

VENTILATION SCHEDULE

| Pandora at Rookwood Commons - Cincinnati, OH | | Table 6-1 | | | | | | | | | | Vbz = Az x Ra + Rp x Pz | |
|--|---------------|-----------|-----------|-------|----------|--------|---------|---------|-----|-----|-----|-------------------------|-------|
| ROOM # | ROOM NAME | Az | OCCUPANCY | Rp | Ra | Pz | PEOPLE | AREA | OA | AIR | SA | Zp = | Vot = |
| | | SQFT | CATEGORY | CFM/P | CFM/SQFT | people | Rp x Pz | Az x Ra | CFM | Eff | CFM | Voz / | Vou / |
| | Sales Area | 816 | Sales | 7.5 | 0.12 | 10 | 75 | 98 | 173 | 0.8 | 216 | 1200 | 240 |
| | Back of House | 282 | Storage | 0 | 0.12 | 0 | 0 | 34 | 34 | 0.8 | 42 | 350 | 70 |
| | Toilet | 52 | Toilet | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 50 | 10 |
| | RTU-1 | 1150 | | | | 10 | | | | | 258 | 1600 | 320 |



ROOFTOP UNIT SCHEDULE

| TAG | MANUFACTURER | MODEL | NOMINAL TONAGE | SUPPLY CFM | OA CFM | ESP IN IN. W.C. | TOT BTUH | SENS BTUH | SEER | STAGE | HTG IN BTUH | HTG OUT BTUH | ELECTRICAL | | | | | | WEIGHT | REMARKS |
|-------|--------------|-------------|----------------|------------|--------|-----------------|----------|-----------|------|-------|-------------|--------------|------------|---------|-------|-----|-----|------|--------|---------------|
| | | | | | | | | | | | | | BHP | VOLTAGE | PHASE | FLA | MCA | MOCP | | |
| RTU-1 | ICP | RGV048HEFVA | 4 | 1600 | 320 | 1 | 46,720 | 35,168 | 14 | 1 | 110,000 | 88,000 | 1 | 208 | 3 | - | 26 | 30 | 772 | A,B,C,D,E,F,G |

REMARKS

- A. ALL HVAC EQUIPMENT TO BE FIELD LABELED TO IDENTIFY WHICH AREAS OF THE BUILDING THEY SERVE.
- B. MERV 13 PLEATED FILTER.
- C. DRY BULB ECONOMIZER WITH BAROMETRIC RELIEF.
- D. SMOKE DETECTOR WITH REMOTE ANNUNCIATOR (BY EC)
- E. 14" HIGH INSULATED ROOF CURB
- F. UNIT MOUNTED NON POWERED CONVENIENCE OUTLET.
- G. UNIT MOUNTED NON FUSED DISCONNECT SWITCH

AIR DISTRIBUTION DEVICES

- NOTES:
- SYMBOL KEY:
 - FIRST LETTER: C-SUPPLY R-RETURN E-EXHAUST
 - SECOND LETTER: D-DIFFUSER R-REGISTER G-GRILLE
 - TITUS IS BASIS OF DESIGN.
 - 1,2,3, AND 4-WAY AIR DEVICES ARE DETERMINED BY DIRECTIONAL ARROWS ON DRAWINGS.
 - DAMPERS SHALL BE OPERABLE FROM FACE
 - A. OPPOSED BLADE
 - B. RADIAL OPPOSED BLADE
 - C. BUTTERFLY
 - FINISH:
 - A. STANDARD WHITE BAKED ENAMEL
 - B. ETCHED FINISH WITH CLEAR FINISH OR ANODIZED
 - C. #26 STANDARD WHITE GENERAL CONTRACTOR TO FIELD PAINT TO MATCH CEILING OR WALLS
 - D. #84 STANDARD BLACK GENERAL CONTRACTOR TO FIELD PAINT TO MATCH CEILING OR WALLS
 - BORDER STYLE:
 - A. SURFACE MOUNTED
 - B. LAY IN MOUNTING
 - C. LAY-IN PANEL, PROVIDE TITUS MODEL # XY-13363 FRAME FOR PLASTER CEILING MOUNTING.

| SYMBOL | CATALOG # | SIZE | | MOUNTING | | | MATERIAL | | FINISH | ACCESSORIES | BORDER STYLE | REMARKS |
|--------|-----------|---------|--------|-----------|---------|------|----------|-------|--------|-------------|--------------|---------|
| | | MODULE | THROAT | SIDE WALL | CEILING | DUCT | STEEL | ALUM. | | | | |
| CD-1 | OMNI | 24 x 24 | 10" Ø | | | ● | ● | | A | C | A | |
| CD-2 | OMNI | 24 x 24 | 6" Ø | | | ● | ● | | A | C | B | |
| RG-1 | OMNI | 24 x 24 | 12" Ø | | | ● | ● | | A | - | A | |

EXHAUST FAN SCHEDULE

| TAG | MANUFACTURER | MODEL | CFM | ESP | RPM | WATTS | ELECTRICAL | | | | | WEIGHT | SONES | REMARKS |
|------|--------------|--------|-----|------|-----|-------|------------|-------|-----|-----|------|--------|-------|---------|
| | | | | | | | VOLTAGE | PHASE | FLA | MCA | MOCP | | | |
| EF-1 | GREENHECK | SP-B90 | 75 | 0.25 | 700 | 21 | 120 | 1 | - | - | - | 10 | 1.2 | A,B,C,D |

REMARKS

- A. DISCONNECT SWITCH
- B. BACKDRAFT DAMPER
- C. ALUMINUM GRILLE WITH WHITE ENAMEL FINISH
- D. HANGING VIBRATION ISOLATORS

MECHANICAL ABBREVIATIONS

| | |
|------|--------------------------------------|
| AC | AIR CONDITIONING |
| AD | ACCESS DOOR |
| AFF | ABOVE FINISHED FLOOR |
| AHJ | AUTHORITY HAVING JURISDICTION |
| AHU | AIR HANDLING UNIT |
| ALT | ALTERNATE |
| BDD | BACKDRAFT DAMPER |
| BHP | BRAKE HORSEPOWER |
| BOD | BOTTOM OF DUCT |
| BTU | BRITISH THERMAL UNIT |
| CAV | CONSTANT AIR VOLUME |
| CD | CEILING DIFFUSER/CONDENSATE DRAIN |
| CLG | CEILING |
| COD | CABLE OPERATED DAMPER |
| CP | CONDENSATE PUMP |
| CR | CEILING RETURN |
| CU | CONDENSING UNIT |
| DN | DOWN |
| DP | DRIP PAN |
| DX | DIRECT EXPANSION |
| EAT | ENTERING AIR TEMPERATURE |
| EDH | ELECTRIC DUCT HEATER |
| EF | EXHAUST FAN |
| ETR | EXISTING TO REMAIN |
| EWT | ENTERING WATER TEMPERATURE |
| FC | FLEXIBLE CONNECTION |
| FCU | FAN COIL UNIT |
| FD | FIRE DAMPER |
| FLA | FULL LOAD AMPS |
| FSD | FIRE SMOKE DAMPER |
| GPM | GALLONS PER MINUTE |
| HP | HORSEPOWER |
| KV | KILOVOLT |
| KVA | KILOVOLT AMPERE |
| KW | KILOWATT |
| KWH | KILOWATT HOUR |
| LAT | LEAVING AIR TEMPERATURE |
| LD | LINEAR DIFFUSER |
| LRA | LOCKED ROTOR AMPS |
| LV | LOW VOLTAGE |
| LWT | LEAVING WATER TEMPERATURE |
| MBH | THOUSAND BTU PER HOUR |
| MCA | MINIMUM CIRCUIT AMPS |
| MD | MOTORIZED DAMPER |
| MOCP | MAXIMUM OVERCURRENT PROTECTION |
| MTD | MOUNTED |
| MTG | MOUNTING |
| NA | NOT APPLICABLE |
| NEC | NATIONAL ELECTRICAL CODE |
| NFPA | NATIONAL FIRE PROTECTION ASSOCIATION |
| NIC | NOT IN CONTRACT |
| NTS | NOT TO SCALE |
| OA | OUTSIDE AIR |
| OAF | OUTSIDE AIR FAN |
| OC | ON CENTER |
| OD | OUTSIDE DIAMETER |
| PSIG | POUNDS PER SQUARE INCH (GAUGE) |
| RCP | REFLECTED CEILING PLAN |
| RG | RETURN GRILLE |
| RPM | REVOLUTIONS PER MINUTE |
| SD | SMOKE DETECTOR |
| SF | SQUARE FOOT (FEET) |
| SG | SUPPLY GRILLE |
| SS | STAINLESS STEEL |
| TD | TRANSFER DUCT |
| TG | TRANSFER GRILLE |
| TYP | TYPICAL |
| UL | UNDERWRITERS LABORATORY |
| V | VOLT |
| VAV | VARIABLE AIR VOLUME |
| VD | VOLUME DAMPER |
| VIF | VERIFY IN FIELD |
| VOLT | VOLTAGE |
| VRF | VARIABLE REFRIGERANT FLOW |
| W | WATT |
| WH | WATER HEATER |
| WMS | WIRE MESH SCREEN |
| WP | WEATHERPROOF |

