ASSESSMENT REPORT

The fire resistance performance of 77mm thick Speedpanel wall systems incorporating Blendair MFD Series, SBFP Series, SHD Series and SSD Series dampers when tested in accordance with AS1530.4-1997 section 7.

Report No:

27776-01

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1 INTRODUCTION

This report presents an assessment of the fire resistance performance of 77mm thick Speedpanel wall systems incorporating Blendair MFD Series, SBFP Series, SHD Series and SSD Series dampers when tested in accordance with AS1530.4-1997 section 7.

The tested systems are described in Section 2 and are to be subject to the proposed variations described in Section 3 and tested in accordance with the referenced test method described in Section 4. The conclusions of the report are summarised in Section 5. The validity of this assessment is conditional on compliance with Sections 7, 8 and 9 of this report.

Summaries of the test data on which this assessment is based are provided in the Appendices together with a summary of the critical issues leading to the assessment conclusions including the main points of argument.

2 TESTED PROTOTYPES

This assessment is based on fire resistance tests FSV 0844, FSV 1395, FSV 0931, BWA 2352300, WFRA 2182600, FSV 1253, BWA 2286900.5, FSV 0562, WFRA 41162.1 and EWFA 2517300.2.

The test specimen reported in FSV 0562 comprised a Speedpanel wall lined with two types of plasterboard in order to provide information. The test was stated to be in accordance with AS1530.4-1997. This test was sponsored by Speedwall Building Product, who has provided permission for the reference of this data by Exova Warringtonfire on behalf of Speedpanel Victoria Pty Ltd.

The test specimen reported in FSV 0931 comprised a 142mm drywall incorporating three Blendair SHD Series dampers, a MFD Series damper and a SBFP Series damper tested in accordance with AS1530.4-1997. This test was sponsored by Blendair Pty Ltd.

The test specimen reported in FSV 1395 comprised a 190mm thick masonry wall incorporating two Blendair SHD Series dampers tested in accordance with AS1530.4-1997. This test was sponsored by Bovis Lend Lease Pty Limited, who has provided permission for the reference of this data by Exova Warringtonfire on behalf of Speedpanel Victoria Pty Ltd.

The test specimen reported in FSV 0844 comprised a 230mm thick masonry wall incorporating a Blendair SHD Series Damper tested in accordance with AS1530.4-1997. This test was sponsored by Blendair Pty Ltd.

BWA 2286900.5 comprised a test of a vertical 78mm thick Speedpanel wall system 3m × 3m in size. The wall was loaded to simulate a wall of increased height. The specimen was tested in accordance with AS 1530.4-2005 and sponsored by Speedpanel Vic Pty. Ltd

The test specimen reported in WFRA 2182600a.1 comprised a 156mm thick fire rated plasterboard partition incorporating two Blendair SSD Series dampers tested in accordance with AS1530.4-1997. This test was sponsored by Bovis Lend Lease Pty Ltd, who has provided permission for the reference of this data by Exova Warringtonfire on behalf of Speedpanel Victoria Pty Ltd.

The test specimen reported in WFRA 41162.1 comprised a 48mm thick Speedpanel wall tested in accordance with AS1530.4-1997. This test was sponsored by Speedpanel Victoria Pty Ltd.

The test specimen reported in EWFA 2517300.2 comprised a 77mm thick Speedpanel wall incorporating various dampers in close proximity to each other tested in accordance with AS1530.4.2005. This test was sponsored by Speedpanel Victoria Pty Ltd.

The test specimen reported in FSV 1253 comprised a 144mm thick fire grade plasterboard lined wall incorporation a dual module motorised fire/smoke damper assembly tested in accordance with AS1530.4-1997. This test was sponsored by Blendair Pty Ltd and Bovis Lend Lease Pty Ltd who has provided permissions for the reference of this data by Exova Warringtonfire on behalf of Speedpanel Victoria Pty Ltd.

The test specimen reported in BWA 2352300 comprised of a 100mm thick Hebel wall incorporating a dual Blendair BSHD Series damper and a Blendair SBFP Series damper tested in accordance with AS1530.4-1997. This test was sponsored by Bovis Lend Lease Pty Ltd, who has provided permission for the reference of this data by Exova Warringtonfire on behalf of Speedpanel Victoria Pty Ltd.

Refer to Appendix A for full summary of the referenced test data.

3 VARIATION TO TESTED PROTOTYPES

Table 1 – Schedule of Components

Item	Description	
1	**Name**	**Trimming Channel**
	Material	Galvanised mild steel
	Size	79mm × 50mm × 1.2mm, cut to suit opening.
2	**Name**	**Speedpanel Panel**
	Material	Mild steel section filled with lightweight concrete as tested in BWA 2286900.5. 
	Size	250mm wide × 78mm thickness
3	**Name**	**Track fixing**
	Size	6mm Dynabolts with 40mm minimum penetration into concrete.
	Spacing	450mm centres
4	**Name**	**10G self-drilling screw through track into panel**
	Material	Mild steel
	Spacing	250mm centres (though within 100mm of track fixing) on each side of wall
5	**Name**	**Speedpanel Channel**
	Material	Galvanised mild steel
	Size	83mm wide × 58mm high × 1.2mm thick
	Sealant	Fire rated acrylic sealant used to seal any gaps between the top and bottom channels and panels. Fire rated acrylic sealant also used to seal interface of channel and surrounding construction. This element may require protection to achieve insulation performance (outside the scope of this assessment).
6	**Name**	**Panel to Panel connecting screws**
	Material	10G self-drilling screw through tongue and groove connecting panel together, on each side of panel.
	Spacing	Above dampers at 400mm vertical centres in every joint. Wall (up to 4.5m in height) generally 1500mm centres in every joint. Wall (up to 6.0m in height) generally 1000mm centres in every joint.
7	**Name**	**Trimming Channel to Panel Screws**
	Material	10G self-drilling screws through track into panel on each side of wall.
	Spacing	400mm centres.
8	**Name**	**Trimming Channel to Panel Screws**
	Material	10G self-drilling screws through track into panel on each side of wall.
	Spacing	400mm centres.

Item	Description	
9	**Name**	**Fire Tested Sealant**
	Material	Refer to Requirements Section 7 for Spec
	Installation	To be applied at the gap formed between the join in the panel and the track to a depth of 15mm min.
10	**Name**	**Fire Tested Sealant**
	Material	Refer to Requirements Section 7 for Spec
	Installation	To be applied at the gap between the track and the panel
11	**Name**	**Damper Trimming Angles**
	Material	Galvanised mild steel
	Size	50mm × 50mm × 1.6mm
12	**Name**	**Angle to Duct fixing**
	Material	Galvanised mild steel
	Size	10G self-drilling screws through track each side of wall.
13	**Name**	**Fire Tested Sealant (Optional)**
	Material	As for Item 9
	Installation	To be applied at the gap between the angle and the duct
14	**Name**	**Blendair MFD Series, SBFP Series, SHD Series and SSD Series dampers**
	Material	Galvanised mild steel
	Size	Blendair SBFP series dampers of maximum size 300mm wide by 300mm high Blendair MFD series dampers of maximum size 1200mm wide by 1200mm high Blendair SHD series dampers of maximum size 1200mm wide by 1200mm high Blendair SSD series dampers of maximum size 1200mm wide by 300mm high and, 450mm wide by 450mm high
15	**Name**	**Duct fixed to Damper**
	Material	Galvanised mild steel
	Installation	To be fixed to each side of damper
16	**Name**	**SHS**
	Size	75mm × 75mm × 5mm SHS for up to 4m high walls. 75 × 125mm × 4mm RHS for up to 6m high walls.
	Material	Galvanised mild steel
	Installation	To be fabricated into portal frame to support panels over damper.
17	**Name**	**Protection for Steel**
	Material	Fire Grade Plasterboard
	Size	3 layers of 16mm Fire grade plasterboard, fixed in accordance with detail 6. 2 layers of 13mm fire grade plasterboard 75mm wide installed on the occupancy side between damper flange and Speedpanel wall.
18	**Name**	**Gyprock Screws**
	Material	6g plasterboard screws
	Fixing	Fixed from each layer to boxed steel stud or trimming track
19	**Name**	**Boxed Track**
	Material	Galvanised mild steel
	Size	Boxed 76 × 32mm steel track fixed to steel frame at 400 centres with 10 self-drilling screws.
20	**Name**	**Trimming Angles**
	Material	Galvanised mild steel
	Size	75mm × 75mm × 0.8mm steel angles
21	**Name**	**Lateral Support Beam**

Item	Description	
	Material	Galvanised mild steel
	Specification	Z-section purlin sized by others. Shall be used in conjunction with lateral restraining braces (see items 24 and 25). The purlin and associated braces shall be designed and installed such that purlin has a maximum deflection of span/360 or 20mm for internal building pressures.
	Installation	Beam shall be fixed to every panel with 10G self-drilling screws through every intersecting tongue and groove panel joint.
22	**Name**	**Beam Protection**
	Material	Board Material such as Boral Firestop plasterboard
	Specification	Protection system shall be tested or assessed to have an FRL of at least 120/-/- when installed on beam section protected. All connections shall be protected with the maximum protection thickness required of any of the members utilising the connection, as per AS4100-1998 clause 12.10.1.
	Installation	Board protection shall be fixed in accordance with tested or assessed prototype design.
23	**Name**	**Column Protection**
	Material	Board Material such as Boral Firestop plasterboard
	Specification	Protection system shall be tested or assessed to have an FRL of at least 120/-/- when installed on column section protected. All connections shall be protected with the maximum protection thickness required of any of the members utilising the connection, as per AS4100-1998 clause 12.10.1.
	Installation	Board protection shall be fixed in accordance with tested or assessed prototype design.
24	**Name**	**L Brace**
	Material	Mild Steel
	Specification	Protection system shall be tested shall be tested or assessed to have an FRL of at least 120/-/- when installed on beam section protected. All connections shall be protected with the maximum protection thickness required of any of the members utilising the connection, as per AS4100-1998 clause 12.10.1.
25	**Name**	**Inclined Brace / Prop.**
	Material	Mild Steel
	Specification	Brace / prop. Shall be fixed to underside of slab and designed to laterally support beam (item 21) for ambient loading. All connections shall be protected with the maximum protection thickness required of any of the members utilising the connection, as per AS4100-1998 clause 12.10.1.
26	**Name**	**Lintel SHS**
	Specification	DuraGal 50 × 50 × 4mm (min)
27	**Name**	**Lintel RHS**
	Specification	DuraGal 100 × 50 × 4mm (min). Shall be used in conjunction with vertical restraining members (see item 26), which shall be located at maximum 3705mm centres; and also in conjunction with lateral restraining members (see items 24 and 25). Lateral restraining members shall be designed and installed such that lintel has a maximum deflection of span/360 or 20mm for internal building pressures.
28	**Name**	**Plate**
	Specification	50 × 200 × 6mm steel plate (min)
	Installation	Welded to item 27 and bolt fixed to item 26
29	**Name**	**Tek Screw**

Item	Description	
	Specification	14 – 20 × 150mm
	Installation	Installed through RHS section into wall panel. Two screws shall be installed at nominally 250mm centres at each panel joint location which fully penetrate the panel.
30	**Name**	**Top Track Protection**
	Material	CSR Fyrchek Plasterboard
	Size	one layer of 13mm thick strip × 120mm wide, *or* two layers of 16mm thick strips × 120mm wide
	Installation	*For one layer of 13mm thick strip:* Installed both sides of top track, secured with fixings through metal capping. (refer figure 19(a) for details) *For two layers of 16mm thick strips:* Installed one side of top track, secured with fixings through metal capping into top track. (refer figure 19(b) for details)
31	**Name**	**Metal Flashing**
	Size	150mm wide × 1mm thick
	Installation	Screw fixed with two lines of screws through plasterboard into track and panel at 500mm centres for one layer of 13mm thick top track protection board and at 250mm centres for two layers of 16mm thick ones.
32	**Name**	**Speedpanel C-Track**
	Size	1.2BMT (refer figure 20- 22 for details)
	Installation	Screw fix tracks both sides at 500mm centres with item 36
33	**Name**	**Adjustable track**
	Size	1.2BMT (refer figure 20- 22 for details)
	Installation	Screw fix tracks both sides at 500mm centres with item 36
34	**Name**	**Vicuclad, fire grade plasterboard or Promatect 50**
	Size	Minimum 50mm thick
	Installation	Fixed into the Speedpanel track leaving a gap of minimum 20mm under adjustable track
35	**Name**	**Track fixings**
	Size	Metal pin anchor or M6.5 × 38 Mushroom head spike
	Installation	Fix adjustable track to slab above every 600mm centres
36	**Name**	**Screw fixings**
	Size	10G 16 × 16 SDS
	Installation	Used to screw fix Speedpanel track (item 32) and adjustable track (item 33) to item 34
37	**Name**	**Floor Slab**
	Description	Min. FRL- 120/120/120
38	**Name**	**Steel Angle**
	Size	50mm × 25mm
	Installation	*Option 1* Installed between top C-track (item 5) and two layers of 16mm thick Fyrchek plasterboard (item 30) and fixed through the C-track into panel at 250mm centres and then fixed to concrete slab by using track fixing (item 3). (Refer figure 19(c) for details.) *Option 2* Installed adjacent to metal flashing (item 31) and fixed through plasterboard and C-track into panel at 250mm centres and then fixed to concrete slab by using track fixing (item 3). (Refer figure 19(d) for details.)

3.1 DAMPERS IN SPEEDPANEL WALLS UP TO 4.5M HEIGHT

Walls up to 4.5m in height shall be constructed as tested in BWA 2286900.5, subject to the following variations:

- Include single damper of size 2000 (max.) wide × 1000 (max.) high near top of unbraced wall up to 4500mm in height, as shown in figures 1 and 1A.
- Include multiple dampers of size 2000 (max.) wide × 1000 (max.) high near top of unbraced wall up to 4500mm in height, as shown in figures 2 and 2A.
- Include multiple dampers of size 2000 (max.) wide × 1000 (max.) high near top of wall up to 4500mm in height including a lateral support beam below the dampers, as shown in figures 3 and 3A.
- Include multiple dampers of size 1650 (max.) wide × 2250 (max.) high near base of wall up to 4000mm in height including a lateral and vertical support beam above the dampers, as shown in figure 4.
- Include single damper of size 1650 (max.) wide × 2250 (max.) high near base of wall up to 4500mm in height including a lateral and vertical support beam above the damper, as shown in figure 5.
- The dampers which may be included are the following:
    - Blendair SBFP series as tested in FSV 0931
    - Blendair MFD series as tested in FSV 1253
    - Blendair SHD series as tested in FSV 0884
    - Blendair SSD series as tested in BWA 2182600

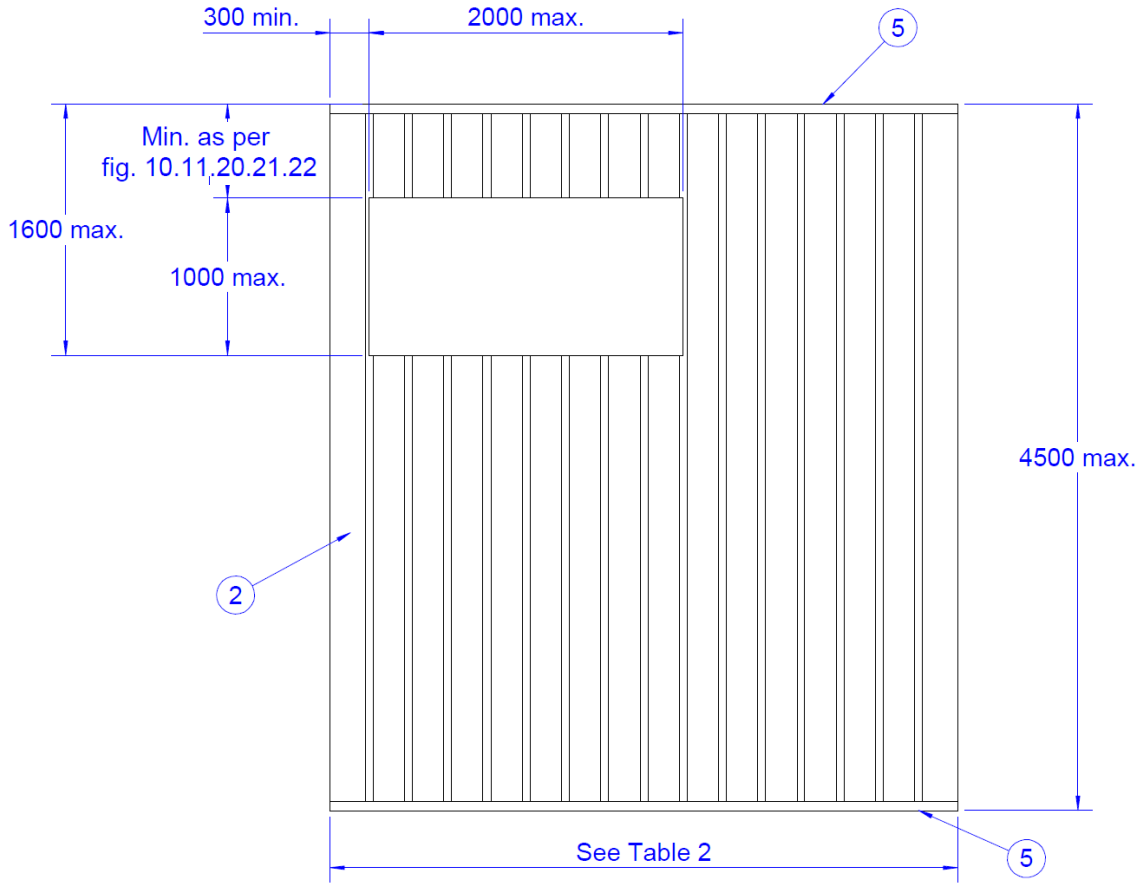

Figure 1 – Single damper near top of unbraced wall up to 4.5m in height

Table 2 – Required wall width

Damper Size (width × height)	Minimum Wall Width
2000 max. × 1000 max.	3360
1000 max. × 500 max.	1600
500 max. × 300 max.	1100

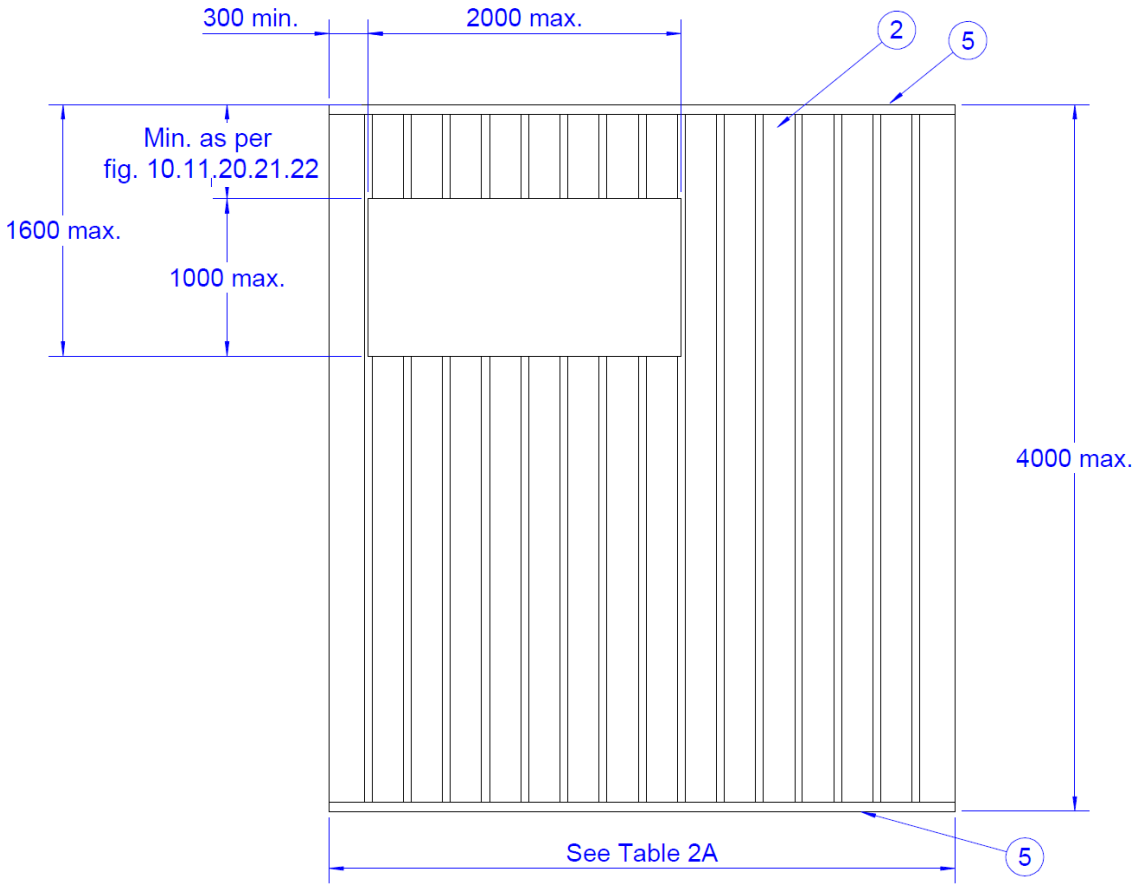

Figure 1A – Single damper near top of unbraced wall up to 4.0m in height

Table 2A – Required wall width

Damper Size (width × height)	Minimum Wall Width
2000 max. × 1000 max.	2950
1000 max. × 500 max.	1600
500 max. × 300 max.	1100

