

# Guide Specifications

## Raider™ Rooftop Units

May 18, 2017



**Note:** This specification specifies **Lennox Industries Raider™ Rooftop Units**. Revise specification section number and title below to suit project requirements, specification practices and section content. Refer to CSI MasterFormat for other section numbers and titles.

This specification utilizes the Construction Specifications Institute (CSI) Manual of Practice, including MasterFormat®, **Packaged Outdoor HVAC Equipment** SectionFormat® and PageFormat®. Optional text and text requiring a decision is indicated by bolded brackets [ ]; delete text not required in final copy of specification. Specifier Notes typically precede specification text; delete notes in final copy of specification. Trade/brand names with appropriate symbols typically are used in Specifier Notes; symbols are not used in specification text. Metric conversion, where used, is soft metric conversion.

---

## SECTION 23 74 00

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Packaged rooftop units, heat pumps and commercial packaged, gas/electric and electric/electric

Specifier Note: Revise paragraph below to suit project requirements. Add section numbers and titles per CSI *MasterFormat* and specifier's practice.

#### 1.2 RELATED SECTIONS

Specifier Note: Article below may be omitted when specifying manufacturer's proprietary products and recommended installation. Retain Reference Article when specifying products and installation by an industry reference standard. If retained, list standard(s) referenced in this section. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced. Conditions of the Contract or Division 1 References Section may establish the edition date of standards. This article does not require compliance with standard, but is merely a listing of references used. Article below should list only those industry standards referenced in this section. Retain only those reference standards to be used within the text of this Section. Add and delete as required for specific project.

#### 1.3 REFERENCES

- A. Agency Listings:
  - 1. Canadian Standards Association (CSA).
- B. Safety Standards:
  - 1. Underwriters Laboratories (UL).
  - 2. Underwriters Laboratories of Canada (ULC).
  - 3. National Electric Code (NEC).
  - 4. Canadian Electric Code (CEC).
  - 5. American National Standard/CSA Standard (ANSI/CSA).
- C. Air-Conditioning, Heating and Refrigeration Institute (AHRI):
  - 1. AHRI 210/240 Performance Rating of Unitary Air Conditioning and Air-Source Heat Pump Equipment.
  - 2. ANSI/ASHRAE 103 Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers.
  - 3. AHRI 270 Sound Performance Rating of Outdoor Unitary Equipment.
- D. All models are ASHRAE 90. 1-2010 compliant
- E. ISO 9001, Manufacturing Quality Systems

Specifier Note: Article below should be restricted to statements describing design or performance requirements and functional (not dimensional) tolerances of a complete system. Limit descriptions to

composite and operational properties required to link components of a system together and to interface with other systems.

## 1.4 PERFORMANCE REQUIREMENTS

Specifier Note: Article below should be restricted to Raider™ (ZG) gas/electric packaged roof top units, Raider™ (ZC) electric/electric packaged roof top units, or Raider™ (ZH) heat pump packaged rooftop units.

- A. [3, 4, and 5] ton capacity
- B. Electrical Characteristics
  - 1. 60 Hz
  - 2. [208/230 v – 1 Phase] [208/230 v – 3 Phase] [460 v – 3 Phase] [575 v – 3 Phase]
- C. Models equipped with low NOx gas heat meet the California Nitrogen Oxides (NOx) Standards that apply in the South Coast Air Quality Management District and the San Francisco Bay Area Air Quality Management District.

Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in Conditions of the Contract and Division 1 Submittal Procedures Section.

## 1.5 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures
- B. Product Data: Submit product data for specified products
- C. Shop Drawings:
  - 1. Submit shop drawings in accordance with Section [01 33 00 - Submittal Procedures]
  - 2. Indicate:
    - a. Equipment, piping and connections, together with valves, strainers, control assemblies, thermostatic controls, auxiliaries and hardware and recommended ancillaries which are mounted, wired and piped ready for final connection to building system, its size and recommended bypass connections
    - b. Piping, valves and fittings shipped loose showing final location in assembly
    - c. Control equipment shipped loose, showing final location in assembly
    - d. Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, mounting curb details, sizes and location of mounting bolt holes; include mass distribution drawings showing point loads
    - e. Detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices or ancillaries, accessories and controllers
    - f. Fan performance tables
    - g. Details of vibration isolation
    - h. Estimate of sound levels to be expected across individual octave bands in db
    - i. Type of refrigerant used
    - j. Plan view, front view end view, back view and curb detail with dimensions
- D. Quality Assurance:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties
2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements
3. Manufacturer's Instructions: Manufacturer's installation instructions

Specifier Note: Coordinate paragraph below with Part 3 Field Quality Requirements Article herein. Retain or delete as applicable.

