



CONFIDENTIAL

Report: Chilt/P11032

**Report on the testing of a
downlighter with and without loft
covers, to the principles of BS EN
1026: 2000 Window and doors – Air
permeability – test method**

Issue date: June 2011



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1 Introduction

Chiltern Dynamics was commissioned by Tenmat Limited to undertake testing of a 2No loft covers to the principles of BS EN 1026: 2000 Window and doors – Air permeability – test method

Testing was conducted at the Chiltern Dynamics testing laboratory on 6 April 2011

2 Objective

To measure the airtightness of a downlighter and of a downlighter with a Tenmat Firefly 120 thermal loft cover fitted, at positive pressures of 5, 10, 15, 20, 35, 50, 75 and 100 pascals

3 Description of test specimen

The light was identified as a Halo H7T 6" downlight with no lamp fitted. The Tenmat FF135 and FF130 thermal loft covers were each in turn fitted over the back of the downlighter, and fixed in place with a silicone seal to the plywood.

4 Test preparation

Installation

The test assembly was fitted into weather test rig (Ref. T7.22). The front of the rig was boarded off with a sheet of 12mm thick plywood. The roof was constructed from a sheet of 12mm plywood. A 170mm diameter hole was cut in the plywood to allow the installation of the downlighter. The overall dimensions of the roof were 660mm x 1230mm.

5 Test procedure and results

The downlighter was sealed with tape and the pressure inside the chamber increased incrementally to 5Pa, 10Pa, 15Pa, 20Pa, 35Pa, 50Pa, 75Pa and 100Pa and then reduced in similar stages to zero.

At each pressure the airflow into the rig was allowed to stabilise and the rate of flow required to achieve a level of pressure and the air pressure was recorded. These readings gave the permeability of the test chamber at the various pressure levels.

The sealing of the downlighter was removed and the pressure within the chamber raised in similar stages to a maximum of 100Pa and reduced in stages as before. Airflow into the rig and the pressure level was again measured.

The Tenmat FF135 loft cover was then fitted over the downlighter and sealed at the base with silicone. The pressure in the chamber was again raised in similar stages to a maximum of 100Pa and reduced in stages as before. Airflow into the rig and the pressure level was again measured.

The Tenmat FF130 loft cover was then fitted over the downlighter and sealed at the base with silicone. The pressure in the chamber was again raised in similar stages to a maximum of 100Pa and reduced in stages as before. Airflow into the rig and the pressure level was again measured.

These values were plotted on a graph and a best fit curve was calculated and used to give the leakage values of the downlighter with and without the loft covers at the increments given.

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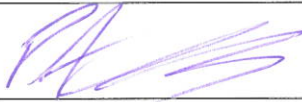
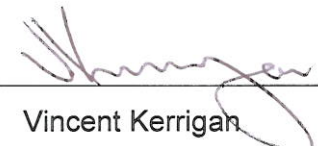


Individual results for the tests are detailed in Appendix 1

The following are values calculated from the best-fit curve characteristics

Downlight description	Air leakage at 2Pa (m ³ /h)	Air leakage at 50Pa (m ³ /h)
Halo 6" Downlighter	19.98	106.68
Downlighter with Tenmat FF135 loft cover	2.62	44.60
Downlighter with Tenmat FF130 loft cover	1.27	33.02

The results only relate to the performance of the samples under the particular conditions of test.

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Date of issue:		13-06-2011

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Appendix 1

Test results

Test Pressure (Pa) nominal	Chamber Leakage		Chamber Leakage		Chamber Average		Chamber calculated	
	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)
2.00	-	-	-	-	-	-	2.00	0.37
5.00	5.0	0.5	5.0	0.5	5.00	0.50	5.00	0.60
10.00	10.0	1.0	10.0	1.0	10.00	1.00	10.00	0.97
15.00	15.0	1.4	15.0	1.4	15.00	1.40	15.00	1.34
20.00	20.0	1.7	20.0	1.8	20.00	1.75	20.00	1.71
35.00	35.3	2.8	35.0	2.8	35.15	2.80	35.00	2.80
50.00	50.0	3.8	50.0	3.9	50.00	3.85	50.00	3.86
75.00	75.0	5.5	75.0	5.5	75.00	5.50	75.00	5.57
100.00	100.0	7.2	100.0	7.2	100.00	7.20	100.00	7.21

