



Low Intensity Two-Stage Tube Heaters



ENGINEERING SUBMITTAL DATA TWO-STAGE LOW INTENSITY GAS-FIRED INFRA-RED TUBE HEATERS

WARNING! These heaters must be installed and serviced by trained gas heater installation and service personnel only! Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment. Observe all safety information. Retain instructions for future reference.

Straight Heater Length	High Fire MBTUH	Low Fire MBTUH	Natural Gas				LP / Propane Gas				Typical Mounting Height	Wt.**	U-Tube Heater Length
			Straight Heaters		U-Tube Heaters		Straight Heaters		U-Tube Heaters				
			Model #	Qty	U*	Qty	Model #	Qty	U*	Qty			
22'-1/4"	85	65	HLS 85/65N20		U*		HLS 85/65L20		U*		11' - 18'	150#	13'-4-1/4"
27'-1/4"	85	65	HLS 85/65N25		NA		HLS 85/65L25		NA		11' - 18'	185#	NA
32'-1/4"	100	65	HLS 100/65N30		U*		HLS 100/65L30		U*		12' - 20'	225#	18'-4-1/4"
32'-1/4"	125	95	HLS 125/95N30		U*		NA		NA		14' - 25'	225#	18'-4-1/4"
37'-1/4"	100	65	HLS 100/65N35		NA		HLS 100/65L35		NA		12' - 20'	260#	NA
37'-1/4"	125	95	HLS 125/95N35		NA		NA		NA		14' - 25'	260#	NA
42'-1/4"	100	65	HLS 100/65N40		U*		HLS 100/65L40		U*		12' - 20'	275#	23'-4-1/4"
42'-1/4"	125	95	HLS 125/95N40		U*		HLS 125/95L40		U*		14' - 25'	275#	23'-4-1/4"
42'-1/4"	150	100	HLS 150/100N40		U*		HLS 150/100L40		U*		16' - 30'	275#	23'-4-1/4"
47'-1/4"	100	65	HLS 100/65N45		NA		HLS 100/65L45		NA		12' - 20'	310#	NA
47'-1/4"	125	95	HLS 125/95N45		NA		HLS 125/95L45		NA		14' - 25'	310#	NA
47'-1/4"	150	100	HLS 150/100N45		NA		HLS 150/100L45		NA		16' - 30'	310#	NA
52'-1/4"	125	95	HLS 125/95N50		U*		HLS 125/95L50		U*		14' - 25'	350#	28'-4-1/4"
52'-1/4"	150	100	HLS 150/100N50		U*		HLS 150/100L50		U*		16' - 30'	350#	28'-4-1/4"
52'-1/4"	175	125	HLS 175/125N50		U*		HLS 175/125L50		U*		17' - 35'	350#	28'-4-1/4"
52'-1/4"	200	145	HLS 200/145N50		U*		HLS 200/145L50		U*		19' - 42'	350#	28'-4-1/4"
57'-1/4"	125	95	HLS 125/95N55		NA		HLS 125/95L55		NA		14' - 25'	385#	NA
57'-1/4"	150	100	HLS 150/100N55		NA		HLS 150/100L55		NA		16' - 30'	385#	NA
57'-1/4"	175	125	HLS 175/125N55		NA		HLS 175/125L55		NA		17' - 35'	385#	NA
57'-1/4"	200	145	HLS 200/145N55		NA		HLS 200/145L55		NA		19' - 42'	385#	NA
62'-1/4"	150	100	HLS 150/100N60		U*		HLS 150/100L60		U*		16' - 30'	400#	33'-4-1/4"
62'-1/4"	175	125	HLS 175/125N60		U*		HLS 175/125L60		U*		17' - 35'	400#	33'-4-1/4"
62'-1/4"	200	145	HLS 200/145N60		U*		HLS 200/145L60		U*		19' - 42'	400#	33'-4-1/4"
67'-1/4"	150	100	HLS 150/100N65		NA		HLS 150/100L65		NA		16' - 30'	435#	NA
67'-1/4"	175	125	HLS 175/125N65		NA		HLS 175/125L65		NA		17' - 35'	435#	NA
67'-1/4"	200	145	HLS 200/145N65		NA		HLS 200/145L65		NA		19' - 42'	435#	NA
72'-1/4"	175	125	HLS 175/125N70		U*		HLS 175/125L70		U*		17' - 35'	475#	38'-4-1/4"
72'-1/4"	200	145	HLS 200/145N70		U*		HLS 200/145L70		U*		19' - 42'	475#	38'-4-1/4"

