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Assessment Number **BTC 20287LC**

A structural test assessment on a range of British Gypsum GypWall QUIET partitions, incorporating twin frames (of various widths) of Gypframe 48S50 'C' Studs and with a range of double layer cladding options, if tested in accordance with BS 5234: Part 2: 1992

Assessment Date: 30th August 2017

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Applicant: **British Gypsum**
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DETAILS OF THE REQUEST

It is required to assess the following construction for structural performance if tested in accordance with BS 5234: Part 2: 1992 Annexes A, B, C, D, E & F on behalf of British Gypsum.

Systems to be covered in this assessment include six British Gypsum GypWall QUIET constructions on twin frame UltraEMBOSSED Gypframe 48S50 'C' Studs of various partition widths and a range of double layer cladding options as described in Table 1.

British Gypsum GypWall QUIET Partitions (double layer)				
Overall Width	Board thickness	Board type	Maximum Partition Height (mm)	Unique reference for discussion section
200 mm	15 mm	Gyproc SoundBloc	7500	1
		Gyproc FireLine	7500	2
	19 mm (inner) 12.5 mm (outer)	Gyproc Plank (inner) Gyproc SoundBloc (outer)	6200	3
250 mm	15 mm	Gyproc SoundBloc	7500	4
300 mm	15 mm	Gyproc SoundBloc	7500	5
	19 mm (inner) 12.5 mm (outer)	Gyproc Plank (inner) Gyproc SoundBloc (outer)	6200	6

Table 1. Range of constructions to be assessed

Note: all systems covered in this assessment are taken from the 12th Edition of the British Gypsum White Book. Any changes to the White Book after the issue date of this assessment will not be covered by this assessment without review

Proposed Construction

A 4600 mm long test specimen (see Table 1 for maximum heights) constructed in the test aperture with one end of the partition fixed to the test rig and the other remaining free.

A door set, measuring 900 mm x 2100 mm incorporated into the partition 700 mm from the fixed end.

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Framework

Gypframe 50DC60 Deep Flange Floor & Ceiling Channels screw fixed to the head and base of the test aperture using 35 mm British Gypsum drywall screws spaced at 600 mm centres incorporating a 900 mm opening for the door set. Partition heights below 4200 mm use 'FEC Folded Edge Channel' in place of 'DC Deep Flange Channel'.

Gypframe 48S50 'C' Studs positioned at the fixed end and screw-fixed to the side of the test aperture using 35 mm British Gypsum Drywall Screws at 600 mm centres.

Gypframe 48S50 'C' Studs positioned between the head and base channel at 600 mm centres. The stud at the free-end of the partition remains free.

A second framework using the same components and fixing details is located adjacent to the first framework to create the twin frame and a final overall partition thickness described in Table 1. The Gypframe 48S50 'C' Studs are located at 600 mm centres parallel with the first set of framework studs.

The studs are cross braced using Gypframe 99FC50 Fixing Channel at 1200 mm centres and fixed twice to each stud using two 13 mm British Gypsum Wafer Head Drywall Screws. The braces are staggered by 600 mm between stud pairs.

Door Aperture

The door jambs are braced from above the door opening using Gypframe 99FC50 Fixing Channel at 1200 mm centres and fixed twice to each stud using two 13 mm British Gypsum Wafer Head Drywall Screws.

The vertical framework at the door opening is formed as follows:

The vertical framework that contains the doorset formed using Gypframe 48S50 'C' Studs and timber sub frame. The base channel is fixed to the aperture using two 1 ¾" woodscrews at the door opening and 150 mm adjacent to the first row of fixings. A timber sub-frame is inserted into the web of the door jamb studs and extended 150 mm above the head of the door frame.

The Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel are extended 300 mm beyond the door opening on either side. Each flange of the extended channel is cut at the jamb position and the 300 mm over run bent up through 90 degrees to cover the bottom of the jamb stud. The channel is fixed to the jamb stud twice either side using 13 mm British Gypsum Wafer Head Drywall screws.

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At the head of the door opening, Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel is cut and bent to extend 150 mm down the face of the studs. The channel and door jamb studs are fixed twice to each side using 13 mm British Gypsum Wafer Head Drywall screws.

The exposed door jamb studs on each side of the opening are sleeved to full door height with Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel section.

The vertical framework that does not contain the doorset is formed using Gypframe 48S50 'C' Studs. The Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel is fixed to the test aperture base with two 1 ¾" woodscrews at the door opening and 150 mm adjacent to the first row of fixings. The channel is fixed to the jamb stud on either side using 13 mm British Gypsum Wafer Head Drywall screws.

At the head of the door opening, Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel is cut and bent to extend 150 mm down the face of the studs. The channel and door jamb studs are fixed twice to each side using 13 mm British Gypsum Wafer Head Drywall screws.

A length of Gypframe 48S50 'C' Stud is positioned between the door head detail and the head of the partition to maintain 600 mm stud centres above both door openings. The studs are cross braced using Gypframe 99FC50 Fixing Channel at 1200 mm centres and fixed twice to each stud using two British Gypsum Wafer Head Drywall Screws. The braces are staggered by 600 mm between stud pairs.

At the door opening the vertical jambs are clad with an inner layer of 15 mm plywood fixed to the studs using 25 mm Gyproc Drywall Screws at 300mm centres and an outer layer of 15 mm Gyproc SoundBloc fixed at 300 mm centres using 40 mm British Gypsum Drywall Screws.

A doorframe, 100 mm x 38 mm (including stop), is fixed into position using two 90 mm British Gypsum Drywall Screws at each point 50 mm from the bottom of the casing and at 400 mm centres thereafter.

A Severe Duty door is fitted using 1½" No.10 countersunk wood screws.

Cladding

The framework clad with a double layer of boards, as described in Table 1, on each side of the partition.

The inner layer of boards was screw fixed around the perimeter of the board at 300 mm centres using 25 mm British Gypsum Drywall Screws (35 mm where inner layer is Gyproc Plank).

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The outer layer of boards was screw fixed around the perimeter of the board and intermediate stud positions at 300 mm centres using 40 mm British Gypsum Drywall Screws (45 mm where inner layer is Gyproc Plank).

