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Fire assessment report

Electrical floorbox in ComFlor and concrete floor slabs

Sponsor: Boss Products (Australia) Pty Ltd

Report number: FAS220037 Revision: R1.0

Issued date: 21 March 2022 Expiry date: 31 March 2027

Quality management

Version	Date	Information about the report			
R1.0	Issue: 21 Mar 2022	Reason for issue	Initial issue		
	Expiry: 31 Mar 2027		**Prepared by**	**Reviewed by**	**Authorised by**
		Name	Rami Al-Darwish	Imran Ahamed	Mahmoud Akl
		Signature			

Executive summary

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of recessed electrical floorboxes in ComFlor® and concrete floor systems with cable bundles penetrating through one or two layers of BOSS® batts – if tested in accordance with AS 1530.4:2014.

The analysis in section 5 of this report found that the proposed systems, together with the described variations, are expected to achieve the FRLs as shown in Table 1, if tested in accordance with AS 1530.4:2014.

Table 1 Assessment outcome

System	Reference tests	Floor system	Cable penetrations	Batt insulation	Figure reference	FRL
Recessed electrical floorboxes in floor systems	FRT180137 R2.0 WF359904 Issue 2	Minimum 130 mm thick ComFlor®	Up to three 32 mm cable bundles with eight CAT6 and four 2C+E power cables (PVC sheathed)	1 × 50 mm	Figure 1	-/120/60
		Minimum 130 mm thick ComFlor®		2 × 50 mm	Figure 2	-/120/120
		Minimum 150 mm thick concrete		2 × 50 mm	Figure 3	-/120/120

The variations and outcome of this assessment are subject to the limitations and requirements described in sections 2, 3 and 6 of this report. The results of this report are valid until 31 March 2027.

Contents

1. Introduction

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of recessed electrical floorboxes in ComFlor® and concrete floor systems with cable bundles penetrating through one or two layers of BOSS® batts if tested in accordance with AS 1530.4:2014[1].

This report may be used as Evidence of Suitability in accordance with the requirements of the relevant National Construction Code (NCC) to support the use of the material, product, form of construction or design as given within the scope of this assessment report. It also references test evidence for meeting deemed to satisfy (DTS) provisions of the NCC as applicable to the assessed systems.

This assessment was carried out at the request of Boss Products (Australia) Pty Ltd.

The sponsor details are included in Table 2.

Table 2 Sponsor details

Sponsor	Address
Boss Products (Australia) Pty Ltd	Unit 1, 16 Atkinson Road Taren Point NSW 2229 Australia

2. Framework for the assessment

2.1 Assessment approach

An assessment is an opinion about the expected performance of a component or element of structure if it was subject to a fire test.

No specific framework, methodology, standard or guidance documents exists in Australia for doing these assessments. We have therefore followed the 'Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence' prepared by the Passive Fire Protection Forum (PFPF) in the UK in 2021[2].

This guide provides a framework for undertaking assessments in the absence of specific fire test results. Some areas where assessments may be offered are:

- Where a modification is made to a construction which has already been tested
- The interpolation or extrapolation of results of a series of fire resistance tests, or utilisation of a series of fire test results to evaluate a range of variables in a construction design or a product
- Where, for various reasons – eg size or configuration – it is not possible to subject a construction or a product to a fire test.

Assessments will vary from relatively simple judgements on small changes to a product or construction through to detailed and often complex engineering assessments of large or sophisticated constructions.

This assessment uses established empirical methods and our experience of fire testing similar products to extend the scope of application by determining the limits for the design based on the tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance if the elements were to be tested in accordance with AS 1530.4:2014.

[1] Standards Australia, 2014, Methods for fire tests on building materials, components and structures – Part 4: Fire-resistance tests for elements of construction, AS 1530.4:2014, Standards Australia, NSW.
[2] Passive Fire Protection Forum (PFPF), 2021, Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence, Passive Fire Protection Forum (PFPF), UK.

This assessment has been written using appropriate test evidence generated at accredited laboratories to the relevant test standard. The supporting test evidence has been deemed appropriate to support the manufacturer's stated design.

2.2 Compliance with the National Construction Code

This assessment report has been prepared to meet the Evidence of Suitability requirements of the NCC 2019, including amendments[3] under A5.2 (1) (d).

