



SECTION 23 36 23

AIR ROTATION UNITS

**Note: Click on “Show/Hide ¶” Button to Reveal "Specifier Notes" Throughout Section.  
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PART 1 - GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. The General Conditions, Supplementary Conditions, and Division 01 – General Requirements apply.

1.2 SECTION INCLUDES

- A. Air rotation units.
- B. [Insert item description.]

1.3 RELATED SECTIONS

- A. Section 23 31 00 - HVAC Ducts and Casings: Connection of units to ductwork.
- B. Division 26 - Electrical: Connection of units to power supply.
- C. Section [xxxxx] – [Section Title]: [Include brief description of work specified in another section that is related to the work of this section.]

1.4 PERFORMANCE REQUIREMENTS

- A. Design hangers and supports [and seismic restraints] to withstand the effects of gravity [and seismic] loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" [and] [ASCE/SEI 7] [SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems"].
  - 1. Seismic Hazard Level [A] [B] [C]: Seismic force to weight ratio, [0.48] [0.30] [0.15].

1.5 SUBMITTALS

- A. Submit under provisions of Section [01 33 00] [\_\_\_\_\_].
- B. Product Data: Submit for each product specified indicating:



1. Rated capacities.
  2. Specialties furnished with unit.
  3. Sound-power ratings.
  4. Accessories.
- C. Shop Drawings: Submit plans, elevations, sections, details, and attachment to other work.
1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  2. Wiring Diagrams: For power, signal, and control wiring.
  3. Hangers and supports, including methods for duct and building attachment[, seismic restraints,] and vibration isolation.
- D. Qualification Data: Submit documentation indicating qualifications of air rotation unit manufacturer.
- E. Operation and Maintenance Data: Submit for air rotation units to include in maintenance manuals.
1. Instructions for resetting minimum and maximum air volumes.
  2. Instructions for adjusting software set points.
- F. Warranty: Submit sample special warranty specified in this section.

## 1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Source Limitations: Obtain each type of air rotation unit from same manufacturer.

## 1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace air rotation units that fail within specified warranty period.
1. Warranty Period: [Two (2)] [Insert number] years from date of original installation.
  2. Warranty coverage limited to owner of property at time of installation.
  3. Manufacturer's obligation is limited to furnishing a replacement air rotation unit for any unit covered by limited warranty which manufacturer determines to be defective. Manufacturer will not be liable for installation costs of replacement unit or for any special, indirect, incidental or consequential damages.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS



- A. Basis-of-Design Product: The design for air rotation units is based on The Rack™ Air Rotation Unit manufactured by Air Energy Systems, 4790 West 73 Street, Indianapolis, IN 46268; telephone: 317-290-8500; Email: [bmaher@aesrack.com](mailto:bmaher@aesrack.com); Web Site: [www.aesrack.com](http://www.aesrack.com).
- B. Substitutions will not be considered.
- C. Substitutions will be considered, subject to compliance with requirements of this section, under provisions of Section 01 60 00.

## 2.2 AIR ROTATION UNITS

- A. Air Rotation Cooling Unit: The Rack™ Air Rotation Unit Model ER-130 equipped with one (1) 30-inch 1/2-hp 115 volt/single phase/12 amp fan rated at 9000 cfm; noise level not to exceed 12 sones - 64 dba:
  - 1. Configuration: [Cooling fresh air intake left] [Cooling fresh air intake right] [Cooling fresh air roof mounted] [Cooling standard unit].
  - 2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  - 3. Vibration isolators mounted between fan and fan wall housing.
  - 4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
  - 5. Front Guard: Located between fan and discharge blades; OSHA approved.
  - 6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  - 7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  - 8. Discharge Blades: 20-gage metal, 360 degree 4-way blades.
    - a. Seven (7) 32 x 5 inch front discharge air blades, up and down individually pipe locked to reduce blade raw edges.
    - b. 14 12 x 5 inch side discharge air blades, up and down individually pipe locked to reduce blade raw edges.
    - c. Six (6) 34 x 5 internal discharge air blades, left and right individually pipe locked to reduce blade raw edges, located on inside of fan wall assembly.
    - d. Anchor fan blades with 1/4-inch nylon inset nuts and bolts to eliminate loosening of blades during operation.
  - 9. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  - 10. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.