HVAC LEGEND

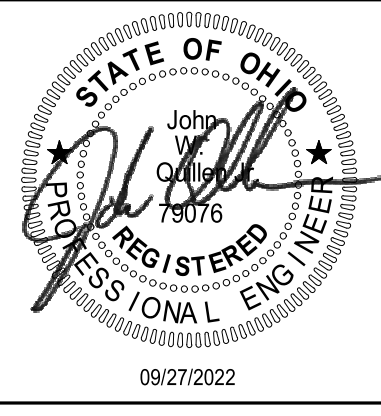
| | |
|--|--|
| | DRAWING NOTE SYMBOL |
| | NEW RECTANGULAR DUCTWORK AND SIZE |
| | NEW ROUND DUCTWORK AND SIZE |
| | BALANCING/VOLUME DAMPER |
| | FLEX DUCT |
| | THERMOSTAT |
| | REMOTE SENSOR |
| | NEW SUPPLY AIR DIFFUSER AND CFM |
| | NEW PERFORATED SUPPLY AIR DIFFUSER AND CFM |
| | NEW RETURN GRILLE |
| | NEW EXHAUST GRILLE AND CFM |
| | EXISTING EXHAUST GRILLE TO REMAIN |
| | EXISTING EXHAUST GRILLE TO BE REMOVED |
| | NEW EXHAUST FAN |
| | AIR FLOW DIRECTION |
| | REFRIGERANT PIPING |
| | EXISTING VAV BOX TO BE REMOVED |
| | FIRE DAMPER |
| | SMOKE DETECTOR |
| | NEW VAV BOX WITH ELECTRIC HEAT |
| | NEW VAV BOX WITHOUT ELECTRIC HEAT |
| | SUPPLY DUCT UP THROUGH ROOF |
| | RETURN/EXHAUST DUCT UP THROUGH ROOF |
| | MOTOR OPERATED DAMPER |
| | CONNECT TO EXISTING |

MECHANICAL RESPONSIBILITY SCHEDULE

| | TENANT | | LANDLORD | | TENANT CONTRACTOR | | OTHER | EXISTING TO REMAIN | NOT APPLICABLE | REMARKS |
|---------------------------------|---------|---------|----------|---------|-------------------|---------|-------|--------------------|----------------|---------|
| | FURNISH | INSTALL | FURNISH | INSTALL | FURNISH | INSTALL | | | | |
| AIR HANDLING UNIT | | | | | ● | ● | | | | |
| ECONOMIZER | | | | | | | | ● | | |
| ROOF CURB | | | | | ● | ● | | | | |
| ROOF CURB ADAPTER | | | | | | | | ● | | |
| ROOFING | | | | | ● | ● | | | | |
| ROOF CANT STRIP | | | | | ● | ● | | | | |
| ROOF CURB LEVELING | | | | | ● | ● | | | | |
| DIFFUSERS AND GRILLES | | | | | ● | ● | | | | |
| WALL FIRE DAMPERS | | | | | | | | | ● | |
| COMBINATION FIRE/SMOKE DAMPERS | | | | | | | | | ● | |
| DUCTWORK | | | | | ● | ● | | | | |
| VAV BOXES | | | | | | | | | ● | |
| UNIT HEATER | | | | | | | | | ● | |
| CONDENSATE PIPING | | | | | ● | ● | | | | |
| DUCT SUPPORTS | | | | | ● | ● | | | | |
| SEISMIC BRACING | | | | | | | | | ● | |
| TEMP CONTROL SYSTEM | | | | | ● | ● | | | | |
| EQUIPMENT AND CONTROL STARTUP | | | | | ● | ● | | | | |
| MOTOR OPERATED DAMPER | | | | | ● | ● | | | | |
| DUCT MOUNTED SMOKE DETECTOR(S) | | | | | ● | ● | | | | |
| ZONE DAMPERS | | | | | | | | | ● | |
| ZONE DAMPER ACTUATORS | | | | | | | | | ● | |
| TOILET EXHAUST FANS | | | | | ● | ● | | | | |
| TOILET EXHAUST DUCTWORK | | | | | ● | ● | | | | |
| TOILET EXHAUST ROOF CURB | | | | | ● | ● | | | | |
| AIR BALANCE REPORT | | | | | ● | ● | | | | |
| AS-BUILT DRAWINGS | | | | | ● | ● | | | | |
| 1ST YR LABOR WARRANTY FOR EQUIP | | | | | ● | ● | | | | |
| 1ST YR PARTS WARRANTY FOR EQUIP | | | | | ● | ● | | | | |

MECHANICAL RESPONSIBILITY SCHEDULE NOTES

- ANY ITEM SHOWN ON DRAWINGS AS NEW CONSTRUCTION, BUT NOT SPECIFICALLY ADDRESSED IN RESPONSIBILITY SCHEDULE SHALL BE ASSUMED TO BE GENERAL CONTRACTOR FURNISHED AND INSTALLED.
- IF SCOPE OF RESPONSIBILITY ON SCHEDULE IS IN CONFLICT WITH DRAWINGS OR SPECIFICATIONS, GENERAL CONTRACTOR MUST NOTIFY ARCHITECT AND CONSTRUCTION MANAGER.
- GENERAL CONTRACTOR SHALL PROVIDE LABEL ON ALL COMPONENTS OF SYSTEM TO APPROPRIATELY IDENTIFY EACH COMPONENT OF SYSTEM, AS WELL AS PROVIDE ALL RELEVANT INFORMATION ABOUT OPERATION OF THE COMPONENT. LABEL SHALL INCLUDE, BUT NOT BE LIMITED TO THE INCLUSION OF: WHERE COMPONENT IS FED FROM, LOCATION OF TEST EQUIPMENT FOR COMPONENT, AND ALL CODE REQUIRED LABELING NOT PRESENT FROM MANUFACTURER.



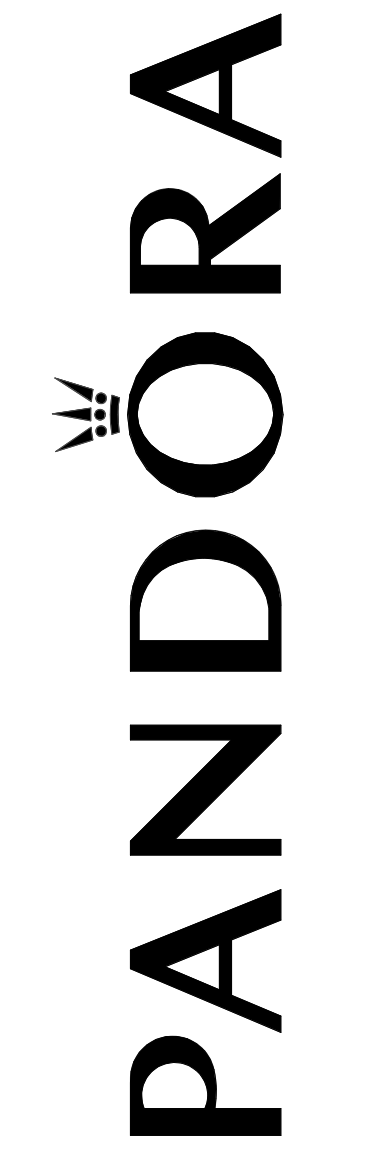
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Revisions:

| Mark | Date | By | Description |
|------------|------|----------|-------------------------------|
| 03/28/2022 | | EDN/R/BW | ISSUED FOR LL/PERMIT APPROVAL |

Revision Schedule

| Rev # | Description | Date |
|-------|-------------|----------|
| 1 | Bulletin #1 | 09/27/22 |