- E. Manufacturer's Field Reports: Manufacturer's field reports specified herein
- F. Closeout Submittals: Submit the following:
  1. Warranty: Warranty documents specified herein
  2. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance. Include names and addresses of spare part suppliers
  3. Provide brief description of unit, with details of function, operation, control and component service
  4. Provide equipment inspection report and equipment operation test report
  5. Commissioning Report: Submit commissioning reports, report forms and schematics in accordance with Section [01 81 00 – Commissioning]

## 1.6 QUALITY ASSURANCE

- A. Qualifications:
  1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project
  2. Preinstallation Meetings: Conduct preinstallation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings).

## 1.7 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirements
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays
- C. Packing, Shipping, Handling and Delivery:
  1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact
  2. Ship, handle and unload units according to manufacturer's instructions
- D. Storage and Protection:
  1. Store materials protected from exposure to harmful weather conditions
  2. Factory shipping covers to remain in place until installation

## 1.8 PROJECT CONDITIONS

- 
- A. Installation Location: [Confirm design conditions and temperature]

Specifier Note: Coordinate article below with Conditions of the Contract and Division 1 Closeout Submittals (Warranty).

## **1.9 WARRANTY**

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

Specifier Note: Coordinate paragraph below with manufacturer's warranty requirements.

- C. Warranty Bond: Commencing on Date of Installation
  - 1. Limited 10 years Aluminized Heat Exchanger
  - 2. Limited 5 years on compressors
  - 3. [Limited 3 years on the Lennox Environ™ Coil System]
  - 4. [Limited 5 years on High Performance Economizers ]
  - 5. Limited 1 year all other covered components

---

## PART 2 - PRODUCTS

Specifier Note: Retain article below for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as “or equal” or “or approved equal” or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining “or equal” products.

### 2.1 LENNOX RAIDER™ PACKAGED ROOFTOP UNITS

- A. Manufacturer: Lennox Industries
  - 1. Contact: 2140 Lake Park Blvd., Richardson, TX 75080; Telephone: (800) 453-6669; Website: [www.lennoxcommercial.com](http://www.lennoxcommercial.com)
- B. General:
  - 1. Capacity
    - a. 3-5 tons
- C. Proprietary Products/Systems:
  - 1. Cabinet:
    - a. Heavy gauge steel panels
    - b. Pre-painted steel panels
    - c. Full perimeter heavy gauge galvanized steel base rail
    - d. Rigging holes on all four corners
    - e. Forklift slots (on three sides, not directly below condenser coil) on base rail
    - f. Raised flanged edges around duct and power entry openings

Specifier Note: “Downflow” is the standard configuration that all Raider units are shipped. Specifier Note: “Horizontal Flow” is an option for all Raider™ models.

- g. Airflow Choice:
  - 1. 3 to 5 ton units are shipped in downflow, configuration can be field converted to horizontal air flow without the need of a kit

Specifier Note: Add [and gas lines] only if using a Raider (ZG) gas/electric model.

- h. Electrical lines [and gas lines] can be brought through the base of the unit or through horizontal knockouts
- i. Insulation:
  - 1. All panels adjacent to conditioned air are fully insulated with non-hygroscopic fiberglass insulation
- j. Access Panels are provided for compressor/controls/heating areas, blower access and air filter/economizer access;
- k. Exterior panels constructed of heavy-gauge galvanized steel with two layer enamel paint finish
- l. [Corrosion Protection – Factory installed]
  - 1. [Military Specification MIL-P-53084]

2. [ASTM B117]
3. [ASTM 1153]
- m. Hinged Service Panel – condenser section
- n. [Coil/Hail Guards – Field installed]

Specifier Note: “Factory Installed Options” are options that can be selected for the Raider rooftop units. The “Factory Installed Options” are installed at the Lennox manufacturing facility.

Specifier Note: “Field Installed Accessories” are options that can be selected for the Raider roof top units. The “Field Installed Accessories” are shipped separately and installed in the field.

