

# Air Leakage Test Report

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In compliance with ATTMA TSL1 and TSL2




Building Address: Plot 2  
Shirburn Road  
Eggbuckland  
Plymouth, Devon  
PL6 5PQ

Performed for: Tribus Homes

Performed by: Ben Marsh  
Test date: 2016-09-20  
Associated Test file: 8415#APT#TH#Plot 2 Shirburn Road,Eggbuckland,Plymouth, PL6 5PQ  
Report Number: 8415  
Unique Property ID Number:

## Summary

|  |   |   |
|--|---|---|
| <br><b>FanTestic</b> | version: <b>5.8.37</b>  | licensed to: <b>Energy Performance Services</b> |
| Test date: <b>2016-09-20</b>   | By: <b>Ben Marsh</b>  |   |
| Customer:  | <b>Tribus Homes</b>   |   |
| Building Lot Number:   |   |   |
| Building address:  | <b>Plot 2<br/>Shirburn Road<br/>Eggbuckland<br/>Plymouth, Devon<br/>PL6 5PQ</b> |   |

| <b>Building and Test Information</b>  |   |
|---------------------------------------|---|
| Test file name:                       | <b>8415#APT#TH#Plot 2 Shirburn Road,Eggbuckland,Plymouth, PL6 5PQ</b> |
| Building volume:                      | <b>163.5</b>  |
| Building Height (from ground to top): | <b>0</b>  |
| Floor Area:                           | <b>68.1</b>   |
| Envelope Area:                        | <b>216.4</b>  |

| <b>Results</b>  |              |
|---|--------------|
| Air flow at 50 Pa, $Q_{50}$ [m <sup>3</sup> /h]           | <b>407.5</b> |
| Air changes, $n_{50}$                                     | <b>2.49</b>  |
| Equivalent leakage area at 50 Pa [cm <sup>2</sup> ]       | <b>203.0</b> |
| Permeability at 50 Pa [m <sup>3</sup> /h/m <sup>2</sup> ] | <b>1.883</b> |

## Compliance

If you are not happy with my service, please contact me: Ben Marsh, or the Scheme Manager at BINDT.

## Assumptions and warnings

While FanTestic software may calculate air leakage results based on user input, use of this software does not in any way guarantee these results.

## Building Information

### Building Measurements

Building Volume [m<sup>3</sup>]: 163.5

Envelope Area (A<sub>T</sub>) [m<sup>2</sup>]: 216.4

### Heating/Ventilation System

HVAC Systems Present:

### Pictures

### Test Method

Carried out in accordance with the following standards:

- ATTMA TS1 Issue 2 – Measuring Air Permeability of Building Envelopes
- BS EN13829:2001 Thermal Performance of Buildings
- BINDT – Quality Procedures and Explanatory Notes for Air Tightness Testing

The building was tested using the equipment listed in the equipment appendix.

### Openings and Temporary Sealing

### Deviations from Standard Methods:

Large Building Setup Notes:

Tester Complaints:

## Discussion of Results

### Combined Test Data

|   | Results | Uncertainty |
|---|---------|-------------|
| Air flow at 50 Pa, Q <sub>50</sub> [m <sup>3</sup> /h]    | 407.5   | +/-0.6%     |
| Air changes, n <sub>50</sub>                              | 2.49    | +/-0.6%     |
| Equivalent leakage area at 50 Pa [cm <sup>2</sup> ]       | 203.0   | +/-0.6%     |
| Permeability at 50 Pa [m <sup>3</sup> /h/m <sup>2</sup> ] | 1.883   | +/-0.6%     |

## Air Leakage Test Data Appendix-

### Depressurize Data Set

Test Dataset Date and Time: 2016-09-20-16:05

Test was carried out under (method A, B or C).

