

## HVAC Guideline Specifications

### Technical Summary

Schwank builderSchwank Series: STRAIGHT TUBE MODEL 'S100' (U-Tube Models next page)

Positive Pressure Gas-Fired Infrared Radiant Tube Type Heater

Commercial/Industrial Applications

**Straight Tube Input Range: 45,000 Btuh to 200,000 Btuh Nominal (Input Rating)**

<u>Model</u>	<u>Input</u> Btuh (kWh)	<u>Fuel</u>	<u>Nominal</u> <u>Length*</u> ft. (mm)	<u>System</u> <u>Length**</u> ft.-in. (mm)	<u>Weight</u> lb. (kg)	<u>Turbulator</u> ft. (mm)
S100-45-20	45,000 (13)	NG or LP	20' (6100)	21'-4" (6500)	111 (50)	14' (4270)
S100-60-20	60,000 (17.5)	NG or LP	20' (6100)	21'-4" (6500)	111 (50)	14' (4270)
S100-60-30	60,000 (17.5)	NG or LP	30' (9150)	31'-0" (9450)	154 (70)	14' (4270)
S100-80-20	80,000 (23)	NG or LP	20' (6100)	21'-4" (6500)	111 (50)	14' (4270)
S100-80-30	80,000 (23)	NG or LP	30' (9150)	31'-0" (9450)	154 (70)	14' (4270)
S100-80-40	80,000 (23)	NG or LP	40' (12100)	40'-8" (12400)	197 (89)	10' (3050)
S100-100-20	100,000 (29)	NG Only	20' (6100)	21'-4" (6500)	113 (50)	10' (3050)
S100-110-30	110,000 (32)	NG or LP	30' (9150)	31'-0" (9450)	154 (70)	14' (4270)
S100-110-40	110,000 (32)	NG or LP	40' (12100)	40'-8" (12400)	197 (89)	10' (3050)
S100-110-50	110,000 (32)	NG or LP	50' (15150)	50'-4" (15350)	239 (108)	None
S100-130-30	125,000 (38)	NG Only	30' (9150)	31'-0" (9450)	154 (70)	14' (4270)
S100-130-40	125,000 (38)	NG or LP	40' (12100)	40'-8" (12400)	197 (89)	10' (3050)
S100-130-50	125,000 (38)	NG or LP	50' (15150)	50'-4" (15350)	239 (108)	None
S100-155-40	150,000 (45)	NG or LP	40' (12100)	40'-8" (12400)	197 (89)	10' (3050)
S100-155-50	150,000 (45)	NG or LP	50' (15150)	50'-4" (15350)	239 (108)	None
S100-155-60	150,000 (45)	NG or LP	60' (18300)	60'-0" (18300)	282 (128)	None
S100-175-50	175,000 (51)	NG or LP	50' (15150)	50'-4" (15350)	239 (108)	10' (3050)
S100-175-60	175,000 (51)	NG or LP	60' (18300)	60'-0" (18300)	282 (128)	10' (3050)
S100-175-70	175,000 (51)	NG Only	70' (21350)	69'-8" (21230)	324 (147)	10' (3050)
S100-200-50	200,000 (58)	NG Only	50' (15150)	50'-4" (15350)	239 (108)	10' (3050)
S100-200-60	200,000 (58)	NG or LP	60' (18300)	60'-0" (18300)	282 (128)	10' (3050)
S100-200-70	200,000 (58)	NG or LP	70' (21350)	69'-8" (21230)	324 (147)	10' (3050)

\* Note: Due to 4" (100 mm) length of swaged overlap connection, the net length of each tube section is 9'-8" (2950 mm), except last tube is 10' (3050 mm).

\*\* System Length includes burner and all tubes.

<u>Gas Supply</u>	<u>Line Pressure</u> ("w.c.)		<u>Manifold</u>
	<u>Min.</u>	<u>Max.</u>	<u>Pressure</u> ("w.c.)
Natural Gas	5.0	14.0	3.5
Propane Gas	11.0	14.0	10.0

Electrical Supply: 120V, 60Hz, 145VA; electrically grounded in accordance with National Electrical code ANSI/NFPA 70 or Canadian Electrical Code CSA C22.1

Thermostat: 24 V infrared set-back thermostat or 24V thermostat

Requires optional Relay Switch(es) JS-0568-CC to operate multiple heaters per thermostat:  
Qty 1 x 24V thermostat for 1<sup>st</sup> heater + Qty 1 x JS-0568-CC for each additional heater