2. Cooling System:
  - a. Refrigerant type: R-410A
  - b. Capable of operating from 35 to 125°F (2 to 52°C) without installation of additional controls
  - c. Compressors:
    1. Scroll Type
    2. Resiliently mounted on rubber grommets for quiet operation
    3. Overload Protected
    4. Internal excessive current and temperature protection
    5. Refrigerant cooled
  - d. High capacity filter/driers
  - e. High pressure switches

Specifier Note: Include following 2 articles for Raider™ (ZH) packaged heat pumps models. f. Reversing Valves: Four-way interchange reversing valve

Specifier note: Crankcase heater is standard feature on ZH models only, and it is a field-installed option on ZC and ZG models.

- g. [Crankcase heaters]
3. Coil Construction:

Specifier note: Add [condensing/] only if using a Raider ZH heat pump model

- a. Tube and fin [condensing/]evaporator coil general construction:
  1. Copper tube construction
  2. Rippled-edge aluminum fins
  3. Flared shoulder tubing connections
  4. Silver soldered construction for improved leak protection.
  5. Factory leak tested at manufacturing facility
- b. Evaporator Coils:
  1. Pressure and leak tested to 500 psi

2. [With flexible immersed coating electrodeposited by dry film process] c. Condenser Coils:

Specifier note: Add [Environ Coil System] and sub-description only if using. Raider ZG gas/electric and ZC electric/electric models

1. [Environ Coil System]
    - a. [All aluminum construction]
    - b. [Over-core reinforcement]
    - c. [Coil-mounting isolators]
    - d. [Sheet metal isolators]
    - e. [Coil Stabilizers]
  2. [Flexible immersed coating electrodeposited by dry film process] on corrosion hardened units only
- d. Condensate Drain Pan:
    1. Plastic pan, sloped to meet drainage requirements of ASHRAE 62.1
    2. End drain connection
  - e. Outdoor coil fan motors:
    1. Thermal overload protected
    2. Shaft down, fan guard mount
    3. Permanently lubricated bearings
  - f. Outdoor coil fans: PVC coated fan guard furnished

Specifier note: Followings are field-installed options/accessories for Raider models.

- g. [Condensate Drain Trap : available in copper or PVC]
- h. [Drain Pan Overflow Switch]
- i. [Low Ambient Kit]

Specifier Note: Raider units with Gas Heating Systems are ZG models.

4. Gas Heating System:
  - a. Induced draft with PSC motor and ball bearings.
  - b. Natural gas fired system with direct spark ignition
  - c. Electronic flame sensor
  - d. Flame rollout switch
  - e. High heat limit switch
  - f. Induced draft failure switch
  - g. Capable of operating to altitude of 2000 feet (610m) with no de-rate to manifold pressure. High altitude de-rate above 2000FT is (2%/1000FT) less than standard de-rate (4%/100FT)
  - h. Service access for controls, burners and heat exchanger
  - i. Heat Exchanger:



1. Tubular Design
2. Aluminized steel
- j. Gas piping system tight and free of leaks when pressurized to maximum supply pressure
- k. [Gas Valve: Two-stage, redundant type gas heat valve with manual shutoff]
- l. [Gas Valve: Single-stage, redundant type gas heat valve with manual shutoff]
- m. Gas Burners: Aluminized steel body inshot-type gas burners with powder metal flame retention ring.
- n. Direct spark pilot ignition
- o. Fan and Limit Controls
- p. Safety Switches
- q. Gas piping system tight and free of leaks
- r. [Low NOx]

Specifier Note: “Field Installed Accessories” are options that can be selected for the Raider ZG Gas/Electric models. The “Field Installed Accessories” are shipped separately and installed in the field.

- r. [Field Installed Accessories:]
  1. [Vertical Vent Extension Kit]
  2. [LPG/Propane Kit]

Specifier Note: The “Electric Heating System” is an option for Raider (ZH), heat pump, and Raider (ZC), electric/electric models only. The “Electric Heating System” is only available for field installation.

5. Electric Heating System:
  - a. Electrical resistance heater
  - b. [Field] installed.
  - c. [Field] installed Fuse Block.
  - d. Fusible link thermal limit protection.
  - e. Single point power supply
  - f. Heater Element:
    1. Nickel chromium wire
    2. Individually fused.
  - g. Electric heater slides out of unit for service
6. Heating Controls:
  - a. Support 2 stages of heating control from thermostat (ZG models)
  - b. Support 1 stage of heating control from thermostat (ZC models)
  - c. Support 2 stages of heating control from thermostat (ZH models)
7. Supply Air Fan (Blower)
  - a. Belt Drive Motor
    1. Overload protected
    2. Equipped with ball bearings
  - b. Supply Air Blower