|                          |                     |                         |
|--------------------------|---------------------|-------------------------|
| Environmental Conditions |                     |                         |
| Wind speed:              | 3                   | from the                |
| Operator Location:       | Inside the building |                         |
| Initial Bias Pressure:   | -0.25 Pa            |                         |
| Final Bias Pressure:     | 0.00 Pa             |                         |
| Initial Temperature:     | indoors: 20         | outdoors: 19.           |
| Final Temperature:       | indoors: 20         | outdoors: 19.           |
| Barometric Pressure      | 101.6 kPa           | from Direct measurement |

|  |         |                       |         |
|--|---------|-----------------------|---------|
| Test Analysis  |         |                       |         |
| Correlation, r:  | 0.9989  | 95% confidence limits |         |
| Slope, n:  | 0.728   | 0.69450               | 0.76166 |
| Intercept, $C_{env}$ [m <sup>3</sup> /h/Pa <sup>n</sup> ]:           | 23.619  | 20.72                 | 26.92   |
|  |         |                       |         |
|  | Results | Uncertainty           |         |
| Air flow at 50 Pa, $Q_{50}$ m <sup>3</sup> /h                        | 407.61  | +/-0.6%               |         |
| Air changes, $n_{50}$ :  | 2.493   | +/-0.6%               |         |
| Equivalent leakage area at 50 Pa [cm <sup>2</sup> ]                  | 203.2   | +/-0.6%               |         |
| Permeability at 50 Pa, $AP_{50}$ [m <sup>3</sup> /h/m <sup>2</sup> ] | 1.8833  | +/-0.6%               |         |

|   |                          |       |       |       |       |       |       |       |       |  |  |  |  |
|---|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--|--|--|--|
| Measured pressure [Pa]                        |                          | -64.8 | -59.0 | -53.3 | -52.1 | -49.6 | -44.8 | -40.9 | -35.0 |  |  |  |  |
| Fan #1, Range C2                              | Fan Pressure [Pa]        | 174.0 | 154.0 | 132.0 | 128.5 | 124.0 | 107.0 | 96.4  | 76.9  |  |  |  |  |
|   | Flow [m <sup>3</sup> /h] | 496.0 | 463.3 | 425.0 | 418.7 | 410.4 | 377.9 | 356.5 | 314.2 |  |  |  |  |
|   |                          |       |       |       |       |       |       |       |       |  |  |  |  |
| Total Flow, $Q_c$ [m <sup>3</sup> /h]         |                          | 496.0 | 463.3 | 425.0 | 418.7 | 410.4 | 377.9 | 356.5 | 314.2 |  |  |  |  |
| Corrected Flow, $Q_{env}$ [m <sup>3</sup> /h] |                          | 492.8 | 460.3 | 422.3 | 416.0 | 407.8 | 375.5 | 354.2 | 312.2 |  |  |  |  |
| Error [%]                                     |                          | 0.3%  | 0.3%  | -0.9% | -0.8% | 0.8%  | 0.0%  | 0.8%  | -0.4% |  |  |  |  |

