

# HVAC SPECIFICATIONS

## DIVISION 23 HVAC

### 23 05 00 BASIC HVAC REQUIREMENTS

- A.

SEE DIVISION 00 PROCUREMENT AND CONTRACTING AND DIVISION 01 GENERAL REQUIREMENT FOR ADDITIONAL REQUIREMENTS.
- B.

HVAC CONTRACTOR SHALL VERIFY REQUIREMENTS FOR TEMPORARY HEATING WITH GENERAL CONTRACTOR AND INCLUDE IN HIS SCOPE OF WORK WHEN DIRECTED BY G.C. INSTALL IN ACCORDANCE WITH ALL CODE AND OSHA REQUIREMENTS FOR CONSTRUCTION PROJECTS.
- C.

SUBSTITUTIONS

1. SEE DIVISION 01 23 00 PRODUCT SUBSTITUTION PROCEDURES FOR ADDITIONAL REQUIREMENTS.

2. CONTRACTOR SHALL PROVIDE ALL SUPPORTING DATA AND ASSUME THE BURDEN OF PROOF THAT ANY SUBSTITUTE IS EQUIVALENT AS TO APPEARANCE, CONSTRUCTION, CAPACITY, AND PERFORMANCE. THE JUDGMENT OF EQUIVALENCY SHALL BE MADE BY THE ENGINEER AT THE TIME OF SHOP DRAWING REVIEW, NOT DURING BIDDING.

3. WHERE SUBSTITUTE EQUIPMENT REQUIRES REDESIGN OF ANY PART OF THE PROJECT, THE COST OF REDESIGN AND ADDITIONAL COSTS OF THE WORK SHALL BE PAID BY THE CONTRACTOR. REDESIGN SHALL BE SUBJECT TO THE APPROVAL OF ALL AUTHORITIES HAVING JURISDICTION OVER THE WORK INCLUDING THE ARCHITECT/ENGINEER.

4. CONTRACTOR SHALL ASSUME ALL COORDINATION RESPONSIBILITIES FOR SUBSTITUTE EQUIPMENT INCLUDING COORDINATION ACROSS TRADES AND COORDINATION OF PREVIOUSLY REVIEWED AND APPROVED SHOP DRAWING SUBMITTALS, SHOULD THESE SHOP DRAWINGS BE AFFECTED BY THE SUBSTITUTED EQUIPMENT.
- D.

SHOP DRAWINGS, PRODUCT DATA, TEST RESULTS, PROJECT CLOSEOUT DOCUMENTS:

1. SEE DIVISION 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES FOR ADDITIONAL REQUIREMENTS

2. CONSTRUCTION ADMINISTRATION SUBMITTAL LIST:

a.

DUCTWORK

b.

DUCTWORK ACCESSORIES

c.

INSULATION

d.

GRILLES

e.

FANS

f.

ROOFTOP AIR CONDITIONING UNITS.

g.

TEST AND BALANCE REPORT

3. PROJECT CLOSEOUT

a.

PROVIDE HVAC EQUIPMENT OPERATING AND MAINTENANCE MANUALS TO THE OWNER PER NYECC C408.1.1 AND C408.3.2.2.

b.

AS-BUILT DRAWINGS SHALL BE MARKED ON A FINAL SET OF DRAWINGS WHICH INCLUDES ALL REVISIONS.

c.

PROVIDE "AS-BUILT" DRAWINGS TO THE OWNER IN AUTOCAD FORMAT
- E.

DETAILS AND SCHEDULES ARE SHOWN TO AID THE CONTRACTOR AND ARE NOT MEANT TO BE INCLUSIVE OF ALL DEVICES. PROVIDE REQUIRED EQUIPMENT AND ACCESSORIES FOR A COMPLETE INSTALLATION.
- F.

INSTALL ALL EQUIPMENT PER MANUFACTURER'S INSTALLATION INSTRUCTIONS AND REQUIREMENTS. PROVIDE ADDITIONAL WORK AND MATERIALS AS REQUIRED.
- G.

COORDINATE INSTALLATION OF HVAC WORK WITH THE OTHER CONTRACTORS TO AVOID CONFLICTS WITH OTHER WORK.
- H.

PROVIDE ALL CUTTING AND PATCHING NECESSARY FOR HVAC WORK INSTALLATION UNLESS THIS WORK IS IDENTIFIED TO BE THE WORK OF OTHER CONTRACTORS. PATCHING SHALL MATCH ADJACENT SURFACES.
- I.

PROJECT COMPLETION

1. INSTALL CLEAN SET OF FILTERS IN ALL UNITS AT TIME OF TESTING AND BALANCING.

2. CLEAN GRILLES AND EQUIPMENT AND LEAVE IN PROPER WORKING CONDITION AT THE TIME OF FINAL CLEAN-UP.

- C.

ROUND DUCTWORK

1. CONCEALED BRANCH DUCTWORK TO GRILLES AND DIFFUSERS MAY BE LONGITUDINAL LOCKSEAM. ALL OTHER ROUND DUCTWORK SHALL BE SPIRAL LOCKSEAM WITH FITTINGS AND COUPLINGS MINIMUM 2 GAUGES HEAVIER THAN DUCT.
- D.

FLEXIBLE DUCTWORK

1. MANUFACTURERS: THERMAFLEX, FLEXMASTER, CLEVAFLEX.

2. U.L. 181 LISTED CLASS 1 FACTORY FABRICATED FLEXIBLE AIR DUCT, COMPLY WITH NFPA 90A, FLAME SPREAD OF 25 OR LESS, SMOKE DEVELOPED RATING OF 50 OR LESS.

3. MINIMUM PRESSURE RANGE -1/2" TO 4" W.C., TEMPERATURE RANGE 0-200 DEG F.

4. ACOUSTIC: THERMAFLEX MAKE OR G-KM, FLEXMASTER TYPE 1 OR 6.

a.

POLYETHYLENE, SPUNBOUND NYLON OR CHLORINATED POLYETHYLENE LINER.

b.

DUCTWORK TO HAVE TESTED ACOUSTICAL PERFORMANCE NOT LESS THAN 2 DB LESS THAN THE TYPES SPECIFIED.

5. SEMI-RIGID FLEXIBLE ALUMINUM DUCTWORK NOT PERMITTED.

6. SUPPLY DUCTWORK SHALL BE INSULATED WITH FIBERGLASS INSULATION, MINIMUM R VALUE 4, WITH VAPOR BARRIER JACKET WITH MAXIMUM 0.10 PERM RATING

7. CONNECT TO SUPPLY DUCTWORK BY SLIDING CORE OVER COLLAR, TAPE JOINT WITH MINIMUM 3 WRAPS OF TAPE, AND APPLY METAL BAND CLAMP OR PANDUIT. FOR INSULATED DUCTWORK, PULL INSULATION AND OUTER JACKET BACK INTO POSITION, AND TAPE WITH MINIMUM 3 WRAPS OF TAPE BETWEEN FLEX DUCT AND DUCT INSULATION.

8. CONNECT TO GRILLES AND RETURN AND TRANSFER DUCTWORK WITH METAL BAND CLAMP OR PANDUIT.

9. MAXIMUM LENGTH FROM DUCTWORK TO GRILLES OR SLOTS 8'-0" WITH ONE 90 DEG ELBOW.

10. DO NOT RUN THROUGH WALLS OR PARTITIONS.
- E.

DUCTWORK SEALANTS

1. MANUFACTURERS: HARDCAST SURE-GRIP 404 SOLVENT BASED DUCT SEALANT OR EQUIVALENT.

a.

SYNTHETIC RUBBER RESIN BASE.

-20 TO 200 DEG F.

c.

PRESSURE CLASSES UP TO 10" W.C., MEETING SEAL CLASS A.

d.

MAXIMUM FLAME SPREAD OF 25, SMOKE DEVELOPED OF 50.

e.

APPLY MINIMUM 20-MIL THICK WET FILM AT TEMPERATURES BETWEEN 35-100 DEG F.

2. HARDCAST ALUMA-GRIP 701 OR EQUIVALENT PRESSURE SENSITIVE DUCT JOINT ROLLED SEALANT MAY BE USED IN PLACE OF MASTIC. SEALANT SHALL COMPLY WITH THE FOLLOWING:

a.

MILL FINISH ALUMINUM SUBSTRATE WITH GRAY ADHESIVE.

b.

MINIMUM 30 MIL THICK

c.

MIN. 17 LB PER LINEAR INCH PEEL STRENGTH

d.

MAX FLAME SPREAD OF 25, MAX SMOKE DEVELOPED OF 50 WHEN TESTED IN ACCORDANCE WITH ASTM G-53.

e.

VOC: 0 G/L, COMPLIANT WITH LEED SCAQMD RULE 1168.

f.

PRESSURE CLASSES UP TO 10" W.C.

F.

DUCT CLEANING

1. PROTECT DUCTWORK AGAINST ENTRY OF FOREIGN MATTER DURING CONSTRUCTION. PROVIDE TEMPORARY END CAPS AND SEALS. PROVIDE TEMPORARY FILTERS OVER RETURN OR EXHAUST AIR INLETS IF DUCTWORK IS USED DURING CONSTRUCTION.

2. REMOVE ALL DIRT AND FOREIGN MATTER AND CLEAN DIFFUSERS, REGISTERS, AND GRILLES BEFORE OPERATING FANS.

G.

