

Partial Thermal Storage Hydronic Heater Testing Summary

Available Data as of 11/1/12

Manufacturer (or Code)	Mfr A	Mfr A	Mfr A	Mfr A	
Model (or Code)	Model B	Model B	Model B	Model B	
Test Date	7/23/2012	7/26/2012	7/27/2012	7/30/2012	
Test Run	1	2	3	4	
Mfr.'s Rated Output	150000	150000	150000	150000	Btu/hr
Firebox Volume	8.1	8.1	8.1	8.1	ft ³
Minimum Recommended Storage Volume	529	529	529	529	gallons
Storage Volume as Tested	317	317	317	317	gallons
Appliance Storage Volume	47	47	47	47	gallons
Test Category (I, II, III, or IV)	IV	I	I	II	
Target Load Draw Rate	150000	22500	22500	24000	Btu/hour
Actual Load Draw Rate	143984	20272	20729	31884	Btu/hour
Actual Load Draw Rate at % of Mfr.'s Rated Output	96.0	13.5	13.8	21.3	%
Total Load Output	436752	132441	114012	128067	Btu
Total Stored Output	NA	146180	162969	139378	Btu
Stored Output Rate	NA	22374	29631	34700	Btu/hour
Total Output	436752	278621	276981	267445	Btu
Number of Off Cycles during Test Run	0	1	1	0	
<u>Cordwood</u>					
Nominal Test Fuel Load Weight	81	81	81	81	lb (wet basis)
Predominant Species	Oak	Oak	Oak	Oak	
Nominal Fuel Piece Length (or Range)	18-20	18-20	18-20	18-20	in.
Number of Pieces in Test Fuel Load	?	?	?	?	
Total Fuel Load Weight as Tested (Excluding Kindling)	83.2	83.4	82.6	81.7	lb (wet basis)
Test Fuel Loading Density as Tested	10.27	10.30	10.20	10.09	lb/ft ³ firebox volume
Average Test Fuel Moisture as Tested	19.3	24.5	23.5	22.6	% (dry basis)
Charcoal Bed Weight as Tested (if applicable)	15.1	NA	NA	NA	lb (wet basis)

Charcoal Bed Weight as % of Test Fuel Weight	18.1	NA	NA	NA	%
Kindling and Newspaper Weight (if applicable)	NA	8.9	8	8.9	lb (wet basis)
Kindling Weight as % of Test Fuel Weight	NA	10.7	9.7	10.9	%
Kindling Moisture as Tested	NA	19	19	19	% (dry basis)
Start-up Fuel Weight	NA	9	8.9	8.1	lb (wet basis)
Number of Pieces of Start-up Fuel	NA	7	7	7	
Start-up Fuel as % of Test Fuel Weight	NA	10.8	10.8	9.9	%
Total Test Time	182	392	330	241	minutes
Residual Charcoal Weight at End of Test (if applicable)	NA	2.9	3.3	3	lb (wet basis)
Residual Charcoal Weight as % of Test Fuel Load Weight	NA	3.5	4.0	3.7	%
Residual Charcoal Heat Content (@11,000 Btu/lb)	NA	31900	36300	33000	Btu
Total Fuel Consumed	31.6	33.8	33.4	33.6	kg (dry basis)
Total Fuel Consumed	69.7	74.5	73.6	74.1	lb (dry basis)
Total Heat Input (adjusted for residual charcoal if applicable)	599765	608516	596705	604419	Btu (HHV)
Total PM Emissions (ASTM E2515, Sect 11.5, Eq. 15)	16.8	173.0	160.7	153.0	g
PM Emission Factor	0.5	5.1	4.8	4.6	g/dry kg
PM Emission Rate	5.5	26.5	29.2	38.1	g/hr
PM Emission Output Rate	0.08	1.37	1.28	1.26	lb/mmBtu output
Overall Efficiency (HHV) @8600 Btu/lb dry basis	72.8	45.8	46.4	44.2	%
Overall Efficiency (LHV) @7988 Btu/lb dry basis	78.4	49.5	50.2	47.8	%
Overall Stack Loss Efficiency (HHV) per CSA B415.1-10	na	na	na	na	%
Initial Storage Water Temperature	NA	122.6	126.4	123.3	°F
Final Storage Water Temperature	NA	168.3	177.4	167.3	°F