DIVISION 23 - MECHANICAL

SECTION 23 00 00 - BASIC MECHANICAL REQUIREMENTS

A. NOTE

1. THE ABBREVIATION ESD&C WHEREVER IT APPEARS IN THESE MECHANICAL DRAWINGS AND/OR SPECIFICATIONS SHALL REFER TO "EXPRESS STORE DESIGN AND CONSTRUCTION". ANY REFERENCE TO TENANT'S PROJECT MANAGER OR FURNISHED BY ANY OF THE ABOVE REFERS TO ESD&C.
2. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND ALL OTHER SPECIFICATION SECTIONS, APPLY TO THIS AND THE OTHER SECTIONS OF DIVISION 23 (FORMERLY DIVISION 15).
3. THE CONTRACTOR FOR THIS DIVISION OF WORK IS REQUIRED TO READ THE SPECIFICATIONS AND REVIEW DRAWINGS FOR ALL DIVISIONS OF WORK AND IS RESPONSIBLE FOR THE COORDINATION OF THIS WORK AND THE WORK OF HIS SUBCONTRACTORS WITH ALL DIVISIONS OF WORK. IT IS THIS CONTRACTOR'S RESPONSIBILITY TO PROVIDE HIS SUBCONTRACTORS WITH A COMPLETE SET OF BID DOCUMENTS.
4. THIS CONTRACTOR IS RESPONSIBLE FOR SCHEDULING THE COMPLETION AND INSPECTION OF THIS WORK TO COMPLY WITH THE ESD&C SCHEDULE AND THE PROJECT COMPLETION DATE.
5. THIS CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTAL OF BID TO DETERMINE CONDITIONS AFFECTING THE WORK. ANY ITEMS WHICH ARE NOT COVERED IN THE BID DOCUMENTS OR ANY PROPOSED SUBSTITUTIONS SHALL BE LISTED SEPARATELY AND QUALIFIED IN THE CONTRACTOR'S BID. SUBMITTAL OF BID SHALL SERVE AS EVIDENCE OF KNOWLEDGE OF EXISTING CONDITIONS AND ANY MODIFICATIONS WHICH ARE REQUIRED TO MEET THE INTENT OF THE DRAWINGS AND SPECIFICATIONS. FAILURE TO VISIT THE SITE DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY IN PERFORMANCE OF HIS WORK.
6. REFER TO RESPONSIBILITY SCHEDULE ON SHEET M04.1 FOR INFORMATION IN REGARD TO RESPONSIBILITY OF WORK OR ITEMS WHICH MAY AFFECT THE BID.

B. GENERAL REQUIREMENTS

1. THIS CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, SERVICES, TOOLS, TRANSPORTATION, INCIDENTALS AND DETAILS NECESSARY TO PROVIDE A COMPLETE MECHANICAL SYSTEM AS INDICATED ON THE DRAWINGS, CALLED FOR IN THE SPECIFICATIONS, DETAILED, REQUIRED BY RELEVANT CODES AND AS REQUIRED BY JOB CONDITIONS. ALL WORK NOT SPECIFICALLY NOTED AS BEING BY THE LANDLORD OR ESD&C SHALL BE PROVIDED BY THIS CONTRACTOR. CLOSELY COORDINATE THE ENTIRE INSTALLATION WITH THE LANDLORD AND THE ESD&C PROJECT MANAGER, AS REQUIRED.
2. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO SUPPLEMENT EACH OTHER AND ANY MATERIAL OR LABOR CALLED FOR IN ONE SHALL BE FURNISHED AND INSTALLED EVEN THOUGH NOT SPECIFICALLY MENTIONED IN BOTH. ANY MATERIAL OR LABOR WHICH IS NEITHER SHOWN ON THE DRAWINGS NOR CALLED FOR IN THE SPECIFICATIONS, BUT WHICH IS OBVIOUSLY NECESSARY TO COMPLETE THE WORK, AND WHICH IS USUALLY INCLUDED IN WORK OF SIMILAR CHARACTER, SHALL BE FURNISHED AND INSTALLED AS PART OF CONTRACT.
3. WHERE THE DRAWINGS OR SPECIFICATIONS CALL FOR ITEMS WHICH EXCEED CODES OR THE LANDLORD'S TENANT CRITERIA, THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING THE SYSTEM WITH THE MORE STRINGENT REQUIREMENTS AS DESIGNED AND DESCRIBED ON THESE DRAWINGS, UNLESS SPECIFICALLY NOTED OTHERWISE.
4. ALL WORK IN THIS SECTION SHALL BE INSTALLED SO AS TO BE READILY ACCESSIBLE FOR OPERATING, SERVICING, MAINTAINING, AND REPAIRING. THIS CONTRACTOR IS RESPONSIBLE FOR PROVIDING SUFFICIENT SERVICE ACCESS TO ALL EQUIPMENT.
5. ALL WORK SHALL BE PERFORMED IN A NEAT PROFESSIONAL MANNER USING GOOD CONSTRUCTION PRACTICES.
6. UNLESS SPECIFICALLY NOTED OTHERWISE, MATERIALS, PRODUCTS, AND EQUIPMENT, INCLUDING ALL COMPONENTS THEREOF, SHALL BE NEW, UNDERWRITERS LABORATORIES (UL/ULC) LISTED AND LABELED AND SIZED IN CONFORMITY WITH REQUIREMENTS OF ALL GOVERNMENTAL CODES (STATE, PROVINCIAL, MUNICIPAL AND ALL OTHER LOCAL CODES), WHICHEVER IS MORE STRINGENT.
7. THIS CONTRACTOR SHALL DO ALL CUTTING, CHASING AND CHANNELING REQUIRED FOR ANY WORK UNDER THIS DIVISION. CUTTING SHALL HAVE PRIOR APPROVAL BY ESD&C PROJECT MANAGER AND THE LANDLORD. ALL PATCHING SHALL BE BY GC AND SHALL MATCH THE SURROUNDING SURFACES.
8. THE MECHANICAL CONTRACTOR SHALL MAKE ALL FINAL MECHANICAL CONNECTIONS AS REQUIRED FOR A COMPLETE AND OPERATING SYSTEM.
   a. THE MECHANICAL CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR TO CONTACT ESD&C'S DESIGNATED COMPANY (EMS) FOR START-UP. (REFER TO SHEET M01.2).

C. CODES

1. ALL WORK SHALL CONFORM TO THE LANDLORD'S CRITERIA, ALL RELEVANT LOCAL CODES (PROVINCE, STATE, CITY, COUNTY, MUNICIPAL, AND ANY OTHER APPLICABLE LOCAL CODES OR ORDINANCES), SAFETY AND HEALTH CODES, NFPA CODES, ENERGY CODES AND ALL OTHER APPLICABLE CODES AND REQUIREMENTS. THIS CONTRACTOR SHALL INQUIRE INTO AND COMPLY WITH ALL APPLICABLE CODES, ORDINANCES, AND REGULATIONS. THIS CONTRACTOR SHALL INCLUDE ANY CHANGES REQUIRED BY CODES IN THE BID AND IF THESE CHANGES ARE NOT INCLUDED IN THE BID, THEY MUST BE QUALIFIED AS A SEPARATE LINE ITEM IN THE BID. AFTER CONTRACT IS AWARDED, CHANGE ORDERS FOR INCREASED COSTS DUE TO CODE ISSUES WILL NOT BE ACCEPTED BY ESD&C.

D. LICENSES, PERMITS, INSPECTIONS & FEES

1. THIS CONTRACTOR SHALL OBTAIN AND PAY FOR ALL LICENSES, PERMITS, INSPECTIONS, AND FEES REQUIRED OR RELATED TO HIS WORK.
2. FURNISH TO THE ESD&C'S PROJECT MANAGER ALL CERTIFICATES OF INSPECTION AND FINAL INSPECTION APPROVAL AT COMPLETION OF PROJECT.