Joints

A horizontal joint at 2400 mm from the base on the outer layer boards and at 1200 mm from the base on the inner layer boards, on both faces of the specimen. A Gypframe GFS1 Fixing Strap used behind the horizontal outer layer board joint.

All vertical joints staggered between layers.

The vertical and horizontal joints adjacent to the door taped and filled on both sides using Gyproc joint tape and Gyproc joint filler.

Doorframe, architrave and skirting

Softwood architrave, 45 mm x 18 mm, fixed to both sides of the partition with 50 mm bright oval nails at 300 mm centres into the timber doorframe.

Bullnose softwood skirting fixed to the base track and at stud positions on both sides of the partition using a pair of 40 mm British Gypsum Drywall Screws at 600 mm centres

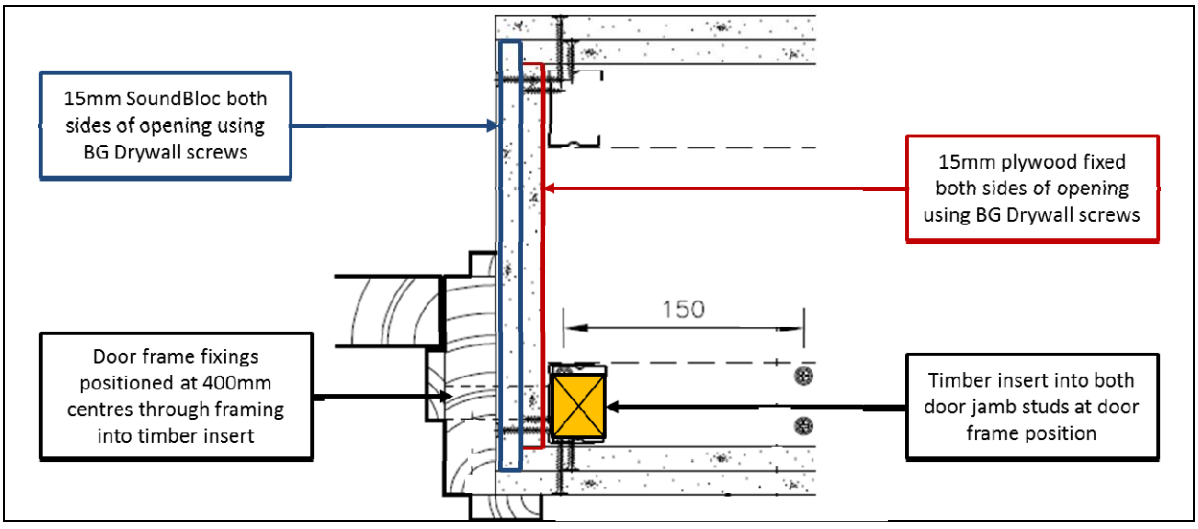

Figure 1. Horizontal cross section view of the door opening in the proposed partitions

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Fire Acoustics Structures

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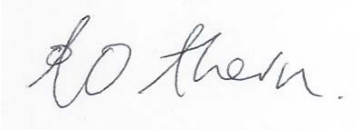
THE ASSESSORS

The Building Test Centre operates as an independent accredited test house for the construction industry. The Building Test Centre has unrivalled experience in the development of drywall systems. The Building Test Centre is UKAS accredited under No. 0296 for fire resistance, reaction to fire, acoustic and structural testing. The Building Test Centre is wholly owned by British Gypsum, a major manufacturer of building products.

ASSESSMENT AUTHORISATION

Assessment Author



Alexandra Ahern
B.Eng, MIOA
BTC Technical Manager

Reviewing Assessor

Phil Barnes

Head of Laboratory

This assessment is not valid unless it incorporates the Declaration by Applicant form duly signed by the applicant.

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TEST EVIDENCE

The test evidence used in this assessment has been used under the authorisation of the test report owner and has been used with their permission (see pages 33 & 34). Furthermore, the test evidence has been reviewed by The Building Test Centre to ensure that the test reports are still valid.

All test evidence is presented in its original format, including figure and table numbers

Primary Evidence : BTC 20236S

A structural test report covering laboratory testing to BS 5234 Part 2: 1992, Annexes A, B, C, D, E, F, and G on a British Gypsum GypWall Quiet partition clad with a double layer of 15mm Gyproc SoundBloc. (UltraEMBOSSED™ profiles)

TEST CONSTRUCTION

A 3600mm high x 4600mm long twin-framed test specimen was constructed in the test aperture with one end of the partition fixed to the test rig and the other remaining free.

A door set, measuring 900mm x 2100mm, was incorporated into the partition 700mm from the fixed end.

Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channels were screw fixed to the head and base of the test aperture using 35mm British Gypsum Drywall Screws spaced at 600mm centres incorporating a 900mm opening for the door set.

Gypframe 48S50 'C' Studs were positioned at the fixed end and were screw-fixed to the side of the test aperture using 35mm British Gypsum Drywall Screws at 600mm centres.

Gypframe 48S50 'C' Studs were positioned between the head and base channel at 600mm centres. The stud at the free-end of the partition remained free.

A second framework using the same components and fixing details was located adjacent to the first framework by 40mm to create the twin frame and a final overall partition thickness of 200mm. The Gypframe 48S50 ‘C’ Studs were located at 600mm centres parallel with the first set of framework studs.

The studs were cross braced using Gypframe 99FC50 Fixing Channel at 1200mm centres and fixed twice to each stud using two 13mm British Gypsum Wafer Head Drywall Screws. The braces were staggered by 600mm between stud pairs.

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The door jambs were braced from above the door opening using Gypframe 99FC50 Fixing Channel at 1200mm centres and fixed twice to each stud using two 13mm British Gypsum Wafer Head Drywall Screws.

The vertical framework at the door opening was formed as follows:

The vertical framework that contained the doorset was formed using Gypframe 48S50 'C' Studs and timber sub frame. The base channel was fixed to the aperture using two 1 ¾" woodscrews at the door opening and 150mm adjacent to the first row of fixings. A timber sub-frame was inserted into the web of the door jamb studs and extended 150mm above the head of the door frame.

The Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel was extended 300mm beyond the door opening on either side. Each flange of the extended channel was cut at the jamb position and the 300mm over run was bent up through 90 degrees to cover the bottom of the jamb stud. The channel was fixed to the jamb stud twice either side using 13mm British Gypsum Wafer Head Drywall screws.

At the head of the door opening, Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel was cut and bent to extend 150mm down the face of the studs. The channel and door jamb studs were fixed twice to each side using 13mm British Gypsum Wafer Head Drywall screws.

The exposed door jamb studs on each side of the opening were sleeved to full door height with Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel section.

The vertical framework that did not contain the doorset was formed using Gypframe 48S50 'C' Studs. The Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel was fixed to the test aperture base with two 1 ¾" woodscrews at the door opening and 150mm adjacent to the first row of fixings. The channel was fixed to the jamb stud on either side using 13mm British Gypsum Wafer Head Drywall screws.

At the head of the door opening, Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel was cut and bent to extend 150mm down the face of the studs. The channel and door jamb studs were fixed twice to each side using 13mm British Gypsum Wafer Head Drywall screws.

A length of Gypframe 48S50 ‘C’ Stud was positioned between the door head detail and the head of the partition to maintain 600mm stud centres above both door openings. The studs were cross braced using Gypframe 99FC50 Fixing Channel at 1200mm centres and fixed twice to each stud using two British Gypsum Wafer Head Drywall Screws. The braces were staggered by 600mm between stud pairs.

The framework was clad with a double layer of 15mm Gyproc SoundBloc on each side. The inner layer of boards was screw fixed around the perimeter of the board at 300mm centres using 25mm British Gypsum Drywall Screws.

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The outer layer of boards was screw fixed around the perimeter of the board and intermediate stud positions at 300mm centres using 40mm British Gypsum Drywall Screws.

A horizontal joint was positioned at 2400mm from the base on the outer layer boards and at 1200mm from the base on the inner layer boards, on both faces of the specimen. A Gypframe GFS1 Fixing Strap was used behind the horizontal outer layer board joint.

At the door opening the vertical jambs were clad with an inner layer of 15mm plywood fixed to the studs using 25mm Gyproc Drywall Screws at 300mm centres and an outer layer of 15mm Gyproc SoundBloc fixed at 300mm centres using 40mm British Gypsum Drywall Screws.

A doorframe, 100mm x 38mm (including stop), was fixed into position using two 90mm British Gypsum Drywall Screws at each point 50mm from the bottom of the casing and at 400mm centres thereafter. A Severe Duty door was fitted using 1½" No.10 countersunk wood screws.

All vertical joints were staggered between layers. The vertical and horizontal joints adjacent to the door were taped and filled on both sides using Gyproc joint tape and Gyproc joint filler.

A softwood architrave, 45mm x 18mm, was fixed to both sides of the partition with 50mm bright oval nails at 300mm centres into the timber doorframe. Bullnose softwood skirting was fixed to the base track and at stud positions on both sides of the partition using a pair of 40mm British Gypsum Drywall Screws at 600mm centres.

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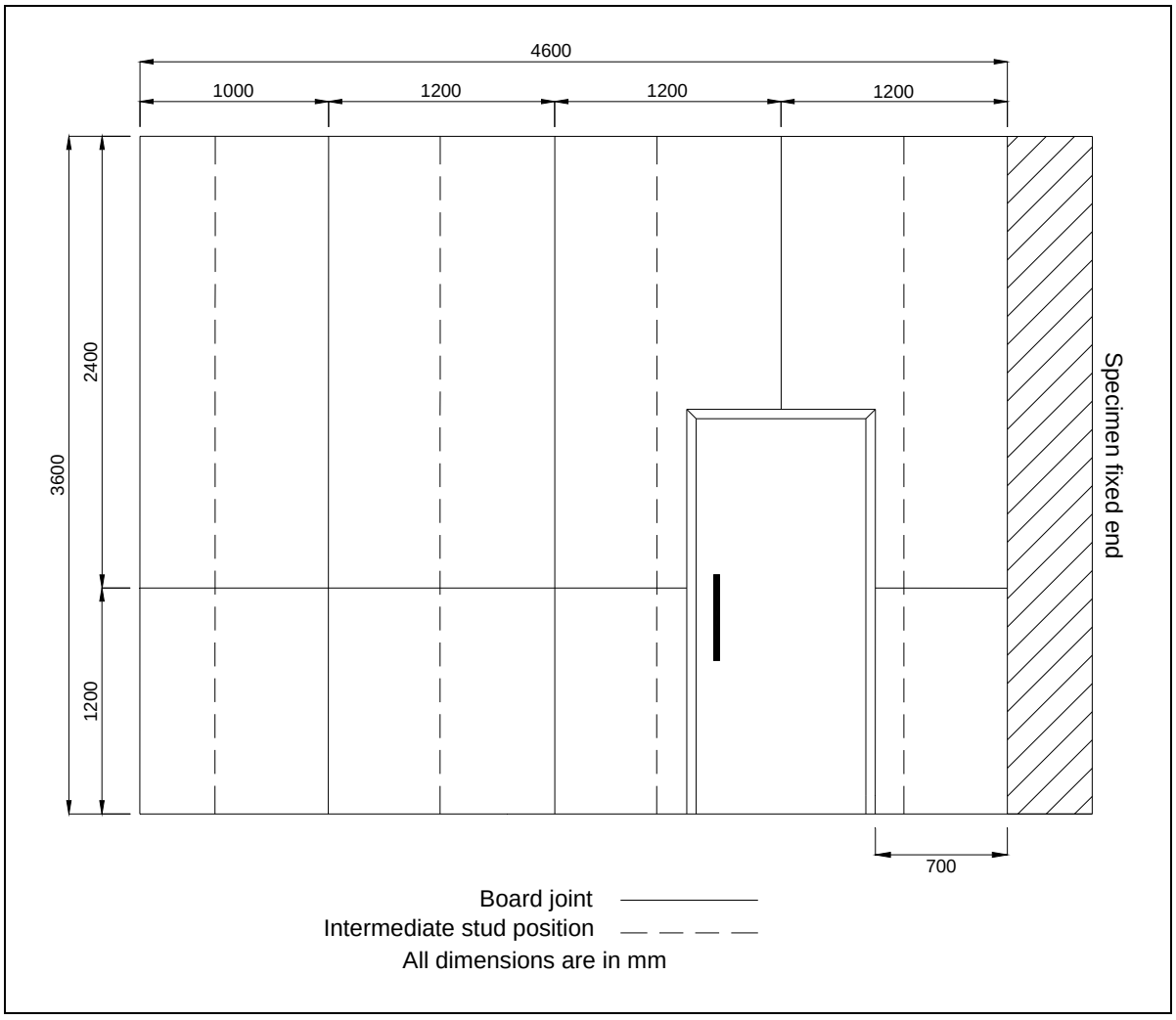

