

MECHANICAL SPECIFICATIONS

15000 GENERAL PROVISIONS

- 0.01 DEFINITIONS: THE TERMS LISTED BELOW ARE DEFINED AS FOLLOWS WHEN USED IN DIVISION 15 WORK AND ONLY DIVISION 15 WORK.
- A. WORK: LABOR AND MATERIALS OF THE CONTRACTOR AND/OR SUBCONTRACTOR.
- B. FURNISH: OBTAIN, COORDINATE, SUBMIT THE NECESSARY DRAWINGS, DELIVER TO THE JOBSITE IN NEW CONDITION AND GUARANTEE.
- C. INSTALL: RECEIVE AT THE JOB-SITE, UNLOAD, STORE, SET IN PLACE, CONNECT, PLACE IN OPERATION AND GUARANTEE.
- D. PROVIDE: FURNISH AND INSTALL.
- E. CONNECT: BRING SERVICE TO THE EQUIPMENT AND MAKE FINAL ATTACHMENTS INCLUDING NECESSARY PIPE FITTINGS, DUCTWORK, TRANSITIONS, ETC.
- F. CONCEALED: HIDDEN FROM SIGHT IN CHASES, FURRED SPACES, SHAFTS, ABOVE CEILING, EMBEDDED IN CONSTRUCTION, IN CRAWL SPACES OR BURIED.
- G. EXPOSED: NOT INSTALLED UNDERGROUND OR CONCEALED AS DEFINED ABOVE.
- H. REMOVE: REMOVE ALL EQUIPMENT AND MATERIALS NOT BEING RE-USED. DISPOSE OF OFF-SITE IN A LEGAL AND ENVIRONMENTALLY CONCIIOUS MANNER.
- 0.02 PERFORMANCE: MECHANICAL CONTRACTOR SHALL PERFORM ALL WORK SPECIFIED, INDICATED AND REQUIRED UNLESS OTHERWISE NOTED, INCLUDING FINAL CONNECTIONS, IN A WORKMANLIKE MANNER USING WORKERS SKILLED AND EXPERIENCED IN THE TRADE.
- 0.03 SITE EXAMINATION: EXAMINE SITE BEFORE BIDDING. CLAIM NO EXTRAS RESULTING FROM LACK OF KNOWLEDGE OF SITE CONDITIONS. IF SITE CONDITIONS REQUIRE MODIFICATION OF THE SYSTEMS INDICATED IN THESE DOCUMENTS, SO ADVISE ENGINEER, AND IF ACCEPTED BY ENGINEER, INCLUDE COST OF SUCH MODIFICATIONS IN BID.
- 0.04 JOBSITE CONDITIONS: ACCEPT SOLE AND COMPLETE RESPONSIBILITY FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK.
- 0.05 FULL FUNCTION: PROVIDE ALL MINOR ITEMS NECESSARY FOR A COMPLETE AND FULLY FUNCTIONAL INSTALLATION.
- 0.06 ADMINISTRATION: PROVIDE EVIDENCE OF LICENSING, BONDING, AND INSURANCE, AND PERFORM OTHER ADMINISTRATIVE FUNCTIONS, AS REQUIRED.
- 0.07 PERMITS: PROCURE AND PAY FOR ALL REQUIRED PERMITS AND SERVICE CHARGES.
- 0.08 UTILITY SERVICES: ARRANGE FOR ALL REQUIRED UTILITY SERVICES AND PAY ALL UTILITY SERVICE FEES.
- 0.09 COORDINATION: CONFORM TO GENERAL CONSTRUCTION CONTRACT DOCUMENTS EXCEPT AS MODIFIED HEREIN. REFER ALSO TO STRUCTURAL AND ELECTRICAL CONTRACT DOCUMENTS. COORDINATE ALL WORK WITH OTHER TRADES.
- 0.10 CUTTING AND PATCHING: CUT AND PATCH AS REQUIRED. CUT OR WELD STRUCTURAL MEMBERS ONLY WITH APPROVAL OF STRUCTURAL ENGINEER. PATCHING SUBJECT TO APPROVAL BY ARCHITECT.
- 0.11EXISTING FLOORS: TRENCH OR CORE BORE EXISTING FLOORS PER LANDLORD REQUIREMENTS.
- 0.12 ROOF PENETRATIONS: ALL ROOFING WORK SHALL BE PERFORMED BY LANDLORD-APPROVED ROOFING CONTRACTOR AT THIS CONTRACTOR'S COST. COORDINATE WITH LANDLORD.
- 0.13 EQUIPMENT SUBSTITUTIONS: REIMBURSE ELECTRICAL CONTRACTOR, AT NO CHARGE TO TENANT, FOR HIS COSTS INCURRED DUE TO SUBSTITUTION OF MECHANICAL EQUIPMENT HAVING ELECTRICAL REQUIREMENTS DIFFERING FROM THOSE INDICATED.
- 0.14 ADJUSTMENTS: MAKE MINOR ADJUSTMENTS TO WORK WHERE REQUESTED BY TENANT, WHEN SUCH ADJUSTMENTS ARE NECESSARY TO PROPER OPERATION AND WITHIN THE INTENT OF THE CONTRACT.
- 0.15 REFERENCE STANDARDS: COMPLY WITH APPLICABLE STANDARDS OF NFPA, ANSI, UL, ASHRAE, AND SMACNA, EXCEPT AS SUPERSEDED BY LOCAL AUTHORITY. CONFORM WITH CONTRACT DOCUMENTS WHERE THEY EXCEED CODE MINIMUM REQUIREMENTS.