Best fit curve calculated $y = -6 \times 10^{-5}x^2 + 0.0759x + 0.2171$ $R^2 = 0.9995$

Test Pressure (Pa) nominal	Halo 6" Downlighter		Halo 6" Downlighter		Halo 6" Downlighter average		Calculated leakage(less calculated chamber leakage)	
	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)
2.00	-	-	-	-	-	-	2.00	19.99
5.00	5.0	32.2	5.0	32.2	5.00	32.20	5.00	32.36
10.00	10.0	48.8	10.0	48.8	10.00	48.80	10.00	46.47
15.00	15.0	59.2	15.0	59.1	15.00	59.15	15.00	57.38
20.00	20.0	68.5	20.0	68.2	20.00	68.35	20.00	66.60
35.00	35.0	91.1	35.0	91.1	35.00	91.10	35.00	88.88
50.00	50.0	110.0	50.0	110.2	50.00	110.10	50.00	106.73
75.00	75.0	136.2	75.0	136.4	75.00	136.30	75.00	131.29
100.00	100.0	159.4	100.0	159.5	100.00	159.45	100.00	152.01

Best fit curve calculated $y = 14.138x^{0.5258}$ $R^2 = 0.9993$

Test Pressure (Pa) nominal	Downlighter with Tenmat FF135 loft cover		Downlighter with Tenmat FF135 loft cover		Downlighter with Tenmat FF135 loft cover average		Calculated leakage(less calculated chamber leakage)	
	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)
2.00	-	-	-	-	-	-	2.00	2.61
5.00	5.0	5.7	5.0	5.7	5.00	5.70	5.00	5.53
10.00	10.0	12.4	10.0	10.3	10.00	11.35	10.00	10.31
15.00	15.0	16.6	15.0	16.6	15.00	16.60	15.00	14.98
20.00	20.0	21.4	20.0	21.4	20.00	21.40	20.00	19.55
35.00	35.0	35.4	35.0	35.4	35.00	35.40	35.00	32.61
50.00	50.0	48.5	50.0	48.5	50.00	48.50	50.00	44.70
75.00	75.0	67.7	75.0	67.6	75.00	67.65	75.00	62.72
100.00	100.0	85.1	100.0	84.9	100.00	85.00	100.00	78.07