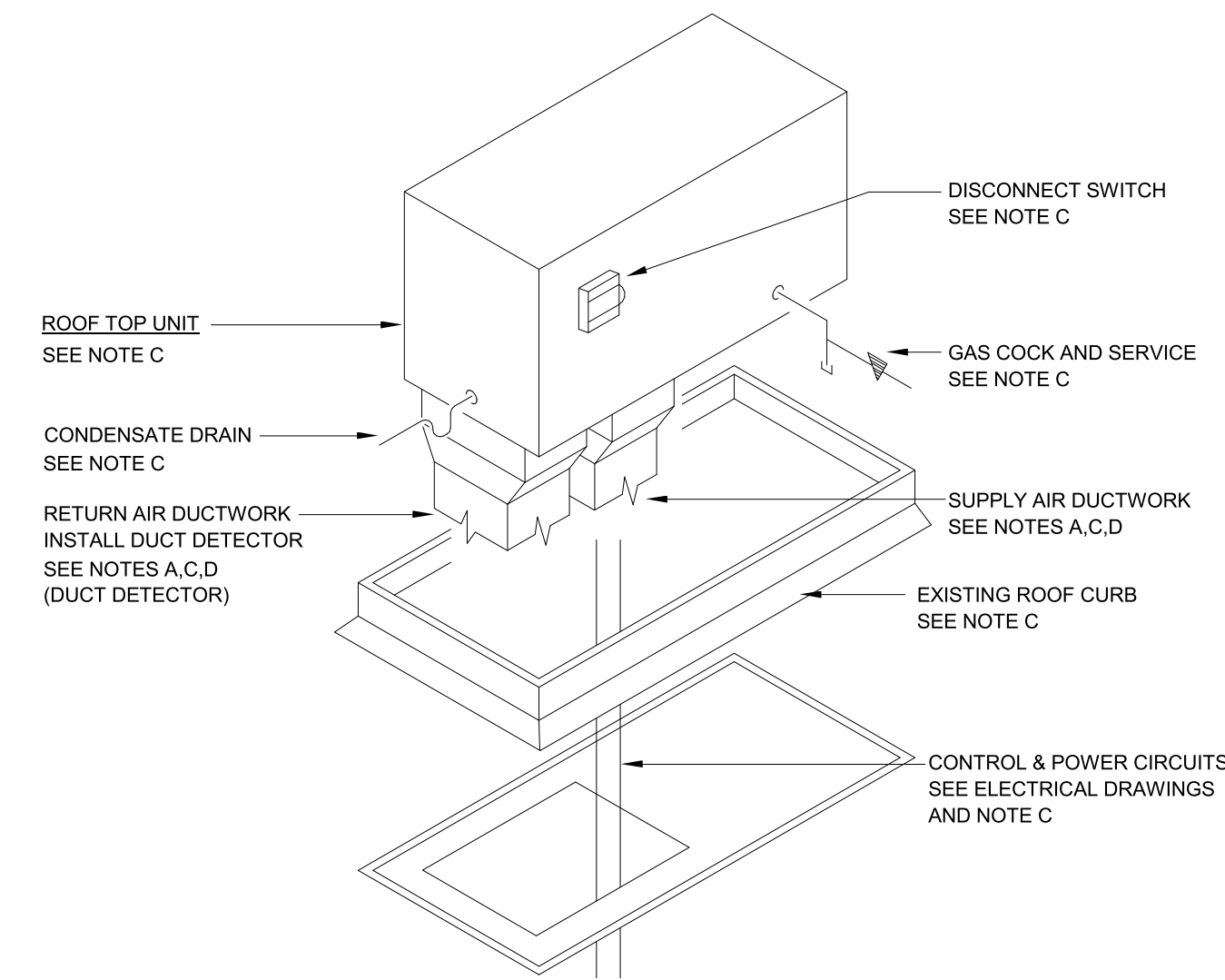


ROOKWOOD COMMONS
 2655 EDMONDSON ROAD
 NORWOOD, OH 45209

PROJECT # 11919
 DATE ISSUED 03/28/2022

MECHANICAL SCHEDULES

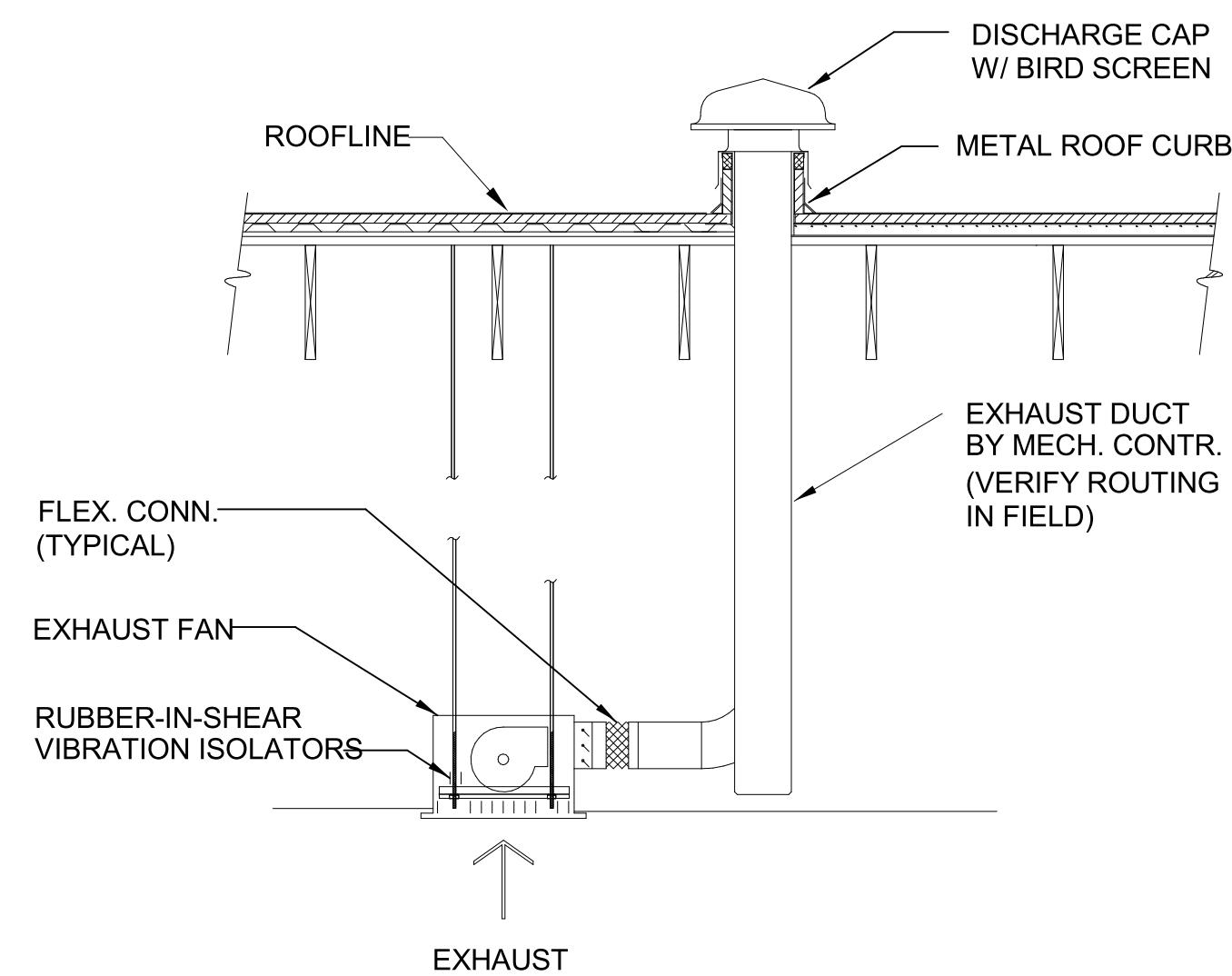
M201



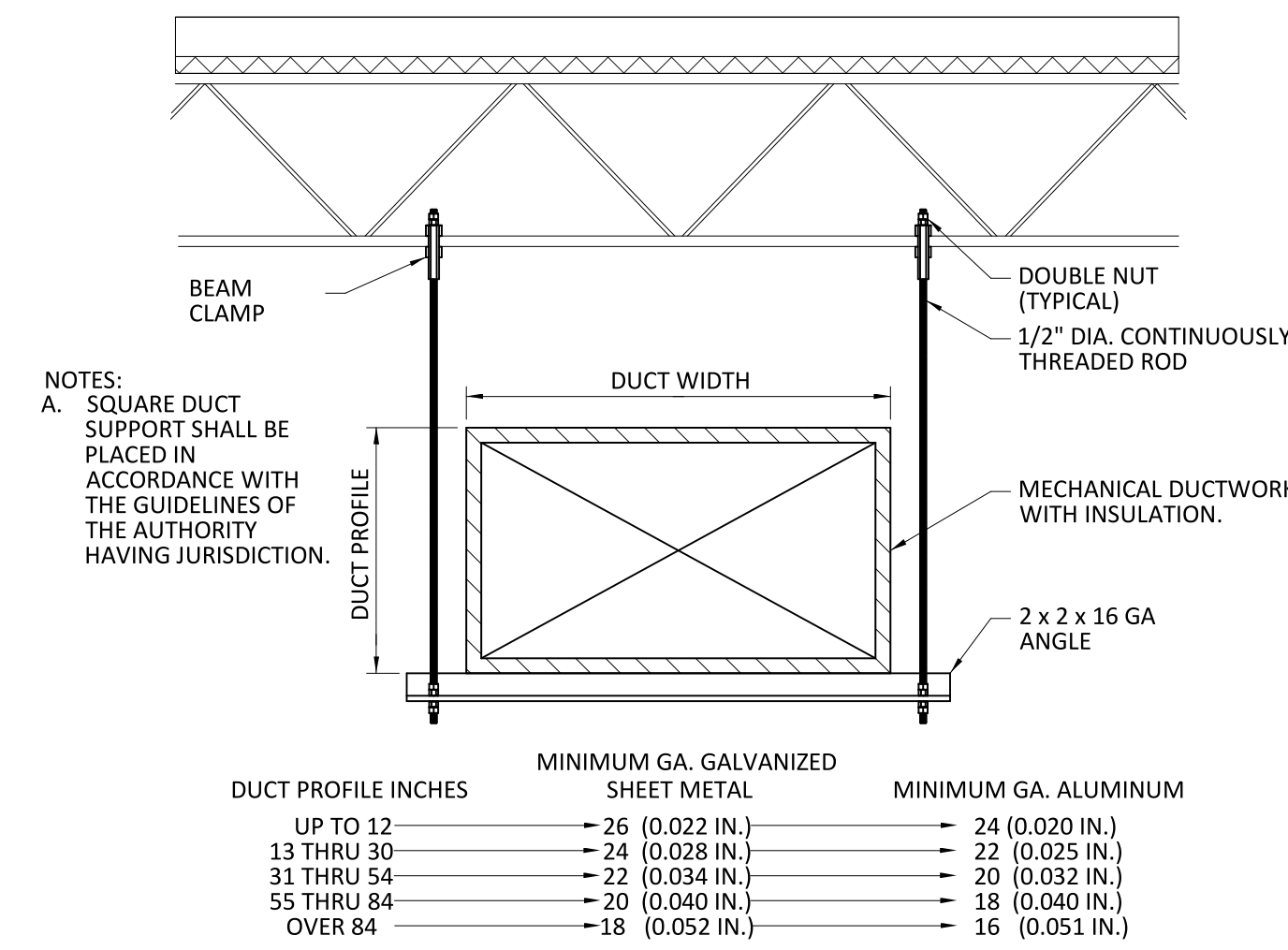
ROOF TOP UNIT NOTES

- DUCT TRANSITION FROM RTU TO DUCT SIZE SHOWN ON MECHANICAL DRAWING SHALL BE MADE BETWEEN RTU & TOP OF ROOF WITH-IN CURB.
- SIZE OF OPENING IN ROOF DECK TO BE AS SMALL AS POSSIBLE. COORDINATE WITH STRUCTURAL DRAWINGS (6" MIN. LARGER THAN DUCT SIZE SHOWN).
- INSTALL PER MANUFACTURER'S RECOMMENDATION AND INSTALLATION MANUAL. PROVIDE CURB ADAPTER TO FIT EXISTING ROOF CURB.
- NEOPRENE FLEXIBLE CONNECTOR.

