OnSpeX™

Consumer Product Evaluation

Program Description

Comparison of natural gas powered low intensity infrared tube heater with and without "Get Green System" using test methods derived from ANSI Z83.20 - 2008 Gas Fired Low Intensity Infrared Heaters.

Executive Summary

An Ener-Radient EXRL-100S (serial #106186) natural gas powered infrared radiant tube heater head was mounted to a Roberts Gordon 30 foot hot rolled steel heat exchanger kit; this assembly was then subjected to tests detailed in this report. The determination from the findings is that the use of the Get Green® device does not negatively affect the performance or safety aspects of the heater.

The conditions observed during testing are contained in this report.

OnSpeX
Consumer Product Evolution

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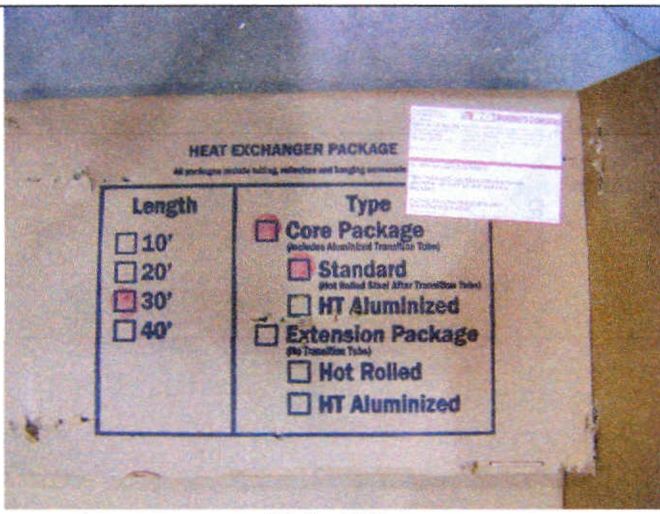
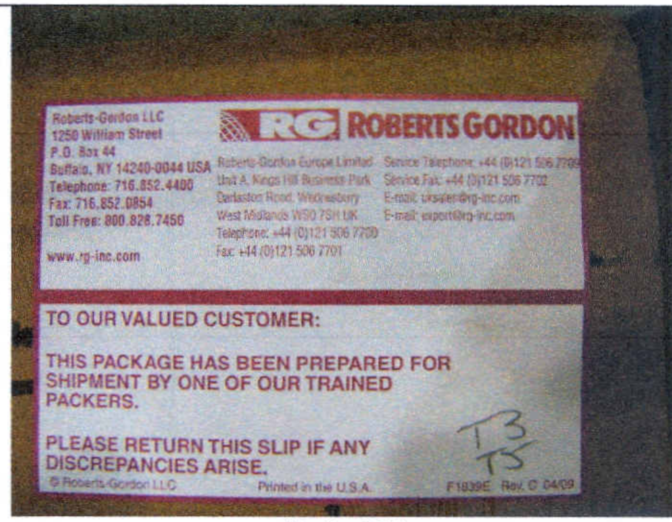
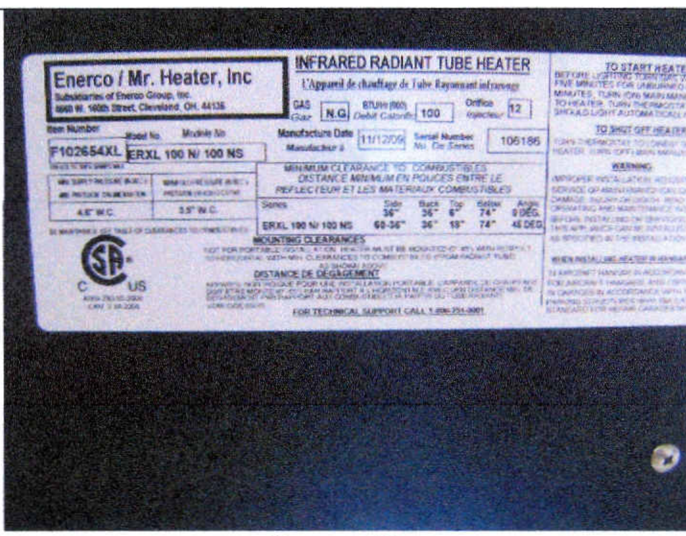
Components



