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IFC ASSESSMENT REPORT

PAR/15464/01

The Field of Application of F811, F812 and F821 Downlights, in terms of their contribution to the Fire Resistance of various ceiling/floor constructions

Fire Resistance Standard: BS476: Part 21: 1987

Prepared on behalf of:

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ISSUE AND AMENDMENT RECORD

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PAR/15464/01	April 2016	RA	CM	

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1. INTRODUCTION

This report has been prepared by International Fire Consultants Ltd, (IFC), on the instruction of JS Lighting Ltd, to determine the Field of Application, using existing fire resistance test evidence, of their F811, F812 and F821 downlights when installed in the associated floor/ceiling constructions defined herein.

Fire resisting assemblies are rarely supplied in an identical form to that which was tested. The specification will invariably require the associated construction to be supplied at a size, in a span, at centres etc., which are different from that tested. The result of a fire resistance test can apply to variations in constructions as long as they do not reduce the performance to one which is below that specified. The influence of those variations is covered by a judgement, sometimes made by the approving authority.

Where the approving authority does not feel able to make such judgements, or accept the responsibility for making them, an independent expert opinion is often sought. Such an opinion is often expressed in the form of an assessment of the performance, which may be supported by numerical/quantifiable methods or may be purely an expert judgement.

When establishing the variations in the construction that can achieve the required fire resistance performance, International Fire Consultants Ltd follows the guidance given in BS.ISO/TR12470: 1998, *"Fire resistance tests - Guidance on the application and extension of results".*

The assessment is based upon the constructional information of the various downlights supplied to us (detailed in Section 2) and upon the fire resistance test evidence (detailed in Section 3). A full analysis of the fire resistance performance of these assemblies is presented in Section 4.

2. PROPOSAL

It is proposed that this report will define the Field of Application of the F811, F812 and F821 downlights with regard to their contribution to the fire resistance of various ceiling/floor constructions, expressed in terms of integrity and, where appropriate, insulation; in terms of the criteria and conditions defined in BS476: Part 21: 1987.

The assessed downlights are generally based upon details shown on the drawings and/or schedules provided by JS Lighting Ltd, copies of which are kept on file by IFC for reference. The construction and details of the assemblies are summarised in the following sections, but the documents should be read in conjunction with this report for full interpretation.

Anyone using this report should verify that copies of documents in their possession match those copies which are kept on file by IFC. If variations occur between details described herein and those on the relevant documents, the former shall take precedence. Otherwise IFC should be contacted for clarification. Refer to Section 6 for recommendations with respect to audit and verification of the manufactured/installed assemblies.

For photographs and drawings of the JS Lighting Ltd F811, F812 and F821 downlights see **Appendix A**.

2.1 JS Lighting Ltd. F811, F812 and F821 Downlights

Summaries of the construction of the approved downlights are given below.

F811

The F811 downlight consists of a steel flange, 80mm outside diameter, 53mm inside diameter and 0.9mm thick, to which various other parts/components of the assembly are fixed.

A ring of graphite based intumescent material, 78mm outside diameter, 56mm inside diameter and 1.6mm thick with a red cover is fitted to the rear of the flange.

A steel main body, 53mm diameter x 75mm high overall, is riveted to the rear of the steel flange.

Two steel arms, approximately 50mm x 18mm x 1.2mm, are attached to the body 36mm above the upper surface of the sealing gasket.

The F811 downlight incorporates a GU10 halogen reflector, 50mm in diameter, clamped to the flange with a steel sprung retaining clip. A GU10 halogen bulb is installed in the holder.

An 'L' shaped bracket, 85mm x 21mm x 0.8mm thick overall, is riveted to the top edge of the body. A plastic cable connection box is screw fixed to the top of the bracket. The connecting wires for the lamp pass out of a 12mm diameter hole at the centre of the top of the body.

A total of 6no. additional 6mm diameter holes are equally spaced around the top of the can. A 1.6mm thick graphite based intumescent ring is sandwiched using a 45mm diameter steel ring riveted to the underside of the main body. The intumescent ring has holes corresponding to those at the top of the main body.

The downlight is installed in a cut out 65mm in diameter. It is retained within the ceiling lining using two spring clips which are fitted on either side of the assembly.

The overall weight of the F811 downlight is 0.204kg.