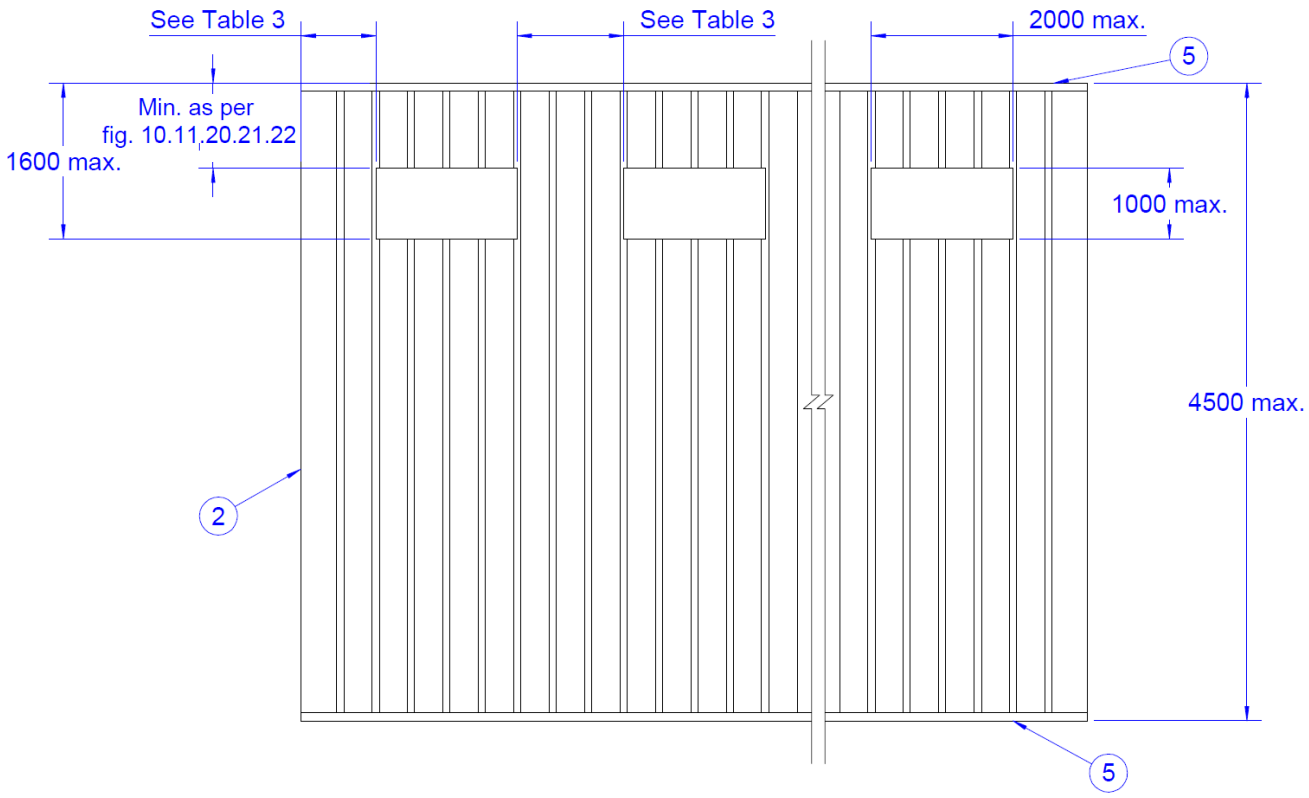

Figure 2 – Multiple dampers near top of unbraced wall up to 4.5m in height

Table 3 – Required damper spacing and end space for wall height up to 4500mm

Damper Size (width × height)	Minimum Damper Spacing	Minimum End Space
2000 max. × 1000 max.	1360	680
1000 max. × 500 max.	350	300
500 max. × 300 max.	300	300

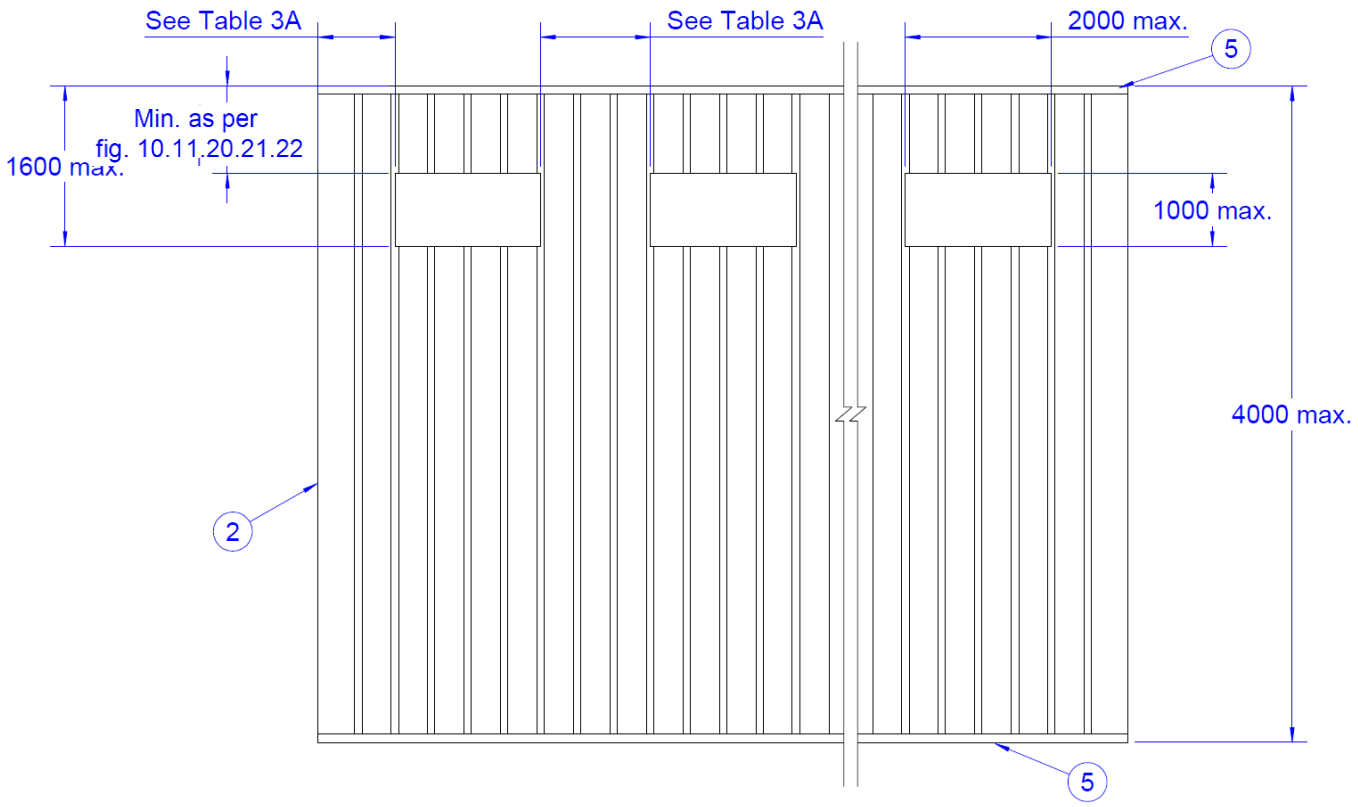

Figure 2A – Multiple dampers near top of unbraced wall up to 4.0m in height

Table 3A – Required damper spacing and end space

Damper Size (width × height)	Minimum Damper Spacing	Minimum End Space
2000 max. × 1000 max.	950	475
1000 max. × 500 max.	300	300
500 max. × 300 max.	300	300

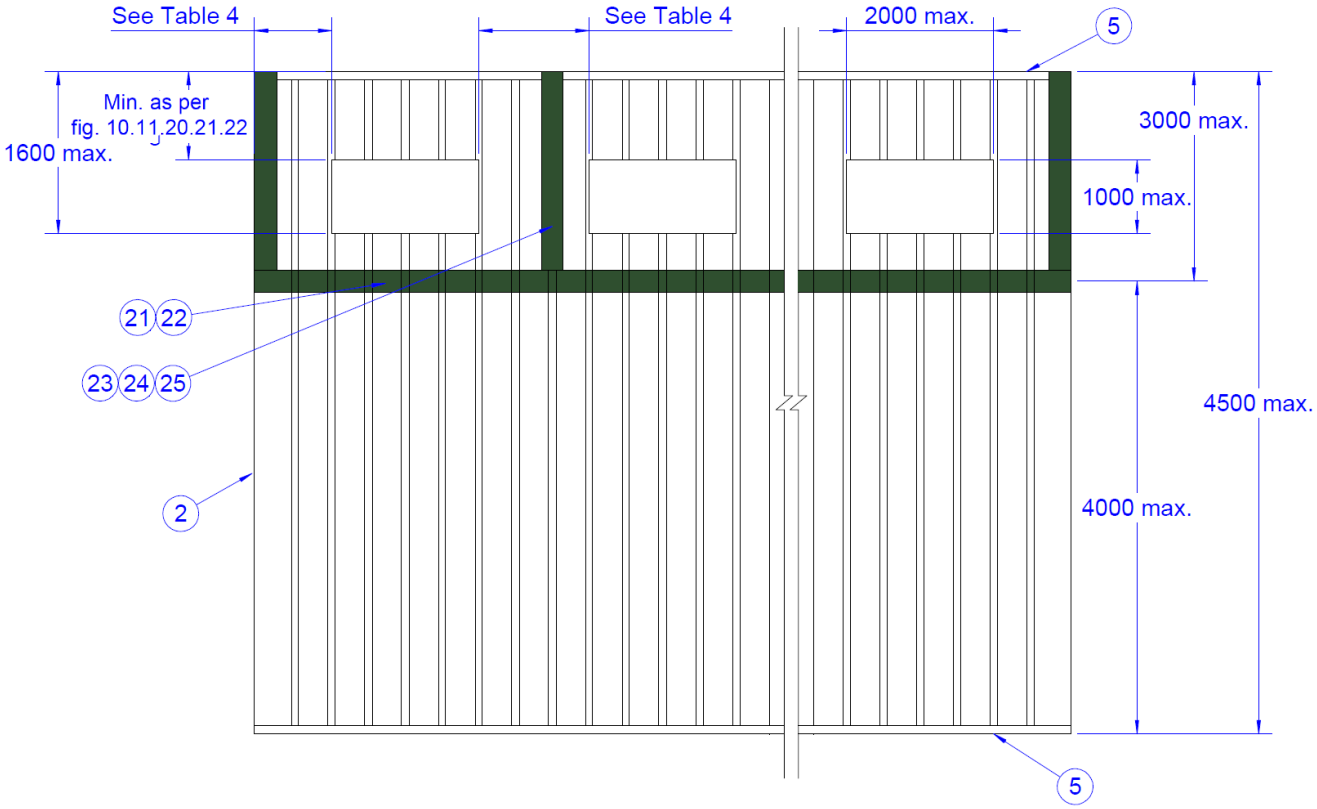

Figure 3 – Multiple dampers near top of wall up to 4.5m in height including a lateral support beam below dampers

Note: Lateral supporting members (23 and 24 – depicted in green above) shall be designed and installed such that purlin (21) has a maximum deflection of span/360 or 20mm for internal building pressures.

Table 4 – Required damper spacing and end space

Damper Size (width × height)	Minimum Damper Spacing	Minimum End Space
2000 max. × 1000 max.	425	213
1000 max. × 500 max.	145	110
500 max. × 300 max.	110	110

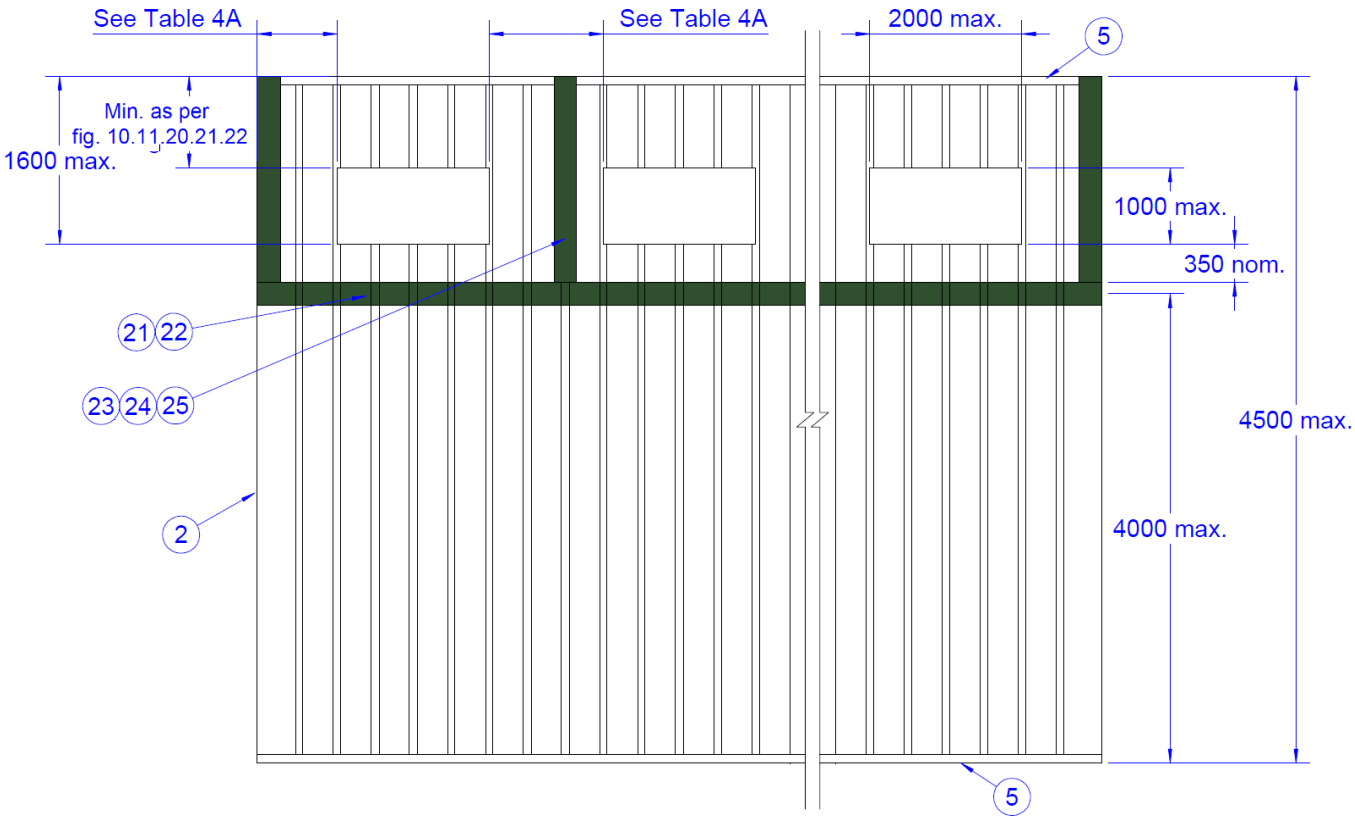

Figure 3A – Multiple dampers near top of wall up to 4.5m in height including a lateral support beam 350mm nominal below dampers

Note: Lateral supporting members (23 and 24 – depicted in green above) shall be designed and installed such that purlin (21) has a maximum deflection of span/360 or 20mm for internal building pressures.

Table 4A – Required damper spacing and end space for beam located 350mm nominal below dampers

Damper Size (width × height)	Minimum Damper Spacing	Minimum End Space
2000 max. × 1000 max.	160	110
1000 max. × 500 max.	110	110
500 max. × 300 max.	110	110

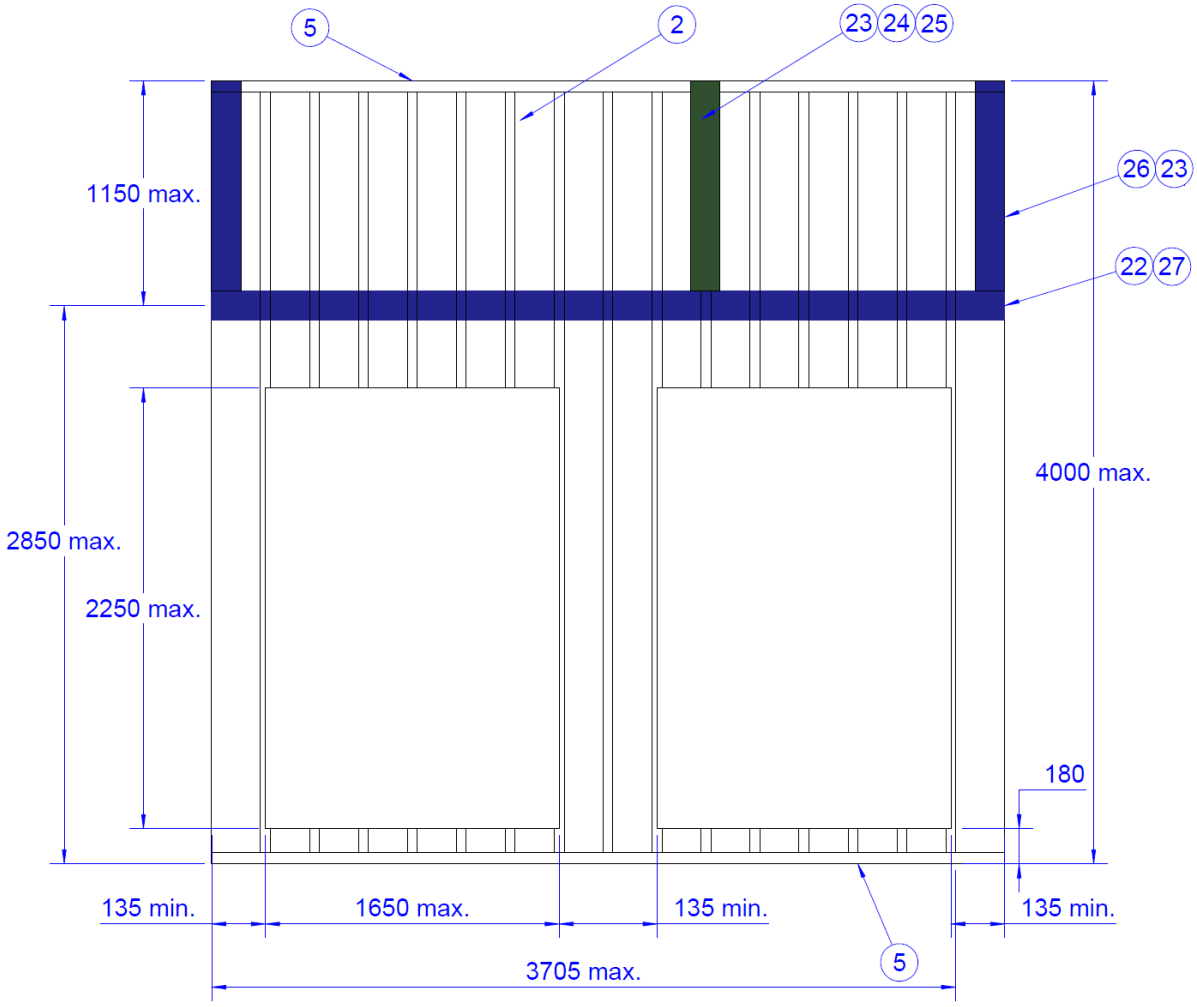

Figure 4 – Multiple dampers in wall up to 4.0m in height including a lateral and vertical support beam above the dampers

Note: Lateral supporting members (23 and 24 – depicted in green above) shall be designed and installed such that lintel (27) has a maximum deflection of span/360 or 20mm for internal building pressures. Vertical supporting members (26 – depicted in blue above) shall be located at each end of lintel (27) and at maximum 3705mm centres.

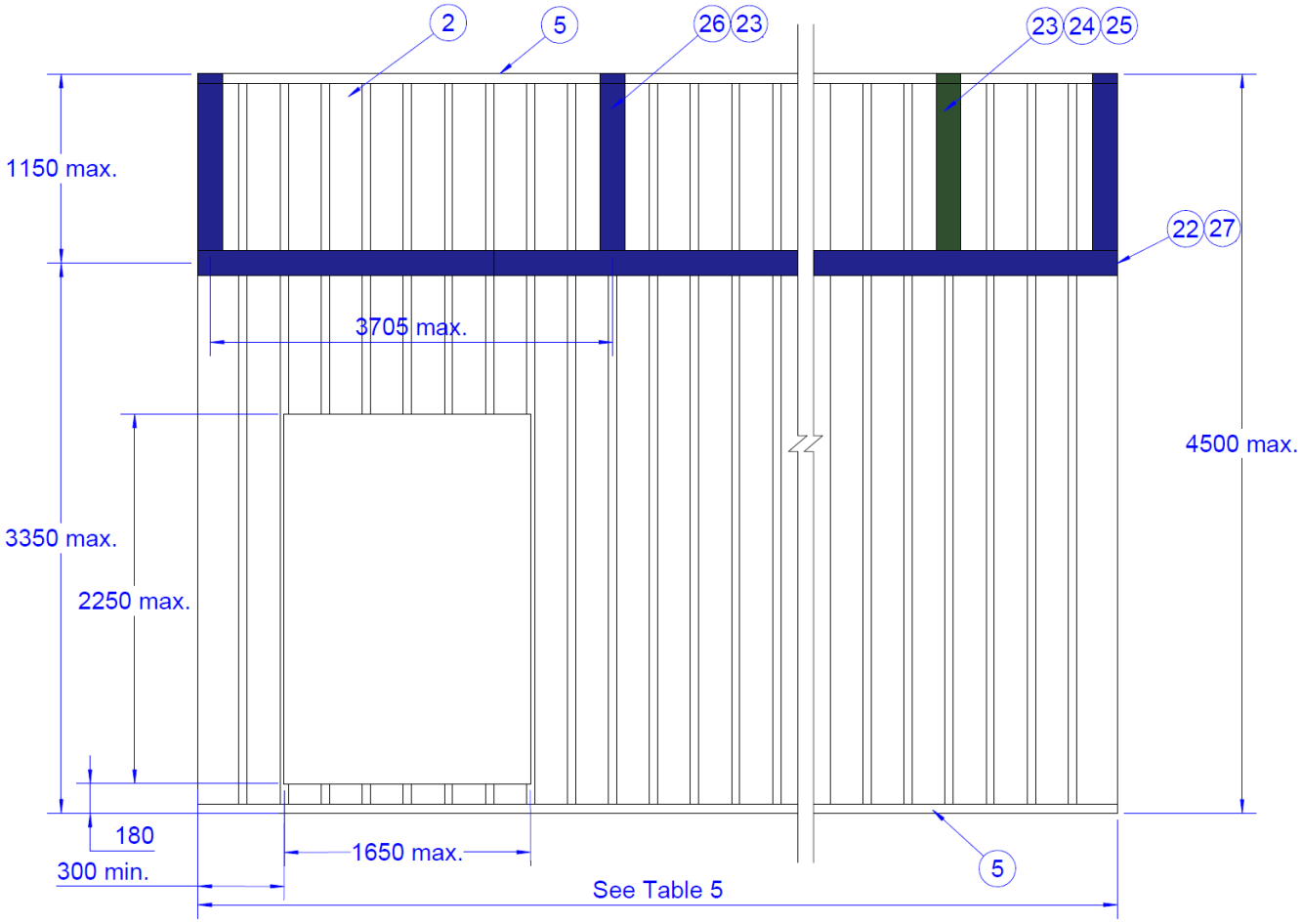

Figure 5 – Single damper in wall up to 4.5m in height including a lateral and vertical support beam above the damper

Note: Lateral supporting members (23 and 24 – depicted in green above) shall be designed and installed such that lintel (27) has a maximum deflection of span/360 or 20mm for internal building pressures. Vertical supporting members (26 – depicted in blue above) shall be located at each end of lintel (27) and at maximum 3705mm centres.