MBTUH = 1000 BTU per hour.

NA = Not Available.

U* = U (HLU) replaces S (HLS) in the model number for U-tube heaters.

Wt.** = Shipping Weight. Add 25# to weight for U-tube heaters.

Submitted by: _____ Date: _____

Job Title: _____

Address: _____ City: _____ State: _____ Zip: _____

Contractor: _____ Phone #: _____

Address: _____ City: _____ State: _____ Zip: _____

Engineer: _____

Local Representative: _____

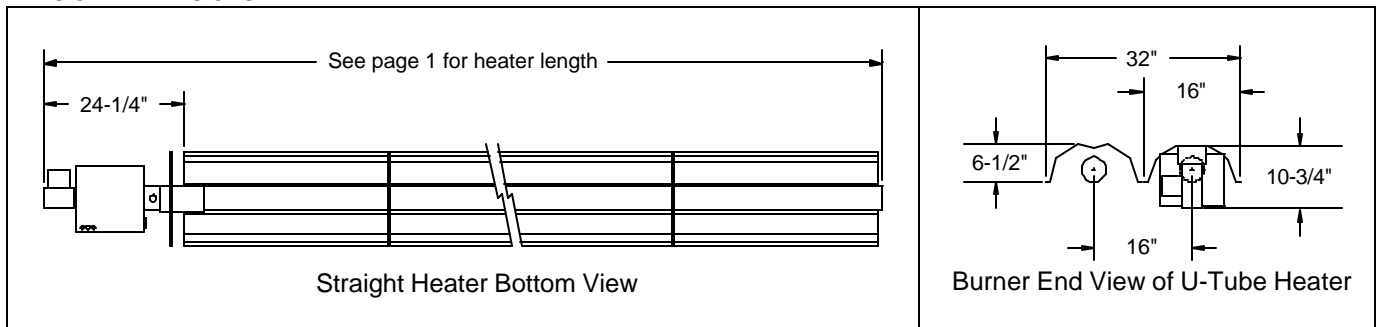
Notes: _____

SPECIFICATIONS AND CLEARANCES

SPECIFICATIONS

<p>APPROVALS</p> <ul style="list-style-type: none"> • CSA International Design Certified, Report # 163199-1063506. • Indoor / Outdoor Approval. • Commercial / Industrial Approval. <p>BURNER AND CONTROLS</p> <ul style="list-style-type: none"> • Two-Stage Control of Both Gas and Air for Precise Air to Gas Ratios and Complete Efficient Combustion at Both High and Low Fire Rates. • Two-stage gas valve - 30% differential. • Two-speed blower thermally protected and permanently lubricated. • Blower impeller balanced statically and dynamically. • Controls isolated from combustion air. • Safety differential pressure switch. • Redundant gas safety shut-off 100%. • Durable direct spark ignitor. • Independent flame rod sensing. • Sight glass for burner observation. • Pre- and post-purge controls. 	<ul style="list-style-type: none"> • 3 trials for ignition and automatic recycle after inadvertent shutdown. • Self-diagnostic LED and soft lockout. • Controls inside a corrosion resistant housing, yet easily accessible from 3 sides by removing the cover. • 24-volt thermostatic control. <p>HEAT EXCHANGER TUBES</p> <ul style="list-style-type: none"> • Heavy duty 12 ga. 4" O.D. black steel for excellent heat transfer