- 0.16 LOCAL REQUIREMENTS: COMPLY WITH THE REQUIREMENTS OF APPLICABLE CODES, LANDLORD, SERVING UTILITIES, AND THE LOCAL AUTHORITY HAVING JURISDICTION. SECURE APPROVAL OF INSTALLATION BY LANDLORD, LOCAL AUTHORITY, AND OTHERS AS REQUIRED.
- 0.17 MATERIALS AND EQUIPMENT: PROVIDE NEW, UL LISTED, COMMERCIAL GRADE MATERIALS, DEVICES, EQUIPMENT, AND FIXTURES, SUITABLE FOR ENVIRONMENT. REUSE EXISTING ONLY WHEN COMPLIANT WITH THE CONTRACT DOCUMENTS, IN GOOD CONDITION, AND APPROVED BY THE ENGINEER.
- 0.18 SHOP DRAWINGS: BEFORE ORDERING EQUIPMENT AND MATERIALS, SUBMIT NOT LESS THAN FIVE CERTIFIED COPIES OF ALL SHOP AND EQUIPMENT DRAWINGS FOR ENGINEER'S REVIEW, WHO WILL RETAIN TWO COPIES. ONLY FURNISH SYSTEMS AND EQUIPMENT IN COMPLIANCE WITH ACCEPTED SHOP DRAWINGS.
- 0.19 INSTALLATION: INSTALL ALL MATERIALS, EQUIPMENT AND SYSTEMS IN FULL ACCORD WITH MANUFACTURER'S INSTRUCTIONS.
- 0.20 LAYOUT: INSTALL ALL PIPING AND DUCTWORK TO PRESENT A NEAT AND ORDERLY APPEARANCE. RUN ALL LINES PARALLEL WITH BUILDING CONSTRUCTION. MAINTAIN HEADROOM AND EQUIPMENT CLEARANCE, AND GRADIENT WHERE REQUIRED. ALLOW FOR EXPANSION AND CONTRACTION.
- 0.21 ACCESS DOORS: PROVIDE ACCESS DOORS OR PANELS FOR ALL VALVES, CLEANOUTS, DAMPERS, CONTROLS, DEVICES, AND OTHER ITEMS REQUIRING INSPECTION OR MAINTENANCE. ACCESS PANELS SERVING HVAC COMPONENTS SHALL BE 12-INCHES BY 12-INCHES MINIMUM OR LARGER TO PROVIDE SUFFICIENT WORKING CLEARANCE FOR COMPONENT BEING ACCESSED.
- 0.22 COMMISSIONING: THOROUGHLY TEST AND DEMONSTRATE PROPER OPERATION OF ALL SYSTEMS AND EQUIPMENT FURNISHED OR INSTALLED UNDER THIS CONTRACT.
- 0.23 RECORD DRAWINGS: PREPARE AND SUBMIT TO GENERAL CONTRACTOR RECORD DRAWINGS SHOWING ALL SIGNIFICANT DEVIATIONS FROM CONSTRUCTION DOCUMENTS. INCLUDE MANUFACTURER AND MODEL NUMBERS FOR ALL EQUIPMENT INSTALLED.
- 0.24 O & M MANUALS: AN OPERATION AND MAINTENANCE MANUAL SHALL BE PROVIDED TO THE BUILDING OWNER OR OPERATOR. THE MANUAL SHALL INCLUDE BASIC DATA RELATING TO THE OPERATION AND MAINTENANCE OF HVAC SYSTEMS AND EQUIPMENT. REQUIRED ROUTINE MAINTENANCE ACTIONS SHALL BE CLEARLY IDENTIFIED. WHERE APPLICABLE, HVAC CONTROLS INFORMATION SUCH AS DIAGRAMS, SCHEMATICS, CONTROL SEQUENCE DESCRIPTIONS, AND MAINTENANCE AND CALIBRATION INFORMATION SHALL BE INCLUDED.
- 0.25 WARRANTY: UNCONDITIONALLY WARRANT ALL WORK TO BE FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR ONE YEAR FROM DATE OF FINAL ACCEPTANCE, EXCEPT WARRANT AIR CONDITIONING COMPRESSORS FOR FIVE YEARS AND GAS-FIRED HEAT EXCHANGERS FOR 10 YEARS. DURING WARRANTY PERIOD, REPAIR OR REPLACE DEFECTIVE MATERIALS, EQUIPMENT OR WORKMANSHIP WITHOUT COST TO TENANT.
- 0.26 EQUIPMENT IDENTIFICATION: IDENTIFY ALL APPLICABLE ROOFTOP EQUIPMENT WITH TENANT'S NAME, SPACE NUMBER AND UNIT NUMBER, USING 2" HIGH PAINTED CHARACTERS OR STAMPED METAL TAG. LABEL INDOOR EQUIPMENT WITH UNIT NUMBER IN LIKE MANNER.
- 0.27 DRAWINGS ARE DIAGRAMMATIC: VERIFY ALL DIMENSIONS AND LENGTHS, AND ADJUST EQUIPMENT, PIPE AND DUCT LOCATIONS TO AVOID CONFLICTS WITH OTHER CONSTRUCTION AND TRADES.
- 0.28 DOCUMENT PRIORITY: DRAWING INDICATIONS AND NOTATIONS SUPERSEDE THESE SPECIFICATIONS.
- 0.29 RATINGS: REFER TO DRAWINGS AND SCHEDULES FOR ADDITIONAL RATINGS AND REQUIREMENTS.