Tube Kit



Tube Kit



Burner Box

Get Green Device, installed

Input Rating Verification	
Standard Referenced: Derived from ANSI Z83.20 - 2008 Starting with all parts of the heater at room temperature, the heater shall be operated for 15 minutes and the rate shall be within ±2 percent of the manufacturer's specified hourly BTU input rating.	
Manufacturer's Specified BTU Input 100,000 (98,000 – 102,000 allowable)	
Without Get Green Device	**With Get Green Device**
99,847 BTU	100,065 BTU

Combustion			
Standard Referenced: Derived from ANSI Z83.20 - 2008 A heater shall not produce a concentration of carbon monoxide in access of 0.04% in an air free sample. The gas appliance pressure regulator shall be adjusted to 112% of input rate and after a brief purge period (2 minutes) a sample of the flue gas shall be secured. When the increased input rate cannot be readily obtained by adjustment of the appliance pressure regulator, this increase may be obtained with the regulator removed or blocked in the full open position. An appliance provided with a power burner shall have an additional combustion sample secured with the appliance operating at normal inlet pressure and with the supply voltage reduced to 85% of the appliance rating plate voltage.			
Without Get Green Device		**With Get Green Device**	
Normal	0.00016 COAF	Normal	0.00015 COAF
Reduced	0.00018 COAF	Reduced	0.00019 COAF
Increased	0.00139 COAF	Increased	0.00138 COAF
85% of 120V	0.00016 COAF	85% of 120V	0.00015 COAF

Burner Operating Characteristics - Flashback											
Standard Referenced: Derived from ANSI Z83.20 - 2008 Burner flames shall not flash back: 1). When turned on and off at there burner adjustment at normal, reduced and increased test pressures.											
Without Get Green Device						**With Get Green Device**					
Reduced		**Normal**		**Increased**		**Reduced**		**Normal**		**Increased**	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass

Burner Operating Characteristics - Effective Ignition											
Standard Referenced: Derived from ANSI Z83.20 - 2008 The arrangement of main burners and ignition devices shall be such that the gas from any burner or combination of burners will be effectively ignited without delayed ignition, excessive flash out from the heater, ignition at the orifice or danger to the appliance under test conditions specified above in flash back.											
Without Get Green Device						**With Get Green Device**					
Reduced		**Normal**		**Increased**		**Reduced**		**Normal**		**Increased**	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass

Burner Operating Characteristics - Objectionable Noise											
Standard Referenced: Derived from ANSI Z83.20 - 2008 Burners shall ignite, operate and extinguish without objectionable noise under normal, reduced and increased test pressures.											
Without Get Green Device						**With Get Green Device**					
Reduced		**Normal**		**Increased**		**Reduced**		**Normal**		**Increased**	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass

Burner Operating Characteristics - Power Burner

Standard Referenced: Derived from ANSI Z83.20 - 2008

If the appliance is equipped with a power burner, repeat burner operating characteristics tests above at both 85% and 110% rated voltage.

Without Get Green Device						With Get Green Device					
Flashback at 85% rated voltage						**Flashback at 85% rated voltage**					
Reduced – 85%		Normal – 85%		Increased – 85%		Reduced – 85%		Normal – 85%		Increased – 85%	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
Flashback at 110% rated voltage						**Flashback at 110% rated voltage**					
Reduced – 110%		Normal- 110%		Increased – 110%		Reduced – 110%		Normal – 110%		Increased – 110%	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
Effective Ignition at 85% rated voltage						**Effective Ignition at 85% rated voltage**					
Reduced – 85%		Normal - 85%		Increased - 85%		Reduced – 85%		Normal - 85%		Increased - 85%	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
Effective Ignition at 110% rated voltage						**Effective Ignition at 110% rated voltage**					
Reduced – 110%		Normal - 110%		Increased - 110%		Reduced – 110%		Normal - 110%		Increased - 110%	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
Objectionable Noise at 85% rated voltage						**Objectionable Noise at 85% rated voltage**					
Reduced – 85%		Normal - 85%		Increased - 85%		Reduced – 85%		Normal - 85%		Increased - 85%	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
Objectionable Noise at 110% rated voltage						**Objectionable Noise at 110% rated voltage**					
Reduced – 110%		Normal - 110%		Increased - 110%		Reduced – 110%		Normal - 110%		Increased - 110%	
Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold
pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass

Nonload Bearing Flue Gas Baffle Temperatures

Standard Referenced: Derived from ANSI Z83.20 - 2008

Metal used in the construction of non-load-bearing flue gas baffles shall be suitable for the maximum temperature rise developed during the following test method and in accordance with Table IX. This test is conducted at normal inlet test pressure. Thermocouples shall be attached to the baffle(s) at probable high temperature points. The heater shall be placed into operation and when equilibrium conditions are attained, temperature as indicated by the thermocouples shall be recorded. The maximum temperature rise on any part of the flue gas baffle(s) shall not be in excess of that permitted for the material employed as specified in Table IX.