F812

The F812 downlight consists of a brushed steel bezel, 82mm outside diameter, 40mm inside diameter and 1.2mm thick, screw fixed to the main body. The steel main body measures 62mm diameter x 82mm high overall.

A ring of silicone material, 82mm outside diameter, 62mm inside diameter and 2mm thick is sandwiched between the bezel and the flange of the main body, and also behind of the flange of the main body.

A circular piece of glass is installed in the opening of the bezel.

Two steel springs, approximately 50mm x 18mm x 1.2mm, are attached to the body 44mm above the upper surface of the sealing gasket.

The F812 downlight incorporates a GU10 lamp connection. A halogen lamp is clamped to the bezel using two steel retaining clamp arms, each 5mm wide x 0.5mm thick.

An 'L' shaped bracket, 85mm x 21mm x 0.8mm thick overall, is riveted to the top edge of the body. A plastic cable connection box is screw fixed to the top of the bracket. The connecting wires for the lamp pass out of two 7mm diameter holes on the top of the body.

A total of 11no. additional 4.5mm diameter holes are spaced around the top of the body. A 1.6mm thick graphite based intumescent ring is sandwiched using a 57mm diameter steel ring riveted to the underside of the main body. The intumescent ring has holes corresponding to those at the top of the main body.

The downlight is installed in a cut out 72mm in diameter. It is retained within the ceiling lining using the two spring clips which are fitted on either side of the assembly.

The overall weight of the F812 downlight is 0.286kg.

F821

The F821 downlight consists of a two part steel flange, 80mm overall outside diameter, 45mm inside diameter, riveted to the main body. The stepped steel main body measures 67mm diameter x 80mm high overall.

Two steel springs, approximately 50mm x 18mm x 1.2mm, are attached to the body 34mm above the upper surface of the sealing gasket.

The F821 downlight incorporates a GU10 halogen lamp connector. A halogen lamp is clamped to the inner flange using two steel retaining clamp arms, each 5mm wide x 0.5mm thick.

An 'L' shaped bracket, 85mm x 21mm x 0.8mm thick overall, is riveted to the top edge of the body. A plastic cable connection box is screw fixed to the top of the bracket. The connecting wires for the lamp pass out of a 6mm diameter hole at the centre of the top of the body.

A total of 8no. additional 6mm diameter holes are spaced around the top of the body. A 1.6mm thick graphite based intumescent ring is sandwiched using a 46mm diameter steel ring riveted to the underside of the main body. The intumescent ring has holes corresponding to those at the top of the main body.

The downlight is installed in a cut out 72mm in diameter. It is retained within the ceiling lining using two spring clips which are fitted on either side of the assembly.

The overall weight of the F821 downlight is 0.236kg.

2.2 Proposed Downlight, Ceiling Lining and Joist Combinations

The following tables present the proposed combinations of downlight, ceiling lining and joist systems.

30 Minutes Fire Resistance

Downlight model	Ceiling Lining	Joist systems
F811	1 No. 12.5mm FireLine	Solid Timber Joist
F812	1 No. 12.5mm FireLine	Solid Timber Joist
F821	1 No. 12.5mm FireLine	Solid Timber Joist

60 Minutes Fire Resistance

Downlight model	Ceiling Lining	Joist systems
F811	2 No. 12.5mm FireLine	Solid Timber Joist
F812	2 No. 12.5mm FireLine	Solid Timber Joist
F821	2 No. 12.5mm FireLine	Solid Timber Joist

90 Minutes Fire Resistance

Downlight model	Ceiling Lining	Joist systems
F811	2 No. 15mm FireLine	Solid Timber Joist
F812	2 No. 15mm FireLine	Solid Timber Joist
F821	2 No. 15mm FireLine	Solid Timber Joist

It should be noted that the combination of ceiling linings and joist systems into which the above downlights are proposed to be installed, and the exact specifications of such systems, must also have evidence of fire resistance performance, either through test or assessment to BS476: Part 21: 1987, for the required fire resistance period; and at the proposed sizes/spans and loadings. See also Section 4.4.

3. TEST EVIDENCE

The proposed downlights have not been tested for fire resistance performance in the form and/or configurations proposed, hence the requirement for this assessment of fire resistance performance. Applicable fire resistance test evidence does exist for the downlights under consideration at a reduced scale, and this can be used to form the basis of the technical evaluation. The available test evidence is summarised in the following sections;

3.1 CFR1602031

A reduced scale fire resistance test was undertaken on 3 February 2016 at the laboratories of Cambridge Fire Research Ltd. (CFR) following the general methodology of BS476: Part 21: 1987. The test was carried out on a plasterboard lined softwood timber joist ceiling/floor construction which was fitted with three downlights.