Table 5 – Required wall width

Damper Size (width × height)	Minimum Wall Width
1650 max. × 2250 max.	2250
2000 max. × 1000 max.	2685
1000 max. × 500 max.	1600
500 max. × 300 max.	1100

3.2 DAMPERS IN SPEEDPANEL WALLS UP TO 6.0M HEIGHT

Walls up to 6.0m in height shall be constructed as tested in BWA 2286900.5, subject to the following variations:

- Include single damper of size 500 (max.) wide × 300 (max.) high in unbraced wall up to 6000mm in height with protected top track, as shown in figure 6.
- Include multiple dampers of size 2000 (max.) wide × 1000 (max.) high in wall up to 6000mm in height with protected top track and including a lateral support beam below the dampers, as shown in figures 7 and 7A.
- Include multiple dampers of size 1650 (max.) wide × 2250 (max.) high in wall up to 6000mm in height with protected top track and including a lateral support beam above the dampers, as shown in figure 8.
- Include single damper of size 1650 (max.) wide × 2250 (max.) high in wall up to 6000mm in height with protected top track and including a lateral support beam above the damper, as shown in figure 9.
- The dampers which may be included are the following:
    - Blendair SBFP series as tested in FSV 0931
    - Blendair MFD series as tested in FSV 1253
    - Blendair SHD series as tested in FSV 0884
    - Blendair SSD series as tested in BWA 2182600

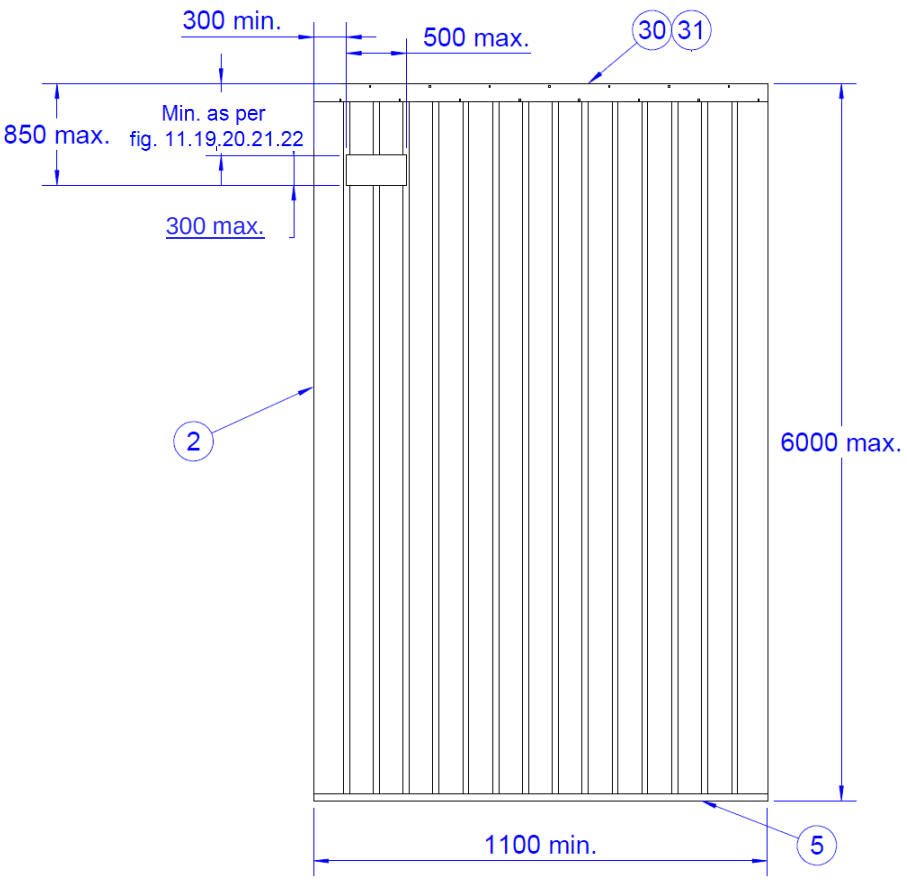

Figure 6 – Single damper in unbraced wall up to 6.0m in height

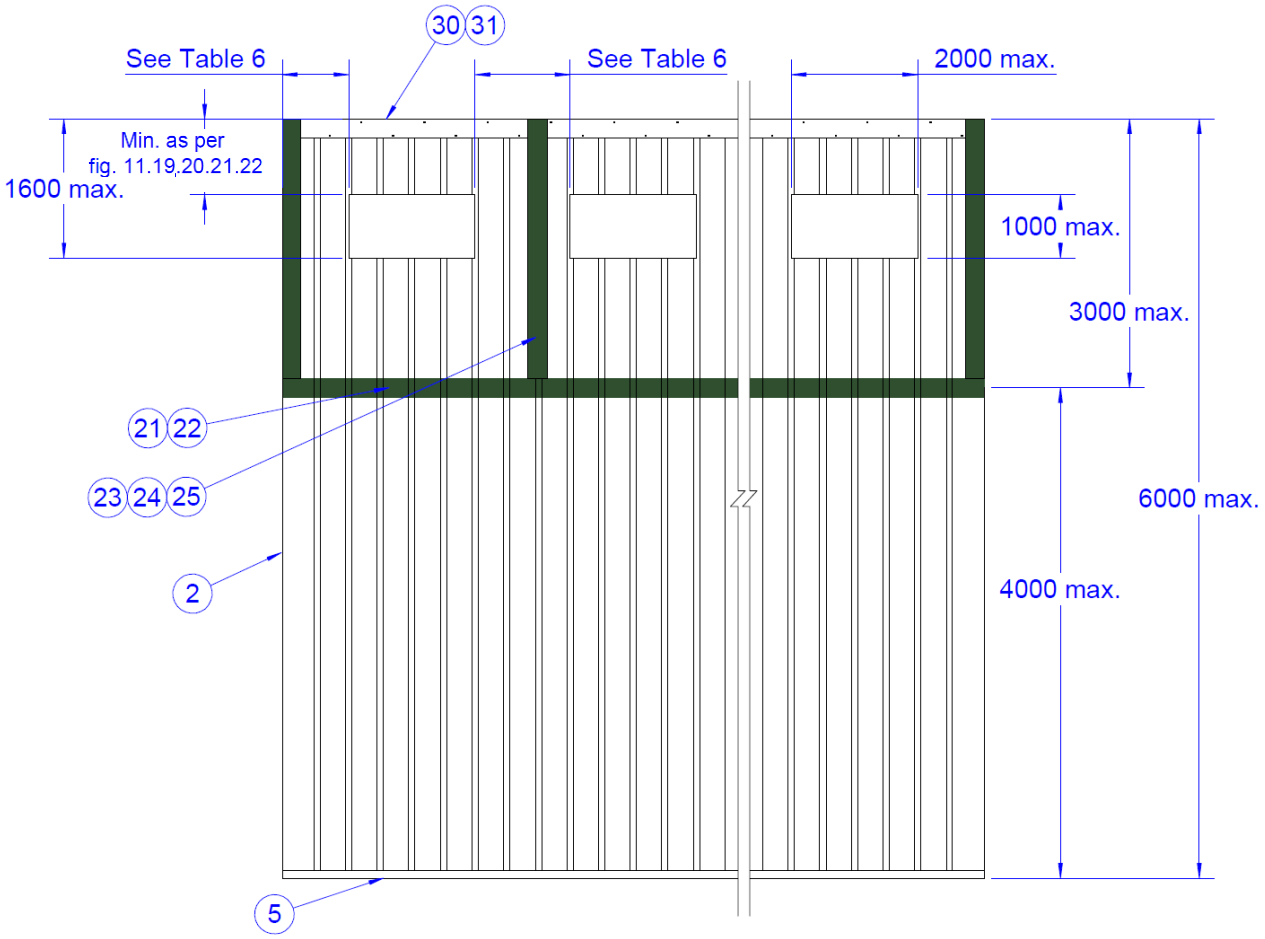

Figure 7 – Multiple dampers in wall up to 6.0m in height including a lateral support beam below the dampers

Note: Lateral supporting members (23 and 24 – depicted in green above) shall be designed and installed such that purlin (21) has a maximum deflection of span/360 or 20mm for internal building pressures.

Table 6 – Required damper spacing and end space

Damper Size (width × height)	Minimum Damper Spacing	Minimum End Space
2000 max. × 1000 max.	425	213
1000 max. × 500 max.	145	110
500 max. × 300 max.	110	110

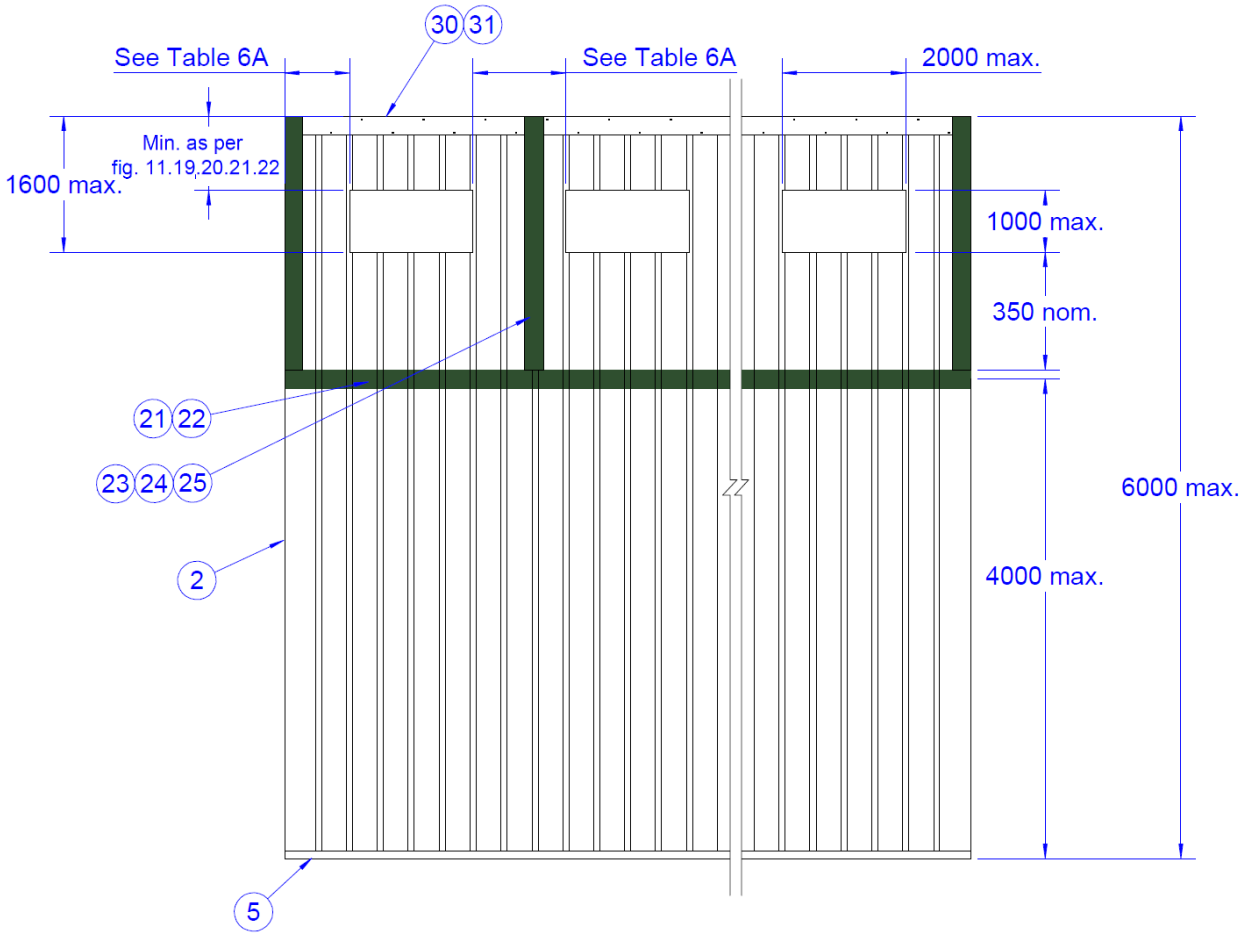

Figure 7A – Multiple dampers in wall up to 6.0m in height including a lateral support beam 350mm nominal below the dampers

Note: Lateral supporting members (23 and 24 – depicted in green above) shall be designed and installed such that purlin (21) has a maximum deflection of span/360 or 20mm for internal building pressures.

Table 6A – Required damper spacing and end space for beam located 350mm nominal below dampers

Damper Size (width × height)	Minimum Damper Spacing	Minimum End Space
2000 max. × 1000 max.	160	110
1000 max.× 500 max.	110	110
500 max. × 300 max.	110	110

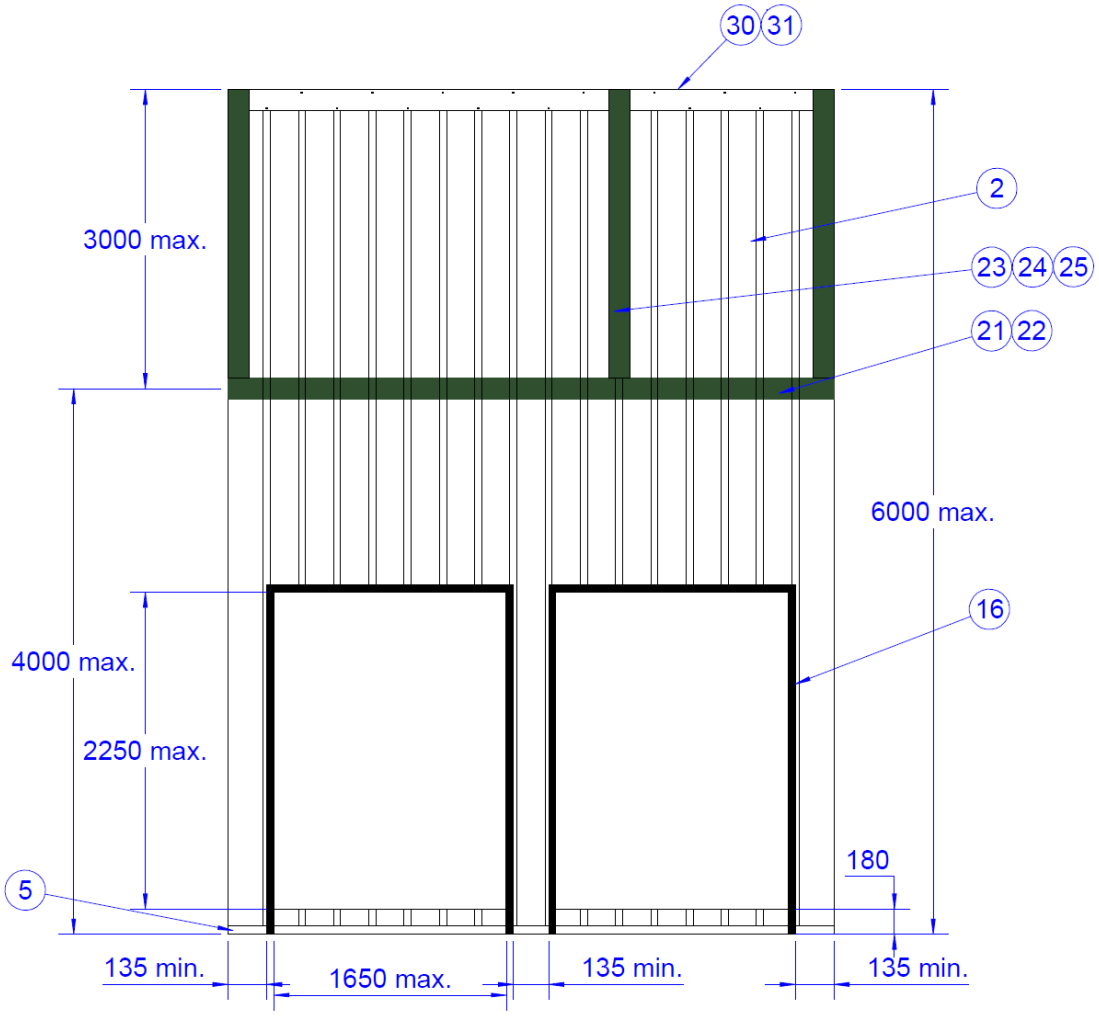

Figure 8 – Multiple dampers in wall up to 6.0m in height including a lateral support beam above the damper

Note: Lateral supporting members (23 and 24 – depicted in green above) shall be designed and installed such that purlin (21) has a maximum deflection of span/360 or 20mm for internal building pressures.

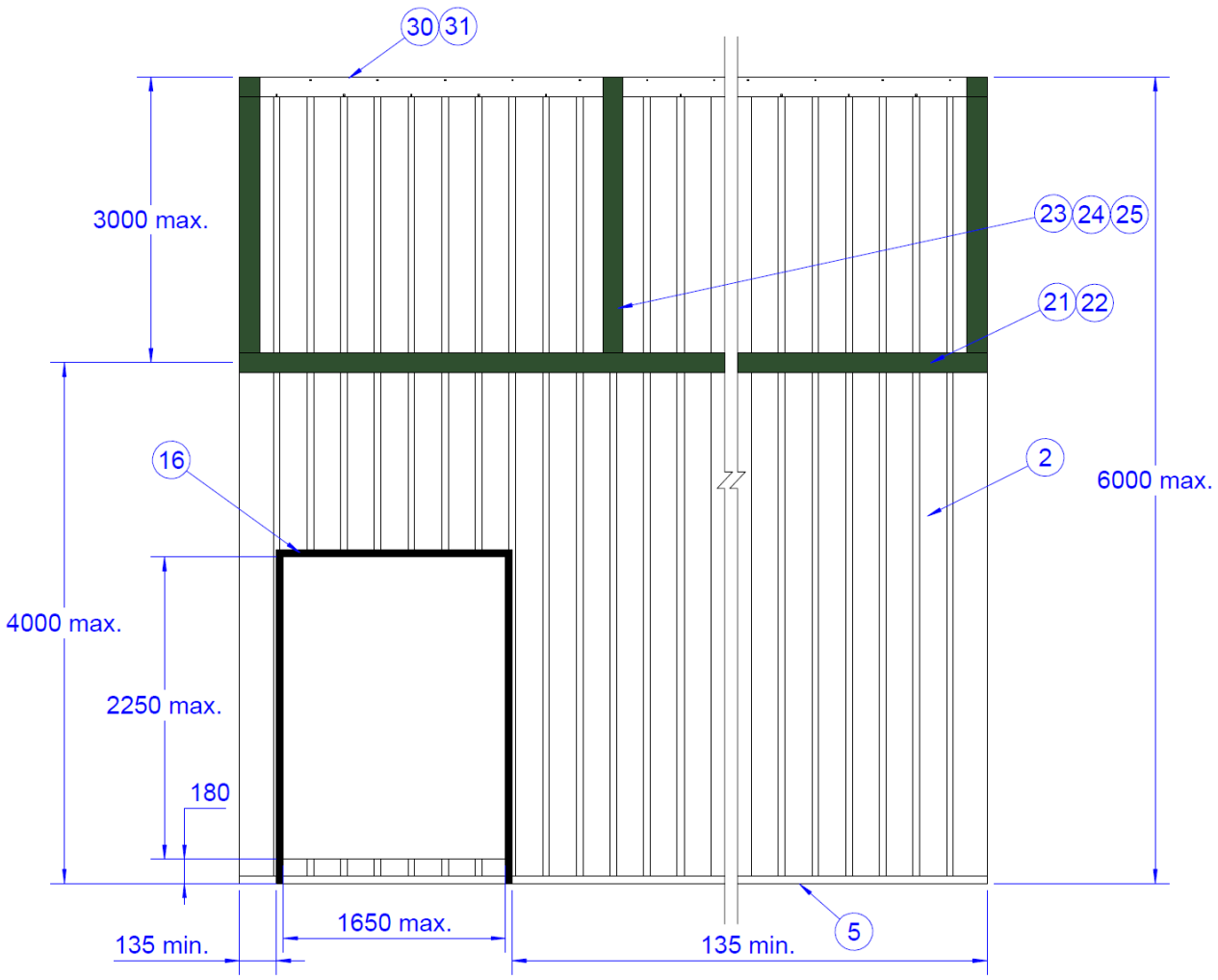

Figure 9 – Single damper in wall up to 6.0m in height including a lateral support beam above the damper

Note: Lateral supporting members (23 and 24 – depicted in green above) shall be designed and installed such that purlin (21) has a maximum deflection of span/360 or 20mm for internal building pressures.