0.30 PROJECT REQUIREMENTS: REFER TO DRAWINGS FOR PARTICULAR PROJECT REQUIREMENTS, AS NOT ALL ITEMS INCLUDED IN THESE SPECIFICATIONS MAY BE REQUIRED FOR THIS PROJECT.

0.31 DOCUMENT ERRORS: NOTIFY THE ENGINEER OF ANY ERRORS, DISCREPANCIES OR OMISSIONS BEFORE CONSTRUCTION OR FABRICATION OF AFFECTED WORK, OR, FAILING SUCH NOTICE, BE RESPONSIBLE FOR CORRECTING SAME WITHOUT COST TO TENANT, ARCHITECT OR ENGINEER.

15100 BASIC MATERIALS AND METHODS

1.10PIPE HANGERS AND SUPPORTS: PROPERLY SUPPORT ALL PIPING FROM JOISTS (TOP CHORD) OR OTHER STRUCTURAL MEMBERS. FOR PIPES UP TO 4" O.D., USE GRINNELL FIG. 260 CLEVIS HANGERS WITH 3/8" ROD, OR FIG. 195 BRACKETS.

1.20 INSULATION SHIELDS: PROVIDE 18 GAUGE X 12" LONG GALVANIZED INSULATION SHIELDS AT SUPPORT POINTS FOR INSULATED PIPES.

1.30 PIPE SUPPORT SPACING: SUPPORT PIPE NOT LESS THAN 6 FT. ON CENTER FOR COPPER PIPE UP TO 2" O.D., OR NOT LESS THAN 10 FT. ON CENTER FOR STEEL PIPE UP TO 4" O.D.

1.40 COPPER CONTACT: PROVIDE COPPER PLATED HANGERS AND SUPPORTS WHERE IN CONTACT WITH COPPER PIPE.

1.50 PIPE SLEEVES: SLEEVE ALL HORIZONTAL PIPING WHICH PENETRATES WALLS WITH STANDARD WEIGHT STEEL PIPE OF 1" GREATER DIAMETER THAN PIPE OR INSULATION O.D. CUT SLEEVE FLUSH WITH WALL. FINISH BOTH SIDES.

1.60 SEALANT: SEAL PIPE SLEEVES WITH ROPE AND EXPANDO NON-SHRINK SEALANT. FIRE/SMOKE SEAL PENETRATIONS OF RATED CONSTRUCTION TO MAINTAIN RATING.

1.70 WALL PLATES: FIT UNCOVERED PIPE PASSING THROUGH WALLS WITH WALL PLATES, CRANE NO. 10 OR EQUAL.

15200 THERMAL AND ACOUSTIC INSULATION

2.10 VIBRATION ISOLATION: PROVIDE EFFECTIVE VIBRATION ISOLATION DEVICES, AND FLEXIBLE CONNECTIONS, FOR ALL MOVING MACHINERY. PROVIDE DEVICES IN ACCORDANCE WITH THE RECOMMENDATIONS IN THE ASHRAE HANDBOOK, HVAC APPLICATIONS (LATEST EDITION), CHAPTER "SOUND AND VIBRATION CONTROL".

2.20 NOISE TRANSMISSION: INSTALL PIPING AND DUCTWORK FREE FROM CONTACT WITH STRUCTURE OR EQUIPMENT TO PREVENT NOISE TRANSMISSION.

2.30 INSULATION REQUIREMENTS: INSULATE SYSTEMS AS SPECIFIED ONLY AFTER THEY HAVE BEEN TESTED AND INSPECTED. CLEAN ALL SURFACES THOROUGHLY OF MOISTURE, FOREIGN MATERIAL, GREASE, AND RUST. INSTALL INSULATION CONTINUOUS THROUGH WALL AND FLOOR PENETRATIONS.

2.31 EXISTING SYSTEMS BEING RE-USED: INSULATE EXISTING PIPE AND DUCT SYSTEMS BEING RE-USED SAME AS SPECIFIED FOR NEW SYSTEMS. REPAIR/REPLACE EXISTING INSULATION TO LIKE-NEW CONDITION AS REQUIRED.

2.32 INSULATION HAZARDS: USE ONLY INSULATION, JACKETS, ADHESIVES, SEALERS, AND COATINGS WITH FIRE HAZARD RATING NOT TO EXCEED 25/50/50 FLAME SPREAD, FUEL CONTRIBUTED, AND SMOKE DEVELOPED, IN ACCORDANCE WITH UL 723 AND ASTM E84.

2.33 INSULATED PLUMBING SYSTEMS: INSULATE HOT AND COLD WATER PIPING WITH 1" THICK CLOSED CELL, SELF SEALING FLEXIBLE TUBING, ARMAFLEX 2000 OR EQUAL.