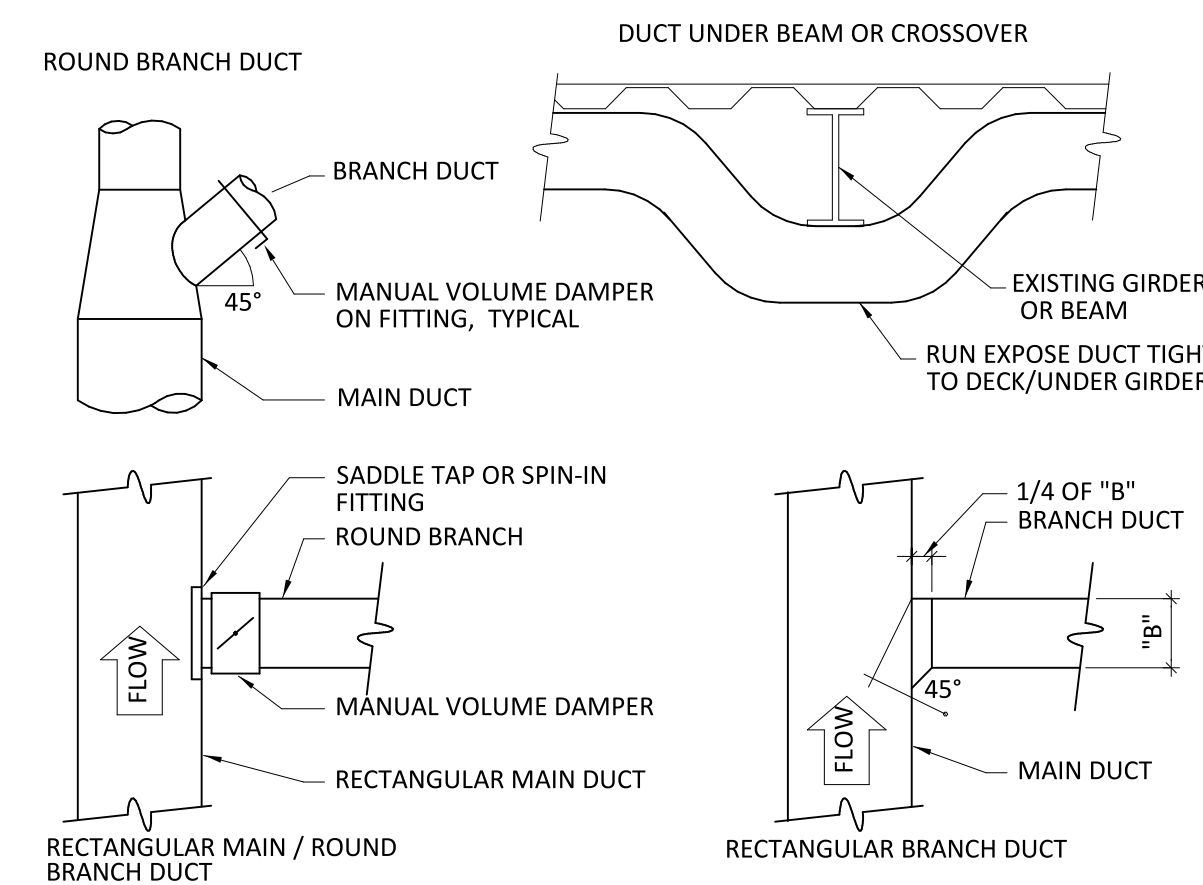
6 ROOFTOP UNIT DETAIL
M301 N.T.S.



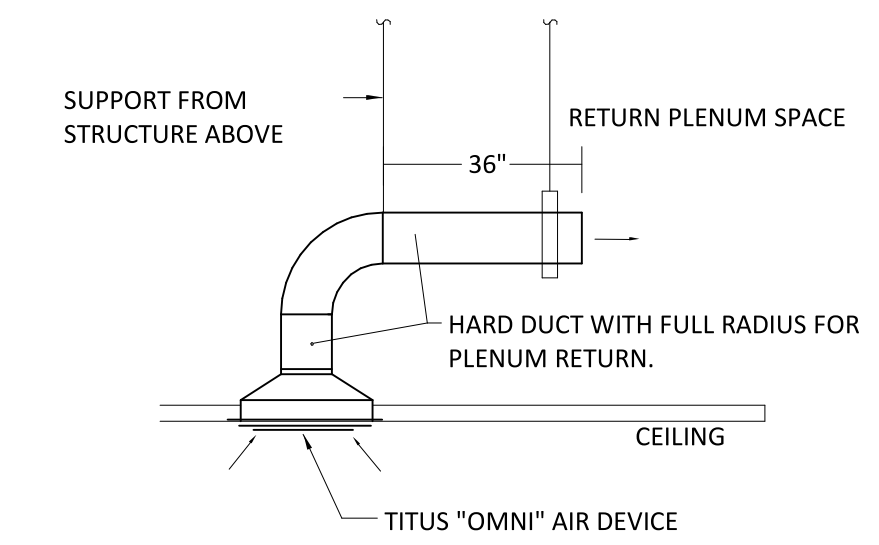
7 EXHAUST FAN DETAIL
M301 N.T.S.



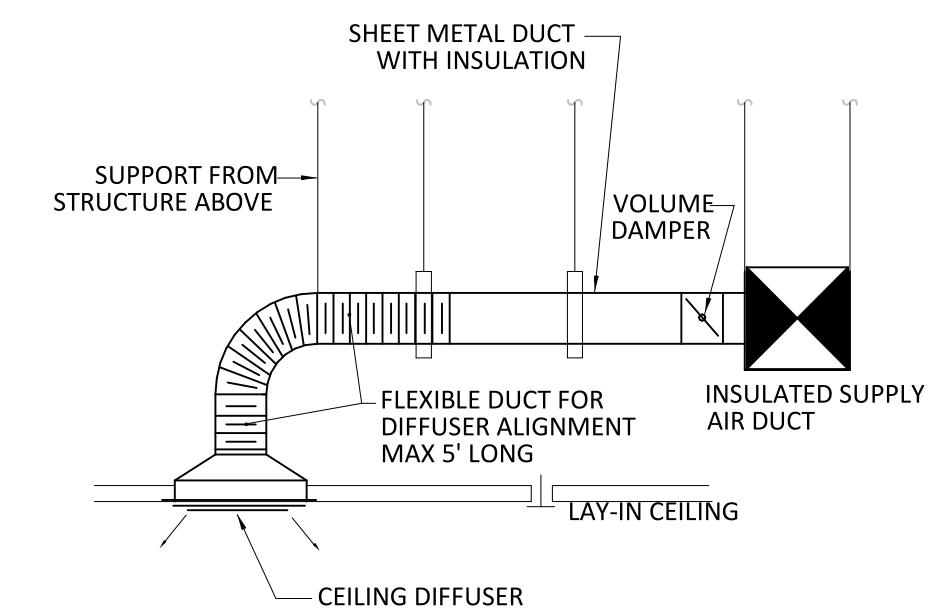
4 RECT. DUCT SUPPORT DETAIL
M301 N.T.S.



