

## MECHANICAL AND PLUMBING SPECIFICATIONS:

### 1. DUCTWORK:

- A. ALL HVAC SUPPLY AND RETURN AIR DUCTWORK SHALL BE CONSTRUCTED FOR CONSTRUCTION AS FOLLOWS: LOW PRESSURE – CLASS 2" W. G.
- B. DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH LATEST EDITIONS OF ASHRAE AND SMACNA DUCT STANDARD. INSIDE RADIUS OF ALL CURVES AND BENDS SHALL NOT BE LESS THAN THE WIDTH OF DUCTS IN PLANE OF BEND, BELOW THIS RADIUS, SQUARE ELBOWS SHALL BE USED.

1. THE FOLLOWING MINIMUM CONSTRUCTION MUST BE PROVIDED. NO EXCEPTIONS TO THE FOLLOWING WILL BE GRANTED.

- a. LONGITUDINAL SEAMS SHALL BE PITTSBURGH SEAM WITH SEALANT.
- b. DUCT JOINTS UP TO 18" SHALL BE DRIVE SLIP; OVER 18" SHALL BE EITHER STANDINGS SLIP, STANDING SEAM POINT OR POCKET LOCK ALL WITH SEALANT.
- c. SHEET METAL TRANSITIONS SHALL BE MADE WITH SLOPES NOT EXCEEDING ONE (1) TO SEVEN (7). INSIDE RADIUS OF ALL CURVES AND BENDS SHALL NOT BE LESS THAN THE WIDTH OF DUCTS IN PLANS OF BEND. BELOW THIS RADIUS, SQUARE ELBOWS SHALL BE USED.
- d. ALL BRANCH TAKE-OFFS SHALL BE PROVIDED WITH 45° SHOE-TAP CONNECTION WITH PROPER TRANSITION TO ROUND DUCT, WHERE APPLICABLE

### 2. DUCT INSULATION:

- A. ACCEPTABLE MANUFACTURERS: MANVILLE, OWENS-CORNING, CGS. JM, KNAUFF UNLESS OTHERWISE NOTED.

- B. ADHESIVES AND COATINGS SHALL BE AS MANUFACTURED BY INSULCOUSTIC, BENJAMIN-FOSTER OR APPROVED EQUAL.

#### C. INSULATE AS FOLLOWS:

1. ALL SUPPLY AND RETURN DUCTWORK AND PLENUMS, TYPE D-1 FOR CONCEALED WITHIN HUNG CEILING CAVITY, SHAFTS, FURRING SPACES AND TYPE D-2 FOR EXPOSED DUCTWORK. WHERE EXISTING INSULATION TO REMAIN IS DAMAGED IN THE COURSE OF DEMOLITION OR MODIFICATION THE DAMAGED INSTALLATION SHALL BE REPLACED WITH NEW INSULATION AND ADHESIVES AS SPECIFIED ABOVE.

2. ALL OUTSIDE AIR DUCT WORK AND PLENUMS SHALL BE PROVIDED WITH 2" THICK RIGID BOARD INSULATION.

3. TYPE D-1 DUCT INSULATION WITH VAPOR BARRIER:

- a. DUCT INSULATION SHALL BE 1 1/2" INCH THICK 1-1/2 LB PER CU. FT. DENSITY GLASS FIBER WITH A MAXIMUM K FACTORY OF 0.29 AT 75 DEG. F MEAN TEMPERATURE, WITH REINFORCED FOIL-FACED VAPOR BARRIER. INSTALL AS PER MANUFACTURER'S RECOMMENDATION.

4. TYPE D-2, ACOUSTICAL INSULATION:

- a. DUCT LINING SHALL BE 3 LB. PER CU. FT. DENSITY: OWENS-CORNING, AEROFLEX, JOHNS MANVILLE OR KNAUF: MINIMUM THICKNESS IS 1/2", UNLESS OTHERWISE NOTED. LINING SHALL MEET REQUIREMENTS OF NFPA-90A AND ALL MATERIALS USED SHALL HAVE A FLAMESPREAD RATING OF 25 OR LESS AND SMOKE DEVELOPED RATING OF NO HIGHER THAN 50. APPLICATION: AS PER MANUFACTURER'S RECOMMENDATIONS. OWENS-CORNING "AERO FLEX LINER" OR APPROVED EQUAL

- b. METAL PERFORATED LINING

- c. DIMENSIONS OF LINED DUCTS SHOWN ON DRAWINGS ARE THE CLEAR INSIDE DIMENSIONS OF THE DUCT AFTER THE LINING HAS BEEN INSTALLED.

