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Title:

Fire Resistance Assessment
30 and 60 minute loaded, timber composite,
'I'-joist based floor constructions,
incorporating downlighters

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WF Contract:

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Prepared for:

JCC Lighting Products Ltd

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1 Foreword

This field of application report has been commissioned by JCC Lighting Products Ltd to consider the use of various downlighter designs when recessed into the ceiling soffit of previously tested, loaded, timber 'I'-joist floor constructions.

The report is for National Application and has been written in accordance with the general principles outlined in BS EN 15725: 2010; *Extended application reports on the fire performance of construction products and building elements*.

This field of application (scope) uses established empirical methods of extrapolation and experience of fire testing similar assemblies, in order to extend the scope of application by determining the limits for the designs based on the tested constructions and performances obtained. The scope is an evaluation of the potential fire resistance performance, if the variations specified herein were to be tested in accordance with BS 476: Part 21: 1987 and therefore can neither be considered for a CE marking application nor can the conclusion be used to establish a formal classification against EN13501-2.

This field of application has been written using appropriate test evidence generated at UKAS accredited laboratories, to the relevant test standard. The supporting test evidence has been deemed appropriate to support the manufacturers stated designs and is summarised in section 3.

The scope presented in this report relates to the behaviour of the proposed design variations under the particular conditions of the test; it is not intended to be the sole criterion for considering the potential fire hazard of the assembly in use.

This field of application has been prepared and checked by product assessors with the necessary competence, who subscribe to the principles outlined in the Passive Fire Protection Federation (PFPF) guidelines to undertaking assessments. The aim of the PFPF guidelines is to give confidence to end-users that assessments that exist in the UK are of a satisfactory standard to be used for building control and other purposes.

The PFPF guidelines are produced by the UK Fire Test Study Group (FTSG) an association of the major fire testing laboratories in the UK and are published by the PFPF, the representative body for the passive fire protection industry in the UK.

2 Proposal

The proposal is to consider the performance of various downlighter designs when installed within specified 30 and 60 minute loaded, floor constructions based on timber composite 'I'-joists from Boise Cascade, Louisiana Pacific (Finnforest), and Trus Joist. The floor systems incorporating downlighter units are required to maintain the specified level of performance when tested to the current fire resistance test standard, BS 476: Part 21: 1987 *Fire tests on building materials and structures. Method for determination of the fire resistance of load bearing elements of construction*.

The field of application defined in this report is based on the fire resistance test evidence for specified floor constructions when fitted with specified downlighter designs, which is summarised in section 3. Analysis of specific construction details that require assessment are given within this report against the relevant element of construction, as appropriate.

3 Performance Data

The test evidence summarised below has been generated to support the fire resistance performance of the downlighter designs that are the subject of this field of application.

The tables below summarise the tests supporting this field of application. Each of the tests are then detailed in sections 4, 5 and 6.

3.1 Summary of Full Scale Performance Data

Report Reference	Specimen/product
FER/F00025 (Louisiana-Pacific Europe - owned by Finnforest UK)	30 minutes, 4 x 3m exposed area, loaded floor (1.5kN/m ²), LPI 26 'I'-joists at 600mm centres without downlighters
TE 89137 (Trus Joist® - owned by Weyerhaeuser)	30 minutes, 4 x 3m exposed area, loaded floor (2.0kN/m ²), TJI® 'I'-joists at 600mm centres, without downlighters
FER/F99092 (owned by Boise Cascade Sales Ltd)	30 minutes, 4 x 3m exposed area, loaded floor (1.5kN/m ²), BCI 40S 'I'-joists at 600mm centres, without downlighters
Warres 117647 (Louisiana-Pacific Europe - owned by Finnforest UK)	60 minutes, 4 x 3m exposed area, loaded floor (2.5kN/m ²), LPI 26 'I'-joists at 600mm centres, without downlighters
FER/F99092(owned by Boise Cascade Sales Ltd)	60 minutes, 4 x 3m exposed area, loaded floor (1.5kN/m ²), BCI 45S 'I'-joists at 600mm centres, without downlighters
BRE 232878 (owned by JCC Lighting Ltd)	60 minutes, 4 x 3m exposed area, loaded floor (1.5kN/m ²), TJI® 'I'-joists at 600mm centres, incorporating 9 JCC downlighters

3.2 Summary of Supplementary Performance Data

Report Reference	Specimen/product
FER/F04105 (owned by JCC Lighting Ltd)	30 minutes, 4 x 3m exposed area, loaded floor (1.5kN/m ²), solid joists at 600mm centres, incorporating 6 JCC downlighters
Chilt/FF07001 (owned by JCC Lighting Ltd)	30 minutes, 3.2 x 2.4m exposed area, unloaded floor, TJI®360 'I'-joists at 600mm centres, incorporating 6 JCC downlighters
Chilt/IF07062 (owned by JCC Lighting Ltd)	30 minutes, 1.05 x 1.05m exposed area, unloaded floor, solid joists at 500 centres, incorporating 2 JCC downlighters
Chiltern IF10038 (owned by JCC Lighting Ltd)	30 minutes, 1.05 x 1.05m exposed area, unloaded floor, solid joists at 525 centres, incorporating 2 JCC downlighters
Chilt/IF05037 (owned by JCC Lighting Ltd)	60 minutes, 1.05 x 1.05m exposed area, unloaded floor, solid joists at 525mm centres, incorporating 2 JCC downlighters
Chiltern IF10055 (owned by JCC Lighting Ltd)	60 minutes, 1.05 x 1.05m exposed area, unloaded floor, solid joists at 525 centres, incorporating 1 JCC downlighter
Chiltern IF12049 (owned by JCC Lighting Ltd)	30 minutes, 1.51 x 1.51m exposed area, unloaded floor, with 600 centre joists, incorporating 2 JCC converter plates, each fitted with a JCC downlighter
Chiltern IF12054 (owned by JCC Lighting Ltd)	90 minutes, 1.51 x 1.51m exposed area, unloaded floor, with 450 centre joists, incorporating 2 JCC converter plates, each fitted with a JCC downlighter

3.3 Summary of Control Performance Data

Chilt/IF10026 (owned by Warringtonfire Testing and Certification Ltd)	90 minutes, 1.05 x 1.05m exposed area, unloaded floor, solid joists at 450mm centres, without downlighters
Chilt/IF10057 (owned by Warringtonfire Testing and Certification Ltd)	30 minutes, 1.05 x 1.05m exposed area, unloaded floor, solid joists at 525mm centres, without downlighters

These tests are summarised in the following sections.

Downlighters are specified by their current JCC part numbers. The fire test summaries state the current part number with a reference to the previous part number where relevant.

The heights given for each downlighter are approximate.

The weights given for each downlighter include the weight of the bulb assembly unless otherwise stated.

4 Full Scale Performance Data

4.1 Fire resistance test FER/F00025 – 30 minutes specification

Test Date: 14th March 2000

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd. UKAS No. 1762

Test Sponsor: Louisiana Pacific Europe, now trading as Finnforest UK.

The tested specimen comprised a floor section measuring 4000mm x 3000mm.

The basic construction of the specimen comprised:

- LPI 26 'I'-joists of section 241mm x 37mm with a 10mm OSB web, spaced at 600mm centres.
- Floor decking comprising 2400mm x 600mm x 22mm thick tongue and groove chipboard, fixed with 36mm long steel screws at 230mm centres.
- Exposed ceiling comprising 1 layer of 15mm thick British Gypsum Type 1 Wallboard plasterboard fixed to the joists with 36mm long drywall screws at 230 centres
- All joints were taped and the nail heads filled with a British Gypsum jointing compound.