Best fit curve calculated $y = -0.0022x^2 + 1.0642x + 0.8558$ $R^2 = 0.9996$

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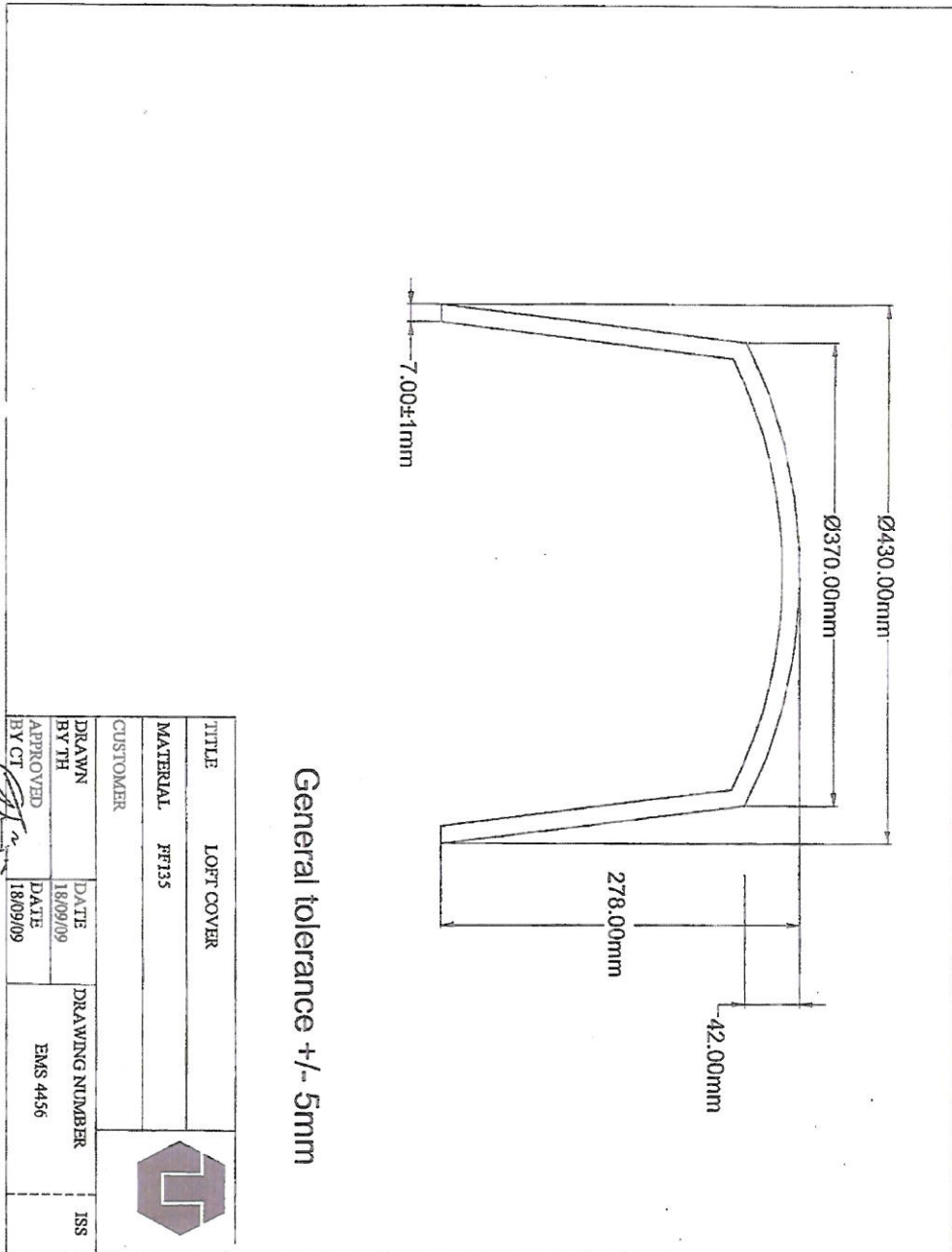
Test Pressure (Pa) nominal	Downlighter with Tenmat FF130 loft cover		Downlighter with Tenmat FF130 loft cover		Downlighter with Tenmat FF135 loft cover average		Calculated leakage(less calculated chamber leakage)	
	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)	Pressure (Pa)	Leakage (m ³ /h)
2.00	-	-	-	-	-	-	2.00	1.26
5.00	5.0	4.0	5.0	4.0	5.00	4.00	5.00	3.42
10.00	10.0	7.5	10.0	7.7	10.00	7.60	10.00	6.96
15.00	15.0	12.0	15.0	12.0	15.00	12.00	15.00	10.45
20.00	20.0	15.7	20.0	15.8	20.00	15.75	20.00	13.87
35.00	35.0	26.6	35.0	26.6	35.00	26.60	35.00	23.76
50.00	50.0	37.0	50.0	37.2	50.00	37.10	50.00	33.10
75.00	75.0	52.6	75.0	52.8	75.00	52.70	75.00	47.41
100.00	100.0	67.6	100.0	67.6	100.00	67.60	100.00	60.18

