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| Technical Note | | TN-002 | |
| Test: Dynamic DHW Test – DHW dynamic flow rates. | | Test no.: 2a 2b | |
| Assumption: DHW Flowrate | | Assumption no: 19 | |
| Rev: 1 | Date: 20 Aug 20 | Author: Martin Crane | Checked: Tom Naughton |

1. Introduction

The DHW outputs used in the Test, the 0.06 l/s (10 kW), 0.10 l/s (17 kW) and 0.13 l/s (22 kW) are based on those that were immediately possible on the Test rig used for the SBRI tests. For a 50C DHW set point used in the tests, the corresponding power outputs are 10, 17 and 22kW respectively. The low flow test (Test 3a and 3b) additionally test at 0.02 l/sec. These outputs are low in comparison to the peak DHW outputs of HIU but reflect well on typical DHW usage for all but running a bath.

This Test is primarily to generate primary return temperature measurements that are used in the VWARD calculations. The test additionally graphically shows how good the HIU control is at maintaining DHW and DH return temperatures as DHW flowrates change.

2. Considerations for tested DHW flowrates

Are these flow rates appropriate for simulation of real world HIU use to deliver DHW? Or do these test DHW flows adequately represent real world HIU primary return temperature for the range of typical DHW demands?

3. Consideration 1

If higher DHW outputs were tested then this may then require separate tests for different DHW outputs, e.g. HIUs sized to deliver similar outputs to combi boilers (30-35 kW) would need a different test to a HIU (often over specified) designed for 55 kW DHW output.

4. Consideration 2

Return temperatures from HIUs at high DHW flow rates have not been raised as an issue when views on the Test have been sought.

5. Consideration 3

From the completed tests, it can be seen that the variation in return temperature between the 0.06 l/s and 0.13 l/s DHW flow rates is only a few degrees C – as per examples attached in section 10 at the end

of this document. There is an exception to this in that one of the SBRI tested HIU employed a much cruder form of control that resulted in a wide variation in return temperature. This manufacturer has recently tested an HIU which now has similar variation as all the other HIUs.

6. Consideration 4

A study identifying how often higher DHW flow rates actually occur should be done prior to any changes being made to the DHW test flowrates. Current data analysis indicates that DHW demand as over 30kW are rare. If the high demands are rare, poor performance during them will not have a material effect on the annual average return temperatures.

7. Consideration 5

The current test flow rates are similar to those for combi boiler tests (EN 13203-2:2018) for the Small and Medium demand profiles. Small is defined as 767 kWh DHW per year and Medium is defined as 2,133 kWh DHW per year. A typical new build 1 - 2 bedroom flat would have a DHW consumption of 1,500-2,000 kWh/yr of DHW. The peak DHW for these profiles is 0.10 litre/sec at 40C. The Large DHW demand profile (4,254 kWh DHW/yr) is 0.167 litre/sec at 40C (21kW) both of which are smaller than the HIU test of 0.13 l/s at 50C (21.8 kW). On this basis the HIU Test DHW outputs are higher than those for combi boilers.

8. Conclusions

Data from testing shows the variation in return temperature is small in the 10-22 kW range. The HIU Test flow rates are higher than that used for Combi boiler testing for similar DHW demands.

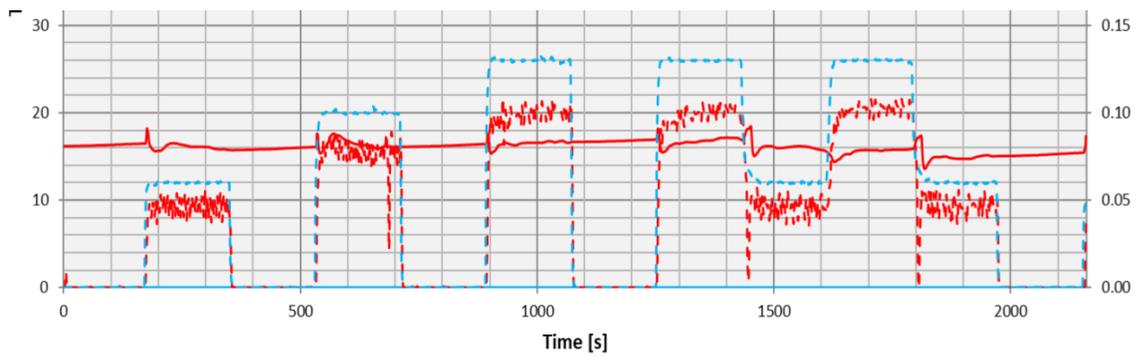
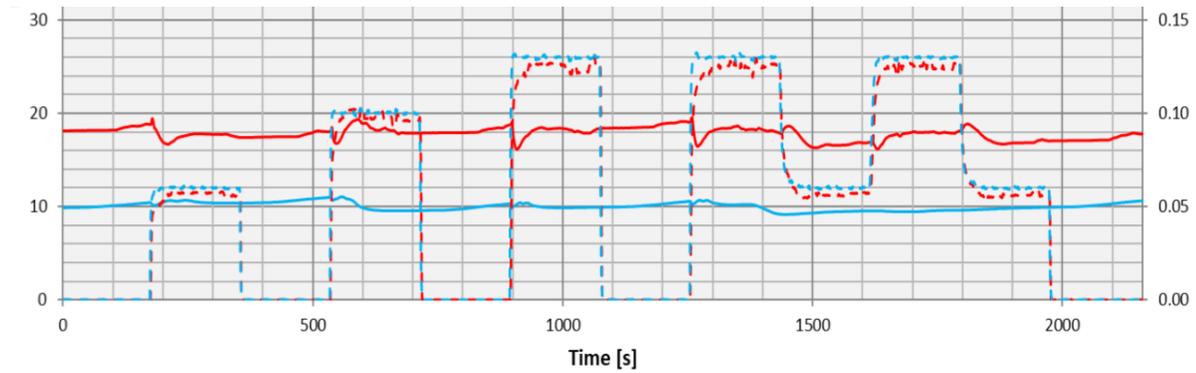
Increasing the DHW output is likely to require considerations of the nominal maximum DHW output of the HIU which will increase the Test complexity if separate test for different sized HIU are then required. Need to make sure any additional test complexity actually drives some HIU performance or test accuracy improvement.