When tested to BS 476-21:1987, the specimen achieved the following performances:

- Loadbearing capacity - 40 minutes
- Integrity - 40 minutes
- Insulation - 40 minutes

The primary test observation was:

40.21 The floor collapsed and the test was terminated.

Full construction details and fixing arrangements are shown in the test report, which should be referred to where necessary.

4.2 Fire resistance test TE89137 – 30 minutes specification

Test Date: 21st May 1997

Testing Organisation: Loss Prevention Council (BRE) UKAS No. 0578

Test Sponsor: Weyerhaeuser (Trus Joist®).

The tested specimen comprised a floor section measuring 4150mm x 3500mm.

The basic construction of the specimen comprised:

- TJI®/15 SP 'I'-joists of section 241mm x 38mm with a 9.5mm OSB web, spaced at 600mm centres.
- Floor decking comprising 1800mm x 600mm x 22mm thick tongue and groove chipboard, fixed with 68mm long steel screws at 300mm centres.
- Exposed ceiling comprising 1 layer of 15mm thick British Gypsum Type 1 Wallboard plasterboard fixed to the joists with 40mm long galvanised nails at 150mm centres.
- All joints were taped and the nail heads filled with a British Gypsum jointing compound.

When tested to BS 476-21:1987, the specimen achieved the following performances:

- Loadbearing capacity - 36 minutes
- Integrity - 36 minutes
- Insulation - 36 minutes

The primary test observation was:

36.00....No failure was recorded upon termination of the test at 36 minutes at request
of sponsor.

Full construction details and fixing arrangements are shown in the test report, which should be referred to where necessary.

4.3 Fire resistance test FER/F99091 – 30 minutes specification

Test Date: 25th August 1999

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd. UKAS No. 1762

Test Sponsor: Boise Cascade Sales Ltd.

The tested specimen comprised a floor section measuring 4000mm x 3000mm.

The basic construction of the specimen comprised:

- BCI 40S 'I'-joists of section 241mm x 38mm with a 9.5mm OSB web, spaced at 600mm centres.
- Floor decking comprising 2400mm x 600mm x 22mm thick tongue and groove chipboard, fixed with 50mm long steel screws at 290mm centres.
- Exposed ceiling comprising 1 layer of 15mm thick British Gypsum Type 1 Wallboard plasterboard fixed to the joists with 36mm long drywall screws at 230mm centres.
- All joints were taped and the nail heads filled with a British Gypsum jointing compound.

When tested to BS 476-21:1987, the specimen achieved the following performances:

- Loadbearing capacity - 40 minutes
- Integrity - 40 minutes
- Insulation - 40 minutes

The primary test observation was:

40.00 No failure was recorded upon termination of the test at 40 minutes.

Full construction details and fixing arrangements are shown in the test report, which should be referred to where necessary.

4.4 Fire resistance test Warres 117647 – 60 minutes specification

Test Date: 6th April 2001

Testing Organisation: Warrington Fire Research, now trading as Warringtonfire Testing and Certification Ltd. UKAS No. 0249.

Test Sponsor: Louisiana Pacific Europe, now trading as Finnforest UK.

The tested specimen comprised a floor section measuring 4000mm x 3000mm.

The basic construction of the specimen comprised:

- LPI 26 'I'-joists of section 241mm x 37mm with a 10mm OSB web, spaced at 600mm centres.
- Floor decking comprising 2400mm x 600mm x 18mm thick tongue and groove chipboard, fixed with 50mm long steel screws at 290mm centres.
- Exposed ceiling comprising 2 layers of 12.5mm thick British Fireline plasterboard fixed to the joists with 32mm long drywall screws at 230 centres on the inner layer and 50mm long drywall screws at 250mm centres on the outer layer.
- All joints were taped and the nail heads filled with a British Gypsum jointing compound.

When tested to BS 476-21:1987, the specimen achieved the following performances:

- Loadbearing capacity - 60 minutes
- Integrity - 60 minutes
- Insulation - 60 minutes

The primary test observation was:

60.00 No failure was recorded upon termination of the test at 60 minutes.

Full construction details and fixing arrangements are shown in the test report, which should be referred to where necessary.

4.5 Fire resistance test FER/F99092 – 60 minutes specification

Test Date: 27th August 1999

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd. UKAS No. 1762

Test Sponsor: Boise Cascade Ltd.

The tested specimen comprised a floor section measuring 4000mm x 3000mm.

The basic construction of the specimen comprised:

- BCI 45S 'I'-joists of section 241mm x 45mm with a 9.5mm web, spaced at 600mm centres.
- Floor decking comprising 2400mm x 600mm x 22mm thick tongue and groove chipboard, fixed with 50mm long steel screws at 290mm centres.
- Exposed ceiling comprising 2 layer of 12.5mm thick British Fireline plasterboard fixed to the joists with 36mm long drywall screws at 230mm centres on the inner layer and 50mm long drywall screws at 230mm centres on the outer layer.
- All joints were taped and the nail heads filled with a British Gypsum jointing compound.

When tested to BS 476-21:1987, the specimen achieved the following performances:

- Loadbearing capacity - 62 minutes
- Integrity - 62 minutes
- Insulation - 62 minutes

The primary test observation was:

62.37 Collapse of the specimen constituting integrity, insulation and loadbearing failure. Test terminated.

Full construction details and fixing arrangements are shown in the test report, which should be referred to where necessary.

4.6 Fire Resistance Test BRE 232878 – 60 minutes specification for JCC

Test Date: 18th January 2007

Testing Organisation: BRE. UKAS No. 0578

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section measuring 4200mm x 3000mm. The construction, which is summarised below, was generally constructed as specified by report referenced C014011 in the 2001 edition of the British Gypsum White Book.

The basic construction of the specimen comprised:

- TJI@360 'I'-joists of section 241mm x 58mm with a 9mm OSB web, spaced at 600mm centres.
- Floor decking comprising 2400mm x 600mm x 22mm thick tongue and groove chipboard, fixed with 50mm long steel screws at 300mm centres.
- Exposed ceiling comprising 2 layers of 12.5mm thick British Gypsum Fireline plasterboard fixed to the joists with 42mm long inner layer, 52mm long outer layer, drywall screws at 300mm centres.
- All joints taped and the nail heads filled with a British Gypsum jointing compound.
- The floor was fitted with 9 No. JCC lighting downlight units (JC94213) as specified in the following table, with 6 No. (specimens A-C and G-I) fitted centrally between the joists and 3 No. (specimens D-F) fitted 50mm from the edge of the joists:

Specimen Nos.	Type	Voltage	Cut out (mm)	Model	Height (mm)	Weight (kg)
A-I	IP65	12	68	JC94113 ¹	130	0.253

¹ Previous model number: JC94213

When tested to BS 476-21:1987, the specimen achieved the following performances:

- Loadbearing capacity - 75 minutes
- Integrity - 76 minutes
- Insulation - 76 minutes

The primary test observations were:

- 40.00 Plasterboard joints opening – nominally 10mm wide –exposed layer bowing down between fixings
- 48.00 Glass is drooping from downlighter F.
- 55.00 Flames issue from internal apertures of all downlights.
- 59.30 Initial loss of exposed plasterboard in central location revealing open joints in second layer with flaming from joints indicating lower joist flange combusting.
- 63.00 Further loss of exposed plasterboard.
- 64.00 Downlighter E .falling away from position and further loss of exposed boards
- 75.00 Loadbearing capacity failure.
- 76.00 Integrity failure – flames issue from openings in chipboard flooring.
- 77.00 Floor collapses and the test is terminated.