SEALING DUCT PENETRATIONS

1. THRU NON-RATED WALLS WHERE DRYWALL, CONCRETE, OR MASONRY EXTENDS TO STRUCTURE. FILL VOID BETWEEN DUCT AND WALL WITH MINERAL WOOL AND CAULK BOTH SIDES WITH NON-HARDENING CAULK.
- ### 23 33 00 DUCTWORK ACCESSORIES
- A.

GENERAL - ALL DUCT ACCESSORIES SHALL BE CONSTRUCTED OF SAME MATERIAL AS DUCTWORK BEING INSTALLED IN.

B.

TURNING VANES

1. MANUFACTURERS: AERO/DYNE CO. H.E.P., HART & COOLEY, UNITED MCGILL, SEMCO.

2. RECTANGULAR DUCTWORK: AIRFOIL TURNING VANES IN ACCORDANCE WITH SMACNA FIG. 2-3 AND 2-4. VANE RADIUS AS PROVIDED BY AERO/DYNE H.E.P. OR 4-1/2 INCHES WITH A 3-1/2 INCH SPACING.

3. ROUND DUCTWORK: TWO-PIECE MITERED, MINIMUM 20 GAUGE.

C.

CONTROL DAMPER INSTALLATION

1. RECEIVE CONTROL DAMPERS FROM TEMPERATURE CONTROL CONTRACTOR AND INSTALL DAMPERS.

2. DAMPER SECTIONS AND MULTIPLE SECTION ASSEMBLIES MUST BE COMPLETELY SQUARE AND FREE FROM RACKING, TWISTING, OR BENDING.

3. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION OF CONTROL DAMPERS.

4. INSTALL EXTENDED SHAFT OR JACKSHAFT PER MANUFACTURER'S INSTRUCTIONS.

5. PROVIDE A VISIBLE INDICATOR OF DAMPER POSITION ON THE DRIVE SHAFT END.

6. AFTER INSTALLATION OF LOW-LEAKAGE DAMPERS WITH SEALS, CAULK BETWEEN FRAME AND DUCT OR OPENING TO PREVENT LEAKAGE AROUND PERIMETER OF DAMPER.

D.

MANUAL VOLUME DAMPERS

1. MANUFACTURERS: RUSKIN, VENT PRODUCTS, UNITED MCGILL.

2. DAMPERS WITH EXTENDED SHAFTS AND QUADRANTS, OPERATOR WITH LOCKING DEVICE, POSITION INDICATOR, AND ELEVATED PLATFORM FOR EXTERNALLY INSULATED DUCTWORK.

3. EVERY SUPPLY, RETURN AND EXHAUST GRILLE SHALL HAVE EITHER A VOLUME DAMPER IN THE BRANCH DUCT OR AT THE GRILLE WHERE SHOWN. IF ONE IS NOT SHOWN, CONTRACTOR SHALL PROVIDE VOLUME DAMPER IN DUCT IF DUCT IS ACCESSIBLE, OTHERWISE AT THE GRILLE.

4. RECTANGULAR DAMPERS WHICH DO NOT EXCEED 12" HIGH OR 36" WIDE: BUTTERFLY DAMPER, MINIMUM 22 GAUGE. SHAFT ALONG ENTIRE LENGTH OF DAMPER FOR DAMPERS EXCEEDING 18" IN WIDTH.

5. RECTANGULAR DAMPERS GREATER THAN 12" HIGH OR 36" WIDE: MULTI-BLADE DAMPER WITH CONNECTING LINKAGE TO CONTROL FROM A SINGLE POINT. BLADES MINIMUM 16 GAUGE WITH OPPOSED BLADE ACTION.

6. ROUND DAMPERS: MINIMUM 20 GAUGE BUTTERFLY DAMPER.

E.

TAKE-OFF FITTINGS

1. MANUFACTURERS: FLEXMASTER, UNITED MCGILL.

2. ROUND BRANCH TAKE-OFFS TO MULTIPLE GRILLES SHALL BE CONICAL.

3. RECTANGULAR BRANCH TAKE-OFFS TO MULTIPLE GRILLES SHALL BE PER DUCT FITTING DETAIL ON PLANS.

4. ROUND TAKE-OFFS TO INDIVIDUAL GRILLES AND SLOT DIFFUSERS: ONE PIECE SPIN-IN WITH INTEGRAL FACTORY INSTALLED LOCKING TYPE BALANCING DAMPERS.

F.

DUCT ACCESS DOORS

1. MANUFACTURERS: CESCO, FLEXMASTER, VENT PRODUCTS, KEES, UNITED MCGILL, SEMCO, DUCTMATE.

2. HINGE, LATCHES, HANDLES, AND RUBBER GASKET IN FRAME. 1" INSULATED DOUBLE WALL CONSTRUCTION FOR DOORS IN LINED OR EXTERNALLY INSULATED DUCTWORK. ATTACHMENT CABLES FOR SPIN-IN UNITS. DOOR SUITABLE FOR DUCT STATIC PRESSURE CLASS.

3. DOOR SIZE 2" LESS THAN THE WIDTH OF THE DUCT (MAX. DOOR SIZE 24"x 24" (24" DIA.).

4. ROUND DUCTWORK: 16 GAUGE ROLLED SHEET METAL HINGED ACCESS DOOR WITH BUCKLE LOCKS.

5. PROVIDE AT:

a.

MOTOR OPERATED AND BACKDRAFT DAMPERS

b.

UPSTREAM SIDE OF TURNING VANES IN RETURN AND EXHAUST DUCTWORK

c.

AT ANY DEVICE IN THE DUCT WHICH REQUIRES MAINTENANCE, SERVICE OR CLEANING.

6. USE HINGED ACCESS DOORS WHERE POSSIBLE. USE CAM OPERATED REMOVABLE DOORS WHERE SPACE PREVENTS THE OPENING OF A HINGED MODEL.

G.

FLEXIBLE CONNECTIONS

1. MANUFACTURERS: VENTFABRICS, DURO-DYNE.

2. MATERIAL BOLTED SECURELY TO THE EQUIPMENT AND CONNECTING DUCTWORK WITH #16 GAUGE GALVANIZED IRON BAND (LOOP) CLAMPS BOLTED TIGHT TO MAKE AN AIRTIGHT CONNECTION, MINIMUM 6" WIDE.

3. PROVIDE AT INLET AND OUTLET OF ALL ROOFTOP UNITS AND FANS IN ACCORDANCE WITH SMACNA FIGURE 2-19.

4. CONVENTIONAL INTERIOR: VENTGLAS, -20 TO 200 DEG F., 30 OZ. PER SQUARE YARD GLASS FABRIC DOUBLE COATED WITH NEOPRENE, UL 214 APPROVED.

H.

BACKDRAFT DAMPERS

1. MANUFACTURERS: RUSKIN, VENT PRODUCTS.

2. ALUMINUM FRAME AND BLADE CONSTRUCTION WITH BLADE AND EDGE SEALS. LEAKAGE LESS THAN 12 CFM PER SQ. FT. AT 1/2" W.G., COUNTERBALANCE TO OPEN AT APPROXIMATELY 1/8" STATIC PRESSURE.
- ### 23 90 00 TEMPERATURE CONTROLS
- A.

ALL PRODUCTS USED IN THIS INSTALLATION SHALL BE NEW, CURRENTLY UNDER MANUFACTURE, AND SHALL BE APPLIED IN STANDARD OFF THE SHELF PRODUCTS. THIS INSTALLATION SHALL NOT BE USED AS A TEST SITE FOR ANY NEW PRODUCTS UNLESS EXPLICITLY APPROVED BY THE ENGINEER IN WRITING. SPARE PARTS SHALL BE AVAILABLE FOR AT LEAST 5 YEARS AFTER COMPLETION OF THIS CONTRACT.
- B.

ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

C.

LABOR AND MATERIALS FOR THE CONTROL SYSTEM SPECIFIED SHALL BE WARRANTED FREE FROM DEFECTS FOR A PERIOD OF 12 MONTHS AFTER FINAL COMPLETION AND ACCEPTANCE. CONTROL SYSTEM FAILURES DURING THE WARRANTY PERIOD SHALL BE ADJUSTED, REPAIRED, OR REPLACED AT NO ADDITIONAL COST OR REDUCTION IN SERVICE TO THE OWNER.

D.

POWER SUPPLIES: UL LISTED TRANSFORMERS WITH CLASS 2 CURRENT-LIMITING TYPE OR OVERCURRENT PROTECTION; LIMIT CONNECTED LOADS TO 80 PERCENT OF RATED CAPACITY. DC POWER SUPPLY SHALL MATCH OUTPUT CURRENT AND VOLTAGE REQUIREMENTS AND BE FULL-WAVE RECTIFIER TYPE.

E.

POWER LINE FILTERING: INTERNAL OR EXTERNAL TRANSIENT VOLTAGE AND SURGE SUPPRESSION.

F.

THERMOSTAT INSTALLATION

1. INSTALL ALL THERMOSTATS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

2. ROOM THERMOSTATS SHALL BE INSTALLED ON CONCEALED JUNCTION BOXES PROPERLY SUPPORTED BY THE WALL FRAMING WITH CONDUIT STUB TO ABOVE THE CEILING.

3. COORDINATE LOCATION OF THERMOSTATS WITH PLANS AND ROOM DETAILS BEFORE INSTALLATION.

4. ALL WIRES ATTACHED TO THERMOSTAT SHALL BE AIR SEALED IN THEIR RACEWAYS OR IN THE WALL TO STOP AIR TRANSMITTED FROM OTHER AREAS AFFECTING SENSOR READINGS.

G.