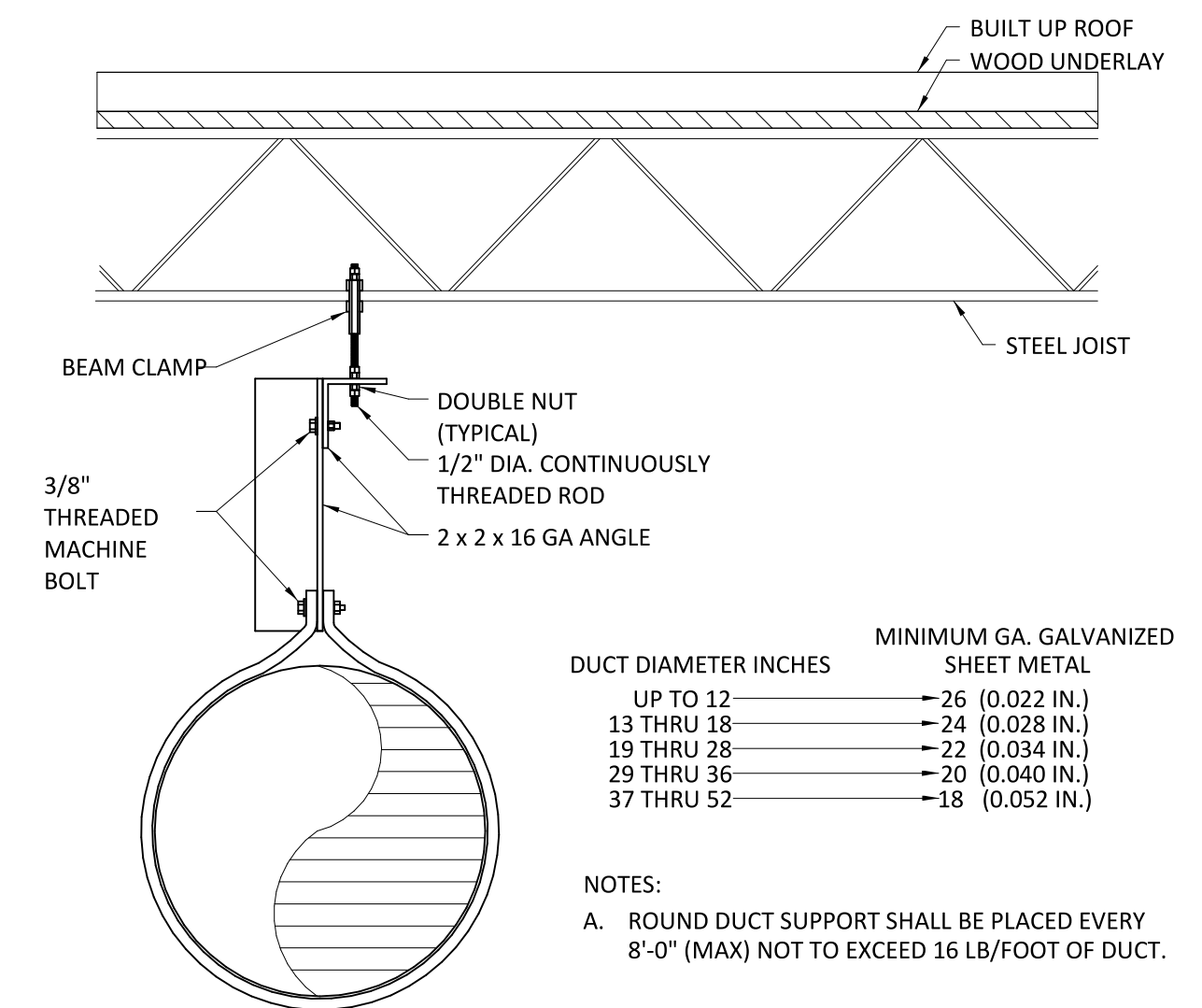
5 BRANCH DUCT TAKEOFF DETAIL
M301 N.T.S.



1 SOUND TRAP DETAIL
M301 N.T.S.



2 CEILING DIFFUSER DETAIL
M301 N.T.S.



3 ROUND DUCT SUPPORT DETAIL
M301 N.T.S.

Revisions:

| Mark | Date | By | Description |
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| 03/28/2022 | | ED/KR/BW | ISSUED FOR LL/PERMIT APPROVAL |

Revision Schedule

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|-------|-------------|------|
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DIVISION 23 MECHANICAL SPECIFICATIONS

23 05 01 COMMON REQUIREMENTS FOR HVAC

ALL MECHANICAL WORK AND TESTS SHALL BE DONE IN STRICT ACCORDANCE WITH THE LATEST STATE, COUNTY, AND LOCAL REGULATIONS, LAWS, AND ORDINANCES WHICH MAY BE APPLICABLE.

BEFORE SUBMITTING A BID, EXAMINE DOCUMENTS OF ALL OTHER TRADES, VISIT THE SITE AND GET ACQUAINTED WITH ALL CONDITIONS THAT MAY IN ANY WAY AFFECT THE EXECUTION OF THIS CONTRACT. TAKE MEASUREMENTS AND BE RESPONSIBLE FOR EXACT SIZE AND LOCATIONS OF ALL OPENINGS REQUIRED. VERIFY INSTALLATION MAY BE MADE IN COMPLETE ACCORDANCE WITH ALL PERTINENT CODES AND REGULATIONS. IN THE EVENT OF DISCREPANCY, IMMEDIATELY NOTIFY THE PROFESSIONAL ENGINEER OF RECORD. DO NOT PROCEED WITH THE INSTALLATION IN AREAS OF DISCREPANCY UNTIL ALL SUCH DISCREPANCIES HAVE BEEN FULLY RESOLVED.

IT IS NOT THE INTENT OF THE DRAWINGS THAT EXISTING CONDITIONS BE ACCURATELY SHOWN. EXISTING MECHANICAL WORK IS SHOWN TO LIMITED EXTENT ON DRAWINGS AND IS SHOWN FOR GENERAL REFERENCE ONLY. LOCATIONS AND INFORMATION WERE DERIVED FROM AERIAL SURVEY, VISUAL OBSERVATIONS OR FROM DOCUMENTS THAT WERE PREPARED FOR PREVIOUSLY INSTALLED WORK WHEN AVAILABLE.

THE WORK COVERED BY THESE SPECIFICATIONS SHALL CONSIST OF PROVIDING ALL NEW MATERIAL, LABOR, EQUIPMENT, AND SERVICES NECESSARY FOR A COMPLETE MECHANICAL INSTALLATION AS SPECIFIED HEREIN. WORK IN THIS SECTION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING ITEMS:

- DUCT
- DAMPERS
- DIFFUSERS, REGISTERS, AND LOUVERS

WHENEVER THE WORDS "CONTRACTOR" APPEAR ON MECHANICAL DRAWINGS OR IN THESE SPECIFICATIONS, IT SHALL REFER TO THE MECHANICAL SUB-CONTRACTOR. WHENEVER THE WORD "PROVIDE" APPEARS IN THESE DOCUMENTS, IT SHALL BE INTERPRETED TO MEAN "FURNISH AND INSTALL".

COORDINATE ALL WORK WITH THE OWNER TO MINIMIZE INTERRUPTION OF BUILDING OPERATION.

COORDINATE THE INSTALLATION OF MECHANICAL ITEMS WITH THE SCHEDULES FOR WORK OF ALL OTHER TRADES TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

THIS CONTRACTOR SHALL VERIFY AND SATISFY HIMSELF THAT ALL EQUIPMENT FURNISHED WILL PROPERLY FIT IN THE SPACE PROVIDED, THAT IT WILL FUNCTION PROPERLY, AND THAT ALL PARTS OF EQUIPMENT REQUIRING SERVICE ARE READILY ACCESSIBLE.

ALL PIPING SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING WALLS AND FRAMING SYSTEM. ALL VERTICAL RUNS SHALL BE HELD AGAINST WALLS, COLUMNS, ETC., AS POSSIBLE TO PERMIT MAKING OF PIPE JOINTS.

CONTRACTOR SHALL PROVIDE A GUARANTEE IN WRITTEN FORM STATING THAT ALL WORK SHALL BE FREE OF DEFECTS OR ERRORS, AND ALL EQUIPMENT, MATERIALS, OR PARTS FOR A PERIOD OF ONE YEAR FROM THE DATE OF OWNER'S FINAL ACCEPTANCE AND SHALL REPAIR, REVISE OR REPLACE AT NO COST TO THE OWNER ANY SUCH DEFECTS OCCURRING WITHIN THE GUARANTEE PERIOD.

CONTRACTOR SHALL ALSO STATE IN WRITTEN FORM THAT ANY ITEMS OR OCCURRENCES ARISING DURING THE GUARANTEE PERIOD WILL BE ATTENDED TO IN A TIMELY MANNER AND WILL IN NO CASE EXCEED THREE (3) WORKING DAYS FROM DATE OF NOTIFICATION BY OWNER.

PROVIDE A COMPLETE INSTALLATION IN CONFORMANCE WITH THE FOLLOWING STANDARDS.
ASCA: AMERICAN GAS ASSOCIATION
ASHRAE: AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
NFPA: NATIONAL FIRE PROTECTION ASSOCIATION
SMACNA: SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION.
STATEWIDE BUILDING CODE
INTERNATIONAL MECHANICAL CODE

CONTRACTOR SHALL DO ALL CUTTING AND PATCHING REQUIRED FOR INSTALLATION OF THIS WORK. ALL OPENINGS IN WALLS, FLOORS OR CEILINGS SHALL BE PROPERLY SEALED AND RESTORED IN KIND. FLASH AND COUNTER-FLASH AT ROOF OPENINGS.

ALL EQUIPMENT SHALL BE LISTED AND LABELED, UNLESS OTHERWISE APPROVED.

ALL WIRING SHALL MEET THE REQUIREMENTS LISTED IN THE ELECTRICAL SPECIFICATIONS. ALL CONTROL AND INTERLOCK WIRING AND CONDUIT (120V OR 24V) SHALL BE BY THE MECHANICAL CONTRACTOR.

EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE CONDITIONS OF LISTING AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THIS CODE.

CLEANING: THIS CONTRACTOR SHALL REMOVE FROM THE PREMISES ALL ACCUMULATION OF DIRT, DEBRIS, WASTE MATERIALS AND RUBBISH CAUSED BY HIS EMPLOYEES OR WORK, AT LEAST ONCE A WEEK, EXCEPT THAT COMBUSTIBLE MATERIALS SHALL BE REMOVED DAILY.