Full construction details and fixing arrangements are shown in the test report, which should be referred to where necessary.

5 JCC Supplementary Performance Data

5.1 Fire Resistance Test RF04105 – 30 minutes specification solid timber joists

Test Date: 3rd November 2004

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd. UKAS No. 1762

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section measuring 4200mm x 3000mm. The construction, which is summarised below, was generally constructed as specified by report referenced C0106002 in the 2001 edition of the British Gypsum White Book.

The basic construction of the specimen comprised:

- Grade C24 solid softwood joists of section 225mm x 38mm, spaced at 600mm centres.
- Floor decking comprising 2400mm x 600mm x 22mm thick tongue and groove chipboard, fixed with 32mm long steel screws at 150mm centres.
- Exposed ceiling comprising 1 layer of 12.5mm thick British Gypsum wallboard plasterboard, individually fixed to the joists with 36mm long steel drywall screws inserted at 230mm centres.
- 38 x 38mm softwood noggins at board joints
- Joints were taped and screw heads filled with British Gypsum jointing compound.

JCC downlighter units were fixed into the plasterboard ceiling as summarised in the following table:

Specimen No.	Type	Voltage	Cut out (Ø mm)	Model	Height (mm)	Weight (kg)
1	IP65	12	65	JC94203 ¹	130	0.253
2	IP65	240	65	JC94110 ²	130	0.285
3	IP65	12	65	JC04203 ¹	130	0.253
4	STD	240	65	JC94113 ³	110	0.291
5	STD	12	65	JC94211 ⁴	110	0.261
6	STD	240	65	JC94113 ³	110	0.291

Previous model numbers: ¹ JC94003; ² JC94210; ³ JC94213; ⁴ JC94001.

When tested to BS 476-21:1987, the specimen achieved the following performances:

- Loadbearing capacity - 31 minutes
- Integrity - 31 minutes
- Insulation - 31 minutes

The primary test observations were:

20.40 Ceiling boards are beginning to crack around the light positions and along the centre, from back to front.

22.05 The ceiling boards are falling away.

31.00 No failure was recorded upon termination of the test at 31 minutes.

Full construction details and fixing arrangements are shown in the test report, which should be referred to where necessary.

5.2 Fire resistance test Chilt/FF07001 – 30 minutes specification

Test Date: 2007

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd. UKAS No. 1762

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section measuring 3200mm x 2400mm.

The basic construction of the specimen comprised:

- TJI@360 'I'-joists of section 241mm x 58mm with a 9mm OSB web, spaced at 600mm centres.
- Floor decking comprising 1800mm x 600mm x 22mm thick tongue and groove chipboard, fixed with 50mm long steel screws at 230mm centres.
- Exposed ceiling comprising 1 layer of 15mm thick Knauf Type 1 Wallboard plasterboard fixed to the joists with 42mm long drywall screws at 230mm centres.
- All joints were taped and the nail heads filled with a British Gypsum jointing compound.
- The floor was fitted with 6 No. JCC lighting downlight units (JC94213), as specified in the following table, with 4 No. (specimens 1, 3, 4 and 6) fitted centrally between the joists and 2 No. (specimens 2 and 5) fitted 50mm from the edge of the joists:

Specimen Nos.	Type	Voltage	Cut out (mm)	Model	Height (mm)	Weight (kg)
1-6	IP65	12	68	JC94113 ¹	130	0.253

¹ Previously: JC94213.

When tested to the principles of BS 476-21:1987 the specimen achieved the following performances:

- Integrity - 33 minutes
- Insulation - 33 minutes

The primary test observation was:

33.00 No failure was recorded upon termination of the test at 33minutes.

Full construction details and fixing arrangements are shown in the test report, which should be referred to where necessary

5.3 Indicative Fire Resistance Test IF07062 – 30 minutes specification

Test Date: 22nd August 2007

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section with the exposed area measuring 1050mm long x 1050mm wide x 240mm deep. The basic construction of the specimen comprised:

- Grade C16 solid softwood joists of section 225mm x 47mm, spaced at 500mm centres.
- Floor decking comprising 18mm thick tongue and groove chipboard, fixed with 32mm long steel screws at 150mm centres.
- Exposed ceiling comprising 1 layer of 15mm thick Knauf Wallboard plasterboard, fixed to the joists with 42mm long steel drywall screws inserted at 230mm centres.
- Joints were taped and screw heads filled with jointing compound.
- Full height noggins were used to make four discrete voids, one of which was used as a control and two of which each had a single downlighter fitting.

Two JCC lighting downlighters were fixed into the plasterboard ceiling as follows:

Specimen No.	Type	Voltage	Cut out (Ø mm)	Model	Height (mm)	Weight (kg)
1	GU10	240 (tilt)	86	JC94006	83	0.359
2	GU10	12 (eyeball)	83	JC94007	83	0.349

When tested to the principles of BS 476: Part 20: 1987, the specimen achieved the following performance:

- Integrity - 49 minutes.

The primary test observations were:

30.00 Both downlighters are still in position.

49.00 The plasterboard has fallen from all the voids. No failure was recorded upon termination of the test at 49 minutes.

5.4 Indicative Fire Resistance Test IF10038 – 30 minutes specification

Test Date: 12th May 2010

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd. UKAS No. 1762

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section with the exposed area measuring 1050mm long x 1050mm wide x 282 deep. The basic construction of the specimen comprised:

- Grade C16 solid softwood joists of section 245mm x 50mm, spaced at 525mm centres.
- Floor decking comprising 22mm thick tongue and groove chipboard, fixed with 40mm long steel screws at 210 - 230mm centres.
- Exposed ceiling comprising a single layer of 15mm thick British Gypsum Wallboard plasterboard, fixed to the joists with 42mm long steel drywall screws inserted at 210 - 230mm centres.
- Joints were taped and screw heads filled with British Gypsum jointing compound.
- Full height noggins were used to make four discrete voids, one of which was used as a control and two of which each had a single downlighter fitting.

Two JCC lighting downlighters were fixed into the plasterboard ceiling as follows:

Specimen No.	Type	Voltage	Cut out (Ø mm)	Model	Height (mm)	Weight (kg)
1	GU10	240	64	JC94170	101	0.286
2	GU10	240	64	JC94170	101	0.286

When tested to the principles of BS 476: Part 20: 1987, the specimen achieved the following performance:

- Integrity - 30 minutes.

The primary test observations were:

21.11 Cracks are appearing in the plasterboard.

24.36 The right hand side of the plasterboard has fallen away from Void C.

25.55 The left hand side boards have fallen away. No failure was recorded upon termination of the test at 30 minutes.

5.5 Indicative Fire Resistance Test IF05037 – 60 minutes specification

Test Date: 13th April 2005

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section with the exposed area measuring 1050mm x 1050mm. The basic construction of the specimen comprised:

- Grade C24 solid softwood joists of section 225mm x 47mm, spaced at 600mm centres.
- Floor decking comprising 18mm thick tongue and groove chipboard, fixed with 32mm long steel screws at 150mm centres.
- Exposed ceiling comprising 2 layers of 15mm thick British Gypsum Wallboard plasterboard, the first layer fixed to the joists with 41mm long steel drywall screws inserted at 230mm centres and the second layer was fixed with 61mm drywall screws at 230mm centres.
- Joints were taped and screw heads filled with British Gypsum jointing compound.