ELECTRICAL WIRING AND CONNECTION INSTALLATION

1. ALL CONTROL AND INTERLOCK WIRING SHALL COMPLY WITH NATIONAL AND LOCAL ELECTRICAL CODES AND ELECTRICAL SPECIFICATION. WHERE THE REQUIREMENTS OF THIS SECTION DIFFER WITH THOSE IN THE ELECTRICAL SPECIFICATIONS, THE MORE STRINGENT REQUIREMENTS SHALL TAKE PRECEDENCE.

2. ALL NEC CLASS 1 (LINE VOLTAGE) WIRING SHALL BE UL LISTED IN APPROVED RACEWAY PER NEC AND ELECTRICAL SPECIFICATIONS.

3. SEE ELECTRICAL SPECIFICATIONS FOR CONDUIT REQUIREMENTS.

4. ALL LOW-VOLTAGE WIRING SHALL MEET NEC CLASS 2 REQUIREMENTS. (LOW-VOLTAGE POWER CIRCUITS SHALL BE SUB-FUSED WHEN REQUIRED TO MEET CLASS 2 CURRENT-LIMIT).

5. ALL WIRING IN MECHANICAL, ELECTRICAL, OR SERVICE ROOMS AND WHERE SUBJECT TO DAMAGE SHALL BE INSTALLED IN RACEWAYS.

6. WHERE NEC CLASS 2 (CURRENT-LIMITED) WIRES ARE IN CONCEALED AND ACCESSIBLE LOCATIONS, APPROVED CABLES NOT IN RACEWAY MAY BE USED PROVIDED THAT CABLES ARE UL LISTED FOR THE INTENDED APPLICATION.

7. DO NOT INSTALL CLASS 2 WIRING IN RACEWAY, BOXES AND PANELS CONTAINING CLASS 1 WIRING.

8. SUPPORT CABLES AND RACEWAYS FROM STRUCTURAL MEMBERS. CABLES AND RACEWAYS SHALL NOT BE SUPPORTED BY DUCTWORK, ELECTRICAL RACEWAYS, PIPING, OR CEILING SUSPENSION SYSTEMS. SECURE AND SUPPORT CABLE AT INTERVALS NOT EXCEEDING 30 INCHES AND NOT MORE THAN 6 INCHES FROM CABINETS, BOXES, FITTINGS, OUTLETS, RACKS, FRAMES, AND TERMINALS.

9. INSTALL WIRING IN SLEEVES WHERE IT PASSES THROUGH WALLS AND FLOORS. MAINTAIN FIRE RATING AT ALL PENETRATIONS.

10. SIZE OF WIRE AND RACEWAY SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND BE PER THE MANUFACTURER'S RECOMMENDATION AND NEC REQUIREMENTS.

11. FLEXIBLE METAL RACEWAYS ARE NOT PERMITTED OVER 6 FEET.

### 23 90 10 SEQUENCE OF OPERATION

A.

ROOFTOP AIR CONDITIONING UNITS

1. PROVIDE A HONEYWELL VISION PRO TH8320R1003 SEVEN DAY PROGRAMMABLE HEATING/COOLING THERMOSTAT CAPABLE OF 2 STAGES OF HEATING AND 2 STAGES OF COOLING (CONVENTIONAL), WITH ECONOMIZER/TIME OF DAY OUTPUT.

a.

SET FAN SETTING TO "ON" FOR FAN TO RUN CONTINUOUSLY IN OCCUPIED PERIODS, AND TO RUN WITH EQUIPMENT OPERATION DURING UNOCCUPIED PERIODS.

b.

SET INSTALLER SETUP NUMBERS TO MATCH INSTALLED SYSTEM IN ADDITION TO THE FOLLOWING (CONTACT ENGINEER WITH ANY QUESTIONS REGARDING ANY SETUP NUMBERS):

1).

101 APPLICATION: COMMERCIAL

2).

326 EXTENDED FAN RUN TIME IN HEAT: 60 SECONDS.

2. ECONOMIZER PACKAGE PROVIDED WITH ROOFTOP UNIT. MONITOR FAULT DETECTION AND DIAGNOSTICS SYSTEM FOR FAULTS.

3. MOUNT AND WIRE ALL CONTROL WIRING ASSOCIATED WITH THE ROOFTOP AND PROVIDE ANY ADDITIONAL DEVICES NECESSARY FOR A COMPLETE OPERATIONAL SYSTEM.

### 23 95 00 TESTING, ADJUSTING AND BALANCING

A.

QUALITY ASSURANCE

1. PERFORM TOTAL SYSTEM BALANCE IN ACCORDANCE WITH AABC NATIONAL STANDARDS FOR FIELD MEASUREMENT AND INSTRUMENTATION, TOTAL SYSTEM BALANCE OR NEBB PROCEDURAL STANDARDS FOR TESTING, BALANCING AND ADJUSTING OF ENVIRONMENTAL SYSTEMS, AND ASHRAE STANDARD 111. THE TESTING, ADJUSTING AND BALANCING (TAB) CONTRACTOR SHALL BE AN INDEPENDENT COMPANY SPECIALIZING IN THE TESTING, ADJUSTING, AND BALANCING OF SYSTEMS WITH MINIMUM THREE YEARS EXPERIENCE AND NOT ASSOCIATED WITH THE SUPPLIERS OF EQUIPMENT OR THE INSTALLING CONTRACTOR.

2. PERFORM WORK UNDER SUPERVISION OF AABC CERTIFIED TEST AND BALANCE ENGINEER OR NEBB CERTIFIED TESTING, BALANCING AND ADJUSTING SUPERVISOR.

B.

SUBMITTALS

1. CONTRACTOR SHALL SUBMIT THE FINAL TESTING AND BALANCING REPORT PRIOR TO PROJECT COMPLETION AND IN ADVANCE OF DATE OF OCCUPANCY. SUBMIT REPORTS ON AABC NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE OR NEBB FORMS.

2. SUBMIT THE DESIGN AND ACTUAL DATA FOR EACH SCHEDULED PIECE OF EQUIPMENT: MODEL; SUPPLY, RETURN, AND OUTSIDE AIR FLOWS; STATIC PRESSURE PROFILES OF AIR HANDLING UNIT COMPONENTS AND ALL FANS; FAN RPM, BHP, AMPERAGE; FAN AND MOTOR SHEAVE, DIAMETER, BORE AND MAKE; BELT SIZE AND QUANTITY; MOTOR SHEAVE CENTER LINE AND OPERATOR DISTANCE; ROOM AIR FLOW.

C.

INSTALLATION TOLERANCES

1. AIR HANDLING SYSTEMS: ADJUST SUPPLY SYSTEMS TO WITHIN PLUS OR MINUS 5 PERCENT OF DESIGN AND RETURN AND EXHAUST SYSTEMS TO PLUS OR MINUS 10 PERCENT OF DESIGN.

2. AIR OUTLETS AND INLETS: ADJUST TOTAL AIR FLOW TO SPACE TO WITHIN PLUS 10 PERCENT AND MINUS 5 PERCENT OF DESIGN.

3. ADJUST OUTLETS AND INLETS IN SPACE TO WITHIN PLUS OR MINUS 10 PERCENT OF DESIGN.

D.

AIR SYSTEM BALANCE

1. VARY TOTAL SYSTEM AIR QUANTITIES BY ADJUSTING FAN SPEEDS. VARY BRANCH AIR QUANTITIES BY DAMPER REGULATION.

2. ADJUST SETTINGS ON DIRECT DRIVE FANS WITH ECM MOTORS AS REQUIRED TO ACHIEVE DESIGN AIRFLOW.

3. ADJUST OUTSIDE AIR, RETURN AIR, AND EXHAUST AIR AUTOMATIC DAMPERS FOR DESIGN CONDITIONS.

4. TEST AIR HANDLING UNITS AT MINIMUM AND 100% OUTSIDE AIR.

E.

FANS WITH FIXED MOTOR SHEAVES - TEST THE FAN EQUIPMENT. IF THE DESIGN CONDITIONS ARE NOT OBTAINED, CALCULATE THE FINAL FIXED MOTOR SHEAVE AND/OR BELTS REQUIRED TO OBTAIN DESIGN CONDITIONS. HEATING CONTRACTOR SHALL OBTAIN THE FINAL FIXED MOTOR SHEAVE AND BELT(S) FROM THE FAN MANUFACTURER AND TURN THEM OVER TO THE TAB CONTRACTOR FOR INSTALLATION.