- 
- 1. Forward curved blades
  - 2. Wheel is statically and dynamically balanced
  - 3. Equipped with ball bearings and adjustable pulley for speed change
  - c. Blower
    - 1. Constant Air Volume (CAV)
  - 8. Supply Air Filters:
    - a. Disposable 2 inch furnished as standard
  - 9. Controls:
    - a. Unit Control
      - 1. 24V transformer (secondary) with external fuse protection
    - b. Heat/Cool Staging
      - 1. 2 heat/2 cool staging control system or thermostat
    - c. Night setback mode
    - d. Controls Options:
      - 1. [L Connection® Network]
      - 2. [Thermostat]

Specifier Note: Approved for California Title 24

- 3. [Smart Thermostat]
  - 4. [Fault Detection and Diagnostics]
    - ii. Mixed Air Temperature sensor error
    - iii. CO2 sensor error
    - iv. Outside Air Temperature sensor error
    - v. Discharge Air sensor error
    - vi. Actuator over voltage
    - vii. Actuator under voltage
    - viii. Actuator stalled
    - ix. Current alarms
    - x. Historic alarms
9. Serviceability:
- d. Wiring:
    - 1. Labeled field connections, color coded and continuously marked wire to identify point-to-point component connections
    - 2. Not in contact with hot-gas refrigerant lines or sharp metal edges
  - e. Electrical Plugs
  - f. Access Panels
  - g. Toolless filter access panel

- h. Blower Access
  - i. Coil Cleaning
  - j. Standard Components
  - k. Hinged Compressor access panel
10. Accessories:
- a. [Economizer downflow]: Hoods provided [Field] [Factory]]
  - b. [Economizer horizontal]: Hoods provided [Field]]
  - c. [High Performance Economizer downflow]:Hoods provided [Field] [Factory]
  - d. [High Performance Economizer horizontal]: Hoods provided [Factory]
    - i. Outside (fresh) Air damper Max Leakage Rate: 3 CFM/sq. ft. at 1" w.g.
    - ii. Return Air Max Leakage Rate: 3 CFM/sq. ft. at 1" w.g.
    - iii. Damper Reliability: 60,000 cycles minimum
    - iv. Economizer fault detection and diagnostics
      - a. Mixed Air Temperature sensor error
      - b. CO2 sensor error
      - c. Outside Air Temperature sensor error
      - d. Discharge Air sensor error
      - e. Actuator over voltage
      - f. Actuator under voltage
      - g. Actuator stalled
      - h. Current alarms
      - i. Historic alarms

Specifier Note: Single, Differential and Differential Dual Enthalpy are **NOT** Approved for California Title 24

- a. [Economizer control: Single Enthalpy: [Field]]
- b. [High Performance Economizer control: Dry Bulb Sensor: [Field] [Factory]]
- c. [High Performance Economizer control: Differential Enthalpy: [Field]]
- d. [High Performance Economizer control: Differential Dual Enthalpy: [Field] [Factory]]
- e. [Outdoor Air Damper: Hood provided [Field]][Downflow][ Horizontal]

Specifier Note: Barometric relief damper is included with field installed economizer.

- f. [Power exhaust fan: [Field]]
- g. [Roof curb: Field][Downflow][ Horizontal]
- h. [Ceiling Diffuser: Field] [Flush] [Step down]
- i. [Indoor Air Quality (CO2) Sensors]
- j. [Coil/Hail Guards: [Field]]
- k. [Condensate drain trap plastic: [Field]]
- l. [Condensate drain trap copper: [Field]]

Specifier Note: Edit article below to suit project requirements. If substitutions are permitted, edit text below. Add text to refer to Division 1 Project Requirements (Product Substitutions Procedures) Section.

---

## 2.2 PRODUCT SUBSTITUTIONS

- A. Substitutions: No substitutions permitted

## PART 3 – EXECUTION

### 3.1 MANUFACTURER’S INSTRUCTIONS

Specifier Note: Article below is an addition to the CSI *SectionFormat*. Revise article below to suit project requirements and specifier’s practice.

- A. Compliance: Comply with manufacturer’s written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions and manufacturer’s SPEC-DATA® sheets.

### 3.2 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer’s instructions.

### 3.3 INSTALLATION

- A. Install [Packaged rooftop units] [And] [Commercial packaged, gas/electric, electric/electric and electric/heat pumps] in accordance with manufacturer’s instructions [On roof curbs provided by manufacturer] [As indicated].

**END OF SECTION**

Bulletin No. 000358 (May 2017)