Two JCC lighting downlighters were fixed into the plasterboard ceiling as follows:

Specimen No.	Type	Voltage	Cut out (Ø mm)	Model	Height (mm)	Weight (kg)
1	STD	240 (tilt)	86	JC94114 ¹	125	0.405
2	STD	12 (eyeball)	86	JC94009	115	0.399

¹ Previously JC94214.

When tested to the principles of BS 476: Part 20: 1987, the specimen achieved the following performances:

- Integrity - 62 minutes

The primary test observations were:

26.20 Ceiling boards start to crack.

53.02 Second layer of ceiling boards start to fall.

62.00 No failure was recorded upon termination of the test at 62 minutes.

5.6 Indicative Fire Resistance Test IF10055 – 60 minutes specification

Test Date: 5th September 2010

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section with the exposed area measuring 1050mm long x 1050mm wide x 297mm deep. The basic construction of the specimen comprised:

- Grade C24 solid softwood joists of section 225mm x 45mm, at 525mm centres.
- Floor decking comprising 22mm thick tongue and groove chipboard, fixed with 40mm long steel screws at 230mm centres.
- Exposed ceiling comprising 2 layers of 15mm thick British Gypsum Wallboard plasterboard, the first layer fixed to the joists with 42mm long steel drywall screws inserted at 230mm centres and the second layer was fixed with 60mm drywall screws at 230mm centres.
- Joints were taped and screw heads filled with British Gypsum jointing compound.
- Full height noggins were used to make four discrete voids, one of which was used as a control and two of which each had a single downlighter fitting.

Two JCC lighting downlighters were fixed into the plasterboard ceiling as follows:

Specimen No.	Type	Voltage	Cut out (Ø mm)	Model	Height (mm)	Weight (kg)
1	GU10	240	63	JC94170	90	0.337
2	GU10	240	72	JC94171	85	0.357

When tested to the principles of BS 476: Part 20: 1987, the specimen achieved the following performance:

- Integrity - 60 minutes.

The primary test observations were:

- 23.43 A crack has appearing along the length of the right hand plasterboard, 100mm from the centre join.
- 29.31 The glass has fallen away from specimen 2.
- 30.47 The left hand side has a large crack appearing in the board.
- 32.55 Approximately 50% of the first layer on the right hand side has fallen away. The board around light (specimen 1) is still intact.
- 36.35 Approximately 50% of the first layer on the left hand side has fallen away. The board around light (specimen 1) is still intact.
- 38.55 The majority of the first layer of board has fallen away from specimen 2.
- 40.21 A hairline crack is starting to appear on the second layer.
- 51.17 The right hand side a large crack has appeared with part of the board sagging down exposing the void.
- 52.52 Downlighter 1 has fallen away.
- 53.26 Downlighter 2 has fallen away.
- 60.00 No failure was recorded upon termination of the test at 60 minutes.

5.7 Indicative Fire Resistance Test IF12049 – 30 minutes specification

Test Date: 9th September 2012

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section with the exposed area measuring 2000mm long x 2000mm wide x 258 deep. The basic construction comprised:

- Grade C24 softwood joists of section 225mm x 47mm, spaced at 600mm centres.
- Floor decking comprising 18mm thick tongue and groove chipboard, fixed with 50mm long steel screws at 300mm centres.
- Exposed ceiling (soffit) comprising a single layer of 15mm thick British Gypsum Wallboard plasterboard, fixed to the joists with 41mm long steel drywall screws inserted at 230mm centres.
- Joints were taped and screw heads filled with British Gypsum jointing compound.
- Full height noggins were used to make four discrete voids, A-D, of which B was used as a control and C and D each had a single downlighter fitting.

Two downlight converter plates, manufacturers reference JC94180BN, were fitted to the plasterboard over 80mm Ø and 135mm Ø cut out apertures. The converter plate comprised a 170mm outside diameter decorative cast aluminium brushed nickel finished plate, fitted over a 137mm outside diameter steel plate with an 8mm high upstand around the centre aperture. A rubber gasket surrounds the edge of the steel plate with an outside diameter of 142mm. A 22mm wide x 1mm thick graphite based intumescent disc was fitted on the unexposed face.

Two JCC lighting downlighters were fitted into the converter plates as follows:

Specimen No.	Type	Voltage	Cut out (Ø mm)	Model	Height (mm)	Weight (kg)
C	LED7 IP65	240	135	JC94174	101	0.286 ²
D	LED7 IP65	240	80 ¹	JC94174	101	0.286 ²

¹ the 80 cut out was slotted at two points to allow fitting of the retaining clamp screws

² the combined weight of the downlight and converter plate was 572gm

When tested to the principles of BS 476: Part 20: 1987, the specimen achieved the following performance:

- Integrity - 30 minutes.

The primary test observations were:

- 05.20 Both voids C and D - the bulbs are starting to melt and fall out.
 - 26.00 Void C, a section of board has fallen away
 - 27.30 Void D, a section of board has fallen away taking the light unit with it.
 - 29.00 All boards have now fallen away.
 - 30.00 Void C and D thermocouple temperatures were between 198°C less and 103°C more than the thermocouple temperatures of control void B
 - 30.20 No failure was recorded upon termination of the test at 30 minutes.
- Void C and D central joist and central noggin char rates were within ± 1mm of control void B.

5.8 Indicative Fire Resistance Test IF12054 – 90 minutes specification

Test Date: 8th October 2012

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

Test Sponsor: JCC Lighting Ltd.

The tested specimen comprised a floor section with the exposed area measuring 2000mm long x 2000mm wide x 268 deep. The basic construction of the specimen comprised:

- Grade C24 softwood joists of section 225mm x 47mm, spaced at 450mm centres.
- Floor decking comprising 18mm thick tongue and groove chipboard, fixed with 40mm long steel screws at 300mm centres.
- Exposed ceiling (soffit) comprising a double layer of 15mm thick British Gypsum Fireline plasterboard, fixed to the joists with 41mm long (1st layer) and 60mm long (2nd layer) steel drywall screws inserted at 230mm centres.
- Joints were taped and screw heads filled with British Gypsum jointing compound.
- Full height noggins were used to make six discrete voids, A-F, of which F was used as a control and A and C each had a single downlighter fitting.

Two downlight converter plates, manufacturers reference JC94180BN, were fitted to the plasterboard over 80mm Ø and 135mm Ø cut out apertures. The converter plate comprised a 170mm outside diameter decorative cast aluminium brushed nickel finished plate, fitted over a 137mm outside diameter steel plate with an 8mm high upstand around the centre aperture. A rubber gasket surrounds the edge of the steel plate that has an outside diameter of 142mm

Two JCC lighting downlighters were fitted into the converter plates as follows:

Specimen No.	Type	Voltage	Cut out (Ø mm)	Model	Height (mm)	Weight (kg)
A	LED7 IP65	240	80 ¹	JC94174	101	0.286 ²
C	LED7 IP65	240	135	JC94174	101	0.286 ²

¹ the 80 cut out was slotted at two points to allow fitting of the retaining clamp screws and chamfered back 12mm on the inner face around circa ¼ of the cut out circumference.