2.34 INSULATED HVAC PIPING SYSTEMS: INSULATE REFRIGERANT SUCTION PIPING AND COOLING COIL CONDENSATE PIPING WITH 3/4" THICK CLOSED CELL FOAM INSULATION, ARMAFLEX 2000 OR EQUAL. INSULATE HVAC HOT AND CHILLED WATER PIPING SYSTEMS, LOW PRESSURE STEAM PIPING AND STEAM CONDENSATE PIPING WITH 1-1/2" THICK HEAVY DENSITY FIBERGLASS PIPE INSULATION HAVING A FACTORY-APPLIED ALL-SERVICE JACKET WITH DOUBLE SELF-SEALING LAP, OWENS-CORNING FIBERGLASS ASJ/SSL-II, OR EQUAL.

2.35 ACOUSTICALLY LINED SUPPLY AND RETURN DUCT: UNLESS OTHERWISE INDICATED ON THE PLANS, LINE SUPPLY AND RETURN DUCTWORK WITHIN 10-FEET OF THE DISCHARGE AND INTAKE OF AIR MOVING EQUIPMENT WITH 1" THICK GLASS FIBER ACOUSTICAL DUCT LINER BOARD, OWENS-CORNING, OR EQUAL. INCREASE DUCT SIZE INDICATED ON PLANS 2" EACH DIMENSION TO ACCOMMODATE DUCT LINER. MATERIAL SHALL BE RATED FOR 4,000 FPM AIR VELOCITY AND SHALL HAVE A MOLD-, HUMIDITY-, AND CORROSION-RESISTANT SURFACE THAT MEETS THE REQUIREMENTS OF UL 181.

2.36 EXTERNALLY INSULATED SUPPLY AND RETURN DUCT: INSULATE SHEET METAL DUCTWORK WITH 1-1/2" THICK FIBERGLASS INSULATION WITH AN INTEGRAL VAPOR BARRIER FACING, OWENS-CORNING, OR EQUAL. INSULATION INSTALLED ON DUCTWORK WITHIN THE CONDITIONED SPACE OR RETURN AIR PLENUM SHALL HAVE MINIMUM R=5 HR-SQ.FT.-DEG. F/BTU-IN. THERMAL RESISTANCE. INSULATION INSTALLED ON EXTERIOR DUCTWORK SHALL HAVE MINIMUM R=8.0 HR-SQ.FT.-DEG. F/BTU-IN. THERMAL RESISTANCE. PORTIONS OF DUCTWORK WHICH ARE INTERNALLY LINED SHALL ALSO BE EXTERNALLY INSULATED. EXTERNAL INSULATION INSTALLED ABOVE CEILINGS OR OTHERWISE OUT OF VIEW SHALL BE BLANKET TYPE. EXPOSED INSULATION SHALL BE RIGID TYPE. DO NOT INSULATE SUPPLY AIR DUCTWORK IN CONDITIONED SPACES UNLESS OTHERWISE INDICATED ON THE DRAWINGS (RETURN AIR PLENUMS ARE NOT CONSIDERED CONDITIONED SPACES). RETURN AIR DUCTWORK INSTALLED IN A RETURN AIR PLENUM NEED NOT BE EXTERNALLY INSULATED. EXTERIOR DUCTWORK AND INSULATION SHALL BE PROTECTED WITH A WEATHER-PROOF JACKET.

2.37 INSULATED OUTDOOR AIR AND EXHAUST DUCTWORK: EXTERNALLY INSULATE ALL OUTDOOR AIR DUCTWORK AND EXHAUST DUCTWORK WITHIN 10-FEET OF THE BUILDING ENVELOPE PENETRATION WITH 2" THICK GLASS FIBER INSULATION WITH KRAFT FOIL VAPOR BARRIER, MINIMUM R=8.0 HR-SQ.FT.-DEG. F/BTU-IN. THERMAL RESISTANCE, OWENS-CORNING, OR EQUAL.

2.40 INSULATED FLEXIBLE DUCT: GENERAL ENVIRONMENTAL CORPORATION TYPE G30A OR EQUAL, 5'-0" MAXIMUM LENGTH WITH A MINIMUM ELBOW RADIUS OF 1.5 X D AND A MINIMUM R = 5 HR SQ. FT.- DEG. F/BTU-IN. THERMAL RESISTANCE. USE ONLY FOR FINAL CONNECTIONS TO CEILING DIFFUSERS. DO NOT USE FOR VAV BOX INLET CONNECTIONS.

15400 PLUMBING

4.10 DRAIN, WASTE AND VENT PIPING:

- A. BELOW GRADE:
1. PVC PIPE ASTM D2665, WITH PVC FITTINGS AND ASTM D2855 SOLVENT WELD JOINTS WITH ASTM D2564 SOLVENT CEMENT.
 2. NO-HUB CAST IRON SANITARY SYSTEM PER CISPI 301-69T.
 3. SERVICE WEIGHT CAST IRON HUB AND SPIGOT WITH NEOPRENE GASKET, PER CISPI HSN-68T.
- B. ABOVE GRADE:
1. NO-HUB CAST IRON SANITARY SYSTEM PER CISPI 301-69T.
 2. GALVANIZED PIPE WITH CAST IRON DRAINAGE FITTINGS.
 3. INDIRECT DRAINS: COPPER TUBE, ASTM B306, DWV, WITH COPPER FITTINGS AND SOLDERED JOINTS.

