

BUILDING LEAKAGE TEST

Edge Innovation Ltd
High Performance Products & Testing
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Date of Test: 10/03/2021 Test File: Edge-Martin

Final Test - Actual - Copy

Technician: Richard Walklin ATTMA # 14848

Project Number: Martin House

Customer: Ethos Homes Ltd
Peter Bielski

Building Address: New Passive House

Phone:

Fax:

Test Results at 50 Pascals:

	<u>Depressurization</u>	<u>Pressurization</u>	<u>Average</u>
q ₅₀ : m ³ /h (Airflow)	108 (+/- 1.5 %)	110 (+/- 1.8 %)	109
n ₅₀ : 1/h (Air Change Rate)	0.36	0.37	0.37
q _{F50} : m ³ /(h·m ² Floor Area)	0.89	0.91	0.90
q _{E50} : m ³ /(h·m ² Envelope Area)	0.30	0.31	0.30

Leakage Areas:

ELA ₅₀ : m ²	0.0033 (+/- 1.8 %)	0.0034 (+/- 1.8 %)	0.0033
ELA _{F50} : m ² /m ²	0.0000271	0.0000278	0.0000274
ELA _{E50} : m ² /m ²	0.0000091	0.0000094	0.0000093

Building Leakage Curve:

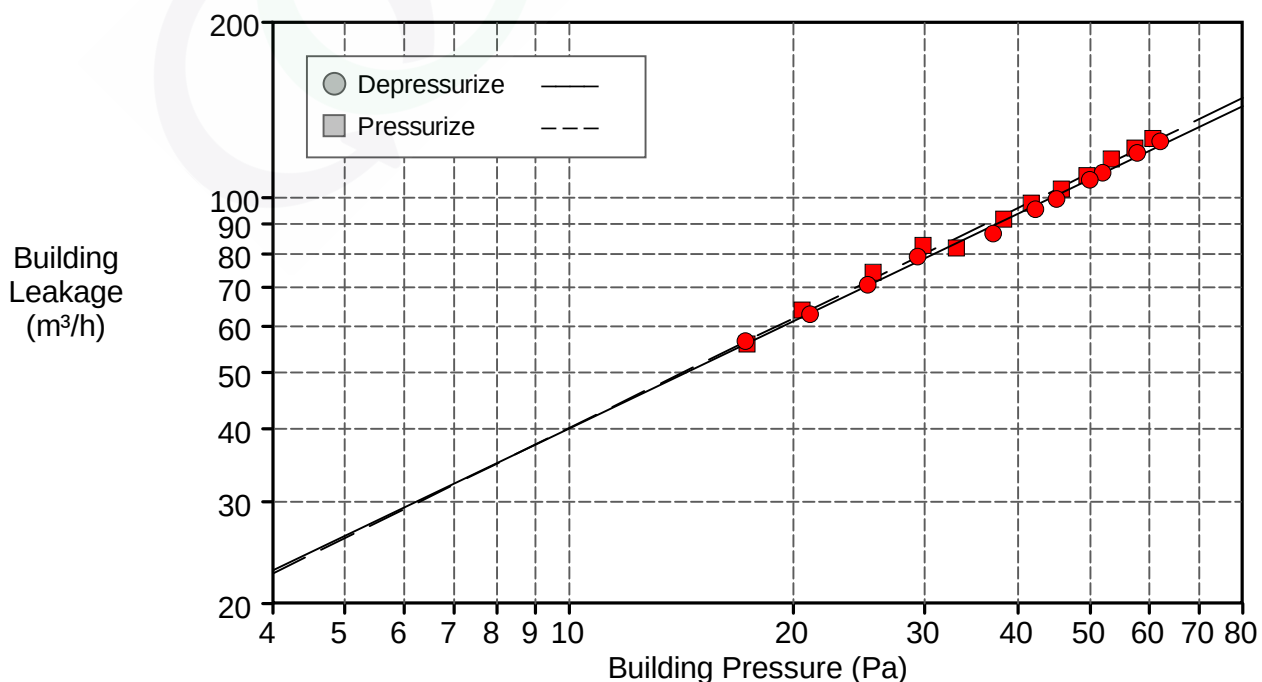
Air Flow Coefficient (C _{env}) m ³ /(h·Pa ⁿ)	9.8 (+/- 10.5 %)	9.5 (+/- 12.9 %)
Air Leakage Coefficient (C _L) m ³ /(h·Pa ⁿ)	9.8 (+/- 10.5 %)	9.5 (+/- 12.9 %)
Exponent (n)	0.613 (+/- 0.029)	0.628 (+/- 0.036)
Coefficient of Determination (r ²)	0.99613	0.99360