9. Recommendation

Leave test flow rate as they currently are as there are no grounds to change them and the maintaining the current test basis keep historic and future testing comparable. The format of the combi boiler test profiles, over 14 hours, at variable DHW temperature and based on kWh delivered would be much more time consuming and hence expensive test to undertake.

10. References

Samples of Test 2a 2b :



Switch 2 (both above) showing little variation in primary return temperatures.

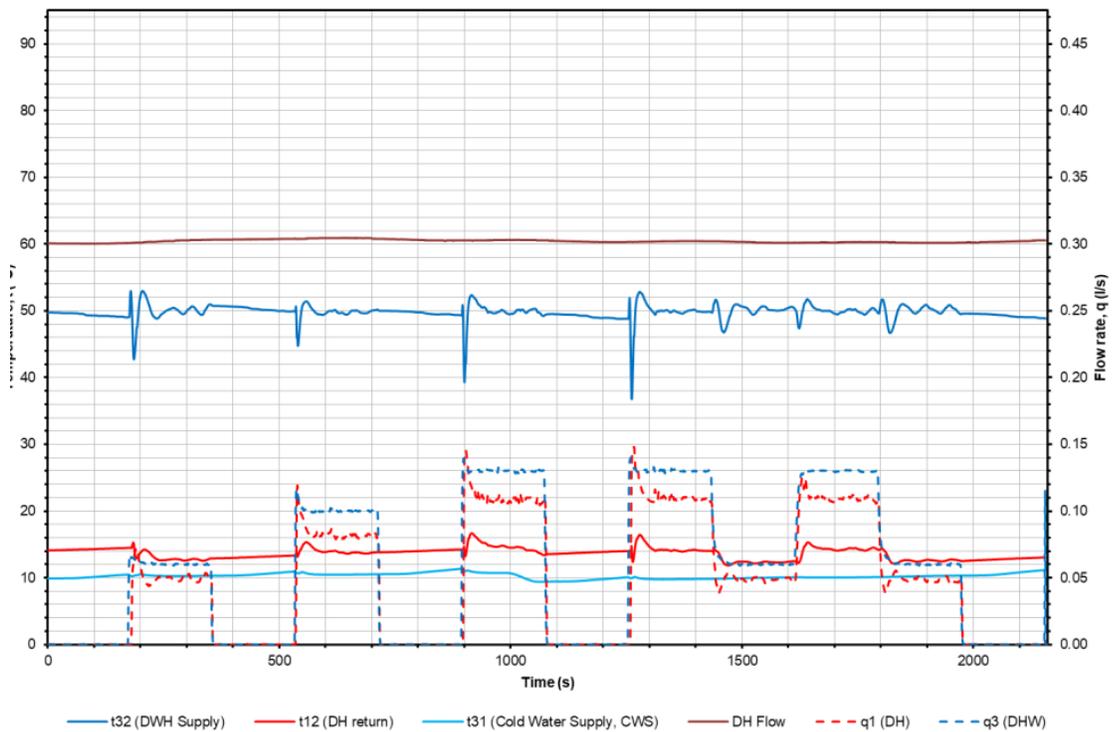
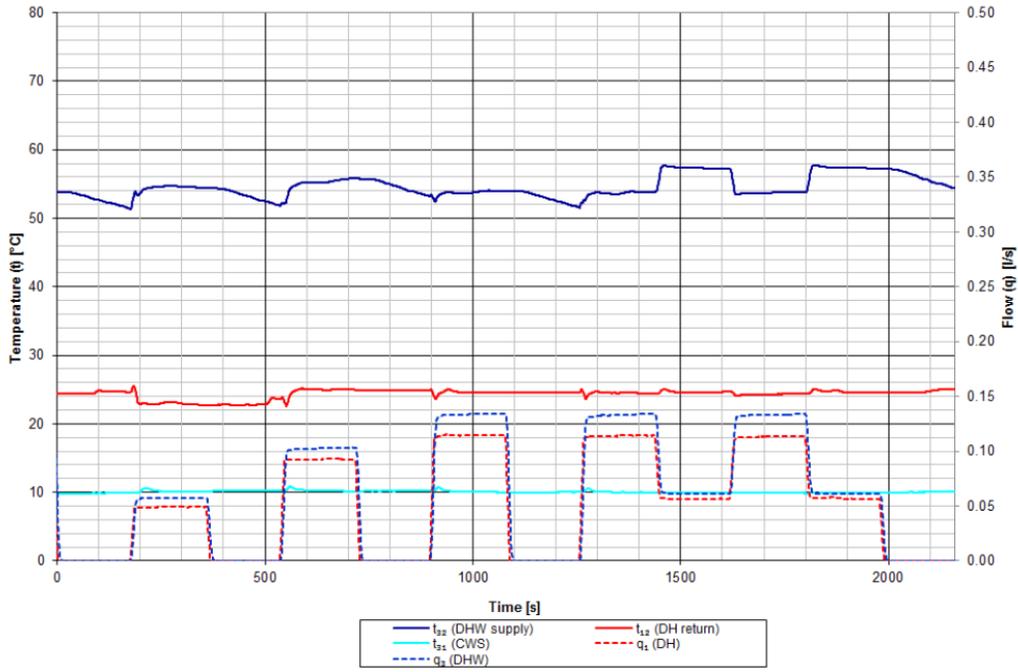