4.20 DOMESTIC (POTABLE) WATER SUPPLY PIPING:

- A. BELOW GRADE: TYPE K SOFT TEMPER COPPER TUBE, WITH NO JOINTS.
- B. ABOVE GRADE: TYPE L HARD TEMPER COPPER TUBE PER ASTM B88, WITH WROUGHT COPPER FITTINGS PER USASI B16.18 AND .18A.
- C. JOINTS: USE ONLY 95/5 LEAD-FREE SOLDER IN POTABLE WATER PIPING. PROVIDE DIELECTRIC UNIONS AT EVERY JUNCTION OF TWO DISSIMILAR METAL PIPE MATERIALS.

4.30 NATURAL GAS PIPING, ABOVE GRADE:

- A. PIPE SIZE 2" AND SMALLER: ASTM A53 SCHEDULE 40 BLACK STEEL PIPE, WITH CLASS 150 MALLEABLE IRON FITTINGS AND THREADED JOINTS.
- B. PIPE SIZE 2-1/2" AND LARGER: ASTM A53 SCHEDULE 40 BLACK STEEL PIPE, WITH FORGED STEEL FITTINGS AND BUTT-WELDED JOINTS.
- C. EXTERIOR PIPING SHALL BE GALVANIZED, PAINTED OR COATED WITH AN APPROVED RUST-RESISTANT COATING.
- D. ROOF-MOUNTED PIPING SHALL BE SUPPORTED 10' O.C. WITH PRE-MANUFACTURED PIPE SUPPORTS.

4.40 VALVES: FURNISH AND INSTALL VALVES WHERE INDICATED ON PLAN AND AS NECESSARY FOR PROPER SYSTEM OPERATION AND COMPONENT ISOLATION. PROVIDE VALVES RATED FOR 125 PSIG OR GREATER WORKING PRESSURE IN WATER PIPING.

- A. CHECK VALVE UP TO 3": CRANE NO. 37, OR EQUAL.
- B. GLOBE VALVE UP TO 3": CRANE NO. 1, 17TF, OR EQUAL.
- C. GATE VALVE UP TO 3": CRANE NO. 428, 1334, OR EQUAL.
- D. BALL VALVE UP TO 3": APOLLO SERIES 70-100, 70-200, OR EQUAL.
- E. SHOCKSTOP: WADE W-5 (HOT), WADE W-10 (COLD), OR EQUAL.
- F. BACKFLOW PREVENTER: WATTS NO. 98D, OR EQUAL.
- G. VACUUM RELIEF VALVE: WATTS NO. N36 - 3/4", OR EQUAL.
- H. PRESSURE REDUCING VALVE: WATTS NO. U5 SERIES, OR EQUAL.
- I. TRAP SEAL PRIMER: JOSAM NO. 88250.

4.50 PLUMBING FIXTURES AND EQUIPMENT: FURNISH AND INSTALL PLUMBING FIXTURES AND EQUIPMENT AS SCHEDULED ON DRAWINGS, OR APPROVED EQUAL.

4.60 INSTALLATION:

- A. INSTALL AND SECURE FIXTURES IN PLACE WITH WALL CARRIERS AND BOLTS. PROVIDE BRACKETS, BRACES AND REINFORCING ANGLES AS REQUIRED IN ALL PARTITIONS NOT SUFFICIENT IN THEMSELVES TO SUPPORT PLUMBING FIXTURES OR OTHER WALL-HUNG EQUIPMENT.
- B. INSTALL EACH FIXTURE WITH CHROME PLATED, 17 GAUGE TUBING TRAP WITH CLEANOUT, EASILY REMOVABLE FOR SERVICING AND CLEANING.
- C. INSTALL COMPONENTS LEVEL, PLUMB AND SECURE.
- D. SEAL FIXTURES TO WALL AND FLOOR SURFACES WITH SEALANT, COLOR TO MATCH FIXTURE.
- E. ROUTE PIPING IN ORDERLY MANNER. INSTALL PIPING TO CONSERVE BUILDING SPACE AND NOT INTERFERE WITH USE OF SPACE. GROUP PIPING AT COMMON ELEVATION WHENEVER PRACTICAL. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS OR CONNECTED FIXTURES/EQUIPMENT. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS. PROVIDE ACCESS WHERE VALVES AND FITTINGS ARE NOT EXPOSED. SLOPE PIPING AND ARRANGE TO DRAIN AT LOW POINTS.
- F. INSTALL NON-CONDUCTING DIELECTRIC CONNECTIONS WHENEVER JOINING DISSIMILAR METALS.
- G. PROVIDE SHUT-OFF VALVES AT ALL SUPPLY CONNECTIONS TO FIXTURES AND EQUIPMENT.
- H. INSULATE SUPPLY AND WASTE PIPES OF ALL HANDICAP FIXTURES.
- I. EXPOSED WATER PIPING SHALL BE CHROME-PLATED BRASS.