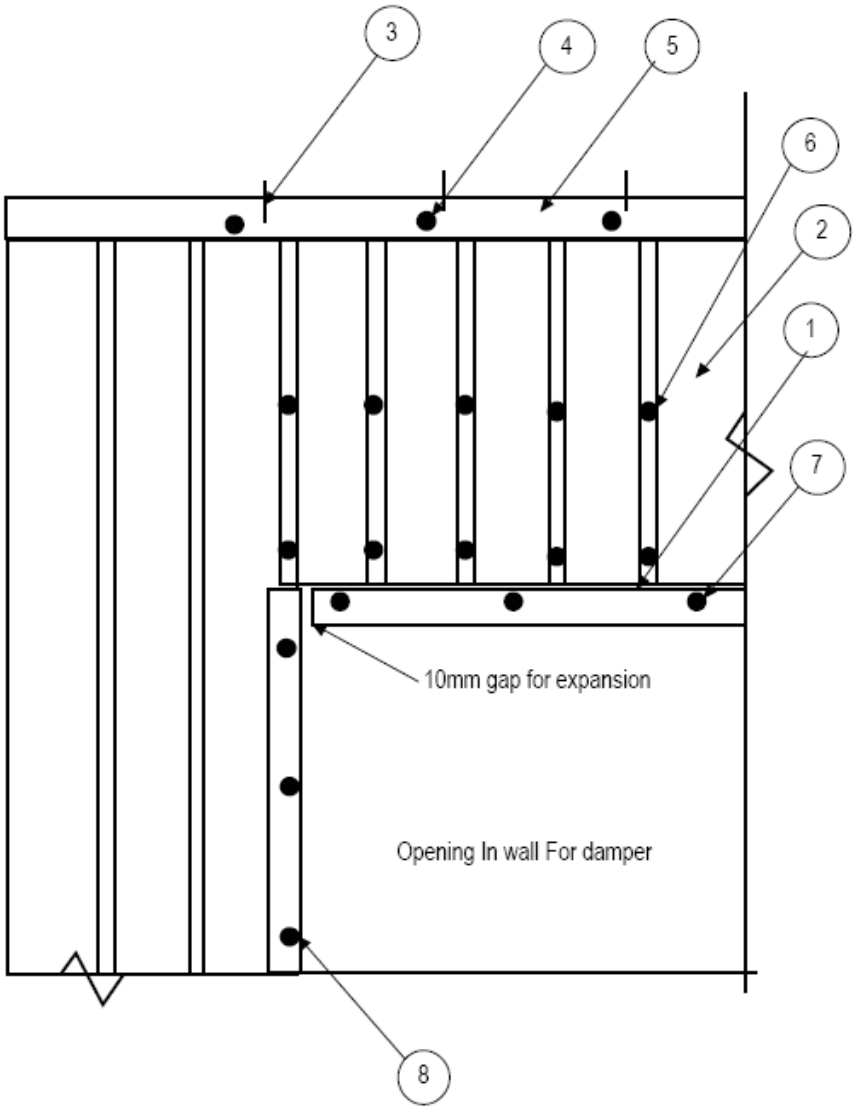

Figure 10 – Trimming of opening and panel and track fixings for dampers near top of wall

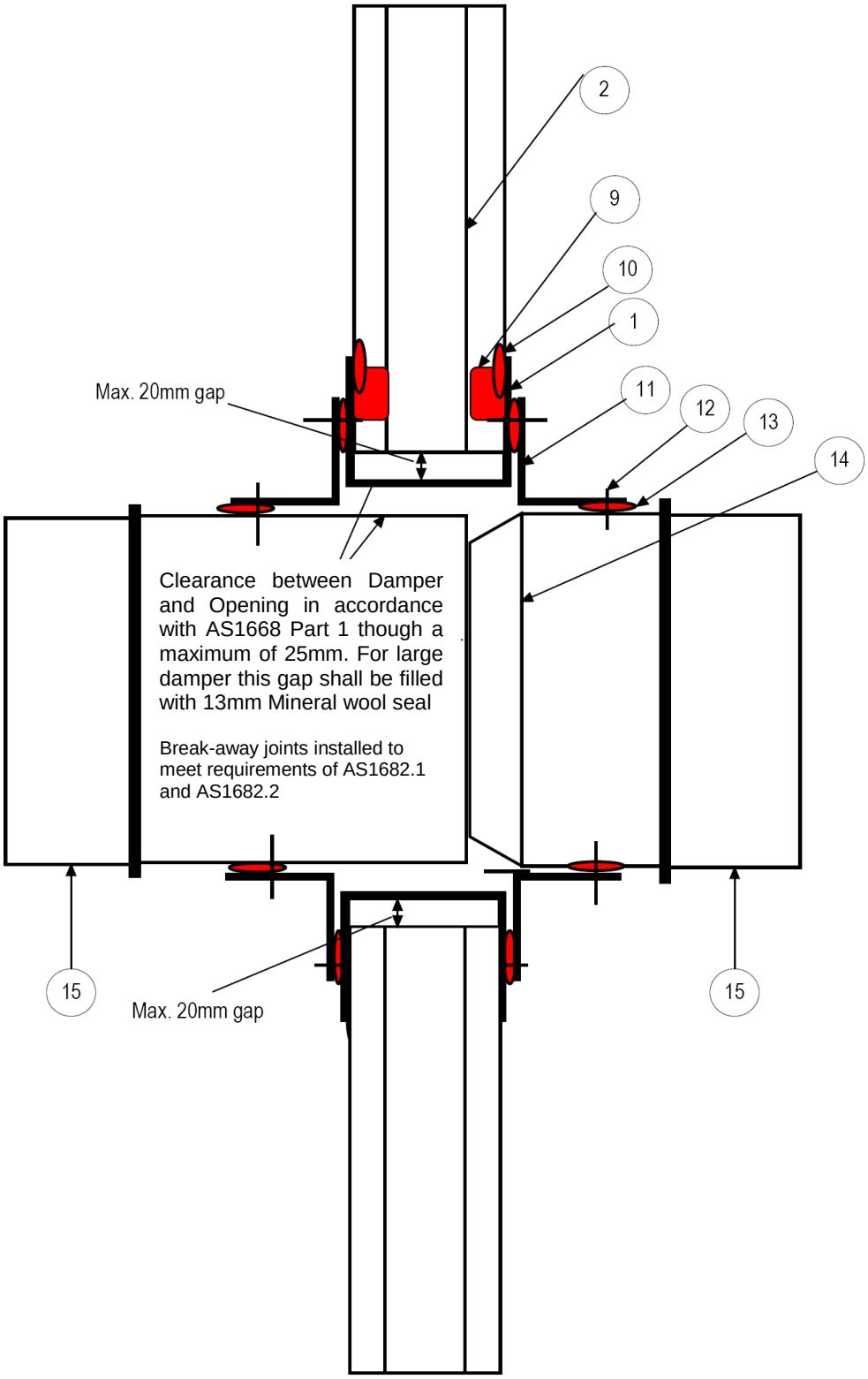

Figure 11 – Fixing to wall for dampers of size 2000 (max.) wide × 1000 (max.) high near top of wall

Note: Fixing of retaining angles (Component 11) to the wall from both sides is not Mandatory unless the damper is fixed to the wall from one side only

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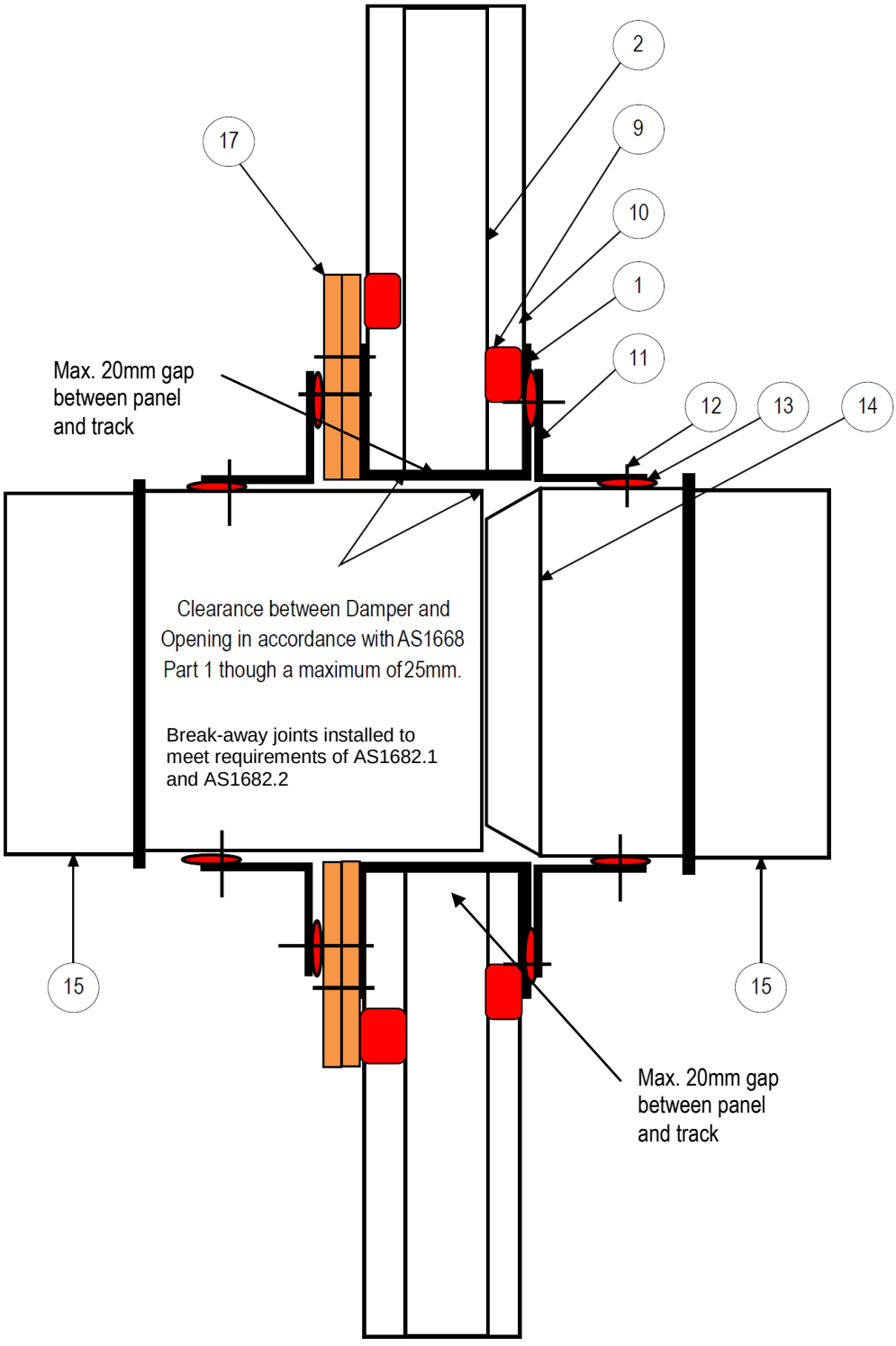

Figure 12 – Fixing to wall for all dampers sizes at bottom of walls up to 4.5m in height.

Note: (i) Component 13 (Sealant between retaining angle and damper case) is optional- Minimum gap to be maintained to allow for expansion
(ii) Fixing of retaining angles (Component 11) to the wall from both sides is not Mandatory unless the damper is fixed to the wall from one side only

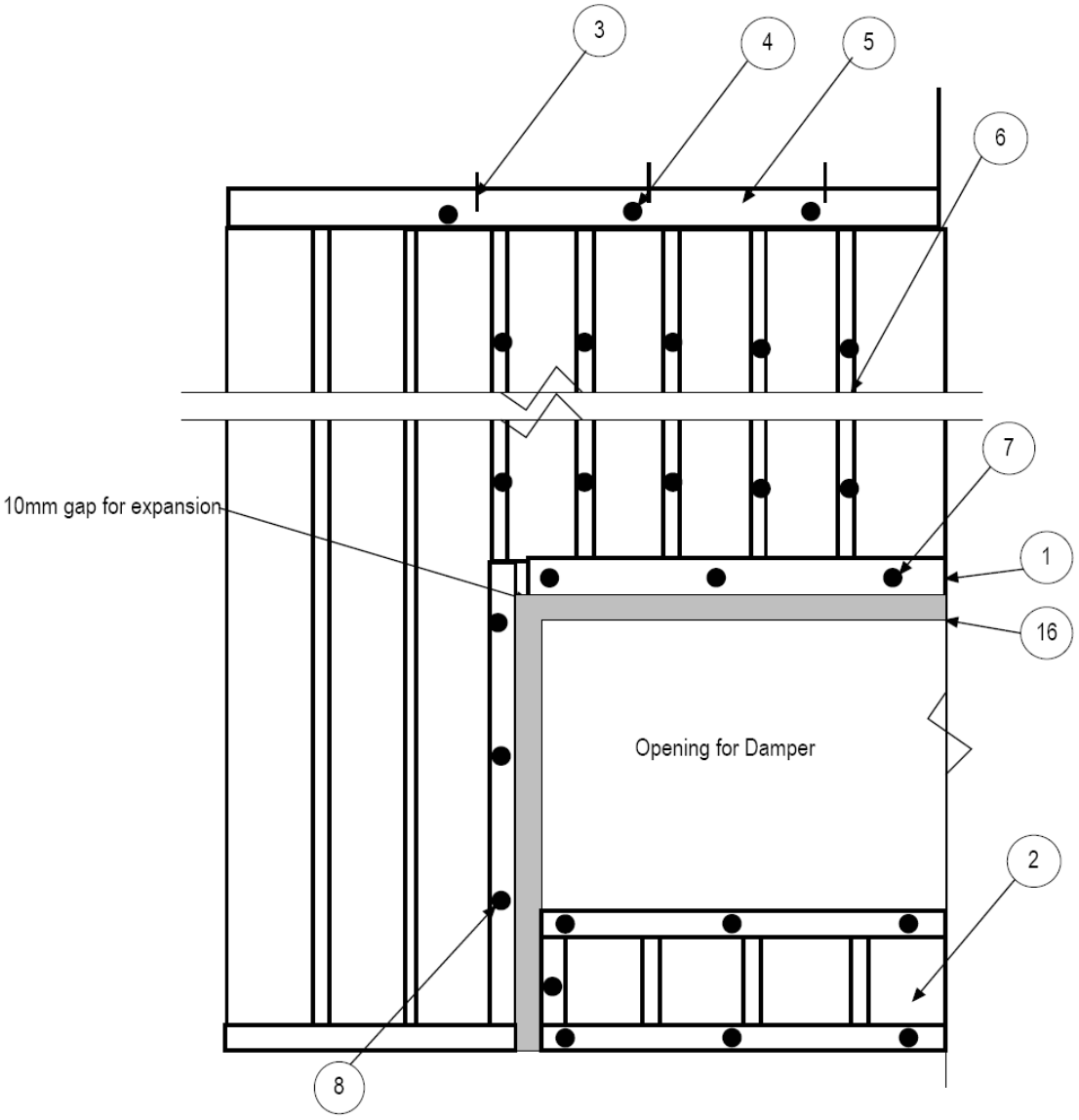

Figure 13 – Trimming of opening and panel and track fixings for dampers near base of wall

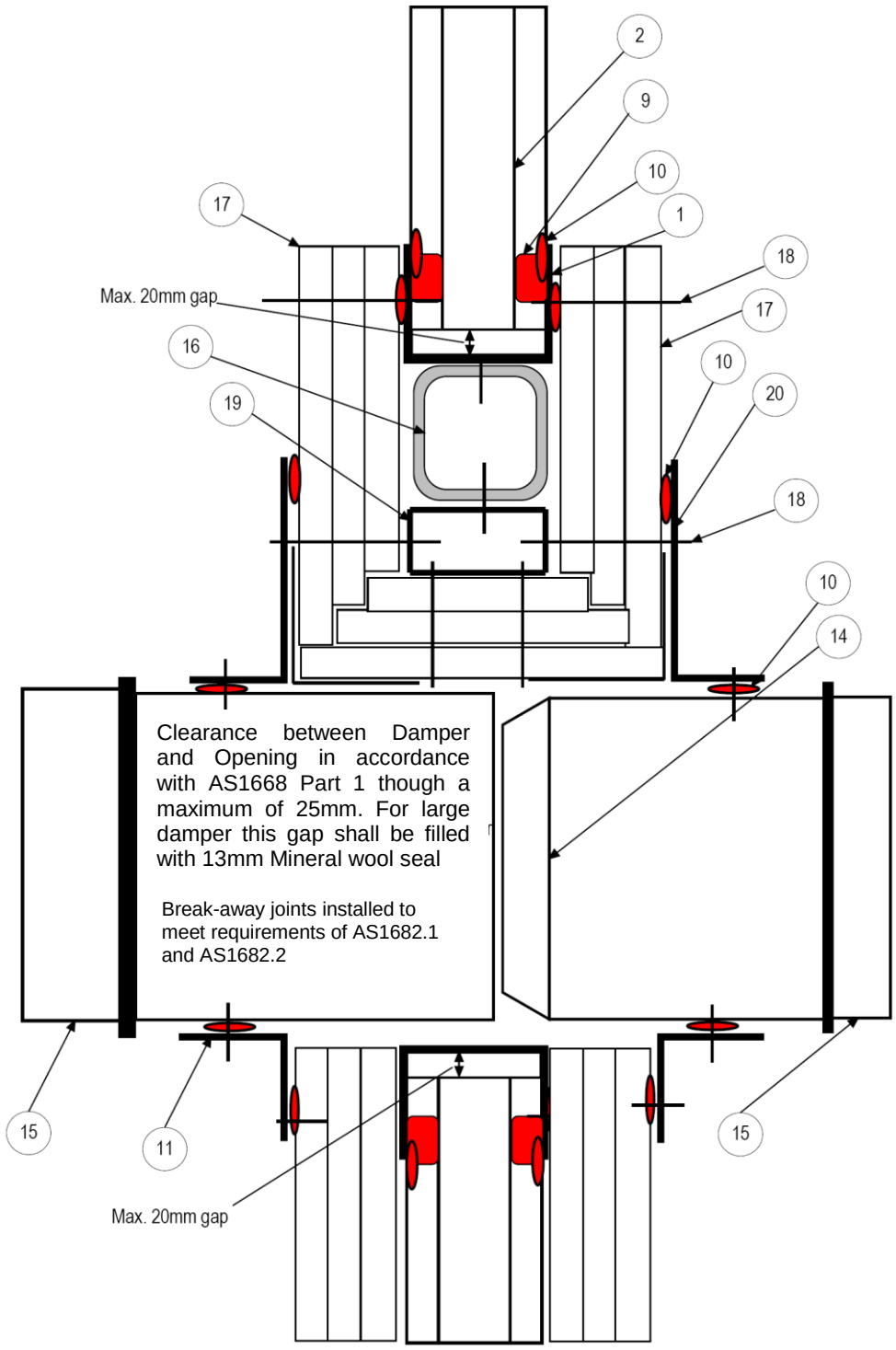

Figure 14 – Fixing to wall for dampers near base of wall up to 6m in height

Note: (i) Component 10 (Sealant between retaining angle and damper case) is optional- minimum gap to be maintained to allow for expansion
(ii)Fixing of retaining angles (Component 11) to the wall from both sides is not mandatory unless the damper is fixed to the wall from one side only

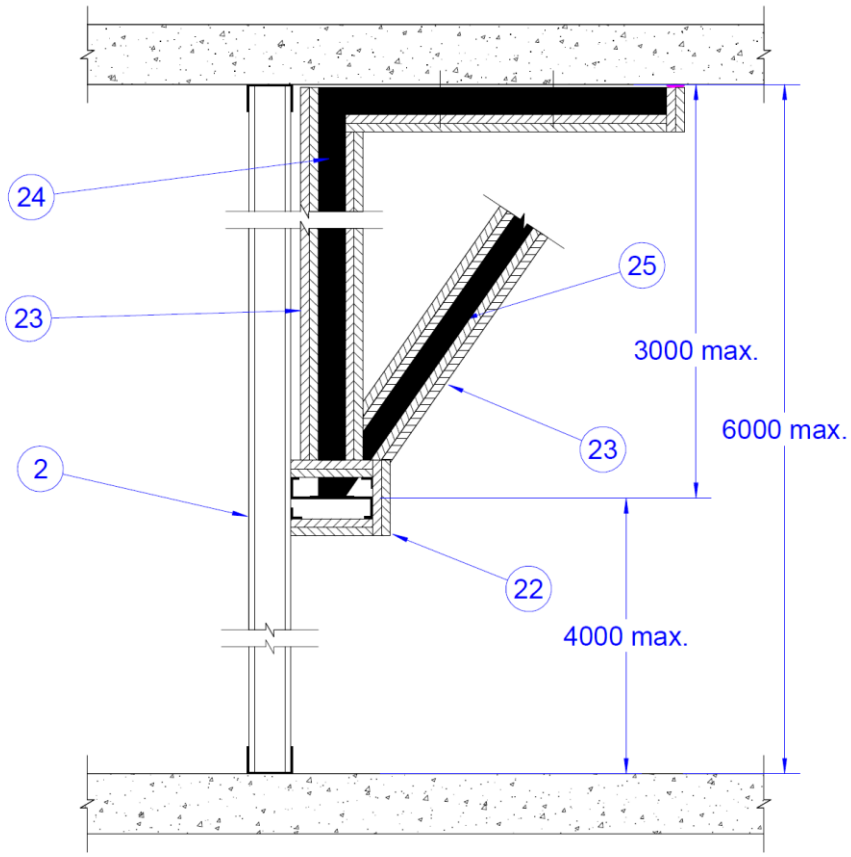

Figure 15 – Section of wall showing lateral bracing

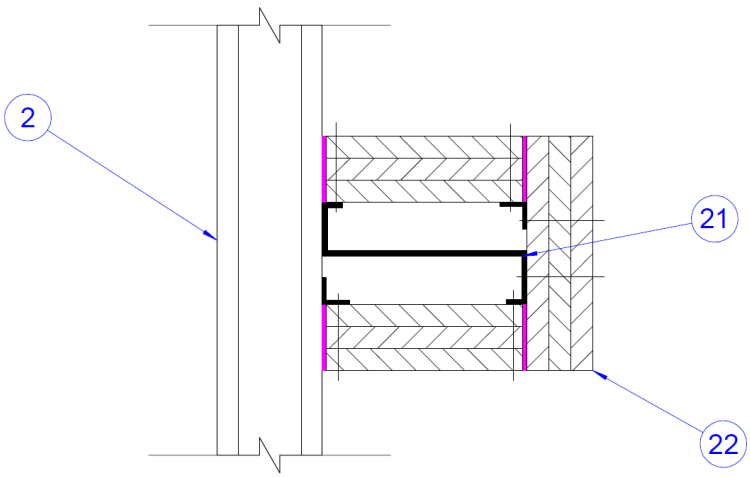

Figure 16 – Enlarged view of lateral support beam protection for braced walls

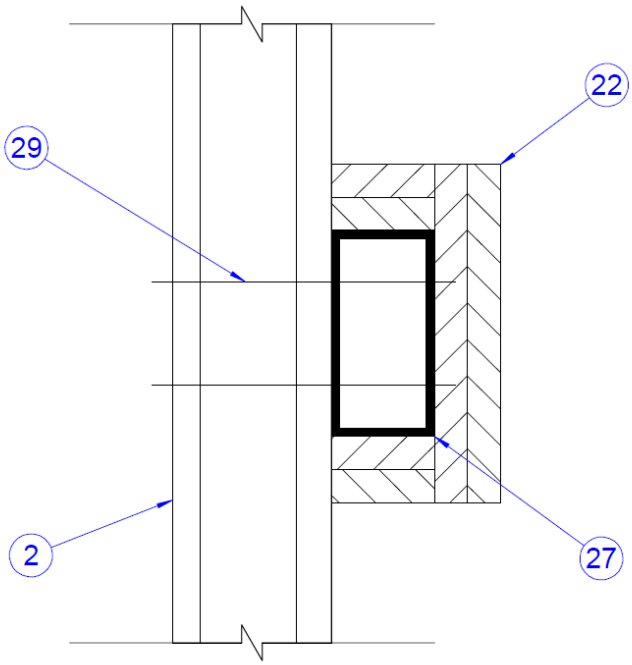

Figure 17 – Section showing lintel (lateral and vertical support beam) connection to Speedpanel wall