Figure 1. Side A elevation of the partition (inner layer)

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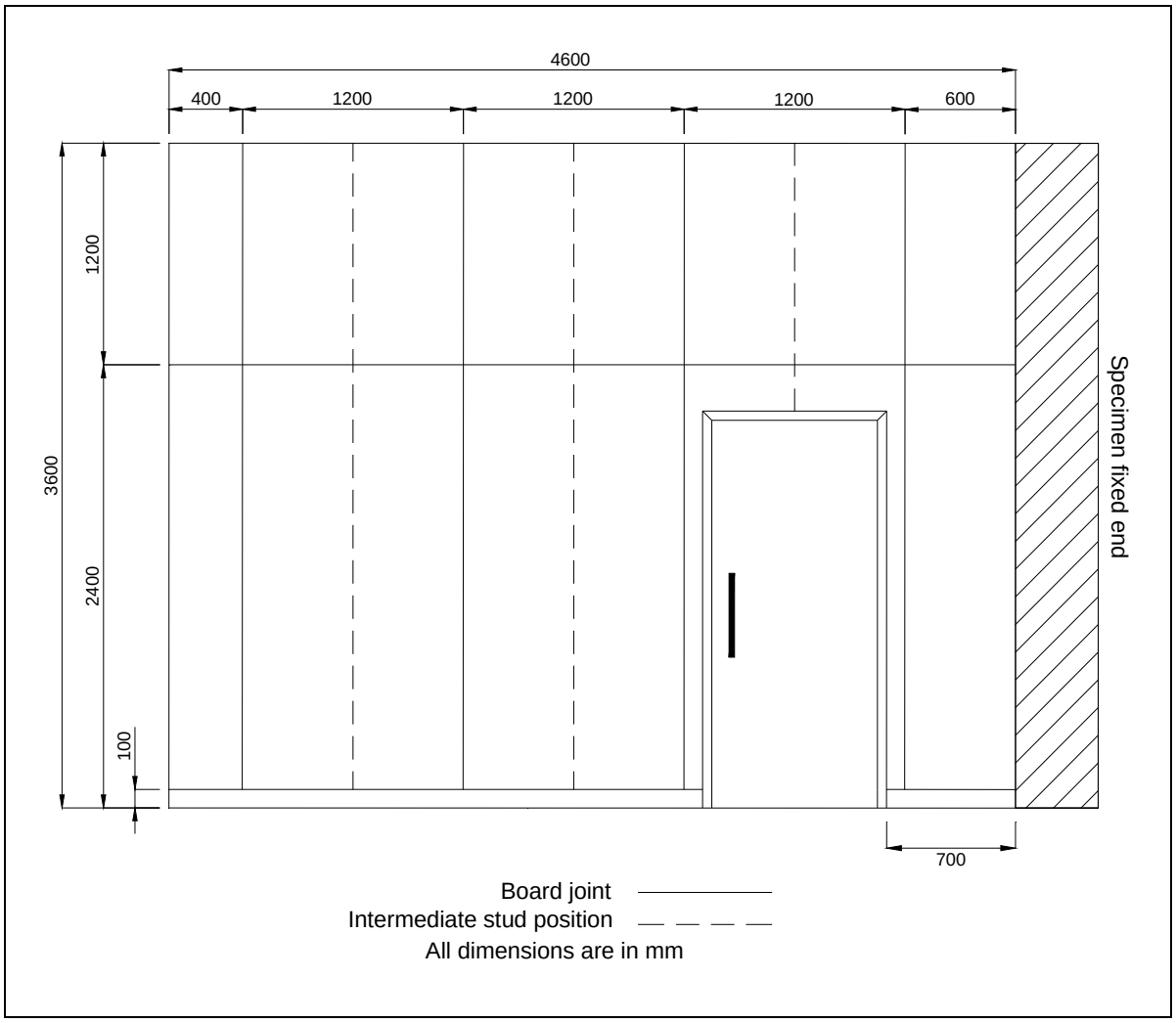

Figure 2. Side A elevation of the partition (outer layer)