The plasterboard lined timber joist ceiling/floor construction was assembled from softwood timber joists and noggins, 195mm x 45mm, to effectively provide four ceiling voids which were independent of each other. Three of the voids had a downlight installed within them and the fourth void, which did not have a downlight installed, formed a control void. The construction had a 22mm thick chipboard floor and a single layer of 12.5mm FireLine manufactured by British Gypsum fixed to the underside to form a ceiling lining.

An F811 downlight was fitted within Void A. It was fitted in a 65mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void. An F812 downlight was fitted within Void B. It was fitted in a 72mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void. An F821 downlight was fitted within Void C. It was fitted in a 72mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void.

No load was applied to the assembly. The reduced scale fire resistance test was witnessed by a representative of International Fire Consultants Ltd.

The following details relating to the specimen construction were recorded:

Void	Downlight Type	Body Diameter (mm)	Cut Out Diameter Tested (mm)	Weight of Downlight (kg)	Ceiling Lining Material
A	F811	80	65	204	1 No. 12.5mm FireLine
B	F812	82	72	286	1 No. 12.5mm FireLine
C	F821	80	72	236	1 No. 12.5mm FireLine
D	None (Control Void)	-	-	-	1 No. 12.5mm FireLine

Table 1: Installation and constructional details from test CFR1602031

Thermocouples were positioned throughout the test specimen to provide unexposed plasterboard surface temperatures, void air temperatures and timber joist/noggin surface temperatures.

The test duration was 61 minutes, at which point the test was ended at request of the sponsor. A summary of the data generated during the test can be found below:

Void	Downlight Type	Lining Material	Assembly Integrity Performance (min)	Assembly Insulation Performance (min)	Time for 350°C to be achieved on joist (min)	Time for 350°C to be achieved in void (min)	Time downlight body observed to fall out (min)
A	F811	1 No. 12.5mm FireLine	61	61	Not reached during test	Not reached during test	Not observed during test
B	F812	1 No. 12.5mm FireLine	61	61	Not reached during test	54	Not observed during test
C	F821	1 No. 12.5mm FireLine	61	61	57	49	Not observed during test
D	None (Control Void)	1 No. 12.5mm FireLine	61	61	50	44	N/A

Table 2: Data generated from test CFR1602031

3.2 CFR1602101

A reduced scale fire resistance test was undertaken on 10 February 2016 at the laboratories of Cambridge Fire Research Ltd. (CFR) following the general methodology of BS476: Part 21: 1987. The test was carried out on a plasterboard lined softwood timber joist ceiling/floor construction which was fitted with three downlights.

The plasterboard lined timber joist ceiling/floor construction was assembled from softwood timber joists and noggins, 195mm x 45mm, to effectively provide four ceiling voids which were independent of each other. Three of the voids had a downlight installed within them and the fourth void, which did not have a downlight installed, formed a control void. The construction had a 22mm thick chipboard floor and a double layer of 12.5mm FireLine manufactured by British Gypsum fixed to the underside to form a ceiling lining.

An F811 downlight was fitted within Void A. It was fitted in a 65mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void. An F812 downlight was fitted within Void B. It was fitted in a 72mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void. An F821 downlight was fitted within Void C. It was fitted in a 72mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void.

No load was applied to the assembly. The reduced scale fire resistance test was witnessed by a representative of International Fire Consultants Ltd.

The following details relating to the specimen construction were recorded:

Void	Downlight Type	Body Diameter (mm)	Cut Out Diameter Tested (mm)	Weight of Downlight (kg)	Ceiling Lining Material
A	F811	80	65	204	2 No. 12.5mm FireLine
B	F812	82	72	286	2 No. 12.5mm FireLine
C	F821	80	72	236	2 No. 12.5mm FireLine
D	None (Control Void)	-	-	-	2 No. 12.5mm FireLine

Table 3: Installation and constructional details from test CFR1602101

Thermocouples were positioned throughout the test specimen to provide unexposed plasterboard surface temperatures, void air temperatures and timber joist/noggin surface temperatures.