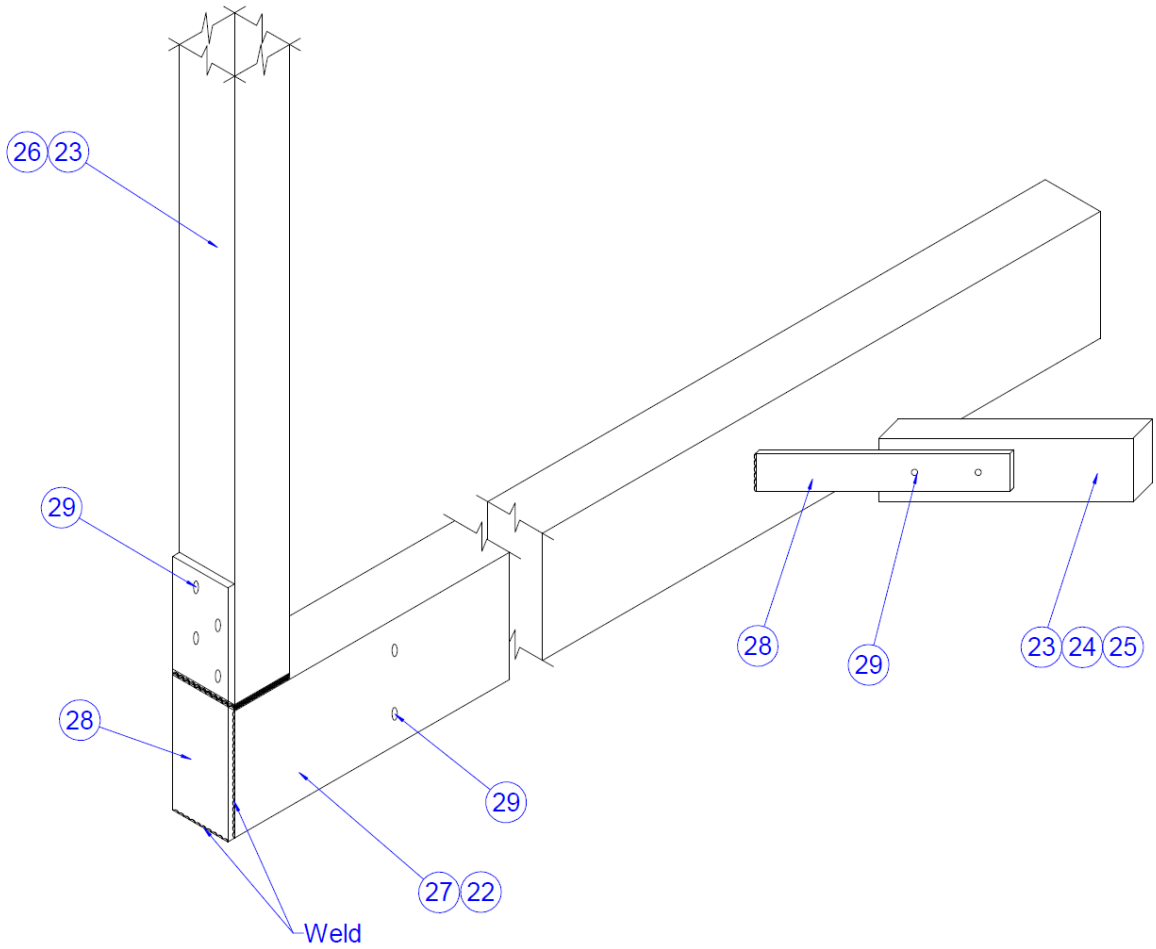

Figure 18 – Isometric view of lintel (item 27) assembly (board protection not shown)

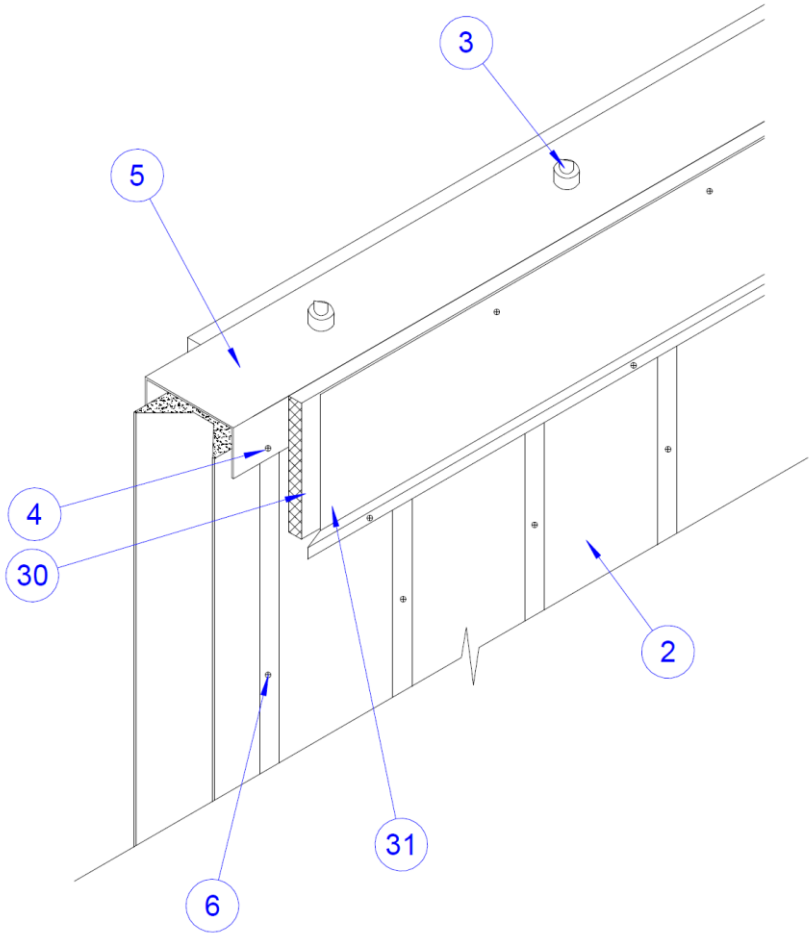

Figure 19(A) – Isometric view showing top track protection with 13mm thick of fire grade plasterboard each side (for walls up to 6.0m in height)

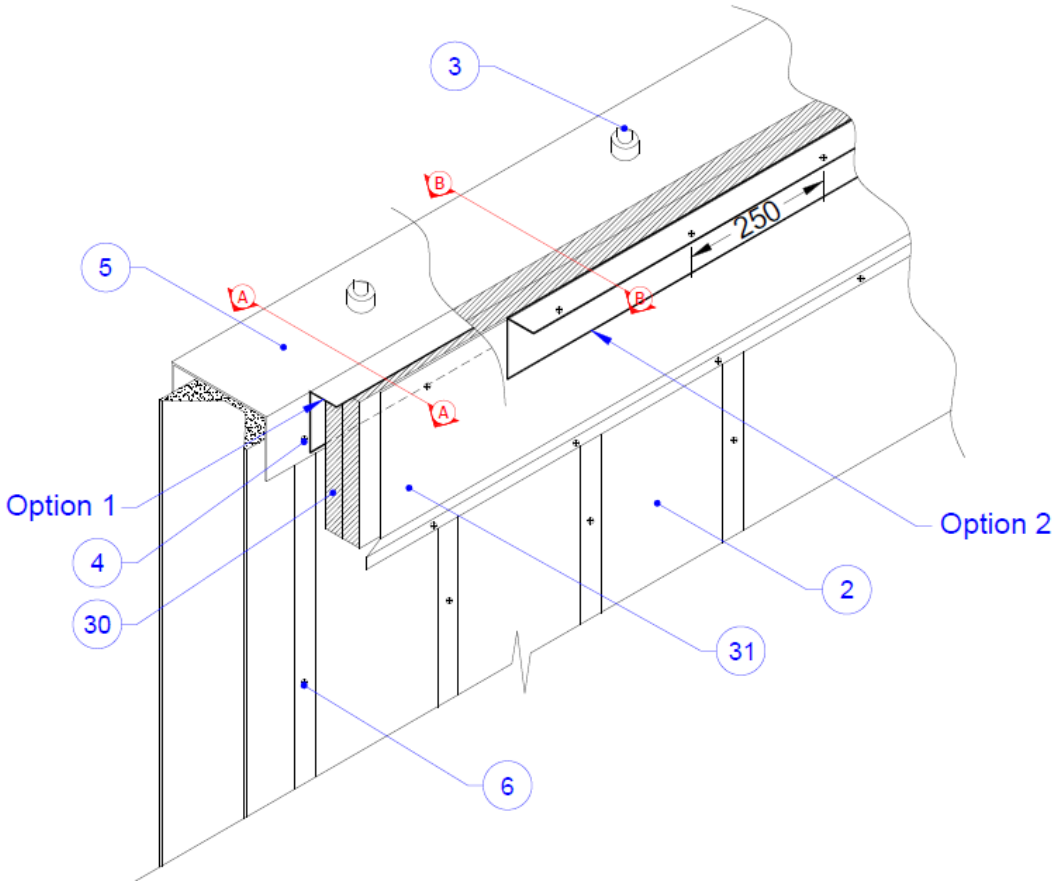

Figure 19(B) – Isometric view showing top track protection with two layers of 16mm thick of fire grade plasterboard on one side (for walls up to 6.0m in height)

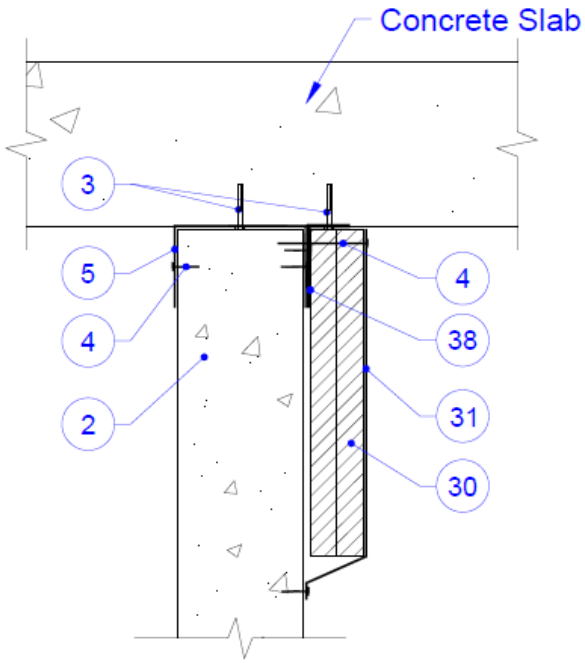

Figure 19(C) – Top track protection with two layers of 16mm thick plasterboard with Steel Angle Installation Option 1 (A-A)

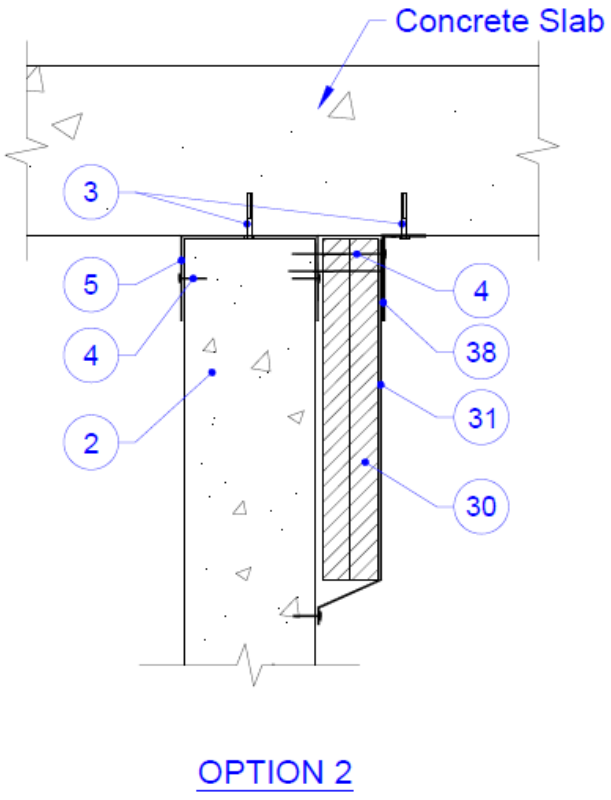

Figure 19(D) – Top track protection with two layers of 16mm thick plasterboard With Steel Angle Installation Option 2 (B-B)

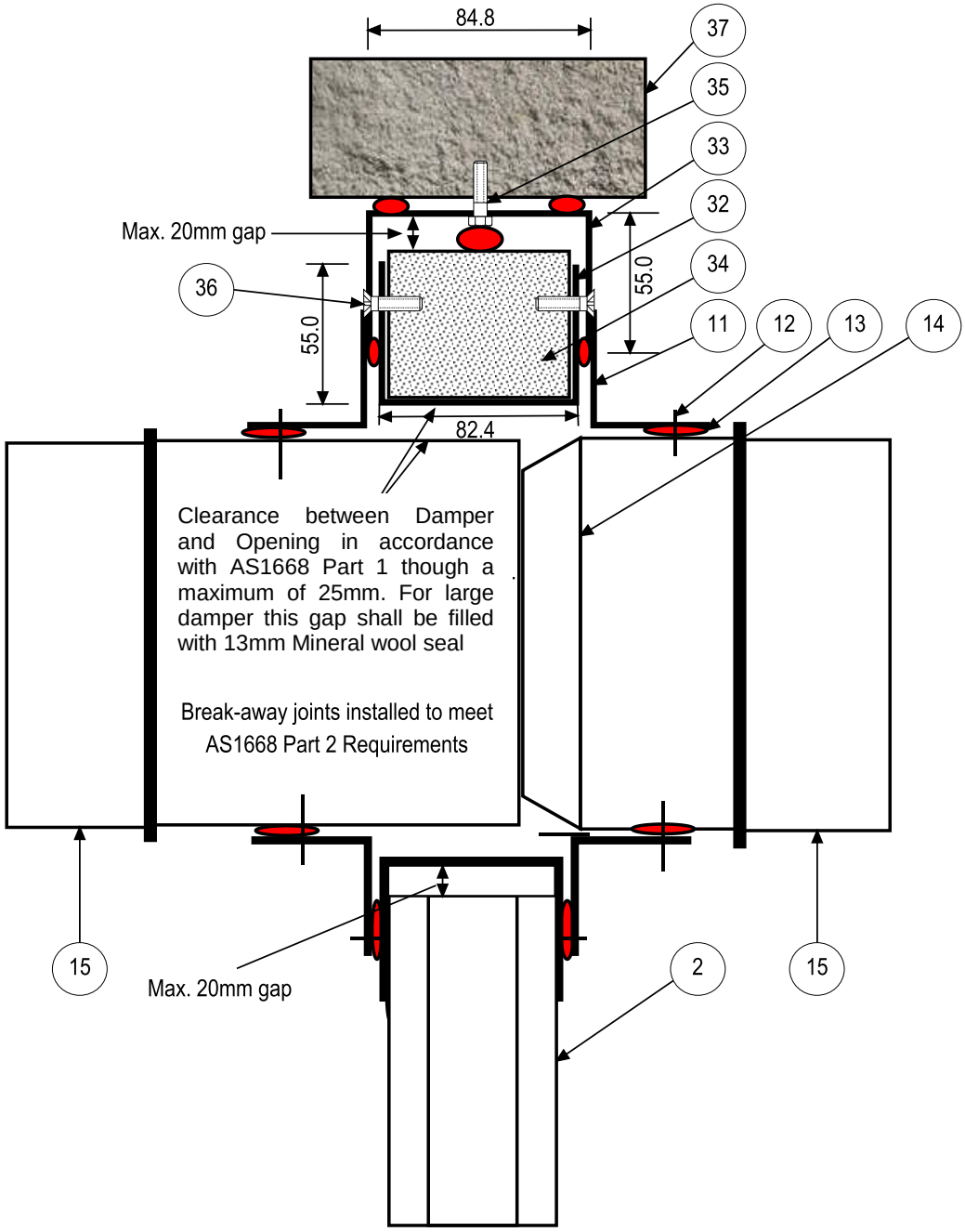

Figure 20 – Fixing to slab for dampers- Option 1

Note: (i) Component 13 (Sealant between retaining angles and damper case) is optional- minimum gap to be maintained to allow for expansion
(ii) Fixing of retaining angles (Component 11) to the wall from both sides is not mandatory Unless the damper is fixed to the wall from one side only

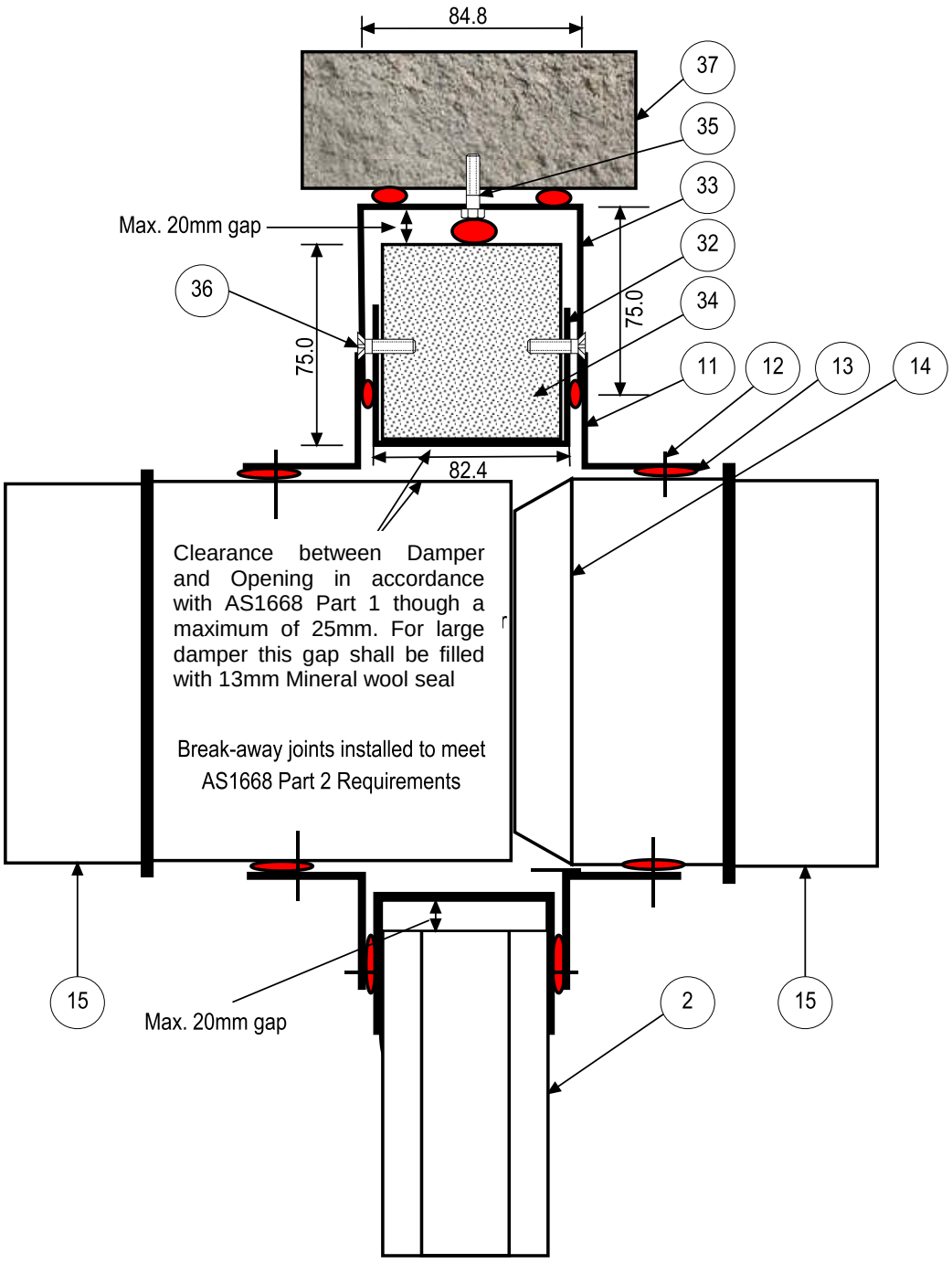

Figure 21 – Fixing to slab for dampers- Option 2

Note: (i) Component 13 (Sealant between retaining angle and damper case) is optional- minimum gap to be maintained to allow for expansion
(ii)Fixing of retaining angles (Component 11) to the wall from both sides is not mandatory unless the damper is fixed to the wall from one side only

