ASPHALT BASE PROTECTIVE COATING.
21. ENCASE BURIED METAL DUCTWORK IN 3 INCH MINIMUM OF CONCRETE. PROVIDE ADEQUATE TIE-DOWN POINTS TO PREVENT DUCTS FROM FLOATING DURING CONCRETE PLACEMENT. INTRODUCE NO HEAT INTO DUCTS FOR 20 DAYS FOLLOWING PLACEMENT OF CONCRETE.
22. TAPE JOINTS OF PVC COATED METAL DUCTWORK WITH PVC TAPE.
23. CONNECT TERMINAL UNITS TO SUPPLY DUCTS WITH 5 FEET MAXIMUM LENGTH OF FLEXIBLE DUCT. DO NOT USE FLEXIBLE DUCT TO CHANGE DIRECTION.
24. CONNECT DIFFUSERS TO LOW PRESSURE DUCTS WITH 5 FEET MAXIMUM LENGTH OF FLEXIBLE DUCT HELD IN PLACE WITH STRAP OR CLAMP.
25. PAINT DUCTWORK VISIBLE BEHIND AIR OUTLETS AND INLETS MATTE BLACK FOR OCCUPIED SPACES.
26. CONNECT METALLIC FLEXIBLE DUCTS TO METAL DUCTS WITH ADHESIVE PLUS SHEET METAL SCREWS.
27. CONNECT NONMETALLIC FLEXIBLE DUCTS TO METAL DUCTS WITH ADHESIVE PLUS DRAWBANDS.
28. DURING CONSTRUCTION PROVIDE TEMPORARY CLOSURES OF METAL OR TAPED POLYETHYLENE ON OPEN DUCTWORK TO PREVENT CONSTRUCTION DUST FROM ENTERING DUCTWORK SYSTEM.
29. CLEANING OF DUCT SYSTEMS
30. CLEAN DUCT SYSTEM AND FORCE AIR AT HIGH VELOCITY THROUGH DUCT TO REMOVE ACCUMULATED DUST. TO OBTAIN SUFFICIENT AIR, CLEAN HALF SYSTEM AT TIME. PROTECT EQUIPMENT WHICH MAY BE HARMED BY EXCESSIVE DIRT WITH TEMPORARY FILTERS, OR BYPASS DURING CLEANING.
31. CLEAN DUCT SYSTEMS WITH HIGH POWER VACUUM MACHINES. PROTECT EQUIPMENT WHICH MAY BE HARMED BY EXCESSIVE DIRT WITH FILTERS, OR BYPASS DURING CLEANING. PROVIDE ADEQUATE ACCESS INTO DUCTWORK FOR CLEANING PURPOSES.
32. INSTALLATION – KITCHEN EXHAUST HOOD (PER CONTRACT)
33. INSTALL KITCHEN HOOD EXHAUST DUCT IN ACCORDANCE WITH NFPA 96.
34. CONSTRUCT JOINTS AND SEAMS WITH LIQUID-TIGHT CONTINUOUS EXTERNAL WELD.
35. INSTALL RESIDUE TRAPS IN KITCHEN HOOD EXHAUST DUCTS AT BASE OF VERTICAL RISERS WITH PROVISIONS FOR CLEAN OUT.
36. INSTALL DUCTS WITHOUT FORMING DIPS OR TRAPS WHICH MIGHT COLLECT RESIDUALS.
37. ENCLOSE KITCHEN EXHAUST DUCTS IN FIRE BARRIER TYPE INSULATION
38. INSTALL KITCHEN HOOD EXHAUST DUCT WITH ACCESS DOORS AT EACH CHANGE IN DIRECTION OF DUCT AND AT 10 FOOT INTERVALS IN STRAIGHT RUNS. INSTALL OPENINGS IN SIDE OF DUCT NO LESS THAN 1-1/2 INCH FROM BOTTOM. INSTALL ACCESS PANELS 24 INCH X 24 INCH SIZE WHERE DUCT DIMENSIONS ALLOW, OTHERWISE MAKE ACCESS PANELS AS LARGE AS POSSIBLE.
39. FURNISH AUTOMATIC GAS VALVE INCLUDED WITH HOOD FIRE SUPPRESSION SYSTEM TO INSTALLER OF NATURAL GAS PIPING. (COORDINATE WITH PLUMBING CONTRACTOR)
40. ELECTRICAL WIRING FOR SHUTDOWN OF ELECTRICAL CIRCUITS FOR COOKING APPLIANCES AND INTERLOCK WITH BUILDING FIRE ALARM SYSTEM PROVIDED BY . FURNISH COORDINATION, WIRING DIAGRAMS, AND INSTALLATION INSTRUCTIONS
41. INSTALLATION – DUCT ACCESSORIES
42. INSTALL DUCT ACCESSORIES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, NFPA 90A, AND FOLLOW SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.