## LEGEND

NOTE: ALL SYMBOLS SHOWN MAY NOT APPEAR ON DRAWINGS.

| SYM.                       | ABBR.       | IDENTIFICATION                            | SYM. | ABBR.      | IDENTIFICATION                           |
|----------------------------|-------------|---|------|------------|--|
| DUCTWORK                   |             |   |      |            |  |
|                            | R           | DUCT (RISE/DROP)                          |      | SA OR OA   | DUCT DOWN OR AWAY                        |
|                            |             | RADIUS ELBOW                              |      | EA         | DUCT DOWN OR AWAY                        |
|                            |             | SQUARE ELBOW WITH TURNING VANES           |      | RA         | DUCT DOWN OR AWAY                        |
|                            |             | SQUARE ELBOW WITHOUT TURNING VANES        |      | VD         | VOLUME DAMPER                            |
|                            |             | SQUARE OR RECTANGULAR BRANCH TAKEOFF      |      | BDD        | BACKDRAFT DAMPER                         |
|                            |             | RECTANGULAR TO ROUND TAKEOFF              |      | MOD        | MOTOR OPERATED DAMPER                    |
|                            |             | TEE WITH TURNING VANES                    |      | DSD        | DUCT SMOKE DETECTOR                      |
|                            |             | ROUND TO ROUND CONICAL TAKEOFF            |      | FD         | FIRE DAMPER                              |
|                            |             | ECCENTRIC TRANSITION                      |      | SD         | SMOKE DAMPER                             |
|                            |             | CONCENTRIC TRANSITION                     |      | FSD        | FIRE/SMOKE DAMPER                        |
|                            |             | SQUARE TO ROUND TRANS.                    |      | SG         | SUPPLY GRILLE                            |
|                            |             | DUCT CAP                                  |      | EG, RG, TG | (EX)HAUST / (R)ETURN / (T)RANSFER GRILLE |
|                            | ALD         | ACOUSTICALLY LINED DUCT                   |      | UCD        | UNDERCUT DOOR (BY GC)                    |
|                            | SA          | SUPPLY AIR DUCT UP                        |      | DTG (0 SF) | DOOR TRANSFER GRILLE                     |
|                            | OA          | OUTSIDE AIR DUCT UP                       |      | FC         | FLEXIBLE CONNECTION                      |
|                            | RA          | RETURN AIR DUCT UP                        |      | AD         | ACCESS DOOR                              |
|                            | EA          | EXHAUST AIR DUCT UP                       |      |            |  |
| MISCELLANEOUS AND CONTROLS |             |   |      |            |  |
|                            |             | DETAIL OR SECTION NUMBER SHEET NUMBER     |      |            | STATIC PRESS. SENSOR                     |
|                            | HD          | HUMIDISTAT / HUMID. SENSOR                |      | SS         | SLAB TEMPERATURE SENSOR                  |
|                            | TD          | THERMOSTAT / TEMP. SENSOR                 |      |            | COMBINATION STARTER                      |
|                            | VFD         | VARIABLE FREQUENCY DRIVE                  |      | MS         | MANUAL STARTER                           |
|                            | AFF         | ABOVE FINISHED FLOOR                      |      | OC         | ON CENTER                                |
|                            | AFG         | ABOVE FINISHED GRADE                      |      | PC         | PLUMBING CONTRACTOR                      |
|                            | AP          | ACCESS PANEL                              |      | RAO        | RETURN AIR OPENING                       |
|                            | BJ          | BETWEEN JOISTS                            |      | TAO        | TRANSFER AIR OPENING                     |
|                            | BOD         | BOTTOM OF DUCT                            |      | EAO        | EXHAUST AIR OPENING                      |
|                            | BOG         | BOTTOM OF GRILLE                          |      | TCC        | TEMPERATURE CONTROL CONTRACTOR           |
|                            | EC          | ELECTRICAL CONTRACTOR                     |      | TCP        | TEMPERATURE CONTROL PANEL                |
|                            | GC          | GENERAL CONTRACTOR / CONSTRUCTION MANAGER |      | TJ         | THRU JOISTS                              |
|                            | HC          | HVAC CONTRACTOR                           |      | TYP.       | TYPICAL                                  |
|                            | IMP         | INSULATED METAL PANEL                     |      | TTT        | TIGHT TO STRUCTURE                       |
|                            | NIC         | NOT IN CONTRACT                           |      | TV         | TURNING VANES                            |
|                            | NTS         | NOT TO SCALE                              |      | WWM        | WELDED WIRE MESH                         |
| PIPING                     |             |   |      |            |  |
|                            |             | SHUTOFF VALVE                             |      | PRV        | PRESS. REDUCING VALVE                    |
|                            |             | BALANCE VALVE                             |      | SRV        | SAFETY RELIEF VALVE                      |
|                            |             | CHECK VALVE                               |      |            | STEAM TRAP                               |
|                            |             | COMBINATION VALVE                         |      |            | ANCHOR                                   |
|                            |             | STRAINER                                  |      |            | GUIDE                                    |
|                            |             | DRAIN VALVE                               |      |            | PIPPING BOTTOM TAKE-OFF                  |
|                            |             | GLOBE VALVE                               |      |            | PIPPING TOP TAKE-OFF                     |
|                            |             | THERMOMETER                               |      |            | PIPE DOWN OR AWAY                        |
|                            | PG          | PRESSURE GAUGE                            |      |            | PIPE UP                                  |
|                            |             | GAUGE COCK                                |      |            | PIPPING CAP                              |
|                            | TCV         | TEMP. CONTROL VALVE                       |      |            | UNION/FLANGE                             |
|                            |             | TEST CONNECTION                           |      |            | PIPE PITCH DOWN                          |
|                            | MAV         | MANUAL AIR VENT                           |      |            | CONCENTRIC REDUCER                       |
|                            | FM          | FLOW METER                                |      |            | ECCENTRIC REDUCER                        |
|                            |             | FLOW CONTROL / SHUTOFF VALVE              |      | FC         | FLEXIBLE CONNECTION                      |
|                            |             | FLOW CONTROL VALVE                        |      | BF         | BLIND FLANGE                             |
|                            | GEO-S/GEO-R | GEOTHERMAL SUPPLY/RETURN                  |      | HWS/HWR    | HOT WATER SUPPLY/RETURN                  |
|                            | CTS/CTR     | COOLING TOWER WATER SUPPLY/RETURN         |      | GS/GR      | GLYCOL SUPPLY/RETURN                     |
|                            | MU          | MAKEUP WATER                              |      | RWS/RWR    | RADIANT WATER SUPPLY/RETURN              |
|                            | LPS/LPC     | LOW PRESSURE STEAM/CONDENSATE             |      | SMS/SMR    | SNOW MELT SUPPLY/RETURN                  |
|                            | HPS/HPC     | HIGH PRESSURE STEAM/CONDENSATE            |      | FOS/FOR    | FUEL OIL SUPPLY/RETURN                   |
|                            | PC          | PUMPED CONDENSATE                         |      | BF         | BOILER FEED                              |
|                            | GLP         | NATURAL GAS/LP GAS                        |      | CF         | CHEMICAL FEED                            |
|                            | D           | DRAIN                                     |      | A          | COMPRESSED AIR                           |
|                            | CHWS/CHWR   | CHILLED WATER SUPPLY/RETURN               |      | V          | VENT                                     |
| FIRE RATED WALLS           |             |   |      |            |  |
|                            |             | FIRE - 1 HOUR                             |      |            | FIRE - 3 HOUR                            |
|                            |             | FIRE - 2 HOUR                             |      |            | FIRE - 4 HOUR                            |

| PROJECT DESIGN CRITERIA |                              |      |
|-------------------------|------------------------------|------|
| MECHANICAL CODE         | 2020 NYMCC                   |      |
| ENERGY CODE             | 2020 NYECC                   |      |
| SEISMIC DESIGN CATEGORY | B                            |      |
| NEAREST ASHRAE CITY     | NEW YORK STEWART INTL. ARPT. |      |
| ELEVATION               | 491                          |      |
|                         | OUTSIDE                      |      |
|                         | DB                           | WB   |
| WINTER:                 | 2.7                          | N/A  |
| SUMMER:                 | 90.3                         | 75.7 |

BASED ON ASHRAE 0.4% DESIGN CONDITIONS.

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100 Camelot Drive  
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920-926-9800  
excelengineer.com

COLLABORATION

AspenDental

PROJECT INFORMATION

PROPOSED BUILD-OUT FOR:  
**ASPEN DENTAL**  
6 LOCEY LANE • HARRIMAN, NY 10926

PROFESSIONAL SEAL

SHEET DATES

SHEET ISSUE JULY 12, 2023

REVISIONS

JOB NUMBER

230264900

SHEET NUMBER

H0.1

HVAC LEGEND AND SPECIFICATIONS





AspenDental

PROPOSED BUILD-OUT FOR:

**ASPEN DENTAL**

6 LOCEY LANE • HARRIMAN, NY 10926

# H1.1

10 EXHAUST AIR DUCT UP AT 45 DEG. INTO EXHAUST AIR DUCT UP TO ROOF CAP.



## HVAC FIRST FLOOR PLAN





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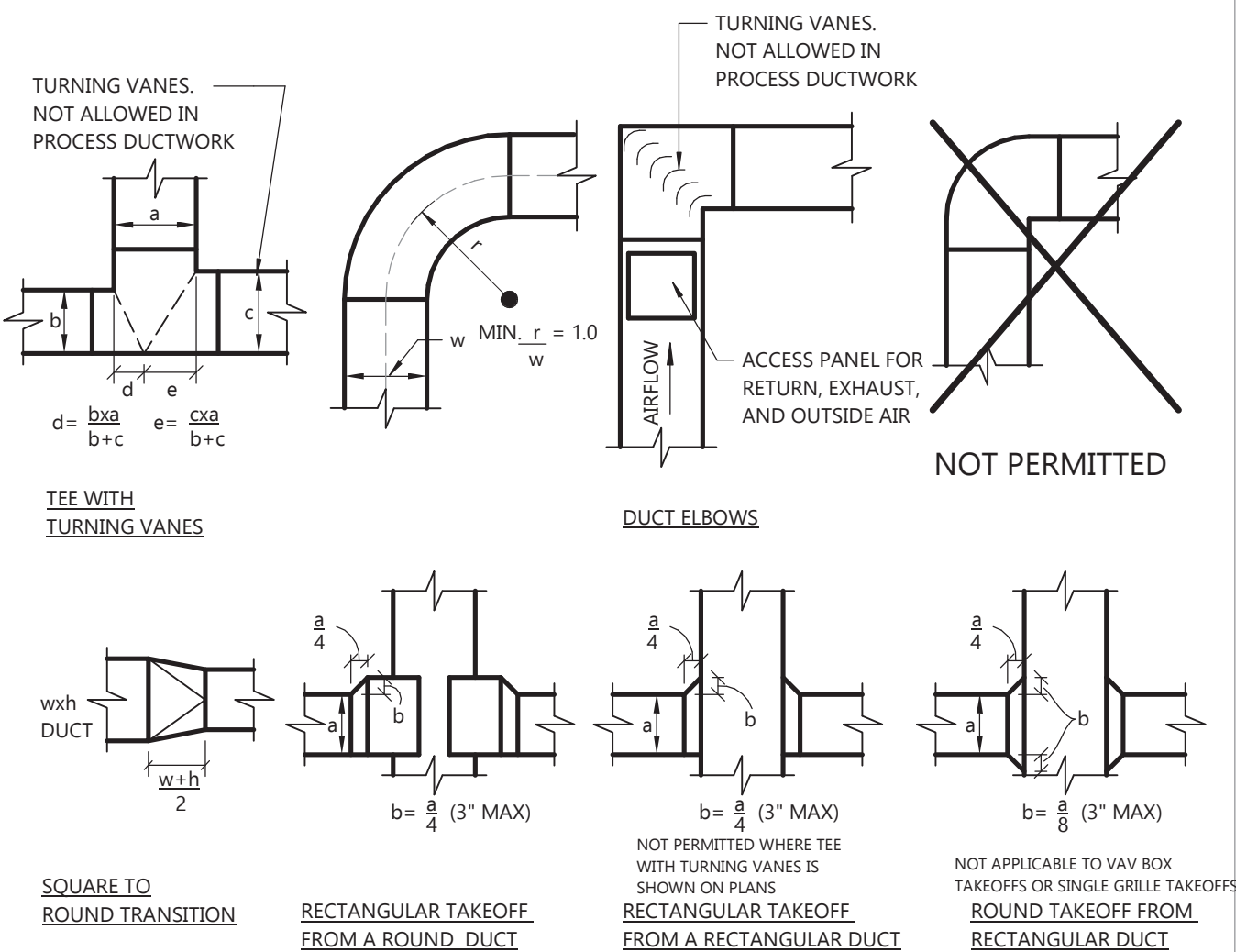
JOB NUMBER

230264900

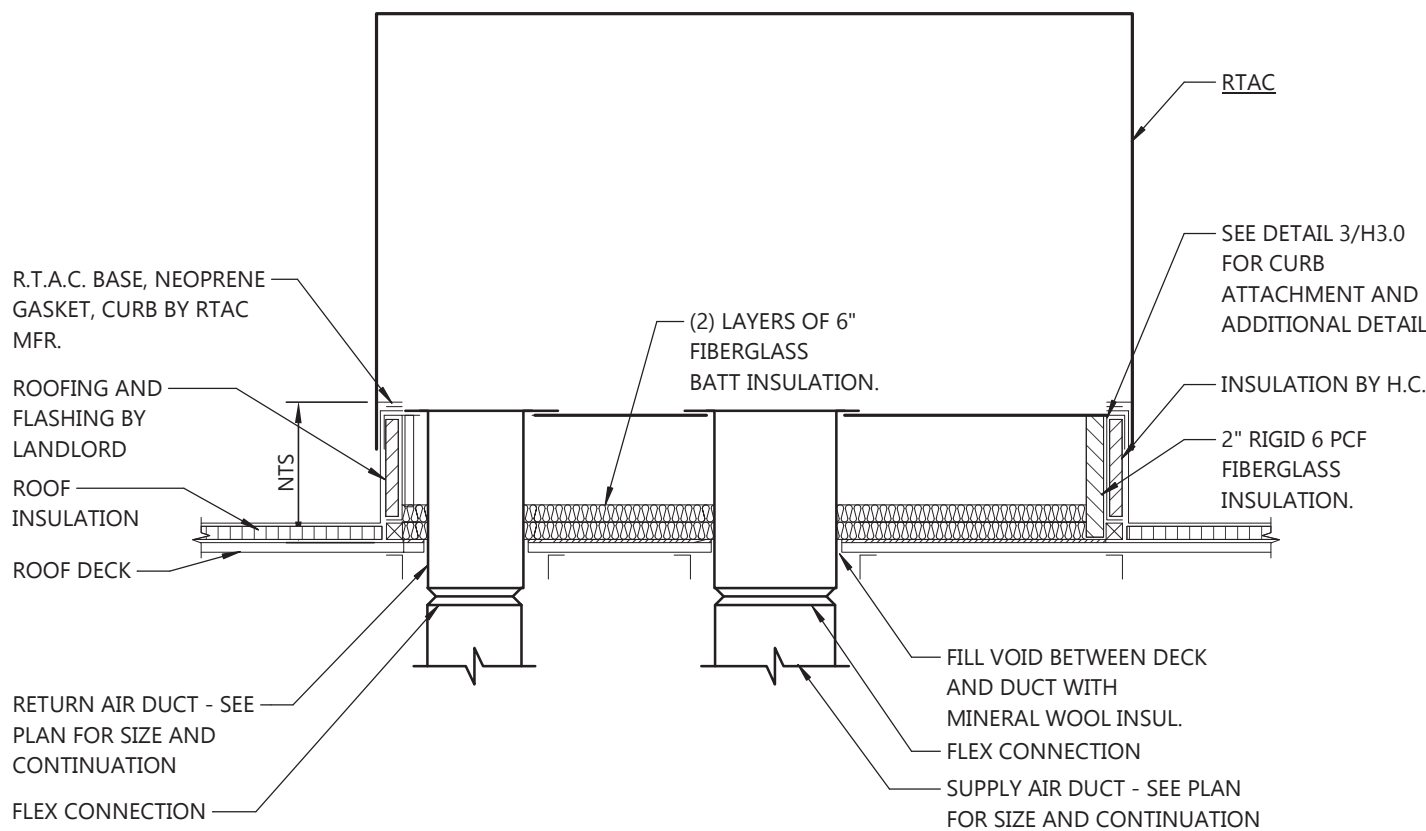
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H3.0