Figure 7-8 - Test 2b - DHW only at 60 °C

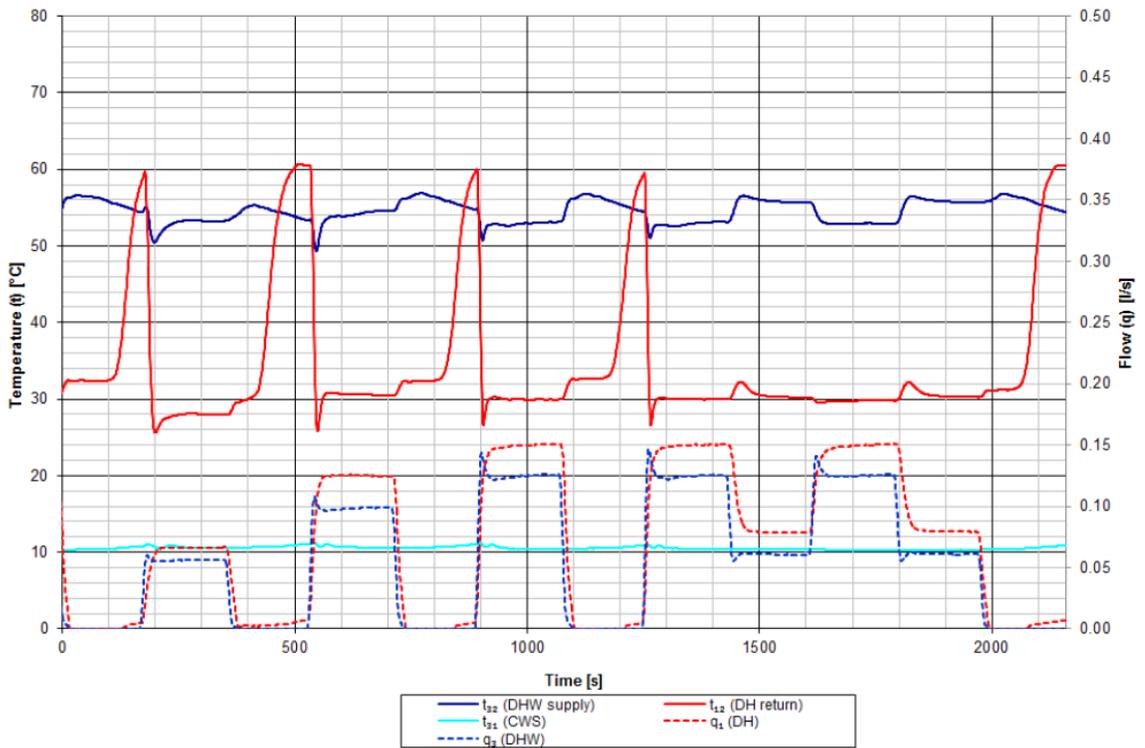
Vital Electronic showing little variation in primary return temperatures.

Figure 11. Results for test point 4a: DHW only, DH 75°C flow.