emissivity and durability. • Turbulator baffle factory installed. • 8" long clamps of 2 layers of 18 ga. aluminized steel with 4 clamping bolts. <p>COMBUSTION TUBES</p> <ul style="list-style-type: none"> • 4" O.D. Alumina Therm for excellent corrosion resistance. <p>REFLECTORS</p> <ul style="list-style-type: none"> • 91.7% reflectional efficiency. • Brite finished aluminum. • Rotate sections independently or continuous overlap. 	<p>GAS CONNECTION</p> <ul style="list-style-type: none"> • ½" FPT gas inlet. <p>GAS SUPPLY (W.C.)</p> <table border="1"> <thead> <tr> <th></th> <th>NAT</th> <th>LP</th> </tr> </thead> <tbody> <tr> <td>• Manifold pressure (High)</td> <td>5"</td> <td>5"</td> </tr> <tr> <td>• Minimum inlet pressure</td> <td>7"</td> <td>11"</td> </tr> <tr> <td>• Maximum inlet pressure</td> <td>14"</td> <td>14"</td> </tr> </tbody> </table> <p>COMBUSTION AIR / VENTING</p> <ul style="list-style-type: none"> • Wall or roof venting – 4" diameter pipe up to 20 linear feet and one 90° elbow. <p>POWER SUPPLY</p> <ul style="list-style-type: none"> • 120 VAC, 60 Hz, 1 phase. • Maximum current draw is 1.3 amps. • 3-prong plug power cord 36" long. • Thermostatic 24-volt power supply provided at heater terminal board. <p>LIMITED WARRANTY</p> <ul style="list-style-type: none"> • 10 years on Burner Core. • 10 years on All Heat Exchanger & Combustion Tubes. • 2 years on All Burner Controls. <p>MADE IN THE USA</p>		NAT	LP	• Manifold pressure (High)	5"	5"	• Minimum inlet pressure	7"	11"	• Maximum inlet pressure	14"	14"
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• Minimum inlet pressure	7"	11"												
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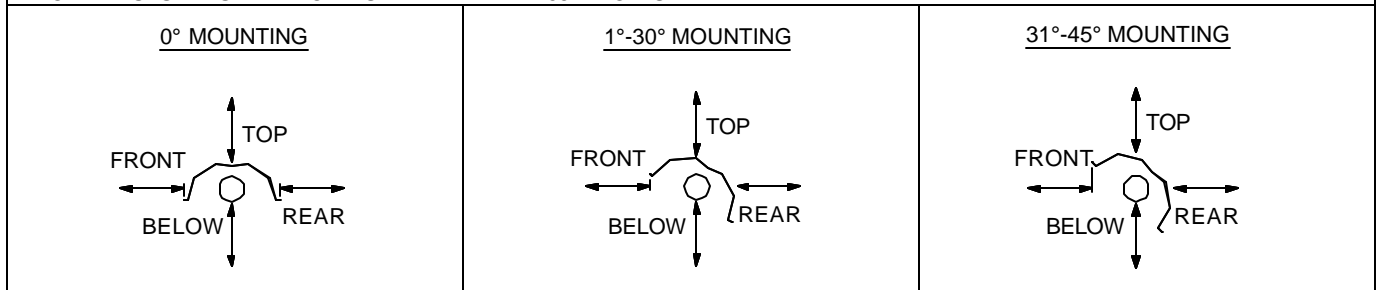
PHYSICAL DIMENSIONS