EXISTING CONDITIONS

DO NOT REUSE REMOVED MECHANICAL MATERIALS UNLESS SPECIFICALLY INDICATED ON DRAWINGS. EXISTING SYSTEMS MAY BE UTILIZED ONLY TO THE EXTENT INDICATED ON DRAWINGS.

IF REQUIRED TO ACCOMMODATE CONSTRUCTION RELATED ACTIVITIES TEMPORARILY REMOVE, STORE IN PROTECTED LOCATION ON SITE, AND REINSTALL CONFLICTING MECHANICAL EQUIPMENT, OR DEVICES THAT ARE TO REMAIN OR TO BE RELOCATED.

WHERE THE TERM "DEMOLITION" IS USED HEREIN, INTERPRET IT TO MEAN "DEMOLITION" OR "SELECTIVE DEMOLITION" WHERE APPLICABLE.

PROVIDE MECHANICAL DEMOLITION WORK AS REQUIRED TO ACCOMMODATE PROJECT DEMOLITION AND AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. DISCONNECT AND REMOVE WORK TO BE ABANDONED, AND AS REQUIRED TO ACCOMMODATE WORK OF OTHER TRADES, IN AREAS AFFECTED BY THIS PROJECT.

LEGALLY DISPOSE OF MATERIALS TO SALVAGED OR RETAINED.

DURING PROGRESS OF THE WORK, MAINTAIN ON DRAWINGS AT THE SITE, AN ACCURATE RECORD OF THE INSTALLATION OF THE MECHANICAL SYSTEM, INDICATING ALL ITEMS WHICH HAVE BEEN CHANGED OR ADDED.

OBTAIN AND PAY FOR ALL PERMITS AND MECHANICAL INSPECTIONS REQUIRED BY LOCAL AUTHORITY, FOR THE APPROVAL OF WORK.

A CERTIFICATE OF FINAL INSPECTION AND APPROVAL SHALL BE SUBMITTED WITH THE CONTRACTOR'S REQUEST FOR FINAL PAYMENT. NO FINAL PAYMENT WILL BE APPROVED WITHOUT THIS CERTIFICATE.

23 05 03 SUBMITTALS FOR MECHANICAL SYSTEMS

DESIGN BASIS MANUFACTURERS OF MATERIAL AND EQUIPMENT ARE SPECIFIED AND PLANS ARE DETAILED ACCORDING TO THIS MATERIAL. CONTRACTOR SHALL BASE HIS BID ON FURNISHING AND INSTALLING THIS MAKE OF MATERIAL AND EQUIPMENT.

SHOP DRAWINGS SHALL INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING: MAKE, MODEL NUMBER, DIMENSIONS, ELECTRICAL CHARACTERISTICS (RATING), SHOP DRAWINGS SHALL BEAR NAME OF PROJECT AND LOCATION.

THE MAKE, TYPE, AND FINISH OF ALL MATERIALS, EQUIPMENT AND APPARATUS SHALL BE APPROVED BY THE ENGINEER/ARCHITECT IN WRITING BEFORE THE CONTRACTOR INSTALLS IT. ANY SUBSTITUTION FOR ANY SPECIFIED EQUIPMENT OR MATERIAL SHALL FIRST BY APPROVED BY THE ENGINEER/ARCHITECT IN WRITING.

SUBMIT SHOP DRAWINGS ON THE FOLLOWING ITEMS FOR REVIEW BEFORE FABRICATION OR SHIPMENT:

- DUCT
- DAMPERS
- DIFFUSERS, REGISTERS, AND LOUVERS

MAINTENANCE MANUALS: FURNISH THREE FINAL COPIES, INCLUDING WIRING DIAGRAMS, MAINTENANCE AND OPERATING INSTRUCTIONS, PARTS LISTINGS, AND COPIES OF OTHER SUBMITTALS INDICATED FOR INCLUSION.

ANY CHANGES TO ITEMS SPECIFIED MUST BE SUBMITTED AS A SUBSTITUTION, WITH COMPLETE DOCUMENTATION OF PRICE DIFFERENTIAL AND EQUIPMENT DETAILS.

1. CERTAIN MAKES OF MATERIALS AND EQUIPMENT ARE SPECIFIED AND DRAWINGS ARE DETAILED ACCORDING TO THIS MATERIAL. CONTRACTOR SHALL BASE HIS BID ON FURNISHINGS AND INSTALLING THE SPECIFIED MAKE AND MODEL OR THE "EQUIVALENT" MODEL OF ANOTHER OF THE SPECIFIED MANUFACTURERS WHICH MEETS ALL THE QUALIFICATIONS OF THE SPECIFIED ITEMS.
2. WHERE MORE THAN ONE MAKE OF MATERIAL OR EQUIPMENT IS SPECIFIED, THE CONTRACTOR SHALL STATE IN HIS BID WHICH MAKE HE PROPOSES TO FURNISH. SHOP DRAWING APPROVAL SHALL BE OBTAINED PRIOR TO SHIPMENT OF EQUIPMENT.
3. "EQUIVALENT" MATERIALS AND EQUIPMENT ARE THOSE OF MANUFACTURER WHICH MEET THE SAME STANDARDS OF PERFORMANCE, HAVE EQUAL OR BETTER MATERIALS OF CONSTRUCTION, AND EQUAL OR BETTER MAINTENANCE CHARACTERISTICS. ALL EQUIVALENTS MUST FIT THE SPACE PROVIDED IN THE BUILDING STRUCTURE. WHERE THE USE OF EQUIVALENTS RESULTS IN CHANGES, THIS CONTRACTOR SHALL BE RESPONSIBLE FOR SUCH CHANGES AND ANY COSTS RESULTING FROM THEM.
4. IF THE CONTRACTOR INTENDS TO USE EQUIPMENT OR MATERIALS NOT SPECIFIED, HE MUST RECEIVE APPROVAL FROM THE ENGINEER/ARCHITECT PRIOR TO THE AWARD OF THE CONTRACT. THIS PRIOR APPROVAL ONLY PERMITS SUBMITTAL OF A PARTICULAR MANUFACTURER'S EQUIPMENT IN GENERAL. THE SPECIFIED ITEM TO BE USED MUST AGAIN BE SUBMITTED FOR FINAL REVIEW AS SPECIFIED UNDER "SHOP DRAWINGS".

23 05 29 PIPING HANGERS AND SUPPORTS

SUPPORT ALL DUCT WORK BY HANGERS OR BRACKETS. FURNISH STRUCTURAL STEEL MEMBERS WHERE REQUIRED TO SUPPORT DUCT WORK. DUCTWORK - SUPPORT BY MEANS OF HANGERS AS FOLLOWS:
DUCT WIDTH 30 OR LESS

HANGER SIZE (16 GAUGE)

TYPE: MAX. SPACING: 8
A PAIR OF HANGERS SHALL BE LOCATED AT EVERY TRANSVERSE JOINT AND ELSEWHERE ACCORDING TO THE TABLE.

23 05 93 HVAC SYSTEM TESTING, ADJUSTING AND BALANCING FOR HVAC

ALL SYSTEMS AND EQUIPMENT SHALL BE CAREFULLY ADJUSTED TO PROVIDE COMFORTABLE AND UNIFORM CONDITIONS IN EACH AND EVERY SPACE TO THE OWNER'S SATISFACTION. PROVIDE ANY REQUIRED DRIVES TO SATISFY QUANTITIES INDICATED. PROVIDE A CERTIFIED AIR BALANCE OF THE DIFFUSERS AND AIR HANDLERS.

AIR SYSTEM:

AIR BALANCE AND TESTING SHALL NOT BEGIN UNTIL THE SYSTEM HAS BEEN COMPLETED AND IS IN FULL WORKING ORDER. CONTRACTOR SHALL PUT ALL HEATING, VENTILATING AND AIR CONDITIONING SYSTEM AND EQUIPMENT INTO FULL OPERATION AND SHALL CONTINUE THE OPERATION OF SAME DURING EACH WORKING DAY OF TESTING AND BALANCING. CONTRACTOR SHALL SUBMIT WITHIN 30 DAYS AFTER RECEIPT OF CONTRACT, COPIES OF SUBMITTAL DATA FOR THE TESTING AND BALANCING OF THE AIR CONDITIONING, HEATING, AND VENTILATING SYSTEMS. THE AIR BALANCE AND TESTING AGENCY SHALL PROVIDE PROOF OF HAVING SUCCESSFULLY COMPLETED AT LAST FIVE PROJECTS OF SIMILAR SIZE AND SCOPE.

CONTRACTOR SHALL PROCURE THE SERVICES OF AN INDEPENDENT AIR BALANCE AND TESTING AGENCY, APPROVED BY THE ENGINEER, AND A MEMBER OF AAAC OR NEBB, WHICH SPECIALIZES IN THE BALANCING AND TESTING OF HEATING VENTILATION AND AIR CONDITIONING SYSTEMS. TO BALANCE, ADJUST AND TEST AIR MOVING EQUIPMENT AND AIR DISTRIBUTION OR EXHAUST SYSTEMS AS HEREIN SPECIFIED.

ALL WORK BY THIS AGENCY SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A QUALIFIED HEATING AND VENTILATING ENGINEER EMPLOYED BY THIS AGENCY. ALL INSTRUMENTS USED BY THIS AGENCY SHALL BE ACCURATELY CALIBRATED AND MAINTAINED IN GOOD WORKING ORDER.