E. TRADE NAMES, MANUFACTURERS AND SHOP DRAWINGS

1. WHERE TRADE NAMES AND MANUFACTURER NAMES ARE USED ON THE DRAWINGS OR IN THE SPECIFICATIONS, THE EXACT EQUIPMENT SHALL BE USED AS A MINIMUM FOR THE BASE BID. MANUFACTURERS CONSIDERED AS AN EQUAL OR BETTER IN ALL ASPECTS TO THAT SPECIFIED WILL BE SUBJECT TO APPROVAL IN WRITING BY ESD&C'S PROJECT MANAGER THROUGH SHOP DRAWING SUBMITTAL PROCESS FOR ACCEPTANCE PRIOR TO INSTALLATION. THE USE OF ANY UNAUTHORIZED EQUIPMENT SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
2. GENERAL CONTRACTOR SHALL SUBMIT ONLY SUBSTITUTION REQUESTS TO ESD&C PROJECT MANAGER FOR APPROVAL. SUBMISSIONS SHALL BE MADE EARLY ENOUGH IN PROJECT TO ALLOW FOUR (4) WORKING DAYS FOR ESD&C PROJECT MANAGER'S REVIEW WITHOUT CAUSING DELAYS OR CONFLICTS TO THE JOB'S PROGRESS. SUBMITTALS SHALL BEAR THE STAMP AND/OR THE SIGNATURE OF THE GENERAL CONTRACTOR AND THE SUBCONTRACTOR SHOWING THAT HE HAS REVIEWED AND CONFIRMED THAT THE SUBMITTALS ARE IN CONFORMANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS OR INDICATE WHERE EXCEPTIONS HAVE BEEN TAKEN.

F. GUARANTEE

1. THIS CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORK PROVIDED UNDER HIS CONTRACT AND SHALL MAKE GOOD, REPAIR OR REPLACE AT HIS OWN EXPENSE, ANY DEFECTIVE WORK, MATERIAL, OR EQUIPMENT WHICH MAY BE DISCOVERED WITHIN A PERIOD OF 12 MONTHS FROM THE DATE OF ACCEPTANCE (IN WRITING) OF THE INSTALLATION BY ESD&C'S PROJECT MANAGER. EXTENDED WARRANTIES ARE AS SPECIFIED WITH INDIVIDUAL EQUIPMENT.
2. THE EQUIPMENT MANUFACTURER SHALL GUARANTEE AND PROVIDE A 12 MONTH GUARANTEE TO ESD&C FROM THE DATE OF ACCEPTANCE. THIS CONTRACTOR SHALL WARRANTY THE INSTALLATION OF THIS EQUIPMENT AND WILL BE RESPONSIBLE FOR ANY DAMAGE AND/OR MALFUNCTION CAUSED BY THE INSTALLATION. THIS CONTRACTOR SHALL NOT BEAR ADDITIONAL WARRANTIES BEYOND A COMPLETE WORKING SYSTEM.

G. RECORD DRAWINGS

1. THIS CONTRACTOR SHALL MAINTAIN ONE SET OF DRAWINGS ON THE JOB SITE UPDATED WEEKLY TO RECORD ALL DEVIATIONS FROM CONTRACT DRAWINGS, SUCH AS:
   a. LOCATION OF CONCEALED PIPING VALVES AND DUCTS.
   b. REVISIONS, ADDENDUM, AND CHANGE ORDERS.
   c. SIGNIFICANT DEVIATIONS MADE NECESSARY BY FIELD CONDITIONS, APPROVED EQUIPMENT SUBSTITUTIONS, AND CONTRACTOR'S COORDINATION WITH OTHER TRADES.
2. AT COMPLETION OF THE PROJECT AND BEFORE FINAL APPROVAL, THIS CONTRACTOR SHALL MAKE ANY FINAL CORRECTIONS TO DRAWINGS AND CERTIFY THE ACCURACY OF EACH PRINT BY SIGNATURE THEREON. FAILURE TO KEEP THESE RECORDS WILL ALLOW ESD&C TO DIRECT THE GENERAL CONTRACTOR TO PROVIDE THESE RECORDS AT THIS CONTRACTOR'S EXPENSE PRIOR TO FINAL PAYMENT.

H. DISCREPANCIES IN DOCUMENTS

1. DRAWINGS (PLANS, SPECIFICATIONS, AND DETAILS) ARE DIAGRAMMATIC AND INDICATE THE GENERAL LOCATION AND INTENT OF THE MECHANICAL SYSTEMS. WHERE DRAWINGS, EXISTING SITE CONDITIONS, SPECIFICATIONS OR OTHER TRADES CONFLICT OR ARE UNCLEAR, ADVISE THE GENERAL CONTRACTOR IN WRITING, PRIOR TO SUBMITTAL OF BID. THE GENERAL CONTRACTOR IS RESPONSIBLE TO ADVISE ESD&C'S PROJECT MANAGER, IN WRITING, OF VARIATIONS TO CONTRACT DOCUMENTS PRIOR TO SUBMISSION OF BID. OTHERWISE, ESD&C PROJECT MANAGER'S INTERPRETATION OF CONTRACT DOCUMENTS OR CONDITIONS SHALL BE FINAL WITH NO ADDITIONAL COMPENSATION PERMITTED.

I. PHASING REQUIREMENTS

1. THIS CONTRACTOR IS TO INCLUDE IN HIS BID ALL NECESSARY SERVICE REQUIRED TO KEEP THE OPERATING PHASE OF THE STORE'S HVAC, PLUMBING AND SPRINKLER SERVICE IN OPERATION. CONTRACTOR MUST SCHEDULE IN WRITING WITH ESD&C'S PROJECT MANAGER AND THE LANDLORD ONE WEEK PRIOR TO ANY SHUT DOWN OF THE HVAC, PLUMBING OR FIRE PROTECTION SYSTEMS.

J. DEMOLITION

1. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF THE DEMOLITION OF EXISTING WORK AND THE DEMOLITION PROVIDED BY THE GENERAL CONTRACTOR. COORDINATE WITH THE GENERAL CONTRACTOR ANY EXISTING EQUIPMENT REQUIRED TO BE LEFT INTACT.
2. THIS CONTRACTOR SHALL INCLUDE, AND WILL BE HELD RESPONSIBLE FOR, THE REMOVAL OF ALL EXISTING HVAC UNITS, HYDRONIC PIPING, REFRIGERANT RECAPTURE, EXHAUST FANS, ETC. AND ASSOCIATED ROOF CURBS NOT TO BE REUSED ON THIS PROJECT, UNLESS SPECIFICALLY NOTED OTHERWISE. CONTRACTOR MUST VERIFY WITH THE LANDLORD ALL PRESUMED ABANDONED EQUIPMENT, PIPES, DUCTWORK, AND EQUIPMENT PRIOR TO REMOVAL. ROOF CURBS SHALL BE REMOVED AND THE ROOF PATCHED. ALL EXTRANEOUS ITEMS IN THE SPACE OR ON THE ROOF NOT APPLICABLE TO THE NEW WORK MUST BE REMOVED AND ROOF/WALL/FLOOR PATCHED/REPAIRED TO MATCH EXISTING STRUCTURE. EXISTING ABANDONED PIPES, DUCTS, OR EQUIPMENT IN THE FLOOR, EMBEDDED IN CONCRETE OR OTHERWISE INACCESSIBLE ARE TO BE CUT OFF AND SEALED BELOW OR WITHIN FLOOR OR WALL LEVEL WHEN THEY ARE NOT TO BE REUSED IN THIS PROJECT. IF REQUIRED BY LANDLORD OR CODES, ABANDONED PIPING AND/OR DUCTWORK MUST BE REMOVED TO POINT OF ORIGIN. CONFIRM THE EXTENT OF DEMOLITION PRIOR TO BID AND INCLUDE IN BID PROPOSAL.