Without Get Green Device						With Get Green Device					
Allowable baffle temperature 1104° F											
TC1	TC2	TC3	TC4	TC5	Average	TC1	TC2	TC3	TC4	TC5	Average
734° F	712° F	667° F	633° F	601° F	669° F	740° F	718° F	671° F	638° F	606° F	675° F

Allowable Heating Element – Heat Exchanger External Surface

Standard Referenced: Derived from ANSI Z83.20 - 2008

The external surface of the heating element shall not exceed the temperature indicated in Table I, Maximum Heating Element, for the type of metal involved when tested under continuous operation.

Without Get Green Device							With Get Green Device						
Allowable external surface temperature 1104° F													
TC1	TC2	TC3	TC4	TC5	TC6	Average	TC1	TC2	TC3	TC4	TC5	TC6	Average
1048°F	1037°F	1079°F	1015°F	997°F	1047°F	1037°F	1077°F	1052°F	1064°F	1036°F	1023°F	1047°F	1050°F

Blocked Flue	
Standard Referenced: Derived from ANSI Z83.20 - 2008 With the outlet blocked or air-intake terminal, if so equipped blocked to any degree up to and including complete closure, the concentration of carbon monoxide in an air-free sample of the flue gases shall not exceed 0.04 percent. The appliance shall be operated for at least 15 minutes at normal inlet test pressure. The area of the flue outlet or air intake terminal shall be gradually decreased to the lowest point at which the control will remain in its open position. A sample of the flue gases shall then be secured and analyzed. In case of outage, the blocked condition shall be maintained for 3 minutes to allow for operation of safety devices, and then removed and observation made.	
Without Get Green Device	**With Get Green Device**
0.000117 COAF; with no outage	0.000122 COAF; with no outage

Combustion Efficiency and Flue Loss			
Standard Referenced: Derived from ANSI Z83.20 - 2008 An infrared heater which has physical dimensions that prohibit it from being tested under Radiant Coefficient parameters shall have a combustion efficiency of not less that 70% based on the total heating value of the gas. The hourly flue loss shall be computed as the summation of heat above room temperature carried by carbon dioxide, free air and water vapor. For purposes of this computation, water vapor is assumed to exist as a vapor above room temperature, condensation occurring at room temperature. Flue loss shall be determined in accordance with Exhibit C, Flue Loss Calculations. The heater combustion efficiency shall be computed by the following formula: Heater Combustion Efficiency = 100 percent – percent flue loss.			
Without Get Green Device		**With Get Green Device**	
Flue Loss	**Efficiency**	**Flue Loss**	**Efficiency**
21.0%	79.0%	21.2%	78.8%

OPTIONAL TESTING

The tests below (Wind test and Rain test) were not conducted.

Wind test
Standard Referenced: Derived from ANSI Z83.20 - 2008 The main burner flames of a heater for outdoor installation shall be capable of being ignited, when the unit is exposed to a wind velocity of 10 mph and remain lighted at a wind velocity of 40 mph.

Rain test
Standard Referenced: Derived from ANSI Z83.20 - 2008 A heater for outdoor installation shall be constructed so water will not accumulate within the appliance and so the appliance will be able to operate within 5 minutes after having been subjected to a simulated rainstorm. After adjustment of the spray head unit, the rain test apparatus shall be operated (at 5 psi) for a period of 15 minutes. The main burner shall then be placed in operation and the rain test apparatus operated for an additional 15 minutes. The appliance shall perform normally during exposure to the simulated rainstorm, or if main burner outage occurs, the main gas shall automatically shut off.

Equipment List:		
Description	Barcode #	Calibration Due Date
Variac	EM-70	05/2011
Gas meter (dry)	DTM-77	10/2011
Siemens CO/CO2 analyzer	CO25-23P	03/2011
Stop watch	250	12/2011
Potentiometer	TI-15	08/2011
Thermocouples	ITW-J-24-2-305-0-C (CO7514)	n/a
Manometer	PM168	n/a
Manometer	PM216	n/a