² the combined weight of the downlight and converter plate was 572gm.

When tested to the principles of BS 476: Part 20: 1987, the specimen achieved the following performance:

- Integrity - 90 minutes.

The primary test observations were:

05.00 The glass/LED bulbs have melted and fallen out of both fittings.

23.40 Void C, the bezel cover plate has fallen away.

24.30 Void A, the bezel cover plate has fallen away.

78.00 The first board layer is starting to distort down.

81.10 The first board layer has dropped by circa 15-20mm at the board edges.

90.00 Void A and C thermocouple temperatures were between 55°C less and 125°C more than the thermocouple temperatures of control void F.

Void A and C central joist char rates were within - 1 to + 2mm of control void F.

6 Control Performance Data

Note: The 30 and 90 minute tests summarised below were conducted as a part of research by Chiltern International Fire Limited (now owned by Warringtonfire) to determine, in terms of board behaviour, board fall characteristics, joist temperatures and void temperatures, the validity of comparisons between indicative, and medium or full scale tests and between pre and post 2009 indicative tests, as discussed in section 7.4.

6.1 Indicative Fire Resistance Control Test IF10057 – 30 minutes specification

Test Date: 13th July 2010

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

Test Sponsor: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

The tested specimen comprised a floor section with the exposed area measuring 1050mm long x 1050mm wide x 282mm deep. The basic construction of the specimen comprised:

- Grade C24 solid softwood joists of section 225mm x 45mm, spaced at 525mm centres.
- Floor decking comprising 22mm thick tongue and groove chipboard, fixed with 40mm long wood screws at 230mm centres.
- Exposed ceiling comprising 1 layer of 15mm thick British Gypsum Wallboard plasterboard, fixed to the joists with 42mm long timber drywall steel screws inserted at 230mm centres.
- Full height noggins were used to make four discrete voids: A to D.
- Joints were taped and screw heads filled with British Gypsum jointing compound.
- No downlighters were fitted.

When tested to the principles of BS 476: Part 20: 1987, the specimen achieved the following performance:

- Integrity - 31 minutes.

The primary test observations were:

21.27 Cracks are appearing across the plasterboards.

26.32 The right hand side of the board and the back left hand side corner of the board has cracked and is slumping.

27.26 The left hand side board has a crack across the middle and the front half is slumping.

29.15 The right hand side board has fallen away.

31.01 No failure was recorded upon termination of the test at 31 minutes.

6.2 Indicative Fire Resistance Control Test IF10026 – 90 minutes specification

Test Date: 11th March 2010

Testing Organisation: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

Test Sponsor: Chiltern International Fire Ltd, now trading as Warringtonfire Testing and Certification Ltd.

The tested specimen comprised a floor section with the exposed area measuring 1050mm long x 1050mm wide x 277mm deep. The basic construction of the specimen comprised:

- Grade C24 solid softwood joists of section 225mm x 45mm, spaced at 450mm centres.
- Floor decking comprising 22mm thick tongue and groove chipboard, fixed with 40mm long wood screws at 230mm centres.
- Exposed ceiling comprising 2 layers of 15mm thick British Gypsum Fireline plasterboard, the first layer fixed to the joists with 42mm long steel drywall screws inserted at 230mm centres and the second layer was fixed with 60mm drywall screws at 230mm centres.
- Full height noggins were used to make four discrete voids.
- Joints were taped and screw heads filled with British Gypsum jointing compound.
- No downlighters were fitted.

When tested to the principles of BS 476: Part 20: 1987, the specimen achieved the following performance:

- Integrity - 96 minutes.

The primary test observations were:

38.00 Joints between the boards are opening.

59.00 Left hand side, the first layer of plasterboard has fallen away. As the plasterboard shrinks, the screws tear through the plasterboard at the join.

81.00 Right hand side, the first layer of plasterboard has fallen away.

96.00 No failure was recorded upon termination of the test at 96 minutes.

7 Analysis

7.1 General

Experience of testing 'I'-joists based floors demonstrates that the critical point is the performance of the joist web. The OSB webs within the joist types covered in this assessment are in the range of 9-10mm in thickness. Once the web is compromised then structural failure occurs shortly afterwards. Therefore, it is critical that the plasterboard soffit (ceiling) stays in position to within at least a few minutes of the required fire performance duration.

Consequently, this assessment is based on determining that the conditions within the floor construction are not significantly more onerous with the inclusion of the downlight types outlined in Section 8.

7.2 Tested 30 minute floor constructions

The temperature of the 'I'-joists web was monitored in each of the 30 minute tests outlined. The results are summarised below:

Criteria	FF07001 downlight adjacent to joist	FF07001 downlight remote from joist	RF99091 downlights not fitted	TE 89137 downlights not fitted	RF00025 downlights not fitted
Web temp @ 25 mins	87-91	110-128	94-161	92	93-100
Web temp @ 30 mins	141-214	174-361	103-220	103	139-141
Plasterboard falls	30 mins		36 mins	36 mins	34 mins

The results demonstrate that whilst the plasterboard fell earlier on the specimen with downlights fitted this still did not occur prior to 30 mins. Furthermore, at 25 minutes the temperatures in the areas where the downlights were fitted are comparable, and in some cases lower, than the unpenetrated ceilings; even at 30 minutes the temperatures are still comparable. Based on the temperature information and the fact that the plasterboard fall observed always occurred from 30 minutes onwards it is our opinion that providing floor constructions meet either all the relevant provisos contained within section 9 of this report, or the manufacturers specifications if higher, it would be acceptable to fit the downlights listed in section 8 within the 30 minute 'I'-joist floor constructions currently specified by Boise Cascade, Finnforest and Trus Joist®.

7.3 Tested 60 minute floor constructions

The temperature of the 'I'-joist web was monitored in each of the 60 minute tests outlined. The results are summarised below:

	BRE 232878 downlight adjacent to joist	BRE 232878 downlight remote from joist	Warres 117647 downlights not fitted	RF99092 downlights not fitted
Web temp @ 55 mins	125-150°C	125°C	126-144°C	285-292°C
Web temp @ 60 mins	145-200°C	175°C	426-581°C	334-367°C
2 nd Layer Plasterboard falls	64 mins +	64 mins +	57 mins	57 mins

From the performance shown above it can be seen that the critical web temperatures in the test fitted with downlights were equivalent to or lower than those experienced in the other tests. Observations of the testing were made that indicated that local to the downlights the boards took longer to fall than in other areas.

It has been proposed that the rim and springs within the downlights might provide some nominal additional support to the plasterboard at these locations.

While open backed downlights were not tested to 60 minutes they have been shown by test not to allow significantly more heat passage providing they have a fire rated glass lens.

Based on the temperature information and the slower rate of plasterboard fall observed it is our opinion that it is our opinion that providing floor constructions meet either all the relevant provisos contained within section 9 of this report, or the manufacturers specifications if higher, it would be acceptable to fit the downlights listed in section 8 within the 60 minute 'I'-joist floor constructions currently specified by Boise Cascade, Finnforest and Trus Joist®.

7.4 Methodology for tested indicative floor constructions and use of test data

Until 2009, the Warringtonfire criterion for a successful indicative downlighter test was that the downlighters should remain in position throughout the required test duration, 30, 60 or 90 minutes.