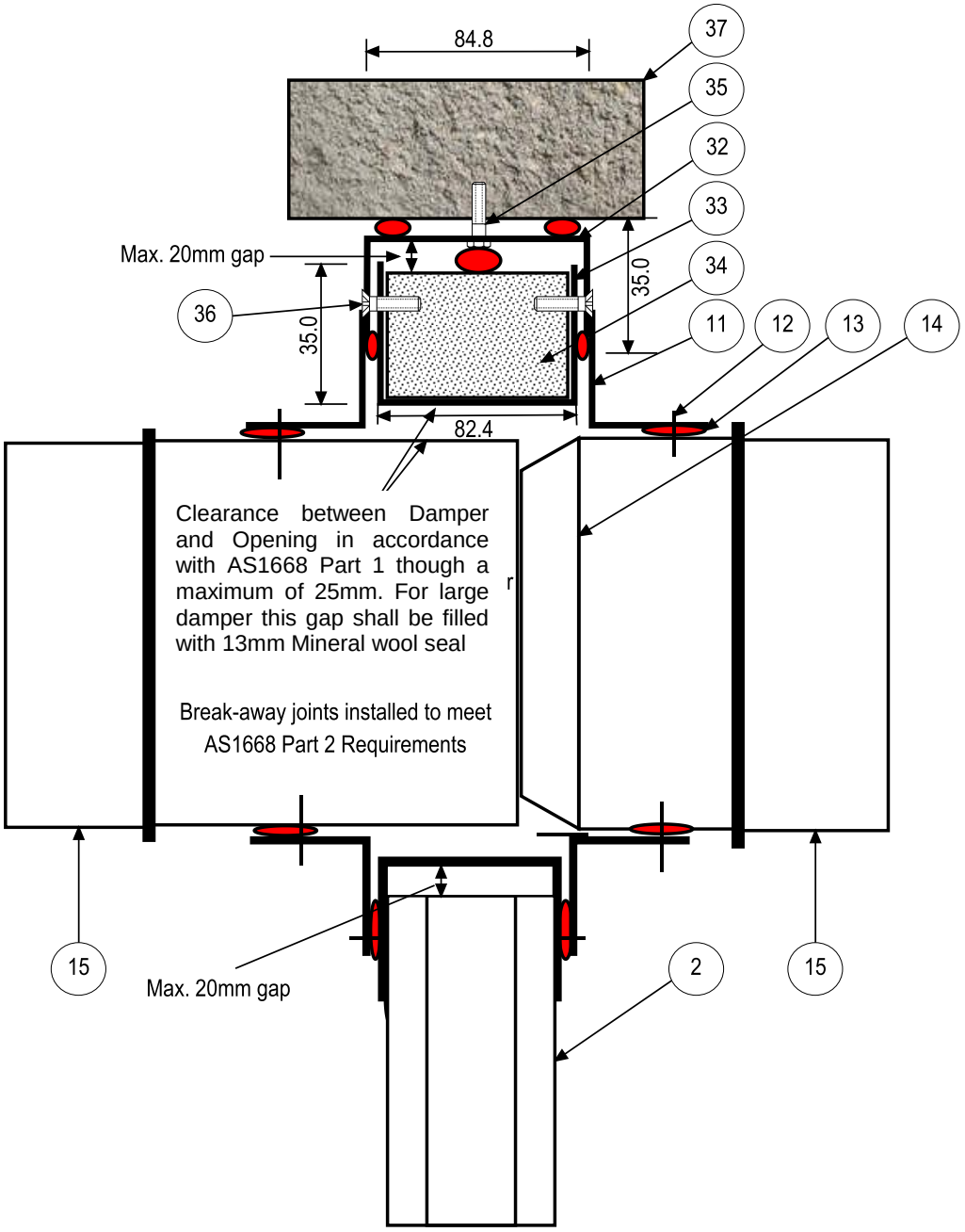

Figure 22 – Fixing to slab for dampers- Option 3

Note: (i) Component 13 (Sealant between retaining angle and damper case) is optional- minimum gap to be maintained to allow for expansion
(ii) Fixing of retaining angles (Component 11) to the wall from both sides is not Mandatory unless the damper is fixed to the wall from one side only

4 REFERENCED TEST PROCEDURES

This report is prepared with reference to the requirements of AS1530.4-1997 Section 7. Reference is also made to AS4100-1998 (steel structures standard) Section 12 for fire protection of structural fixings.

5 FORMAL ASSESSMENT SUMMARY

Based on the discussion presented in this report, it is the opinion of this testing authority that if the tested prototype described in Section 2 had been modified within the scope of Section 3, it will achieve the fire resistance level (FRL) as stated below in if tested in accordance with the test method referenced in Section 4 and subject to the requirements of Section 7:

Performance of Dampers if tested in accordance with AS1530.4-1997 Section 7

Damper	Installation	FRL
Blendair SBFP Series Damper	Refer to Section 3 of this report	**-/120/-**
Blendair MFD Series Damper		
Blendair SHD Series Damper		
Blendair SSD Series Damper		

Note

- The insulation performance of dampers with continuous ducting either side of the wall is commonly waived and is outside the scope of AS1530.4- 1997 – Section 7 and was therefore not considered.
- This summary is to be read in conjunction with section 7 of this report

6 DIRECT FIELD OF APPLICATION

This assessment applies to damper assemblies smaller than the assessed sizes provided there are no changes to the cross-sectional dimensions of the components.

This assessment applies to dampers fixed to continuous ducts on each side of the wall.

The results of the assessment report are based on actual test data and the scope is necessarily limited to the specifications indicated Section 3 and discussed in the Appendices of the assessment.

7 REQUIREMENTS

This report details the methods of construction, test conditions and assessed results that would have been expected had the specific elements of construction described herein been tested in accordance with AS1530.4-1997. Any further variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those identified in this report, may invalidate the conclusions drawn in this report.

Unless otherwise stated in this report:

- All materials used, methods of installation and restraint conditions are to be the same as the tested prototype(s).

The fire rated sealant used for sealing around a damper shall have demonstrated by test that when used to protect a control joint on the underside of a floor slab 20mm wide the system is capable of achieving an FRL of at least -/120/- with a sealant depth not exceeding 15mm.

Dampers shall be installed to ducts on each side of the wall and break away joints shall otherwise be designed and installed in accordance with and AS1682.1 and AS 1682.2.

The beam, beam protection, bracing, and bracing protection shall be tested or assessed to have an FRL of at least 120/-/- in loadbearing configuration. All associated connections shall be protected with the maximum protection thickness required of any of the members utilising the connection, as per AS4100-1998 clause 12.10.1.

It is required that the lateral load capacity of the head track and base track be verified by the design engineer for the lateral load capacity under ambient loading conditions

The supporting masonry or concrete construction shall be capable of providing effective support for the proposed construction for the required fire period.

The insulation performance of the wall at the top track, bottom track and wall junction is outside the scope of this assessment.

This assessment is based on referenced test and assessment reports on the fire damper in accordance with AS1530.4-1997 and the requirements in AS4072.1-1992. The referenced Australian Standards have since been revised to AS1530.4-2005 and subsequently to AS1530.4-2014 and AS4072.1 to the current issue AS4072.1-2005. All current versions of the standards require fire dampers to be leakage tested as part of the performance criteria. It is to be noted that even though the fire dampers tested in earlier versions of the relevant Australian Standards will provide the required integrity and insulation performance for the penetrations in the separating wall, the dampers cannot be assessed to meet with the current standards as they have not been leakage tested as per the standards requirement

8 VALIDITY

This assessment report does not provide an endorsement by Exova Warringtonfire Aus Pty Ltd of the actual products supplied.

The conclusions of this assessment may be used to directly assess the fire resistance performance under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire conditions.

Because of the nature of fire resistance 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.

The assessment can therefore only relate only to the actual prototype test specimens, testing conditions and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that this report be reviewed on or, before, the stated expiry date.

The information contained in this report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

9 AUTHORITY

9.1 APPLICANT UNDERTAKINGS AND CONDITIONS OF USE

By using this report as evidence of compliance or performance, the applicant(s) confirms 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, and
- they agree to withdraw this assessment from circulation should the component or element of structure be 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, and
- 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, agree to ask the assessing authority to withdraw the assessment.

9.2 GENERAL CONDITIONS OF USE

This report may only be reproduced in full without modifications by the report sponsor. Copies, extracts or abridgments of this report in any form shall not be published by other organisations or individuals without the permission of Exova Warringtonfire Aus Pty Ltd.

9.3 AUTHORISATION ON BEHALF OF EXOVA WARRINGTONFIRE AUS PTY LTD

Prepared by:

M. Akl

Reviewed by:

O. Saad

9.4 DATE OF ISSUE

23/11/2017

9.5 EXPIRY DATE

30/11/2022

APPENDIX A - SUMMARY OF SUPPORTING DATA

A.1 TEST REPORT- WFRA 41162.1

A.1.1 Report Sponsor

A.1.1.1 Speedpanel Victoria Pty Ltd

A.1.2 Test Laboratory

A.1.2.1 Warrington Fire Research (Aust) Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong Victoria 3175, Australia.

A.1.3 Test Date

A.1.3.1 The fire resistance test was conducted on 13th December 2004.

A.1.4 Test standards

A.1.4.1 The test was performed in general accordance with AS1530.4-1997.

A.1.5 General description of tested specimen

A.1.5.1 The test assembly comprised a nominal 3000mm × 3000mm non-loadbearing partition system consisted of 12-off panels (295mm wide × 3000mm high) that were nominally 42mm thick having 0.4mm thick steel faces, encasing a lightweight concrete core of nominal density 470kg/m³.

A.1.5.2 The panels were fixed together and secured around the edges to the metal C-channels with 12mm long self-drill, button metal screws. The C-channels were secured to the concrete block lined steel restraint frame with 6.5 × 50mm long masonry anchors.

A.1.6 Instrumentation

A.1.6.1 In accordance with AS1530.4-1997

A.1.7 Test Results

A.1.7.1 Integrity failure (through gap) at 91 minutes at an opening that had formed at the top of the specimen between the C-channel and the concrete block surround. No integrity failure occurred between panel sections during the duration of the fire-resistance test.

A.1.7.2 Lateral deflection was approximately 180mm towards the furnace at 120 minutes.

A.1.7.3 The test was discontinued after a period of 244 minutes.

A.2 REPORT BWA 2286900.5

A.2.1 Test Sponsor

A.2.1.1 Speedpanel Vic, Pty. Ltd., 89-91 Canterbury Road, Kilsyth, Vic 3137.

A.2.2 Test Laboratory

A.2.2.1 Bodycote Warringtonfire Aus Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.

A.2.3 Test Date

A.2.3.1 The test was conducted on 18th August 2008.

A.2.4 Test standard prescribed

A.2.4.1 The test was conducted in accordance with AS 1530.4-2005 Sections 2 & 3.

A.2.5 Variations to Test Standard

A.2.5.1 None

A.2.6 Description of Tested Assembly

A.2.6.1 The test specimen comprised a nominal 2790mm wide × 3000mm high × 78mm thick loadbearing wall made of vertically oriented 78mm thick Speedpanel panels that incorporated a “tongue and groove” detail on their vertical edges. The panels were made from 0.42mm galvanized mild steel.

A.2.6.2 The perimeter framing comprised 83mm wide × 58mm high × 1.2mm thick steel C-tracks on the top and bottom of the wall system. The end cap on the west side was 50mm wide × 59mm high × 0.6mm thick and the C-track and on the east side was 17mm wide × 60mm high × 0.6mm thick.

A.2.6.3 The panels were fixed to the top and bottom C-tracks at nominal 250mm centres and fixed to each other along the horizontal centreline on both exposed and unexposed sides with 15mm long self-tapping screws.

A.2.6.4 Fire rated acrylic sealant was used to seal any gaps in the construction prior to testing.

A.2.6.5 The wall was loaded from the base of the wall at six points, at 500mm centres. The average load that was applied at each point for the duration of the test was approximately 2.0kN per load point (4.3kN/m).

A.2.7 Instrumentation

A.2.7.1 The test instrumentation was in accordance with AS 1530.4-2005.

A.2.8 Conditioning

A.2.8.1 The test load was applied to the wall for 15 minutes prior to the commencement of the fire resistance test.

A.2.9 Results

A.2.9.1 The test was terminated at 144 minutes.

A.2.9.2 The ambient temperature at the start of the test was 29°C and varied between 29°C and 30°C during the test.

A.2.9.3 The deflection of the free edge was 60mm at 120 minutes

A.2.9.4 The specimen achieved the following performance:

Criteria	Performance
Structural adequacy	144 minutes
Integrity	120 minutes Ignition of sealant at interface of top C-track and panel initiated failure of specimen by sustained flaming for longer than 10 seconds.
Insulation (Wall System)	64 minutes Maximum temperature on top C-track (T/C B6) exceeded 180 K above the initial temperature.
Insulation (Panel only)	80 minutes Maximum temperature 15 mm from the edge of a vertical joint (T/C B8) exceeded 180 K above the initial temperature.

A.3 TEST REPORT- FSV 1395

A.3.1 Report Sponsor

A.3.1.1 Bovis Lend Lease Pty Limited, 30 The Bond, 30 Hickson Road, Millers Point, NSW.

A.3.2 Test Laboratory

A.3.2.1 CSIRO, Division of Building Construction and Engineering, 14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113.

A.3.3 Test Date

A.3.3.1 The test was conducted on 14th January 2010.

A.3.4 Test standards prescribed

A.3.4.1 The test was conducted in accordance with AS1530.4-1997

A.3.5 General description of tested specimens

A.3.5.1 The test specimen comprised a 190mm thick Boral Block wall incorporating three Blendair SHD series curtain fire dampers.

Fire Damper A

A.3.5.2 The specimen comprised a 1165mm wide × 365mm high Blendair SHD series curtain fire damper protecting a nominally 1200mm wide × 500mm high opening. The top of the opening was formed using a bond bean reinforced with two Y16 bars that extended 200mm along either side of the opening and filled with mortar. Two layers of 50mm thick Promat Calcium Silicate board were dynabolted to the bond beam at 300mm centres reducing the height of the opening to 400mm high.

A.3.5.3 The damper casing was secured by steel retaining angles on both faces of the wall system, three nominally 50mm × 40mm × 2mm thick galvanised steel retaining angles were used along the bottom and both vertical edges, a nominally 150mm × 50mm × 2mm thick galvanised steel retaining angle was installed at the top of the damper. The retaining angles were bolted to the damper casing using 16mm long × 6.4mm thick cup head bolts and nuts at nominally 150mm centre, the gaps between the damper and the wall were filled with Bradford Fireseal Damper Strip Rockwool, and PROMASEAL® Supa Mastic was applied along the retaining angles which were in contact with the wall.

Fire Damper B

A.3.5.4 The specimen comprised a 600mm wide × 365mm high and Blendair SHD series curtain fire damper protecting a nominally 600mm wide × 400mm high opening. The damper was built into the 190mm thick block wall with the block laid directly on top of the damper and the gasp filled with mortar.

A.3.5.5 The damper casing was secured by steel retaining angles on both faces of the wall system. Four nominally 50mm × 40mm × 2mm thick galvanised steel retaining angles were used around the perimeter of the damper. The retaining angles were bolted to the damper casing using 16mm long × 6.4mm thick cup head bolts and nuts at nominally 150mm centres.

Fire Damper C

A.3.5.6 The fire damper C was of similar construction to Damper A except a 150mm × 90mm × 10mm thick unequal angle, 1600mm long was installed as a lintel beam across the top of the opening.

A.3.5.7 Instrumentation was stated to be in accordance with AS1530.4-1997.

A.3.6 Test Results

Damper No.	Integrity	Close Time
Damper A	No failure at 121 minutes	15 seconds
Damper B	No failure at 121 minutes	15 seconds
Damper C	No failure at 121 minutes	15 seconds

A.4 TEST REPORT- FSV 0931

A.4.1 Report Sponsor

A.4.1.1 Blendair Pty Ltd, 2/19-21 Burns Road, Heathcote, NSW 2233.

A.4.2 Test Laboratory

A.4.2.1 CSIRO, Division of Building Construction and Engineering, 14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113.

A.4.3 Test Date

A.4.3.1 The fire resistance test was conducted on 18th October and 22nd November 2002.

A.4.4 Test standards prescribed

A.4.4.1 The test was conducted in accordance with AS1530.4-1997

A.4.5 General description of tested specimens

A.4.5.1 The test report covered two fire resistance tests with dampers both in a similar drywall system. Six dampers were tested, Damper 1, 2 and 3 were tested in FS3520/2380, and Damper 4, 5 and 6 were tested in FS3533/2406.

Damper 1 (Blendair SHD series fire damper)

A.4.5.2 The damper consisted of mild steel, roll formed, perimeter frame, nominally 600mm × 600mm × 1.5mm thick, with a slat curtain through a plasterboard dry wall. The damper was secured by mild steel angles nominally 2mm thick; to both faces and any gaps between the wall and damper were filled mastic. On the exposed side of the damper the securing angle was positioned between the wall and damper and extended through the depth of the damper to the unexposed face. On the unexposed face of the damper both the angles were bolt fixed to the sleeve of the damper.

Damper 2 (Blendair SHD series fire damper)

A.4.5.3 The damper 2 was of similar construction to damper 1 except with an outer casing of 1mm thick mild steel with overall dimensions of 630mm high × 630mm wide. Mineral fibre was packed between the outer casing and sleeve. The damper was secured with 2mm angles on the exposed face only with mastic between the damper and wall.

Damper 3 (Blendair SHD series fire damper)

A.4.5.4 The damper 3 was of similar construction to damper 1 except with angles mounted on the unexposed side only.

Damper 4 (Blendair SHD series fire damper)

A.4.5.5 The damper consisted of a nominal 300mm × 400mm damper made from 1.5mm thick roll formed stainless steel.

Damper 5 (Blendair MFD series fire damper)

A.4.5.6 The damper consisted of a nominal 600mm × 770mm motorised blade damper. The damper was secured in place by nominal 2.5mm thick angles to both sides. The sleeve consisted of a

lipped channel to the vertical sides and flat sheet to the horizontal sides made from nominal 2mm thick mild steel.

Damper 6 (Blendair SBFP series fire damper)

A.4.5.7 The damper consisted of a nominal 300mm × 300mm mild steel damper. The sleeve consisted of a roll formed section and was secured to the wall with angles nominally 2.5mm thick.

A.4.6 Instrumentation

A.4.6.1 This was stated to be in accordance with AS1530.4-1997.

A.4.7 Test Results

A.4.7.1 The temperature of the test area was 27°C and the test was terminated at 120 minutes.

A.4.7.2 Damper 1 closed at 17 seconds and had not failed the integrity for a period of 120 minutes.

A.4.7.3 Damper 2 and 3 closed at 16 seconds and had not failed the integrity for a period of 120 minutes.

A.4.7.4 Damper 4 closed at 25 seconds and had not failed the integrity for a period of 120 minutes.

A.4.7.5 Damper 5 closed at 26 seconds and had not failed the integrity for a period of 120 minutes.

A.4.7.6 Damper 6 closed at 27 seconds and had not failed the integrity for a period of 120 minutes.

A.5 TEST REPORT- FSV 0844

A.5.1 Report Sponsor

A.5.1.1 Blendair Pty Ltd, Unit 2, 19-21 Burns Road, Heathcote, NSW.

A.5.2 Test Laboratory

A.5.2.1 CSIRO, Division of Building Construction and Engineering, 14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113.

A.5.3 Test Date

A.5.3.1 The fire resistance test was conducted on 29th June 2001.

A.5.4 Test standards prescribed

A.5.4.1 The test was conducted in accordance with AS1530.4-1997.

A.5.5 General description of tested specimens

A.5.5.1 The specimen comprised a 230mm thick Masonry wall incorporating a Blendair SHD Series curtain blade fire damper assembly protecting a normally 2470mm × 2470mm opening.

A.5.5.2 The damper assembly was nominally 2440mm × 2440mm × 350mm thick and was formed from four modules bolted together, each nominally 1220mm × 1200mm × 350mm thick. The casing was made from 1.5mm thick galvabond steel.

A.5.5.3 The specimen was restrained on all side. The damper assembly was tested with two modules having their top blade swing towards the furnace and two swing away from the furnace.

A.5.5.4 The gaps between brickwork and the fire damper were blocked with casing seal channels and seal channel joiners.

A.5.6 Instrumentation

A.5.6.1 This was stated to be in accordance with AS1530.4-1997.

A.5.7 Test Results

A.5.7.1 The temperature of the test area at the start of the test was 19°C.

A.5.7.2 All dampers modules closed at 35 seconds.

A.5.7.3 The damper had not failed integrity at 241 minutes.

A.5.7.4 The test was discontinued after a period of 241 minutes.

A.6 TEST REPORT- WFRA 2182600A.1

A.6.1 Report Sponsor

A.6.1.1 Bovis Lend Lease Pty Ltd, Level 4, 30 The Bond, 30 Hickson Road, Millers Point, NSW/

A.6.2 Test Laboratory

A.6.2.1 Warrington Fire Research Aust Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, ViC 3175.

