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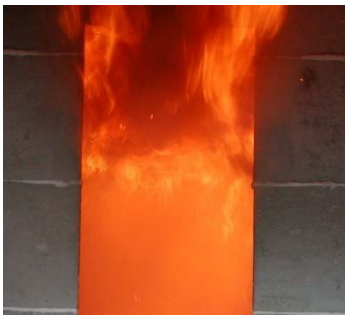

FIRE ASSESSMENT REPORT

FAR 3895

ASSESSMENT OF A NON LOAD BEARING HORIZONTAL AND VERTICAL ORIENTATED SPEEDPANEL WALL WITH VARIATIONS TO CONNECTION DETAILS

CLIENT
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ASSESSMENT OBJECTIVE

This report gives BRANZ's assessment of the fire resistance of the Speedpanel non-loadbearing, pre-cast, horizontal and vertical panel orientated wall as previously assessed in BRANZ assessment FAR 3580 with variations to the connection details between the horizontal and vertical orientated panels.

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.

This assessment report may only be quoted or reproduced in full.

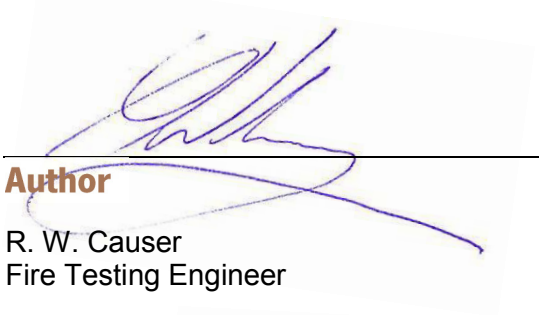
TERMS AND CONDITIONS

This report is issued in accordance the Terms and Conditions as detailed and agreed in BRANZ Services Agreement for this work.

CONTENTS

FIGURES

SIGNATORIES



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1. BACKGROUND

1.1 BRANZ Assessment Report FAR 3582

In BRANZ assessment report FAR 3582 the fire resistance in accordance with AS 1530.4-2005 of a Speedpanel shaft comprising horizontally orientated panels up to 4,500 mm wide with continuous height were considered to provide at least 120 minutes integrity and 120 minutes insulation fire resistance with the following provisions:

- All walls in the systems are non-load bearing.
- The combined load of the horizontal Speedpanel walls onto the vertical Speedpanel wall should not exceed 180 kg per linear meter. Variations to this limitation will require structural analysis on a project specific basis.
- Where the perimeter tracks pass through by a floor slab, they should be overlapped by at least 350 mm and in all cases should additionally be fixed using a minimum size M8 steel bolt penetrating the floor slab edge, centrally, by at least 50 mm.
- Subject to the wall and/or shaft construction being structurally adequate under ambient conditions.

1.2 BRANZ Assessment Report FAR 3581

In BRANZ assessment report FAR 3581 the fire resistance in accordance with AS 1530.4-2005 of a Speedpanel vertically aligned walls up to 4,500 mm high were considered to provide at least 120 minutes integrity and 120 minutes insulation fire resistance with the following provisions:

- Maximum wall height between floor levels 4,500 mm
- Maximum wall width between perimeter walls and shaft unlimited
- Minimum steel sheath thickness 0.44 mm
- Maximum fixing centres at panel interlock 1,500 mm
- Minimum design criteria for perimeter track contained in FAR 3107, FAR 3561, FP 3904 and FR 3754

1.3 BWA Fire Resistance Test Report 2257600.4

In BWA fire resistance test 2257600.4 the test specimen consisted of a non-loadbearing, Speedwall® panel wall nominally 3,000 mm high by 3,000 mm wide which comprised interlocking panels (tongue and groove), each 285 mm wide x 78 mm thick, of a light weight concrete core with galvanised steel sheathing. Steel C-channels, 54 mm x 83 mm x 54 mm x 1.19 mm thick were fixed to all perimeter edges of the Speedpanel wall.

A 25 mm clearance gap was provided between the top edge of the panels and the specimen frame, and a 80 mm gap was provided between the specimen frame

holder at the bottom. A 10 mm expansion gap was provided at the sides between the panels and side C-track.

The specimen was tested for a duration of 242 minutes in accordance with AS 1530.4-2005 and achieved fire resistance of 128 minutes integrity due to flaming of a cotton pad at a horizontal join in the middle of the upper half of the wall.