This assessment has been written in accordance with the general principles outlined in EN 15725:2010[4] for extended application reports on the fire performance of construction products and building elements. It also references test evidence for meeting a performance requirement or deemed to satisfy (DTS) provision of the NCC under, A5.5 for reaction to fire and as applicable to the assessed system/s.

This assessment report may also be used to demonstrate compliance with the requirements for Evidence of Suitability under NCC 2016, including amendments[5].

2.3 Declaration

The 'Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence' prepared by the PFPF in the UK requires a declaration from the client. By accepting our fee proposal on 28 February 2022, Boss Products (Australia) Pty Ltd confirmed that:

- To their knowledge, the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the standard against which this assessment is being made.
- They agree to withdraw this assessment from circulation if the component or element of structure is the subject of a fire test by a test authority in accordance with the standard against which this assessment is being made and the results are not in agreement with this assessment.
- They are not aware of any information that could adversely affect the conclusions of this assessment and – if they subsequently become aware of any such information – they agree to ask the assessing authority to withdraw the assessment.

3. Limitations of this assessment

- The scope of this report is limited to an assessment of the variations to the tested systems described in section 4.3.
- This report details the methods of construction, test conditions and assessed results that are expected if the systems were tested in accordance with AS 1530.4:2014.
- This assessment is applicable to floor systems exposed to fire from below in accordance with the requirements of AS 1530.4:2014 where horizontal elements must be exposed to heat from the underside only.
- This report is valid for ComFlor® and concrete floor systems with minimum thickness of 130 mm and 150 mm, respectively.
- This report is only valid for the assessed systems and must not be used for any other purpose. Any changes with respect to size, construction details, fixings, services, material densities, edge or end conditions – other than those identified in this report – may invalidate the findings of this assessment. If there are changes to the system, a reassessment will need to be done by an Accredited Testing Laboratory (ATL) that is accredited to the same nominated standards of this report.

[3] National Construction Code Volumes One and Two - Building Code of Australia 2019 including Amendments, Australian Building Codes Board, Australia
[4] European Committee for Standardization, 2010, Extended application reports on the fire performance of construction products and building elements, EN 15725:2010, European Committee for Standardization, Brussels, Belgium.
[5] National Construction Code Volumes One and Two - Building Code of Australia 2016 including Amendments, Australian Building Codes Board, Australia

- The documentation that forms the basis for this report is listed in Appendix A and Appendix B.
- This report has been prepared based on information provided by others. Warringtonfire has not verified the accuracy and/or completeness of that information and will not be responsible for any errors or omissions that may be incorporated into this report as a result.
- This assessment is based on the proposed systems being constructed under comprehensive quality control practices and following appropriate industry regulations and Australian Standards on quality of materials, design of structures, guidance on workmanship and expert handling, placing and finishing of the products on site. These variables are beyond the control and consideration of this report.

4. Description of the specimen and variations

4.1 System description

The proposed construction consists of a recessed electrical floorbox in a ComFlor® and concrete floor systems. The cable bundles entering into the electrical box penetrates through 1 × 50 mm or 2 × 50 mm Boss batts which are mechanically fixed into the underside of the ComFlor® or concrete floor system as shown in Figure 1 to Figure 3. FireMastic - HPE™ fire sealant will be used to protect the cables passing through the Batt systems and the cut edges of the insulation batts.

4.2 Referenced test data

The assessment of the variation to the tested systems and the determination of the expected performance is based on the results of the fire tests documented in the reports summarised in Table 3. Further details of the tested systems are included in Appendix B.

Table 3 Referenced test data

Report number	Test sponsor	Test date	Testing authority
FRT180137 R2.0	BOSS Fire & Safety Pty Ltd	7 March 2019	Warringtonfire Australia
WF359904 Issue 2	FSi Limited	15 September 2015	Warringtonfire Australia

4.3 Variations to the tested systems

An identical system has not been subject to a standard fire test. We have therefore assessed the system using baseline test information for similar systems. The variations to the tested systems – together with the referenced standard fire tests – are described in Table 4.