23 07 13 DUCT INSTALLATION

INSULATE ALL SUPPLY, DIFFUSER PLENUMS, AND OUTSIDE AIR DUCTWORK OF ALL UNITS WITH OWENS CORNING "ALL SERVICE DUCT WRAP" TYPE 150 GLASS FIBER INSULATION UNLESS OTHERWISE NOTED. INSULATION SHALL BE 1-1/2" THICK (2" THICK FOR SUPPLY AND RETURN IN TRUSS SPACE), 1.5 PCF. DENSITY WITH FRK JACKET. 002 THICK REINFORCED ALUMINUM FOIL VAPOR BARRIER. INSULATION SHALL CONFORM TO NFPA 90A AND 90B PER ASTM E-84 FOR FLAME SPREAD AND SMOKE DEVELOPED RATING.

PROVIDE INSULATION ON ALL CONCEALED SUPPLY, RETURN DUCTWORK. ALL LINERS, INSULATION AND ADHESIVES SHALL HAVE A FLAME SPREAD INDEX NOT MORE THAN 25 AND A SMOKE DEVELOPED INDEX OF NOT MORE THAN 50.

RIGID FIBERGLASS DUCTWORK INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 612, TYPE II, WITHOUT FACING AND WITH VAPOR BARRIER ALL-SERVICE JACKET MANUFACTURED FROM KRAFT PAPER, REINFORCING SCRM, ALUMINUM FOIL, AND VINYL FILM. INSULATION SHALL HAVE A MINIMUM R VALUE AS REQUIRED BY CODE.

FLEXIBLE FIBERGLASS DUCTWORK INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 553, TYPE II, WITHOUT FACING AND WITH VAPOR BARRIER ALL-SERVICE JACKET MANUFACTURED FROM KRAFT PAPER, REINFORCING SCRM, ALUMINUM FOIL, AND VINYL FILM. INSULATION SHALL HAVE A MINIMUM R VALUE AS REQUIRED BY CODE.

VAPOR BARRIER MATERIAL FOR DUCTWORK: PAPER-BACKED ALUMINUM-FOIL, EXCEPT AS OTHERWISE INDICATED; STRENGTH AND PERMEABILITY RATING EQUIVALENT TO FACTORY-APPLIED VAPOR BARRIERS ON ADJOINING DUCTWORK INSULATION, WHERE AVAILABLE; WITH FOLLOWING ADDITIONAL CONSTRUCTION CHARACTERISTICS:

HIGH PUNCTURE RESISTANCE: LOW VAPOR TRANSMISSION (FOR DUCTS IN EXPOSED AREAS; MECH. ROOMS, ETC.)
MODERATE PUNCTURE RESISTANCE: MEDIUM VAPOR TRANSMISSION (FOR DUCTS IN CONCEALED AREAS).

INSTALLATION IS NOT PERMITTED ABOVE DRYWALL CEILINGS AND INACCESSIBLE CEILINGS.

23 09 93 SEQUENCE OF OPERATION

PACKAGED ROOFTOP UNIT

STARTUP

THE UNIT SHALL OPERATE ON A 7 DAY/NIGHT PROGRAMMABLE THERMOSTAT. DURING STARTUP, THE FAN SHALL RUN WITH THE DAMPERS IN THE FULL RECIRCULATION POSITION. PROVIDE OCCUPIED CHANGEOVER SEQUENCE WITH OPTIMUM START FUNCTION. WHEN THE RETURN AIR TEMPERATURE REACHES OCCUPIED SETPOINT (ADJUSTABLE), THE MINIMUM OUTSIDE AIR DAMPER SHALL OPEN TO THE CONTROLLED MINIMUM OUTDOOR AIR POSITION.

SUPPLY FAN CONTROL
THE SUPPLY FAN SPEED SHALL BE CONSTANT AND SET TO THE REQUIRED CFM.

SPACE TEMPERATURE CONTROL
PROVIDE LOCAL WALL MOUNTED ROOM TEMPERATURE THERMOSTAT WITH DIGITAL DISPLAY OF ROOM TEMPERATURE AND SETPOINT (+/- DEG. F., ADJUSTABLE), AND OVERRIDE FEATURE. PROVIDE REMOTE SENSOR TO MONITOR SPACE TEMPERATURE AND MAINTAIN THERMOSTAT SETPOINT.

MINIMUM OUTSIDE AIR CONTROL
DURING OCCUPIED MODE THE MINIMUM OUTSIDE AIR DAMPER SHALL BE OPEN. PROVIDE MOTORIZED OUTDOOR AIR DAMPER.

ECONOMIZER CONTROL
DRY BULB CONTROLLED ECONOMIZER: OPERATED TO AUTOMATICALLY USE OUTDOOR AIR FOR "FREE COOLING" WHEN OUTDOOR AIR TEMPERATURE IS AT ACCEPTABLE LEVELS. AUTOMATICALLY MODULATED OUTDOOR AND RETURN AIR DAMPERS MAINTAIN PROPER DISCHARGE AIR TEMPERATURE INTO THE CONDITIONED SPACE. ADJUSTABLE MINIMUM POSITION CONTROL IS STANDARD. ECONOMIZER SHALL HAVE POWERED OR BAROMETRIC RELIEF, AS SCHEDULED.

COOLING CONTROL
COOLING SHALL BE CONTROLLED TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON A CALL FOR COOLING THE HEATING SHALL BE OFF. ON A FURTHER CALL FOR COOLING, ENABLE THE ECONOMIZER MODE. ON A FURTHER CALL FOR COOLING, DISABLE THE ECONOMIZER MODE AND THE MECHANICAL COOLING SHALL BE STAGED ON.

HEATING CONTROL
HEATING SHALL BE CONTROLLED TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON A CALL FOR HEATING, THE MECHANICAL COOLING SHALL BE OFF. ON A FURTHER CALL FOR HEATING, THE ECONOMIZER MODE SHALL BE DISABLED. ON A FURTHER CALL FOR HEATING THE GAS HEATING SHALL BE STAGED ON.

SMOKE DETECTOR
WHEN THE SMOKE DETECTOR IS ALARMED, THE SYSTEM SHALL BE ALARMED AND THE AIR HANDLER SHALL FAIL SAFE WITH MANUAL RESET. ELECTRICAL CONTRACTOR SHALL FURNISH, HVAC CONTRACTOR SHALL MOUNT & ELECTRICAL CONTRACTOR SHALL WIRE A UL LISTED PHOTOELECTRIC SMOKE DETECTOR PER LOCAL CODE AUTHORITY HAVING JURISDICTION.

UNOCCUPIED MODE
DURING THE UNOCCUPIED MODE OF OPERATION, THE RTU SHALL GO INTO NIGHT SETBACK MODE. AT NIGHT SETBACK/SHUTDOWN THE RTU SHALL GO TO FAIL SAFE POSITION. FAIL SAFE POSITION IS DEFINED BY THE FOLLOWING: THE SUPPLY FAN IS OFF, THE OUTDOOR AIR INTAKE DAMPER IS CLOSED, THE HEATING IS OFF AND THE MECHANICAL COOLING IS OFF. THE SUPPLY FAN SHALL CYCLE IN CONJUNCTION WITH EITHER THE HEATING OR COOLING SYSTEM TO MAINTAIN A MINIMUM/MAXIMUM SPACE TEMPERATURE DEPENDING ON THE SEASON.

23 30 00 AIR DISTRIBUTION SYSTEM

CEILING AIR DIFFUSERS:
SQUARE: SQUARE HOUSING, CORE OF SQUARE CONCENTRIC LOUVERS, SQUARE OR ROUND DUCT CONNECTION.

DIFFUSER MOUNTINGS:
SURFACE MOUNT: DIFFUSER SHALL HAVE ROLLED EDGE BELOW FINISHED CEILING FOR SURFACE MOUNTING OR DIFFUSER SHALL BE FURNISHED WITH ACCESSORY PLASTER FRAME.

LAY-IN: DIFFUSER HOUSING SIZED TO FIT BETWEEN CEILING EXPOSED SUSPENSION TEE BARS AND REST ON TOP SURFACE OF TEE BAR.

DIFFUSER ACOUSTIC PERFORMANCE: NC LESS THAN OR EQUAL TO 30

DIFFUSER ACCESSORIES: PLASTER RING; PERIMETER RING DESIGNED TO ACT AS PLASTER STOP AND DIFFUSER ANCHOR.

DIFFUSER FINISHES: WHITE ENAMEL; SEMI-GLOSS WHITE ENAMEL PRIME FINISH.

CEILING AND WALL REGISTERS & GRILLES:
STEEL CONSTRUCTION: MANUFACTURER'S STANDARD STAMPED SHEET STEEL FRAME AND ADJUSTABLE BLADES.

REGISTER AND GRILLE FINISHES: WHITE ENAMEL; SEMI-GLOSS WHITE ENAMEL PRIME FINISH.

23 31 13 METAL DUCTS

CONSTRUCTION, INSTALLATION AND SUPPORT OF ALL DUCTWORK SHALL CONFORM TO THE LATEST EDITION OF SMACNA "HVAC DUCT CONSTRUCTION STANDARD -METAL AND FLEXIBLE".