K. SLEEVES

1. THIS CONTRACTOR SHALL PROVIDE SLEEVES TO PROTECT EQUIPMENT OR FACILITIES IN THE INSTALLATION. EACH SLEEVE SHALL EXTEND THROUGH IT'S RESPECTIVE FLOOR, WALL OR PARTITION AND SHALL BE CUT FLUSH WITH EACH SURFACE EXCEPT SLEEVES THAT PENETRATE THE FLOOR, WHICH SHALL EXTEND 2" ABOVE THE FLOOR. CONTRACTOR MUST COORDINATE THROUGH THE LANDLORD ANY CORE DRILLING OR CUTTING OF OPENINGS IN MASONRY FLOORS OR WALLS.
2. ALL SLEEVES AND OPENINGS THROUGH FIRE RATED WALLS AND/OR FLOORS SHALL BE FIRE SEALED WITH CALCIUM SILICATE, SILICONE "RTV" FOAM, "3M" FIRE RATED SEALANTS OR EQUAL, SO AS TO RETAIN THEIR FIRE RATING.
3. SLEEVES IN BEARING AND MASONRY WALLS, FLOORS, AND PARTITIONS SHALL BE STANDARD WEIGHT STEEL PIPE FINISHED WITH SMOOTH EDGES. FOR OTHER THAN MASONRY PARTITIONS, THROUGH SUSPENDED CEILINGS, OR FOR CONCEALED VERTICAL PIPING, SLEEVES SHALL BE NO. 22 U.S.G. GALVANIZED STEEL MINIMUM.

L. SCOPE OF WORK

1. THIS CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT, SERVICES, TOOLS, TRANSPORTATION AND FACILITIES NECESSARY FOR, REASONABLY IMPLIED AND INCIDENTAL TO, THE FURNISHING, INSTALLATION, COMPLETION AND TESTING OF ALL THE WORK FOR THE HVAC SYSTEMS AS INDICATED ON THE DRAWINGS, CALLED FOR IN THE SPECIFICATIONS, AND AS REQUIRED BY JOB CONDITIONS, TO INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:
   a. HVAC UNITS, ALL RELATED EQUIPMENT AND ACCESSORIES (UNLESS NOTED OTHERWISE).
   b. DUCTWORK, FITTINGS, DAMPERS, AND INSULATION.
   c. HYDRONIC PIPING. (AS APPLICABLE, REFER TO PLANS).
   d. REFRIGERANT PIPING (AS APPLICABLE, REFER TO PLANS).
   e. CURBS, ROOFING, AND STEEL FRAMING FOR SUPPORT (AS APPLICABLE, REFER TO PLANS).
   f. TESTING, ADJUSTING, AND BALANCING.
   g. KEEPING A RECORD SET AND PREPARE AS-BUILTS DRAWINGS.
2. BEFORE STARTING WORK, THIS CONTRACTOR SHALL VISIT THE JOB SITE AND EXAMINE THE ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL PLANS AND SPECIFICATIONS TO SEQUENCE, COORDINATE, AND INTEGRATE THE VARIOUS ELEMENTS OF THE HVAC SYSTEM, MATERIALS, AND EQUIPMENT WITH OTHER CONTRACTORS TO AVOID INTERFERENCES AND CONFRONTATIONS.
3. RELOCATION OF EXISTING DUCT MAINS OR BRANCHES TO MEET STORE DESIGN CRITERIA MUST BE INCLUDED IN BID PROPOSAL.

M. HVAC EQUIPMENT

1. PRIMARY HEATING AND AIR CONDITIONING UNITS ARE TO BE FURNISHED BY ESD&C AS SCHEDULED UNLESS NOTED OTHERWISE. REFER TO PLANS FOR REQUIREMENTS. ALL EQUIPMENT SHALL INCLUDE A FIVE (5) YEAR COMPRESSOR AND TEN (10) YEAR HEAT EXCHANGER WARRANTY.
2. ALL EQUIPMENT SHALL BE COMPLETE IN EVERY RESPECT WITH ALL DEVICES AND ACCESSORIES PROVIDED TO MEET THE DESIGN INTENT AND OPERATION OF THE SYSTEMS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.
3. EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

N. EQUIPMENT FURNISHED BY EXPRESS STORE DESIGN AND CONSTRUCTION

1. THE FOLLOWING EQUIPMENT IS FURNISHED BY ESD&C AND INSTALLED BY THIS CONTRACTOR UNLESS SPECIFICALLY NOTED OTHERWISE. REFER TO RESPONSIBILITY SCHEDULE AND PLANS FOR APPLICABILITY.
   a. HVAC UNITS.
   b. TOILET EXHAUST FANS.
   c. DIFFUSERS, GRILLES AND REGISTERS.
   d. TEMPERATURE CONTROLS.
2. ALL DUCTWORK, ROOF OPENINGS AND CAPS NECESSARY TO PROVIDE A COMPLETE TOILET EXHAUST SYSTEM SHALL BE FURNISHED AND INSTALLED BY THIS CONTRACTOR.

O. CURBS FOR SUPPORT

1. THIS CONTRACTOR SHALL FURNISH AND INSTALL CURB ADAPTORS ON EXISTING CURBS WHERE ALLOWED BY LANDLORD. CURB ADAPTERS MUST BE MANUFACTURED BY THYBAR, MICROMETL, OR ESD&C APPROVED EQUAL.
2. WHERE EXISTING CURBS ARE NOT AVAILABLE OR WHERE CURB ADAPTORS ARE NOT ALLOWED THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY CURBS REQUIRED TO INSTALL ALL HVAC EQUIPMENT AS DESCRIBED ON THE DRAWINGS. CURBS SHALL BE A MINIMUM OF 14" HIGH (SEE M01.2 "LOCAL AREA REQUIREMENTS" ITEM #5), OF THE SAME MANUFACTURER OF THE EQUIPMENT UNLESS NOTED OTHERWISE.
3. ALL CURBS AND CURB ADAPTORS SHALL BE INSTALLED SUCH THAT TOP OF CURBS ARE LEVEL. ALL PENETRATIONS OF EXISTING STRUCTURE SHALL BE PERFORMED IN ACCORDANCE WITH THE LANDLORD'S GUIDELINES AT THIS CONTRACTOR'S EXPENSE. THIS CONTRACTOR SHALL RECEIVE ESD&C PROJECT MANAGER'S WRITTEN APPROVAL BEFORE ANY WORK TAKES PLACE. THIS CONTRACTOR IS ALSO RESPONSIBLE FOR THE INSTALLATION OF ALL EQUIPMENT, STRUCTURAL SUPPORT, SEISMIC RESTRAINTS, HURRICANE OR OTHER SPECIAL SECURING DEVICES AND/OR INSTALLATION TECHNIQUES REQUIRED BY LOCAL OR OTHER CODES. REFER TO STRUCTURAL INFORMATION (DETAILS, DRAWINGS, DIAGRAMS, ETC.) PROVIDED WITH THESE CONTRACT DOCUMENTS.

