

KEY INFORMATION

INSTALL DATE: JULY 2013

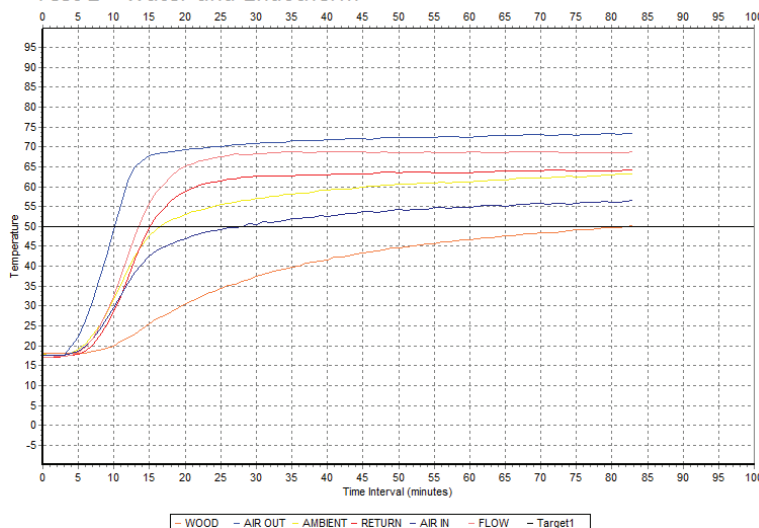
TEST PERIOD: 1 DAY (lab)

REPORTED SAVINGS:

23.7%



Test 2 - Water and Endotherm



EndoTherm™ was tested in a sealed test chamber by Tomorrow Air Solutions

INTRODUCTION - THE TEST FACILITY

A sealed test chamber measuring 12.5m³ was created, into which 3 x 10kW heat exchangers were placed, each moving 500m³ of air every hour.

A wooden block measuring 100mm³ was placed in the chamber at a height of 1800mm.

Each test would be concluded when the wooden block achieved a core temperature of 50°C

FOCUS:

- To raise the core temperature of a wooden block measuring 100mm³ to a temperature of 50°C.
- To monitor the temperatures achieved in the following areas;
 - Liquid temperature of flow and return at the boiler
 - Air temperature in and out of one of the heat exchangers
 - Air temperature in the chamber
 - Target test temperature in a wooden cube measuring 100mm³

Additionally, the fuel tank (propane bottle) was weighed before and after each test.

HEATING EQUIPMENT:

A TAS GH-30 gas boiler system was used to heat circulating medium comprising mainly of water. The water was pumped to 3 x 10kW heat exchangers which converted the hot water into hot air at the rate of 500m³ per hour, per exchanger (i.e all three circulating the air at a rate of 1500m³ per hour). The boiler was a condensing type with a SEDBUK rating A, working at 91.6 efficient.

For the purpose of this test we have assumed that the boiler is 100% efficient and that 1L of propane generates 7.38kW of heat energy.

COMPONENT FLUID CAPACITIES

Boiler: 3 Litres
Primary Pipes: 17 Litres
Secondary pipes and manifold: 4.2 Litres
Heat exchangers: 3.17 litres each
Total litres in system: 48.6 Litres

TEST ADDITIVES

EndoEnterprises: EndoTherm™ mixing ratio at 50:1 = 1 litre (rounded up).
Dow Chemicals: Propylene Glycol (Dowcal N): mixing ration @ 33% = 16 litres

RESULTS

	Test 1	Test 2	Test 3	Test 4
Circulating Medium	Water	Water and Endotherm	Water and Propylene Glycol	Water / Propylene Glycol and Endotherm
Time taken to reach 50°C	70 minutes	80 minutes	93 minutes	85 minutes
Fuel consumption	1.7 kilos 3.37 litres	1.3 kilos 2.57 litres	1.5 kilos 2.97 litres	0.9 kilos 1.78 litres
Kilowatts consumed	24.87 kW	18.96 kW	21.91 kW	13.13 kW
Propane cost @ £0.11 per kW	£2.73	£2.08	£2.41	£1.44

CONCLUSION

Test 1: Pure water raised the temperature of the block in the quickest time but used the most energy/fuel

Test 2: Water and EndoTherm™ took 10 minutes longer than water to reach the target temperature but used 5.91kW less energy (saving £0.65 or 23.7%).

Test 3: Water and glycol took the longest time to reach the target temperature, a full 23 minutes longer than water although it used 2.96kW less than water and saved £0.32

Test 4: Water, Glycol and EndoTherm™ took 15 minutes longer than water, but it used the least amount of fuel/energy; 11.74KW less than water with a cost saving of £1.29.

Using water with both EndoTherm™ and Glycol as additives creates the best heat transfer fluid as it offers anti-corrosion and anti-freeze protection whilst allowing the fluid to absorb and release heat energy efficiently.

Whilst this combination is not the quickest method of heating the wooden block, it is certainly the cheapest using 47% less than water alone.

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