4.95 CLEANING AND TESTING: CLEAN, DISINFECT, AND TEST ALL PLUMBING AND PIPING SYSTEMS.

15500 HVAC PIPING AND SPECIALTIES

5.65 MISCELLANEOUS DRAIN LINES, RECEIVING COOLING COIL CONDENSATE, DRIP FOR HUMIDIFIERS, ETC.: TYPE "DWV" COPPER, WITH WROUGHT COPPER FITTINGS AND SOLDERED JOINTS.

15600 HVAC EQUIPMENT

6.10 GENERAL

- A. FURNISH AND INSTALL HVAC EQUIPMENT AS SCHEDULED ON DRAWINGS, OR APPROVED EQUAL.
- B. ALL EQUIPMENT SHALL BE NEW, OF COMMERCIAL QUALITY, AND MANUFACTURED BY AN APPROVED NATIONAL, RECOGNIZED MANUFACTURER AS SCHEDULED ON DRAWINGS.
- C. ALL EQUIPMENT SHALL BE UL LISTED, AND CERTIFIED BY ARI, AMCA, OR OTHER APPLICABLE INDUSTRY STANDARD ORGANIZATION.
- D. INSTALLATION:
1. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
 2. MAINTAIN SERVICE CLEARANCES RECOMMENDED BY MANUFACTURER.
 3. ALL EQUIPMENT SHALL BE SUPPORTED WITH VIBRATION ISOLATORS.
 4. ALL ROOF-MOUNTED EQUIPMENT SHALL BE SUPPORTED WITH FACTORY-FABRICATED FULL PERIMETER CURBS, UNLESS NOTED OTHERWISE. ALL SUPPORTS FOR ROOF-MOUNTED EQUIPMENT SHALL BE FLSHD INTO THE ROOF SYSTEM.
 5. CHANGE FILTERS ON ALL HVAC EQUIPMENT PRIOR TO TURN-OVER TO TENANT.

6.20 EXISTING EQUIPMENT BEING RE-USED SHALL BE CLEANED AND REFURBISHED AS NOTED ON DRAWINGS.

15800 DUCTWORK AND APPURTENANCES

8.10 SHEET METAL DUCTWORK:

- A. FABRICATE AND INSTALL AS RECOMMENDED IN LATEST EDITIONS OF SMACNA HVAC DUCT CONSTRUCTION STANDARDS--METAL AND FLEXIBLE AND THE ASHRAE GUIDE AND DATA BOOK FOR SHEET METAL DUCTWORK SERVING SUPPLY, RETURN AND EXHAUST SYSTEMS OPERATING BETWEEN -2.0 IN.-W.G. AND +2.0 IN.-W.G. MAXIMUM PRESSURE. INSTALL WHERE INDICATED ON THE PLANS. DUCT SIZES SHOWN ON THE DRAWINGS ARE NOMINAL INSIDE CLEAR DIMENSIONS. WHERE INTERNAL INSULATION IS PROVIDED, DUCT SIZES SHALL BE INCREASED APPROPRIATELY TO MAINTAIN THE INDICATED CLEAR INSIDE DIMENSIONS. ASSEMBLE AND INSTALL DUCTWORK IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICE FOR ACHIEVING AIR TIGHT (5% LEAKAGE) AND NOISELESS (NO OBJECTIONABLE NOISE) SYSTEMS, CAPABLE OF PERFORMING EACH INDICATED SERVICE. FURNISH AND INSTALL ALL REQUIRED DAMPERS, TRANSITIONS, CONNECTIONS TO AIR TERMINALS, AND OTHER ACCESSORIES NECESSARY FOR A COMPLETEAND PROPERLY OPERATING SYSTEM.
- B. FABRICATE DUCTWORK FROM GALVANIZED SHEET STEEL COMPLYING WITH ANSI/ASTM A-527, LOCKFORMING QUALITY, WITH ANSI/ASTM A-525 G90 ZINC COATING; MILL PHOSPHATIZED FOR EXPOSED LOCATIONS. MINIMUM SHEET THICKNESS AND REINFORCING SHALL BE AS FOLLOWS:
- DUCTS UP TO 12" WIDEST DIMENSION OR DIAMETER: 26 GAUGE.
- DUCTS 13" TO 24" WIDEST DIMENSION: 24 GAUGE.
- DUCTS 25" TO 42" WIDEST DIMENSION: 22 GAUGE.
- DUCTS 43" TO 84" WIDEST DIMENSION: 20 GAUGE.
- C. DUCT SEALANT: UNITED DUCT SEALER, OR EQUAL.
- D. SUPPORT MATERIALS: EXCEPT AS OTHERWISE INDICATED, PROVIDE HOT-DIPPED GALVANIZED STEEL FASTENERS, ANCHORS, RODS STRAPS, TRIM AND ANGLES FOR SUPPORT OF DUCTWORK.
- E. ANY SUPPLY DUCTWORK AND PLENUMS THAT ARE DESIGNED TO OPERATE AT STATIC PRESSURE FROM 0.25 INCHES TO 2 INCHES WATER COLUMN INCLUSIVE WHICH ARE LOCATED OUTSIDE OF THE CONDITIONED SPACE OR IN RETURN PLENUMS SHALL HAVE JOINTS SEALED IN ACCORDANCE WITH SEAL CLASS C AS DEFINED IN THE SMACNA HVAC DUCT LEAKAGE TEST MANUAL. PRESSURE SENSITIVE TAPE SHALL NOT BE USED AS THE PRIMARY SEALANT WHERE SUCH DUCTS ARE DESIGNED TO OPERATE AT STATIC PRESSURES OF 1 INCH WATER COLUMN OR GREATER.
- F. EXPOSED DUCTWORK: EXPOSED DUCTWORK SHALL HAVE A PAINTABLE FINISH ON THE EXTERIOR SURFACE.