P. LABELING OF DUCT, PIPING AND EQUIPMENT

1. FURNISH AND INSTALL PIPE IDENTIFICATION MARKERS ON ALL PIPES AND DUCT IDENTIFICATION MARKERS ON ALL DUCT INSTALLED UNDER THIS CONTRACT. MARKERS SHALL BE A MINIMUM OF 1-1/2" X 8" AND IDENTIFIED IN ACCORDANCE WITH THE BACKGROUND AND LETTER COLORS ISSUED BY THE AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).
2. PIPING SHALL BE IDENTIFIED AS FOLLOWS: CHILLED WATER RETURN, CHILLED WATER SUPPLY, CONDENSATE, HOT WATER RETURN, HOT WATER SUPPLY, CONDENSER WATER RETURN, CONDENSER WATER SUPPLY, REFRIGERANT LIQUID, REFRIGERANT SUCTION, AND DIRECTIONAL ARROWS. ALL IDENTIFICATIONS MUST BE VISIBLE AT EQUIPMENT.
3. DUCTWORK SHALL BE IDENTIFIED AS FOLLOWS: HIGH/MEDIUM PRESSURE SUPPLY AIR, LOW PRESSURE SUPPLY AIR, RETURN AIR, OUTSIDE AIR, COMBUSTION AIR, RELIEF AIR, AND SMOKE EVACUATION. IN ADDITION, ALL PLENUMS SHALL BE LABELED AS TO PURPOSE (OUTSIDE AIR INTAKE, EXHAUST AIR, ETC.). ALL IDENTIFICATIONS MUST BE VISIBLE AT EACH END OF DUCT AND AT INTERMEDIATE POINTS AS NEEDED FOR CLARITY.
4. EACH PIECE OF EQUIPMENT SHALL BE LABELED AS INDICATED ON EQUIPMENT SCHEDULES/CALLOUTS USING 4" TALL STENCILED LETTERS.

Q. FINAL HVAC INSPECTIONS

1. ASIDE FROM NORMAL INTERIM INSPECTIONS OF WORK IN PLACE, ESD&C SHALL HAVE AN INDEPENDENT HVAC CONTRACTOR INSPECT THE FINISHED HVAC INSTALLATION UPON COMPLETION FOR COMPLIANCE WITH THE PLANS, SPECIFICATIONS AND CODES. THE INSTALLING CONTRACTOR WILL BE RESPONSIBLE TO BRING ALL ITEMS REPORTED BY THE INDEPENDENT HVAC CONTRACTOR UP TO PLANS AND SPECIFICATION REQUIREMENTS.

END OF SECTION 23 00 00

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

A. HANGERS

1. HANGERS SHALL INCLUDE ALL MISCELLANEOUS STEEL SUCH AS ANGLE IRON, BANDS, C-CLAMPS WITH RETAINING CLIPS, CHANNELS, HANGER RODS, ETC., NECESSARY FOR THE INSTALLATION OF WORK.
2. HANGERS SHALL BE FASTENED TO BUILDING STEEL, CONCRETE, OR MASONRY, BUT NOT TO PIPING. HANGING FROM METAL DECK IS NOT PERMITTED. HANGERS MUST BE ATTACHED TO UPPER CHORD OF BAR JOIST. WHERE INTERFERENCES OCCUR, AND IN ORDER TO SUPPORT DUCTWORK OR PIPING, THE CONTRACTOR MUST INSTALL TRAPEZE TYPE HANGERS OR SUPPORTS WHICH SHALL BE LOCATED WHERE THEY DO NOT INTERFERE WITH ACCESS TO FIRE DAMPERS, VALVES, AND OTHER EQUIPMENT. HANGER TYPES AND INSTALLATION METHODS ARE ALSO SUBJECT TO LANDLORD CRITERIA.
3. HANGERS FOR ALL INSULATED PIPING SHALL BE SIZED AND INSTALLED FOR THE OUTER DIAMETER OF INSULATION. INSTALL 6" LONG SPLIT CIRCLE GALVANIZED SADDLE BETWEEN THE HANGER AND THE PIPE INSULATION.
4. HANGERS AND PIPING OF DISSIMILAR METALS SHALL BE DI-ELECTRICALLY SEPARATED.

B. VIBRATION ISOLATION DEVICES

1. SPRING VIBRATION ISOLATION DEVICES SHALL BE FURNISHED AND INSTALLED IN ALL SUPPORTS BETWEEN VIBRATING EQUIPMENT (FANS, AIR HANDLERS, ETC.) AND STRUCTURE. ISOLATORS TO BE SIZED ACCORDING TO LOAD WITH A MIN. 1" DEFLECTION. VIBRATING EQUIPMENT HUNG FROM STRUCTURE SHALL BE ISOLATED WITH RUBBER AND SPRING DEVICES. VIBRATING EQUIPMENT SUPPORTED FROM FLOOR OR DECK SHALL BE ISOLATED WITH HOUSED SPRING MOUNT DEVICES.
2. EXAMINE DEAD LOAD AND OPERATING LOAD CONDITIONS WHEN SELECTING DEVICES. ADJUST FOR PROPER ALIGNMENT AND LOADING. AVOID "GROUNDING" THE ISOLATOR.
3. CHECK HANGER ROD SIZE FOR ALLOWABLE LOADS AT THE ISOLATING DEVICE AND AT THE UPPER AND LOWER ATTACHMENTS TO STRUCTURES, DUCTS, EQUIPMENT, ETC.
4. CONSULT MANUFACTURER FOR APPLICATION DATA.

C. TESTING, ADJUSTING AND BALANCING

1. TESTING, ADJUSTING AND BALANCING OF ALL WORK SHALL BE MADE BY AN INDEPENDENT CONTRACTOR WHO IS A CURRENTLY LICENSED ASSOCIATED AIR BALANCING COUNCIL (AABC) OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) BALANCING CONTRACTOR. NO OTHER BALANCE REPORTS WILL BE ACCEPTED. ALL BALANCING WORK MUST BE COMPLETE AND DONE IN ACCORDANCE WITH THE MOST RECENT STANDARDS OF THEIR SOCIETY AND AS A MINIMUM SHALL INCLUDE THE INFORMATION AS SHOWN IN THE AIR BALANCE REVIEW CHECKLIST IN THE GC PROJECT MANUAL. PAYMENT OF ALL COSTS FOR TESTING AND BALANCING SHALL BE INCLUDED IN THE BID. HOWEVER, IT WILL BE THE G.C. THAT WILL CONTRACT DIRECTLY WITH THE AIR BALANCING COMPANY.
2. FINAL TESTING, ADJUSTING AND BALANCING REPORT MUST BE COMPLETE AND SUBMITTED WITH FINAL CLOSE-OUT DOCUMENTS TO ESD&C 1 WEEK PRIOR TO MERCHANDISING DATE.
3. THE HVAC CONTRACTOR SHALL BE PRESENT FOR AIR BALANCE TO VERIFY ACCESSIBILITY TO ALL DEVICES, VERIFY ALL OPERATING SEQUENCES AND INSTALL NEW FILTERS IN ALL UNITS JUST PRIOR TO THE AIR BALANCE. THE COMPLETE AIR BALANCE SHALL TAKE PLACE WITH OUTSIDE AIR DAMPERS IN MINIMUM POSITION, EXCEPT AS NOTED OTHERWISE. HVAC CONTRACTOR SHALL ALSO INSTALL A NEW SET OF FILTERS ONE DAY PRIOR TO MERCHANDISING.
4. BALANCE LANDLORD MEDIA QUANTITIES TO WITHIN 5% OF THAT INDICATED ON THE DRAWINGS. ANY REQUIRED CHANGES IN SHEAVES, BELTS OR PULLEYS NEEDED TO ACHIEVE SPECIFIED FLOW RATES SHALL BE PERFORMED BY THE HVAC CONTRACTOR WITH NO ADDITIONAL COST TO ESD&C.
5. ALL CONTROL SEQUENCES SHALL BE TESTED (INTERLOCKED EQUIPMENT, SMOKE DETECTORS, SMOKE EVACUATION, ECONOMIZER, ETC.) AND OPERATING STATUS RECORDED IN THE BALANCE REPORT.
6. AIR BALANCING CONTRACTOR IS TO CONFIRM OVERRIDE OF MINIMUM OUTSIDE AIR INTAKE UPON CO2 MONITORING CONFIRMATION. FOR CO2 MONITORING CONTACT, SEE CONTACT INFORMATION ON SHEET M02.3.
7. THREE COPIES OF THE BALANCE REPORT SHALL BE SUBMITTED THROUGH THE GENERAL CONTRACTOR TO ESD&C FOR APPROVAL. THE GENERAL CONTRACTOR SHALL VERIFY THE COMPLETENESS OF THE REPORTS PRIOR TO SUBMITTING TO ESD&C. SUBMIT ONE COPY OF FINAL APPROVED AIR BALANCE REPORT TO MALL GENERAL MANAGER.
8. THE BALANCING CONTRACTOR SHALL PERFORM ALL APPLICABLE TESTING AND BALANCING FUNCTIONS REQUIRED FOR THE SYSTEM DESIGNED ON THESE DRAWINGS. ALL SYSTEMS UNABLE TO BE COMPLETELY BALANCED AT THE TIME OF ORIGINAL BALANCE MUST BE BALANCED IN FUTURE AT NO ADDITIONAL EXPENSE TO ESD&C THE BALANCING CONTRACTOR SHALL RECHECK ANY ITEMS THAT ESD&C DEEMS NECESSARY AT NO ADDITIONAL COST TO ESD&C.