**HVAC Guideline Specifications  
Technical Summary**

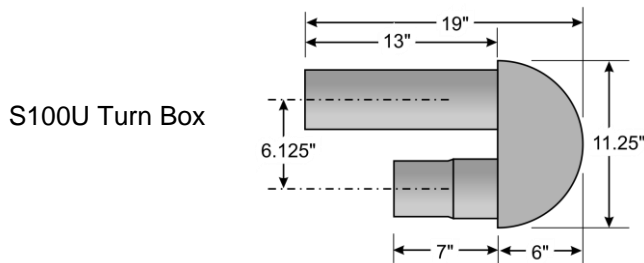
**Schwank builderSchwank Series: U-TUBE MODEL 'S100U' (Straight Tube Models previous page)  
Positive Pressure Gas-Fired Infrared Radiant Tube Type Heater  
Commercial/Industrial Applications**

**U-Tube Input Range: 60,000 Btuh to 200,000 Btuh Nominal (Input Rating)**

<u>Model</u>	<u>Input Btuh (kWh)</u>	<u>Fuel</u>	<u>Nominal Length*</u> ft. (mm)	<u>System Length**</u> ft.-in. (mm)	<u>Weight</u> lb. (kg)	<u>Turbulator</u> ft. (mm)
S100U-60-10	60,000 (17.5)	NG or LP	20' (6100)	12'-7" (3835)	116 (53)	14' (4270)
S100U-80-10	80,000 (23)	NG or LP	20' (6100)	12'-7" (3835)	116 (73)	14' (4270)
S100U-80-15	80,000 (23)	NG or LP	30' (9150)	17'-3" (5258)	160 (70)	13' (4270)
S100U-110-15	110,000 (32)	NG or LP	30' (9150)	17'-3" (5258)	160 (70)	13' (4270)
S100U-110-20	110,000 (32)	NG or LP	40' (12100)	22'-3" (6782)	202 (92)	10' (3050)
S100U-130-15	125,000 (38)	NG Only	30' (9150)	17'-3" (5258)	160 (70)	13' (4270)
S100U-130-20	125,000 (38)	NG or LP	40' (12100)	22'-3" (6782)	202 (92)	10' (3050)
S100U-155-20	150,000 (45)	NG or LP	40' (12100)	22'-3" (6782)	202 (92)	10' (3050)
S100U-155-30	150,000 (45)	NG or LP	60' (18300)	31'-11" (9728)	287 (130)	None
S100U-175-30	175,000 (51)	NG Only	60' (18300)	31'-11" (9728)	287 (130)	10' (3050)
S100U-200-30	200,000 (58)	NG Only	60' (18300)	31'-11" (9728)	287 (130)	10' (3050)

\* Note: Due to 4" (100 mm) length of swaged overlap connection, the net length of each tube section is 9'-8" (2950 mm), except last tube is 10' (3050 mm).

\*\* System Length includes burner, all tubes, and turn box (180°).



<u>Gas Supply</u>	<u>Line Pressure</u> ("w.c.)		<u>Manifold</u>
	<u>Min.</u>	<u>Max.</u>	<u>Pressure</u> ("w.c.)
Natural Gas	5.0	14.0	3.5
Propane Gas	11.0	14.0	10.0

**Electrical Supply: 120V, 60Hz, 145VA; electrically grounded in accordance with National Electrical code ANSI/NFPA 70 or Canadian Electrical Code CSA C22.1**

**Thermostat: 24 V infrared set-back thermostat or 24V thermostat**

**Requires optional Relay Switch(es) JS-0568-CC to operate multiple heaters per thermostat:  
Qty 1 x 24V thermostat for 1<sup>st</sup> heater + Qty 1 x JS-0568-CC for each additional heater**

## Part 1 — General

### 1.01 SYSTEM DESCRIPTION

Indoor overhead mounted, electrically controlled positive pressure radiant tube type infrared heating unit utilizing gas combustion for heating of spaces or areas.

### 1.02 QUALITY ASSURANCE

- A. Heater will be tested in accordance with ANSI Z83.20-2004 / CSA 2.34-2004 Standards, and certified by CSA International.
- B. Each heater burner 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 ten (10) years on the ceramic burner cup, five (5) years on the combustion and heat exchanger tubes, and two (2) years on all other heater 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:

Site assembled, modular infrared radiant heating unit for overhead mounted space or area heating application. Supplied with the heater as required for field installation and start-up will be a burner with all necessary factory installed wiring, piping, and controls and a radiant tube/reflector system, complete with hangers and end plates, corresponding in length to the burner input.

The radiant tube type infrared heating unit(s) will be manufactured by Schwank.