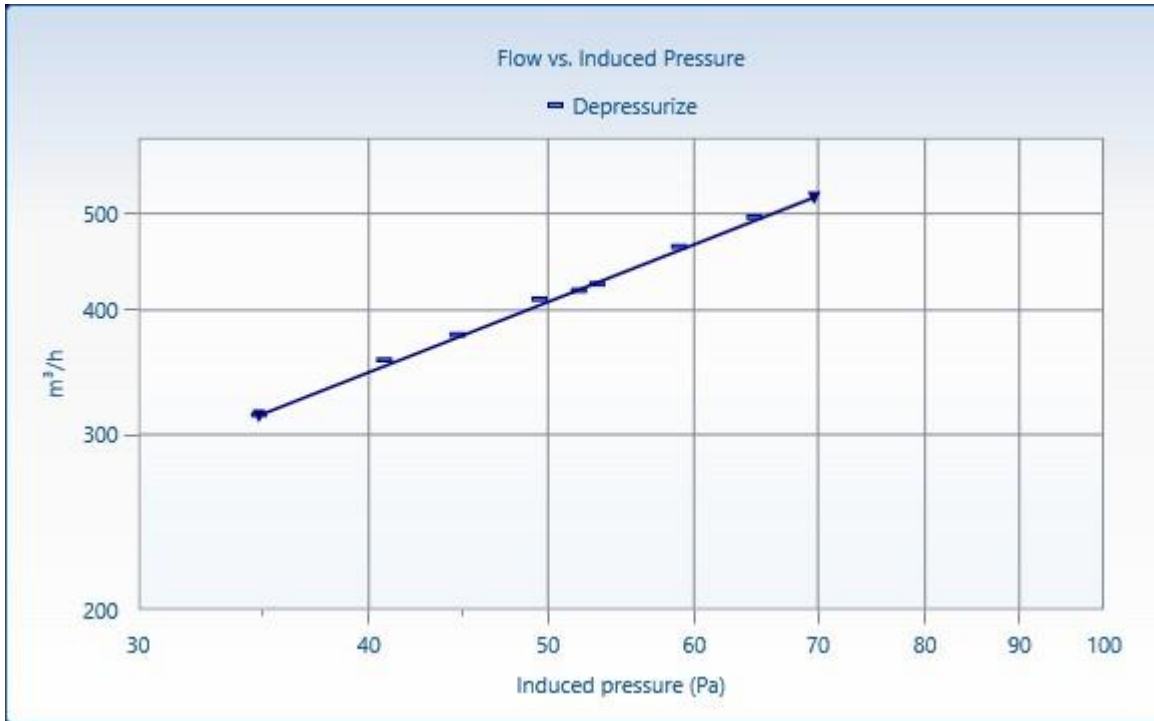
8 induced pressures each taken for 0 of the required 5 seconds.

5 baseline pressures each taken for 0 of required 6 seconds.

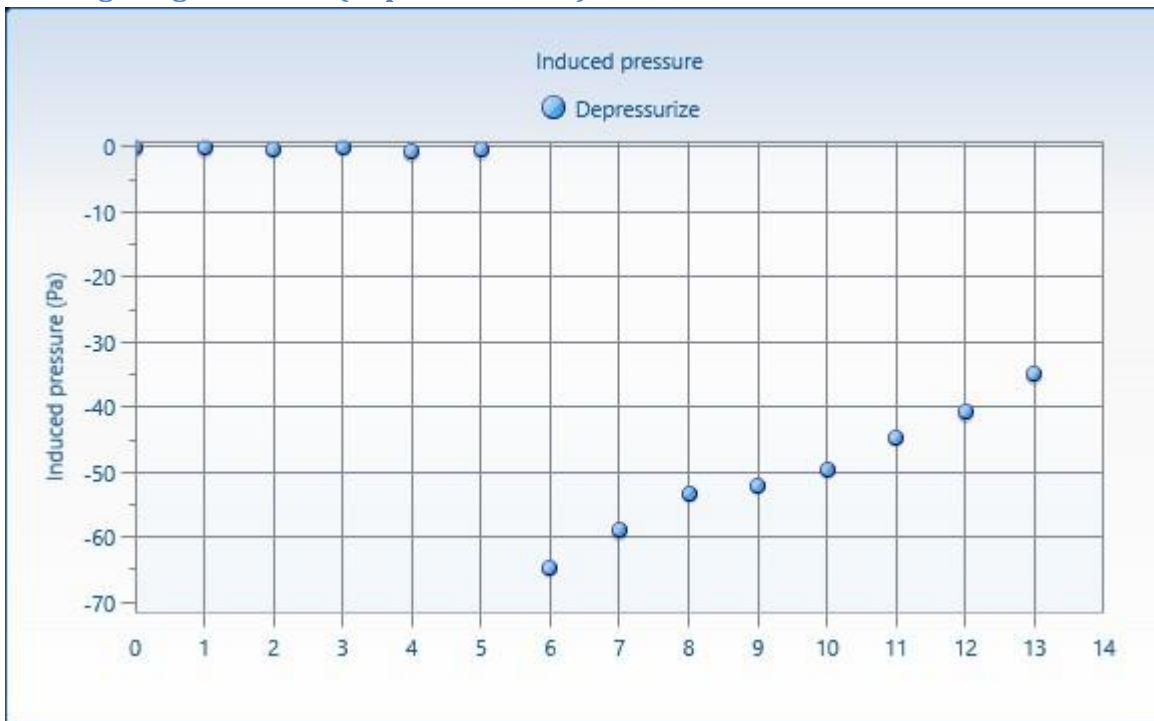
|                           |                       |                       |                       |
|---------------------------|-----------------------|-----------------------|-----------------------|
| Static Pressure Averages: |                       |                       |                       |
| initial [Pa]              | $\Delta P_{01}$ -0.25 | $\Delta P_{01}$ -0.32 | $\Delta P_{01}$ +0.07 |
| final [Pa]                | $\Delta P_{02}$ 0.00  | $\Delta P_{02}$ -0.00 | $\Delta P_{02}$ +0.00 |

