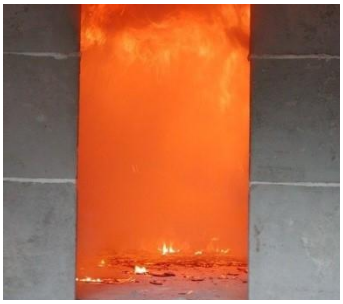

FIRE ASSESSMENT REPORT

FAR 3821 ISSUE 4

FIRE RESISTANCE OF FIREMASTIC 300 AND FIRECOUSTIC LINEAR GAP SEALS

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ASSESSMENT OBJECTIVE

To assess the FRL of Firemastic 300 and Firecoustic linear gap seals in accordance with AS 4072.1-2005 when tested in accordance with AS 1530.4:2014.

CONCLUSION

It is considered that Firemastic 300 and Firecoustic sealant may be used as a linear gap seal and achieve the levels of Integrity and Insulation as given in Table 19 to Table 25 below in accordance with AS 4072.1-2005 when tested in accordance with AS 1530.4:2014.

It is considered that Firemastic 300 and Firecoustic sealant may be used as a sealant around the perimeter of various wall constructions as listed below without being detrimental to the fire resistance of the wall provided the gap width is not greater than 10 mm.

- Hebel
- Metal clad AAC with an established FRL
- Speedpanel
- Dincel
- AFS
- Shaftliner
- Korok
- Concrete
- solid and hollow masonry walls

In the case where there is a deflection head track the maximum gap width may be increased to 20 mm x the full thickness of the plasterboard.

It is considered that Firemastic 300 and Firecoustic sealant may be used to install intumescent dampers either face fixed or in-line with the wall provided that for face fixing the gap is not greater than 5 mm and the damper overlaps the aperture by at least 50 mm. For in-line installation the gap between the edge of the damper and structural opening must not be greater than 25 mm and applied to the full depth of the damper.

LIMITATION

This report is subject to the accuracy and completeness of the information supplied.

BRANZ reserves the right to amend or withdraw this assessment if information becomes available which indicates the stated fire performance may not be achieved.

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04	4 September 2019	4 September 2029	Add expiry date. Update to AS 1530.4:2014 and inclusion of additional wall systems

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1. INTRODUCTION

This report gives BRANZ's assessment of the FRL of Firemastic 300 and Firecoustic linear gap seals in accordance with AS 4072.1-2005 when tested in accordance with AS 1530.4:2014:

- Masonry to masonry
- Masonry to steel, where the steel remains rigid.
- Masonry to timber, where the timber remains rigid.
- General sealant around the perimeter of various walls.
- Sealant around the perimeter of intumescent dampers.

2. BACKGROUND

In Warrington Fire Research Centre fire resistance test report WARRES No. 141438 four specimens of linear gap seal systems in a 250 mm thick aerated concrete floor and four in a 250 mm aerated concrete wall were tested in accordance with the heating conditions and assessed with respect to Integrity and Insulation criteria as given in BS 476: Part 20: 1987 with additional guidelines from prEN 1366-4. The results are given in Table 1 and Table 2.

Table 1: Floor Mounted Specimens (250 mm thick floor)

Specimen Ref	Gap Width mm	Seal Depth mm	Gap faces	Backing	Integrity min	Insulation min
A	30	15	Masonry	PE-rod	300	66
B	20	10	Masonry	PE-rod	300	133
C	10	10	Masonry	PE-rod	300	-
D	50	25	Masonry	PE-rod	300	214

Note: A 10 mm gap is too small to include a thermocouple so no Insulation value is given.
PE = Polyethylene

Table 2: Wall Mounted Specimens (250 mm thick wall)

Specimen Ref	Gap Width mm	Seal Depth mm	Gap faces	Backing	Integrity min	Insulation min
A	30	15	Masonry/steel	PE-rod	300	91
B	20	10	Masonry	PE-rod	300	300
C	10	10	Masonry	PE-rod	300	-
D	30	15	Masonry	PE-rod	300	215

Note: A 10 mm gap is too small to include a thermocouple so no Insulation value is given.