D. VALVES

1. GATE VALVES, 2-INCH AND SMALLER: CLASS 150, BODY AND UNION BONNET OF ASTM B 62 CAST BRONZE WITH THREADED OR SOLDER ENDS, INTEGRAL SEAT, RENEWABLE SOLID BRONZE WEDGE DISC, RISING STEM, SCREWED BONNET AND RE-PACKABLE UNDER PRESSURE. BALL VALVES ARE ACCEPTED AS AN EQUAL SUBSTITUTION.
2. GATE VALVES, 2-1/2 INCH AND LARGER: CLASS 125 CAST IRON BODY, RENEWABLE BRONZE SEATS AND SOLID WEDGE DISC, RISING STEM, FLANGED ENDS, AND RE-PACKABLE UNDER PRESSURE.
3. SWING CHECK VALVES, 2-INCH AND SMALLER: CLASS 150, CAST BRONZE BODY AND CAP CONFORMING TO ASTM B 62 WITH HORIZONTAL SWING, Y-PATTERN, RENEWABLE BRONZE DISC, AND HAVING THREADED OR SOLDERED ENDS.
4. SWING CHECK VALVE, 2-1/2 INCH AND LARGER: CLASS 125 CAST IRON BODY AND BOLTED CAP, HORIZONTAL SWING, RENEWABLE BRONZE DISC, FLANGED ENDS AND CAPABLE OF BEING REFITTED WHILE THE VALVE REMAINS IN THE LINE.
5. COMBINATION BALANCING AND SHUTOFF VALVES: BELL & GOSSETT CIRCUIT SETTER WITH LOCKING SET POINT. A CIRCUIT SETTER BALANCE WHEEL MUST BE INCLUDED WITH O & M MANUAL. TACO OR GRISWOLD ARE CONSIDERED AS EQUAL.

END OF SECTION 23 05 00

SECTION 23 07 00 - HVAC INSULATION

A. DUCTWORK INSULATION

1. FURNISH AND INSTALL INSULATION PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS, AND IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES. INSULATION MUST COMPLY WITH NFPA 90A. ALL INSULATION SHALL HAVE A FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NO HIGHER THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E 84-05, OR AS REQUIRED BY LOCAL CODES.
2. DUCT SIZES SHOWN ON DRAWINGS ARE INSIDE CLEAR DIMENSIONS. ALL RECTANGULAR DUCTWORK (SUPPLY AND RETURN) SHALL BE INTERNALLY INSULATED WITH 1" THICK LINER (TOTAL CONDUCTIVITY <=0.28 AT 75°F; R-4.2). WHEN A COMPLETE DUCTED RETURN AIR SYSTEM IS INDICATED ON THE DRAWINGS, ONLY THE 15'-0" OF THE RETURN AIR DUCT CLOSEST TO THE AIR HANDLING UNIT IS TO BE INSULATED. LINER IS TO HAVE A COATED SURFACE EXPOSED TO AIRSTREAM TO PREVENT EROSION. APPLY ADHESIVES AND MECHANICAL FASTENERS AS RECOMMENDED BY SMACNA AND THE MANUFACTURER TO PREVENT LINER SEPARATION FROM THE DUCT. ALL TRANSVERSE EDGES TO BE COATED WITH ADHESIVE.
3. ALL OUTDOOR AIR (ROUND, OVAL, AND RECTANGULAR) AND ROUND/OVAL SUPPLY AIR DUCTWORK SHALL BE EXTERNALLY INSULATED WITH A MINIMUM OF 1-1/2" THICK, 1.5 PCF DENSITY (R=6.0) DUCT WRAP WITH VAPOR BARRIER. VAPOR BARRIER IS TO BE MAINTAINED THROUGHOUT DUCT SYSTEM, EXCEPT LINED DUCTWORK SPECIFIED ELSEWHERE AND EXHAUST DUCTWORK. ALL JOINTS MUST BE OVERLAPPED AND TUCKED SO THAT NO INSULATION FIBER IS VISIBLE. EXTEND DUCTWORK INSULATION WITHOUT INTERRUPTION THROUGH WALLS, FLOORS AND OTHER PENETRATIONS.

B. HYDRONIC PIPING INSULATION

1. ALL HYDRONIC PIPING FOR CHILLED WATER AND/OR HEATING WATER (NOT INCLUDING CONDENSER WATER UNLESS SPECIFICALLY NOTED OTHERWISE), VALVES, FITTINGS, AND ACCESSORIES SHALL BE INSULATED. FOR PIPE SIZES UP TO 2", INSULATE WITH 1" THICK (K=0.23 @ 75°F) FIBERGLASS INSULATION WITH ALL SERVICE JACKET AND VAPOR BARRIER. FOR PIPE SIZES LARGER THAN 2", INSULATE WITH 1-1/2" THICK (K=0.23 @ 75°F) FIBERGLASS INSULATION WITH ALL SERVICE JACKET AND VAPOR BARRIER.
2. INSULATION AT ALL HANGERS FOR PIPING 2-1/2 INCHES AND LARGER SHALL BE HARD AND NON-COMPRESSIBLE.
3. ALL INSULATION SHALL HAVE A FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NO HIGHER THAT 50 TO CONFORM WITH THE REQUIREMENTS OF THE NFPA.
4. PROVIDE ZESTON OR EQUAL INSULATION FITTINGS FOR ALL TEES, ELLS OR SPECIALTY FITTINGS.

C. REFRIGERANT PIPING INSULATION

1. INSULATE THE REFRIGERANT SUCTION LINES AND CONDENSATE LINES WITH RUBATEX OR ARMSTRONG 1 INCH THICK PIPE INSULATION WITH FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NOT MORE THAN 50 IN ACCORDANCE WITH INDUSTRY STANDARDS. DO NOT INSULATE THE HOT GAS (LIQUID) LINES OR ANY HOT GAS BYPASS.

END OF SECTION 23 07 00

SECTION 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC

A. WORK RESPONSIBILITY

1. ESD&C HVAC SUPPLIER WILL FURNISH NECESSARY CONTROL DEVICES TO THE FIELD. FOR ALL DEVICES NOT FACTORY INSTALLED, IT WILL BE THE MECHANICAL CONTRACTOR'S RESPONSIBILITY TO INSTALL.