Table 4 Variations to tested systems

Item	Reference test	Description	Variations
1	FRT180137 R2.0 WF 359904 Issue 2	The test report WF 359904 issue 2 consists of various service penetrations through 2 × 50 mm insulation batts – identical to Boss batts – installed in a 150 mm thick concrete slab. The test report FRT180137 consists of various service penetrations through 1 × 50 mm insulation batt installed in a 130 mm thick ComFlor® system.	• Electrical floorbox recessed in a ComFlor® system with 1 × 50 mm Boss batts mechanically fixed into the underside of the ComFlor® to achieve an FRL of -/120/60. • Electrical floorbox recessed in a ComFlor® or concrete floor system with 2 × 50 mm Boss batts mechanically fixed into the underside of the floor to achieve an FRL of -/120/120. • Up to three 32 mm cable bundles with eight CAT6 and four 2C+E power cables (PVC sheathed) penetrating the Boss batts and protected with FireMastic - HPE™.

4.4 Schedule of components

Table 5 outlines the schedule of components for the assessed systems

Table 5 Schedule of components of assessed systems

Item	Description
1.	ComFlor® trapezoidal slab system – Minimum 130 mm thick slab as tested in FRT180137 R2.0
2.	Floorbox
3.	Boss batts with ablative coating or FireMastic - HPE™ applied to cut edges.
4.	Boss batts infill with ablative coating or FireMastic - HPE™ applied to cut edges.
5.	Mechanical fixing with large washer
6.	Up to three 32 mm cable bundles with eight CAT6 and four 2C+E power cables (PVC sheathed)
7.	FireMastic - HPE ™ fire rated sealant applied in any annular gap between the cables and the batt for a depth of 25 mm and finished with a fillet of 25 mm × 25 mm. Sealant must be applied in a fillet of 25 mm × 25 mm at the service entry point of floor box.
8.	Minimum 150 mm thick concrete floor slab

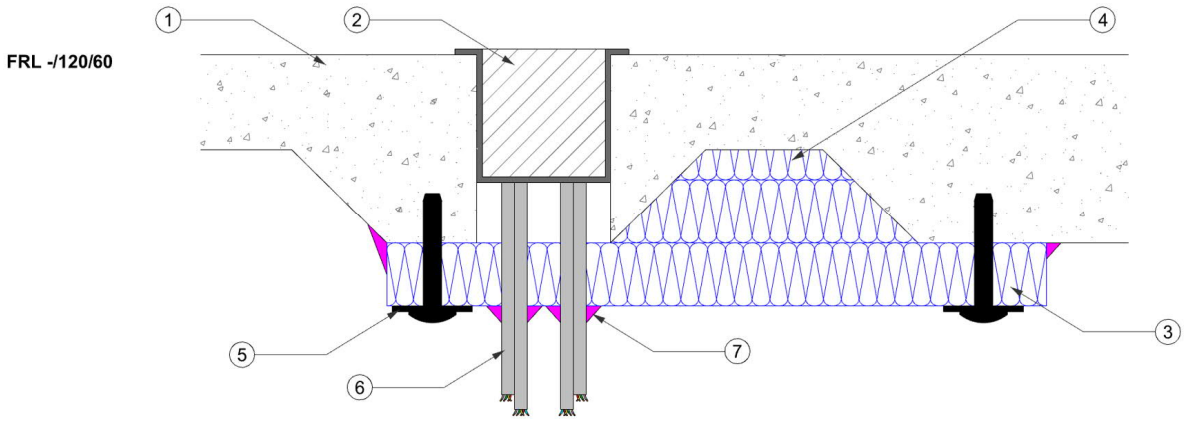

Figure 1 Electrical floorbox recessed in ComFlor® system with cable bundles penetrating 1 × 50 mm Boss® batts