However, following an analysis of observations of floors fitted on our small scale (indicative) furnace, and with the intention of improving the validity of comparing small scale test data against full scale test data, we changed the construction of small scale floor test samples to include a through joint around the perimeter of the exposed ceiling soffit area. The aim of this change is that board fall would more closely match that seen in full scale tests.

This change resulted in earlier fall times than had previously been observed and therefore, to prove the validity of the new designs, Warringtonfire commissioned a series of control tests using the same new small scale floor construction but without downlighters fitted. The key control test results are shown in indicative tests IF10026 and IF10057, summarised in sections 6.1 and 6.2 above.

Following this change of design, the new criterion for a successful test is that as well as achieving the required integrity performance for the floor, 30 60 or 90 minutes, as appropriate, the indicative tests for new downlighters (in this case IF10038 and IF10055) must be comparable to the relevant control tests.

For this assessment, in addition to the full scale tests a number of indicative tests were conducted to evaluate the same and additional downlighters fitted to various floor constructions appropriate to 30 and 60 minutes.

A comparison between the Warringtonfire indicative control tests, the indicative downlighter tests, and the full scale tests, in terms of void temperatures, plasterboard ceiling cracking and falling times, and eventual failure times, have enabled us to verify the validity of comparative results within certain specified parameters.

Based on this analysis we are able to assess the specified tested and non-tested downlighters against weight and design parameters for use in 30 and 60 minutes floor constructions, as stated in the following sections, providing both the specific and general caveats summarised in section 9, are all complied with.

8 Assessed Downlighters

8.1 General

Additional non-tested downlighter units in three categories have been requested by the client to be considered within this assessment. Based on the analysis in section 7 of this report we are confident that assessment is acceptable, as described in sections 8.2, 8.3 and 8.4 below, providing the specified caveats are followed.

Assessment is based on an analysis of comparable designs to the tested downlighters in terms of weight, design details and dimensions, retention method, and intumescent specification.

Notes:

- Downlighters are specified by their current JCC part numbers. (The fire test summaries and tables also include, where relevant, a reference to the previous part numbers.)
- The heights given for each downlighter are approximate.
- Unless otherwise stated, the weights given for each downlighter include the weight of the bulb.

8.2 Assessed Downlighters

The following table indicates their relevant details:

Downlighter model	Cut out (Ø mm)	Height (mm)	Weight (kg)
JC94005 ¹	62	Nominal 35 (open back)	0.259
JC94211*	61	81	0.259
JC94212**	70	81	0.303
JC94113***	61	81	0.305
JC94114#	70	81	0.343
JC94017	61	81	0.255
JC94018	70	81	0.293
JC94019 ¹	60	Nominal 35 (open back)	0.259

¹ Lamp apertures of open backed designs are all protected with fire rated borosilicate glass lenses.

* Old reference: JC94011; ** Old ref: JC94012; *** Old ref: JC94213; # Old ref: JC94214.

Where not directly fire tested, samples of the above have been provided and Warringtonfire confirm that their size, weight, material and retention method are all comparable to those tested and are therefore acceptable for 30 and 60 minutes performance, subject to the provisos detailed in section 9.

8.3 Assessed New Fireguard Models

A range of new Fireguard downlighter units have been requested by the client to be considered within this assessment.

The following table indicates their relevant details:

Model	Cut out (Ø mm)	Height (mm)	Weight (kg)
JC94028*	74	110*	0.345
JC94029*	74	110*	0.350
JC94032	72	114	0.345
JC94034	74	114	0.310
JC94035	74	118	0.350
JC94036	74	118	0.350
JC94041	90	110	0.375 (0.430 ¹)

¹ Including the bulb

* Lamp apertures of open-backed designs are all protected with fire rated, borosilicate glass, lenses.

The seven models shown above form part of a range of new Fireguard designs.

Examination of these models reveals a new construction. In earlier models the steel can and visible flange were a single element in which a circular intumescent gasket, fitted into a circular rubber gasket, was contained within the visible flange of the can.

In the new range, with the exception of JC94041, there is a two part construction in which the circular intumescent gasket sits above the non-visible integral flange of the steel can. The non-visible integral flange and intumescent gasket both fit into a circular rubber gasket contained within a separate, visible, steel flange and socket. The visible steel flange and socket (which will not melt under fire conditions for the assessed performance ratings) screw into the steel can using a quarter turn twist fitting (details are held on file by Warringtonfire).

We are confident that the separate visible flange and socket, if correctly fitted, will not be able to come loose during a fire. However, even in the absence of the visible flange, the non-visible integral flange of the can, in combination with the steel fixing clips, will still function to hold the can of the downlighter in position. Therefore, we are confident that the new construction will perform in the same manner as the tested downlighters and will be acceptable for 30 and 60 minutes performance, subject to the provisos detailed in section 9.

In the case of JC94041 the steel can does not incorporate an integral flange but the visible steel flange and socket (into which the intumescent and rubber gaskets are fitted) and which screw into the steel can, are designed to be non-detachable.

8.3.1 30, and 60 Minutes Performance

Although not directly fire tested, Warringtonfire have analysed samples of the downlighters referenced in 8.3 above, and confirm that their size, weight, material, and retention method, are all comparable to those tested, and are therefore acceptable for 30 and 60 minutes performance, subject to the provisos detailed in section 9.

8.4 New LED 7 Fireguard Range

A range of new LED 7 Fireguard downlighter units have been requested to be considered within this assessment. The following table indicates their relevant details:

Downlighter model	Cut out (Ø mm)	Height (mm)	Weight (kg)
JC94172	71	105	0.361
JC94173	71	112	0.361
JC94174	71	112	0.361
JC94175	71	112	0.361
JC94181	85	106	0.315 (0.440 ¹)

¹ Including the bulb.

8.4.1 30 and 60 Minutes Performance

Although not directly fire tested, a destructive examination demonstrates that the key elements of the new LED 7 Fireguard range of downlighters in terms of construction, intumescent specification, and method of retention within a ceiling, are all essentially as tested in the primary full scale tests.

However, the new LED 7 downlighters are heavier than those originally tested and, analytical weighing shows that this is primarily due to the outer flange and integral LED module. Testing of the outer flange by exposure to fire, demonstrates that this outer flange will begin to melt at a temperature of approximately 620°C, confirming it as a cast aluminium alloy. Analysis of previously conducted tests shows that this melting will result in the outer flange/LED module falling out within the first 10-25 minutes of a fire test. Once the outer flange/LED module has fallen, the weight of the remaining downlighter elements will be comparable to those originally tested. Warringtonfire are therefore confident the downlighters will not contribute to a premature fall of the ceiling board (or boards).

However, once the outer flange/LED module melts and falls away, retention of the steel can is maintained by the spring clips holding the steel flange of the can against the ceiling board(s). It is therefore essential that the ceiling board cut out size is of a small enough diameter to allow the steel flange of the can to be successfully held against the ceiling boards. Based on the cut out diameters used for the original testing, it is the view of Warringtonfire that the ceiling cut out should always be at least 5mm less than the can flange diameter. Therefore, our caveat to assessment of these lights will be the requirement that installation instructions show a cut out diameter no greater than 5mm less than the can flange diameter.