CLEARANCES

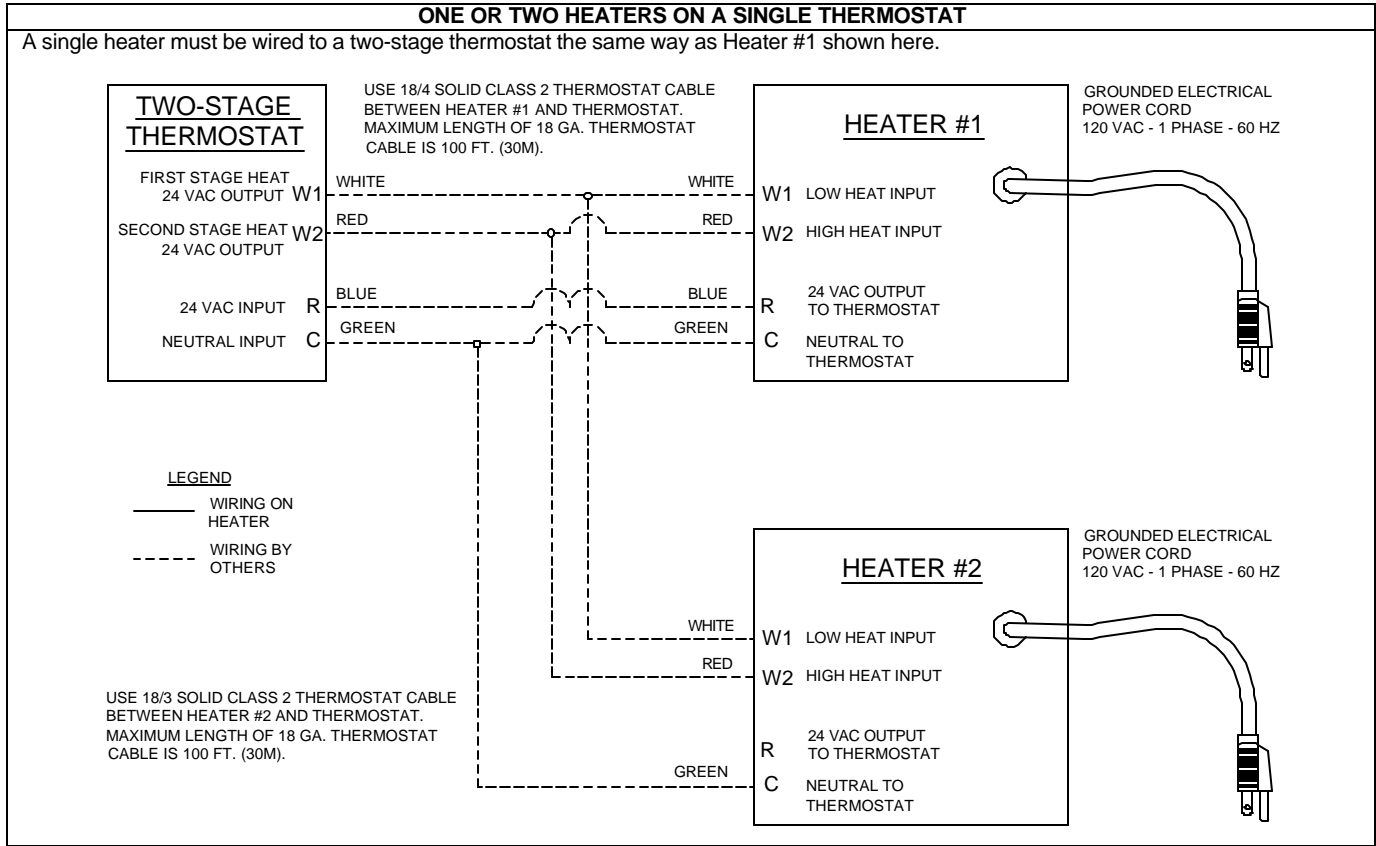
MODELS	CLEARANCES TO COMBUSTIBLES* (INCHES)				
	MOUNTING ANGLE	FRONT	REAR	TOP	BELOW
HL(S,U) 85/65(N,L)(20,25)	0°-30°	24	24	12	60
HL(S,U) 100/65(N,L)(30,35,40)	0°-30°	24	24	12	60
HL(S,U) 125/95(N,L)(30,35,40,45,50)	0°-30°	32	32	12	72
HL(S,U) 150/100(N,L)(40,45,50,55,60)	0°-30°	48	48	12	82
	31°-45°	70	12	12	82
HL(S,U) 175/125(N,L)(50,55,60,65,70)	0°-30°	58	58	12	92
	31°-45°	80	12	12	92
HL(S,U) 200/145(N,L)(50,55,60,65,70)	0°-30°	68	68	12	102
	31°-45°	90	12	12	102

* FOR ALL SYSTEMS: 12" FROM BURNER END AND 68" FROM U-BEND.