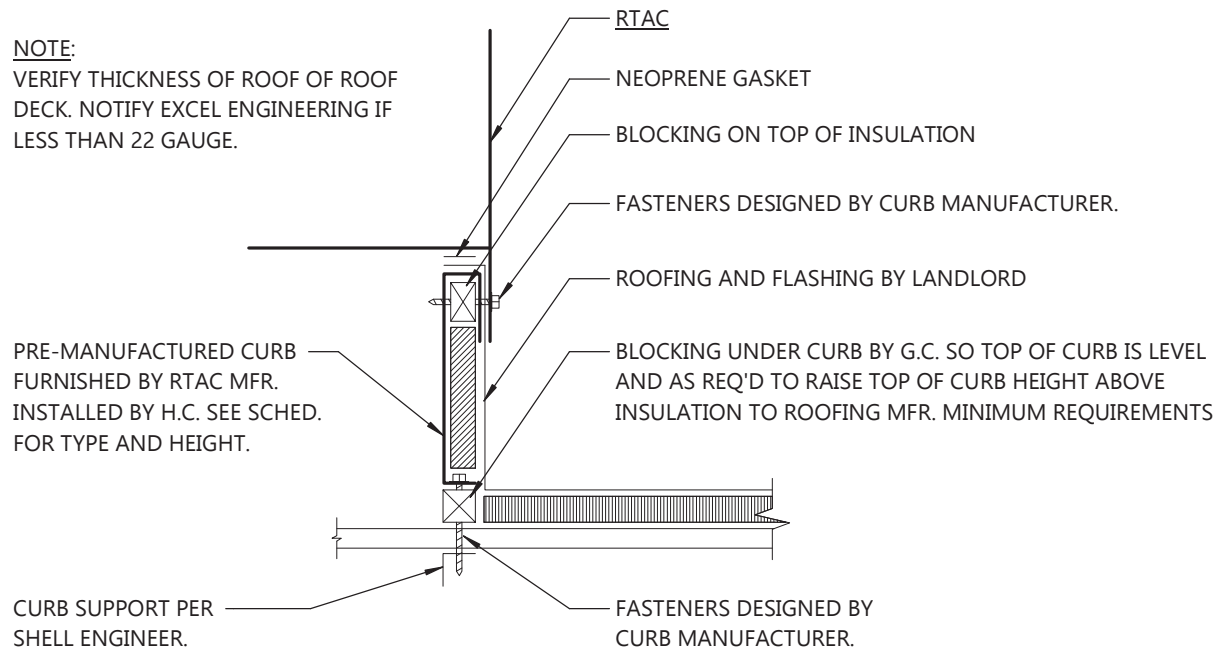
HVAC DETAILS



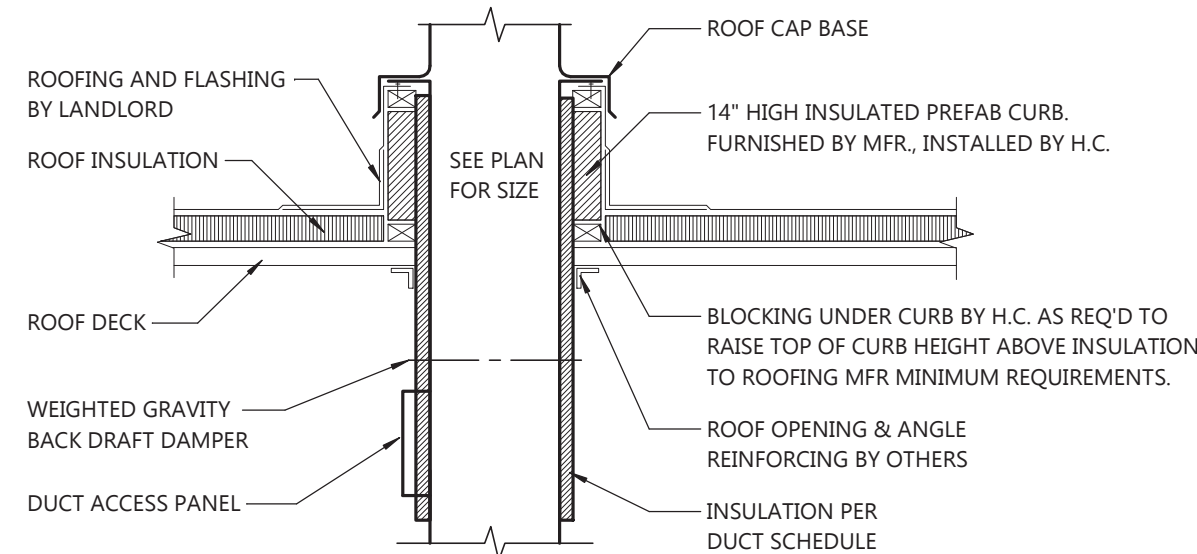
1 DUCT FITTING DETAILS  
H3.0 NOT TO SCALE



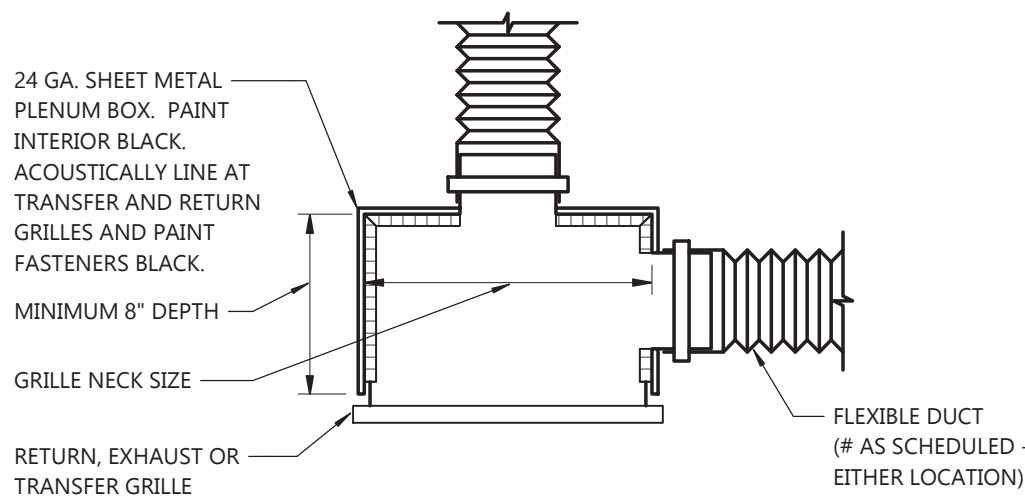
2 TYPICAL RTAC AND CURB DETAIL  
H3.0 NOT TO SCALE



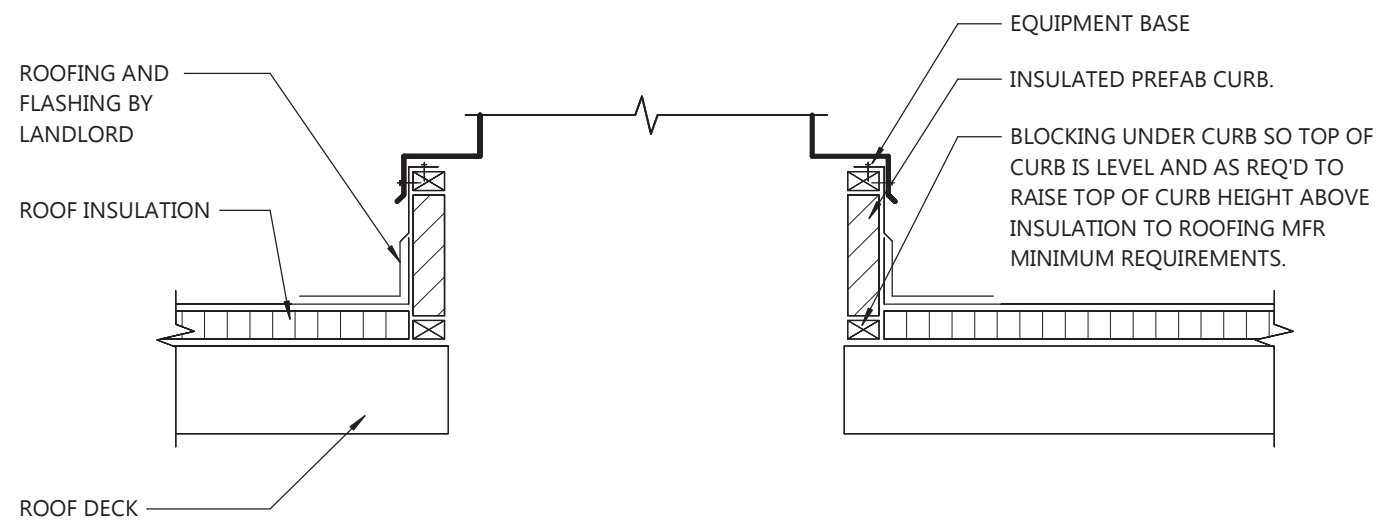
3 RTAC AND CURB ATTACHMENT DETAIL  
H3.0 NOT TO SCALE



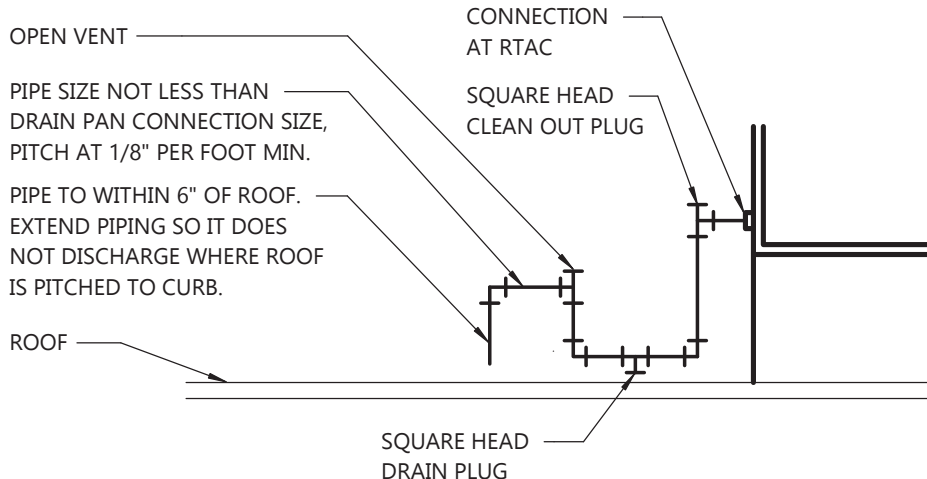
5 ROOF CAP AND CURB DETAIL  
H3.0 NOT TO SCALE



6 GRILLE PLENUM BOX DETAIL  
H3.0 NOT TO SCALE



4 TYPICAL ROOF CURB DETAIL  
H3.0 NOT TO SCALE



- NOTES:
- FILL TRAP MANUALLY ON INITIAL START-UP.
  - TRAP EACH COMPONENT DRAIN CONNECTION.
  - PIPE SIZE TO MATCH DRAIN CONNECTION AT RTAC.

8 RTAC CONDENSATE DRAIN TRAP PIPING DETAIL  
H3.0 NOT TO SCALE

#### UNITS WITH COVER PLATE IN BASEPAN

##### Step 1 — Mount the Cover Plate

The cover plate is located in the compressor compartment of the unit, directly below the control box (see Fig. 1). Remove the blank cover plate from the unit. Discard the blank cover plate but reserve the screws. Depending on the number of connectors required, select either the (3) hole or the (4) hole cover plate. Adhere the gasket to the underside of the selected cover plate. Attach the desired bulkhead connectors to the cover plate (see Table 3) and then, using the reserved screws, attach the cover plate with the bulkhead connectors to the opening in the basepan.

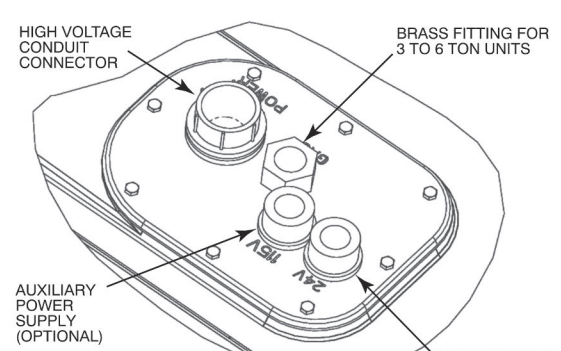


Fig. 1 — Thru-Base Gas Connection Fittings (Four Hole Cover Plate Shown)

| Table 3 — Hole Size Requirements |  |  |
|----------------------------------|--|--|
| COUPLING SIZE                    | USAGE  | REQUIRED HOLE SIZE (MAX) (PREF-PUNCHING) |
| 1/2-in.                          | 24-v control wiring  | 7/8-in. (22.2 mm)                        |
| 1/2-in.                          | 115-v accessory wiring   | 7/8-in. (22.2 mm)                        |
| 1/2-in.                          | High-voltage power wiring and accessory convenience outlet wiring (3 to 8 for units) | 1 1/8-in. (29.0 mm)                      |
| 1/2-in. NPT                      | Gas line   | 1 1/8-in. (29.0 mm)                      |

##### Step 2 — Run Wiring and Connect Conduit

IMPORTANT: Liquid-tight conduit must be used on outdoor appliances.