5. PROVIDE 1/2" THICK RIGID FIBERBOARD SLEEVE WHEREVER NEW DUCTWORK PENETRATED WALLS, FLOOR SLABS, PARTITIONS, ETC. SPACE BETWEEN DUCT AND WALL SLEEVE AND BETWEEN DUCT AND SLAB OPENING SHALL BE TIGHTLY PACKAGED WITH MINERAL WOOL AND SEALED WITH APPROVED TYPE NON-HARDENING CAULKING COMPOUND.

6. ALL INSULATION SHALL HAVE A COMPOSITE (INSULATION, JACKET OR FACING, AND ADHESIVE USED TO ADHERE THE FACING OR JACKET TO THE INSULATION) FIRE AND SMOKE HAZARD RATING AS TESTED BY PROCEDURE ASTM E84, NFPA 255, AND UL 723 NOT EXCEEDING:

FLAME	25
SMOKE DEVELOPED	50

7. ACCESSORIES SUCH AS ADHESIVES, MASTICS, CEMENTS, AND TAPES SHALL HAVE THE SAME COMPONENT RATING AS LISTED ABOVE.

### 3. AIR DISTRIBUTION EQUIPMENT:

- A. PROVIDE FLEXIBLE DUCT CONNECTION AT THE INTAKE AND DISCHARGE SIDES OF ALL AIR CONDITIONING UNITS. FLEXIBLE CONNECTORS SHALL BE MADE OF VINYL COVERED GLASS FIBER MATERIAL. CONNECTORS SHALL BE NOT LESS THAN 4" LONG NOR MORE THAN 6" LONG.

### 4. VOLUME CONTROL DAMPER:

- A. AT EACH NEW MAIN BRANCH TAKE-OFF, PROVIDE VOLUME DAMPERS OF THE OPPOSED BLADE, MULTI-LOUVERED TYPE, OPERATED BY INDICATING QUADRANTS AND SET SCREWS. VOLUME DAMPERS AND ALL MANUAL DAMPERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA AND ASHRAE STD..

- B. PROVIDE 45 DEG. CLINCH COLLARS AT MAIN TAKEOFFS.

### 5. ACCESS DOORS:

- A. PROVIDE A SUITABLY SIZED ACCESS DOORS BEFORE AND AFTER IN-DUCT ELECTRIC HEATERS AND FOR FIRE DAMPERS. MINIMUM SIZE OF ACCESS DOORS SHALL BE 12" X 12" OR 12" X FULL DEPTH OF DUCT IF SMALLER THAN 12".

- B. ACCESS DOORS IN DUCTWORK HANDLING CONDITIONED AIR SHALL BE OF THE DOUBLE PANEL TYPE, WITH INSULATION THICKNESS SAME AS DUCT INSULATION, SET IN BETWEEN 18 GAGE INTERIOR CASING. SINGLE PANEL ACCESS DOORS SHALL BE FABRICATED OF 18 GAGE UP TO 12" X 12" AND 16 GAGE WHEN LARGER.

- C. ACCESS DOORS SHALL BE PROVIDED WITH HEAVY ANGLE IRON FRAMES AND SHALL BE FITTED WITH A MINIMUM OF TWO (2) HINGES AND CAM FASTENERS. ACCESS DOORS ON THE BOTTOM OF DUCTS SHALL HAVE CAM FASTENERS.

### 6. HANGERS AND SUPPORTS:

- A. WHERE HANGER STRAPS ARE USED THEY SHALL BE 1" X 18" GA. MINIMUM, GALVANIZED STEEL. BAND IRONS ARE NOT ACCEPTABLE.

- B. DUCTS OVER 60 INCHES WIDE SHALL BE SUSPENDED ON A TRAPEZE TYPE HANGER. THE DUCT SHALL NOT BE SECURED TO THE HANGER.

- C. PROVIDE INSERTS, FISHPLATES AND OTHER METHODS RECOMMENDED BY SMACNA, AND AS APPROVED, FOR SUPPORTING HANGER STRAPS AND TRAPEZE HANGERS.

- D. TRANSITION PIECES FROM RECTANGULAR TO ROUND AT FAN DISCHARGE SHALL BE 16 GAUGE ALL-WELDED CONSTRUCTION. PROVIDE SUITABLE ANGLE REINFORCEMENT.