In Bodycote warringtonfire fire resistance test report WF Report No. 168902 three specimens of linear gap seal systems in a 100 mm thick aerated concrete wall and three in a 150 mm aerated concrete floor were tested in accordance with BS EN 1366-4. The results are given in Table 3 and Table 4.

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Table 3: Wall Mounted Specimens (100 mm thick wall)

Specimen Ref.	Gap Width mm	Seal Depth mm	Gap faces	Backing	Integrity min	Insulation min
A wall	20	10	Masonry	PE-rod	137	51
B wall	20	10	Masonry/ timber	PE-rod	33	24
C wall	20	10	Masonry/ mild steel	PE-rod	179	28

Table 4: Floor Mounted Specimens (150 mm thick floor)

Specimen Ref.	Gap Width mm	Seal Depth mm	Gap faces	Backing	Integrity min	Insulation min
D floor	20	10	Masonry	PE-rod	240	53
E floor	20	10	Masonry/ mild steel	PE-rod	240	41
F floor	20	10	Masonry/ timber	PE-rod	35	36

In Bodycote warringtonfire fire resistance test report WF Report No. 168903 three specimens of linear gap seal systems in a 100 mm thick aerated concrete wall and three in a 150 mm aerated concrete floor were tested in accordance with BS EN 1366-4. The results are given in Table 5 and Table 6.

Table 5: Wall Mounted Specimens (100 mm thick wall)

Specimen Ref.	Gap Width mm	Seal Depth mm	Gap faces	Backing	Integrity min	Insulation min
A	50	25	Masonry/ timber	PE-rod	53	53
B	50	25	Masonry/ mild steel	PE-rod	55	42
C	50	25	Masonry	PE-rod	144	66

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Table 6: Floor Mounted Specimens (150 mm thick floor)

Specimen Ref.	Gap Width mm	Seal Depth mm	Gap faces	Backing	Integrity min	Insulation min
D	50	25	Masonry	PE-rod	240	103
E	50	25	Masonry/ mild steel	PE-rod	240	97
F	50	25	Masonry/ timber	PE-rod	57	57

The original sponsor of the tests has given permission to use the data for the purposes of this assessment.

3. DISCUSSION

3.1 Test Standard

The above referenced tests were carried out in accordance with the heating conditions and criteria specified in BS 476: Part 20 with additional guidelines from prEN 1366-4 in WARRES No. 141438 and in accordance with BS EN 1366-4 in WF Report No. 168902 and WF Report No. 168903.

BS 476: Part 20 makes no specific requirement for testing of penetration seals. However tests can be carried out using the heating conditions and criteria specified in that standard. BS EN 1366-4 and prEN 1366-4 give specific requirements for testing linear gap seals which are similar to those specified in AS 1530.4:2014. The results of the tests can therefore be used in providing an assessment in accordance with AS 4072.1-2005 when tested in accordance with AS 1530.4:2014.

3.2 Wall Construction

The linear gap seals tested in fire resistance test reports referenced above were installed in lightweight autoclaved aerated concrete (AAC). This could give a better insulation value than normal concrete or masonry, but is considered unlikely to affect the fire resistance of the seals. Where the seals are used in concrete or masonry construction other than AAC, the lesser insulation value of the actual wall or that given for the wall in Table 2 will apply.

The tests were carried out in walls and floors of thicknesses from 100 mm to 250 mm. The results apply to the specific wall thicknesses as identified in the tables below or of any greater thickness.

3.3 Direction of Fire exposure

In the tests described above the seals were positioned against the fire exposed face. This is considered to be the more onerous direction therefore this assessment applies to fire from either direction when the seals are mounted flush with the face.

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3.4 250 mm Thick Masonry Wall Gap

The specimens tested in WARRES No. 141438 demonstrated their ability to provide their specified Integrity and Insulation. On the principle that a reduction in width will not be detrimental to the performance of the seal. From the result of the 20 mm wide x 10 mm deep seal, which achieved 300 minutes Integrity and Insulation, the seal dimensions given in Table 7 can be used without being detrimental to the fire resistance of the seal.