- d. 15 amp fuse for motor over-load protection.
- B. Air Rotation Unit with Unit Heater: The Rack™ Air Rotation Unit Model ER-130-200/250 equipped with one (1) 30-inch 1/2-hp 115 volt/single phase/12 amp fan rated at 9000 cfm and either one (1) 200,000 or one (1) 250,000 Btu/hr 80 percent unit heater; noise level not to exceed 12 sones - 64 dba:
1. Configuration: [Heating roof mounted fresh air 80 percent] [Heating sidewall fresh air intake left 80 percent] [Heating sidewall fresh air intake right 80 percent].
  2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  3. Vibration isolators mounted between fan and fan wall housing.
  4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.
  6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  9. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.
    - d. 15 amp fuse for motor over-load protection.
- C. Air Rotation Unit with Unit Heater: The Rack™ Air Rotation Unit Model ER-130-180/215 equipped with one (1) 30-inch 1/2-hp 115 volt/single phase/12 amp fan rated at 9000 cfm and one (1) 180,000 or one (1) 215,000 Btu/hr 93 percent unit heater; noise level not to exceed 12 sones - 64 dba:
1. Configuration: [Heating roof mounted fresh air 93 percent] [Heating sidewall fresh air intake left 93 percent] [Heating sidewall fresh air intake right 93 percent] [Heating standard unit 93 percent].
  2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  3. Vibration isolators mounted between fan and fan wall housing.
  4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
    - a. Provide frame with six (6) 1/2-inch pre-punched holes for mounting.
    - b. Hang unit from 3/8-diameter all-thread rod.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.



6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  9. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.
    - d. 15 amp fuse for motor over-load protection.
- D. Air Rotation Cooling Unit: The Rack™ Air Rotation Unit Model ER-142 equipped with one (1) 42-inch 3/4-hp 115 volt/single phase/14 amp fan rated at 16500 cfm; noise level not to exceed 12 sones - 64 dba:
1. Configuration: [Cooling fresh air intake left] [Cooling fresh air intake right] [Cooling fresh air roof mounted] [Cooling standard unit].
  2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  3. Vibration isolators mounted between fan and fan wall housing.
  4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.
  6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Discharge Blades: 20-gage metal, 360 degree 4-way blades.
    - a. 11 42 x 5 inch front discharge air blades, up and down individually pipe locked to reduce blade raw edges.
    - b. 22 19 x 5 inch side discharge air blades, up and down individually pipe locked to reduce blade raw edges.
    - c. 10 46 x 5 internal discharge air blades, left and right individually pipe locked to reduce blade raw edges, located on inside of fan wall assembly.
    - d. Anchor fan blades with 1/4-inch nylon inset nuts and bolts to eliminate loosening of blades during operation.
  9. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.



10. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
  - a. Toggle Switch: 24 volt on/off switch with operating light.
  - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
  - c. Seven (7) day 24 hour 24 volt programmable thermostat.
  - d. 15 amp fuse for motor over-load protection.
  
- E. Air Rotation Unit with Unit Heater: The Rack™ Air Rotation Unit Model ER-142-310/400 equipped with one (1) 42-inch 3/4-hp 115 volt/single phase/14 amp fan rated at 16500 cfm and either one (1) 310,000 93 percent or one (1) 400,000 Btu/hr 80 percent unit heater; noise level not to exceed 12 sones - 64 dba:
  1. Configuration: [Heating roof mounted fresh air [80] [93] percent] [Heating sidewall fresh air intake left [80] [93] percent] [Heating sidewall fresh air intake right [80] [93] percent] [Heating standard unit [80] [93] percent].
  2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  3. Vibration isolators mounted between fan and fan wall housing.
  4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between unit heater and welded angle iron mounting frame.
    - a. Provide frame with six (6) 1/2-inch pre-punched holes for mounting.
    - b. Hang unit from 3/8-diameter all-thread rod.
    - c. Unit heater mounting frame shipped loose.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.
  6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  9. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.
    - d. 15 amp fuse for motor over-load protection.
  
- F. Air Rotation Cooling Unit: The Rack™ Air Rotation Unit Model ER-230 equipped with two (2) 30-inch 1/2-hp 115 volt/single phase/12 amp fan rated at 18000 cfm; noise level not to exceed 12 sones - 64 dba:
  1. Configuration: [Cooling fresh air intake left] [Cooling fresh air intake right] [Cooling fresh air roof mounted] [Cooling standard unit].
  2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.