Heater size(s) and capacity(s) are as noted on drawing and/or schedule

#### B. Emitting Tube System:

##### 1. General:

- a. All tubes will be 4 inch (100 mm) diameter with an emitting surface area of 152 in<sup>2</sup> per linear foot
- b. The system tubes will have a swage of approximately 4 inches in length to accommodate the connection of subsequent tubes and vent pipe at the heater termination
- c. Each tube connection in the system will be secured in place with a 4 inch TorcTite® coupler
- d. 20 ft Straight Tube and 10 ft U-Tube systems:
  - For inputs up to and including 80,000 Btuh
  - The 10 foot combustion tube adjoining to the burner will be constructed of 16 gauge aluminized steel
  - The remaining 10 ft tube will be constructed of 16 gauge cold-rolled steel
- e. 30 ft, 40 ft, and 50 ft Straight Tube and 15 ft and 20 ft U-Tube systems:
  - For inputs up to and including 150,000 Btuh
  - The 10 foot combustion tube adjoining to the burner and the next tube in the system will be constructed of 16 gauge aluminized steel
  - The balance of the tubes in the system will be constructed of 16 gauge cold-rolled steel
- f. 50 ft, 60 ft, and 70 ft Straight Tube and 30 ft U-Tube systems:
  - For inputs 175,000 and 200,000 Btuh
  - The 10 foot combustion tube adjoining to the burner will be constructed of 16 gauge 439 grade stainless steel
  - The next tube in the system will be constructed of 16 gauge aluminized steel
  - The balance of the heat exchanger tube system (lengths as approved for burner input) will be 10 ft lengths of 16 gauge cold-rolled steel

C. Reflector Shield System:

1. General:

- a. Reflector shields will be constructed of high grade steel with a heat and corrosion resistant hot-bonded aluminum-silicon alloy coating.
- b. The reflector system will enclose the emitting tube system on the top and two sides and extend to the bottom surface of the tube system to entrap convection heat around the tube system, thereby increasing overall tube temperature and infrared heat emission.
- c. The reflector system will have an aluminized-steel sheet metal end cap at each end of the system and at each juncture with an elbow to minimize the escape of entrapped convection heat and reduce clearance to combustibles above the heater.

D. Tube/Reflector Suspension System:

1. General:

- a. The straight tube/reflector system will have ¼" galvanized steel wire hangers at each side of a tube connection that will serve to support the reflector/tube system, and allow the free passage of entrapped convection heat along the length of the system to produce more uniform heat from end to end
- b. The tube/reflector hangers will enable suspension of the system so that the reflector shields can be oriented about the long axis of the system at a fixed angle between 0° to 45° as indicated on the drawings
- c. The U-tube/reflector system will have bar hangers at each side of a tube connection that will serve to support the reflector/tube system, and allow the free passage of entrapped convection heat along the length of the system to produce more uniform heat from end to end
- d. The entire tube/reflector system will be suspended from the structure as indicated in the Installation and Owner's Manual or as specified in the drawings and/or schedule

E. Burner:

1. General:

- a. The burner will utilize a burner cup with an 'effect' ceramic tile at its outlet to ensure a homogenous gas/air mixture and high velocity flow of the gas/air mixture exiting the burner.
- b. The burner will use coaxial flow control elements and high velocity flow of the gas/air mixture to create a very long, laminar and axially straight flame that will produce higher tube temperature and optimum temperature uniformity incrementally along the tube length. The flame will have a minimum length of 6 feet at 60,000 Btuh input and will be 14 ft in length at 200,000 Btuh input.
- c. The burner will have a blower to create a positive pressure in the tube system
- d. The blower will provide combustion air flow directly to the burner assembly so that electronic burner components are isolated from the air flow
- e. The burner will operate on either natural gas or propane gas
- f. The burner will be housed in a pre-painted sheet metal protective cabinet
- g. The burner cabinet will be of a 'clam-shell' design that opens downward on a hinge to provide service access to all burner components
- h. The burner will be able to operate with the housing cabinet in the 'open' service position
- i. The burner will be fitted with a 4 inch diameter collar at the blower inlet for connection of outside combustion air if case site conditions require

2. Gas Supply:

- a. The gas supply will be connected to the heater using a flexible gas connection of the type and in a manner that is prescribed by national and/or local codes
- b. The flexible gas connector will be supplied by the manufacturer

F. Controls and Safeties:

1. General:

- a. Electrical Rating: The burner will operate on a 115Vac, 60Hz electrical supply with a current rating of no less than 1.5A at 115Vac
- b. Heater gas and ignition controls will be readily accessible for servicing.
- c. The burner will have solid state direct spark ignition and flame sensor control that is dedicated to secure the operation of the burner