Table 7: 250 mm Thick Masonry Wall Maximum 20 mm x 10 mm Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
5	10	300	300
10	10	300	300
15	10	300	300
20	10	300	300

Similarly for the 30 mm wide x 15 mm deep seal, which achieved 300 minutes Integrity and 215 minutes Insulation, the seal dimensions given in Table 8 can be used without being detrimental to the fire resistance of the seal.

Table 8: 250 mm Thick Masonry Wall Maximum 30 mm x 15 mm Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
25	15	300	215
30	15	300	215

No test was carried out on a gap wider than 30 mm in the wall. A 50 mm wide linear gap seal was tested in a floor. In WARRES No. 141438, for a given gap width and seal depth, the seal in the wall consistently performed better than the floor, so it is reasonable to use data from a seal in a floor to assess a seal in a wall. On that basis the 50 mm wide x 25 mm deep linear gap seal which achieved 300 minutes Integrity, the seal dimensions given in Table 9 can be used without being detrimental to the fire resistance of the seal.

Table 9: 250 mm Thick Masonry Wall Maximum 50 mm x 25 mm Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
35	25	300	214
40	25	300	214
45	25	300	214
50	25	300	214

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3.5 250 mm Thick Masonry/Mild Steel Wall Gap

Similarly to the masonry to masonry wall gap discussed in section 3.4, data from the seal with a rigid mild steel face on one side can be used to provide the data given in Table 10. In this case the gap was 30 mm wide x 15 mm deep and achieved 300 minutes Integrity and 91 minutes Insulation.

Table 10: 250 mm Thick Masonry Wall Maximum 30 mm x 15 mm Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
5	15	300	91
10	15	300	91
15	15	300	91
20	15	300	91
25	15	300	91
30	15	300	91

3.6 250 mm Thick Masonry Floor Gap

From the result of the 20 mm wide x 10 mm deep seal, which achieved 300 minutes Integrity and 133 minutes Insulation, the seal dimensions given in Table 11 can be used without being detrimental to the fire resistance of the seal.

Table 11: 250 mm Thick Masonry Floor Maximum 20 mm x 10 mm Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
5	10	300	133
10	10	300	133
15	10	300	133
20	10	300	133

From the result of the 30 mm wide x 15 mm deep seal, which achieved 300 minutes Integrity and 66 minutes Insulation, the seal dimensions given in Table 12 can be used without being detrimental to the fire resistance of the seal.

Table 12: 250 mm Thick Masonry Floor Maximum 30 mm x 15 mm Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
25	15	300	66
30	15	300	66

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The 30 mm wide x 15 mm deep seal achieved 300 minutes Integrity and 66 minutes Insulation. In comparison the 50 mm wide x 25 mm deep seal achieved 300 minutes Integrity and 214 minutes Insulation. Both of these seals have the same aspect ratio of 2:1, width to depth. The aspect ratio can be used as a measure of fire resistance performance. Applying this to these results and using the lower performing seal, for a 20 mm deep seal the widths given in Table 13 apply.

Table 13: 250 mm Thick Masonry Floor Maximum 40 mm x 20 mm Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
35	20	300	66
40	20	300	66

In both of these cases the depth of seal is greater than 15 mm and the aspect ratio is 2:1 or less.

From the result of the 50 mm wide x 25 mm deep seal, which achieved 300 minutes Integrity and 214 minutes Insulation, the seal dimensions given in Table 14 can be used without being detrimental to the fire resistance of the seal.

Table 14: 250 mm Thick Masonry Floor Maximum 50 mm x 25 mm Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
45	25	300	214
50	25	300	214

3.7 20 mm Wide x 10 mm Deep Seal

This seal may be installed in a 100 mm thick masonry wall or 150 mm thick floor. The test results given in Bodycote warringtonfire fire resistance test report WF Report No. 168902 demonstrate the ability of the seal to provide the result given in Table 15 and Table 16.