A.6.3 Test Date

A.6.3.1 The fire resistance test was conducted on 21st May 2007.

A.6.4 Test standards prescribed

A.6.4.1 The test was conducted in accordance with AS1530.4-1997.

A.6.5 Variation from test standards

A.6.5.1 Thermocouples were not attached to the curtain blade of the damper. Considering the test was predominately undertaken to assess the affect the damper penetrations had on the separating element these omitted thermocouples were unexpected to have an adverse effect on the results of the test.

A.6.5.2 The furnace pressure varied from the target range of 15Pa ± 5Pa in AS1530.4-2007 for the first 35 minutes. In addition it varied 11Pa and 19Pa. the pressure was able to be increased for the last 25 minutes to approximately 17-19Pa. a higher pressure was not possible early on because of the gaps in the wall construction from the other specimens. Considering there were no evident gaps around the penetrations, up until 35 minutes test duration, through which excessive hot gases may pass the lower pressure at the start of the test were unlikely to have had an adverse effect on the results of the test.

A.6.6 General description of tested specimens

A.6.6.1 the test assembly comprised a nominal 3200mm × 3200mm × 156mm thick fire rated plasterboard partition incorporating a 170mm wide × 110mm deep concrete lintel, and two fire damper installations (one with two cooper pipes beside) and an ABS pipe installation.

A.6.6.2 For the purpose of this assessment, only the performances of two fire dampers are considered.

A.6.6.3 The details of the damper configurations are summarised below;

Damper A	**Description**
Damper opening	1250mm wide × 320mm high, damper was installed with a 20mm clearance at the top of the concrete lintel and 50mm clearance to the left hand which incorporated two pipes.
Product name	Blendair SSD series fire damper
Overall size	1205mm wide × 305mm high × 300mm thick
Frame Material	1.5mm thick Galvanized steel
Mounting angle	3-off 120mm × 50mm × 2mm thick Galvanized steel angles(fire side only) pop riveted to damper body
Sealant	Fyreseal Fire damper strip was installed in the 20mm clearance gap and protected with bead of Lorient intumescent mastic each side.

Damper B	Description
Damper opening	460mm wide × 460mm high, damper was installed with minimal clearance at the top and sides (less than 5mm)
Product name	Blendair SSD series fire damper
Overall size	445mm wide × 445mm high × 300mm thick
Frame Material	1.5mm thick Galvanized steel
Mounting angle	4-off 50mm × 70mm × 2mm thick Galvanized steel angles(fire side only) pop riveted to damper body

A.6.7 Instrumentation

A.6.7.1 This was stated to be in accordance with AS1530.4-1997.

A.6.8 Test Results

A.6.8.1 The ambient temperature at the start of the test was 16°C.

A.6.8.2 The damper had not failed integrity in accordance with AS1530.4-1997 at 121 minutes. The test was discontinued after a period of 121 minutes.

A.6.8.3 Damper A closed at 16 seconds and Damper B closed at 49 seconds.

A.7 TEST REPORT- FSV 1253

A.7.1 Report Sponsor

A.7.1.1 Bovis Lend Lease Pty Ltd, Level 4, 30 The Bond, 30 Hickson Road, Millers Point NSW, and Blendair Pty Ltd, 2/19-21 Burns Road, Heathcote, NSW

A.7.2 Test Laboratory

A.7.2.1 CSIRO, Division of Building Construction and Engineering, 14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113..

A.7.3 Test Date

A.7.3.1 The fire resistance test was conducted on 20th November 2006.

A.7.4 Test standards prescribed

A.7.4.1 The test was conducted in accordance with AS1530.4-1997

A.7.5 General description of tested specimens

A.7.5.1 The specimen comprised a double module MFD series, multi-blade fire damper installed in a non-loadbearing steel framed partition system lined with two layers of 13mm thick Boral Firestop plasterboard.

A.7.5.2 The fire damper assembly comprised a mild steel casing, nominally 2400mm wide × 900mm high × 2mm thick. The damper assembly was installed in a through opening in the wall system, located approximately 750mm from the base of the wall, measuring nominally 2446mm wide × 946mm high.

A.7.5.3 The damper opening in the wall was reinforced with a frame fabricated from 90mm × 90mm × 3.6mm SHS. The SHS frame comprised two uprights fixed to the top and bottom of the specimen frame, with slide-in spigots located at the top and bottom for expansion. The horizontal cross members were fixed to the upright using a steel angle bracket and four self-tapping hex-head screws.

A.7.5.4 The damper casing was secured by steel retaining angles on both faces of the wall system. Four nominally 75mm × 50mm ×2mm thick galvanised steel retaining angles were used around the perimeter of the damper. The retaining angles were fixed to the damper casing

using 10/12 hex head Tek screw.at nominally 150mm centres. Before the damper was positioned within the wall opening, Promat fire rated mastic was applied along the retaining angles which were in contact with the wall.

A.7.6 Instrumentation

A.7.6.1 This was stated to be in accordance with AS1530.4-1997.

A.7.7 Test Results

A.7.7.1 The temperature of the test area was 32°C and the test was terminated at a period of 121 minutes by agreement with the sponsor.

A.7.7.2 Both damper modules closed completely at 17 seconds.

A.7.7.3 Damper blades are starting to bow out at the centres of each module; a small gap (less than 20mm) was visible between the blades at 3 minutes.

A.7.7.4 The casing of the damper had deformed along the top at 5 minutes

A.7.7.5 Thin crack have developed in the plasterboard above the damper assembly.

A.7.7.6 The double module fire damper had not failed the integrity for a period of 121 minutes.

A.8 TEST REPORT- BWA 2352300

A.8.1 Report Sponsor

A.8.1.1 Bovis Lend Lease Pty Ltd, Level 4, 30 The Bond, 30 Hickson Road, Millers Point NSW.

A.8.2 Test Laboratory

A.8.2.1 Bodycote Warringtonfire (Aust) Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, VIC 3175.

A.8.3 Test Date

A.8.3.1 The fire resistance test was conducted on 26th May 2009

A.8.4 Test standards prescribed

A.8.4.1 The test was conducted in accordance with AS1530.4-1997.

A.8.5 General description of tested specimens

A.8.5.1 The test assembly comprised a nominally 3000mm high × 3000mm wide × 100mm thick Hebel wall system penetrated by mechanical dampers, PVC, HDPE and Copper pipes and PVC insulated copper cables.

A.8.5.2 For the purpose of this assessment, only damper specimens F and G in this test are considered, and the details of tested damper configurations are summarised below;

Damper F	**Description**
Product name	Blendair Curtain Type Fire Damper – Series BSHD
Overall damper size	2000mm wide × 992mm high
Individual damper opening	992mm wide × 992mm high
Individual overall size	995mm wide × 995mm high × 262mm thick
Frame Material	Press-formed and welded galvanised steel frame

Mounting angle	The damper was secured within the opening by 50mm × 50mm right angle roll formed mounting angles that were 2mm thick. These angles were bolted to the perimeter of the dampers on both sides with cup head bolts with nut and washer.
Damper fixing	The two sections of the damper were bolted together vertically on both sides of the system with cup head bolts with nut and washer.
installation	A nominal 10mm gap around the perimeter of the damper between the damper and the wall was filled with Bradford Fireseal Insulation
Compression	Approximately 15%
Damper G	**Description**
Product name	Blendair Single Blade Fire Damper – Series SBFP
Damper opening	298mm wide × 194mm high
Overall size	300mm wide × 200mm high × 262mm thick
Frame Material	Press formed 1.6mm galvanised sheet steel
Mounting angle	The damper was secured within the opening by 50mm × 50mm right angle roll formed mounting angles that were 2mm thick. Each of these angles was bolted at one point to the perimeter of the dampers on both sides with cup head bolts with nut and washer.
Insulation	A nominal 10mm gap around the perimeter of the damper between the damper and the wall was filled with Bradford Fireseal Insulation
Compression	Approximately 15%.

A.8.6 Instrumentation

A.8.6.1 This was stated to be in accordance with AS1530.4-1997.

A.8.7 Test Results

A.8.7.1 The temperature of the test area at the start of the test was 16°C.

A.8.7.2 Both modules of Damper F closed within 1 second.

A.8.7.3 For damper F, one opening had become evident between the concrete lintel and the rockwool above the join of the dampers at 112 minutes. Visual inspection of this opening indicated that a 6 × 150mm gap gauge could not penetrate this opening.

A.8.7.4 The damper F had not failed the integrity of a period of 121 minutes.

A.8.7.5 Damper G closed at 18 seconds.

A.8.7.6 Damper G had not failed the integrity of a period of 121 minutes.

A.8.7.7 The test was discontinued after a period of 121 minutes.

A.9 TEST REPORT- EWFA 2517300.2

A.9.1 Report Sponsor

A.9.1.1 Speedpanel (VIC) Pty. Ltd., 89-91 Canterbury Road, Kilsyth, VIC, 3137.

A.9.2 Test Laboratory

A.9.2.1 Exova Warringtonfire Aus Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.

A.9.3 Test Date

A.9.3.1 The fire resistance test was conducted on 27th October, 2010.

A.9.4 Test standards prescribed

A.9.4.1 The test was performed in accordance with the requirements of AS1530.4-2005 sections 2 and 10 as appropriate.

A.9.4.2 The dampers were not tested in full accordance with AS1530.4-2005. Specifically, a pressure difference was not applied across the damper. In this assessment, only the behaviour of the junctions of the damper and the wall will be considered, as this was in accordance with AS1530.4-2005.

A.9.5 General description of tested specimens

A.9.5.1 The test assembly comprised a nominal 3000mm wide × 3000mm high × 77mm thick non-load-bearing Speedpanel panel wall system.

A.9.5.2 The panels were stitched together on the unexposed side only at 1500mm centres.

A.9.5.3 The wall incorporated five pipe penetration systems, one cable tray and four dampers. Only the performance of the dampers and pipes are relevant to this assessment.

A.9.5.4 The details of the dampers are provided below:

Specimen	Damper Model	Size
A	Bullock 5650	400mm wide × 250mm high
B	Bullock 4800	390mm wide × 290mm high
C	Bullock 4900	290mm wide × 590mm high
D	Prefco/Bullock Motorised Air/Smoke/Fire Damper	390mm wide × 290mm high

A.9.5.5 The dampers were arranged in a cluster, such that the gap between adjacent dampers varied between 148mm to 364mm.

A.9.6 Instrumentation

A.9.6.1 The instrumentation was provided in accordance with AS1530.4-2005, except for the variations previously stated

A.9.7 Test Results

A.9.7.1 The test duration was 195 minutes.

A.9.7.2 There were no observations made which suggest integrity weakness via the formation of gaps at any of the damper-wall junctions for the test duration.

A.9.7.3 There were no observations made which suggest degradation or integrity weakness via the formation of gaps in the wall panels between adjacent dampers for the test duration.

A.10 TEST REPORT- BWA 2245900.2

A.10.1 Report Sponsor

A.10.1.1 Bovis Lend Lease Pty. Ltd., 30 The Bond, 30 Hickson Road, Millers Point, NSW, 2000.

A.10.2 Test Laboratory

A.10.2.1 Bodycote Warringtonfire (Aus) Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.

A.10.3 Test Date

A.10.3.1 The fire resistance test was conducted on 12th February 2007.

A.10.4 Test standards prescribed

A.10.4.1 The test was performed in accordance with the requirements of AS1530.4-1997.

A.10.5 General description of tested specimens

A.10.5.1 The test assembly comprised a nominal 3200mm × 3200mm × 190mm thick masonry block wall incorporating a single opening of nominal overall dimension 2450mm wide × 900mm high.

A.10.5.2 The test specimen comprised a dual module curtain blade damper topped with two layers of Vicuclad, each 25mm thick.

A.10.5.3 Both the dampers were Bullock Model 4900 Curtain Type Fire Dampers of 1196mm wide × 880mm high × 337mm thick overall size.

A.10.5.4 6-off 50mm × 60mm × 1.6mm Galvanised steel angles were bolted onto the body of the damper along each side. These retained metal expansion seals around the perimeter of the damper. Two layers of Vicuclad were laid onto the top section of the damper between the flanges along each edge. Each layer of Vicuclad was 25mm thick and was cut to fit the width of the space between the top flanges.

A.10.5.5 20.01s blocks were used to construct the separating element. A reinforced concrete lintel was placed above the damper opening and a bead of fire-rated sealant was applied to the fire-exposed-side of the specimen, along the lintel and Vicuclad interface and along the Vicuclad damper interface. A layer of fire-grade plasterboard, 25mm thick, was inserted above the concrete lintel to fill the gap between the lintel and the steel specimen restraint frame.

A.10.6 Instrumentation

A.10.6.1 The instrumentation was provided in accordance with AS1530.4-1997.

A.10.7 Test Results

A.10.7.1 The test duration was 121 minutes.

A.10.7.2 There were no observations made which suggest integrity weakness via the formation of gaps at any of the damper-wall junctions for the test duration.

APPENDIX B - ASSESSMENT OF SPECIFIC VARIATIONS

B.1 INTEGRITY OF VARIOUS BLENDAIR DAMPERS

B.1.1 General

B.1.1.1 The important aspects of integrity performance of the proposed construction are the performance of the proposed damper, the integrity performance of the seal between the damper and the wall, and the performance of the wall above the damper opening.

B.1.1.2 It is a requirement of the proposal that a suitable fire rated sealant is used between the duct and the supporting construction.

B.1.1.3 It is considered for the purposes of this report that a suitable sealant is one capable of demonstrating by test or assessment, that when tested as a control joint on the fire side of a slab at a 15mm depth and 20mm width, achieved 90 minutes integrity in accordance with AS1530.4-1997.

B.1.2 Discussion

Support of Ducts Generally

B.1.2.1 It is a requirement of AS1668.2 that the damper/duct assembly incorporate a break away joint on each side of the wall and that the duct section that penetrates the wall is supported by the wall structure.

B.1.2.2 With reference to figures 11, 12 and 14, it is noted that the proposed construction incorporates this feature.

Integrity of Damper Unit

B.1.2.3 The integrity performance in accordance with AS1530.4 -1997 Clause 7.6.1(a) (b), (e) and (f) for the dampers below were demonstrated in the following tests;

Test Reference	Description	Individual Damper Size	Integrity with respect to AS1530.4-1997 Clause 7.6.1 (a), (b) (f)	Time to Closure of Damper AS1530.4-1997 Clause 7.6.1 (e)
FSV 0931	Blendair SBFP Series Damper	300mm wide × 300mm high	No failure at 120 minutes	27 seconds
FSV 1253	Blendair MFD Series Damper	1200mm wide × 900mm high	No failure at 121 minutes	17 seconds
FSV 0844	Blendair SHD Series Damper	1220mm wide × 1220mm high	No failure at 241 minutes	35 seconds
WFRA 2182600	Blendair SSD Series Damper	1200mm wide × 300mm wide	No failure at 121 minutes	16 seconds

B.1.2.4 The size of the proposed dampers is the same or smaller than those tested while the cross section properties of the damper remain the same.

B.1.2.5 In absence of any integrity related weakness in the tested specimen before 121 minutes, and factors of the proposed construction unlikely to reduce integrity, it is considered reasonable to expect that an integrity performance of at least 120 minutes would be achieved.

Integrity of Damper to Wall Seal Blendair SBFP Series Dampers

B.1.2.6 The tested SBFP Series damper in FSV 0931 incorporated perimeter mounting angles without Rockwool insulation seal or sealant between damper and wall, which was a 142mm thick steel framed dry wall with two layers of 13mm thick fire grade plasterboard lined each side of steel studs.

B.1.2.7 The tested construction in FSV 0931 did not demonstrate any integrity weakness at the damper/wall junction for the duration of the test of 120 minutes.

B.1.2.8 The proposed construction also incorporates steel mounting angles; however, the wall construction is 77mm wide.

B.1.2.9 The reduced thickness of the proposed wall construction will tend to increase the tendency for the penetration of flames through any small gaps between the mounting angles.

B.1.2.10 The proposed construction incorporates a fire rated sealant (and fire rated plasterboard, for damper installations near the base of the wall) between the damper flanges, and between the damper body and wall. This will act to significantly decrease the size of gaps, particularly on the non-fire side of the damper. The likelihood of gaps forming large enough to allow a view into the furnace will be minimized

B.1.2.11 The expected thermal curvature of the wall (discussed in more detail in B.2) equates to an expected differential deflection of approximately 2mm over the height of a 300mm high damper.

B.1.2.12 The proposed construction for 300mm × 300mm dampers incorporates flange angles that are nominally 50mm in size, which is expected to accommodate a relative movement of 2mm. This increased flange dimension will also allow for effective installation of sealant at the perimeter of the damper between the mounting flange and the profiles wall panel.

B.1.2.13 In the absence of any weakness of the proposed construction that is likely to reduce integrity, it is considered reasonable that an integrity performance of 120 minutes would be achieved by the proposed construction if it were tested in accordance with AS1530.4 -1997 Section 7.6.2, as appropriate to dampers.

Integrity of Damper to Wall Seal Blendair MFD Series Dampers

B.1.2.14 The tested dual module MFD Series damper in FSV 1253 incorporated perimeter mounting angles and Promat fire rated mastic was applied along the retaining angles which were in contact with the wall before the damper was positioned within the wall opening. The damper was installed in a 144mm thick dry wall comprised two layers of 13mm thick fire grade plasterboard each side.

B.1.2.15 The tested construction in FSV 1253 did not demonstrate any integrity weakness at the damper/wall junction for the duration of the test of 121 minutes.

B.1.2.16 The proposed construction also incorporates a Rockwool seal between the damper body covered with steel mounting angles, however, the wall construction is 77mm wide. The reduced thickness of the proposed wall construction will tend to increase the tendency for the penetration of flames through any small gaps between the mounting angles.

B.1.2.17 The proposed construction incorporates a fire rated sealant (and fire rated plasterboard, for damper installations near the base of the wall and at the top of walls for dampers up to 1650mm wide × 2250mm high) between the damper flanges, and between the damper body and wall. This will act to significantly decrease the size of gaps, particularly on the non-fire side of the damper, and to reduce the likelihood of gaps forming that are large enough to allow a view into the furnace.

B.1.2.18 The expected thermal curvature of the wall (discussed in more detail in B.2) equates to an expected differential deflection of approximately 16mm over the height of a 900mm high damper.

B.1.2.19 The proposed construction for 1200mm wide × 900mm high dampers incorporates flange angles that are nominally 50mm in size. The increased dimension will allow the flanges to deform and tolerate the expected vertical curvature of the wall panel over the 900mm height.

B.1.2.20 The 50mm angles will all also facilitate fixing of the flange angle to the damper clear of the 90mm wide central curtain in the damper body. This is important as the screws may otherwise interfere with the operation of the damper.

B.1.2.21 In absence of any weakness of the proposed construction that is likely to reduce the integrity, it is considered reasonable that an integrity performance of 120 minutes would be achieved by the proposed construction if it were tested in accordance with AS1530.4 -1997 Section 7.6.2, as appropriate to dampers.

Integrity of Damper to Wall Seal Blendair SHD Series Dampers

B.1.2.22 The tested damper modules in FSV 0844 incorporated perimeter mounting angles and no insulation seal between damper body and wall, which was a 230mm thick masonry wall.

B.1.2.23 The tested multi-unit damper and multi-blade damper assemblies in FSV 0844 were in 2 × 2 modular formation. The casing with mullions was installed in the wall aperture.

B.1.2.24 The tested construction in FSV 0844 did not demonstrate any integrity weakness at the damper/wall junction for the duration of the test of 240 minutes each.

B.1.2.25 The proposed construction also incorporates steel mounting angles; however, the wall construction is 77mm wide.

B.1.2.26 The reduced thickness of the proposed wall construction will tend to increase the tendency for the penetration of flames through any small gaps between the mounting angles.

B.1.2.27 The proposed construction incorporates a fire rated sealant (and fire rated plasterboard, for damper installations near the base of the wall and at the top of walls for dampers up to 1650mm wide × 2250mm high) between the damper flanges, and between the damper body and wall. This will act to significantly decrease the size of gaps, particularly on the non-fire side of the damper. The likelihood of gaps forming large enough to allow a view into the furnace will be minimised.

B.1.2.28 For the proposed 2250mm high dampers reference is made to subsequent testing of 77 thick panels in BWA 2286900. In this test, the free edge most closely simulates the 2250mm high opening in the wall. When tested, the total deflection of the free edge of 3000mm high was 60mm at 120 minutes. The radius of curvature of the free edge was calculated to be 18.78m.

B.1.2.29 When this curvature is applied across the 2250mm high section of the opening the curvature the in the panel creates a maximum differential deflection between the panel and the damper of 34mm.

B.1.2.30 The proposed perimeter construction for 1650mm wide × 2250mm high dampers incorporates flange angles that are nominally 50mm in size. The increased dimension of these angles will allow the flanges to deform and tolerate the expected curvature of the wall panel over the 2250mm height.

B.1.2.31 The 50mm angles will all also facilitate fixing of the flange angle to the damper clear of the 90mm wide central curtain in the damper body. This is important as the screws may otherwise interfere with the operation of the damper.

B.1.2.32 In absence of any weakness of the proposed construction that is likely to reduce the integrity, it is considered reasonable that an integrity performance of 120 minutes would be achieved by the proposed construction if it were tested in accordance with AS1530.4 -1997 Section 7.6.2, as appropriate to dampers.

Effect of Gap between Track and Panel

B.1.2.33 The proposed construction includes a maximum gap of 20mm between the edge of the Speedpanel panels and the trimming channel.

B.1.2.34 The inclusion of such a gap does not affect the integrity performance initially as the size of the trimming channel means there is no through gap in the specimen.

B.1.2.35 The presence of the gap, however, might alter the heat transfer to the trimming channel and the adjacent elements. As the fire side seals degrade, the gap will allow more hot gases to reach the trimming channel than if the panels were butted against the channel. This may produce warping/buckling of the channel web.

