Air Leakage Measurement Australia

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Air Leakage Test Report on Efficiency Matrix Downlight Mitt

Introduction

This report has been commissioned by Efficiency Matrix Pty Ltd to undertake testing of air leakage on a downlight fitted with an Efficiency Matrix downlight mitt. Air leakage due to uncovered downlight perforations is a significant factor in energy loss in domestic and commercial buildings.

Testing was conducted by Air Leakage Measurement Australia on the 20th October 2010 in Canberra ACT.

Description of Test Specimen

The Downlight Mitt is a non ventilated downlight product which focuses on fixing the inefficiencies of downlights. The Downlight cover is made out of an intumescent/insulative material taking downlight safety to a new level, while also providing an R-value of 0.5 above the luminaire. This product is primarily designed to be installed from below the ceiling through a 90mm cut out, but can be installed above the ceiling as well. The downlight mitt is 25cm tall with an 18cm internal diameter at the widest point.

Test Preparation

The test assembly comprised of a MDF board with a 10cm diameter Masson gimble downlight fitted through a 9cm diameter hole. The flange of the downlight was flush with the MDF as would be a gyprock mounted fitting. The light fitting contained a standard 50W 12V halogen globe.

The test was performed on the uncovered downlight as well as the same downlight covered with a Efficiency Matrix downlight mitt. The mitt was held in place using the wire fastening device that is supplied with each mitt.

The equipment used for testing is as follows:

- Infiltec Duct Testing Unit Model DL1 - Serial Number – 007101
- Infiltec DM4 Manometer – Serial Number - 946012
- Infiltect pressure tubing
- Infiltec 16cm^2 low flow pressure tube
- Infiltect 4cm^2 low flow pressure tube

The DL1 and DL4 have a calibration date of 25/Jan/2010. The Infiltec low flow tubes were tested with reference plates and displayed variance of >5% to the measured area.

Figure 1. Photograph of test rig

Figure 2. Photograph of mitt and downlight

Test Procedure

The downlight fitting was attached to the 16cm^2 using an airtight seal of putty between the tube and MDF board. Note that the downlight was fitted with the front side facing the DM1 and airflow moving from back to front. A multipoint test was taken leakage from 5 pressures ranging from ~160 Pa down to ~25Pa. The rig was allowed 30 seconds to stabilise at the set pressure and 4 second was applied to the reading to reduce the effect of any fluctuation.

The Efficiency Matrix downlight mitt was fitted to the back of the downlight and the multipoint test was repeated. A point was reached where the low flow tube needed to be exchanged for the 4cm^2 unit to maintain accurate readings by the manometer (the leakage area could not be calculated using the 16cm^2 low flow tube).

These values were plotted on logarithmic axis graph using pressure (Pa) vs leakage (m3/hour). These values were compared to calculate the difference in air leakage volume that Efficiency Matrix mitts effect.

Results

The flowing tables contain the test results.

A. Downlight Fitting without Mitt

Pressure (Pa)	**Air Leakage (m^3/hour)**
160	21.8
108	17.9
89	16.2
44	11.2
25	8.3
Results	**Value**
Curve Correlation Coefficient	0.99994
Flow@50Pa	11.949 m^3/h
Flow	0.59746 m^3/h
ELA-LBL@4Pa	3.445 cm^2(effective leakage area)

B. Downlight Fitting with Efficiency Matrix Mitt

Pressure (Pa)	**Air Leakage (m^3/hour)**
160	9.5
125	8.0
97	6.6
50	3.8 (LF tube changed to 4cm^2)
22	1.8
Results	**Value**
Curve Correlation Coefficient	0.99910
Flow@50Pa	3.6849 m^3/h
Flow	0.18424 m^3/h
ELA-LBL@4Pa	0.4717 cm^2(effective leakage area)

These results indicate that application of an Efficiency Matrix Mitt over an uncovered downlight reduce flow at normal pressures (4pa) by a factor of 3.24 to 0.184m^3/hr. The correlation coefficient indicates the multipoint test results displayed acceptable error margin.

Test conducted by Andrew Cleary, Air Leakage Measurement Australia in Canberra ACT on 20th October 2010.

This test was conducted under controlled conditions with calibrated equipment

Andrew Cleary

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