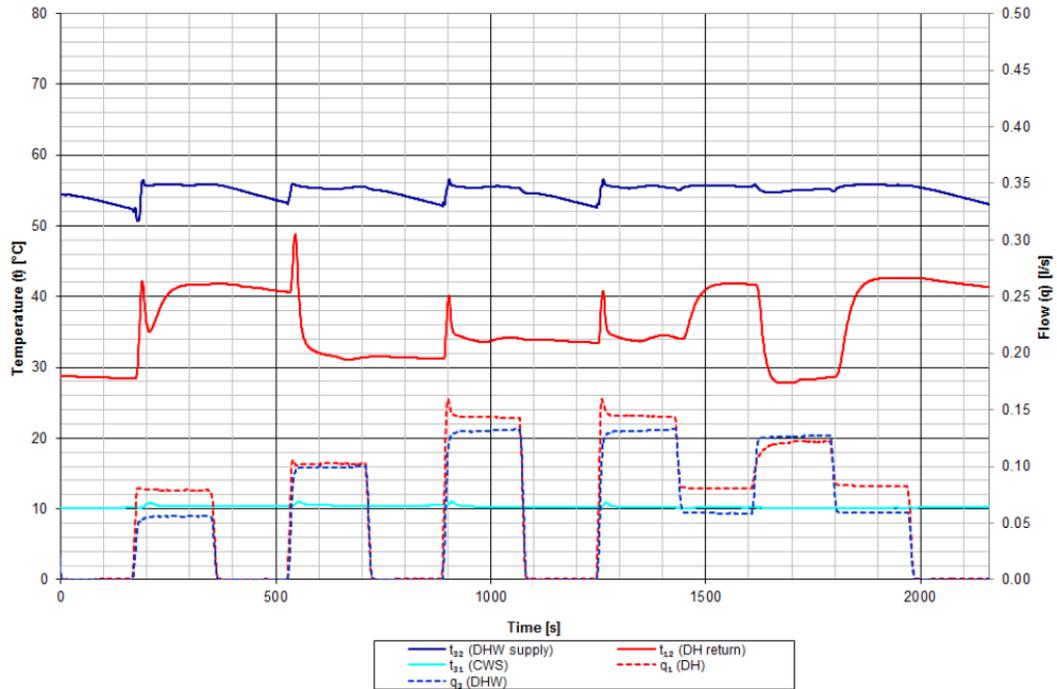
Kamo

Figure 12. Results for test point 4b: DHW only, DH 65°C flow.



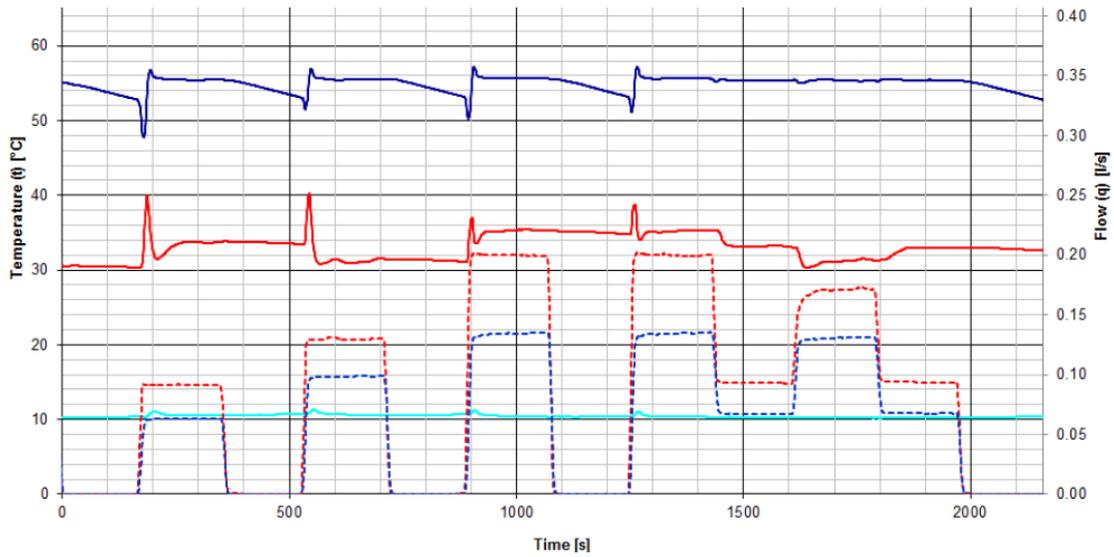
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Figure 11. Results for test point 4a: DHW only, DH 75°C flow.



