



HVAC Guideline Specifications
SE Series
Packaged High Intensity Infrared Radiant Gas Heater
Outdoor/Indoor Commercial/Industrial Applications

Size Range: **35,000 and 50,000 Btuh Input Rating**

Models:	Description	Part # NG	Part # LPG	Input (Btuh)
RSE1S35BP/N RSE1S35SP/N	S/S Enclosure; Aluminum Egg Crate screen	RSE1S35BN	RSE1S35BP	35,000
RSE1S50BP/N RSE1S50SP/N	S/S Screen; Aluminized Covers	RSE1S50BN	RSE1S50BP	50,000

Part 1 — General

1.01 SYSTEM DESCRIPTION

Outdoor / Indoor approved overhead mounted, electrically controlled patio and high intensity infrared radiant heating unit utilizing gas combustion as supplied by Rinnai.

1.02 QUALITY ASSURANCE

- A. Heater will be tested, approved, and certified by CSA International in accordance with ANSI Z83.19b / CSA 2.35b High Intensity Gas-Fired Heaters (indoor use), and additionally in accordance with ANSI Z83.26 / CSA 2.37 Outdoor Gas-Fired Patio Heaters (outdoor use).
- B. Each heater will be subjected to run testing on the assembly line.
- C. The heater will be warranted by the manufacturer for defects in material and workmanship for a period of 3 years on the burner assembly and ceramic tiles that comprise the burner panel, and 1 year on all other parts and components.

1.03 DELIVERY, STORAGE, AND HANDLING

Heater will be stored to secure against damage and handled per manufacturer's recommendations.

Part 2 — Product

2.01 EQUIPMENT (STANDARD)

- A. General:
Factory assembled, single-piece infrared radiant heating unit for overhead mounted patio, space or area heating application. Supplied with the heater will be all necessary factory installed wiring, piping, and controls required prior to field installation and start-up.
- B. Heater Enclosure Construction:
 - a. Exterior sheet metal enclosure components, and all interior sheet metal components exposed to direct heat from the burner will be constructed of 409 grade stainless steel.
 - b. An interior sheet metal divider in the control compartment, and control mounting bracket will be constructed of high grade aluminized steel.
 - c. All exposed surfaces of exterior sheet metal components will have a coating of high temperature flat black emissive coating.
- C. Burner Construction and Emitting Surface:
 - 1. General:
 - a. Burner body will be constructed of high grade aluminized steel

- b. The radiant surface will be comprised of a panel of porous ceramic burner tiles with indentation surface technology creating 372 indentations in the tile radiating surface that increases the emitting surface area by 50%.
 - c. Ceramic tiles will have a homologous grid of approximately 3400 needled perforations that differ not more than +/- 0.001 inch (0.03 mm) in diameter to create a homogeneous radiant surface.
 - d. Ceramic tiles will have machined perimeter edges so that the burner panel assembly requires no gasket material between contiguous tiles.
 - e. The perimeter of the ceramic tile burner panel will be seated to the heater body utilizing an innocuous ceramic gasket material.
 - f. The ceramic tile burner will attain an operating surface temperature of 1740°F (950°C). The ceramic tiles will be able to withstand temperatures of 1832°F (1000°C). The ceramic tiles will have an inner porosity of 66% or more to ensure sufficient thermal insulation between radiant burner surface and mixing chamber.
 - g. The gas/air fuel will be introduced to the burner mixing chamber through a single venturi located at one end of the mixing chamber.
- D. Controls and Safeties:
1. General:
 - a. Each individual burner panel will have solid state direct spark ignition and flame sensor control that is dedicated to maintain and secure the operation of that burner panel
 - b. Heater gas and ignition controls will be readily accessible for servicing.
 2. Ignition and Flame Control:
 - a. Heater will be complete with a low voltage (25Vac), solid state direct spark to pilot ignition and ionization flame sensing control module. Electrical Rating: 25Vac, 60Hz with current rating of 0.2A at 25Vac
 - b. Heater will be complete with an igniter/sensor with separate electrodes for spark ignition of pilot and flame sensing of burner.
 - c. On call for heat the Fenwal 35-60 control will reset, perform a self check routine, flash the diagnostic LED for up to four seconds. The gas valve, pilot, and spark are energized commencing the trial for ignition period. When flame is detected during the trial for ignition, spark is shutoff immediately and the gas valve and pilot remain energized. The thermostat and main burner flame are constantly monitored to assure the system continues to operate properly. When the thermostat is satisfied and the demand for heat ends, or the power supply is interrupted, the gas valve is de-energized.
 - d. Flame Failure - Multi Trial Ignition: Should the main burner fail to ignite, or the flame is not detected during the first trial for ignition period, the gas valve is de-energized and the control goes through an interpurge delay before another ignition attempt. The control will attempt two additional ignition trials before going into soft lockout and the valve relay is de-energized.
 - e. If the thermostat continues to call for heat after 30 minutes the control will automatically reset and retriail the ignition sequence. Soft lockout and retriail will continue until the power supply is interrupted.
 - g. To complete the direct spark to pilot ignition system the heater will incorporate a gas control, 25Vac transformer, and:
 - i) For space heating application an Infrared Setback Thermostat as supplied by the manufacturer of the heater
 - ii) Or for outdoor patio heating a system control panel as supplied by the manufacturer of the heater
 3. Gas Control:
 - a. Heater will be complete with a direct ignition gas control with a manual valve, two automatic operators, and a pressure regulator
Electrical Rating: 24Vac, 60Hz; draw 0.5A with both operators energized