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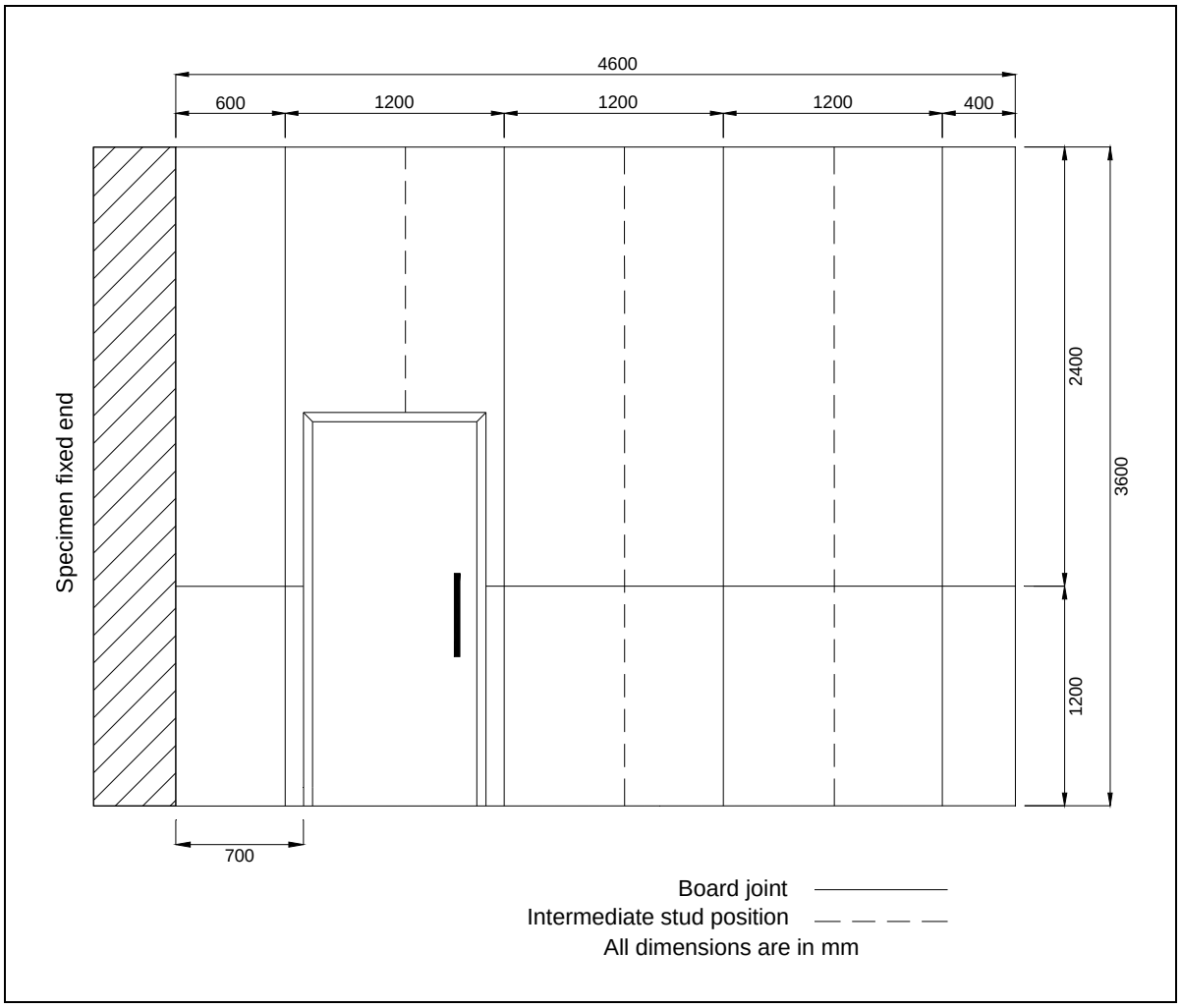

Figure 3. Side B elevation of the partition (inner layer)

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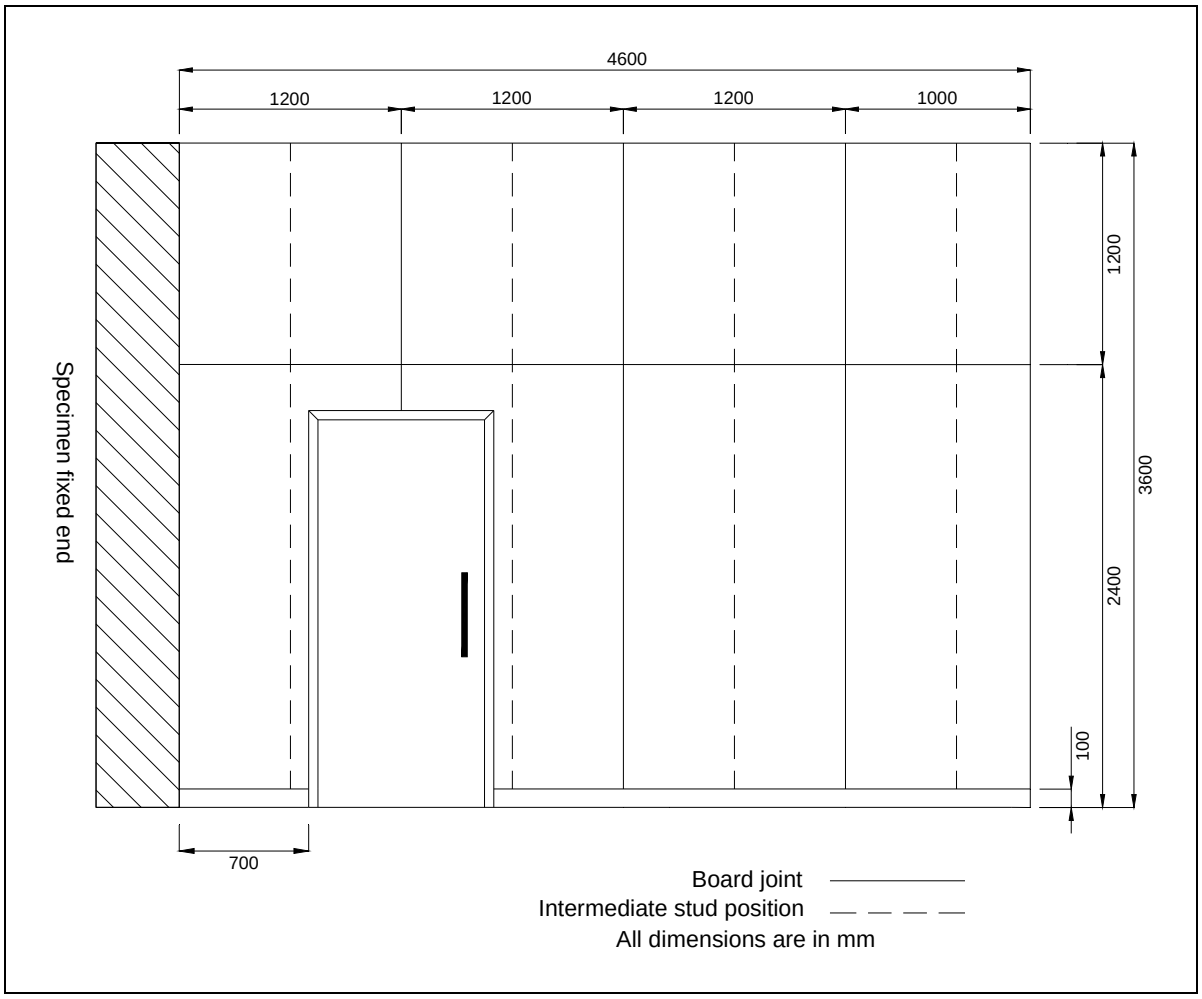