After 23 minutes the insulation failure occurred when the temperature recorded on the east side of the bottom quarter channel exceeded the test criterion of 180°C temperature rise (sealant on the exposed side only).

The temperature rise around the perimeter C-track of the wall varied from 23 minutes to 114 minutes and was depended on the application of intumescent paint and/or acrylic sealant.

The temperature rise of the panel exceeded the test criterion of a temperature rise of 180°C above ambient at 15 mm below a horizontal join in the top half of the wall (approximately the mid point of the top half) after 117 minutes

Full details of the construction of the wall and the results achieved are given in BWA fire resistance test report 2257600.4, dated 25 June 2008.

1.4 BRANZ Fire Resistance Test FR 3569

In BRANZ fire resistance test FR 3569 the test Specimen consisted of a non-loadbearing, Speedwall® panel wall nominally 4,000 mm high by 3,000 mm wide which comprised interlocking panels (tongue and groove), each 286 mm wide x 78 mm thick, of a light weight concrete core with galvanised steel sheathing. Steel C-channels, 60 mm x 80 mm x 60 mm x 1.16 mm thick were fixed to the top, base and left hand perimeter edges of the wall with bolts. The channels were sealed to the specimen frame and to the panels with Bostik Firecaulk fire rated acrylic sealant. The panels were fixed to the channels and to each other with 5 mm diameter x 15 mm long TEK screws. Each panel was fixed to the next at 1,500 mm centres on both sides of the vertical joints.

A 10 mm expansion gap was provided between the top edge of the panels and the specimen frame, and filled with a bead of sealant.

The specimen was tested for a duration of 141 minutes in accordance with AS 1530.4-1997 and achieved fire resistance of 105 minutes Integrity and 72 minutes Insulation. Insulation failure occurred when the temperature recorded on the head channel exceeded the test criterion of 180°C temperature rise. The temperature rise recorded on this head channel at 120 minutes was 257°C. The temperature rises recorded on the edge channels at the sides of the wall did not exceed the test criterion prior to 120 minutes.

Full details of the construction of the wall and the results achieved are given BRANZ fire resistance test report FR 3569, dated 21 March 2006.

1.5 BRANZ Fire Resistance Test FR 3754

In BRANZ fire resistance test FR 3754 the test Specimen consisted of a non-loadbearing, Speedwall® panel wall nominally 3,000 mm high by 3,000 mm wide which comprised interlocking panels (tongue and groove), of a light weight concrete core with galvanised steel sheathing. Steel angles, 64 mm x 55 mm x 1.15 mm thick were fixed to the top, base and left hand perimeter edges of the wall with bolts. The angles were sealed to the specimen frame and the panels with Bostik Firecaulk fire rated acrylic sealant. The panels were fixed to the angles and to each other with Hilti DB7 6 mm diameter fasteners. Each panel was fixed to the next at 1,000 mm centres on both sides of the vertical joints.

A 10 mm expansion gap was provided between the top edge of the panels and the specimen frame, and filled with a bead of sealant. A second set of angles was screw fixed to the unexposed face of the panels at the top, base and left hand side of the with Hilti DB7 fasteners and a bead of sealant was placed between the angles and the panels and specimen frame.

The specimen was tested in accordance with AS 1530.4-1997 and achieved fire resistance of 245 minutes Integrity and 123 minutes Insulation.

Full details of the construction of the wall and the results achieved are given in BRANZ fire resistance test report FR 3754, dated 12 June 2007.

1.6 BRANZ Pilot Fire Resistance Test FP 3904

BRANZ un-reported pilot fire resistance test FP 3904 was carried out on 30 October 2007 at the BRANZ laboratories at Judgeford. The test Specimen consisted of a Speedwall® panel wall nominally 2,200 mm high by 1,000 mm mm wide, identical to that tested in fire resistance test FR 3754, except it included an alternative head detail consisting of a C-channel and Z-flashing strips to each face. The specimen was tested generally in accordance with AS 1530.4-1997, except it was of reduced size. The flashing detail maintained the Integrity criteria for 132 minutes without failure and the Insulation criteria for 130 minutes.

1.7 BRANZ Assessment Report FAR 3107

In BRANZ assessment report FAR 3107 the fire resistance in accordance with AS 1530.4-1997 of the wall tested in BRANZ fire resistance test FR 3754 with the alternative top edge flashing detail tested in FP 3904 was considered to be at least 240 minutes Integrity and 120 minutes Insulation.