END OF SECTION 23 09 00

SECTION 23 21 00 - HYDRONIC PIPING AND PUMPS

A. HYDRONIC PIPING

1. FURNISH AND INSTALL A COMPLETE HYDRONIC PIPING SYSTEM IF APPLICABLE. REFER TO PLANS TO DETERMINE IF A HYDRONIC SYSTEMIS REQUIRED.
2. PIPING:
   a. HYDRONIC PIPING FOR CHILLED WATER, CONDENSER WATER AND/OR HEATING WATER SHALL BE ASTM A-53, SCHEDULE 40, ERW, BLACK STEEL PIPE WITH PLAIN ENDS. INSTALL STEEL PIPE WITH WELDED JOINTS WHERE PIPE IS 2-1/2 INCH AND LARGER. INSTALL STEEL PIPE WITH THREADED JOINTS AND FITTINGS. INSTALL TYPE "K" COPPER PIPE FOR 2 INCH AND SMALLER PIPE. PROVIDE DIELECTRIC UNIONS BETWEEN DISSIMILAR METALS. ALL PIPING SHALL BE IN STRICT CONFORMANCE WITH ASTM, ASA, AND LANDLORD'S REQUIREMENTS. WHICHEVER IS MOST STRINGENT. UNIONS OR FLANGES MUST BE USED AT EQUIPMENT CONNECTIONS WHERE SERVICE OR REMOVAL MAY BE REQUIRED.
   b. ALL PIPING AND EQUIPMENT SHALL BE PRESSURE TESTED WITHOUT LEAKAGE AT A MINIMUM PRESSURE OF 125 PSI.
   c. ALL HYDRONIC PIPING AND EQUIPMENT CONNECTED TO THE HVAC PIPING SYSTEM SHALL BE CLEANED AND FLUSHED. REMOVE, CLEAN, AND REPLACE STRAINER SCREENS. FILL TENANT'S SYSTEM WITH DOMESTIC WATER AND VENT ALL PIPING AND EQUIPMENT PRIOR TO CONNECTION TO THE LANDLORD'S SYSTEM. CONTRACTOR SHALL NOT FILL TENANT'S SYSTEM WITH WATER FROM THE LANDLORD'S SYSTEM UNLESS SPECIFICALLY INSTRUCTED TO DO SO FROM THE LANDLORD'S FIELD REPRESENTATIVE. ANY RUNS THROUGH A CHASE OR SHAFT WILL BE DONE WITH FEWEST JOINTS POSSIBLE USING THE LONGEST LENGTH OF HARD COPPER PIPE AVAILABLE. SHOULD A JOINT BE REQUIRED, CONTRACTOR SHALL MAKE ALL EFFORTS TO KEEP THE JOINTS IN ACCESSIBLE AREAS.
   d. PRIOR TO CONNECTION TO THE LANDLORD'S SYSTEM, CONTRACTOR SHALL OBTAIN WRITTEN CONFIRMATION FROM THE LANDLORD'S FIELD REPRESENTATIVE, THAT ALL TESTING, FLUSHING, AND PROPER FILLING OF THE TENANT'S SYSTEM HAS BEEN COMPLETED IN ACCORDANCE TO THE LANDLORD'S REQUIREMENTS AND THAT THE TENANT'S SYSTEM IS READY TO BE CONNECTED TO THE LANDLORD'S SYSTEM.
3. PIPING SPECIALTIES:
   a. PRESSURE/TEMPERATURE TEST PLUGS (PETE'S PLUG) - 1/4 INCH NPT FITTINGS TO RECEIVE EITHER A TEMPERATURE OR PRESSURE PROBE, 1/8 INCH O.D. FITTING AND CAPS SHALL BE BRASS WITH VALVE CORE OF NORDEL, RATED AT 400 PSIG, 0 TO 200 DEGREES F.
   b. STRAINERS - "Y" PATTERN STRAINERS, 125 PSIG, CAST IRON BODY WITH PERFORATED STAINLESS STEEL SCREEN, THREADED FOR 2 INCHES AND SMALLER, FLANGED FOR 2-1/2 INCHES AND LARGER. SCREEN OPENING SIZE AT 0.033 INCH FOR HEATING AND 1/8 INCH FOR CHILLED OR CONDENSER WATER. PROVIDE WITH BLOWDOWN VALVE WITH HOSE END FITTING.
4. GENERAL INSTALLATION:
   a. INSTALL WATER MAINS WITHOUT PITCH. USE ECCENTRIC REDUCING COUPLINGS AT CHANGES IN SIZE WITH THE TOP OF PIPES AT SAME ELEVATION.
   b. BRANCHES TO UNITS BELOW MAINS TO BE TAKEN FROM BOTTOM OF MAINS AT A 45 DEGREE ANGLE, PITCH DOWNWARD TOWARD UNITS. BRANCHES TO UNITS ABOVE MAINS TO BE TAKEN FROM TOP OF MAINS AT A 45 DEGREE ANGLE PITCHED UPWARD TOWARDS UNITS. PITCH NOT LESS THAN 1" TO 10 FEET.
   c. SEE MECHANICAL DETAIL DRAWINGS FOR APPLICABLE DETAILS.
   d. PROVIDE UL LISTED FIRE STOPPING SYSTEM AROUND ALL PIPING PENETRATIONS THROUGH RATED WALLS. PENETRATIONS SHALL MEET THE REQUIREMENTS OF UL DETAILS WL1001 (UNINSULATED WALL) AND WL5039 (INSULATED WALL).