- b. The gas control will have an inlet pressure tap and an outlet pressure tap to facilitate measurement of gas supply and manifold pressures during servicing.
 - c. Heater will be complete with a ½" pipe nipple and ½" union with ½" female NPT for connection to the gas supply.
4. Heater Zone Temperature Control:
- a. Space Heating: Each heater zone will be controlled by a 24 Vac infrared set-back thermostat (refer Part 4.01), or other 24 Vac thermostat as supplied by the manufacturer
 - b. Outdoor Patio Comfort Heating: Heaters or heater zones will be controlled by a Patio Control Panel (refer Part 4.02) as supplied by the manufacturer
5. Indoor Installation Requirements and Mechanical Exhaust:
- a. Installation in Canada:
 - i. Gas fired infrared radiant heating system installation will comply with the manufacturer's installation instructions, the current national Natural Gas and Propane Installation Code B149.1 and all applicable local codes.
 - ii. The gas fired infrared radiant heating system will be provided with mechanical ventilation at a rate of 300 cfm for each 100,000 Btuh system input or fraction thereof. The ventilation system will be interlocked so that any reduction of the ventilation rate will cause the shutdown of the interlocked heater or group of heaters.
 - b. Installation in the USA:
 - i. Gas fired infrared radiant heating system installation will comply with the manufacturer's installation instructions, the current National Fuel Gas Code, ANSI 223.1 standards, and all applicable local codes.
 - ii. Natural or mechanical exhaust will be provided for the gas fired infrared radiant heating system at a rate of 4 cfm for every 1,000 Btuh of natural gas system input, or at a rate of 4.5 cfm for every 1,000 Btuh of propane gas system input.
- E. Electrical Requirements:
- a. Power supply wiring (25Vac, 60Hz) will connect to the heater ignition module as per the wiring diagram in the manual supplied by the manufacturer.
 - b. For each heater or zone of heaters the installer will provide a 120V/24V/60HZ transformer with a capacity of 40VA for the first heater plus 20VA for each additional heater in the zone.

Part 3 — Performance

3.01 Combustion

Heater will ensure controlled surface combustion with complete conversion of fuel and clean combustion with resultant combustion products CO₂, H₂O, O₂ and N₂ and will produce limited volumes of noxious components CO (< 100 ppm) and NO_x (<20 ppm)

3.02 Safety

Clearances to combustibles in all directions will be defined individually per heater in the technical manual as certified by CSA international.

1. Models RSE1S35BP, RSE1S35BN, RSE1S35SP, RSE1S35SN (35,000 Btuh input):
 - a. When installed outdoors a minimum required clearance to combustibles will not exceed 13" above the heater when oriented in a horizontal mounting position, and will not exceed 17" above the heater when angle oriented up to 30° from horizontal mounting position
 - b. When installed indoors a minimum required clearance to combustibles will not exceed 18" above the heater when oriented in a horizontal mounting position, and will not exceed 20" above the heater when angle oriented up to 30° from horizontal mounting position