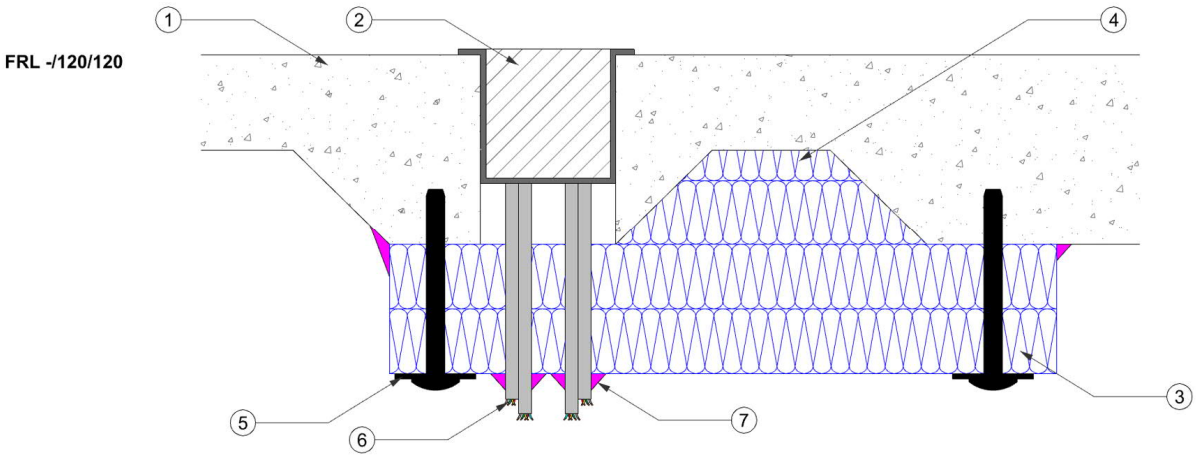

Figure 2 Electrical floorbox recessed in ComFlor® system with cable bundles penetrating 2 × 50 mm Boss® batts

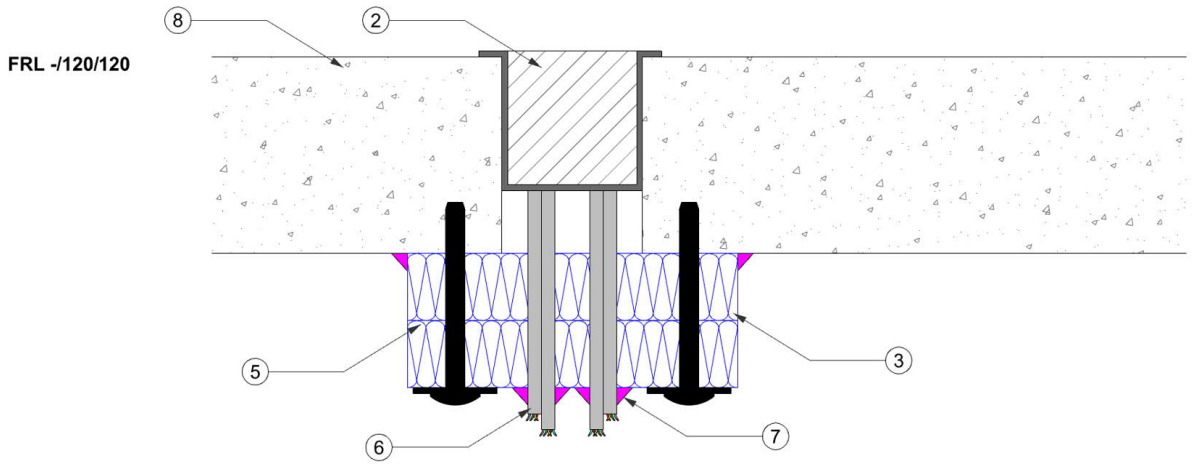

Figure 3 **Electrical floorbox recessed in 150 mm thick concrete slab with cable bundles penetrating 2 × 50 mm Boss® batts**

5. Assessment of electrical floorbox recessed in a ComFlor® system and concrete slabs with cable bundles penetrating Boss insulation batts

5.1 Description of variation

It is proposed to assess electrical floorbox recessed in a minimum 130 mm thick ComFlor® system or minimum 150 mm thick concrete slab with up to three 32 mm cable bundles with eight CAT6 and four 2C+E power cables (PVC sheathed) penetrating 1 × 50 mm and 2 × 50 Boss batts which are mechanically fixed into the underside of the ComFlor® and concrete floor systems as shown in Figure 1 to Figure 3.

5.2 Methodology

The method of assessment used is summarised in Table 6.

Table 6 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative

5.3 Assessment

The test report WF 359904 Issue 2 consisted of various cable and pipe services that penetrated two layers of 50 mm thick bulkhead batts in floor and wall configurations in accordance with BS EN 1366-3:2009[6]. In service penetration J, a 500 mm wide × 25 mm high × 1.0 mm thick perforated steel cable tray supporting 10 “A1”, 10 “A2”, 10 “A3”, two “B”, one “C1”, one “C2” and one “C3” cables were tested in 2 × 50 mm bulkhead batts in floor orientation. The tested “A1”, “A3”, “B”, “C1” and “C3” cable configurations achieved an integrity and insulation performance of up to 132 minutes. The applicability of BS EN 1366-3:2009 test results against AS 1530.4:2014 requirements are summarized in Appendix C.