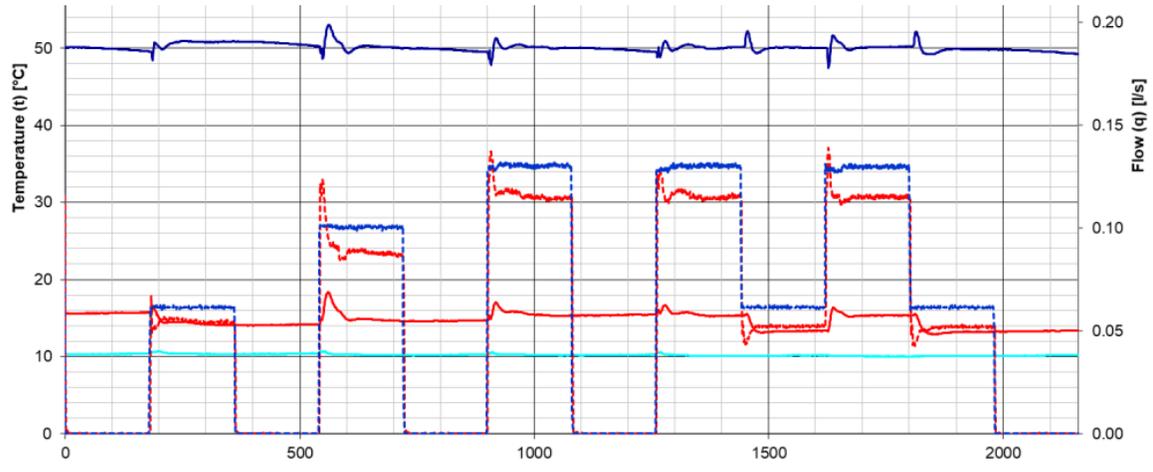
Pegler / Meibes – SBRI Test

12. Results for test point 4b: DHW only, DH 65°C flow.



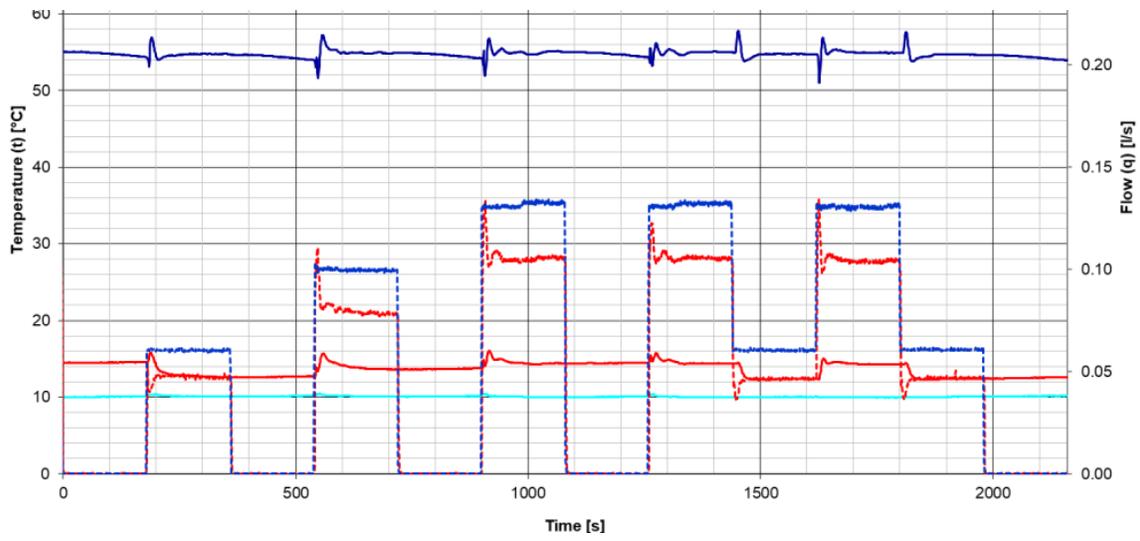
Meibes LT SBRI Test

. Results for test point 2b: DHW only, DH 60 °C supply.



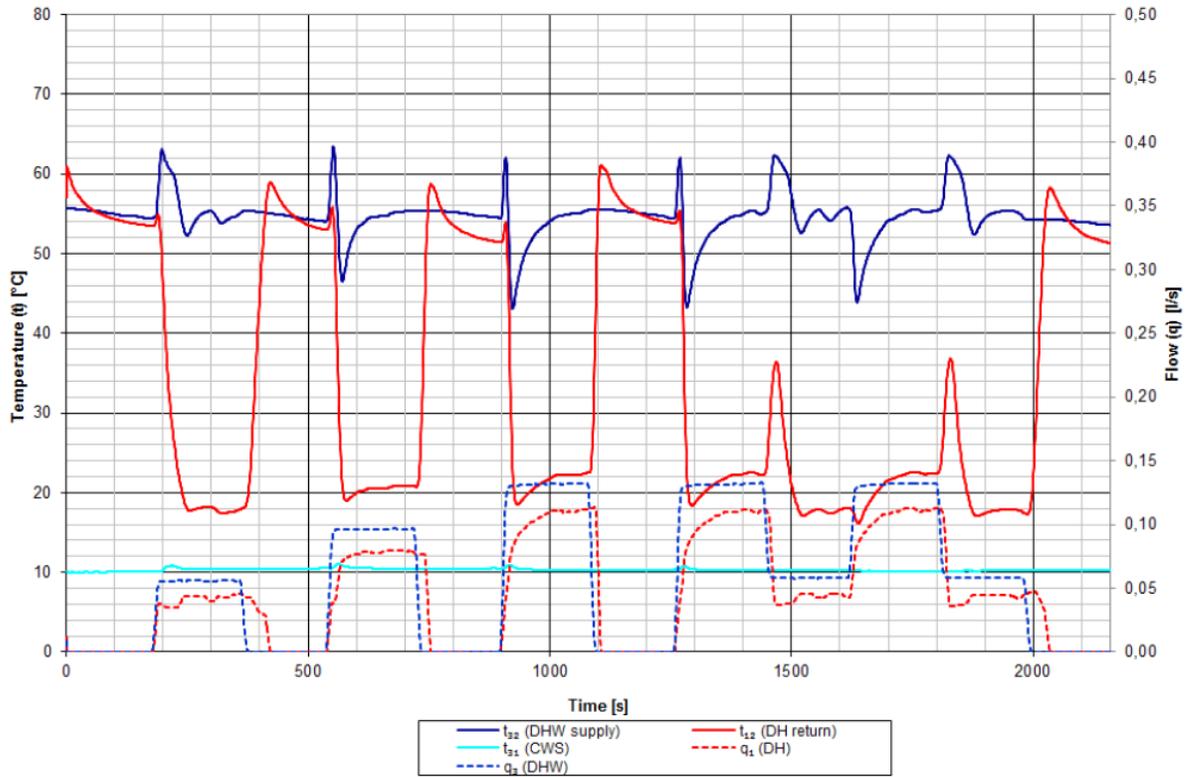
Flamco

. Results for test point 2a: DHW only, DH 70 °C supply.