1.8 BRANZ Assessment Report FAR 3561

In BRANZ assessment report FAR 3561 the fire resistance in accordance with AS 1530.4-1997 of the wall tested in BRANZ fire resistance test FR 3754 was considered to be at least 120 minutes Integrity and 120 minutes Insulation with:

the construction as tested in FR 3754 or alternatively the head detail as tested in pilot fire resistance test FP 3904 as detailed in Figure 1 of Assessment Report FAR 3107; and

1. the construction as tested in FR 3754 or alternatively the bottom and side edge detail consisting of channel sections as tested in FR 3569; and
2. the wall having a maximum height of 4,500 mm; and
3. the screws fixing the panels together at the tongue and groove joints are spaced at 1,500 mm maximum.

1.9 BRANZ Assessment Report FAR 3454

In BRANZ assessment report FAR 3454 the fire resistance in accordance with AS 1530.4-2005 of a Speedpanel wall in BRANZ fire resistance tests FR 3754 and FR 3569 comprising a 90° fixing to another Speedpanel wall was considered to be at least 120 minutes Integrity and 120 minutes Insulation. The perimeter track detail was required to be the same as that in BWA 2257600 or FR 3569. The fixing details of the Speedpanel 90° angle junction is detailed in BRANZ assessment report FAR 3454.

2. DISCUSSION

2.1 90° Junction between a horizontal and vertical Speedpanel wall

In BRANZ assessment report FAR 3454 the installation discussed were two vertically orientated panels at 90° and secured together. The edges of each panel are encapsulated with mild steel C-track as previously tested. Fire rated sealant is to be applied between the end of the panels and tracks and between tracks. The tracks are to be secured together at 250 mm centres through both tracks and the skin of the next panel with a pair of 10 gauge x 16TPI x 16 mm long screws. On the inside of the junction a mild steel angle nominally 50 mm x 50 mm x 1.2 mm thick will be secured at 250 mm centres to each panel. Fire rated sealant will be applied between panels and under the angle section.

Fire exposure for this junction detail is considered from each direction. It is considered that the horizontal panel and vertical panel junction detail gives a conservative method for securing the panels together. It is also considered the horizontal panels will not impact on the integrity of the joint as test evidence has shown that the panels are largely self supporting and deflection at the end junctions of the walls are minimised. The 90 degree junction is expected to provide lateral bracing to the vertical wall and the junction detail will prevent hot gases penetrating through the junction.

The proposal also includes the 4,500 mm wide horizontal panel as a continuous wall similar to that discussed in FAR 3582. The significant difference is that the horizontal panels terminate at one end with the junction detail discussed above. It is considered that the continuous wall will not prejudice the junction detail as long as the provisions set out in section 1.1 are complied with.

It is therefore considered the installation detail as described above and in Figure 1 would maintain the Integrity and Insulation criteria of a vertical and horizontal Speedpanel wall nominally 78 mm thick for at least 120 minutes.

2.2 Straight junction between a vertical and horizontal Speedpanel wall

BRANZ assessment report FAR 3581 assessed vertically orientated Speedpanel walls between a perimeter masonry wall and a shaft wall for continuous length with the provisos as detailed in section 1.2.

BRANZ assessment report FAR 3582 assessed horizontally orientated Speedpanel walls up to a maximum 4,500 mm wide with unlimited height with the provisions as described in 1.1.

The proposal is for the wall described in FAR 3582 to be secured between a masonry wall at one side of a shaft and to a vertically oriented Speedpanel wall at each floor level running in line with the Horizontal wall. The top and bottom C-track and - screw fixings have been tested and discussed in previous assessments. The

new junction detail is shown in Figure 2. The end of each section of vertical and horizontal wall is capped with a C-track section measuring 90 mm x 55 mm x 1.2 mm thick. Both sections of C-track are secured together back to back with 10 gauge x 16TPI x 30 mm long self drilling screws at 450 mm centres. The vertical and horizontal wall sections are screw fixed through each side of the C-track into the wall with 10 gauge x 16TPI x 30 mm long self drilling screws at 200 mm centres. Based on fire resistance testing of Speedpanel walls, it is expected that the panels will deflect towards the fire. As the wall will deflect towards the fire, further strengthening of the wall junction is required at this location. This should be placed on the landing side as this is considered the more onerous. The junction between the two types of wall is strengthened with a 1.0 mm thick flashing detail as shown in Figure 2. This detail is included on the non shaft side only. The flashing detail is secured either side of the channels with 10 gauge x 16TPI x 30 mm long self drilling screws at 200 mm centres. Fire rated sealant is include along the vertical joint and at each side of the C-Track on the vertical and horizontal side of the junction. The flashing detail is secured over the sealant.