### 7. AIR DIFFUSING EQUIPMENT:

- A. PRODUCTS SHALL BE ANEMOSTAT, TITUS, TUTTLE & BAILEY OR APPROVED EQUAL.

- B. DIFFUSER FIGURES NOS.: SHOWN ON SCHEDULE, DIFFUSER FINISH SHALL MATCH CEILING COLOR UNLESS OTHERWISE NOTED, COORDINATE WITH PROJECT MANAGER.

- C. FURNISH SPONGE-RUBBER GASKET FOR EACH SUPPLY GRILLE AND REGISTER. ALL DIFFUSERS, GRILLES, AND REGISTERS SHALL BE SUITABLE FOR THE CEILING CONSTRUCTION, REFER TO ARCHITECTURAL DRAWINGS FOR TYPE OF CEILING CONSTRUCTION. COORDINATE LOCATION WITH ARCHITECT'S REFLECTED CEILING DRAWING.

### 8. COMBINATION FIRE AND SMOKE DAMPERS: (WHERE APPLICABLE)

- A. DAMPERS SHALL BE CLASSIFIED AS "LEAKAGE RATE DAMPERS" UNDER UL555S. ACTUATORS FOR OPERATION OF SMOKE DAMPERS SHALL BE SPRING RETURN, FAIL SAFE, NORMALLY CLOSED TYPE. ACTUATORS MAY BE ELECTRIC. PROVIDE ALL REQUIRED RELAYS, EP SWITCHES, WIRING SYSTEM AND OTHER LABOR AND MATERIAL NECESSARY TO COMPLETELY INTERCONNECT DAMPERS AND ALARM AND DETECTION SYSTEM.

### 9. PIPING:

- A. DOMESTIC COLD AND HOT WATER PIPING: TYPE "L" COPPER (ABOVE GROUND), TYPE "K" COPPER (BURIED). FITTINGS SHALL BE WROUGHT COPPER.

- B. WASTE AND VENT PIPING: CAST IRON PIPE/PVC SCHEDULE 40 OR APPROVED EQUAL.

- C. DRAIN FROM AC UNITS: PVC PIPE.

- D. REAM PIPES AND TUBES. CLEAN OFF SCALE AND DIRT, INSIDE AND OUTSIDE, BEFORE ASSEMBLY. REMOVE ALL FOREIGN MATERIAL FROM PIPING.

- E. SOLDER JOINTS SHALL BE CLEANED BRIGHT AND PROPERLY FLUXED BEFORE APPLYING SOLDER. SOLDER SHOULD BE 95-5 TIN-ANTIMONY, AS MADE BY HANDY & HARMON OR APPROVED EQUAL. FLUX SHALL BE NON-CORROSIVE.

- F. WITH REGARD TO EQUIPMENT, THE MANUFACTURER'S RECOMMENDATION AS TO PIPE SIZE AND ARRANGEMENT SHALL BE FOLLOWED.

- G. CHLORINATE ALL DOMESTIC HOT WATER AND COLD WATER PIPING TO COMPLY WITH LOCAL OR STATE HEALTH OFFICIALS.

### 10. VALVES:

- A. FURNISH VALVES DESIGNED FOR 125 PSIG WORKING PRESSURE. VALVES SHALL BE OF SAME MANUFACTURER. VALVES SHALL BE THREADED AND SHALL HAVE BRONZE BODY.

11. PRODUCT DATA TO BE SUBMITTED SHALL BE PUBLISHED BY THE MANUFACTURERS AND SHALL CONTAIN COMPLETE AND DETAILED ENGINEERING AND DIMENSIONAL INFORMATION. THE CONTRACTOR SHALL SUBMIT PRODUCT DATA AS DESCRIBED BELOW:

- A. PRODUCT DATA SUBMITTED SHALL CONTAIN ONLY INFORMATION RELEVANT TO THE PARTICULAR EQUIPMENT OR MATERIAL TO BE FURNISHED. THE CONTRACTOR SHALL NOT SUBMIT CATALOGS WHICH DESCRIBE SEVERAL DIFFERENT ITEMS IN ADDITION TO THOSE ITEMS TO BE USED, UNLESS ALL IRRELEVANT INFORMATION IS MARKED OUT, OR UNLESS RELEVANT INFORMATION IS CLEARLY MARKED. PRODUCT DATA FROM EACH MANUFACTURER SHALL BE IDENTIFIED AND SUBMITTED SEPARATELY.

