

BRE Test Report

Airtightness test according to Part C of the Building Regulations on a JCC Downlight Product

Prepared for: Michael Rickwood
Date: 30 July 2018
Report Number: P113003-1000 Issue: 1

BRE
Watford, Herts
WD25 9XX

Customer Services 0333 321 8811

From outside the UK:
T + 44 (0) 1923 664000
F + 44 (0) 1923 664010
E enquiries@bre.co.uk
www.bre.co.uk

Prepared for:

Michael Rickwood
QC & Compliance Manager
JCC Lighting Products Ltd
Innovation Centre
Beeding Close
Southern Cross Trading Estate
Bognor Regis
PO22 9TS



Prepared by

Name Ben Holland

Position Laboratory Technician, Fire and Building Technology Group

Date 30 July 2018

Signature

A handwritten signature in black ink that reads "B Holland".

Authorised by

Name Dr. Paul Blackmore

Position Associate Director, Fire and Building Technology Group

Date 30 July 2018

Signature

A handwritten signature in black ink that reads "P Blackmore".

This report is made on behalf of Building Research Establishment Ltd (BRE) and may only be distributed in its entirety, without amendment, and with attribution to BRE to the extent permitted by the terms and conditions of the contract. Test results relate only to the specimens tested. BRE has no responsibility for the design, materials, workmanship or performance of the product or specimens tested. This report does not constitute an approval, certification or endorsement of the product tested and no such claims should be made on websites, marketing materials, etc. Any reference to the results contained in this report should be accompanied by a copy of the full report, or a link to a copy of the full report.

BRE's liability in respect of this report and reliance thereupon shall be as per the terms and conditions of contract with the client and BRE shall have no liability to third parties to the extent permitted in law.



Table of Contents

1	Introduction	3
2	Test programme	4
3	Air leakage criterion	5
4	Test specimen	6
5	Test rig and preparation	7
6	Summary of test results	8
7	Conclusions	9
8	References	10
Appendix A	Test Results	11



1 Introduction

At the request of Michael Rickwood, Quality Checks and Compliance Manager of JCC Lighting Products Ltd, Innovation Centre, Beeding Close, Southern Cross Trading Estate, Bognor Regis, PO22 9TS, BRE issued the proposal P113003-1000. The client accepted this and BRE airtightness tested the provided sample.

The test assesses the airtightness of the specimen light fitting installed in a mock-up ceiling, by using the method in BS EN 13141-1:2004 and criteria set in BS 5250:2002. Part C of the Building Regulations 2010 Site Preparation and resistance to contaminants and moisture, refers to BS 5250:2002 and describes designs that are resistant to moisture transfer into roof and other voids that can, for example, occur in the form of leakage of warm moist air via light fittings.

JCC Lighting Products Ltd provided nine samples of their products to BRE in which five lights of these were then randomly chosen by Mr Ben Holland, Laboratory Technician, BRE.

The tests were carried out by Mr Ben Holland under the BRE Standard Terms and Conditions of Business for testing as part of BRE project and work order number P113003-1000.



2 Test programme

Part C of the Building Regulations makes reference to *BS 5250:2002: Code of practice for the control of condensation in building*. It should be noted that BS 5250:2002 has been superseded by BS 5250:2011+A1:2016. This latest version of BS 5250 includes the same criteria for downlighters as in earlier editions.

The current and previous versions of BS 5250 refer to the test method given in *BS EN 13141-1:2004¹* for assessing the air tightness of recessed light fittings

The airtightness test is performed by application of a series of air pressure differentials across the specimen with measurement of the air leakage through it at each pressure step. The maximum pressure differential was 100 Pa reached in pressure steps of 1, 2, 4, 8, 10, 15, 20, 30, 40, 60, 80 and 100 Pascals.

Measurement of the airtightness of the light fitting was carried out with the air pressure as positive on the room side of the fitting. This causes air to flow through and around the light fitting into the space above the ceiling. The values measured can therefore include air leakage through the light assembly and through the ceiling to light assembly joint when this occurs.