2. Ignition and Flame Control:

- a. To complete the direct spark ignition system the burner will incorporate a gas control
- b. Burner will be complete with a 24Vac transformer, a low voltage (24Vac) solid state direct spark ignition and ionization flame sensing control module that will:
  - i. Check the pressure switch for proper status prior to commencement of the ignition sequence
  - ii. 24Vac thermostat control: Provide a 45 second pre-ignition purge and a 45 second post-ignition purge of the system by the blower.
  - iii. Line voltage thermostat control: Provide a 45 second pre-ignition purge of the system by the blower, but post-ignition purge is disabled.
  - iv. Perform up to three ignition trials prior to a soft lockout period of one hour
  - v. After one hour of soft lockout, the control will automatically reset and resume the three trial ignition sequence
  - vi. Electrical Rating: 24Vac, 60Hz with current rating of 0.2A at 24Vac
- c. Burner will be complete with an igniter/sensor to provide spark ignition and flame monitoring. The igniter/sensor will be installed on site into a port manufactured in the first tube adjacent to the burner.
- d. The ionization module will sense the presence of main burner flame and discontinue spark ignition.
- e. The ionization module will check for a false flame condition (short to ground) and lock out if a false flame condition is present.
- f. The ignition module will have a 15 second trial-for-ignition period
- g. The ignition module will open the main gas valve and generate 30,000 volts at the spark igniter for direct ignition of the burner.
- h. On a loss of burner flame the timed trial-for-ignition is repeated. Soft safety lockout occurs if flame is not reestablished within three trials for ignition. Reset of the control automatic after a period of one hour, or manually from the thermostat or electrical supply.

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 for connection to the gas supply.

4. Heater Temperature Control:

- a. Burner will be complete with a 24/120Vac relay switch;
- b. Space Heating: Each heater will be controlled by a 24 Vac infrared set-back thermostat (refer Part 4A), or other 24 Vac or 120Vac thermostat as supplied by the manufacturer
- c. 24 V thermostat control requires optional 24V/120V relay switch kit JS-0568-KT to operate a single heater per thermostat, or 24V/120V Transformer-Relay Kit JM-0303-KT to operate multiple heaters per thermostat

5. Safety Controls:

- a. Burner will be complete with a pressure switch in the ignition system electrical circuit that will close upon proving a sufficient supply of combustion air from the blower
- b. Burner will further be complete with a separate pressure switch in the ignition system electrical circuit that will open upon pressure resulting from a blocked flue condition in the tube system

G. Exhaust Requirements:

- a. Direct Vented gas fired infrared heating system installation will comply with the manufacturer's installation instructions, the current National Natural Gas and Propane Installation Code and all applicable local codes using:
  - i. A 4 inch vent pipe of a gauge prescribed by national and/or local codes
  - ii. Two heaters may be common vented using a 4 inch x 4 inch by 6 inch vent tee as supplied by the manufacturer; common vented heaters will be controlled by one common thermostat
- b. **Canada:** Indirect Vented Installation
  - 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.
- c. **USA:** Indirect Vented Installation
  - 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 5 cfm for every 1,000 Btuh of propane gas system input.

E. Electrical Requirements:

- a. Power supply wiring (115Vac, 60Hz, with a current rating of no less than 1.5A at 115Vac) will connect to the heater as per the wiring diagram in the manual supplied by the manufacturer.

## Part 3 — Performance

### 3.01 Combustion

Heater will ensure controlled combustion with complete conversion of fuel and clean combustion with resultant combustion products CO<sub>2</sub>, H<sub>2</sub>O, O<sub>2</sub> and N<sub>2</sub> and will produce a limited volume of noxious component CO (< 50 ppm)

### 3.02 Safety

- a. Clearances to combustibles in all directions will be defined individually per heater model in the Installation and Owner's Manual as certified to current standards by CSA international
- b. Minimum clearance to combustibles for horizontal or angle mounting as certified to current standards by CSA International will be maintained as listed in the Installation and Owner's Manual for the Schwank model S100
- c. To allow for heater expansion the heater will be connected to the gas supply using a properly sized certified flexible gas connector of the type approved by all applicable National and/or local codes

## Part 4 — Accessories / Ancillaries

### 4.01 Temperature Control: 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, 60Hz
- f. 24 V thermostat control requires optional 24V/120V relay switch kit JS-0568-KT to operate a single heater per thermostat, or 24V/120V Transformer-Relay Kit JM-0303-KT to operate multiple heaters per thermostat
- g. Alternately a line voltage (120Vac) thermostat will control a single or multiple heaters.