12. THE CONTRACTOR SHALL PROVIDE OPERATING INSTRUCTION AND MAINTENANCE DATA BOOKS FOR ALL EQUIPMENT AND MATERIALS FURNISHED. MAINTENANCE INSTRUCTION MANUALS SHALL INCLUDE COMPLETE OILING, CLEANING, AND SERVICING DATA COMPILED IN CLEARLY AND EASILY UNDERSTANDABLE FORM. LISTS OF REPLACEMENT PARTS, MOTOR RATINGS, AND ACTUAL LOADS. INCLUDE THE FOLLOWING WHERE APPLICABLE:

- A. IDENTIFYING NAME AND MARK NUMBER.
- B. LOCATIONS (WHERE SEVERAL SIMILAR ITEMS ARE USED, PROVIDE A LIST).
- C. COMPLETE NAMEPLATE DATA.
- D. PARTS LIST.
- E. PERFORMANCE CURVES AND DATA.
- F. WIRING DIAGRAMS.
- G. LUBRICATION CHARTS.
- H. MANUFACTURERS' RECOMMENDED OPERATING AND MAINTENANCE INSTRUCTIONS WITH ALL NON-APPLICABLE INFORMATION DELETED.

13. SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO COMMENCING ANY WORK. SHOP DRAWINGS SHALL INCLUDE COMPLETE DATA AND APPLICABLE PROCEDURES FOR THE FOLLOWING EQUIPMENT AND MATERIALS (WHERE APPLICABLE):

- A. ALL VALVES.
- B. VIBRATION ISOLATORS (MOUNTING, HANGERS, AND BASES).
- C. ALL INSULATION MATERIALS.
- D. ALL PLUMBING FIXTURES AND TRIMS.
- E. ALL FANS.
- F. AIR DISTRIBUTION SPECIALTIES (FILTERS, VOLUME DAMPERS, FIRE AND SMOKE DAMPERS, GRILLES, REGISTERS, DIFFUSERS, AND LOUVERS).
- G. COMPLETE TEST AND AIR BALANCE REPORT.

SHOP DRAWINGS SHALL BE DONE IN AN EASILY LEGIBLE SCALE AND SHALL CONTAIN SUFFICIENT PLANS, ELEVATIONS, SECTIONS, AND SCHEMATICS TO CLEARLY DESCRIBE THE APPARATUS. ALL SHEET METAL, PIPING, AND SIMILAR SHOP DRAWINGS SHALL BE DRAWN TO AT LEAST 1/4"=1'-0" SCALE. SHOP DRAWING WHICH DO NOT COMPLY WITH THESE REQUIREMENTS WILL BE RETURNED FOR RESUBMITTAL.

14. SUPPLY AND RETURN AIR SYSTEM INSTALLED SHALL BE BALANCED AND ADJUSTED AS FOLLOWS:

- A. AFTER DUCT SYSTEM HAVE BEEN INSTALLED COMPLETE WITH ALL GRILLES, DAMPERS, DUCTS, AND OTHER ITEMS SPECIFIED OR SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL MAKE ADJUSTMENTS, AS REQUIRED, TO DELIVER THE VOLUME OF AIR AT EACH AIR OUTLET WITHIN 10% OF DESIGN FLOWS AS SHOWN ON THE DRAWINGS. AFTER THE FINISHED AREA IS OCCUPIED, THE AIR VOLUMES SHALL BE READJUSTED, IF REQUIRED, TO PROPERLY BALANCE THE COOLING AND HEATING LOADS THROUGHOUT THE CONDITIONED SPACE.

- B. AIR OUTLET SHALL BE BALANCED WITH AIR PATTERN AS SHOWN ON THE DRAWING.

- C. CONTRACTOR SHALL SUBMIT A CERTIFIED AIR BALANCING REPORT TO THE OWNER FOR REVIEW AND APPROVAL PRIOR TO TURN OVER OF THE HVAC SYSTEM TO THE OWNER.