Test Standard: ISO 9972

Test Mode: Depressurization and Pressurization

Type of Test Method: Method 1 - Test of Building in use

Purpose of Test: Passive House - Final Occupancy Test n₅₀ ≤ 0.6 1/h



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Building Information

Internal Volume, V (m³) (according to ISO)	295.74
Net Floor Area, A_F (m²) (according to ISO)	121.19
Envelope Area, A_E (m²) (according to ISO)	358.63
Height (m)	4.7
Uncertainty of Dimensions (%)	1.5
Year of Construction	2020
Type of Heating	Toshiba Split System Heat Pump
Type of Air Conditioning	Toshiba Split System Heat Pump
Type of Ventilation	Zehnder Q350 MVHR Ventilation System
Building Wind Exposure	Partly Exposed Building
Wind Class	Light Air

Equipment Information

Type	Manufacturer	Model	Serial Number	Custom Calibration Date
Fan	Energy Conservatory	Model 4 (230V)	CE5421	-
Micromanometer	Energy Conservatory	DG1000	673	21/02/2020

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Depressurization Test 1:**Environmental Data**

Indoor Temperature (°C)	Outdoor Temperature (°C)	Barometric Pressure (Pa)
21.8	17.9	101030.2

Pre-Test**Baseline Pressure Data****Post-Test**

$\Delta p_{0,1-}$	$\Delta p_{0,1+}$	$\Delta p_{0,1}$	$\Delta p_{0,2-}$	$\Delta p_{0,2+}$	$\Delta p_{0,2}$
-0.0	0.1	0.1	-1.1	0.0	-1.1

Data Points - Semi-Automated Test (TTE 5.0.8.4)

Nominal Building Pressure (Pa)	Baseline adjusted Building Pressure (Pa)	Fan Pressure (Pa)	Nominal Flow q_r (m³/h)	Adjusted Flow q_{env} (m³/h)	Adjusted Flow q_L (m³/h)	% Error	Fan Configuration
0.1	n/a	n/a					
-62.5	-62.0	38.0	126	125	125	1.8	Ring C
-58.3	-57.8	34.8	120	119	120	1.6	Ring C
-52.4	-51.9	29.9	111	110	110	0.2	Ring C
-50.4	-49.9	28.3	108	107	107	-0.2	Ring C
-45.5	-45.0	24.4	100	99	99	-1.5	Ring C
-42.7	-42.2	22.5	96	95	95	-1.5	Ring C
-37.5	-37.1	18.7	87	86	87	-3.2	Ring C
-29.8	-29.4	41.0	80	79	79	2.0	Ring D
-25.6	-25.2	32.9	71	71	71	0.4	Ring D
-21.5	-21.0	26.0	63	63	63	-0.5	Ring D
-17.7	-17.2	21.1	57	57	57	1.1	Ring D
-1.1	n/a	n/a					

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Pressurization Test 1:

Environmental Data

Indoor Temperature (°C)	Outdoor Temperature (°C)	Barometric Pressure (Pa)
21.9	17.1	101030.2