¹ *BS EN 13141-1:2004 Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 1: Externally and internally mounted air transfer devices.*



3 Air leakage criterion

BS 5250:2002, Clause 8.4.1.2 calls for designers to minimise the amount of moisture entering the roof (or other spaces above ceilings) by providing well sealed ceilings. The airtightness of ceilings is described in Clause 8.4.1.2 of that standard.

The paragraph about downlighters states; 'Recessed light fittings should either comply with BS EN 60529 and be rated IP60 to IP65 (depending on room use) or incorporate an appropriate sealed hood or box which meets the following test criteria. The total leakage through downlighters should not exceed 0.06 m³/h.m² of ceiling at 2 Pa. The leakage of individual downlighters can be tested using the method specified in 4.3 of BS EN 13141-1: 2004'.

BRE information Paper IP4/06 2006 Airtightness of ceilings describes the possible energy losses and condensation risks when ceilings are not 'well sealed'.

Note, as previously mentioned, Part C of the Building Regulations refers to BS 5250:2002, this standard has been superseded by BS 5250:2011+A1:2016. BS 5250:2011+A1:2016 Clause H.4.2 refers to the same test method and criteria as given in BS 5250:2002.

4 Test specimen

Figure 1 and Table 1 below shows the general arrangement and design of downlight tested.

Test Specimen	Details	Cut-out size in ceiling (mm)	Diameter of bezel (mm)	Area of ceiling face (mm ²)
JC1001 Fixed Downlight	Fixed downlight with a profiled 3.5 mm x 9 mm gasket.	70	85	5674.50

Table 1 Test Specimen JC1001 Fixed Downlight



Figure 1 JC1001 Fixed Downlight



5 Test rig and preparation

The five light fittings were installed into a square piece of 18 mm thick MDF board to simulate a stiff ceiling panel. This panel with specimen was screwed in to a 0.5 x 0.5 x 0.5 m welded aluminium welded box. The light fitting is installed into the test rig with the back of the fitting inside the test chamber. Air is sucked out of the test rig to establish the test pressure differential across the light fitting under test and air leakage through it is measured on an air flow meter.

The test specimens were conditioned before testing commenced for at least 4 hours within the temperature range specified in the test standard of 20 +/-5°C.

BS EN 13141-1:2004 requires that the test rig has a background leakage rate lower than 1 litre per second at 100 Pa. This equates to 3.6 m³/h at 100 Pa. The background leakage of the test rig was measured after first sealing off the specimen light fitting. This background leakage was subtracted from all measured test results.



6 Summary of test results

The test results for the five tested JC1001 Fixed Downlights are summarised in the table shown below. Detailed results are given in Appendix A. BRE tested five specimens of the product were selected at random to ensure a representative measurement was obtained.

BS 5250 test criteria: At 2 Pa (Pascals) air leakage through recessed light fittings should not exceed 0.06 m³/h per m² of ceiling.

Test Specimen	Lowest measured flow specimens	Performance against criteria
JC1001 Fixed Downlight	Flow through 5 downlighters = 0.00 m ³ /h at 2 Pa Flow through 1 downlighter = 0.00 m ³ /h at 2 Pa	At 2 Pa, a flow rate through 5 downlighters was measured at 0.00 m ³ /h. The flow rate through 1 downlighter at 2 Pa 0.00 m ³ /h Results are shown in full in Table A1.

Table 2 Summary of airtightness results for a JC1001 Fixed Downlight



7 Conclusions

The JC1001 Downlight, as described in Section 4 of this report, was tested in the manner and to the standard described herein. The results give the measured rate of air leakage through five downlighters as 0.00 m³/h which equates to an average air leakage through one downlighter of 0.00 m³/h.

As there was no measured leakage through the JC1001 Fixed Downlight, the downlighters can be installed at any density in the ceiling.