With reference to BS EN 1366-3:2009, the standard cable configurations stated in table A.1 of the standard are described in Table 7

Table 7 BS EN 1639 standard cable type configurations

Cable	Cable Type	Group	Number of cables	Dimensions
A1	Small sheathed	1	10	5 mm × 1.5 mm^2
A2	Small sheathed	1	10	5 mm × 1.5 mm^2
A3	Small sheathed	1	10	5 mm × 1.5 mm^2
B	Small sheathed	1	2	1 mm × 95 mm^2
C1	Medium sheathed	2	1	4 mm × 95 mm^2
C2	Medium sheathed	2	1	4 mm × 95 mm^2
C3	Medium sheathed	2	1	4 mm × 95 mm^2

The proposed configurations in Figure 1 to Figure 3 consist of service penetrations up to three 32 mm cable bundles with eight CAT6 and four 2C+E power cables (PVC sheathed) terminating at Floorbox installed at the top of the separating element. The aperture is protected by one layer of Boss Batt as shown in Figure 1 and two layers of Boss Batt as shown in Figure 2 and Figure 3. Any annular gap between the cables and the batts must be filled with FireMastic - HPE™ up to 25 mm depth at the fire side. Moreover, the sealant must be finished with a 25 mm × 25 mm fillet at the fireside and 25 mm × 25 mm fillet at the service entry point of floor box.

[6] European Committee for Standardization, 2009, Fire resistance tests for service installations. Penetration seals, BS EN 1366-3:2009, European Committee for Standardization, Brussels, Belgium.

For the integrity performance of the proposed systems, it is considered that the Boss batts will stay in place and maintain the integrity performance of the aperture for 120 minutes. The proposed sealant configuration of the FireMastic - HPE™ sealant is considered sufficient to maintain the integrity of the services. It is understood that the proposed sealant has intumescent capabilities and will be able to close off any gaps formed by the melting of the plastic sheathing of the cables. For the insulation performance, the proposed CAT6 and 2C+E cables are expected to be terminated at the bottom of the Floorbox with no cables penetrating to the non-fire side. This is considered to be less onerous than the tested system as normally the main mode of insulation failure is due to temperature increase recorded by the thermocouple placed on the cables at the non-fire side 25 mm from the separating element. This is mainly governed by heat conduction through the cable cores. In the proposed system, the cables are not expected to penetrate to the non-fire side. Therefore, it is reasonable to consider that even if thermocouples were to placed on the Floorbox, the temperature increase recorded by those thermocouples is not expected to exceed a temperature difference of 180K. Moreover, the proposed cables have an overall conductor area less than the tested cable configurations in penetration J. Thus, the proposed penetrations are expected to have a lower heat conduction compared to the tested penetrations in specimen J.

The proposed system configuration in Figure 1, consists of one layer of 50 mm thick BOSS® batt compared to two layers of 50 mm thick batts shown in Figure 2. The tested services in WF 359904 Issue 2 were penetrating two layers of 50 mm thick bulkhead Batts. Reducing the overall bulkhead Batts thickness from 100 mm to 50 mm is expected to reduce the insulation resistance of the system. As a result, insulation performance of the proposed service configurations shown in Figure 1, was derated from 120 minutes to 60 minutes.

With reference to test report FRT180137, various service penetrations were tested in ComFlor® 60 system, with minimum thickness of 130 mm while being protected with FireMastic - HPE™ and BOSS® batts. One of the specimens included specimen A which consisted of bundle of 22 × TPS cables in 130 mm thick ComFlor® 60 system and 1 × 50 mm thick Boss batts. The TPS bundle had an overall diameter of 50 mm and achieved an integrity and insulation performance of 120 minutes. In addition, specimen C consisted of a 16 mm and 6 mm Pair coil copper pipe 13 mm ¼" × 5/8" with lagging, and 25 mm uPVC pipe were tested in 130 mm thick ComFlor® 60 system and 1 × 50 mm thick Boss batts. The Pair coil copper pipe also achieved an integrity and insulation performance of 120 minutes. With the fire resistance performance achieved by specimens A and C of FRT180137, it is reasonable to consider that the proposed three 32 mm cable bundles with eight CAT6 and four 2C+E power cables (PVC sheathed) penetrating a single layer of Boss batt will achieve an integrity and an insulation performance at least 120 minutes and 60 minutes, respectively and 120 minutes integrity and 120 minutes insulation when penetrating two layers of Boss batt.

