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Assessment of Downlighter Covers for up to 60 minutes Fire Resistance Performance

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Prepared for:	**Tenmat Ltd** **Ashburton Road West** **Trafford Park** **Manchester** **M17 IRU**

Contents

1 Introduction

This assessment report has been commissioned by Tenmat Ltd, to evaluate the fire resistance performance of downlighter covers fitted in to the ceilings of fire resistance tested floor constructions. The assessment is conducted in terms of BS476: Parts 21 and 23: 1987.

2 Proposal

The proposal is to consider the effect of fitting the following downlighters and associated covers to the ceilings of fire resistance tested floor constructions:

Downlighter cover
150mm ∅ at base x 150mm high x 8mm thick
200mm ∅ at base x 200mm high x 8mm thick
250mm ∅ at base x 250mm high x 8mm thick
370mm ∅ at base tapering to 320mm at top x 228mm high x 12mm thick
420mm ∅ at base tapering to 370mm at top x 285mm high x 12mm thick

The downlighter covers will be used for a range of downlighters with cut out sizes of between 50mm and 270mm. The covers will be Tenmat FF 109 type, manufactured to the composition tested and details of which are held in confidence on file with Chiltern International Fire Ltd.

The downlighters will be fitted in to the following types of construction:

1. Suspended ceilings of the type tested in Warres 66142, with the appropriate level of fire resistance performance.
2. Solid timber protected by plasterboard with the appropriate tested level of fire resistance performance.
3. Timber or steel/timber composite joists protected by plasterboard with the appropriate tested level of fire resistance performance.

The requirement is for the downlighter covers to successfully contribute to the floor constructions ability to maintain up to 60 minutes fire resistance performance when tested to one of the following:

- BS476: Part 21: 1987.
- BS476: Part 23: 1987.

3 Test Evidence

Fire resistance test Warres 66142
This test was conducted on behalf of Armstrong World Industries Ltd, on the 15 November 1995.

The test was conducted in accordance with BS476: Part 23: 1987, clause 5, to determine contribution to the fire resistance performance by a suspended ceiling protecting loadbearing "I" section steel beams.
The overall dimensions of the specimen were 4000mm long x 3000mm wide. The suspended ceiling construction comprised an exposed tee section suspension system referred to as "Trulock F4", which supported 1200mm x 600mm x 15mm thick, mineral fibre based ceiling panels referenced "Prima Fine Fissured".

The ceiling protected rolled steel I section beams 203mm x 133mm weighing 30kg/m produced from grade 43A steel. The beams were loaded in accordance with BS449: Part 2: 1969.

The effective protection provided by the suspended ceiling system to the loadbearing steel beams was evaluated in terms of the loadbearing failure criterion defined in BS476: Part 20: 1987.

The test revealed an effective protection of 66 minutes and upon termination no failures were recorded.

Fire resistance test TE94667

This test was conducted on behalf of Tenmat Ltd, on the 13 June 2000, in accordance with BS EN 1365-2 : 2000.

The specimen was a loaded timber floor of overall dimensions 4160mm long x 3500mm wide and comprised 225mm x 45mm timber joists at 600mm centres, clad on the top side with 22mm thick tongue and grooved chipboard and with Lafarge, 15mm thick, Mega-Deco glass fibre reinforced type 5 plasterboard. The ceiling was fitted with a 60mm, 80mm and 145mm diameter downlighters and associated Tenmat FF 109 downlighter covers were fitted within the ceiling void.

When tested in accordance with BS EN 1365-2 : 2000, no failure was recorded for loadbearing capacity, integrity or insulation at 60 minutes, when the test was terminated.

Fire resistance test IF99029

This test was conducted on behalf of Tenmat Ltd, on the 5 August 1999. The test was conducted in accordance with the temperature and pressure requirements specified in BS476: Part 20: 1987, to determine the effect of fitting downlighters and protective covers to a previously tested suspended ceiling.

The specimen comprised a 1.32m^2 section of the Armstrong suspended ceiling system as tested in Warres 66142. The ceiling was fitted with an 80mm diameter downlighter and a 200mm x 200mm Tenmat FF 109 downlighter cover was fitted within the ceiling void.

The test was terminated at 72 minutes at which time no failures were recorded. When compared to the failure criteria specified in BS476: Part 23: 1987 Part 5, the temperature of the steel I beams did not exceed 400°C at 72 minutes.

Fire resistance test FG8962/208217

This test was conducted on behalf of Tenmat Ltd, on the 21 March 2002. The test was conducted in accordance with the temperature and pressure requirements specified in BS476: Part 23: 1987, to determine the effect of fitting downlighters and protective covers to a previously tested suspended ceiling.