### 15. BALANCING-ADJUSTING AND TESTING:

- A. BALANCING OF SYSTEMS – GENERAL

1. THE CONTRACTOR SHALL PROVIDE ALL LABOR MATERIAL EQUIPMENT SERVICES NECESSARY FOR TESTING AND REBALANCING THE AIR CONDITIONING SYSTEMS (AIR AND WATER). THE CONTRACTOR SHALL BE A MEMBER OF EITHER ASSOCIATED AIR BALANCE COUNSEL (AABC), OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) AND PROCEDURES SHALL BE IN ACCORDANCE WITH THOSE PUBLISHED BY THE ASSOCIATED AIR BALANCE COUNCIL (AABC) AND NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB).

2. SUBMIT NAME OF TEST AND BALANCE AGENCY WITHIN 15 DAYS AFTER RECEIPT OF CONTRACT APPROVAL FOR APPROVAL BY OWNER.

3. BALANCING RESULTS SHALL BE GUARANTEED FOR 90 DAYS. BALANCING CONTRACTOR SHALL BE SUBJECT TO RECALL TO THE SITE TO VERIFY RESULTS BEFORE APPROVAL OF BALANCING REPORT BY OWNER. CONTRACTOR SHALL SUBMIT CERTIFICATION WITH BALANCE REPORT.

### 16. CLEANING, DUCT AND EQUIPMENT:

- A. THOROUGHLY CLEAN ALL EXISTING AND NEW DUCTWORK OF ALL FOREIGN SUBSTANCES, INSIDE AND OUT, BEFORE BEING TESTED AND IN OPERATION.

- B. IF PART OF A SYSTEM SHOULD BE STOPPED BY FOREIGN MATTERS AFTER BEING PLACED IN OPERATION, THAT PART SHALL BE DISCONNECTED, CLEANED, AND RECONNECTED WHEREVER NECESSARY TO LOCATE AND REMOVE OBSTRUCTION. ANY WORK DAMAGED IN THE COURSE OF REMOVING CONSTRUCTION SHALL BE REPAIRED OR REPLACED WHEN THE SYSTEM IS RECONNECTED, AT NO ADDITIONAL COST TO THE OWNER.

- C. DURING THE COURSE OF CONSTRUCTION, ALL DUCTS, SHALL BE CAPPED IN AN APPROVED MANNER TO INSURE ADEQUATE PROTECTION AGAINST THE ENTRANCE OF FOREIGN MATTER.

- D. THE SYSTEM WILL NOT BE BROUGHT INTO OPERATION FOR TESTING PURPOSES WITHOUT THE NEW FILTERS. PRIOR TO ACCEPTANCE OF THE SYSTEM BY THE OWNER THE HVAC CONTRACTOR SHALL PROVIDE COMPLETE NEW SETS OF FILTERS.

### 17. TESTING:

- A. ALL TESTS SHALL BE MADE IN THE PRESENCE OF AN AUTHORIZED REPRESENTATIVE OF THE OWNER. HAVE NOT LESS THAN TEN (10) DAYS NOTICE TO OWNER BEFORE MAKING ANY TESTS.

- B. CLEANING:

1. THE CONTRACTOR SHALL, AFTER SATISFACTORY COMPLETION OF ALL PRESSURE TESTS, AND AFTER TEMPORARY OPERATION, PROPERLY CLEAN EVERY PIECE OF APPARATUS FURNISHED UNDER THIS CONTRACT UPON COMPLETION OF THE WORK.

- C. MISCELLANEOUS:

1. AFTER SATISFACTORY PASSING OF THE TESTS IN THIS SECTION AND AFTER ALL NECESSARY ADJUSTMENTS HAVE BEEN MADE. THE CONTRACTOR SHALL TEST THE COMPLETE SYSTEM FOR TWO (2) DAYS UNDER REGULAR OPERATING CONDITIONS OR AS MUCH LONGER AS MAY BE REQUIRED TO ESTABLISH COMPLIANCE WITH ALL PLANS AND SPECIFICATIONS. EACH TEST SHALL BE CONDUCTED DURING THE FIRST YEAR WHEN ITS LOAD IS AVAILABLE.

## LEASING OFFICE CLUB HOUSE

Walker Mill Apartments

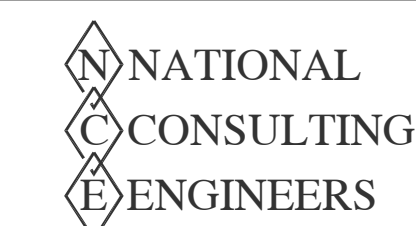
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I CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.  
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## MECHANICAL SPECIFICATIONS

M2