Best fit curve calculated $y = -0.0013x^2 + 0.8036x + 0.0276$

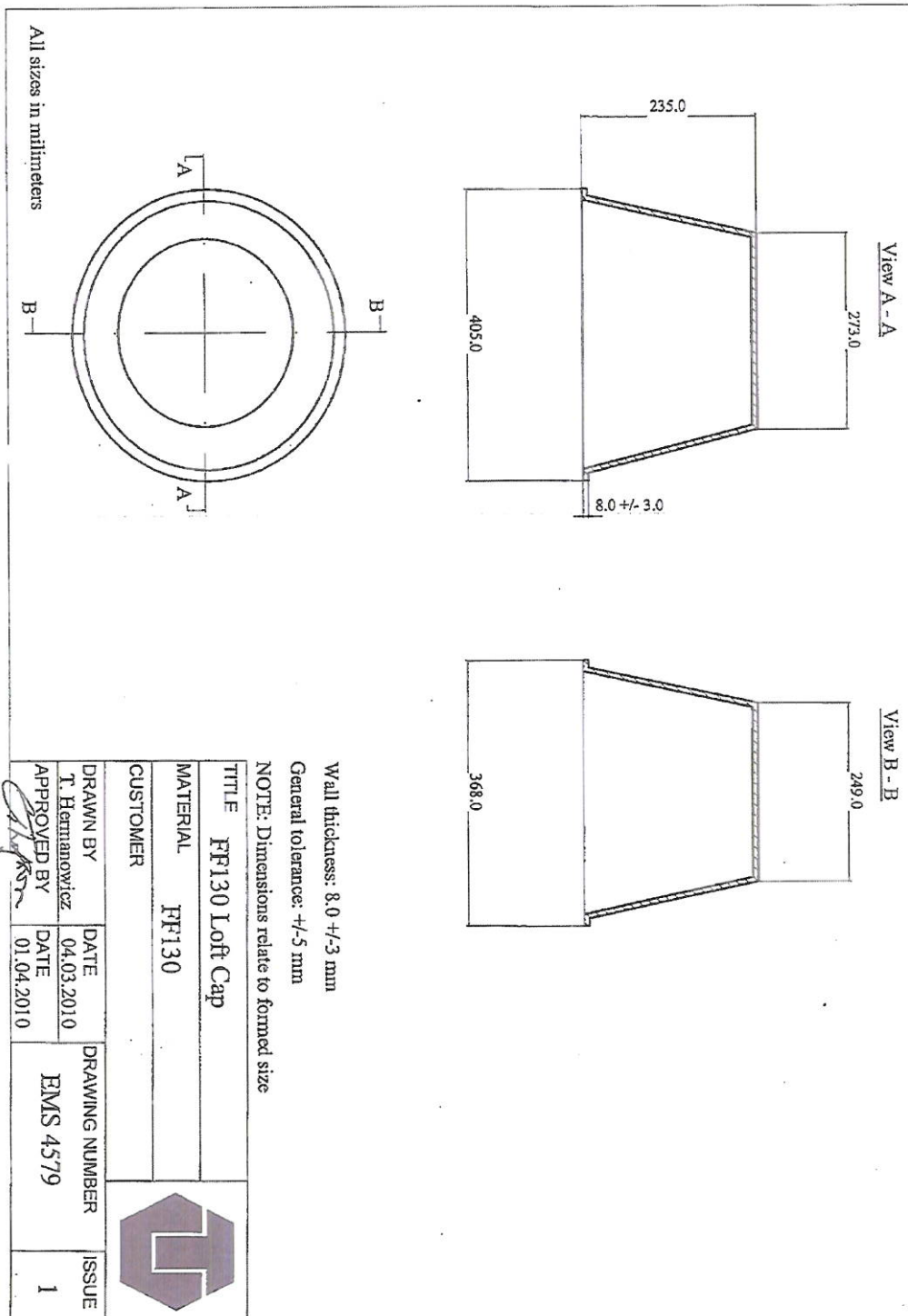
$R^2 = 0.9999$

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Appendix 2
Client drawings of loft covers



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Appendix 3

List of testing apparatus

Ref. No	Description
T7.22	Weathertightness testing rig
T5.149	Measuring tape
T6.53	0-100Pa pressure transducer
T6.54	0-50M3/hr air flow meter
T6.55	50-350M3/hr air flow meter

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