Pre-Test

Baseline Pressure Data

Post-Test

$\Delta p_{0,1-}$	$\Delta p_{0,1+}$	$\Delta p_{0,1}$	$\Delta p_{0,2-}$	$\Delta p_{0,2+}$	$\Delta p_{0,2}$
-0.6	0.0	-0.6	-0.1	0.5	0.5

Data Points - Semi-Automated Test (TTE 5.0.8.4)

Nominal Building Pressure (Pa)	Baseline adjusted Building Pressure (Pa)	Fan Pressure (Pa)	Nominal Flow q_r (m³/h)	Adjusted Flow q_{env} (m³/h)	Adjusted Flow q_L (m³/h)	% Error	Fan Configuration
-0.6	n/a	n/a					
60.7	60.7	37.6	125	127	126	1.2	Ring C
57.4	57.4	34.8	120	122	122	0.8	Ring C
53.3	53.4	32.0	115	117	116	1.1	Ring C
49.5	49.6	28.2	108	109	109	-0.7	Ring C
45.7	45.8	25.5	102	104	103	-1.0	Ring C
41.6	41.7	22.8	97	98	98	-0.9	Ring C
38.2	38.3	20.2	91	92	92	-1.9	Ring C
33.0	33.1	16.2	81	82	82	-4.0	Ring C
29.8	29.9	43.2	82	83	83	3.4	Ring D
25.5	25.6	34.9	74	74	74	2.4	Ring D
20.5	20.6	25.9	63	64	64	1.2	Ring D
17.3	17.3	19.9	55	56	56	-1.4	Ring D
0.5	n/a	n/a					

Comments

EDGE INNOVATION LTD - BLOWER DOOR TEST SETUP
PROJECT SPECIFIC INFORMATION & REQUIREMENTS:

PREPARATION CHECKS / ACTIONS:

1. Check Several Site Dimensions To Verify Layout Plan Dimensions - Checked OK
2. Various Penetrations Closed / Sealed - Checked OK
3. Windows, Doors, Hatches, Roof Windows, Etc. Closed - Checked OK
4. Attic & Storage Hatches & Doors Open Or Closed As Appropriate - N/A
5. Pet Access Doors Closed - N/A
6. All Internal Doors Open - Checked OK
7. Drainage Traps Full Of Water Or Temporarily Sealed - By Builder
8. Mechanical Ventilation Turned Off & Atmosphere Intake & Exhaust Temporarily Sealed - By Builder (Intello & Tape)
9. Passive & Trickle Ventilation Openings - Temporarily Sealed - N/A
10. Air Conditioning Turn Off & Any Atmosphere Connections Temporarily Sealed - By Builder
11. IMPORTANT! - Ashes MUST Be Cleared From All Fireplaces - N/A
12. Chimney's & Flues - Temporarily Sealed As Appropriate - N/A
13. Any Other Temporary Sealing - Refer ATTMA Section 2.5 - (Record here) - N/A
14. Garages & Similar Attached Areas - Normally Excluded From Test - N/A
15. Roof Space / Attic - May Be Included Or Excluded From Test - N/A
16. Any Other Special Considerations - (Record here) - N/A

TEST EQUIPMENT SET-UP & APERTURE LOCATION:

1. Test Aperture Location - Test 1 = Garage / House Entry Door
2. Test Aperture Location - Test 2 = N/A
3. Test Aperture Location - Test 3 = N/A
4. Clear Air Flow Path On Both Sides Of Fan - Yes
5. Blower Door Frame / Membrane Correctly Sealed All-Round In Test Aperture (Tape In Place If Necessary) - Yes (Door Frame Surround Required Due To Steps In Extrusion

-

Tape
Required)

6. Internal Pressure Tube (Clear) Approx. Geometric Centre of Building & Positioned Away From Excessive Heating & / Or Cooling Sources - (Living Sth Wall Area)
7. External Pressure Tube (Clear with Tee) Away From Fan Flow, Building & Direct Sunlight - (North Wall Exterior Shaded)
8. Pre-Test (Fan Cruise) To Check Building Can Pressurise To Min. $\pm 50\text{Pa}$ - N/A
9. Where Unable To Achieve Min. $\pm 50\text{Pa}$ Building Pressure Record Reasons Here - N/A