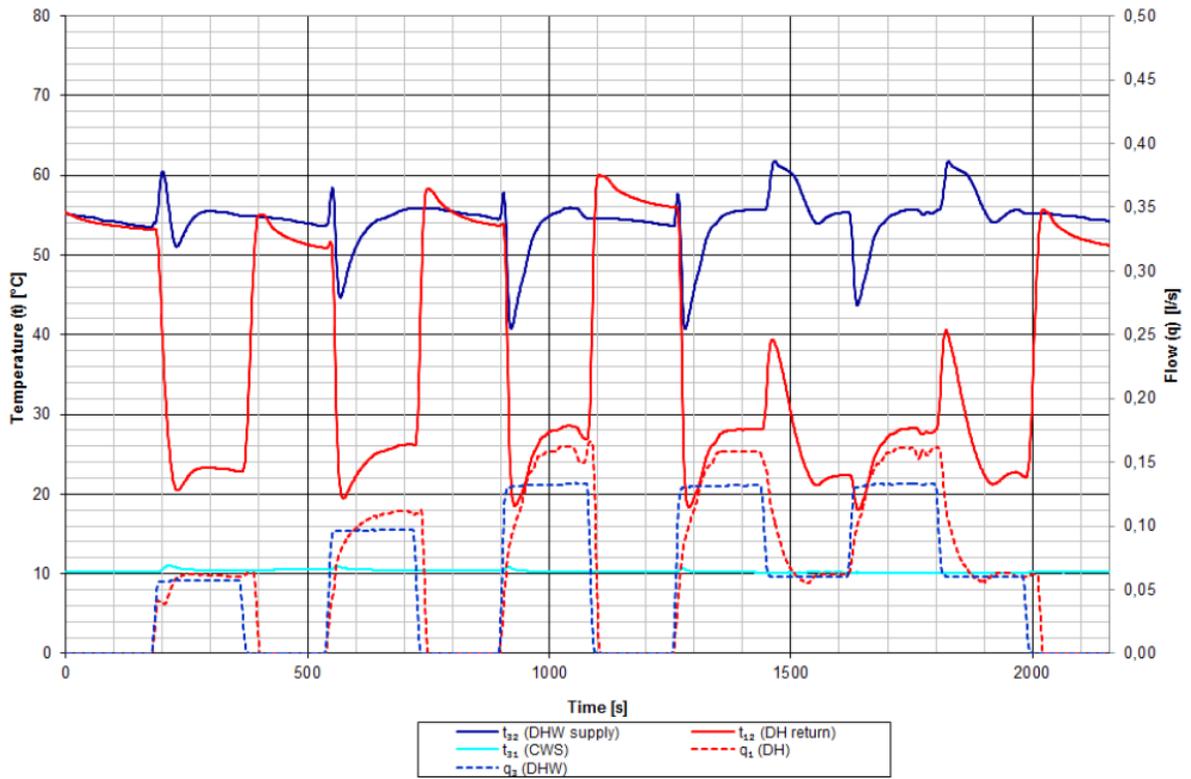
Flamco

Figure 11. Results for test point 4a: DHW only, DH 75°C flow.