8.20 DUCTWORK ACCESSORIES:

- A. BALANCING DAMPERS: AIR BALANCE, INC., LOUVERS & DAMPERS, INC., RUSKIN OR EQUAL. PROVIDE MANUAL, SINGLE OR MULTIBLADE DAMPERS, AS INDICATED AND AS CONSTRUCTED IN ACCORDANCE WITH SMACNA STANDARDS.
- B. DAMPERS SHALL HAVE RIGID 2" X 1/2" X 10 GAUGE CHANNEL FRAMES, BALL OR BRONZE SLEEVE BEARINGS, 1/2" POLISHED STEEL AXLES, 16-GAUGE, REINFORCED, FELT-EDGED BLADES (NOT OVER 8" WIDE) AND STOP FRAMES AROUND THE ENTIRE PERIMETER. VOLUME DAMPERS IN DUCTS LARGER THAN 12" X 6" SHALL BE THE OPPOSED BLADE TYPE. DAMPERS IN ROUND DUCTS AND DUCTS 12" X 6" AND SMALLER SHALL BE BUTTERFLY TYPE. ROUND BUTTERFLY TYPE VOLUME DAMPERS SHALL BE 30 GAUGE, GALVANIZED STEEL THROUGH 12" DIAMETER; 28 GAUGE FOR ABOVE 12".
- C. ALL DAMPERS SHALL BE EQUIPPED WITH STANDARD QUADRANTS OF SUITABLE SIZE IN EQUIPMENT ROOMS/AREAS AND YOUNG #301A, OR EQUAL, RECESSED-TYPE IN FINISHED AREAS. PROVIDE QUADRANT LOCKING DEVICE FOR EACH DAMPER ON ONE END OF THE SHAFT AND AN END BEARING PLATE ON THE OTHER END FOR DAMPER LENGTHS OVER 12". PROVIDE EXTENDED QUADRANT LOCKS AND EXTENDED BEARING PLATES FOR EXTERNALLY INSULATED DUCTWORK. APPROVED MANUFACTURERS ARE VENTFABRICS, AND YOUNG REGULATOR CO.
- D. DAMPERS SHALL BE COATED WITH RED ZINC CHROMATE PRIMER OVER A BOND COAT.
- E. VOLUME DAMPERS, SPLITTERS AND DEFLECTORS SHALL BE PROVIDED IN ALL DUCTS TO PERMIT ACCURATE BALANCING OF THE SYSTEM. THE DAMPERS, SPLITTERS AND DEFLECTORS SHALL BE ADJUSTED TO SATISFY THE HEATING AND VENTILATING REQUIREMENTS OF THE CONDITIONED SPACE AND LOCKED IN PLACE.
- F. WHERE SHOWN ON DRAWINGS AND IN CASES OF INACCESSIBLE VOLUME DAMPERS, PROVIDE REMOTELY ADJUSTABLE VOLUME DAMPERS, YOUNG REGULATOR, OR EQUAL.

8.40 AIR OUTLETS AND INLETS: FURNISH AND INSTALL AIR TERMINALS AS SCHEDULED ON DRAWINGS, OR APPROVED EQUAL. THE CONTRACTOR SHALL PROVIDE MISCELLANEOUS ITEMS AS NECESSARY FOR A COMPLETE AND PROPER INSTALLATION IN THE TYPES OF WALLS AND CEILINGS USED ON THE PROJECT. THIS SHALL INCLUDE SUCH ITEMS AS FASTENERS, PLASTER RINGS, SUPPORTS, ETC.

8.60 FLEXIBLE CONNECTIONS: PROVIDE FLEXIBLE DUCT CONNECTIONS WHEREVER DUCTWORK CONNECTS TO VIBRATION ISOLATED EQUIPMENT AND WHERE SHOWN OR NOTED. MAKE AIR-TIGHT JOINTS. PROVIDE ADEQUATE JOINT FLEXIBILITY TO ALLOW FOR THERMAL, AXIAL, TRANSVERSE AND TORSIONAL MOVEMENT.

15900 SYSTEM CONTROL AND OPERATION

9.10 SPACE TEMPERATURE CONTROL: FURNISH AND INSTALL, UNLESS NOTED OTHERWISE, ALL THERMOSTATS, SENSORS, CONTROLLERS, RELAYS, CONTACTORS, DAMPERS, ACTUATORS, TUBING, CONTROL WIRING AND ALL OTHER ITEMS AND MATERIALS NECESSARY FOR A COMPLETE AND PROPERLY OPERATING TEMPERATURE CONTROL SYSTEM AS SPECIFIED. ALL THERMOSTATS AND OTHER CONTROL COMPONENTS SHALL BE HONEYWELL, OR APPROVED EQUAL, UNLESS SPECIFIED OTHERWISE. ALL CONTROL WIRING SHALL BE BY MECHANICAL CONTRACTOR AND SHALL BE INSTALLED IN CONDUIT IN ACCORDANCE WITH DIVISION 16.