8 References

1. BS EN 13141-1:2004 Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 1: Externally and internally mounted air transfer devices. BSI London
2. BS 5250:2002 Code of practice for control of condensation in buildings. BSI London
3. BS 5250:2011+A1:2016 Code of practice for control of condensation in buildings, BSI London
4. Part C of the Building Regulations 2010. Site Preparation and resistance to contaminants and moisture. ODPM London. 2004 Edition.
5. BRE IP4/06 Airtightness of ceilings. BRE March 2006.



Appendix A Test Results

Airtightness Results for JC1001 Fixed Downlight

Test pressure Pa	Air flow through five JC1001 Fixed Downlights m ³ /h	Calculated Average Air flow through one JC1001 Fixed Downlight m ³ /h
1 (±0.5)	0.00	0.00
2 (±0.5)	0.00	0.00
4 (±1)	0.00	0.00
8 (±1)	0.00	0.00
10 (±1)	0.00	0.00
15 (±1)	0.00	0.00
20 (±1)	0.00	0.00
30 (±2)	0.00	0.00
40 (±2)	0.0036	0.00
60 (±2)	0.0036	0.00
80 (±2)	0.0036	0.00
100 (±2)	0.0036	0.00

Table A1 Air flow through five JC1001 Fixed Downlights

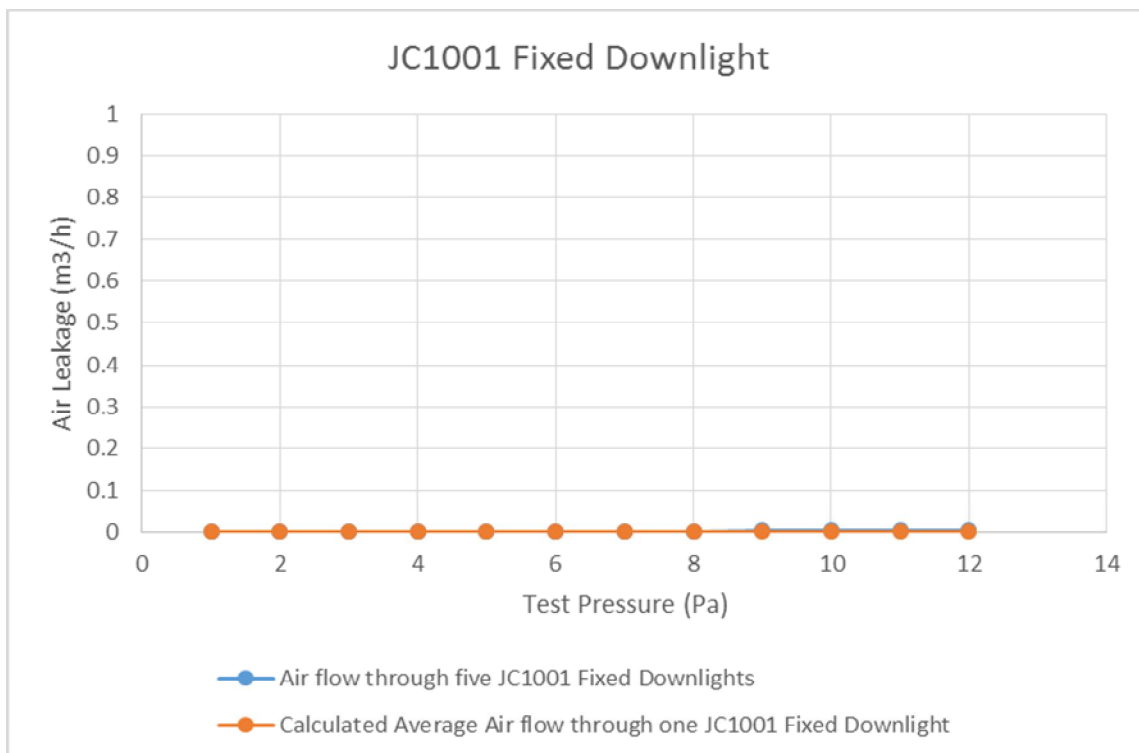


Figure A1 Graph of air flow readings