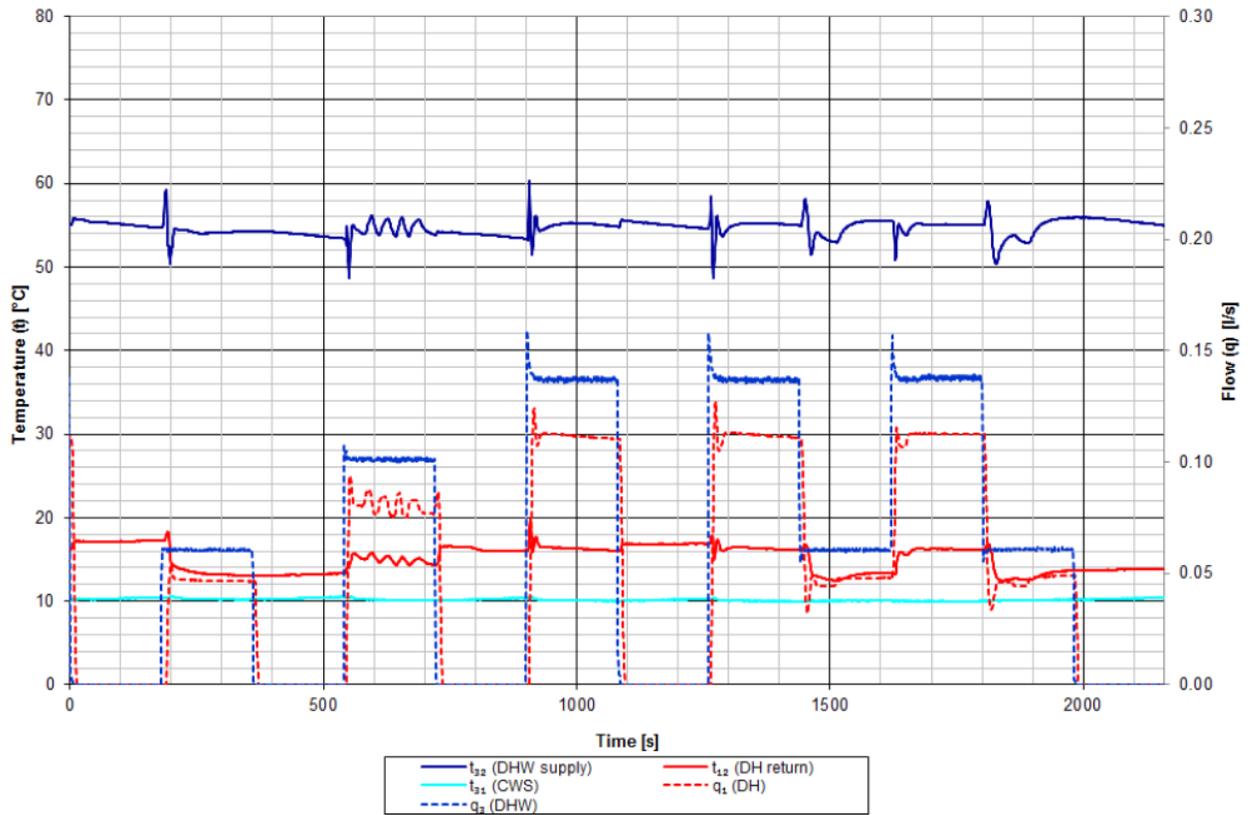
Evinox 2015

Figure 12. Results for test point 4b: DHW only, DH 65°C flow.



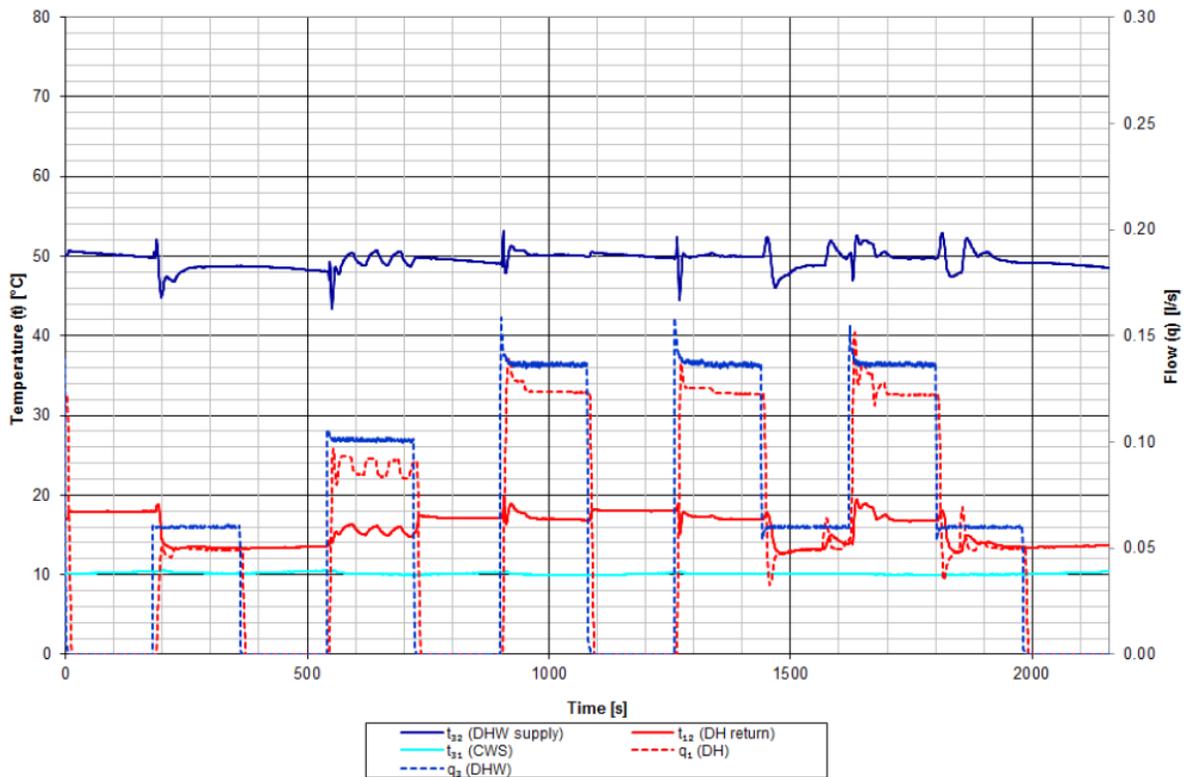
Evinox 2015

Figure 9 Results for test point 2a: DHW only, DH 70 °C supply.