Figure 4. Side B elevation of the partition (outer layer)

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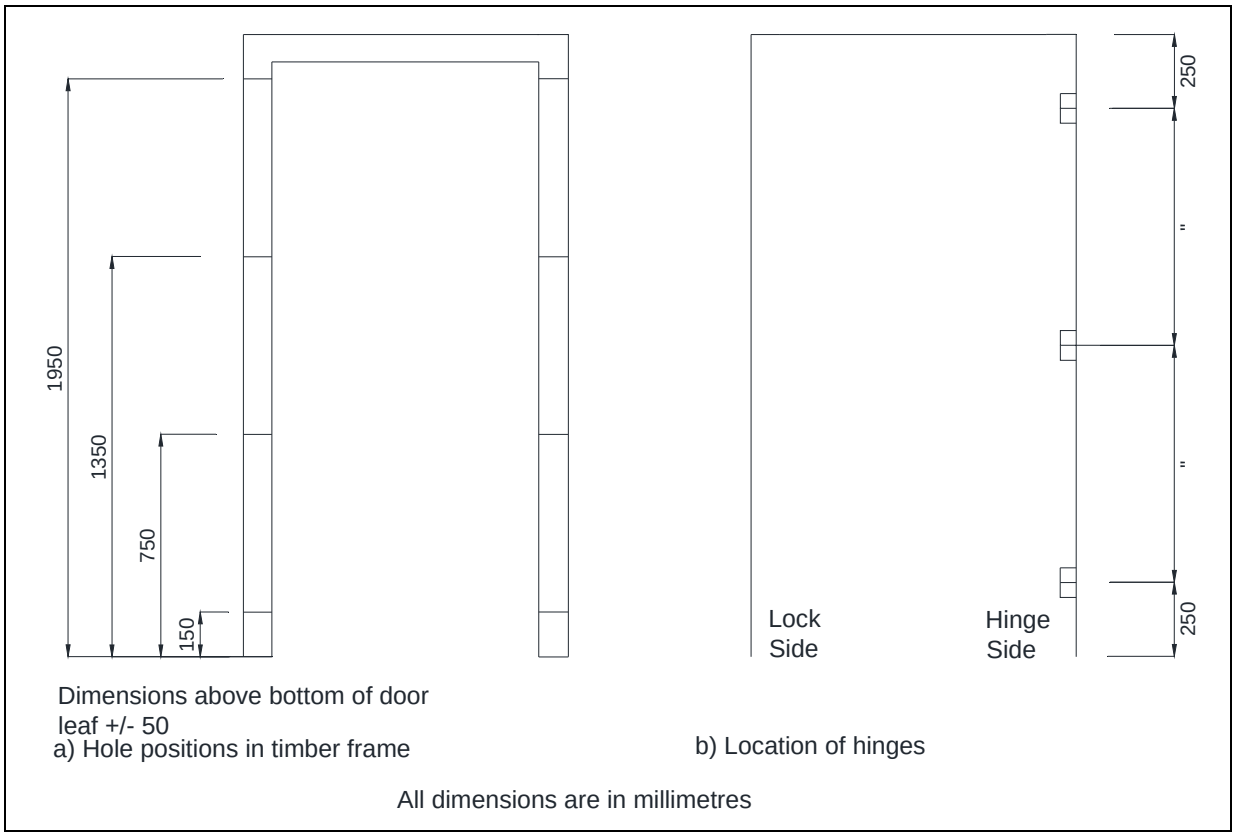

Figure 5. Fixing positions of the door frame

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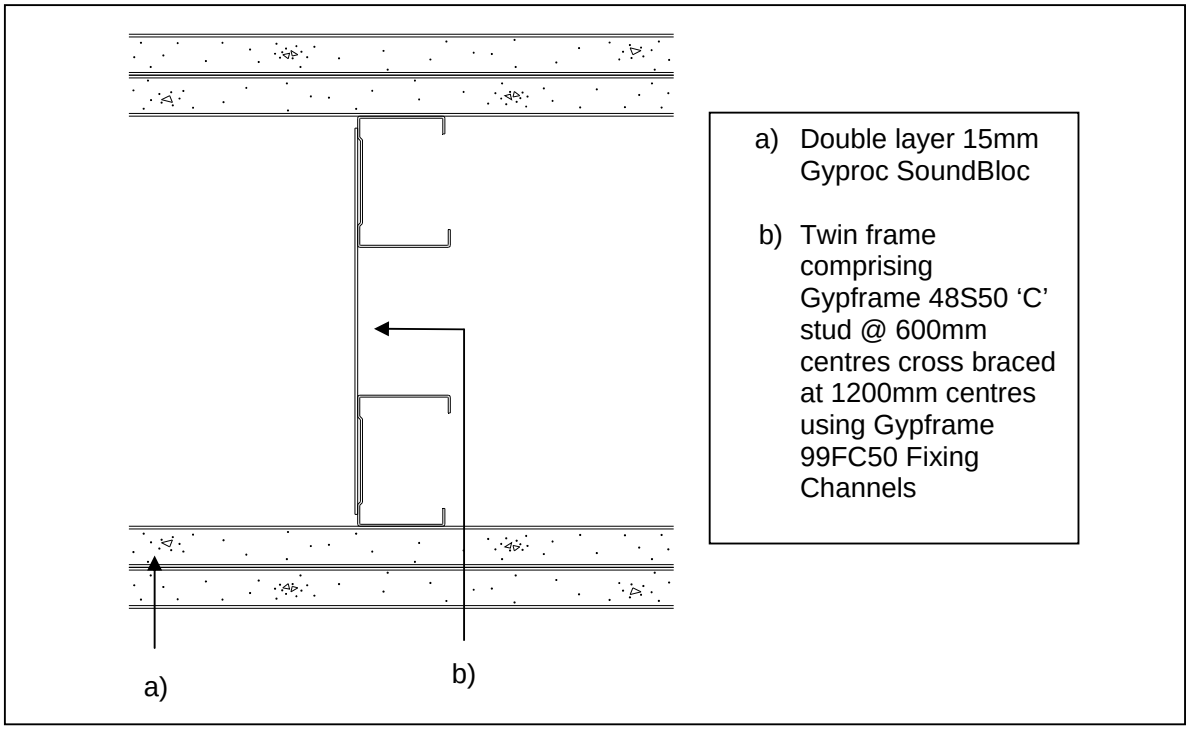