### 4.02 Other Heater Ancillaries

#### A. Gas Connection

- i. **USA:** Each heater will be connected to the gas supply piping using a certified stainless steel flexible gas connector sized according to heater input.
- ii. **Canada:** Each heater will be connected to the gas supply piping using a certified Type-1 Hose gas connector sized according to heater input.
- iii. Gas connection will be accomplished in a manner prescribed by applicable National and/or local gas codes

#### B. Combustion Air intake:

When located in an area with a negative air condition or a dust laden environment the heater will be fitted with an optional combustion air intake adapter and 4 inch diameter duct as described in the Installation and Owner's Manual. The duct termination will be fitted with an optional cap as supplied by the manufacturer

#### C. Elbow Kits:

To enable a 90° bend in the tube system, the heater will be fitted with a 90° elbow kit complete with aluminized steel elbow, two reflector end caps, and tube coupler as supplied by the manufacturer. To enable a 180° bend in the system installation of a 180° elbow kit. Elbow kit will be installed in the system as per the Installation and Owner's Manual provided by the manufacturer, noting in particular minimum length location of the elbow from the burner.

D. Reflector Extension

To prevent impingement of infrared heat on nearby surface(s) the heater will be fitted with a reflector extension as supplied by the manufacturer of the heater. The reflector extension will be installed on the heater(s) as per the manufacturer's instruction and as indicated on the drawings.

## Copy & Paste Table – Conventional Units & Metric Units

<b>GAS FIRED SINGLE STAGE LOW INTENSITY INFRARED HEATERS</b>								
Heater	Location	Manufacturer	Model	Heating Capacity MBH	Gas Input cfm	System Length	Electrical (V/P/C)	
IR-1		Schwank	S100-200-70				115/1/60	
IR-2		Schwank						
IR-3		Schwank						
IR-4		Schwank						
IR-5		Schwank						
IR-6		Schwank						
IR-7		Schwank						
IR-8		Schwank						
IR-9		Schwank						
IR-10		Schwank						

<u>Model</u>	<u>Input</u> Btuh (kWh)	<u>System Length**</u> ft.-in. (mm)	<u>Weight</u> lb. (kg)	<u>Turbulator</u> ft. (mm)
S100-45-10	45,000 (13)	11'-8" (3550)	68 (31)	5' (1525)
S100-45-20	45,000 (13)	21'-4" (6500)	111 (50)	14' (4270)
S100-60-20	60,000 (17.5)	21'-4" (6500)	111 (50)	14' (4270)
S100-60-30	60,000 (17.5)	31'-0" (9450)	154 (70)	14' (4270)
S100-80-20	80,000 (23)	21'-4" (6500)	111 (50)	14' (4270)
S100-80-30	80,000 (23)	31'-0" (9450)	154 (70)	14' (4270)
S100-80-40	80,000 (23)	40'-8" (12400)	197 (89)	10' (3050)
S100-100-20	100,000 (29)	21'-4" (6500)	113 (50)	10' (3050)
S100-110-30	110,000 (32)	31'-0" (9450)	154 (70)	14' (4270)
S100-110-40	110,000 (32)	40'-8" (12400)	197 (89)	10' (3050)
S100-110-50	110,000 (32)	50'-4" (15350)	239 (108)	None
S100-130-30	130,000 (38)	31'-0" (9450)	154 (70)	14' (4270)
S100-130-40	130,000 (38)	40'-8" (12400)	197 (89)	10' (3050)
S100-130-50	130,000 (38)	50'-4" (15350)	239 (108)	None
S100-155-40	155,000 (45)	40'-8" (12400)	197 (89)	10' (3050)
S100-155-50	155,000 (45)	50'-4" (15350)	239 (108)	None
S100-155-60	155,000 (45)	60'-0" (18300)	282 (128)	None
S100-175-50	175,000 (51)	50'-4" (15350)	239 (108)	10' (3050)
S100-175-60	175,000 (51)	60'-0" (18300)	282 (128)	10' (3050)
S100-175-70	175,000 (51)	69'-8" (21230)	324 (147)	10' (3050)
S100-200-50	200,000 (58)	50'-4" (15350)	239 (108)	10' (3050)
S100-200-60	200,000 (58)	60'-0" (18300)	282 (128)	10' (3050)
S100-200-70	200,000 (58)	69'-8" (21230)	324 (147)	10' (3050)