CAUTION: To Avoid Damage To Building DO NOT EXCEED $\pm 100\text{Pa}$ Building Pressure

EDGE INNOVATION LTD - BLOWER DOOR TEST
ADDITIONAL GUIDE INFORMATION:

Comments continued on the next page



Comments (Continued)**TEST STANDARDS GUIDE:**

1. Edge Innovation - ISO 9972:2015 (ISO 9972-15) - Method A / Method 1
2. Passive House - ISO 9972:2015 (ISO 9972-15) - Method A or B
(Volume & Area Calculations Are Room-By-Room - Excludes Volume Of Walls, Mid-Floors,
Etc. Unless Noted Otherwise)

AIR TIGHTNESS / PERMEABILITY TARGET GUIDE:

1. Passive House $\leq 0.6 \text{ ach@Vn50}$
2. Passive House EnerPHit $\leq 1.0 \text{ ach@Vn50}$
3. Passive House PHI Low Energy $\leq 1.0 \text{ ach@Vn50}$
4. NZBC Very Good $\leq 1.5 \text{ ach@Vn50}$
5. NZBC Good $\leq 2.0 \text{ ach@Vn50}$
6. NZBC Fair $\leq 3.0 \text{ ach@Vn50}$
7. NZBC Poor $> 3.0 \text{ ach@Vn50}$
8. NZBC Extremely Poor $> 10 \text{ to } 15 \text{ ach@Vn50}$ (Most NZ Homes)

TEST APERTURE SIZE GUIDE:

Minneapolis Blower Door Frame & Membrane Door / Window Aperture Size Guide:
Absolute Min. 710W x 1320H (Recommended 740 x 1350)
Absolute Max. 1010W x 2430H (Recommended 980 x 2400)
Requires Min. 60mm Wide Flat Surface All 4 Sides Of Aperture For Frame To Seal
Note: Adhesive Taping May Be Required To Ensure Air-Tight Seal Of Door
Membrane To Aperture (Record Note If Tape Applied)

ATMOSPHERIC CONDITIONS GUIDE:

1. Temperature - Ideal Between $+11^{\circ}\text{C}$ and $+30^{\circ}\text{C}$
2. Humidity - Ideal Between 35RH% to 75RH% (RH%75)
3. Barometric Pressure - Ideal between 995 and 1040 hPa (mBar) - Standard
4. Wind Conditions - Beaufort Scale Up To BS-3 Max. (0 km/hr To $\leq 19\text{km/hr}$)
(BS-0 Calm, BS-1 Light Air, BS-2 Light Breeze, Max. BS-3 Gentle Breeze)
Wind Exceeding BS-3 Gentle Breeze - Normally Do Not Test & Reschedule
5. Initial Static Internal / External Pressure Differential ΔP avg Must Not Exceed 5Pa
(Test Is Not Valid If ΔP Criteria Exceed 5Pa Differential)

EQUIPMENT DETAILS & TECHNICAL INFORMATION:

1. Fan Make, Model & Serial Number: Minneapolis 230V Type 4 # CH5421
2. Fan Calibration Date 4th August 2017 / Next Due Date: TBA (Not Required)
3. Manometer Gauge Make Model & Serial Number: TEC DG1000 #673
4. Manometer Gauge Calibration Date: Feb 2020 / Next Due: Feb 2022
(Important: If TEC DG1000 Re-Calibration Is Not Current Note here)
5. Tectite Express Recording & Analysing Software Version: 5.0.8.4
6. TEC DG1000 Pressure & Flow Manometer Software Version: 1.6.0 (16)

Report Date: 15 March 2020

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Blower Door Test Technician.