3. Vibration isolators mounted between fan and fan wall housing.
  4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.
  6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Discharge Blades: 20-gage metal, 360 degree 4-way blades.
    - a. 14 32 x 5 inch front discharge air blades, up and down individually pipe locked to reduce blade raw edges.
    - b. 14 12 x 5 inch side discharge air blades, up and down individually pipe locked to reduce blade raw edges.
    - c. 12 34 x 5 internal discharge air blades, left and right individually pipe locked to reduce blade raw edges, located on inside of fan wall assembly.
    - d. Anchor fan blades with 1/4-inch nylon inset nuts and bolts to eliminate loosening of blades during operation.
  9. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  10. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.
    - d. 15 amp fuse for motor over-load protection.
- G. Air Rotation Unit with Unit Heater: The Rack™ Air Rotation Unit Model ER-230-200/250 equipped with two (2) 30 inch 1/2-hp 115 volt/single phase/12 amp fan rated at 18000 cfm and two (2) 200,000 or two (2) 250,000 Btu/hr 80 percent unit heater; noise level not to exceed 12 sones - 64 dba:
1. Configuration: [Heating roof mounted fresh air 80 percent] [Heating sidewall fresh air intake left 80 percent] [Heating sidewall fresh air intake right 80 percent] [Heating standard unit 80 percent].
  2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  3. Vibration isolators mounted between fan and fan wall housing.
  4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
    - a. Provide frame with six (6) 1/2-inch pre-punched holes for mounting.
    - b. Hang unit from 3/8-diameter all-thread rod.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.
  6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.



7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  9. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.
    - d. 15 amp fuse for motor over-load protection.
- H. Air Rotation Unit with Unit Heater: The Rack™ Air Rotation Unit Model ER-230-430 equipped with one (1) 30 inch 1/2-hp 115 volt/single phase/12 amp fan rated at 18000 cfm and two (2) 215,000 Btu/hr 93 percent unit heater; noise level not to exceed 12 sones - 64 dba:
1. Configuration: [Heating roof mounted fresh air 93 percent] [Heating sidewall fresh air intake left 93 percent] [Heating sidewall fresh air intake right 93 percent] [Heating standard unit 93 percent].
  2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  3. Vibration isolators mounted between fan and fan wall housing.
  4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
    - a. Provide frame with six (6) 1/2-inch pre-punched holes for mounting.
    - b. Hang unit from 3/8-diameter all-thread rod.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.
  6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  9. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.
    - d. 15 amp fuse for motor over-load protection.





- I. Air Rotation Cooling Unit: The Rack™ Air Rotation Unit Model ER-242 equipped with two (2) 42-inch 3/4-hp 115 volt/single phase/14 amp fan rated at 33000 cfm; noise level not to exceed 12 sones - 64 dba:
  - 1. Configuration: [Cooling fresh air intake left] [Cooling fresh air intake right] [Cooling fresh air roof mounted] [Cooling standard unit].
  - 2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  - 3. Vibration isolators mounted between fan and fan wall housing.
  - 4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
  - 5. Front Guard: Located between fan and discharge blades; OSHA approved.
  - 6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  - 7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  - 8. Discharge Blades: 20-gage metal, 360 degree 4-way blades.
    - a. 22 42 x 5 inch front discharge air blades, up and down individually pipe locked to reduce blade raw edges.
    - b. 22 19 x 5 inch side discharge air blades, up and down individually pipe locked to reduce blade raw edges.
    - c. 12 34 x 5 internal discharge air blades, left and right individually pipe locked to reduce blade raw edges, located on inside of fan wall assembly.
    - d. Anchor fan blades with 1/4-inch nylon inset nuts and bolts to eliminate loosening of blades during operation.
  - 9. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  - 10. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.
    - d. 15 amp fuse for motor over-load protection.
  
- J. Air Rotation Unit with Unit Heater: The Rack™ Air Rotation Unit Model ER-242-620 equipped with two (2) 42-inch 3/4-hp 115 volt/single phase/12 amp fan rated at 33000 cfm and two (2) 310,000 Btu/hr 93 percent unit heater; noise level not to exceed 12 sones - 64 dba:
  - 1. Configuration: [Heating roof mounted fresh air 93 percent] [Heating sidewall fresh air intake left 93 percent] [Heating sidewall fresh air intake right 93 percent] [Heating standard unit 93 percent].
  - 2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  - 3. Vibration isolators mounted between fan and fan wall housing.