|                        |       |       |       |      |       |       |  |  |  |  |  |  |
|------------------------|-------|-------|-------|------|-------|-------|--|--|--|--|--|--|
| Baseline, initial [Pa] | -0.10 | -0.12 | -0.32 | 0.07 | -0.67 | -0.38 |  |  |  |  |  |  |
| Baseline, final [Pa]   |       |       |       |      |       |       |  |  |  |  |  |  |

### Induced Pressure vs. Flow (Depressurize Set)



### Building Gauge Pressure (Depressurize Set)



## Test Equipment

The following test equipment was used in the performance of the air leakage tests.

|    | Fan           | Fan serial | Fan location | Gauge | Gauge serial | Gauge Calibration |
|----|---------------|------------|--------------|-------|--------------|-------------------|
| #1 | Retrotec 2000 | FN2000191  | Plymouth     | DM-2  | 203592       |                   |

### Fan Calibration Certificate Retrotec 2000:

| Retrotec 2000 FN2000191 Fan last calibrated: 2016-03-15 (Flow Equation Parameters - Custom) .<br>Change CubicMetersPerSecond |        |            |       |     |            |    |     |
|--|--------|------------|-------|-----|------------|----|-----|
| Range  | n      | K          | K1    | K2  | K3         | K4 | MF  |
| Open(22)   | 0.5203 | 0.2458     | 0     | 0.8 | 0          | 1  | 8.6 |
| A  | 0.491  | 0.1354     | 0     | 1   | 0          | 1  | 12  |
| B  | 0.4963 | 0.0818     | 0     | 0.3 | 0          | 1  | 10  |
| C8   | 0.5067 | 0.0367     | 0     | 0.5 | 0          | 1  | 10  |
| C6   | 0      | 0          | 0     | 0.5 | 0          | 1  | 10  |
| C4   | 0.5313 | 0.017      | 0     | 0.5 | 0          | 1  | 10  |
| C2   | 0.5591 | 0.0077     | 0     | 0.5 | 0          | 1  | 10  |
| C1   | 0.5908 | 0.0037     | 0     | 0.4 | 0          | 1  | 10  |
| L4   | 0.48   | 0.00193475 | 0.003 | 1   | 0.00000019 | 1  | 10  |
| L2   | 0.502  | 0.00097589 | 0     | 0.5 | 0.00000005 | 1  | 10  |
| L1   | 0.4925 | 0.00054812 | 0.1   | 0.5 | 0.00000005 | 1  | 10  |

Fan Pressure (FP) is the measured fan pressure when using a self-referenced fan or when Room Pressure is negative. If using a fan which is not self-referenced, and Room Pressure is positive, Fan Pressure is calculated by subtracting the measured Room Pressure from the Absolute Value of the Fan Pressure.

If  $PrA > 0$  and fan is not self-referencing:  $FP = |PrB| - PrA$

If  $PrA < 0$  or fan is self-referencing:  $FP = PrB$

Flow calculations are not valid if Fan Pressure is less than either MF or  $(K2 \times |CR|)$ .

Flow in CubicMetersPerSecond using the above coefficients is calculated as follows for standard Ranges:

$$flow = (FP - CR \times K1)^n \times (K + K3 \times FP) \times K4$$

FP = fan pressure, CR = corrected room pressure