This analysis is confirmed by the testing conducted in IF12049 and IF12054 of a combination of downlight JC94174 with converter plate JC94180BN. These tests demonstrated that in both a single soffit layer 30 minute test and a double soffit layer 90 minute test that the LED modules melted and fell out within the first 5-10 minutes and the outer alloy flanges melting within the first 20-25 minutes. Additionally, the board fall times, joist charring and void temperatures were comparable with both the indicative control tests and their own control voids. There was no evidence that the converter plate in combination with the downlight significantly affected performance when used with either an 80mm Ø or 135mm Ø cut out in either 30 or 60 minutes floor constructions.

Based on this analysis and test evidence Warringtonfire are therefore confident that providing the fitting caveat described in this section is complied with, the LED7 range of downlighters referenced in section 8.4 above, will maintain the original loadbearing capacity of the assessed floor constructions, for 30 and 60 minutes, subject to the provisos detailed in section 9 of this report.

Additionally, other than downlighter JC94181, Warringtonfire assess the use of the LED7 range when used either with or without converter plate JC94180BN for 30 and 60 minutes performance, subject to the provisos detailed in section 9 of this report.

8.5 New LED3 Fireguard Range

A new range of LED3 Fireguard downlighter units have been requested to be considered within this assessment. The following table indicates their relevant details:

Downlighter model	Cut out (Ø mm)	Height (mm)	Weight (kg)
JC94198	71/80	85	0.314
JC94199	71/80	85	0.314

Although not directly fire tested, a destructive examination demonstrates that the key elements of the new LED3 Fireguard range of downlighters in terms of construction, intumescent specification, and method of retention within a ceiling, are all essentially as for the assessed LED7 downlights. However, the new LED3 range are smaller and not as heavy as the LED7 range and can therefore be considered as less onerous.

However, our caveat to assessment of these lights will be the requirement, as discussed in 8.4.1, that installation instructions show a cut out diameter no greater than 5mm less than the can flange diameter.

Based on this analysis and the supporting test evidence Warringtonfire are therefore confident that providing the fitting caveat described above is complied with, the LED3 range of downlighters referenced above, will maintain the original loadbearing capacity of the assessed floor constructions, for 30 and 60 minutes, subject to the provisos detailed in section 9 of this report.

8.6 New LED10 Fireguard Range

A new range of FGLED10 Fireguard downlighter units have been requested to be considered within this assessment. The following table indicates their relevant details:

Downlighter model	Cut out (Ø mm)	Height (mm)	Weight (kg)
JC94501 ¹	72/81	112	0.400 ²
JC94502 ¹	72/81	112	0.400 ²
JC94503 ¹	72/81	112	0.400 ²
JC94507 ¹	72/81	112	0.400 ²

¹ Dimmable models

² Weight Including integral LED bulb

JC94501 (cool white light)

JC94502 (emergency light)

JC94503 (warm white light)

JC94507 (anti-glare light)

Models are available with bezels finished as Brushed Nickel (BN), Chrome (CH) or White (WH).

Although not directly fire tested, examination demonstrates that the key elements of the new FGLED10 Fireguard range of downlighters in terms of construction, intumescent specification, and method of retention within a ceiling, are all essentially as for the assessed FGLED7 downlights. The weights of the new FGLED10 are comparable to that of the assessed JC94181 and include the integral LED module. As in the analysis in section 8.4.1, the LED module can be expected to melt and fall out within the first 10 to 25 minutes resulting in a weight similar to those originally tested. They can therefore be considered as no more onerous than the tested downlights.

Our caveat to assessment of these lights will be the requirement, as discussed in 8.4.1, that installation instructions show a cut out diameter no greater than 5mm less than the can flange diameter.

Based on this analysis and the supporting test evidence Warringtonfire are therefore confident that providing the fitting caveat for cut out diameters is complied with, the FGLED10 range of downlighters referenced above, will maintain the original loadbearing capacity of the assessed floor constructions, for 30 and 60 minutes, subject to the provisos detailed in section 9.1 of this report.

8.7 New LED Hybrid9 Fireguard Range

A new range of FGLED Hybrid 9 Fireguard downlighter units have been requested to be considered within this assessment. The following table indicates their relevant details:

Downlighter model	Cut out (Ø mm)	Height (mm)	Weight (kg)
JC94901 ¹	74/76	101	0.400 ²
JC94903 ¹	74/76	101	0.400 ²

¹ Dimmable models

² Weight Including integral LED bulb

JC94501 (cool white light)

JC94503 (warm white light)

Models are available with bezels finished as Brushed Nickel (BN), Chrome (CH) or White (WH).

Although not directly fire tested, examination demonstrates that the key elements of the new LED Hybrid9 Fireguard range of downlighters in terms of construction, intumescent specification, and method of retention within a ceiling, are all essentially as for the assessed FGLED7 downlights. The difference with the LED Hybrid 9 is that there is a higher can but no external driver resulting in an overall height similar to the assessed FGLED6. The weights of the new LED Hybrid 9 are comparable to that of the assessed JC94181 and include the integral LED module. As in the analysis in section 8.4.1, the LED module can be expected to melt and fall out within the first 10 to 25 minutes resulting in a weight similar to those originally tested. They can therefore be considered as no more onerous than the tested downlights.

Our caveat to assessment of these lights will be the requirement, as discussed in 8.4.1, that installation instructions show a cut out diameter no greater than 5mm less than the can flange diameter.

Based on this analysis and the supporting test evidence Warringtonfire are therefore confident that providing the fitting caveat for cut out diameters is complied with, the LEDHybrid9 range of downlighters referenced above, will maintain the original loadbearing capacity of the assessed floor constructions, for 30 and 60 minutes, subject to the provisos detailed in section 9.1 of this report.

8.8 New LED Hybrid 7 Fireguard Range

A new range of FGLED Hybrid 7 Fireguard downlighter units have been requested to be considered within this assessment. The following table indicates their relevant details:

Downlighter model	Cut out (Ø mm)	Height (mm)	Weight (kg)
JC94701 ¹	74/76	101	0.356 ²
JC94xxx ¹	74/76	101	0.356 ²

¹ Dimmable models

² Weight Including integral LED bulb

JC94701 (cool white light)

JC94xxx (warm white light)

Models are available with bezels finished as Brushed Nickel (BN), Chrome (CH) or White (WH).

Although not directly fire tested, examination demonstrates that the key elements of the new LED Hybrid7 Fireguard range of downlighters in terms of construction, intumescent specification, and method of retention within a ceiling, are all essentially as for the assessed FGLED7 downlights. The difference with the LED Hybrid 7 is that there is a higher can but no external driver resulting in an overall height similar to the assessed FGLED6. The weights of the new LED Hybrid 9 are comparable to that of the assessed JC94181 and include the integral LED module. As in the analysis in section 8.4.1, the LED module can be expected to melt and fall out within the first 10 to 25 minutes resulting in a weight similar to those originally tested. They can therefore be considered as no more onerous than the tested downlights.

Our caveat to assessment of these lights will be the requirement, as discussed in 8.4.1, that installation instructions show a cut out diameter no greater than 5mm less than the can flange diameter.

Based on this analysis and the supporting test evidence Warringtonfire are therefore confident that providing the fitting caveat for cut out diameters is complied with, the LEDHybrid9 range of downlighters referenced above, will maintain the original loadbearing capacity of the assessed floor constructions, for 30 and 60 minutes, subject to the provisos detailed in section 9.1 of this report.

8.9 Detail change to models JC94210, JC94213, JC94214

The above downlighters have a new terminal to allow push fitting of terminal leads rather than the previous screw fitting.