Figure 6. Horizontal cross section view of the partition

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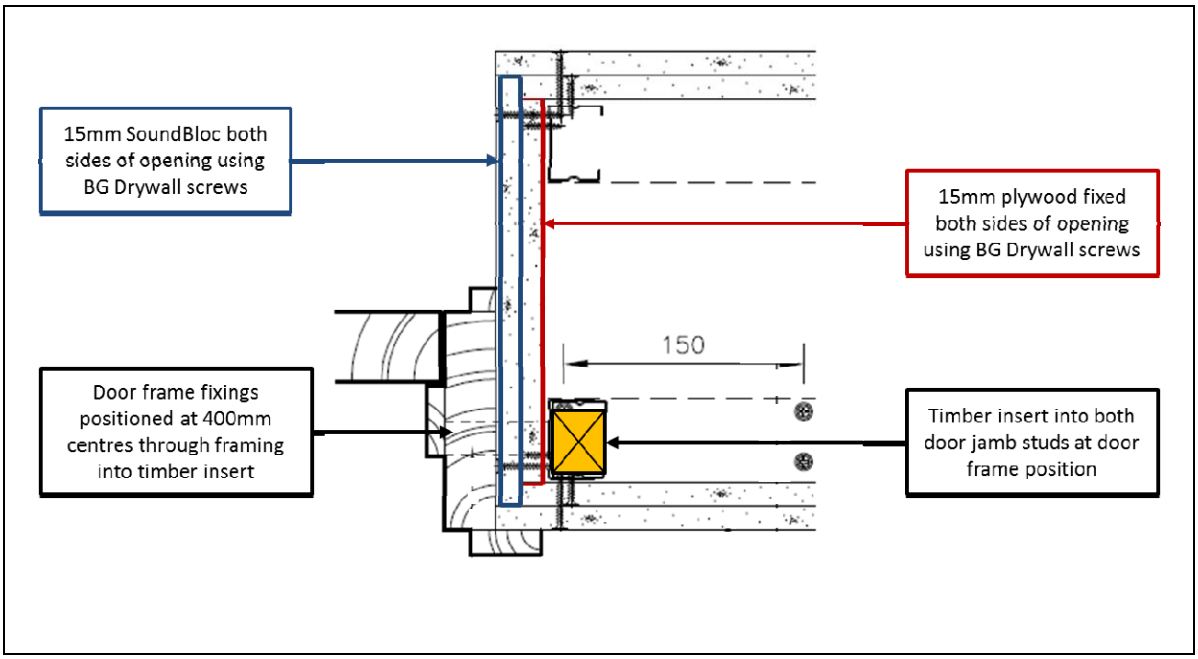

Figure 7. Horizontal cross section view of the door opening in the partition

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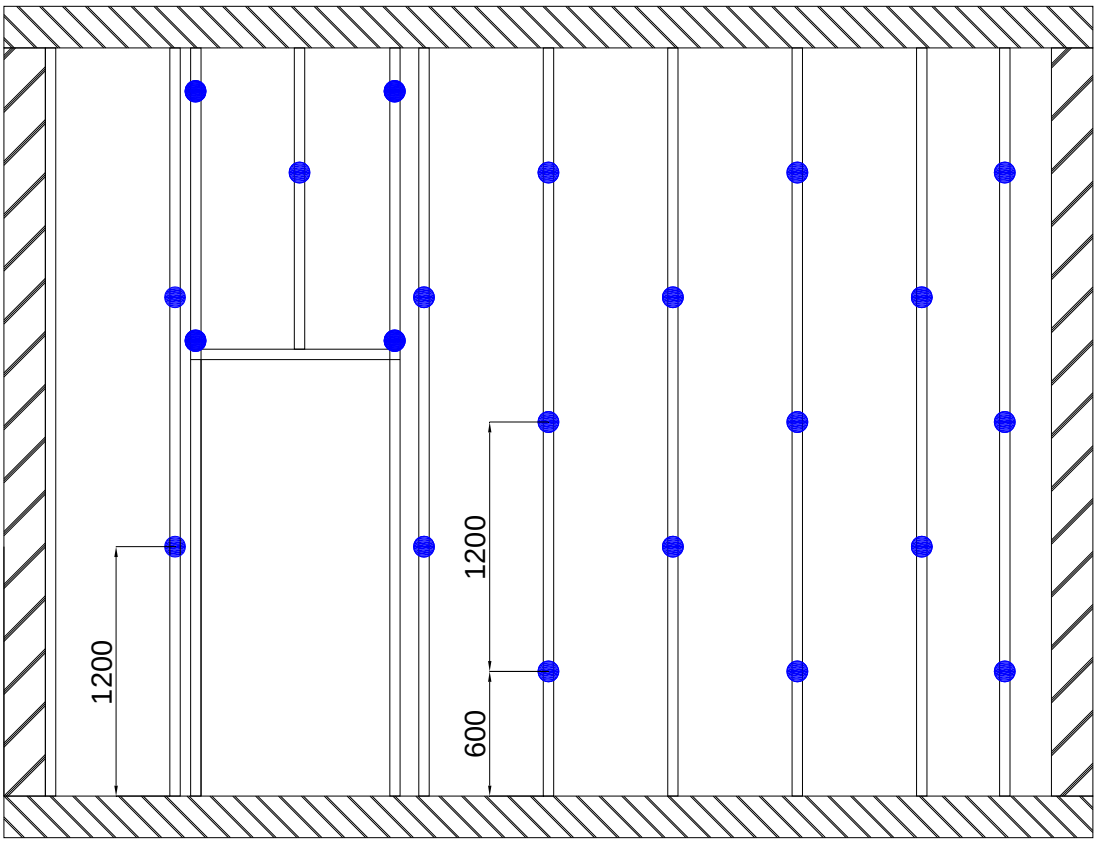

Figure 8. Gypframe 99FC50 Fixing Channel cross brace layout for twin frame partition.