B.1.2.36 The presence of the non-fire side sealant as shown in section 3 is considered capable of preventing the mentioned hot gases passing through the specimen. Also, in the configurations proposed, slight buckling of the channel web is not considered capable of producing a through gap in the specimen, nor inducing any other significant integrity weaknesses.

B.1.2.37 The gap of maximum 20mm is not expected to significantly affect the amount of lateral deflection occurring at the damper.

B.1.2.38 In light of the above discussion, it is considered that a gap of maximum size 20mm between the edge of the Speedpanel panel and the trimming channel is not likely to reduce the integrity performance of the remainder of the damper for at least 120 minutes.

B.2 INTEGRITY OF SPEEDPANEL WALLS INCORPORATING DAMPERS

B.2.1 General

B.2.1.1 The proposed construction includes several Speedpanel wall configurations, each incorporating single or multiple dampers.

B.2.1.2 The important aspect of integrity performance of walls of extended height is the potential for greater overall deflection and the greater mass above the critical central section of the wall.

B.2.1.3 Each Speedpanel wall configuration is discussed below.

B.2.2 Single Damper Near Top of Unbraced Wall up to 4.5m High

B.2.2.1 The proposed construction is shown in figures 1 and 1A.

B.2.2.2 The construction tested in BWA 2286900.5 comprised a nominal 2790mm wide × 3000mm high × 78mm thick loadbearing wall made of vertically oriented Speedpanel panels that incorporated a “tongue and groove” detail on their vertical edges. The panels were made from 0.42mm galvanized mild steel.

B.2.2.3 The wall was loaded from the base of the wall at six points, at 500mm centres. The average load that was applied at each point for the duration of the test was approximately 4.3kN/m.

B.2.2.4 The centre of the wall was measured to have deflected approximately 180mm after 120 minutes. This deflection can be considered representative or conservative for an equivalent however unloaded specimen, since the loading will tend to enhance thermally driven deflections.

B.2.2.5 When increases in wall height and inclusion of damper apertures are involved, the structural stability of the wall must be considered. Increases in wall height will tend to increase thermally driven deflection and induce increased moments on the wall, and addition of an aperture reduces the load bearing capacity of the wall section at the level of the aperture.

B.2.2.6 The likely deflection on walls of increased height may be estimated by assuming the thermal curvature of the wall remains constant.

B.2.2.7 Once the expected deflection is calculated, the likely stress developed at the critical section of the wall can be estimated via calculation. It is necessary that this critical stress be below that which was estimated to have been withstood without failure by the similar wall tested in BWA 2286900.5. It is noted that the proposed configuration prescribes the aperture to be framed out with 79mm × 50mm × 1.2mm trimming channels which are considered to improve the strength of the wall immediately surrounding the aperture.

B.2.2.8 Using the above methodology, it has been confirmed that the configurations proposed by figure 1 and table 2, and figure 1A and table 2A, would likely be in a stress state considered less onerous than that withstood by the wall tested in BWA 2286900.5 for at least 120 minutes.

B.2.2.9 The increase in wall deflection expected will put extra stress on the panel-to-panel fixings as the joints would tend to otherwise open. The proposed fixings above dampers are nominated as 10G self-drilling screws at 400mm centres, applied from both sides of the wall. In addition, for walls up to 4.5m in height, 10G self-drilling screws are prescribed for every 1500mm of wall height in every panel joint, applied from both sides of the wall. There will thus be screws on the non-fire side connecting the panels together which are not considered likely to degrade significantly before 120 minute. Also, no panel opening was noted in BWA 2286900.5 (in which the panels were fixed along the horizontal centreline of the wall at every panel joint, on both sides of the wall). It is thus not considered likely that integrity failure would occur due to panel opening in walls up to 4.5m in height.

B.2.2.10 In light of the above discussion, it is considered that the damper configuration shown in figures 1 and 1A would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.3 Multiple Dampers Near Top of Unbraced Wall up to 4.5m High

B.2.3.1 The proposed construction is shown in figures 2 and 2A.

B.2.3.2 The discussion presented in B.2.2 regarding the expected wall deflection is considered to remain valid for the proposed construction.

B.2.3.3 Using the stress calculation method presented in B.2.2, it has been confirmed that the configurations proposed by figure 2 and table 3, and figure 2A and table 3A, would likely be in a stress state considered less onerous than that withstood by the wall tested in BWA 2286900.5 for at least 120 minutes.

B.2.3.4 Locating multiple dampers in the same vicinity could produce several unwanted effects. The integrity of the panel(s) between adjacent dampers can be compromised, especially if a panel is cut in order to fit in the gap between dampers. This increases the likelihood of gaps forming due to deflection effects, local buckling and wall failure. The section of panel between adjacent dampers could also be subjected to elevated temperatures (conduction from the damper components) compared to distant parts of the wall, thus proving a further weakness.

B.2.3.5 Reference test EWFA 2517300 comprised a 77mm thick Speedpanel wall incorporating four different dampers considered to be representative of those of the proposed construction. As in the proposed construction, the apertures were trimmed with steel C-channels. The dampers were arranged in a cluster and were separated by distances between 148mm and 364mm.

B.2.3.6 The observations made and photographs taken throughout the test verify that that the tested arrangement did not exhibit the formation of gaps, or any local buckling or distortion around the dampers for the test duration of 195 minutes.

B.2.3.7 In light of this, it is considered that multiple dampers spaced as prescribed in figure 2 and table 3, and figure 2A and table 3A, would not likely pose additional local integrity weaknesses beyond those expected for a single damper installation.

B.2.3.8 The discussion presented in B.2.2 regarding the panel-to-panel joint integrity is thus considered to remain valid for the proposed construction.

B.2.3.9 In light of the above discussion, it is considered that the damper configuration shown in figures 2 and 2A would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.4 Multiple Dampers Near Top of Wall up to 4.5m High, including Lateral Support Beam Below Dampers

B.2.4.1 The proposed construction is shown in figures 3 and 3A.

B.2.4.2 The proposed construction includes a lateral support beam that is braced back to the roof/floor construction. The structural braces for the beam and the protection shall be designed by others. It is required for the purpose of this assessment that the beam and braces be protected by a tested or assessed system in accordance with AS4100-1999 for a period of structural adequacy of 120 minutes.

B.2.4.3 The design specification, namely that the lateral support members shall limit the wall to a maximum deflection of span/360 under ambient pressure loadings, is considered sufficient to substantially prevent thermal induced lateral deflection at the location of the horizontal beam member for at least 120 minutes.

B.2.4.4 The maximum expected wall deflection is based on the unsupported span of the wall, a maximum of 3m in the section incorporating dampers, and 4m in section without dampers as prescribed by figure 3. Figure 3A reduces the maximum unsupported span in the section with dampers by adding the constraint of the beam location- 350mm nominal below the damper.

B.2.4.5 Based on the discussion presented in B.2.3 regarding multiple dampers installed in close proximity, it is considered that multiple dampers spaced as prescribed in figure 3 and table 4, and figure 3A and table 4A, would not likely pose additional local integrity weaknesses beyond those expected for a single damper installation.

B.2.4.6 The discussion presented in B.2.2 regarding the panel-to-panel joint integrity is thus considered to remain valid for the proposed construction.

B.2.4.7 Using the stress calculation method presented in B.2.2, it has been confirmed that the configurations proposed by figure 3 and table 4, and figure 3A and table 4A, would likely be in a stress state considered less onerous than that withstood by the wall tested in BWA 2286900.5 for at least 120 minutes.

B.2.4.8 In light of the above discussion, it is considered that the damper configuration shown in figures 3 and 3A would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.5 Multiple Dampers Near Base of Wall up to 4.0m High, including Lateral and Vertical Support Beam Above Dampers

B.2.5.1 The proposed construction is shown in figure 4. The proposed construction conceptually comprises a wall element that extends from the roof above and is vertical and laterally supported at its lower edge by a structural beam and brace arrangement. Below this support there are two large dampers with the gap between them filled with panels.

B.2.5.2 Practically the wall construction comprises Speed panel panels installed full height, then opening for the dampers cut and the lateral and vertical lateral beam arrangement fixed to the face of the panels. The beam is fixed to the panels at 250mm centres with two screws into each joint as shown in figure 17.

B.2.5.3 The stresses in the proposed vertical and lateral support structure have been checked for the dead loads during the fire and found to be lower than yield stress by considerable margin. It is a requirement that the structure be clad in plasterboard or other board protection. Provided this protection is capable of maintaining the structural adequacy for 120 minutes it is expected the support arrangement will continuing to provide support to the panels above the openings for a period of 120 minutes.

B.2.5.4 The discussion presented in B.2.4 regarding thermally induced deflection at the location of the horizontal beam member is considered to remain valid for the proposed construction.

B.2.5.5 The maximum expected wall deflection is based on the unsupported span of the wall, a maximum of 2.85m in the section incorporating dampers, and 1.15m in the section without dampers as prescribed by figure 4.

B.2.5.6 Based on the discussion presented in B.2.3 regarding multiple dampers installed in close proximity, it is considered that multiple dampers spaced as prescribed in figure 4 would not likely pose additional local integrity weaknesses beyond those expected for a single damper installation.

B.2.5.7 The discussion presented in B.2.2 regarding the panel-to-panel joint integrity is thus considered to remain valid for the proposed construction.

B.2.5.8 Using the stress calculation method presented in B.2.2, it has been confirmed that the configurations proposed by figure 4 would likely be in a stress state considered less onerous than that withstood by the wall tested in BWA 2286900.5 for at least 120 minutes.

B.2.5.9 In light of the above discussion, it is considered that the damper configuration shown in figure 4 would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.6 Single Dampers Near Base of Wall up to 4.5m High, including Lateral and Vertical Support Beam Above Damper

B.2.6.1 The proposed construction is shown in figure 5. The conceptual and practical nature of the system was described in B.2.5.

B.2.6.2 The stresses in the proposed vertical and lateral support structure have been checked for dead loads during the fire and found to be lower than yield stress by considerable margin. It is a requirement that the structure be clad in plasterboard or other board protection. Provided this protection is capable of maintaining the structural adequacy for 120 minutes it is expected the support arrangement will continuing to provide support to the panels above the openings for a period of 120 minutes.

B.2.6.3 The discussion presented in B.2.4 regarding thermally induced deflection at the location of the horizontal beam member is considered to remain valid for the proposed construction.

B.2.6.4 The maximum expected wall deflection is based on the unsupported span of the wall, a maximum of 3.35m in the section incorporating dampers, and 1.15m in the section without dampers as prescribed by figure 5.

B.2.6.5 The discussion presented in B.2.2 regarding the panel-to-panel joint integrity is considered to remain valid for the proposed construction.

B.2.6.6 Using the stress calculation method presented in B.2.2, it has been confirmed that the configurations proposed by figure 5 and table 5 would likely be in a stress state considered less onerous than that withstood by the wall tested in BWA 2286900.5 for at least 120 minutes.

B.2.6.7 In light of the above discussion, it is considered that the damper configuration shown in figure 5 would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.7 Single Damper Near Top of Unbraced Wall up to 6.0m High

B.2.7.1 The proposed construction is shown in figure 6.

B.2.7.2 The expected wall deflection is much higher than that previously considered. However it is noted that the proposed wall is supported along the top track with 10G self-drilling screws at 500mm centres. The top track is then protected by 13mm strip of fire grade plasterboard and metal capping fixed over the top, as shown in figures 6 and 19(a). Also, the maximum damper aperture is small- 500mm (max.) wide × 300mm (max.) high.

B.2.7.3 It is also proposed that the top C-track can optionally be protected by two layers of 16mm thick strips of fire grade plasterboard and metal capping fixed over the top at 250mm centres as shown in figure 6 and 19(b). Additional Steel angle of 50mm × 25mm in size is proposed either between C-track and two layers of fire grade plasterboard as shown in figure 19(c) or adjacent to metal capping and fixed into panel at 250mm centres shown in figure 19(d). The steel angle is fixed to the concrete slab in a similar manner for top C-track by using track fixings at 450mm centres.

B.2.7.4 With reference to test BWA 2286900, the tested specimen comprised a Speedpanel wall using C-channels around the perimeter. Top C-track was fixed to the concrete block at nominal 450mm centres. When tested, the temperature recorded on the unexposed side of top C-track at 120 minutes was around 300°C.

B.2.7.5 Based on the above observations, it is considered if the proposed construction was exposed from the top C-track side, the temperature at the interface between C-track and two layers of 16mm thick plasterboard would be around 300°C or less.

B.2.7.6 By calculating the retention capacity of proposed steel angle at 300°C, it can be demonstrated that there will not be a significantly detrimental effect on the capacity of steel angle and connection at the head of the wall for a period of 120 minutes.

B.2.7.7 It is also considered if the proposed construction was exposed from the two layers of 16mm thick fire grade plasterboard side, it is considered two layers of 16mm thick fire grade plasterboard will remain integrity performance for 120 minutes under non-loadbearing condition and at least one layer of plasterboard would remain in place to protect the top C-track.

B.2.7.8 Further confidence is added by metal capping and proposed steel angle which will prevent detachment of plasterboard for longer duration.

B.2.7.9 With reference to the test BWA 2286900, it was recorded the temperature of the unexposed side of top C-track at 120 minutes was around 300°C and the maximum temperature of the unexposed side of Speedpanel wall panels was around 150°C at 120 minutes.

B.2.7.10 Based on the above observations, it is considered the two layers of 16mm thick fire grade plasterboard clad on the exposed side of the top C-track will resist significantly enough heat that maintaining the capacity of the C-track and connection at the head of wall for a period of 120 minutes.

B.2.7.11 Based on the above discussion, the proposed two layers of 16mm thick fire grade plasterboard strips clad on one side of the top C-track is capable of maintaining structural adequacy for a period of 120 minutes.

B.2.7.12 The proposed damper therefore remains a relatively small feature in a tall wall and allows for significant continuity of the panels around the damper.

B.2.7.13 In addition to the discussion presented in B.2.2 regarding the panel-to-panel joint integrity, it is noted that for walls up to 6.0m in height, the fixing lines are prescribed every 1000mm of wall height. In light of this, it is considered that the discussion presented in B.2.2 regarding the panel-to-panel joint integrity is considered to remain valid for the proposed construction.

B.2.7.14 In light of the above discussion, it is considered that the damper configuration shown in figure 6 would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.8 Multiple Dampers Near Top of Wall up to 6.0m High, including Lateral Support Beam Below Dampers

B.2.8.1 The proposed construction is shown in figures 7 and 7A.

B.2.8.2 The proposed construction includes a lateral support beam that is braced back to the roof/floor construction. The structural braces for the beam and the protection shall be designed by others. It is required for the purpose of this assessment that the beam and braces be protected by a tested or assessed system in accordance with AS4100-1999 for a period of structural adequacy of 120 minutes.

B.2.8.3 The design specification, namely that the lateral support members shall limit the wall to a maximum deflection of span/360 under ambient pressure loadings, is considered sufficient to substantially prevent thermal induced lateral deflection at the location of the horizontal beam member for at least 120 minutes.

B.2.8.4 The maximum expected wall deflection is based on the unsupported span of the wall, a maximum of 3m in the section incorporating dampers, and 4m in section without dampers as prescribed by figure 7. Figure 7A reduces the maximum unsupported span in the section with dampers by adding the constraint of the beam location- 350mm nominal below the damper.

B.2.8.5 Based on the discussion presented in B.2.3 regarding multiple dampers installed in close proximity, it is considered that multiple dampers spaced as prescribed in figure 7 and table 6, and figure 7A and table 6A, would not likely pose additional local integrity weaknesses beyond those expected for a single damper installation.

B.2.8.6 The discussion presented in B.2.7 regarding the panel-to-panel joint integrity is thus considered to remain valid for the proposed construction.

B.2.8.7 Using the stress calculation method presented in B.2.2, and noting the effect of the top track supports, it has been confirmed that the configurations proposed by figure 7 and table 6, and figure 7A and table 6A, would likely be in a stress state considered less onerous than that withstood by the wall tested in BWA 2286900.5 for at least 120 minutes.

B.2.8.8 In light of the above discussion, it is considered that the damper configuration shown in figures 7 and 7A would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.9 Multiple Dampers Near Base of Wall up to 6.0m High, including Lateral Support Beam Above Dampers

B.2.9.1 The proposed construction is shown in figure 8.

B.2.9.2 The proposed construction includes a lateral support beam that is braced back to the roof/floor construction. The structural braces for the beam and the protection shall be designed by others. It is required for the purpose of this assessment that the beam and braces be protected by a tested or assessed system in accordance with AS4100-1999 for a period of structural adequacy of 120 minutes.

B.2.9.3 The design specification, namely that the lateral support members shall limit the wall to a maximum deflection of span/360 under ambient pressure loadings, is considered sufficient to substantially prevent thermal induced lateral deflection at the location of the horizontal beam member for at least 120 minutes.

B.2.9.4 The maximum expected wall deflection is based on the unsupported span of the wall, a maximum of 4m in the section incorporating dampers, and 3m in section without dampers as prescribed by figure 8.

B.2.9.5 The proposed wall incorporates the top track fixing detail described in B.2.7, and also includes SHS elements around the damper aperture which are protected with fire grade plasterboard. The proposed plasterboard lining system is configured in such a manner that the plasterboard sheets will be restrained from falling away as they are supported by steel angles, hence improving the thermal performance of the system. The SHS elements are thus considered capable of supporting the weight of the panels above for at least 120 minutes. As the deflection of the lintel is not expected to be significant, the proposed construction is not considered to adversely affect the performance of the seal between the damper and the wall.

B.2.9.6 The above factors lend confidence to the structural viability of the proposed wall.

B.2.9.7 Based on the discussion presented in B.2.3 regarding multiple dampers installed in close proximity, it is considered that multiple dampers spaced as prescribed in figure 8 would not likely pose additional local integrity weaknesses beyond those expected for a single damper installation.

B.2.9.8 The discussion presented in B.2.7 regarding the panel-to-panel joint integrity is thus considered to remain valid for the proposed construction.

B.2.9.9 In light of the above discussion, it is considered that the damper configuration shown in figure 8 would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.10 Single Damper Near Base of Wall up to 6.0m High, including Lateral Support Beam Above Damper

B.2.10.1 The proposed construction is shown in figure 9.

B.2.10.2 The discussion presented in B.2.9 regarding the structural viability of the wall and B.2.7 regarding the panel-to-panel joint integrity is considered to remain valid for the proposed construction.

B.2.10.3 In light of the above discussion, it is considered that the damper configuration shown in figure 9 would likely maintain integrity for at least 120 minutes if tested in accordance with AS1530.4-1997.

B.2.11 Fire Dampers near Top of Wall, fixed to the underside of the slab

B.2.11.1 The proposed construction is shown in figures 20- 22.

B.2.11.2 The proposed construction includes various details for fixing dampers when close to the underside of slabs. The details include interlocking steel tracks filled with fire grade plasterboard, Vicuclad or PROMATECT 50. There shall be a maximum of gap of 20mm not filled with mineral board to allow for fitting and adjustment on site.

B.2.11.3 With reference to the construction tested in BWA 2245900.2 it incorporated 2 layers of 25mm thick Vicuclad placed between the top flanges of the damper. A bead of fire rested sealant was applied along lintel- Vicuclad interface and Vicuclad- damper interface. When tested it achieved integrity performance of 120 minutes.

B.2.11.4 Proposed variation (figure 20-22) is similar to the tested detail except that the support wall is Speedpanel wall and Vicuclad boards are housed in the Speedpanel track and adjustable track with a maximum gap of 20mm gap between adjustable track and Vicuclad. The Speedpanel track is fixed to damper using angles (item 12). Vertical edges and bottom details are as described elsewhere in the report.

B.2.11.5 When tested the Vicuclad- damper interface did not contribute to integrity failure for a period of at least 120 minutes, this demonstrated the viability of such a detail at the perimeter of the tested damper to adequately seal the gap above a damper.

B.2.11.6 There is no evidence from the test data presented in BWA 2245900.2 that an integrity failure at the perimeter imminent; in addition, inclusions of the tracks which enclose the Vicuclad boards are likely to increase the performance of the Vicuclad boards and as there are in turn fixed to the slab above, decrease the likelihood of a gap forming at the slab interface or at the damper interface.

B.2.11.7 In absence of any introduced integrity related weakness in the proposed construction, it is considered the integrity performance of 120 minutes would be achieved at the perimeter if tested in accordance with AS1530.4.-2005.

B.2.12 CONFIRMATION OF FIRE SEALANT APPLICATION BETWEEN DAMPER CASE AND RETAINING ANGLES

B.2.12.1 In all referenced test reports in appendix A, it is confirmed that no fire rated sealant was used between the damper case and the retaining angles.

B.2.12.2 The tested construction in tested reports FSV0931, FSV1253, 2318300.2 didn't demonstrate any integrity weakness at the damper/wall junction for the duration of the test of 120 minutes

B.2.12.3 The proposed construction includes damper installed to the top and bottom of walls height up to 6m.

B.2.12.4 The increase in wall height will tend to increase the tendency for the penetration of flames through any small gaps between the mounting angles and the damper case as it is anticipated that more pressure will be exerted at the damper and retaining angle interface.

B.2.12.5 Therefore, a fire rated sealant between the retaining angles and damper case is required as shown in Figure 11 to decrease the chances of flames and hot gasses penetrating from the exposed side to the unexposed side causing flaming for more than 10 seconds which is considered an integrity failure as per the test method.

B.2.12.6 For dampers installed in walls height less than 3m or near base of wall (for any wall height), the pressure at the base of the wall will be similar to test conditions minimizing any possibility for flames and hot gases escaping form the exposed side to the unexposed side of damper and retaining angle interface , subsequently lowering the chances for flames and hot gasses penetration from the exposed side to the unexposed side which could prompt an integrity failure. Hence, applying fire rated sealant is optional as shown in the note below Figures 12,14,20,21 & 22.