END OF SECTION 23 21 00

SECTION 23 23 00 - REFRIGERANT PIPING

A. REFRIGERANT PIPING

1. THIS CONTRACTOR SHALL FURNISH AND INSTALL A COMPLETE REFRIGERANT PIPING SYSTEM BETWEEN THE INDOOR FAN UNITS AND OUTDOOR CONDENSING UNITS. REFER TO PLANS TO DETERMINE IF A REFRIGERANT SYSTEM IS REQUIRED. NEW PIPING IS REQUIRED. REUSE OF EXISTING PIPING IS NOT ALLOWED.
2. PIPING:
   a. REFRIGERANT PIPING SHALL BE TYPE ACR COPPER TUBING. TUBING SHALL BE CLEAN AND CLEAR OF DEBRIS, AND EVACUATED WITH A DEEP VACUUM PRIOR TO REFRIGERANT CHARGE. THE CONTRACTOR SHALL CONFIRM THE DIAMETER OF THE REFRIGERANT PIPING RUNS IN EXCESS OF 50 EQUIVALENT FEET WITH THE ARCHITECT, ENGINEER, AND MANUFACTURER FOR ALL SPLIT SYSTEMS. NO REFRIGERANT PIPING RUNS EXCEEDING 100 EQUIVALENT FEET ARE TO BE INSTALLED WITHOUT EXPRESS BRANDS' PERMISSION. THE MANUFACTURER SHALL PROVIDE ALL FINAL PIPE SIZING AND COIL SELECTIONS FOR ALL REFRIGERANT PIPING SYSTEMS.
   b. ALL FITTINGS AND JOINTS SHALL BE WROUGHT COPPER OR CAST BRONZE (ANSI B16.22). ALL COPPER TO COPPER JOINTS SHALL BE BRAZED WITH A COPPER-PHOSPHORUS ALLOY AND ALL OTHER JOINTS SHALL BE BRAZED WITH SILFOS-5 ALLOY.
   c. ALL ELBOWS ARE TO BE LONG RADIUS TYPE.
3. INSTALLATION:
   a. REFRIGERANT PIPE SIZING SHALL BE THE RESPONSIBILITY OF THE HVAC SUPPLIER. CONTRACTOR WILL PROVIDE A SCHEMATIC PROPOSED LAYOUT OF THE SYSTEM INCLUDING ALL ELBOWS, RISES, RUNS, ETC., WITH DIMENSIONS. THE HVAC SUPPLIER WILL THEN PROVIDE WRITTEN DOCUMENTATION OF PIPE SIZES AND ADDITIONAL REQUIRED SYSTEM COMPONENTS TO THE FIELD.
   b. SUCTION LINES SHALL HAVE ADEQUATE LIFT TRAPS AND/OR DOUBLE SUCTION RISERS TO MEET THE REQUIREMENTS OF FIELD CONDITIONS AND EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.
   c. BRAZE ALL JOINTS WITH SILFOS-5 STARTING AT THE INDOOR UNIT AND WORKING TOWARD THE OUTDOOR UNIT. THE SEALS ON THE OUTDOOR UNIT SHALL BE BROKEN LAST. A NITROGEN BLEED SHALL BE USED DURING ALL BRAZING AND ANY TIME THE SYSTEM IS OPEN. ALL OPEN LINES SHALL BE CAPPED AND SEALED BEFORE LEAVING THE SITE DURING CONSTRUCTION. PRESSURE TEST FOR LEAKS WITH AN INERT GAS UP TO 245 PSIG. REDO LEAKING JOINTS AND RETEST UNTIL SYSTEM IS TIGHT. EVACUATE ENTIRE SYSTEM TO 200 MICRONS OF MERCURY. CHARGE SYSTEM WITH 25 PSI OF R-22 AND A INERT GAS TO 245 PSI AND RETEST SYSTEM. ENERGIZE CRANK CASE HEATERS 24 HOURS PRIOR TO STARTING COMPRESSOR TO ENSURE THAT ALL REFRIGERANT LIQUID IS OUT OF THE COMPRESSOR.
   d. UPON COMPLETION OF TESTING, BUT BEFORE THE REFRIGERANT PIPING INSULATION IS APPLIED, THE PIPING MUST BE INSPECTED BY A REPRESENTATIVE OF THE LOCAL GOVERNING AUTHORITY AS NECESSARY.
   e. INSULATE THE REFRIGERANT SUCTION LINES AND CONDENSATE LINES WITH RUBATEX OR ARMSTRONG 1 INCH THICK PIPE INSULATION WITH FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NOT MORE THAN 50 IN ACCORDANCE WITH INDUSTRY STANDARDS. DO NOT INSULATE THE HOT GAS (LIQUID) LINES OR ANY HOT GAS BYPASS.
   f. PROVIDE UL LISTED FIRE STOPPING SYSTEM AROUND ALL PIPING PENETRATIONS THROUGH RATED WALLS. PENETRATIONS SHALL MEET THE REQUIREMENTS OF UL DETAILS WL1001 (UNINSULATED WALL) AND WL5039 (INSULATED WALL).
4. INSPECTION:
   a. CONTRACTOR MUST PREPARE AND SUBMIT A COMPLETE PIPING SCHEMATIC TO THE LOCAL MANUFACTURER REPRESENTATIVE FOR APPROVAL PRIOR TO BEGINNING INSTALLATION. UPON COMPLETION OF PIPING, THIS CONTRACTOR MUST CALL THE LOCAL REPRESENTATIVE FOR FIELD INSPECTION OF WORK PERFORMED. ALL ITEMS FOUND TO BE INADEQUATE FOR PROPER PERFORMANCE BY MANUFACTURER REPRESENTATIVE MUST BE CORRECTED. THIS INSPECTION IS PERFORMED AT ESD&C EXPENSE.

END OF SECTION 23 23 00

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

A. METAL DUCTWORK - NO FIBERGLASS DUCT ALLOWED

1. NO DUCTWORK SHALL BE FABRICATED PRIOR TO JOB SITE VISIT AND APPROVAL BY THE GENERAL CONTRACTOR. A SKETCH MUST BE SUBMITTED INDICATING DEVIATIONS FROM DESIGN AND MUST BE APPROVED BY ESD&C'S PROJECT MANAGER PRIOR TO FABRICATION OR INSTALLATION.
2. EXCEPT AS OTHERWISE INDICATED, FABRICATE AND INSTALL RECTANGULAR AND ROUND DUCTWORK WITH GALVANIZED STEEL, IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" OF THE LATEST EDITION. WHERE OTHER CODES ARE ENFORCED, (IE. UMC, BOCA, ETC.) USE THE MOST STRINGENT CODE FOR DUCT CONSTRUCTION STANDARDS.
3. EXCEPT WHERE OTHERWISE INDICATED, CONSTRUCT DUCT SYSTEMS TO THE FOLLOWING PRESSURE CLASSIFICATIONS:
   a. SUPPLY DUCTS: 2" W.G. POSITIVE
   b. RETURN AND EXHAUST DUCTS: 2" W.G. NEGATIVE

   EXCEPT WHERE OTHERWISE INDICATED, USE DUCT SEALANTS OF THE FOLLOWING PRESSURE CLASSIFICATIONS:
   a. SUPPLY DUCTS: CLASS B - 3" W.G.
   b. RETURN AND EXHAUST DUCTS: CLASS C - 2" W.G.

   IN ACCORDANCE WITH THESE CONSTRUCTION AND SEALANT PRESSURE CLASSIFICATIONS, MAXIMUM DUCT AIR LEAKAGE WILL NOT EXCEED 5% AS REQUIRED FOR FINAL AIR BALANCE APPROVAL.
4. ROUND DUCTWORK SHALL BE GALVANIZED STEEL WITH SPIRAL LOCKSEAM CONSTRUCTION FOR ALL SIZES 14" DIAMETER AND LARGER. ROUND DUCTWORK SIZES 13" DIAMETER AND SMALLER MAY BE SNAP-LOCK CONSTRUCTION. ALL SNAP-LOCK SEAMS SHALL BE SEALED AS DESCRIBED IN THESE SPECIFICATIONS. ROUND FITTINGS SHALL BE GALVANIZED STEEL WITH SPOT WELDED AND BONDED CONSTRUCTION.
5. ROUND SPIRAL GALVANIZED STEEL DUCTWORK MAY BE USED IN PLACE OF RECTANGULAR DUCTWORK IN HORIZONTAL APPLICATION WHEN ABOVE CEILING CLEARANCES PERMITS AND EQUIVALENT FREE AREA IS MAINTAINED, WITH THE FOLLOWING EXCEPTION; ALL SUPPLY AND RETURN DUCTWORK WITHIN 15 FEET OF THE AIR HANDLER MUST BE RECTANGULAR AND INTERNALLY LINED. ONCE A TRANSITION IN THE DIRECTION OF THE AIRFLOW TO SPIRAL HAS BEEN DONE, DUCT WILL NOT BE ALLOWED TO REVERT TO RECTANGULAR. WHERE ROUND DUCT SUBSTITUTION WILL TAKE PLACE, SUBMIT A SKETCH AND CHART SHOWING EQUIVALENT ROUND CONVERSIONS OF RECTANGULAR DUCTWORK TO ESD&C PROJECT MANAGER'S FOR APPROVAL PRIOR TO FABRICATION OR INSTALLATION.
6. INSTALL FACTORY MANUFACTURED DOUBLE THICKNESS TURNING VANES IN RIGHT ANGLE ELBOWS IN MAIN DUCT PER LATEST EDITION OF SMACNA.
7. INSTALL RIGID ROUND AND RECTANGULAR METAL DUCT WITH SUPPORT SYSTEMS INDICATED IN SMACNA STANDARDS. SUPPORT HORIZONTAL DUCTS WITHIN 2 FEET OF EACH ELBOW AND WITHIN 4 FEET OF EACH BRANCH INTERSECTION USING DOUBLE STRAP HANGERS ON EACH SIDE OF FITTING. SUPPORT VERTICAL DUCTS AT A MAXIMUM INTERVAL OF 16 FEET AND AT EACH FLOOR. NO WOOD SHALL BE USED TO SUPPORT OR BRACE DUCTS. PROVIDE SWAY AND SEISMIC BRACING AS REQUIRED BY STATE AND LOCAL CODES OR BY LANDLORD.
8. WHERE DUCTS PASS THROUGH ROOFS AND FLOORS, PROVIDE AS MINIMUM 1-1/2"X1-1/2" X1/8" STEEL ANGLE FRAMES AT EACH SIDE OF OPENING. THE ANNULAR SPACE BETWEEN DUCT AND ANGLE FRAMES SHALL BE CAULKED WITH SILICONE SEALANT OR FIREPROOFED AS REQUIRED BY ASSEMBLY FIRE RATING.
9. ALL JOINTS AND SEAMS SHALL BE SEALED WITH 2" WIDE, GLASS-FIBER-FABRIC REINFORCED TAPE. JOINTS ALSO SHALL BE RIVETED OR CONNECTED WITH SHEET METAL SCREWS. LIQUID SEALANTS BY UNITED MCGILL CORP., DOW CORNING, MIRACLE ADHESIVES AND SUREBOND INC. WILL BE ACCEPTED IN LIEU OF TAPE.
10. SOFT ELASTOMER BUTYL GASKET WITH ADHESIVE BACKING SHALL BE USED TO SEAL FLANGED JOINTS.
11. DUCT TRANSITIONS SHALL NOT EXCEED 30 DEGREES SLOPE EXCEPT AS SPECIFICALLY NOTED OTHERWISE.
12. PROVIDE ACCESS TO ALL MOTORIZED DAMPERS, FIRE DAMPERS, CONTROLS, AND OTHER ITEMS IN DUCTWORK THAT REQUIRE SERVICE OR INSPECTION. IF THE ACCESS PANEL LOCATION IS EXPOSED TO THE SALES AREA, IT MUST BE APPROVED BY ESD&C'S PROJECT MANAGER PRIOR TO INSTALLATION. IN HARD CEILINGS, LAY-IN SUPPLY AND RETURN AIR DIFFUSERS, GRILLES AND REGISTERS WITH PLASTER FRAMES MAY BE USED AS ACCESS LOCATIONS WHEN WITHIN 3'-0" OF DEVICE.
13. ALL DUCTWORK SHALL BE INSTALLED WITH INSIDE CLEAR DIMENSIONS AS NOTED ON DRAWINGS. WHERE DUCTWORK SIZE IS LARGER THAN CONNECTED DEVICE (IE. VAV BOX, DIFFUSER, REGISTER) SMOOTH DUCT TRANSITIONS ARE TO TAKE PLACE JUST PRIOR TO DEVICE CONNECTION. SEE MECHANICAL DRAWINGS FOR DETAIL.