Table 15: Wall Mounted Specimens (100 mm thick wall)

Specimen Ref.	Gap Width mm	Seal Depth mm	Gap faces	Integrity min	Insulation min
A wall	20	10	Masonry	137	51
B wall	20	10	Masonry/timber	33	24
C wall	20	10	Masonry/mild steel	179	28

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Table 16: Floor Mounted Specimens (150 mm thick floor)

Specimen Ref.	Gap Width mm	Seal Depth mm	Gap faces	Integrity min	Insulation min
D floor	20	10	Masonry	240	53
E floor	20	10	Masonry/mild steel	240	41
F floor	20	10	Masonry/timber	35	36

Where the gap faces are timber or mild steel the timber and mild steel must remain rigid as if attached to a masonry wall.

The results given above apply to a maximum 20 mm wide x 10 mm deep seal and any lesser gap width.

3.8 50 mm Wide x 25 mm Deep Seal

This seal may be installed in a 100 mm thick masonry wall or 150 mm thick floor. The test results given in Bodycote warringtonfire fire resistance test report WF Report No. 168903 demonstrate the ability of the seal to provide the results given in Table 17 and Table 18.

Table 17: Wall Mounted Specimens (100 mm thick wall)

Specimen Ref.	Gap Width mm	Seal Depth mm	Gap faces	Integrity min	Insulation min
A	50	25	Masonry/timber	53	53
B	50	25	Masonry/mild steel	55	42
C	50	25	Masonry	144	66

Table 18: Floor Mounted Specimens (150 mm thick floor)

Specimen Ref.	Gap Width mm	Seal Depth mm	Gap faces	Integrity min	Insulation min
D	50	25	Masonry	240	103
E	50	25	Masonry/mild steel	240	97
F	50	25	Masonry/timber	57	57

Where the gap faces are timber or mild steel the timber and mild steel must remain rigid as if attached to a masonry wall.

The results given above apply to a maximum 50 mm wide x 25 mm deep seal and any lesser gap width.

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3.9 General Sealant around the Perimeter of Various Walls

The tests referenced in section 3 above demonstrated the ability of the Firemastic 300 and Firecoustic linear gap sealant to fill various gaps without causing flaming on the unexposed face and maintaining the Integrity of the wall for up to 300 minutes. When used with a plasterboard wall it is unlikely that a gap of the dimensions given in the above tables would exist and any edge detail at head, bottom and sides would be backed by a timber or steel stud. In this application the sealant is not being subject to the same heating conditions as in a gap penetrating through the wall. It is therefore expected that the sealant would provide Integrity and Insulation of at least 300 minutes, subject to the maximum Integrity and Insulation of the wall. Generally as the fire resistance of a plasterboard wall increases, the thickness of lining increases, therefore the depth of seal will increase. The gap width must not exceed 10 mm and must be to the full depth of the plasterboard.

In the case where there is a deflection head track the maximum gap width may be increased to 20 mm x the full depth of the plasterboard.

A similar discussion applies to other wall types where the surfaces may be masonry, steel, plasterboard or similar products. Acrylic sealants also have the ability to adhere to PVC so it can be used with a Dincel wall. Typical wall types are as follows:

- Hebel
- Metal clad AAC with an established FRL
- Speedpanel
- Dincel
- AFS
- Shaftliner
- Korok
- Concrete
- solid and hollow masonry walls

3.10 Sealant Around the Perimeter of Intumescent Dampers.

Intumescent dampers may be installed either fixed to the face of a wall or in line with the wall. In both situations Firemastic 300 and Firecoustic sealant may be used to fill any gaps.

Where the intumescent damper is face fixed, the Firemastic 300 and Firecoustic is applied to the section of the damper in contact with the wall and to any steel brackets attached to the wall. The damper must overlap the wall by at least 50 mm and any gaps must not exceed 5 mm.

Where the damper is mounted in line with the wall the Firemastic 300 and Firecoustic is applied all round the edge of the damper. The gap between the edge of the damper and structural opening must not exceed 25 mm and the sealant must be filled to full depth of the damper. This will be significantly in excess of any linear gap seal tested in the reports referenced in section 3 above and would therefore be expected to maintain the fire resistance of the damper.