PART 3 - AIR DISTRIBUTION & TESTING

1. GRILLES, REGISTERS, AND DIFFUSERS
2. GENERAL: GRILLE, REGISTER, AND DIFFUSER INFORMATION MARK, MODEL NUMBER, TYPE, FINISH, AND ACCESSORY ITEMS ARE INDICATED IN SCHEDULE. LOCATIONS, SIZE, TYPE, CFM, AND DIRECTIONS OF THROW ARE INDICATED ON FLOOR PLANS.
3. DEFINITIONS: TERMS USED FOR GRILLES, REGISTERS, AND DIFFUSERS ARE AS FOLLOWS:
4. GRILLES: SAME STYLE AS REGISTERS BUT WITHOUT DAMPER.
5. REGISTERS: ITEMS LABELED AS REGISTERS ARE TO BE PROVIDED WITH OPPOSED BLADE DAMPERS.
6. FINISH: FURNISH GRILLES, REGISTERS AND DIFFUSERS WITH FACTORY APPLIED FINISH. REFER TO DRAWING SCHEDULE FOR FINISH AND COLOR.
7. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF CEILING DIFFUSERS.
8. INSTALL DUCT ACCESSORIES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, NFPA 90A, AND FOLLOW SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE.
9. CLEAN ALL AIR DISTRIBUTION DEVICES AT CONCLUSION OF CONSTRUCTION.
10. TESTING, ADJUSTING, AND BALANCING FOR HVAC
11. QUALITY ASSURANCE
12. TESTER: FIRM CERTIFIED BY NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) OR ASSOCIATED AIR BALANCE COUNCIL (AABC) IN THOSE TESTING AND BALANCING DISCIPLINES SIMILAR TO THOSE REQUIRED FOR THIS PROJECT, WHO IS NOT INSTALLER OF SYSTEM TO BE TESTED AND IS OTHERWISE INDEPENDENT OF PROJECT.
13. COMPLIANCE: COMPLY WITH PROCEDURAL STANDARDS OF APPLICABLE AGENCY AS IT APPLIES TO HVAC AIR DISTRIBUTION SYSTEMS AND ASSOCIATED EQUIPMENT AND APPARATUS.
14. INDUSTRY STANDARDS: COMPLY WITH ASHRAE RECOMMENDATIONS PERTAINING TO MEASUREMENTS, INSTRUMENTS AND TESTING, ADJUSTING AND BALANCING, EXCEPT AS OTHERWISE INDICATED.
15. SUBMITTALS
16. SUBMIT TEST REPORTS. INCLUDE IDENTIFICATION AND TYPES OF INSTRUMENTS USED AND THEIR MOST RECENT CALIBRATION DATE.
17. PRODUCTS
18. PATCHING MATERIALS
19. EXCEPT AS OTHERWISE INDICATED, USE SAME PRODUCTS AS USED BY ORIGINAL INSTALLER FOR PATCHING HOLES IN INSULATION, DUCTWORK AND HOUSINGS WHICH HAVE BEEN CUT OR DRILLED FOR TEST PURPOSES, INCLUDING ACCESS FOR TEST INSTRUMENTS, ATTACHING JIGS, AND SIMILAR PURPOSES.
20. TEST INSTRUMENTS
21. UTILIZE TEST INSTRUMENTS OF TYPE, PRECISION, AND CAPACITY AS RECOMMENDED IN APPLICABLE TESTING, ADJUSTING, AND BALANCING STANDARDS.
22. APPLICATION
23. TESTER MUST EXAMINE INSTALLED WORK AND CONDITIONS UNDER WHICH TESTING IS TO BE DONE TO ENSURE THAT WORK HAS BEEN COMPLETED, CLEANED, AND OPERABLE. NOTIFY CONTRACTOR IN WRITING OF CONDITIONS DETRIMENTAL TO PROPER COMPLETION OF TESTING, ADJUSTING, AND BALANCING WORK. DO NOT PROCEED WITH WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN MANNER ACCEPTABLE TO TESTER.
24. AIR SYSTEMS
25. TEST, ADJUST, AND BALANCE AIR HANDLING UNITS, FANS, DUCTWORK, AND TERMINAL DEVICES IN ACCORDANCE WITH PROCEDURES OUTLINED IN APPLICABLE STANDARDS.
26. PREPARE REPORT OF TEST RESULTS, INCLUDING INSTRUMENTATION CALIBRATION REPORTS, IN FORMAT RECOMMENDED BY APPLICABLE STANDARDS.
27. GENERAL
28. PATCH HOLES IN INSULATION, DUCTWORK AND HOUSINGS, WHICH HAVE BEEN CUT OR DRILLED FOR TEST PURPOSES.
29. MARK EQUIPMENT SETTINGS TO SHOW FINAL SETTINGS AT COMPLETION OF TEST AND BALANCE WORK. PROVIDE MARKINGS WITH PAINT OR OTHER SUITABLE PERMANENT IDENTIFICATION MATERIALS.
30. PREPARE REPORT OF RECOMMENDATIONS FOR CORRECTING UNSATISFACTORY HVAC SYSTEM PERFORMANCES IF SYSTEM CANNOT BE SUCCESSFULLY BALANCED. INCLUDE, WHERE NECESSARY, SUGGESTED MODIFICATIONS, WHICH MAY EXCEED REQUIREMENTS OF CONTRACT DOCUMENTS.

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ISSUE / REVISIONS
12-17-15 FOR PERMIT

PROJECT NUMBER
2815

M-2

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PROFESSIONAL ENGINEER