2. Models RSE1S50BP, RSE1S50BN, RSE1S50SP, RSE1S50SN (50,000 Btuh input):
 - a. When installed outdoors a minimum required clearance to combustibles for will not exceed 16" above the heater when oriented in a horizontal mounting position, and will not exceed 20" above the heater when angle oriented up to 30° from horizontal mounting position
 - b. When installed indoors a minimum required clearance to combustibles for will not exceed 21" above the heater when oriented in a horizontal mounting position, and will not exceed 25" above the heater when angle oriented up to 30° from horizontal mounting position

3.03 Energy Efficiency (Radiant Efficiency)

The heater burner will produce and emit high intensity radiant heat energy. The radiant coefficient (radiant output in relation to heat input, corrected dry value) will not be less than 0.45 (45% radiant heat output) for inputs up to 50,000 Btuh as tested and certified by CSA International according to ANSI Z83.19A-2002 ~ CSA 2.35A - 2002 B and/or European Standard EN 419-2 (Test B methodology). The convection heat coefficient of the burner will not be more than 55% for inputs up to 50,000 Btuh.

3.04 Submissions - Proof of Performance

The project submission will include written results of the radiant coefficient testing of the complete heater as produced by CSA International or other accredited certification test facility.

If a proposed radiant heater is unable to attain the minimum 45% radiant coefficient, a proposal submission will include:

- Written results from a Nationally Recognized Testing Laboratory (NRTL) for certification stipulating the radiant coefficient of the proposed heater
- The required quantity and input rating of the proposed radiant heater to attain the necessary radiant heat to the floor to satisfy the heating design condition of the specified radiant heating system
- The hourly gas consumption rate and resultant volumes of the products of combustion CO₂, CO and NO_x of the proposed radiant heater to enable comparison to the specified radiant heater

Part 4 — Accessories / Ancillaries

4.01 Temperature Control: Indoor Space Heating

A. GENERAL

Infrared Setback Thermostat will sense both infrared radiant temperature and ambient temperature to realize accurate comfort control. The setback feature will automatically reduce the set operating temperature by 9F° (5C°) when area lighting level is reduced due to an unoccupied condition.

- a. The thermostat will be comprised of a metal dome that will attach to a mounting plate using two metal screws. All control circuitry and comfort temperature selection controls will be mounted inside of the metal dome enclosure to protect the circuitry and provide resistance to tampering with temperature settings.
 - i. Optionally tamper proof screws for mounting of the metal dome to the mounting plate will limit access to thermostat settings to authorized personnel with access to the special tool required to manipulate the screws
- b. The thermostat will sense both infrared and ambient temperature and average the two to maintain the comfort temperature setting within the heat zone
- c. The thermostat will incorporate automatic temperature setback of 9F° (5C°) during an unoccupied condition. A photoconductive cell will be used to sense occupancy within the heater zone by sensing illumination. Resumption of the occupied state illumination level will return thermostat temperature control to full comfort setting. A switching mechanism will allow calibration of the photoconductive cell to the base illumination level for occupied

status. A switching mechanism within the thermostat will allow for disabling of the temperature setback feature.

- d. The thermostat mounting plate will attach to a standard 4" x 4" octagonal electrical box.
- e. Electrical rating: 24 Vac

4.02 Heater Control: Outdoor Patio Heating Application

A. GENERAL

A Patio Control Panel will provide individual On/Off control for each heater or each heater zone.

MODELS:

PCP-4	up to 4 Heaters or Zones	Part #: 903000001
PCP-8	up to 8 Heaters or Zones	Part #: 903000002
PCP-12	up to 12 Heaters or Zones	Part #: 903000003

- a. **ELECTRICAL:** The Patio Control Panel will provide 24 Vac power to the heaters. The installer will provide a 120V/24V/60HZ transformer with a minimum capacity of 40VA for the first heater plus 20VA for each additional heater to be controlled by the panel.

4.03 Other Heater Ancillaries

A. Gas Connection

Each heater will be connected to the gas supply piping using an approved 1/2" x 24" stainless steel flexible gas connector (903000013) as supplied by the manufacturer of the heater.

B. Mounting Options:

- a. **Standard:** The heater is supplied with a top cover that facilitates mounting of the heater using chain or rod
- b. **Wall Mount Bracket:** Optional bracket (903000022) facilitates mounting of the heater to a wall surface
- c. **Wall Mount Arm:** Optional Mounting Arm assembly (903000028) extends the heater location 30 inches from a wall or ceiling mounting surface
- d. **Post Mount Bracket:** Optional Post Mount Bracket (903000026) facilitates mounting of the heater on a 4 inch diameter post (post field supplied by others)