9.11THERMOSTATS: REFER TO "HVAC CONTROLS" ON DRAWINGS.

9.20 SEQUENCE OF OPERATION: REFER TO "HVAC CONTROLS" ON DRAWINGS.

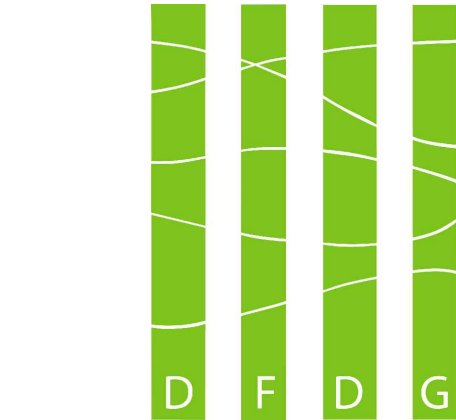
15950 TESTING, ADJUSTING, BALANCING

9.51 NEBB, AABC, OR TABB CERTIFIED TESTING AND BALANCING CONTRACTOR SHALL BE RESPONSIBLE FOR THE TESTING AND BALANCING OF EVERY HEATING, VENTILATING AND AIR CONDITIONING SYSTEM. THE PERSON OR AGENCY RESPONSIBLE FOR BALANCING OF THE SYSTEMS SHALL DOCUMENT IN WRITING THE AMOUNT OF OUTDOOR AIR BEING PROVIDED AND DISTRIBUTED FOR THE BUILDING OCCUPANTS AND ANY OTHER SPECIALTY VENTILATION. TWO (2) COPIES OF A WRITTEN REPORT IN FORMAT LISTED ABOVE SHALL BE SUBMITTED TO THE OWNER, TWO (2) COPIES SHALL BE SUBMITTED TO THE LANDLORD PRIOR TO OCCUPANCY, AND TWO (2) COPIES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.

9.52 AIR SYSTEMS SHALL BE BALANCED IN A MANNER TO MINIMIZE LOSSES FROM DAMPER THROTTLING BY FIRST ADJUSTING FAN SPEED, THEN ADJUSTING DAMPERS IN MAIN DUCTS, AND THEN ADJUSTING DAMPERS IN BRANCH DUCTS IN ORDER TO MEET DESIGN FLOW CONDITIONS. FOR VAV SYSTEMS, ENSURE THAT ALL VAV BOXES ON THIS AIR HANDLER ARE ADJUSTED TO THEIR RESPECTIVE MAXIMUM SETPOINTS DURING BALANCING TO ENSURE PROPER AIRFLOW WHEN SYSTEM IS OPERATING AT MAXIMUM (PEAK) COOLING CAPACITY. COORDINATE SETTING OF VAV BOXES IN OTHER TENANT SPACES IN FIELD WITH LANDLORD'S FIELD REPRESENTATIVE.

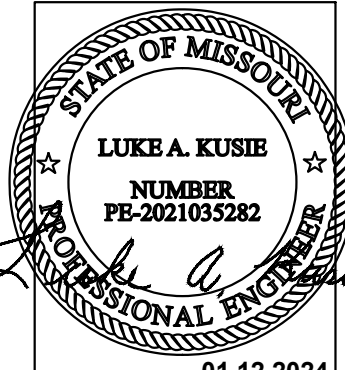
9.53 HVAC CONTROL SYSTEMS SHALL BE TESTED TO ASSURE THAT CONTROL ELEMENTS ARE CALIBRATED, ADJUSTED, AND IN PROPER WORKING ORDER.

- A. MECHANICAL CONTRACTOR SHALL HIRE A COMMISSIONING AGENT APPROVED BY THE AUTHORITY HAVING JURISDICTION TO PROVIDE THE COMMISSIONING OF THE FOLLOWING SYSTEMS (AS APPLICABLE FOR THIS PROJECT):
1. AIR SYSTEMS BALANCING.
 2. FUNCTIONAL PERFORMANCE TESTING.
 3. ECONOMIZERS.
 4. CONTROLS.
 5. MECHANICAL EQUIPMENT.
- B. COMMISSIONING AGENT SHALL PROVIDE WRITTEN REPORT ON ALL SYSTEMS COMMISSIONED. THIS REPORT SHALL BE PROVIDED TO THE TENANT, LANDLORD AND AUTHORITY HAVING JURISDICTION AS REQUIRED.



DAMIAN
FARRELL
DESIGN
GROUP

359 METTY DRIVE, SUITE 4A
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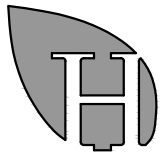


FOR PERMIT ISSUE

C3 - BRANSON MO
3125 GREEN MOUNTAIN DRIVE
BRANSON, MO 65616

DATE	DESCRIPTION
12.28.2023	REVIEW SET
01.12.2024	PERMIT SET
CHECKED	LAK
DRAWN	TMS
HEI PROJECT NO.	R23-4590.006

MECHANICAL
SPECIFICATIONS



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M2.0