The proposed Boss batt fixings in Figure 1 to Figure 3 are identical to the fixings used in test FRT180137 R2.0 – which were secured onto the separating elements on the bottom rib of the decking with four masonry anchors with washer fixings. The gap between the top rib and the BOSS® Batts was covered with trapezoid shape Batt. The Batt to floor fixings were able to hold the batts in place for the whole 120 minutes duration of the test. Therefore, it is expected that the proposed 1 × 50 mm and 2 × 50 mm Boss batts will be secured to the underside of the ComFlor® or concrete slab for at least 120 minutes of fire exposure without risk of falling.

5.4 Assessment outcome

This assessment demonstrates that the electrical floorboxes in ComFlor® and concrete floor systems with cable bundles penetrating through one or two layers of BOSS® batts systems are expected to achieve the FRL – if it were tested in accordance with AS 1530.4:2014.

Table 8 Assessment outcome

System	Reference tests	Floor system	Cable penetrations	Batt insulation	Figure reference	FRL
Recessed electrical floorboxes in floor systems	FRT180137 R2.0 WF359904 Issue 2	Minimum 130 mm thick ComFlor®	Up to three 32 mm cable bundles with eight CAT6 and four 2C+E power cables (PVC sheathed)	1 × 50 mm	Figure 1	-120/60
		Minimum 130 mm thick ComFlor®		2 × 50 mm	Figure 2	-/120/120
		Minimum 150 mm thick concrete		2 × 50 mm	Figure 3	-/120/120

6. Validity

Warringtonfire Australia does not endorse the tested or assessed product in any way. The conclusions of this assessment may be used to directly assess fire resistance, but it should be recognised that a single test method will not provide a full assessment of fire resistance under all conditions.

Due to the nature of fire testing and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

This assessment is based on test data, information and experience available at the time of preparation. If contradictory evidence becomes available to the assessing authority, the assessment will be unconditionally withdrawn, and the report sponsor will be notified in writing. Similarly, the assessment should be re-evaluated, if the assessed construction is subsequently tested since actual test data is deemed to take precedence.

The published procedures for the conduct of tests and the assessment of test results are subject to constant review and improvement. It is therefore recommended that this report be reviewed on, or before, the stated expiry date.

This assessment represents our opinion about the performance of the proposed systems expected to be demonstrated on a test in accordance with AS 1530.4:2014, based on the evidence referred to in this report.

This assessment is provided to Boss Products (Australia) Pty Ltd for their own specific purposes. This report may be used as Evidence of Suitability in accordance with the requirements of the relevant National Construction Code. Building certifiers and other third parties must determine the suitability of the systems described in this report for a specific installation.

Appendix A Drawings and additional information

Table 9 Details of drawings

Drawing title	Date	Drawn by
Electrical floorbox recessed in ComFlor® system with cable bundles penetrating 1 × 50 mm Boss® batts	23 February 2022	Boss Products (Australia) Pty Ltd
Electrical floorbox recessed in ComFlor® system with cable bundles penetrating 2 × 50 mm Boss® batts	23 February 2022	Boss Products (Australia) Pty Ltd
Electrical floorbox recessed in 150 mm thick concrete slab with cable bundles penetrating 2 × 50 mm Boss® batts.	23 February 2022	Boss Products (Australia) Pty Ltd