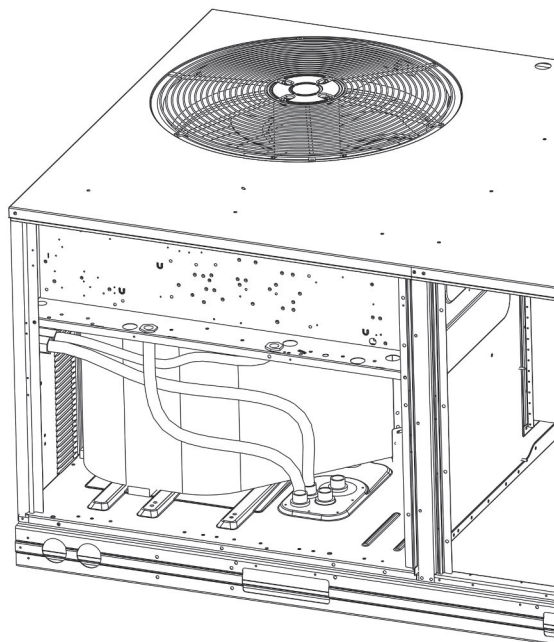


Fig. 2 — Typical Conduit Installation

NOTE: -CAP AND SEAL ANY UNUSED FITTINGS.

7 THRU-BASE CONNECTION DETAIL  
H3.0 NOT TO SCALE





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HVAC SCHEDULES

ELECTRIC WALL HEATER SCHEDULE - (E.W.H.)

| NO. | CFM | EAT F | LAT F | MBH | KW  | THERMOSTAT                         | CABINET RECESS DEPTH | HGT. AFF | MODEL    | REMARKS |
|-----|-----|-------|-------|-----|-----|------------------------------------|----------------------|----------|----------|---------|
| 1   | 100 | 60    | 107   | 5.1 | 1.5 | INTEG., PREWIRED, TAMPER-RESISTANT | 3-3/4"               | 12"      | FRC-1512 | "BERKO" |

- ACCEPTABLE MANUFACTURERS: BERKO, RAYWALL, Q-MARK, MARKEL.
- PROVIDE ALL EWH'S WITH PREWIRED DISCONNECT SWITCH, PREWIRED AUTOMATIC RESET THERMAL OVERLOAD PROTECTION, BUILT-IN FAN DELAY CONTROLS, 16 GAUGE FRONT BAR GRILLE.
- COLOR TO BE NORTHERN WHITE. PROVIDE COLOR SAMPLE TO OWNER FOR FINAL SELECTION AND CONFIRMATION.

SUPPLY GRILLE SCHEDULE (S.G.)

| NO.  | TYPE   | CFM RANGE | NECK/ FACE SIZE | INLET DUCT DIA. | MAT'L | VOL. DMPR | FINISH | FRAME  | THROW | MODEL  | REMARKS |
|------|--------|-----------|-----------------|-----------------|-------|-----------|--------|--------|-------|--------|---------|
| 5-6  | LOUVER | 0-75      | 24 X 24         | 6"              | ALUM. | (1)       | WHITE  | LAY-IN | 4-WAY | TMS-AA | "TITUS" |
| 5-8  | LOUVER | 76-275    | 24 X 24         | 8"              | ALUM. | (1)       | WHITE  | LAY-IN | 4-WAY | TMS-AA | "TITUS" |
| 5-10 | LOUVER | 276-375   | 24 X 24         | 10"             | ALUM. | (1)       | WHITE  | LAY-IN | 4-WAY | TMS-AA | "TITUS" |
| 5-12 | LOUVER | 376-550   | 24 X 24         | 12"             | ALUM. | (1)       | WHITE  | LAY-IN | 4-WAY | TMS-AA | "TITUS" |
| 5-14 | LOUVER | 551-750   | 24 X 24         | 14"             | ALUM. | (1)       | WHITE  | LAY-IN | 4-WAY | TMS-AA | "TITUS" |

- ACCEPTABLE MANUFACTURERS: TITUS, PRICE, KRUEGER, CARNES, SHOEMAKER.
- NOT ALL SUPPLY GRILLES SCHEDULED ARE USED ON THE PROJECT.
- PROVIDE R-6 MOLDED BACKED INSULATION BLANKET.
- BRANCH DUCT SIZE TO GRILLE SHALL BE SAME SIZE AS NECK UNLESS OTHERWISE NOTED.
- (1) VOLUME DAMPER AT THE GRILLE INDICATED BY A "D" AFTER THE GRILLE DESIGNATION. EXAMPLE: SG5D-6 IS SG5-6 WITH A DAMPER.

RETURN GRILLE SCHEDULE (R.G.)

| NO.  | TYPE      | MAX. CFM | NECK/ FACE SIZE | FLEX. DUCT. DIA. | MAT'L | VOL. DMPR | FINISH | FRAME      | MODEL   | REMARKS |
|------|-----------|----------|-----------------|------------------|-------|-----------|--------|------------|---------|---------|
| 2-6  | EGG CRATE | 75       | 24 X 24         | 6"               | ALUM. | (1)       | WHITE  | LAY-IN (3) | 50F (5) | "TITUS" |
| 2-8  | EGG CRATE | 250      | 24 X 24         | 8"               | ALUM. | (1)       | WHITE  | LAY-IN (3) | 50F (5) | "TITUS" |
| 2-10 | EGG CRATE | 450      | 24 X 24         | 10"              | ALUM. | (1)       | WHITE  | LAY-IN (3) | 50F (5) | "TITUS" |
| 2-12 | EGG CRATE | 750      | 24 X 24         | 12"              | ALUM. | (1)       | WHITE  | LAY-IN (3) | 50F (5) | "TITUS" |
| 2-14 | EGG CRATE | 1,100    | 24 X 24         | 14"              | ALUM. | (1)       | WHITE  | LAY-IN (3) | 50F (5) | "TITUS" |
| 2-16 | EGG CRATE | 1,600    | 24 X 24         | 16"              | ALUM. | (1)       | WHITE  | LAY-IN (3) | 50F (5) | "TITUS" |
| 2-18 | EGG CRATE | 2,200    | 24 X 24         | 18"              | ALUM. | (1)       | WHITE  | LAY-IN (3) | 50F (5) | "TITUS" |

- ACCEPTABLE MANUFACTURERS: TITUS, PRICE, KRUEGER, CARNES, SHOEMAKER.
- NOT ALL RETURN GRILLES SCHEDULED ARE USED ON THE PROJECT.
- PROVIDE MIN. 8" DEEP PLENUM BOX AT ALL RETURN GRILLES (TRP).
- BRANCH DUCT SIZE TO GRILLE SHALL BE SAME SIZE AS NECK UNLESS OTHERWISE NOTED.
- (1) VOLUME DAMPER AT THE GRILLE INDICATED BY A "D" AFTER THE GRILLE DESIGNATION. EXAMPLE: RG2D-6 IS RG2-6 WITH A DAMPER.
- (3) SURFACE MOUNT BORDER WITH NO SCREW HOLES FOR LAY-IN APPLICATION.
- (5) 1/2 X 1/2 X 1/2 CORE

DUCTWORK AND DUCTWORK INSULATION SCHEDULE

| SERVICE |                     | LOCATION  | DUCT MAT'L | SMACNA PRESS. CLASS | INSULATION          |                     | INSUL. JACKET |
|---------|---------------------|-----------|------------|---------------------|---------------------|---------------------|---------------|
|         |                     |           |            |                     | RECTANGULAR DUCT    | ROUND DUCT          |               |
| SUPPLY  | SINGLE ZONE SYSTEMS | CONCEALED | GALV. ST.  | +1"                 | 1.5" FLEX. F.G.     | 1.5" FLEX. F.G.     | N.R.          |
| RETURN  | UPSTREAM OF FAN     | CONCEALED | GALV. ST.  | -1"                 | 1.5" FLEX. F.G.     | 1.5" FLEX. F.G.     | N.R.          |
| EXHAUST | DOWNSTREAM OF FAN   | CONCEALED | GALV. ST.  | +1"                 | 1.5" FLEX. F.G. (1) | 1.5" FLEX. F.G. (1) | N.R.          |

- N.R. = NOT REQUIRED
- EXPOSED = VISIBLE FROM OCCUPIED SPACE.
- CONCEALED = HIDDEN FROM VIEW BY WALLS AND CEILINGS.

MATERIALS:

- GALV. STEEL: ASTM A653, LOCK FORMING QUALITY, 1.25 OUNCES/ S.F. ZINC COATING (G90 IN ACCORDANCE WITH ASTM A90 BOTH SIDES).
- ALL JOINTS, LONGITUDINAL AND TRANSVERSE SEAMS AND CONNECTIONS IN DUCTWORK SHALL BE SEALED PER 2020 NYECC 403.11.1.
- (1) INSULATE FROM 18" UPSTREAM OF THE BACKDRAFT DAMPER TO THE POINT WHERE THE DUCT EXITS THE BUILDING.