It is therefore considered the installation detail as described above and in Figure 2 would maintain the Integrity and Insulation criteria of a vertical and horizontal Speedpanel wall nominally 78 mm thick for at least 120 minutes.

3. CONCLUSION

It is considered the installation details as described above and shown in Figures 1 and 2 would maintain the Integrity and Insulation criteria of the junction between a vertical and horizontal Speedpanel wall nominally 78 mm thick for at least 120 minutes in accordance with AS1530.4-2005 subject to the following provisions:

- All walls in the systems are non-load bearing.
- The combined load of the horizontal Speedpanel walls onto the vertical Speedpanel wall should not exceed 180 kg per linear meter. Variations to this limitation will require structural analysis on a project specific basis.
- Where the perimeter tracks pass through by a floor slab, they should be overlapped by at least 350 mm and in all cases should additionally be fixed using a minimum size M8 steel bolt penetrating the floor slab edge, centrally, by at least 50 mm.
- Subject to the wall and/or shaft construction being structurally adequate under ambient conditions.

Figure 1: 90° Junction detail between a horizontal and vertical Speedpanel wall

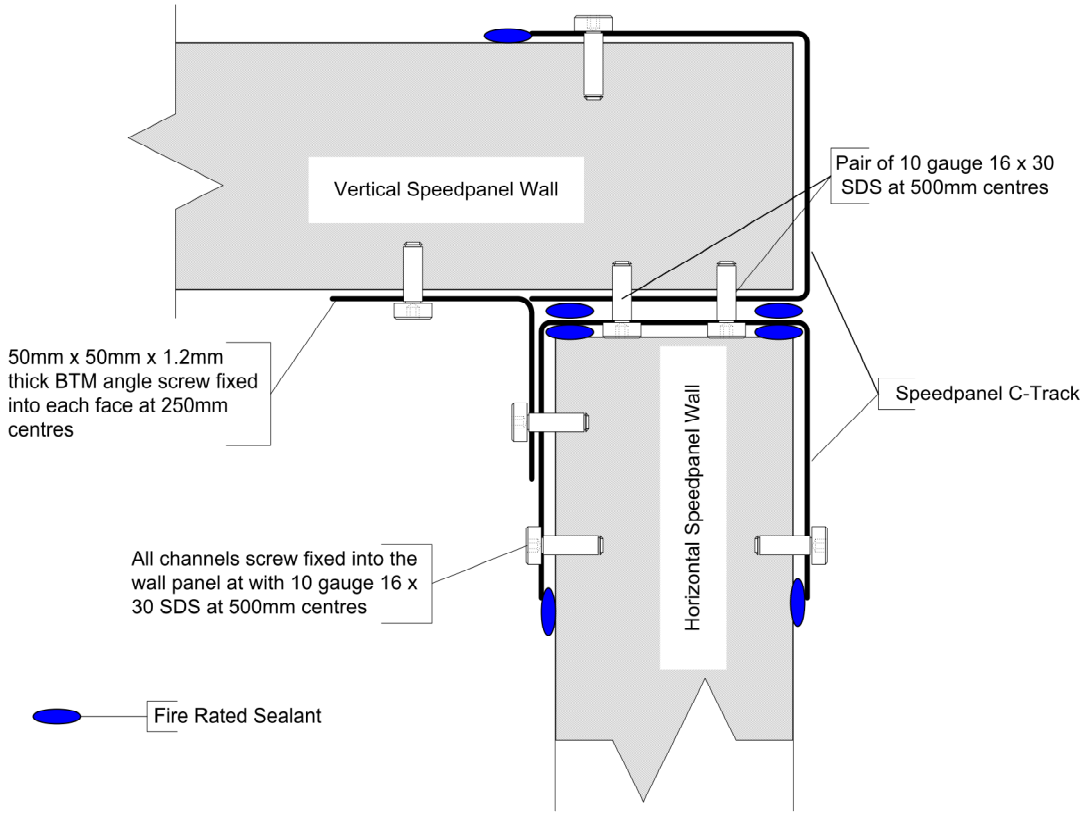

Figure 2: Flashing detail for junction between vertical and horizontal Speedpanel wall