The test duration was 91 minutes, at which point the test was ended at request of the sponsor. A summary of the data generated during the test can be found below:

Void	Downlight Type	Lining Material	Assembly Integrity Performance (min)	Assembly Insulation Performance (min)	Time for 350°C to be achieved on joist (min)	Time for 350°C to be achieved in void (min)	Time downlight body observed to fall out (min)
A	F811	2 No. 12.5mm FireLine	91	91	Not achieved during test	Not achieved during test	Not observed during test
B	F812	2 No. 12.5mm FireLine	91	91	Not achieved during test	Not achieved during test	Not observed during test
C	F821	2 No. 12.5mm FireLine	91	91	Not achieved during test	Not achieved during test	90
D	None (Control Void)	2 No. 12.5mm FireLine	91	91	Not achieved during test	Not achieved during test	N/A

Table 4: Data generated from test CFR1602101

3.3 CFR1602091

A reduced scale fire resistance test was undertaken on 9 February 2016 at the laboratories of Cambridge Fire Research Ltd. (CFR) following the general methodology of BS476: Part 21: 1987. The test was carried out on a plasterboard lined softwood timber joist ceiling/floor construction which was fitted with three downlights.

The plasterboard lined timber joist ceiling/floor construction was assembled from softwood timber joists and noggins, 195mm x 45mm, to effectively provide four ceiling voids which were independent of each other. Three of the voids had a downlight installed within them and the fourth void, which did not have a downlight installed, formed a control void. The construction had a 22mm thick chipboard floor and a double layer of 15mm FireLine manufactured by British Gypsum fixed to the underside to form a ceiling lining.

An F811 downlight was fitted within Void A. It was fitted in a 65mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void. An F812 downlight was fitted within Void B. It was fitted in a 72mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void. An F821 downlight was fitted within Void C. It was fitted in a 72mm diameter cut-out located in the plasterboard, the centre of which corresponded with the centre of the void.

No load was applied to the assembly. The reduced scale fire resistance test was witnessed by a representative of International Fire Consultants Ltd.

The following details relating to the specimen construction were recorded:

Void	Downlight Type	Body Diameter (mm)	Cut Out Diameter Tested (mm)	Weight of Downlight (kg)	Ceiling Lining Material
A	F811	80	65	204	2 No. 15mm FireLine
B	F812	82	72	286	2 No. 15mm FireLine
C	F821	80	72	236	2 No. 15mm FireLine
D	None (Control Void)	-	-	-	2 No. 15mm FireLine

Table 5: Installation and constructional details from test CFR1602091

Thermocouples were positioned throughout the test specimen to provide unexposed plasterboard surface temperatures, void air temperatures and timber joist/noggin surface temperatures.

The test duration was 120 minutes, at which point the test was ended at request of the sponsor. A summary of the data generated during the test can be found below:

Void	Downlight Type	Lining Material	Assembly Integrity Performance (min)	Assembly Insulation Performance (min)	Time for 350°C to be achieved on joist (min)	Time for 350°C to be achieved in void (min)	Time downlight body observed to fall out (min)
A	F811	2 No. 15mm FireLine	120	120	Not reached during test	Not reached during test	Not observed during test
B	F812	2 No. 15mm FireLine	120	120	Not reached during test	Not reached during test	Not observed during test
C	F821	2 No. 15mm FireLine	120	120	Not reached during test	Not reached during test	94
D	None (Control Void)	2 No. 15mm FireLine	120	120	Not reached during test	Not reached during test	N/A

Table 6: Data generated from test CFR1602091

4. ANALYSIS

It is important to note that no British Standard test procedure currently exists for the purpose of testing downlights in terms of fire resistance and testing cannot therefore be undertaken under UKAS accreditation. Hence, the fire performance of downlights should be considered in terms of their contribution to the fire resistance performance of various ceiling/floor constructions within which they are installed.

These ceiling/floor constructions would typically be tested and/or assessed against the requirements given in BS476: Part 21: 1987.

Evaluation of the fire resistance of the proposed assemblies at Section 2 addresses the factors that influence the overall fire performance of various ceiling/floor constructions fitted with downlights under the fire test conditions of BS476: Part 21: 1987. These include the following:

- Downlight body general construction and materials
- Intumescent Seal/Gasket
- Ceiling mounting/Retaining Method
- The ceiling linings
- Insulation fillings
- Influence of load
- Test exposure conditions

4.1 Downlight Construction and Materials

The range of JS Lighting Ltd. downlights considered herein generally consists of a steel 'can' housing a lamp and holder. Under fire conditions the lamp and the lamp holder and other components such as plastic or glass covers/lenses, would be expected to melt and/or fall away early into the fire exposure.