Appendix B Summary of supporting test data

B.1 Test report – FRT180137 R2.0

Table 10 Information about test report

<table>
<tr><th>Item</th><th>Information about test report</th></tr>
<tr><td>Report sponsor</td><td>BOSS Fire & Safety Pty Ltd</td></tr>
<tr><td>Test laboratory</td><td>Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.</td></tr>
<tr><td>Test date</td><td>The fire resistance test was done on 7 May 2019.</td></tr>
<tr><td>Test standards</td><td>The test was done in accordance with AS 1530.4:2014.</td></tr>
<tr><td>Variation to test standards</td><td>None</td></tr>
<tr><td>General description of tested specimen</td><td>The tested system consists of various service penetrations thought a 75 mm thick ComFlor® 60 floor systems. The relevant services were protected with 1 x 50 mm thick BOSS Batts and BOSS FireMastic - HPE™ fire sealants. The relevant services are stated in the below table
<table>
<tr><th>Penetration system</th><th>Service</th><th>Primary fire-stopping protection</th><th>Second fire-stopping protection</th><th>Aperture size (mm)</th></tr>
<tr><td>A</td><td>Bundle of TPS cables</td><td>BOSS Batt</td><td>BOSS FireMastic - HPE™</td><td>Ø76 mm</td></tr>
<tr><td>C</td><td>Pair Coil pipe
25mm uPVC Drain pipe</td><td>BOSS Batt</td><td>BOSS FireMastic – HPE™</td><td>Ø100 mm</td></tr>
</table></td></tr>
<tr><td>Instrumentation</td><td>The test report states that the instrumentation was in accordance with AS 1530.4:2014.</td></tr>
</table>

The test specimen achieved the following results – see Table 11.

Table 11 Results summary for this test report

Penetration system	Service	Primary fire-stopping protection	Second fire-stopping protection	Aperture size (mm)	FRL
A	Bundle of TPS cables	BOSS Batt	BOSS FireMastic - HPE™	Ø76 mm	-/120/120
C	Pair Coil pipe 25 mm uPVC drainpipe	BOSS Batt	BOSS FireMastic – HPE™	Ø100 mm	-/120/120

B.2 Test report – WF 359904 Issue 2

Table 12 Information about test report

Item	Information about test report
Report sponsor	FSi Limited, Westminster Industrial Estate, Tamworth Road, Measham, DE12 7DS
Test laboratory	Warringtonfire United Kingdom
Test date	The fire resistance test was done on 7 May 2019.
Test standards	The test was done in accordance with BS EN 1366-3:2009.
Variation to test standards	None
General description of tested specimen	The specimens were referenced A and B for the purpose of the test and the penetrations within the specimens were referenced as services A to I in the wall and J to R in the floor. For the horizontal floor specimen (Specimen B), the section of floor had overall dimensions of 2230 mm long by 1740 mm wide by 150 mm thick and was provided with a single aperture measuring 1100 mm long by 750 mm wide and was penetrated with various plastic pipes and cables. The service J is relevant for this assessment. In service penetration J, a 500 mm wide × 25 mm high × 1.0 mm thick perforated steel cable tray supporting 10 “A1”, 10 “A2”, 10 “A3”, two “B”, one “C1”, one “C2” and one “C3” cables were tested in 2 × 50 mm bulkhead batts in floor orientation.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-3:2009.

The test specimen achieved the following results – see Table 13

Table 13 Results summary for this test report

SpecimenB (Floor)		Integrity (minutes)			
Service	Details	Cotton pad	Sustained flaming	Gap gauge	Insulation (minutes)
J	500 mm perforated tray	132*	132*	132*	132*
	A1	132*	132*	132*	126
	A2	132*	132*	132*	99
	A3	132*	132*	132*	132*
	B	132*	132*	132*	132*
	C1	132*	132*	132*	132*
	C2	132*	132*	132*	70
	C3	132*	132*	132*	132*

Appendix C Relevance of BS EN 1366.3:2009 test data with respect to AS 1530.4:2014

The fire resistance test WF 359904 Issue 2 was conducted in accordance with BS EN 1366.3:2009 and BS EN 1363.1:2012[7]. This standard differs from AS 1530.4:2014 and the significance of these differences are discussed below.

Temperature regime

The furnace temperature regime for fire resistance tests conducted in accordance with AS 1530.4:2014 follows the same trend as BS EN 1363.1:2012.

The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4:2014 and BS EN 1363.1:2012 are not appreciably different.

Furnace thermocouples

The furnace thermocouples specified in AS 1530.4:2014 are type K, mineral insulated metal sheathed (MIMS), with a stainless-steel sheath having a wire of diameter of less than 1.0mm and an overall diameter of 3 mm. The measuring junction protrudes at least 25mm from the supporting heat resistant tube.

The furnace thermocouple specified in EN 1363.1:2012 is made from folded steel plate that faces the furnace chamber. A thermocouple is fixed to the side of the plate facing the specimen, with the thermocouple hot junction protected by a pad of insulating material.