FIELD WIRING & ACCESSORIES

FIELD WIRING



RECOMMENDED ACCESSORIES

QTY	ITEM #	DESCRIPTION	NOTES
	0002-42-156	Two-stage 24-volt thermostat	Required for two-stage operation. Operates one or two heaters.
	CH-50	Mounting chain set	50 feet of chain plus 16 S-hooks.
	0002-10-046	Gas supply flex connector	24" long, stainless steel, 1/2" psi. max. with 1/2" gas cock & 1/8" tap.
	132237	4" wall vent kit for single heater	Required for single 4" wall vents. Tee, cap, screen & braces.
	131402	4" roof vent cap for single heater	Required for single 4" roof vents. Cap.
	131461	Indoor venting kit	Required for all units when operating unvented. Cap & elbow.
	132336	4" wall air supply kit for single heater	Required for single 4" wall supply. Wall box, flex duct, sleeve & collar.
	132337	4" roof air supply kit for single heater	Required for single 4" roof supply. Cap, B vent connector, flex duct, sleeve & collar.

OTHER ACCESSORIES

QTY	ITEM #	DESCRIPTION	NOTES
	132446	90-degree 4" OD tube elbow & clamp	For L-shaped heater. 16 ga. aluminized steel 90 with tube clamp 132571.
	132448	45-degree 4" OD tube elbow & clamp	For angled heater. 16 ga. aluminized steel 45 with tube clamp 132571.
	S132796	PVC coated gas flex connector	24" long, coated stainless steel for harsh environments, 1/2" psi. max. with 1/2" gas cock & 1/8" tap.
	130828	4"x4"x5" Y-coupler for dual venting	Joins two (2) heaters to one common 5" vent using one thermostat. 16 ga. aluminized steel Y with (2) tube clamps 132571.
	132238	5" wall vent kit for venting 2 heaters	Required for common 5" wall vents. Tee, cap, screen & braces.
	132149	5" roof vent cap for venting 2 heaters	Required for common 5" roof vents. Cap.
	132746	4"x4"x6" Individual vent coupler (Y)	Joins two (2) heaters to one common 6" vent using one or two thermostats. Sheet metal.
	132239	6" wall vent kit for venting 2 heaters	Required for common 6" wall vents. Tee, cap, screen & braces.
	132150	6" roof vent cap for venting 2 heaters	Required for common 6" roof vents. Cap.
	132747	Vent cap for individual vent coupler	Required with 132746 to independently vent two (2) heaters thru one 6" roof vent when using two thermostats.
	132338	6" wall supply kit to supply 2 heaters	Required for common 6" wall supply. 6" wall box, (2) 4" flex ducts, (2) 4" sleeves & (2) collars.
	132339	6" roof supply kit to supply 2 heaters	Required for common 6" roof supply. 6" Cap, (2) 4" flex ducts, (2) 4" sleeves & (2) collars.
	132115	U-bend reflector assembly	Use when ordering U-tube heater. Includes (2) pipe hangers.
	131421	Corner reflector assembly	Use with 132446 elbow. Includes (2) pipe hangers.
	132481	Reflector side extension assembly	Reflector side guard to reduce side clearances. 5-foot long with S-hooks.
	132129	Parabolic reflector assembly	Focus radiant heat in one direction. 10-foot long with support brackets.
	132352	End cap for reflector	Cap for reflector at the end of the heater.
	0002-42-114	Plastic locking thermostat guard	Clear plastic guard, ID: 4.5"H x 7"W x 3"D.
	0002-42-115	Metal locking thermostat guard	Baked enamel finished metal guard, ID: 4.625"H x 7.125"W x 3.25"D.