Hot gasses are prevented from entering the void of the ceiling/floor construction by the can, which acts as a separating membrane. Where the downlight cans have ventilation holes, intumescent material is incorporated which, when heated, expands to fill the gaps and prevents the passage of hot gasses into the ceiling void. In some of the assemblies intumescent material is incorporated behind the flange which assists in preventing the passage of hot gasses through the gap that may otherwise form between the rear of the steel flange and the plasterboard ceiling lining.

Once the membrane formed by the downlight is broken, either due to the downlight body falling away or hot gasses passing through or around the downlight body, temperatures within the ceiling/floor construction void will rise rapidly.

When the temperatures in the void exceed 350°C, there is potential for the timber joists to start to char and reduce in sectional size, hence leading to failure of loadbearing capacity; depending upon the timescales involved, relative to the "target rating". It would normally be the case that loadbearing capacity will be lost before burn-through of the floor decking occurs.

The tests referenced in Section 3 demonstrate that the proposed downlights did not allow/cause excessive temperatures in the void, before the respective target fire resistance periods had been achieved.

4.2 Loading and Reduced Scale Testing

The testing has been carried out without load being applied to the test constructions and further, the testing has been carried out at a reduced span, meaning that there is no significant joist deflection during the test. Without such a deflection, the boards remained in place, and board joints stay closed, for longer than would be expected for a ceiling/floor construction made up of similar timber joists of an identical cross-section at a larger span. As a consequence the integrity ratings achieved in the reduced scale tests are not absolute values.

This said, the deflection that would be experienced under load would be limited. Large, rapid deflections, which would otherwise significantly influence the stability of the ceiling linings and their ability to support downlights, would not take place until gasses hot enough to cause charring of the joists entered the void. This would be expected once the gasses in the void reach 350°C. This could be established by hot gasses passing through the annular gap between the cut out of the ceiling lining and the downlight body, and through the downlight, or as a result of a downlight completely falling out, leaving a breach in the ceiling lining.

As already noted, the tests referenced in Section 3 demonstrate that the installation of the proposed downlights did not allow/cause excessive temperatures in the void, before the respective target fire resistance periods had been achieved; and that the temperatures in the penetrated voids were not significantly different from those in the control void.

4.3 The Ceiling Linings

The nature of the ceiling can make a large difference in the temperatures generated within a floor cavity and will provide varying degrees of strength to support the downlight. Plasterboards have a variety of grades, including:

- Standard wall board
- High density sound reducing board
- Glass fibre reinforced boards

These have different levels of 'hot' strength with standard wallboard being the weakest and the glass fibre reinforced board being the strongest. Consequently, wall board would be expected to support the weight of a downlight, together with any insulation for a much shorter time than the 'sound' grade and much shorter again than one of the reinforced boards.

Once the downlight drops away from the ceiling the board is attacked both from below and from within the cavity and the board's protection capabilities will be limited. As a consequence, the timber floor joists will be attacked even more rigorously following cracking and collapse of the board itself and the gypsum density and strength will influence the protection that it goes on to provide.

Similarly, the longevity of the lining during fire testing is proportional to the board thickness; the thicker the board, the longer it will support the downlight, stay in place and protect the timber components forming the floor. The analysis undertaken in order to generate the field of application of the downlights fully takes into account both the grade of the plasterboard and the thickness and number of such linings; based upon the combinations tested.

4.4 Insulation Fillings

The fire resistance performance of an insulated ceiling/floor construction is different to that of an uninsulated ceiling/floor construction. The plasterboard lining in an insulated ceiling/floor construction will experience higher temperatures during a fire resistance test, or real exposure and, therefore, will fall earlier than when no insulation is incorporated. This is because the heat within the board is unable to disperse into the cavity and the temperature will rise more rapidly and the board's protection capabilities will be lost earlier. For similar insulated and uninsulated ceiling/floor constructions, when exposed to similar fire exposure conditions, this would lead to the plasterboard lining of the insulated ceiling/floor construction falling away at an earlier stage.

When the insulation is a mineral rock fibre (MRF) composition, this makes a contribution that compensates for this loss, (subject to the MRF remaining in place), but when the insulation is non-contributory, e.g. glass fibre or a polymeric foam, then the following paragraph applies.