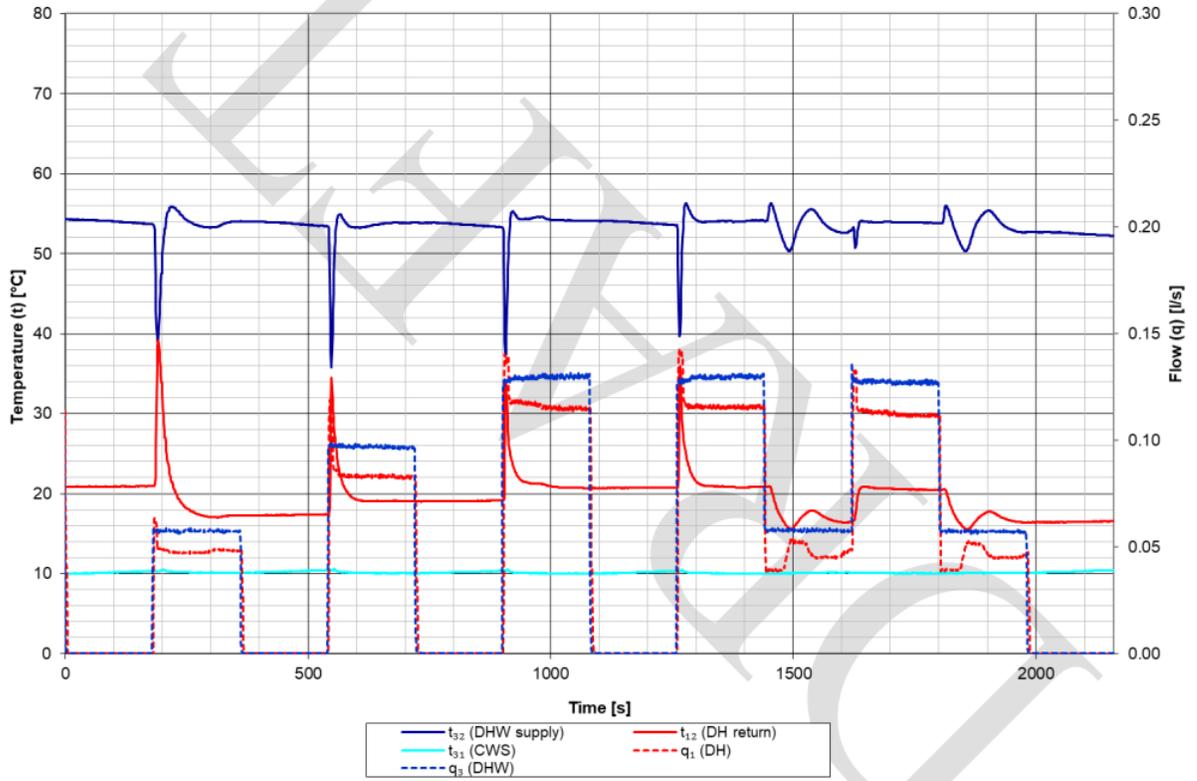
Evinox 2017

Figure 10 Results for test point 2b: DHW only, DH 60 °C supply.



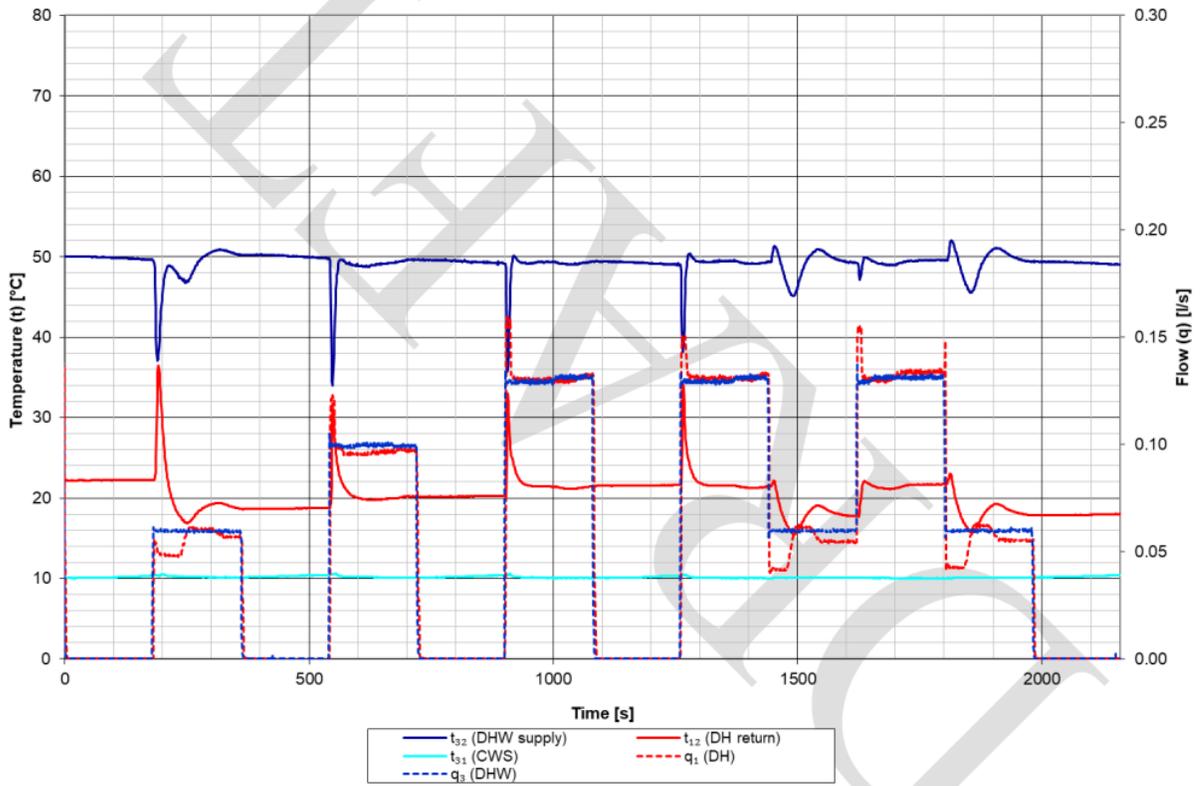
Evinox 2017

Figure 9. Results for test point 2a: DHW only, DH 70 °C supply.



ESSCO

Figure 10. Results for test point 2b: DHW only, DH 60 °C supply.



ESSCO