The plate part is to be constructed from 150 ± 1 mm long by 100 ± 1 mm wide by 0.7 ± 0.1 mm thick nickel alloy sheet strips.

The measuring junction is to consist of nickel chromium/nickel aluminium (Type K) wire as defined in IEC 60584-1, contained within mineral insulation in a heat-resisting steel alloy sheath of nominal diameter 1 mm, with the hot junctions electrically insulated from the sheath.

The thermocouple hot junction is to be fixed to the geometric centre of the plate in the position shown in Figure B6.1 by a small steel strip made from the same material as the plate. The steel strip can be welded to the plate – or may be screwed to it – to facilitate replacement of the thermocouple. The strip should be approximately 18 mm by 6 mm if it is spot-welded to the plate and nominally 25 mm by 6 mm if it is to be screwed to the plate. The screw is to be 2 mm in diameter.

The assembly of plate and thermocouple should be fitted with a pad of inorganic insulation material 97 ±1 mm by 97 ± 1 mm by 10 ± 1 mm thick with a density of 280 ± 30 kg/m^3.

The relative location of the furnace thermocouples for the exposed face of the specimen – for AS 1530.4:2014 and EN 1363.1:2012 – is 100 mm + 10 mm and 100 mm + 50 mm respectively.

The furnace control thermocouples required by EN 1363.1:2012 are less responsive than those specified by AS 1530.4:2014. This variation in sensitivity can produce a potentially more onerous heating condition for specimen tested to EN 1363.1:2012, particularly when the furnace temperature is changing quickly in the early stages of the test.

Specimen thermocouples

For penetration sealing systems, thermocouples are fixed in generally similar locations on the unexposed face. On the supporting construction, and/or seal and on the penetrating service adjacent at the plane of penetration, and on the penetrating service some distance from the plane of penetration.

Furnace pressure

It is a requirement of AS 1530.4:2014 and for EN 1363.1:2012 that for horizontal elements, a furnace gauge pressure of 20 Pa is established at a height 100 mm below the floor soffit level.

[7] European Committee for Standardization, 2012, Fire resistance tests – General requirements, BS EN 1363-1:2012, European Committee for Standardization, Brussels, Belgium.

The parameters outlining the accuracy of control of the furnace pressure in AS 1530.4:2014 and BS EN 1363.1:2012 are also not appreciably different.

Performance criteria

AS 1530.4:2014 specifies the following performance criteria for building materials and structures:

- structural adequacy (not relevant to the referenced test).
- integrity.
- insulation.

Integrity

The integrity criteria differ slightly between AS 1530.4:2014 and BS EN 1363.1:2012.

While a specimen maintains its insulation performance, the specimen shall be deemed to have failed the integrity criterion – in accordance with AS 1530.4:2014 – if it collapses or sustains flaming or other conditions on the unexposed face, which ignites the cotton pad when applied for up to 30 seconds.

A specimen shall be deemed to have failed the integrity criterion in accordance with AS 1530.4:2014 when any of the following occur:

- Sustained flaming for 10 seconds.
- A gap forms that allows the passage of hot gases to the unexposed face and ignites the cotton pad when applied for up to 30 seconds.
- A gap forms that allows the penetration of a 25 mm gap gauge anywhere on the specimen.
- A gap forms that allows a 6mm x 150mm gap gauge to penetrate the specimen anywhere on the specimen.

Except for minor technical variations the integrity criteria in EN 1363.1:2012 are generally applied in a comparable manner.

Insulation

The general insulation criteria of AS 1530.4:2014 and EN 1363.1:2012 are not appreciably different.

Application of test data to AS 1530.4:2014

The variation in furnace heating regimes, furnace thermocouples, and the responses of the difference thermocouple types to the furnace conditions are not expected to have an overall significant effect on the outcome of the referenced fire resistance tests.

The furnace pressure report – WF 359904 Issue 2 – stated that 100 mm below the soffit of the floor assembly the pressure was maintained between 19 Pa and 23 Pa. Thus, those were all within the limits – specified by AS 1530.4:2014 – for both the wall and floor specimens.

Based on the above discussion, the results relating to the integrity and insulation performance of the referenced test can be used as a basis to assess the FRL of the specimens, if tested in accordance with AS 1530.4:2014.

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