ASSEMBLE AND INSTALL DUCTWORK IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES TO ACHIEVE AIR-TIGHT (5% LEAKAGE FOR SYSTEMS RATED 3" AND UNDER; 1% FOR SYSTEMS RATED OVER 3") AND NOISELESS (NO OBJECTIONABLE NOISE) SYSTEMS. INSTALL EACH RUN WITH MINIMUM NUMBER OF JOINTS. ALIGN DUCTWORK ACCURATELY AT CONNECTIONS, WITHIN 1/8" MISALIGNMENT TOLERANCE AND WITH INTERNAL SURFACES SMOOTH.

SUPPORT VERTICAL DUCTS AT EVERY FLOOR. SUPPORT DUCT WITH APPROVED HANGERS AT INTERVALS NOT EXCEEDING 10 FEET.

DUCTS SHALL BE GALVANIZED SHEET METAL OF STANDARD GAUGES. DUCTWORK SHALL HAVE A MINIMUM THICKNESS OF 24 GAUGE. ALL DUCT ELBOWS SHALL BE EITHER FULL RADIUS OR WITH TURNING VANES.

PROVIDE VOLUME DAMPERS IN ALL BRANCH DUCTS OR AS REQUIRED FOR BALANCING TO REQUIRED AIR FLOWS.

PROVIDE RADIUS TYPE FITTINGS FABRICATED OF MULTIPLE SECTIONS WITH MAXIMUM 15 DEG. CHANGE OF DIRECTION PER SECTION. UNLESS DETAILED OTHERWISE, USE 45 DEG. LATERALS AND 45 DEG. ELBOWS FOR BRANCH TAKEOFF CONNECTIONS. WHERE 90 DEG. BRANCHES ARE INDICATED, PROVIDE CONICAL TYPE TEES.

PROVIDE DUCT SEALANT AND/OR CEMENT WHICH IS NON-HARDENING, NON-MIGRATING MASTIC OR OF LIQUID ELASTIC SEALANT. TYPE APPLICABLE FOR FABRICATION/INSTALLATION DETAIL, AS COMPOUNDED AND RECOMMENDED BY MANUFACTURER SPECIFICALLY FOR SEALING JOINTS AND SEAMS IN DUCTWORK.

FLEXIBLE DUCTS SHALL EITHER BE SPIRAL-WOUND SPRING STEEL WITH FLAMEPROOF VINYL SHEATHING OR CORRUGATED ALUMINUM. THE MAXIMUM LENGTH OF FLEX DUCT ON THE SUPPLY EQUALS 5 FEET. FLEX IS NOT ALLOWED FOR RETURN, RELIEF OR EXHAUST APPLICATIONS.

FLEXIBLE DUCTS SHALL CONFORM TO THE REQUIREMENTS OF UL 181 FOR CLASS 0 OR CLASS 1 FLEXIBLE AIR DUCTS AND SHALL BE SO IDENTIFIED.

WHERE INSTALLED IN UNCONDITIONED SPACES OTHER THAN RETURN AIR PLENUMS, PROVIDE 1" THICK 1-1/2 LB. CONTINUOUS FLEXIBLE FIBERGLASS SHEATH WITH VINYL VAPOR BARRIER JACKET.

SHOP FABRICATE DUCTWORK IN 4, 8, 10 OR 12-FT LENGTHS, OR REQUIRED TO COMPLETE RUNS.

FABRICATE DUCTWORK WITH DUCT LINER IN EACH SECTION OF DUCT WHERE INDICATED. LAMINATE LINER TO INTERNAL SURFACES OF DUCT IN ACCORDANCE WITH INSTRUCTIONS BY MANUFACTURERS OF LINING AND ADHESIVE, AND FASTEN WITH MECHANICAL FASTENERS. DUCT LINER TO BE 3-LB DENSITY FOR ACOUSTIC REQUIREMENTS 1" THICK OR AS NOTED. SIZE OF DUCTWORK SHOWN ON THE DRAWINGS IS FREE NET AREA, OUTSIDE DIMENSION OF DUCTS WILL NEED TO BE INCREASED IF LINED DUCT IS USED. SIZE OF DUCTWORK SHOWN ON THE DRAWINGS IS FREE NET AREA, OUTSIDE DIMENSION OF DUCTS WILL NEED TO BE INCREASED IF LINED DUCT IS USED.

DUCT LINER SHALL BE OF FIBROUS GLASS OF THICKNESS INDICATED. 3-LB DENSITY. ALL LINERS, INSULATION AND ADHESIVES SHALL HAVE A FLAME SPREAD INDEX NOT MORE THAN 25 AND A SMOKE DEVELOPED INDEX OF NOT MORE THAN 50.

23 33 13 DAMPERS

DAMPERS WITH LOCKING DEVICE, WHERE ACCESSIBLE, SHALL BE RUSKIN MD-35. OPPOSED BLADE FOR RECTANGULAR DUCTS 12 INCHES AND ABOVE, AND MODEL MD-25 PARALLEL BLADE FOR DUCTS 10 INCHES AND BELOW, AND MODEL MDRS-25 FOR ROUND DUCTS. INSTALL PER MANUFACTURER'S INSTRUCTIONS. SINGLE BLADE ROUND DAMPERS WITH LOCKING DEVICE SHALL BE IN SPIN-IN COLLARS.

ELECTRIC MOTORIZED DAMPER SHALL BE SIZED TO OPERATE WITH SUFFICIENT RESERVE POWER TO PROVIDE SMOOTH MODULATING ACTION OR TWO-POSITION ACTION. INSTALL PER MANUFACTURER'S INSTRUCTIONS.

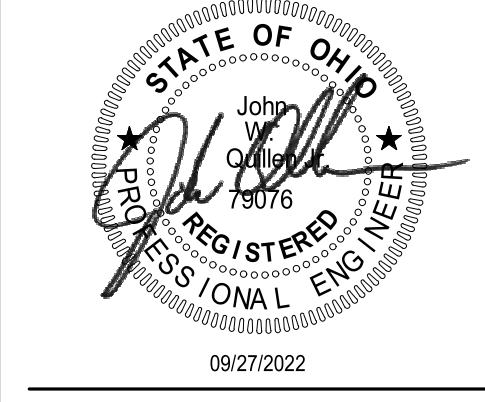
23 74 13 - ROOFTOP UNITS

GAS FIRED ROOFTOP UNIT WHICH MEETS ASHRAE 90.1 MINIMUM ENERGY EFFICIENCY REQUIREMENT. GAS HEATING WITH ELECTRIC COOLING. CAPACITIES SHALL BE AS LISTED. PROVIDE 2" PLEATED FILTER, ROOF CURB, PREWIRED CONTROL CENTER, ELECTRONIC PILOT, GAS VALVE, SAFETY LIMIT, MAX COOLING COIL PRESSURE DROP SHALL BE AS LISTED WHEN WET. SEE SCHEDULE ON DRAWING.

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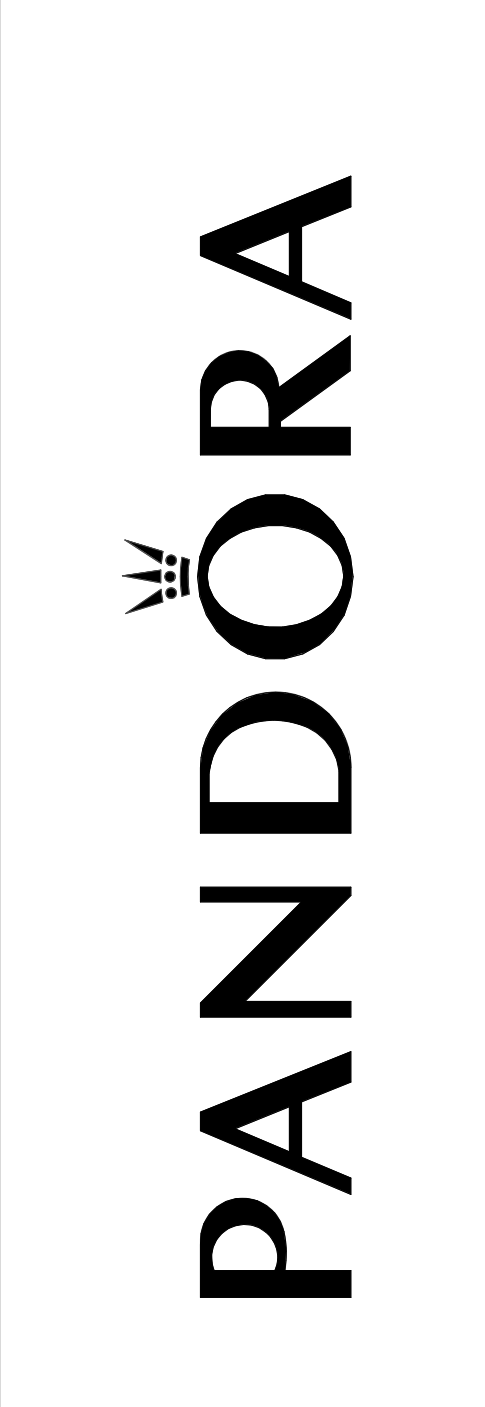
Revisions:

| Mark | Date | By | Description |
|------|------------|----|-------------|
| | 03/28/2022 | | ED/KR/BW |

ISSUED FOR LP/PERMIT APPROVAL

Revision Schedule

| Rev # | Description | Date |
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MECHANICAL SPECIFICATIONS

M401