Notwithstanding the above installation specification, the dampers manufacturers installation instructions must be followed. However Firemastic 300 and Firecoustic may be used in place of the sealant specified.

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3.11 Colour

The colour of the seal may be changed from the white colour tested. The addition of pigments is not expected to be detrimental to the fire performance discussed above.

3.12 Backing Rod/Material

In the tests referenced in section 3 above the backing rod was foamed polyethylene (PE). The PE rod controls the depth of seal and fills only a part of the gap. With the rod or backing material within the gap, it is unlikely to be detrimental to the fire resistance of the seal. With that consideration, a PE rod or similar material may be used provided it does not extend to within the depth of the seal on either face.

4. CONCLUSION

It is considered that Firemastic 300 and Firecoustic sealant may be used as a linear gap seal and achieve the levels of Integrity and Insulation as given in Table 19 to Table 25 below in accordance with AS 4072.1-2005 when tested in accordance with AS 1530.4:2014.

It is considered that Firemastic 300 and Firecoustic sealant may be used as a sealant around the perimeter of various wall constructions as listed below without being detrimental to the fire resistance of the wall provided the gap width is not greater than 10 mm.

- Hebel
- Metal clad AAC with an established FRL
- Speedpanel
- Dincel
- AFS
- Shaftliner
- Korok
- Concrete
- solid and hollow masonry walls

In the case where there is a deflection head track the maximum gap with may be increased to 20 mm x the full thickness of the plasterboard.

It is considered that Firemastic 300 and Firecoustic sealant may be used to install intumescent dampers either face fixed or in-line with the wall provided that for face fixing the gap is not greater than 5 mm and the damper overlaps the aperture by at least 50 mm. For in-line installation the gap between the edge of the damper and structural opening must not be greater than 25 mm and applied to the full depth of the damper.

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Table 19: 250 mm Thick Masonry Wall Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
5	10	300	300
10	10	300	300
15	10	300	300
20	10	300	300
25	15	300	215
30	15	300	215
35	25	300	214
40	25	300	214
45	25	300	214
50	25	300	214

Table 20: 250 mm Thick Masonry/Mild Steel Wall Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
5	15	300	91
10	15	300	91
15	15	300	91
20	15	300	91
25	15	300	91
30	15	300	91

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Table 21: 250 mm Thick Masonry Floor Gap

Gap Width mm	Seal Depth mm	Integrity min	Insulation min
5	10	300	133
10	10	300	133
15	10	300	133
20	10	300	133
25	15	300	66
30	15	300	66
35	20	300	66
40	20	300	66
45	25	300	214
50	25	300	214

Table 22: Wall Mounted Specimens (100 mm thick wall)

Gap Width mm	Seal Depth mm	Gap faces	Integrity min	Insulation min
20	10	Masonry	137	51
20	10	Masonry/timber	33	24
20	10	Masonry/mild steel	179	28

Table 23: Floor Mounted Specimens (150 mm thick floor)

Gap Width mm	Seal Depth mm	Gap faces	Integrity min	Insulation min
20	10	Masonry	240	53
20	10	Masonry/mild steel	240	41
20	10	Masonry/timber	35	36

The results given above apply to a maximum 20 mm wide x 10 mm deep seal and any lesser gap width.

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Table 24: Wall Mounted Specimens (100 mm thick wall)

Gap Width mm	Seal Depth mm	Gap faces	Integrity min	Insulation min
50	25	Masonry/timber	53	53
50	25	Masonry/mild steel	55	42
50	25	Masonry	144	66

Table 25: Floor Mounted Specimens (150 mm thick wall)

Gap Width mm	Seal Depth mm	Gap faces	Integrity min	Insulation min
50	25	Masonry	240	103
50	25	Masonry/mild steel	240	97
50	25	Masonry/timber	57	57

The results given above apply to a maximum 50 mm wide x 25 mm deep seal and any lesser gap width.

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