ELECTRICAL/STARTER/DISCONNECT SCHEDULE

| SYM.   | ELECTRICAL DATA |      |      |      | STARTER |          | FURN. BY | AUX. CONTACT | ACCESS-ORIES | SMOKE DETECTOR | DISCONNECT | FURN. BY | REMARKS  |
|--------|-----------------|------|------|------|---------|----------|----------|--------------|--------------|----------------|------------|----------|----------|
|        | HP              | KW   | AMPS | MCA  | MOP     | VOLT PH. |          |              |              |                |            |          |          |
| RTAC-1 | -               | -    | -    | 28.0 | 40      | 208 3    | INTEG.   | INTEGRAL     | EM           | -              | -          | 3R       | EM (4) - |
| RTAC-2 | -               | -    | -    | 26.0 | 30      | 208 3    | INTEG.   | INTEGRAL     | EM           | -              | -          | 3R       | EM (4) - |
| RTAC-3 | -               | -    | -    | 20.0 | 30      | 208 3    | INTEG.   | INTEGRAL     | EM           | -              | -          | 3R       | EM (4) - |
| EWI-1  | -               | 1.5  | -    | -    | -       | 120 1    | INTEG.   | INTEGRAL     | EM           | -              | -          | R        | EM -     |
| CEF-1  | -               | 0.08 | -    | -    | -       | 120 1    | (1)      | (1)          | EC           | -              | -          | R        | EM -     |
| CEF-2  | -               | 0.08 | -    | -    | -       | 120 1    | (1)      | (1)          | EC           | -              | -          | R        | EM -     |
| CEF-3  | -               | 0.23 | -    | -    | -       | 120 1    | (2)      | (2)          | EC           | -              | -          | R        | EM -     |
| CEF-4  | -               | 0.23 | -    | -    | -       | 120 1    | (3)      | (3)          | EC           | -              | -          | R        | EM -     |

STARTER TYPE:

INTEG = INTEGRAL: PROVIDED INTEGRAL WITH EQUIPMENT.

FURNISHED BY:

EM = EQUIPMENT MANUFACTURER

HC = HEATING CONTRACTOR

EC = ELECTRICAL CONTRACTOR

ACCESSORIES:

HOA = HAND-OFF-AUTO

PL =LED PILOT LIGHT

PB = PUSH BUTTON

DISCONNECT:

NR= NOT REQUIRED

R = REQUIRED

3R = NEMA 3R

REMARKS:

REC.=RECEPTACLE

- VERIFY VOLTAGE AND PHASE WITH ELECTRICAL CONTRACTOR BEFORE ORDERING EQUIPMENT.
- (1) POWER ROUTED THRU INTERIOR LIGHTING CONTACTOR BY E.C. SEE ELECTRICAL PLANS.
- (2) LOCAL WALL SWITCH PROVIDED BY E.C. TO TURN ON FAN.
- (3) FAN WIRED TO REVERSE ACTING THERMOSTAT BY E.C.
- (4) DISCONNECT FACTORY MOUNTED AND PREWIRED BY EQUIPMENT MANUFACTURER.

CABINET EXHAUST FAN SCHEDULE (C.E.F.)

| NO. | AREA SERVED | TYPE    | CFM | S.P.-W.C. | RPM   | MOTOR WATTS | MAX. SONES | DUCT COLLAR SIZE (IN.) | MODEL       | REMARKS     |
|-----|-------------|---------|-----|-----------|-------|-------------|------------|------------------------|-------------|-------------|
| 1   | TOILET RM   | CEILING | 100 | 0.38      | 950   | 80          | 2          | 6                      | SP-B110 (3) | "GREENHECK" |
| 2   | TOILET RM   | CEILING | 100 | 0.38      | 950   | 80          | 2          | 6                      | SP-B110 (3) | "GREENHECK" |
| 3   | LAB         | CEILING | 300 | 0.5       | 1,054 | 224         | 3.5        | 8 X 8                  | SP-AS10 (3) | "GREENHECK" |
| 4   | MECH RM     | CEILING | 300 | 0.5       | 1,054 | 224         | 3.5        | 8 X 8                  | SP-AS10 (3) | "GREENHECK" |

- ACCEPTABLE MANUFACTURERS: GREENHECK, COOK, PENN-BARRY, CARNES.
- SUPPORT FROM STRUCTURE, ISOLATE FAN AND ASSOCIATED DUCTWORK.
- PROVIDE SPEED CONTROL MOUNTED ON FAN HOUSING. INTERNAL PLUG-IN DISCONNECT AND BACKDRAFT DAMPER
- (3) PROVIDE WHITE ALUMINUM GRILLE.

ROOF CAP SCHEDULE (R.C.)

| NO. | SERVICE | TYPE | THROAT | CFM | APD. | SCREEN | DAMPER | MODEL      | REMARKS     |
|-----|---------|------|--------|-----|------|--------|--------|------------|-------------|
| 1   | EXHAUST | FLAT | 7      | 100 | 0.01 | BIRD   | NO     | RCC-7 (1)  | "GREENHECK" |
| 2   | EXHAUST | FLAT | 7      | 100 | 0.01 | BIRD   | NO     | RCC-7 (1)  | "GREENHECK" |
| 3   | EXHAUST | FLAT | 10     | 600 | 0.09 | BIRD   | NO     | GRS-10 (1) | "GREENHECK" |

- ACCEPTABLE MANUFACTURERS: GREENHECK, CARNES
- (1) PROVIDE 14" HIGH ROOF CURB.

ROOFTOP AIR CONDITIONING UNIT SCHEDULE (R.T.A.C.)

| NO. | NOM. TONS | SUPPLY FAN CFM | OA CFM | EXT. SP | DRIVE TYPE | MOTOR BHP | MOD. TYPE | RELIEF BAR. | FAN | EAT DB / WB | MBH CAP. | COOLING AMB. TEMP F | NO. COMPR. | NO. STAGES | HEATING KW | MBH IN | MBH OUT | NO. STAGES | OUTSIDE AIR | SMOKE DETECTOR | HEIGHT BY MFR. | CURB TYPE | MCA  | MOP | VOLT/ PHASE | MIN. CODE | EFFICIENCY UNIT RATING | TEST PROC.  | WEIGHT (LBS.) | MODEL | REMARKS        |
|-----|-----------|----------------|--------|---------|------------|-----------|-----------|-------------|-----|-------------|----------|---------------------|------------|------------|------------|--------|---------|------------|-------------|----------------|----------------|-----------|------|-----|-------------|-----------|------------------------|-------------|---------------|-------|----------------|
| 1   | 5         | 1,975          | 250    | 1       | DIRECT     | 1.49      | -         | X           | -   | 80/67       | 54.7     | 105                 | 1          | 1          | -          | 150    | 120     | 2          | ECON (2)    | NO (1)         | 14"            | STANDARD  | 28.0 | 40  | 208/3       | 14.0 SEER | 14.0 SEER              | ARI 210/240 | 850           | 48FC  | CARRIER (4)(5) |
| 2   | 4         | 1,425          | 200    | 1       | DIRECT     | 0.92      | -         | X           | -   | 80/67       | 43.6     | 105                 | 1          | 1          | -          | 67     | 54      | 2          | ECON (2)    | NO (1)         | 14"            | STANDARD  | 26.0 | 30  | 208/3       | 14.0 SEER | 14.0 SEER              | ARI 210/240 | 850           | 48FC  | CARRIER (4)(5) |
| 3   | 3         | 1,150          | 150    | 1       | DIRECT     | 0.55      | -         | X           | -   | 80/67       | 31.9     | 105                 | 1          | 1          | -          | 67     | 54      | 2          | ECON (2)    | NO (1)         | 14"            | STANDARD  | 20.0 | 30  | 208/3       | 14.0 SEER | 14.0 SEER              | ARI 210/240 | 850           | 48FC  | CARRIER (4)(5) |

- H.C. TO PROVIDE ROOFTOP UNITS AND CURBS. ROOFTOP UNITS ARE PRE-ORDERED BY ASPEN DENTAL MANAGEMENT (ADMI), QUOTES AND SELECTIONS ARE SENT BY ADMI TO THE G.C. FOR DISTRIBUTION TO THE H.C.
- SEE MOTOR SPECIFICATIONS FOR MOTOR REQUIREMENTS.
- PROVIDE WITH 2" ASHRAE STD 52.2 MERV 8 T.A. FILTERS
- RTAC DESIGNED TO PREVENT RAIN INTRUSION INTO THE AIRSTREAM WHEN TESTED AT DESIGN AND NO AIRFLOW PER SECTION 58 OF UL 1995.
- PROVIDE UNIT MOUNTED NEMA 3R DISCONNECT. STAINLESS STEEL HEAT EXCHANGER, LIQUID-TIGHT THRU UNIT BASE ELECTRICAL CONNECTION. HINGED ACCESS PANELS AND HINGED DOOR FOR ECONOMIZER.
- (1) DUCT SMOKE DETECTOR IS NOT REQUIRED PER IMC 606.2.1 AS RETURN AIR FLOW DOES NOT EXCEED 2,000 CFM IN ANY LOCATION AND SYSTEMS DO NOT SHARE COMMON SUPPLY OR RETURN AIR DUCTS.
- (2) PROVIDE ULTRA LOW LEAK CODE COMPLIANT ECONOMIZER WITH FAULT DETECTION, ENTHALPY CONTROL AND BAROMETRIC RELIEF.
- (4) PROVIDE WITH HAIL GUARD FOR CONDENSING COILS.
- (5) PROVIDE EPOXY COATED CONDENSER COIL TO PROVIDE PROTECTION IN COASTAL ENVIRONMENTS.