The specimen comprised a 4200mm long x 3500mm wide floor construction. The specimen comprised a steel grid suspended from 3 steel I beams and protected on the underside by an Armstrong suspended ceiling system. The ceiling was fitted with 145mm and 270mm diameter downlighters from the Click Range, reference R80 and LS6991 respectively amongst other fittings. The downlighters were fitted with FF 109 downlighter covers within the ceiling void.

The test was terminated at 73 minutes at which time no failures were recorded. When compared to the failure criteria specified in BS476: Part 23: 1987 Part 5, the temperature of the steel I beams did not exceed 400°C at 73 minutes.

4 Analysis

Test Warres 66142 and F8962/208217

The specimens tested achieved 10% and 13% margins of over run in performance respectively, above the minimum requirement of 60 minutes effective protection to the steel beams. Whilst the former test, not including downlighters, was terminated with out imminent signs of failure occurring, the latter nevertheless achieved a superior performance with the largest 270mm cut out downlighter and cover in the range.

Test IF99029

This reduced scale test demonstrated a 20% over run in performance above the minimum requirement of 60 minutes effective protection, without exhibiting any signs of imminent failure.

The observations from IF99029 indicate that the fitting of a 80mm cut out downlighter caused cracking in the ceiling panels emanating from the unit, which was recorded as starting at around 30 minutes. However, by reference to the time temperature graph, there is no evidence to suggest that these cracks penetrated through to the void, since the increase in joist and air temperature remained a gradual incline.

Test TE 94667

The specimen tested achieved a performance of 60 minutes load-bearing capacity, integrity and insulation. Upon termination of the test there were no signs of imminent failure recorded and during removal of the specimen from the furnace it was noted that 70% of the plasterboard ceiling was still intact.
This test therefore demonstrates that downlighters fitted into plasterboard ceilings and fitted with FF 109 covers did not adversely affect the floor construction such that performance was reduced below 60 minutes.

Downlighters and Covers

Based on the test evidence discussed above downlighters and Tenmat FF 109 covers may be used within the following scope:

1. The downlighters must be primarily steel or aluminium construction.
2. The downlighter units must not exceed 270mm diameter or be more than 20% heavier than the units tested at the equivalent size range.
3. The FF 109 covers must be of the same formulation, construction and fitted in the same manner tested, but must be of the appropriate size for the downlighter unit as tested.
4. The suspended ceiling systems to which downlighters and covers are fitted must be of a similar type to that tested in Warres 66142.
5. The plasterboard ceiling floor constructions must be tested designs and have a minimum of 10% margin of over run in performance above the minimum specified period.

5 Conclusion

It is our opinion that, if floor constructions fitted with downlighters and Tenmat FF 109 downlighter covers as described in section 2 of this document, were to be tested in accordance with the standards detailed in section 2, a minimum of 60 minutes fire resistance performance would be maintained, subject to the provisos stated.

6 Declaration

1. We the undersigned confirm that we have read and comply with obligations placed on us by Fire Test Study Group (FTSG) Resolution No. 82: 2001.
2. We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the Standard against which this assessment is being made.
3. We agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test to the Standard against which this assessment is being made.
4. We are not aware of any information that could adversely affect the conclusions of this assessment.
5. If we subsequently become aware of any such information we agree to ask the assessing authority to withdraw the assessment.

Signed .....

Name: RUPERT COGGON

For and on behalf of Tenmat Ltd.

7 Limitations

1. This assessment addresses itself solely to the elements and subjects discussed and does not cover any other unspecified criteria. All other details not specifically referred to should remain as tested or assessed.
2. This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available, Chiltern International Fire reserves the right to withdraw the assessment unconditionally but not retrospectively.
3. This assessment has been carried out in accordance with FTSG Resolution No 82: 2001.
4. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
5. This assessment relates only to those aspects of design, materials and construction that influence the performance of the element(s) under supposed fire resistance test conditions. It does not purport to be a complete specification ensuring fitness for purpose and long-term serviceability. It is the responsibility of the client to ensure that the element conforms to recognised good practice in all other respects and that, with the incorporation of the guidance given in this assessment, the element is suitable for its intended purpose.

8 Validity

1. The assessment is valid initially for a period of five years from the date of issue, after which time it is recommended that it be submitted to Chiltern International Fire Ltd. for reappraisal.
2. This assessment report is not valid unless it incorporates the declaration duly signed by the applicant.

Prepared by:

J P Mullett
Principal Consultant

Checked by:

J J Osborn
General Manager

Appendix A

Revision No.	Date	Description
Revision A:	29.9.05	Modification to terms of assessment section 1 and to conclusion section 2.
Revision B	16.7.07	5 year revalidation