If the proposed JS Lighting Ltd. downlights are to be installed within insulated ceiling/floor constructions incorporating a non-contributory insulation, it is a requirement of this report that the ceiling boards must be fixed to the joists by means of screws, rather than by nails, (assuming that the particular floor/ceiling system is tested with nails); although this restriction does not apply if the joists are >44mm thick.

Any insulation must be kept away from the downlights to prevent overheating of the light or to prevent degradation of any wiring, in accordance with the guidance given in the Electrical Safety Council Code of Practice *

REFERENCE:

Electrical installations and their impact on the fire performance of buildings:
Part 1 – Domestic premises: single family units (houses, flats, maisonettes, bungalows)
Published by:
The Electrical Safety Council
18 Buckingham Gate
London
SW1E 6LB
www.esc.org.uk

4.5 Size of Annular Gap/Intumescent Gasket

The size of the annular gap between the body of the downlight and the cut-out in the ceiling lining will have an influence on the volume of hot gasses passing into the ceiling/floor void. The proposed downlights incorporate graphite based intumescent gaskets fitted behind the flange which will have a relatively high level of multi-directional expansion; in the region of 20 times its original thickness, and the capability of generating significant expansion pressure. The influences of removing this seal and increasing the annular gap have not been investigated. For this reason it is a requirement of this report that the downlights are installed with the graphite based intumescent gasket as tested (where included in the testing) and that the annular gaps are no greater than as tested.

4.6 Downlight Distribution Density

The number of downlights that can be fitted within a certain area of void is a critical parameter which needs to be considered. Each of the ceiling voids included in the tests conducted at Cambridge Fire Research were approximately 525mm x 600mm; this equates to an area of 0.315m². Since the plasterboard lining of the test constructions in these tests were independently supported within each void it would be reasonable to state that the maximum downlight density should be 2 per 1.5m² and each downlight should be spaced at least 600mm apart. Further, IFC are of the opinion that downlights should not be installed where the edge of the required cut-out is closer than 100mm from the edge of a board in single layer ceiling linings, and, in all cases, downlights shall not be closer than 100mm to a joist or noggin. Note that all board edges must be fixed back to a joist or noggin.

Based upon the tested performance of JS Lighting Ltd. downlights and the various contributing factors discussed, International Fire Consultants Ltd. (IFC) are of the opinion that each of the proposed configurations given in Section 2 to this report will meet the corresponding fire resistance requirement.

5. CONCLUSIONS

It is the opinion of International Fire Consultants Ltd. that if the JS Lighting Ltd F811, F812 and F821 downlights, as described herein, were to be installed in "full size" supporting floor/ceiling constructions, of the type described in Section 2.2 of this report, then the downlights would not compromise the fire resistance performance, in terms of loadbearing capacity or integrity and insulation performance, of a loadbearing floor for 30, 60 or 90 minutes, as appropriate; if it were tested to BS476: Part 21: 1987.

This assumes that the downlights considered herein are correctly installed in compliance with the requirements given in this report, and remain in full contact with the associated ceiling construction throughout their life.

6. LIMITATIONS

This Field of Application Assessment Report, which is only valid for the JS Lighting Ltd. downlights identified herein, addresses itself solely to the ability of the assemblies described to contribute to the fire resistance performance of the ceiling/floor constructions in which they are installed. It does not imply any suitability for use with respect to other unspecified criteria.

Where the constructional information in this report is taken from details provided to International Fire Consultants Ltd. (IFC) and/or from fire resistance test reports referenced herein, it is, therefore, limited to the information given in those documents. It is necessarily dependent upon the accuracy and completeness of that information. Where constructional or manufacturing details are not specified, or discussed herein, it should not, therefore, be taken to infer approval of variation in such details from those tested or otherwise approved.

It is a requirement of this assessment report that test or assessment evidence is available to substantiate the performance of the construction being penetrated. Where the assessed constructions have not been subject to an on-site audit by International Fire Consultants Ltd, it is the responsibility of anyone using this report to confirm that all aspects of the assemblies fully comply with the descriptions and limitations herein.

Any materials specified in this report have been selected and judged primarily on their fire performance. IFC do not claim expertise in areas other than fire safety. Whilst observing all possible care in the specification of solutions, we would draw the reader's attention to the fact that during the construction and procurement process, the materials used should be subjected to more general examination regarding the wider Health and Safety, and CoSHH Regulations.