WRITTEN SPECIFICATIONS**SECTION 23 55 23 – FUEL-FIRED RADIANT HEATERS****PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. Section includes:
- Gas-Fired Infra-Red Tube Heaters
- B. Related Sections:
- Division 23, Section 23 10 00 "Facility Fuel Systems"
 - Division 23, Section 23 51 00 "Breechings, Chimneys, and Stacks"

1.3 QUALITY ASSURANCE

- A. Building Codes and Standards
- Two stage radiant tube heaters shall be Design Certified by CSA and comply with current Occupational Safety and Health (OSHA) Requirements. The supplier shall provide the CSA Certification Number and the heaters shall bear the CSA Seal of Certification. The heater's low fire and high fire modes of operation must be Design Certified by CSA.
 - Gas-fired two-stage radiant tube heaters shall be furnished and installed in accordance with local codes, building drawings and manufacturer's recommendations.

1.4 SUBMITTALS

- A. The supplier shall furnish the owner/contractor with _____ copies of the engineering specification forms, showing physical dimensions, installation detail, recommendations, and field wiring.

1.5 WARRANTY

- A. The supplier shall provide a manufacturer's published warranty covering the heater's burner core for a period of ten (10) years, heat exchanger and combustion chamber tubes for a period of ten (10) years, and all components utilized in the heater control assembly for a period of two (2) years.

PART 2 – PRODUCTS**2.1 MANUFACTURER**

- A. Two-stage radiant tube heaters shall be SOLARONICS TRUE DUAL SERIES of the model numbers and inputs in MBTUH as manufactured by Solaronics, Inc. Rochester, Michigan 48307.

2.2 DESCRIPTION

- A. The heaters shall provide Two-Stage Control of Both Gas and Air to provide precise air to gas ratios and the most efficient and complete combustion at both high and low fire rates.
- B. Two-stage radiant tube heaters shall be designed to satisfactorily operate at a minimum inlet pressure of 7 inches W.C. when specified for natural gas or 11 inches W.C. when specified for LP/propane gas and at a maximum inlet pressure of 14 inches W.C.
- C. Two-stage radiant tube heaters shall be designed to operate without adjustments when burning natural gas having a heat value of 1000 BTU per cubic foot with a specific gravity of .65, or when burning LP/propane gas having a heat value of 2500 BTU per cubic foot with a specific gravity of 1.53.

2.3 CONSTRUCTION

- A. The heater's controls shall be totally enclosed with a corrosion resistant housing. The controls shall be easily accessible from three sides by removing the cover. The burner core assembly shall be constructed of durable materials specially designed for high efficiency, maximum heat transfer, extremely quiet operation and extended life.
- B. The heater's combustion chamber shall be 4" O.D. Aluma Therm (aluminized titanium alloy steel) (85-100 MBTUH) or Aluma Therm finished with a high emissivity rated, corrosion resistant, black coating (125-200 MBTUH). Aluma Therm provides excellent mechanical properties at elevated temperatures and for corrosion / oxidation resistance is coated with 8% silicon/aluminum alloy, and shall meet MIL 500 hour salt spray test.
- C. The heater's heat exchanger tube shall be heavy duty 12 ga. (.109") wall thickness 4" O.D. black steel.
- D. The heaters are CSA Design Certified for alternate construction utilizing radiant tubes of all Aluma Therm finished with a high emissivity rated, corrosion resistant, black coating.
- E. The 4" O.D. tubes shall be joined by two layers of 18 ga. (.052") wall thickness aluminized steel tube clamp assembly and shall be a minimum of 8" in length for maximum support. Clamp shall be of a compression coupling design for uniform draw and pressure, and four (4) 5/8"-11x2" zinc plated carriage bolts and nuts to draw up (tighten to a minimum of 65 foot-pounds of torque).