Examination of the new detail shows that the internal terminal changes will have no impact on the fire resistance performance of the downlighters.

Examination of the fixing and intumescent disc at the head of the downlighter cans shows that the detail is identical to the previous detail.

The new terminal fitting can therefore be positively assessed as not changing the expected performance of floor assemblies fitted with these models. The new model references are:

JC94210 = JC94110;

JC94213 = JC94113,

JC94214 = JC94113

9 Summary of Scope

The following table summarises the scope of this assessment:

Model	30 minute constructions	60 minute constructions
JC94005	✓ ¹	✓
JC94009	✓	✓
JC94015	✓	✓
JC94017	✓	✓
JC94018	✓	✓
JC94019	✓	✓
JC94028	✓	✓
JC94029	✓	✓
JC94032	✓	✓
JC94034	✓	✓
JC94035	✓	✓
JC94036	✓	✓
JC94041	✓	✓
JC94170	✓	✓
JC94171	✓	✓
JC94172	✓	✓
JC94173	✓	✓
JC94174	✓	✓
JC94175	✓	✓
JC94181	✓*	✓
JC94198	✓	✓
JC94199	✓	✓
JC94203	✓	✓
JC94110	✓	✓
JC94211	✓	✓
JC94212	✓	✓
JC94113	✓	✓
JC94114	✓ ¹	✓ ¹
JC94501	✓ ¹	✓ ¹
JC94502	✓ ¹	✓ ¹

JC94503	✓ ¹	✓ ¹
JC94507	✓ ¹	✓ ¹
JC94901	✓ ¹	✓ ¹
JC94903	✓ ¹	✓ ¹
JC94180BN ²	✓ ¹	✓ ¹

Notes:

This scope summary must be read in conjunction with the provisos contained in section 9.1.

¹ These models must conform to the provisos of both sections 9.1.1 and 9.1.2.

² Converter plate for use with:

FGLED7 downlighters: JC94172, JC94173, JC94174, JC94175

FGLED6 downlighters: JC94472, JC94473, JC94474, JC94475

FGLED10 downlighters: JC94501, JC94502, JC94503, JC94507

9.1 Provisos

The following provisos apply to this assessment.

9.1.1 All Assessed Downlighters

1. Floor constructions must be as justified by the supporting test data detailed in section 4 of this report. The referenced test reports must be consulted for construction and fixing details not specified in this report.
2. If higher, manufacturers' specifications must take precedence.
3. The soffit specification for 30 minute I'-joist floors may comprise either single or double layer boarded ceilings utilising a minimum of 15mm grade A (grade 1) Wallboard** plasterboard or 12.5mm grade F (grade 5) Fire type* plasterboard.
4. The soffit specification for 60 minute I'-joist floors must comprise a double layer boarded ceiling utilising a minimum of 12.5mm Fire type* plasterboard for both board layers.
5. Wallboard** plasterboard is not permitted for 60 minute 'I'-joist soffits (ceilings).
6. Single layer ceilings must be fixed with timber drywall screws, a minimum of 42mm long, at maximum 230mm centres. Double layer ceilings must be fixed with timber drywall screws, a minimum 38mm long for the inner layer, and a minimum 50mm long for the outer layer, both at maximum 230mm centres. All fixings must penetrate the joist by a minimum 25mm.
7. The minimum joist height must be 241mm.
8. Maximum floor loading must not exceed that specified for the floor design.
9. The floor decking must comprise a minimum of 22mm thick tongue & grooved floor boarding.
10. The minimum distance between downlighters when fitted within the same cavity must be 1200mm.
11. The minimum distance between a downlighter cut out and joist edge is 50mm.
12. The 'I'-joist must be constructed from an OSB web with flanges of laminated veneer lumber (LVL) as per the tested specifications outlined in section 3.

9.1.2 Assessed Downlighter Models: JC94009, JC94181, JC94214, JC94501, JC94502, JC94503, JC94507, JC94901, JC94903 and Converter Plate JC94180BN

1. In addition to the provisos above, 'I'-joist floors comprising a single layer of soffit board, must utilise a minimum of 12.5mm thick Fire type* plasterboard.
2. Wallboard** plasterboard is not permitted for single layer soffits.

9.1.3 Notes

* Plasterboard classification BS grade F or BS EN grade 5.

** Plasterboard classification BS grade A or BS EN grade 1.

10 Conclusion

It is our opinion that if the tested, proven 30 and 60 minutes 'I'-joist floor designs, as specified in the testing by Boise Cascade, Louisiana Pacific (Finnforest) and Trus Joist, incorporating JCC downlighter units as specified in this report, were tested in accordance with BS 476-21:1987, the original loadbearing capacity, integrity and insulation, would be maintained, subject to the provisos stated.

11 Declaration by the Applicant

- 1) We the undersigned confirm that we have read and comply with obligations placed on us by 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:

For and on behalf of JCC Lighting Products Ltd



12 Limitations

The following limitations apply to this assessment:

- 1) This assessment addresses itself solely to the elements and subjects discussed and does not cover any other 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, Warringtonfire reserves the right to withdraw the assessment unconditionally but not retrospectively.
- 3) This assessment has been carried out in accordance with Fire Test Study Group 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 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.
- 6) This assessment represents our opinion as to the performance likely to be demonstrated on a test in accordance with BS 476: Part 21: 1987, on the basis of the test evidence referred to in this report. We express no opinion as to whether that evidence, and/or this assessment, would be regarded by any Building Control authority as sufficient for that or any other purpose. This assessment is provided to the client for its own purposes and we cannot opine on whether it will be accepted by Building Control authorities or any other third parties for any purpose
- 7) This report may only be reproduced in full. Extracts or abridgements of reports shall not be published without permission of Warringtonfire. All work and services carried out by Warringtonfire Testing and Certification Limited are subject to, and conducted in accordance with, the Standard Terms and Conditions of Warringtonfire Testing and Certification Limited, which are available at <https://www.element.com/terms/terms-and-conditions> or upon request

13 Validity

- 1) The assessment is valid initially for a period of five years, after which time it must be submitted to Warringtonfire for technical review and revalidation.
- 2) This assessment report is not valid unless it incorporates the declaration given in Section 11 duly signed by the applicant.

Signatures:		
Name:	S Bailey	A M Winning
Title:	Senior Product Assessor	Senior Product Assessor

Appendix A

Revisions and Amendments

Revision	Warringtonfire Reference	Date	Description
A	Chilt/A08180	11.08.2008	Amendment of global assessment to justify additional downlighters.
B	Chilt/A12164	05.09.2012	Revalidation of global assessment to incorporate new product codes, revised assessments and justification of new Fireguard and Fireguard LED downlighters.
C	Chilt/A12262	30.10.2012	Amendment of global assessment to incorporate assessment, based on additional test evidence of Fireguard LED3 downlighters, converter plate for specified Fireguard LED7 downlighters, and modification of cut out caveat for Fireguard LED7 downlighters based on new construction parameters
D	WF372014	30.09.2016	Amendment of global assessment to incorporate assessment of new Fireguard FGLED10 downlighters and new LEDHybrid9 downlighters. Update of report to Exova Warringtonfire format.
E	WF425091	11.02.2020	Five year technical review and revalidation of global assessment, including updating to Warringtonfire, reformatting to the guidance in BS EN15725:2010, assessment of new LEDHybrid7 downlighters and detail change to models JC94110, JC94113, JC94114