This Report is provided to the sponsor on the basis that it is a professional independent engineering opinion as to what the fire performance of the construction/system would be should it be tested to the named standard. It is IFC's experience that such an opinion is normally acceptable in support of an application for building approvals, certainly throughout the UK and in many parts of Europe and the rest of the world.

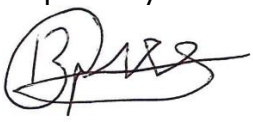
However, unless IFC have been commissioned to liaise with the Authorities that have jurisdiction for the building in question for the purpose of obtaining the necessary approvals, IFC cannot assure that the document will satisfy the requirements of the particular building regulations for any building being constructed.

It is, therefore, the responsibility of the sponsor to establish whether this evidence is appropriate for the application for which it is being supplied and IFC cannot take responsibility for any costs incurred as a result of any rejection of the document for reasons outside of our control. Early submittal of the Report to the Authorities will minimise any risks in this respect.

7. VALIDITY

This assessment has been prepared based on International Fire Consultants Ltd's present knowledge of the products described, the stated testing regime and the submitted test evidence. For this reason anyone using this document after April 2020 should confirm its ongoing validity.

Prepared by:



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APPENDIX A

Photos and Drawings of
the F811, F812 and F821 Downlights

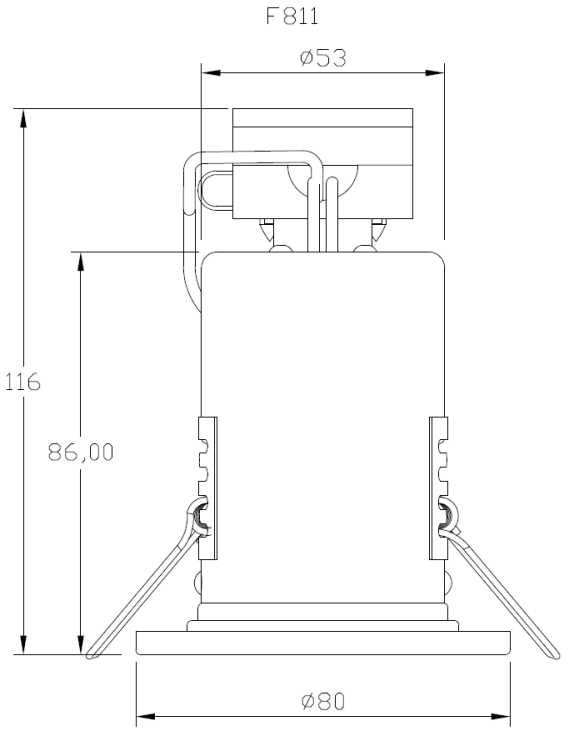

Figure 1 – Drawing of the F811 downlight

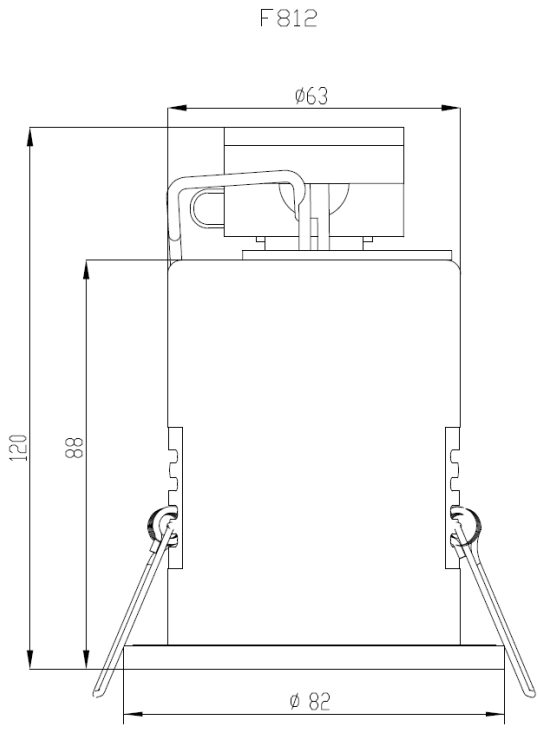

Figure 2 – Drawing of the F812 downlight

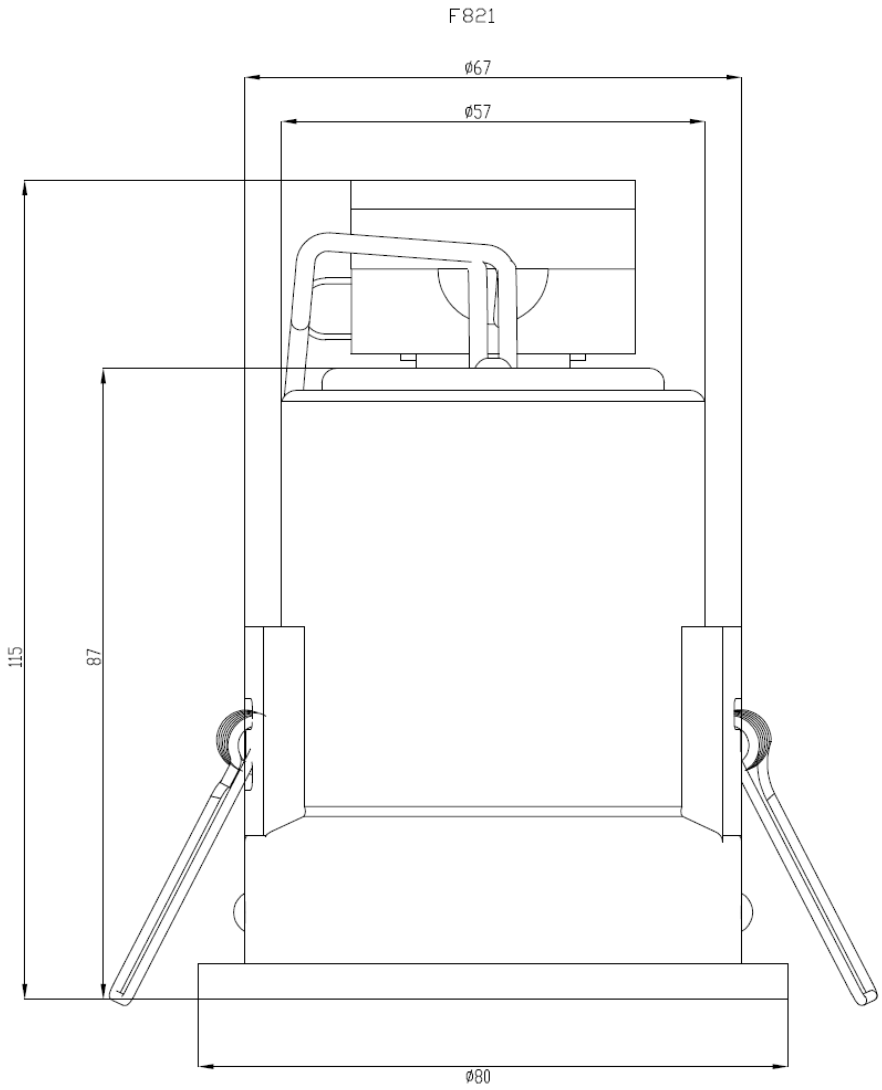

Figure 3 – Drawing of the F821 downlight

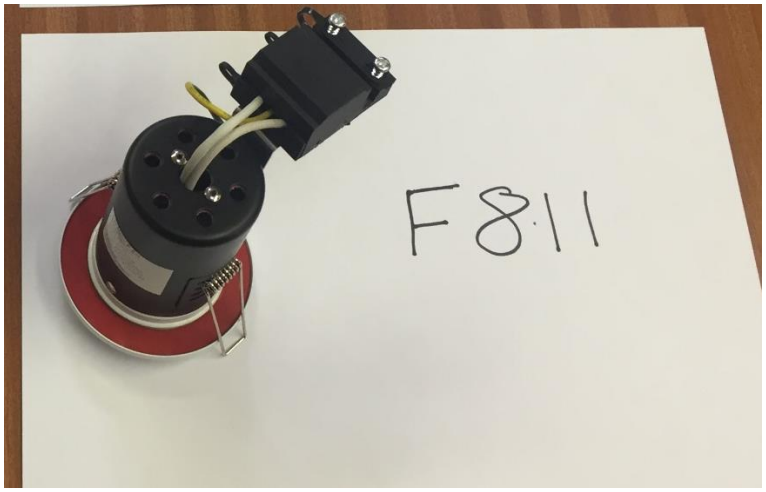

Figure 4 – Photos of the F811, F812 and F821 downlights