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November 12, 2010

Letter Report No. G100009193MID-005.2  
Project No. G100009193

Daryl Lamppa  
Lamppa Manufacturing  
512 South 3<sup>rd</sup> Street  
PO Box 422  
Tower, MN 55790

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Subject: Testing for emissions and efficiency for model VaporFire VF200 Solid Fuel Furnace.

Dear Mr. Lamppa,

This letter concludes and represents the results of the evaluation and tests of the above referenced equipment to the requirements contained in the following standards:

**CAN/CSA B415.1-10 "Performance Testing of Solid-Fuel-Burning Heating Appliances"**

This investigation was authorized by Daryl Lamppa, dated January 4, 2010. The sample was evaluated April 8, 2010 to April 9, 2010 at the Intertek Middleton, WI facility.

Results for efficiency and emissions for model VF100:

Test #1 tested 4/8/10

	HHV Basis	LHV Basis
<b>Overall Efficiency</b>	73.8%	79.5%
<b>Combustion Efficiency</b>	97.3%	97.3%
<b>Heat Transfer Efficiency</b>	76%	81.7%

<b>Output Rate (kJ/h)</b>	33,694	31,962	<b>(Btu/h)</b>
<b>Burn Rate (kg/h)</b>	2.29	5.06	<b>(lb/h)</b>
<b>Input (kJ/h)</b>	45,640	43,294	<b>(Btu/h)</b>

<b>Test Load Weight (dry kg)</b>	16.83	37.09	<b>dry lb</b>
<b>MC wet (%)</b>	18.67		
<b>MC dry (%)</b>	22.96		
<b>Particulate (g)</b>	6.64		
<b>CO (g)</b>	743		
<b>Test Duration (h)</b>	7.33		

Emissions	Particulate	CO
<b>g/MJ Output</b>	0.03	3.01
<b>g/kg Dry Fuel</b>	0.39	44.16
<b>g/h</b>	0.91	101.35
<b>lb/MM Btu Output</b>	0.06	6.99

<b>Air/Fuel Ratio (A/F)</b>	18.33
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Test #2 tested 8/5/10

	HHV Basis	LHV Basis
<b>Overall Efficiency</b>	77.5%	83.5%
<b>Combustion Efficiency</b>	98.1%	98.1%
<b>Heat Transfer Efficiency</b>	79%	85.1%

<b>Output Rate (kJ/h)</b>	41,018	38,910	<b>(Btu/h)</b>
<b>Burn Rate (kg/h)</b>	2.66	5.86	<b>(lb/h)</b>
<b>Input (kJ/h)</b>	52,897	50,178	<b>(Btu/h)</b>

<b>Test Load Weight (dry kg)</b>	16.40	36.15	<b>dry lb</b>
<b>MC wet (%)</b>	17.82		
<b>MC dry (%)</b>	21.68		
<b>Particulate (g)</b>	5.891		
<b>CO (g)</b>	483		
<b>Test Duration (h)</b>	6.17		


Emissions	Particulate	CO
<b>g/MJ Output</b>	0.02	1.91
<b>g/kg Dry Fuel</b>	0.36	29.46
<b>g/h</b>	0.96	78.37
<b>lb/MM Btu Output</b>	0.05	4.44


<b>Air/Fuel Ratio (A/F)</b>	12.77
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This is a report for our evaluation completed by Intertek on April 9, 2010 for Project No. G100009193.

If there are any questions regarding the results contained in this report, or any of the other services offered by Intertek, please do not hesitate to contact the undersigned.

Please note; this Letter Report does not represent authorization for the use of any Intertek certification marks.

Completed by: Ken Slater  
 Title: Associate Engineer  
 Signature:   
 Date: November 12, 2010

Reviewed by: Brian Ziegler  
 Title: Engineering Team Leader  
 Signature:   
 Date: November 12, 2010

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