- F. The direct spark ignitor shall be durable to resist breakage.
- G. Reflectors shall be .025" thick - #3003H25 aluminum brite finish with a geometrically designed configuration not having less than 91.7% reflectional efficiency, shall be held by a .229" diameter aluminized steel wire hanger. Hanger shall incorporate the geometric ability to rotate the reflector up to 45 degrees, in either direction from horizontal using the center of the combustion chamber or heat exchanger as the axis of rotation.
- H. Each 5 or 10-foot reflector section shall have the ability to be independently rotated from all other 5 or 10-foot sections, or overlapped between 5 or 10-foot sections, or a combination of both over the entire length of the system. The heater's reflector hanging system shall be designed to permit expansion while minimizing noise and/or rattles. Reflectors shall be assembled to the heater without the use of tools.
- I. Heaters shall utilize a downstream turbulator that shall be factory installed in the last ten (10) feet of heat exchanger, wave formed for optimal turbulence, acceleration and impingement of the products of combustion resulting in appropriate velocity pressure and momentum for maximum thermal efficiency.
- J. Heaters shall be equipped with a sight glass permitting a visual inspection of the spark ignitor and burner operation from the floor.
- K. The two-stage radiant tube heaters shall be designed such that, at the customer's option, outside combustion air may be supplied without the use of additional supply fans.
- L. Heaters shall be either directly vented outdoors with insulated flue pipe, or indirectly vented by positive air displacement of 4 CFM and one square inch of net free area per 1,000 BTUH input.
- 2.4 CONTROLS**
- A. The two-stage radiant tube heater's normal sequence of operation shall include a defined input differential. The heater must be CSA Design Certified to operate at an input differential of at least 30% between the low fire and high fire modes.
- B. Heater controls shall be isolated from combustion air to prevent corrosion from wet or dirty air.
- C. Heaters shall be equipped with a direct spark ignition system with three (3) trials-for-ignition and upon loss of flame sensing three (3) re-trials-for-ignition. Flame sensing shall be via an independent sensing rod and circuit.
- D. Power supplied to each burner shall be 120 VAC, 60 Hz. Maximum heater electrical current draw shall not exceed 1.3 amps.
- E. The heater controls shall have a three (3) copper conductor electrical power cord extending a minimum of thirty-six (36) inches from the control box with a three (3) prong plug.
- F. Heater controls shall include a safety differential pressure switch to monitor combustion airflow, so as to provide complete burner shutdown due to insufficient combustion air or flue blockage. Gas valve shut-off shall be of the redundant type.
- G. The heater shall incorporate a self-diagnostic ignition module, include an external LED readout display, and automatically recycle itself after an inadvertent shutdown.
- H. The heater's control system shall be designed to shut off the gas flow to the burner in the event either a gas supply or power supply interruption occurs.
- I. The heater's blower motor shall be thermally protected, permanently lubricated and the blower motor's impeller shall be both statically and dynamically balanced.
- J. The heater's air flow control system shall provide a 30-second pre-purge prior to initiating burner operation and a 120-second post-purge upon completion, effectively removing all products of combustion from the heat exchanger and/or radiant tubes.
- K. No condensation shall form as a result of combustion in the combustion chamber or heat exchanger tubes while at operating temperatures.
- L. The thermostats shall be two-stage operating on 24 volts.
- M. The heater control shall provide the 24-volt power supply for the thermostat at the heater terminal board. No additional 24-volt power supply is required.
- N. Total heater shutdown shall occur in the event of circuit control lockout, including burner operation and combustion air blower. An interruption of power (reset thermostat) will restart the firing sequence.

PART 3 – EXECUTION**3.1 INSTALLATION**

- A. Installation shall be in accordance with the requirements of the manufacturer.
- B. An Installation, Operation, and Maintenance Manual shall be supplied with each heater.