B. MEDIUM PRESSURE DUCT

1. WHERE DUCTWORK IS SPECIFICALLY NOTED AS MEDIUM PRESSURE, IT SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA STANDARDS FOR A PRESSURE RATING OF 4 INCHES WATER COLUMN MINIMUM OR GREATER AS REQUIRED BY LANDLORD.
2. ALL GAUGES AND REINFORCEMENT MUST MEET WITH THE LATEST EDITION OF SMACNA STANDARDS FOR MEDIUM PRESSURE DUCT AND WITH THE LANDLORD'S CRITERIA.
3. CONNECTIONS TO THE LANDLORD'S MEDIUM PRESSURE DUCTWORK SHALL BE MADE WITH "LO-LOSS" SADDLE TEE TAPS OR AS OTHERWISE REQUIRED BY THE LANDLORD.
4. ALL OTHER ITEMS FROM METAL DUCTWORK SPECIFICATION SECTION APPLY TO THIS SECTION, WITH THE EXCEPTION THAT ALL MEDIUM PRESSURE DUCTWORK MUST BE WRAPPED WITH INSULATION, NOT LINED.

END OF SECTION 23 31 00

SECTION 23 33 00 - AIR DUCT ACCESSORIES

A. FLEXIBLE CONNECTIONS

1. FLEXIBLE COLLARS SHALL BE FURNISHED AND INSTALLED IN ALL CONNECTIONS BETWEEN VIBRATING EQUIPMENT (FANS, AIR HANDLERS, ETC.) AND DUCTS OR CASINGS. ALSO, FURNISH AND INSTALL FLEXIBLE CONNECTIONS WHERE DUCTS CROSS BUILDING EXPANSION JOINTS.
2. FLEXIBLE CONNECTIONS SHALL BE CONSTRUCTED OF NEOPRENE-COATED FLAMEPROOF FABRIC. PROVIDE ADEQUATE JOINT FLEXIBILITY TO ALLOW FOR MOVEMENT AND PREVENT THE TRANSMISSION OF VIBRATION.

B. FLEXIBLE AIR DUCT

1. FLEXIBLE AIR DUCT SHALL BE 1" INSULATED CLASS 1, UL LISTED AND RATED FOR THE OPERATING PRESSURE OF THE SYSTEM. DUCT CONSTRUCTION MATERIAL (PLASTIC, CLOTH, ALUMINUM) MUST ADHERE TO LOCAL CODES AND LANDLORD'S REQUIREMENTS AND BE INCLUDED AS SUCH IN THE BID.
2. FLEXIBLE AIR DUCT SHALL BE ATTACHED PER DETAILS ON THE DRAWINGS. FLEXIBLE AIR DUCT MAY ONLY BE USED IN VERTICAL APPLICATIONS.
3. FLEXIBLE DUCT SHALL NOT EXTEND OVER 4'-0" IN LENGTH AT ANY ONE LOCATION.

C. SUPPLY AIR TAKE-OFF FITTINGS

1. FURNISH AND INSTALL CONICAL, TAPERED OR 45 DEGREE SADDLE TAKEOFFS FROM MAIN DUCTWORK TO ROUND BRANCHES. INSTALLATION SHALL BE PER SMACNA LATEST EDITION.

D. DAMPERS

1. WHERE DESIGNATED, FURNISH AND INSTALL MANUAL LOCKING QUADRANT VOLUME CONTROL DAMPERS WITH HANDLE OPERATORS AS SHOWN ON PLANS TO FACILITATE AIR BALANCING. DAMPER SHALL BE DURODYNE MODEL NO: K SERIES QUADRANT OR ESD&C APPROVED EQUAL.
2. OPERATING HANDLES ON ALL DAMPERS SHALL BE TAGGED WITH A MINIMUM 18" LONG ORANGE MARKER TAPE.
3. WHERE ACCESS TO BALANCING DAMPER IS RESTRICTED, A REMOTE DEVICE, MANUALLY OPERATED SHALL BE USED. UNITS SHALL BE ORDERED THREE WEEKS BEFORE INSTALLATION TO ALLOW FOR DELIVERY LEAD TIME.

E. FIRE AND FIRE-SMOKE DAMPERS

1. FURNISH AND INSTALL PRIMARY FIRE DAMPERS WHERE INDICATED OR REQUIRED BY CODES. DAMPERS SHALL BE DESIGNED FOR HORIZONTAL OR VERTICAL FLOW OF AIR AS REQUIRED. FIRE DAMPERS SHALL BE UL LABELED AND MEET ALL CODE REQUIREMENTS.
2. FIRE DAMPERS SHALL HAVE THE BLADES OUT OF THE AIRSTREAM AND A 165 DEGREE F FUSIBLE LINK, TYPE B, AS MINIMUM. FURNISH AND INSTALL ACCESS DOORS AS NECESSARY.
3. FURNISH AND INSTALL ALL NECESSARY FRAMING AND SLEEVES FOR DAMPER MOUNTING PER UL AND CODE REQUIREMENTS.
4. FIRE SMOKE DAMPERS SHALL BE FURNISHED AND INSTALLED WITH ELECTRIC POWERED MECHANISM. COORDINATE WITH ELECTRICAL CONTRACTOR FOR POWER REQUIREMENTS.

END OF SECTION 23 33 00

MECHANICAL SPECIFICATIONS

A

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	REQUIRED BY:	DATE
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2 *		04/09/14
3 *		05/06/14

* INDICATES NO REVISION TO THIS SHEET

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