4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
    - a. Provide frame with six (6) 1/2-inch pre-punched holes for mounting.
    - b. Hang unit from 3/8-diameter all-thread rod.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.
  6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.
    - d. 15 amp fuse for motor over-load protection.
  9. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
    - a. Toggle Switch: 24 volt on/off switch with operating light.
    - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
    - c. Seven (7) day 24 hour 24 volt programmable thermostat.
    - d. 15 amp fuse for motor over-load protection.
- K. Air Rotation Unit with Unit Heater: The Rack™ Air Rotation Unit Model ER-242-800 equipped with two (2) 42-inch 3/4-hp 115 volt/single phase/12 amp fan rated at 33000 cfm and two (2) 400,000 Btu/hr 80 percent unit heater; noise level not to exceed 12 sones - 64 dba:
1. Configuration: [Heating roof mounted fresh air 80 percent] [Heating sidewall fresh air intake left 80 percent] [Heating sidewall fresh air intake right 80 percent] [Heating standard unit 80 percent].
  2. Wall Housing: Fully-assembled and constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating.
  3. Vibration isolators mounted between fan and fan wall housing.
  4. Frame constructed from primed and painted 3/16-inch welded angle iron with vibration isolators mounted between fan wall housing and welded angle iron mounting frame.
    - a. Provide frame with six (6) 1/2-inch pre-punched holes for mounting.
    - b. Hang unit from 3/8-diameter all-thread rod.
  5. Front Guard: Located between fan and discharge blades; OSHA approved.
  6. Back Guard: Located between fan and inlet of fan discharge air blades located on the inside of the fan wall assembly; OSHA approved.
  7. Fan Blades: Fabricated from minimum 16-gage galvanized G90 steel; epoxy-coated hub, keyed to fan shaft.
  8. Unit Mounted Control Panel: Constructed of 20-gage pre-painted Sierra Tan ColorKlad G90 galvanized steel with PVC protective coating; 10 x 16 inches in size bolted to wall housing; provide with the following components:
    - a. Service Switch: 120 volt/single phase; mount on wall housing.
    - b. Wire fan's 3/4-hp motor to unit mounted service switch.
    - c. 120 volt/single phase to 24 volt transformer.



- d. 15 amp fuse for motor over-load protection.
- 9. Remote Control Panel: 10 x 8 x 4 inch electrical enclosure; provide with the following components:
  - a. Toggle Switch: 24 volt on/off switch with operating light.
  - b. Toggle switch energizes unit heater; unit heater cannot run without distribution fan running.
  - c. Seven (7) day 24 hour 24 volt programmable thermostat.
  - d. 15 amp fuse for motor over-load protection.

### 2.3 HANGERS AND SUPPORTS

- A. Hanger Rods: Cadmium-plated steel rods and nuts.
- B. Steel Cables: Galvanized steel complying with ASTM A603.
- C. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- D. Air Rotation Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with other materials.
- E. Trapeze and Riser Supports: Steel shapes and plates as required.

### 2.4 SEISMIC-RESTRAINT DEVICES

- A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
- B. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one (1) end and to building structure at the other end. Include matching components and corrosion-resistant coating.
- C. Restraint Cables: ASTM A603, galvanized steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; with an automatic-locking and clamping device or double-cable clips.
- D. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod to strengthen resistance of hanger rods to seismic forces that could cause rods to buckle.
- E. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested in accordance with ASTM E488.

## PART 3 - EXECUTION



3.1 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Install air rotation units in accordance with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
- C. Install air rotation units level and plumb. Maintain sufficient clearance for normal service and maintenance.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. For attachment to building elements, use concrete inserts, powder-actuated fasteners, or structural steel fasteners appropriate for construction materials to which hangers are being attached.
- C. Where hangers are exposed to view, use threaded rod and angle or channel supports.
- D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install hangers and braces designed to support the air rotation units and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems" or ASCE/SEI 7 as applicable as required by Authorities Having Jurisdiction.
- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cable restraints on air rotation units that are suspended with vibration isolators.
- D. Attachment to Structure: Where specific attachment is not indicated on Drawings, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

3.4 CONNECTIONS

- A. Install piping adjacent to air rotation unit to permit easy service and maintenance.
- B. Connect ducts to air rotation units.
- C. Make connections to air terminal units with flexible connectors.



3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Test for compliance with requirements after installing air rotation units and after electrical circuitry has been energized.
  - 2. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Air rotation unit will be considered defective if it does not pass tests and inspections.

3.6 STARTUP SERVICE

- A. Perform startup service.
  - 1. Complete installation and startup checks in accordance with manufacturer's written instructions.
  - 2. Verify that duct connections are as recommended by air rotation unit manufacturer to achieve proper performance.
  - 3. Verify that controls and control enclosure are accessible.
  - 4. Verify that control connections are complete.
  - 5. Verify that nameplate and identification tag are visible.
  - 6. Verify that controls respond to inputs as specified.

3.7 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain air rotation units.

END OF SECTION

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