The descriptions of individual components making up the test specimen were provided by the customer and were checked for accuracy wherever possible.

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TEST MATERIALS

Plasterboard

i) Nominally 2400mm (long) x 1200mm (wide) x 15mm (thick) Gyproc SoundBloc manufactured by British Gypsum, ex East Leake.

Surface density:	13.8kg/m^2
Average thickness:	14.9mm
Board Code:	16 226 17 21:03
	16 226 17 21:03
	16 226 17 20:53

The surface densities were calculated using the actual weight and size of a selection of the boards used in the test specimen.

Frame components

i) 0.5mm thick Gypframe 48S50 'C' Studs.
ii) 0.5mm thick Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel.
iii) Gypframe 99FC50 Fixing Channel.
iv) Gypframe GFS1 Fixing Strap.

All metal components supplied by British Gypsum.

TEST SEQUENCE AND SUMMARY SHEET

OPTIONAL TESTS ON PARTITION SYSTEM			
Requirement Tested	Test Annex	Performance Level	Pass / Fail
Determination of resistance to crowd pressure	G	1.5KN/m	Pass

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SUMMARY OF TESTS FOR GRADE COMPLIANCE						
Requirement Tested	Test Annex	Load Position	Grade Performance achieved Pass/Fail			
			LD	MD	HD	SD
Determination of partition stiffness	A	on stud				Pass
		between studs				Pass
Determination of surface damage by small hard body impact	B					Tested*
Resistance to damage by impact from a large soft body	C	on stud				Pass
		between studs				Pass
Determination of resistance to perforation by small hard body impact	D					Pass
Determination of resistance to structural damage by multiple impacts from a large soft body	E	between studs				Pass
		on stud				Pass
Determination of the effects of door slamming	F					Pass
GRADE achieved			Severe Duty			

*As this is indicative (without pass or fail criteria) the term “tested” is shown against the appropriate level of performance. Sponsors and specifiers should ascertain if surface damage is acceptable.

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APPENDIX A - TEST DATA

Annex A – Determination of partition stiffness (on stud)

TEST DATA		
Load (N)	Deflection (mm)	Observations
0	0	-
100	1	No visible damage
200	1	No visible damage
300	2	No visible damage
400	3	No visible damage
500	4	No visible damage
Max. Deflection	4	-
Residual Deformation	0.6	After 5 minutes

Annex A – Determination of partition stiffness (between studs)

TEST DATA		
Load (N)	Deflection (mm)	Observations
0	0	-
100	1	No visible damage
200	2	No visible damage
300	3	No visible damage
400	4	No visible damage
500	5	No visible damage
Max. Deflection	5	-
Residual Deformation	0.3	After 5 minutes

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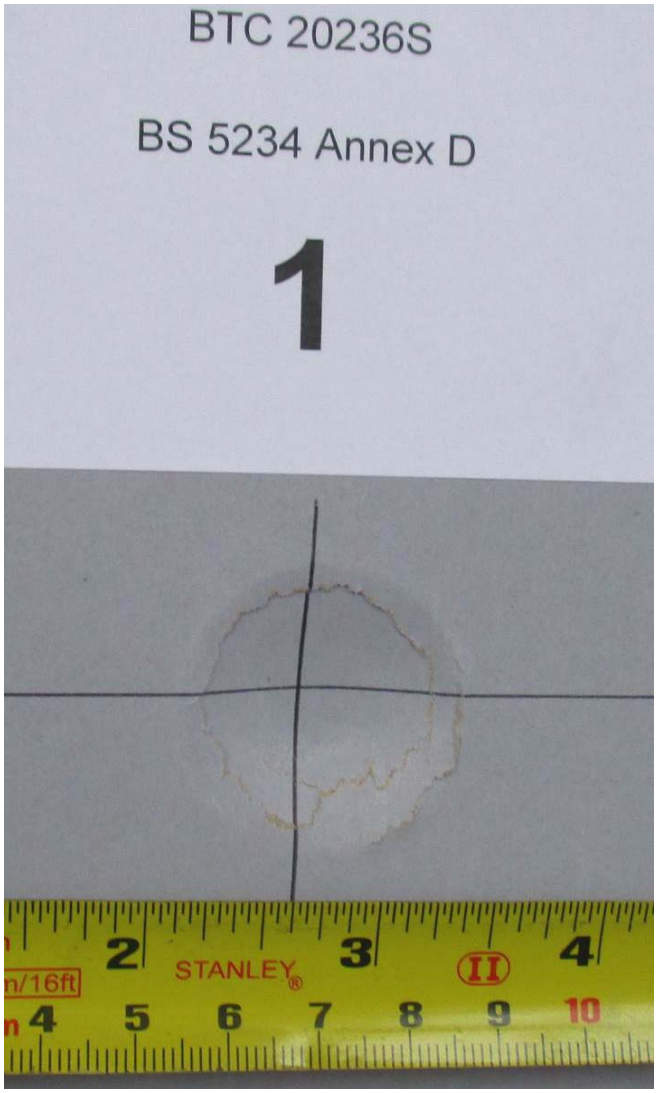

Photograph D.2. Example of damage caused by the Annex D – Determination of resistance to perforation by small hard body impact

The test was carried out in accordance with BS 5234: Part 2: 1992 on the 7th & 8th September 2017 at the Building Test Centre. The test was carried out on behalf of British Gypsum.

Applicant: British Gypsum

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Secondary Evidence :

BTC 12321LC

ESTIMATING THE RECOMMENDED MAXIMUM HEIGHTS OF BRITISH GYPSUM PARTITIONS AND LININGS INCORPORATING VARIOUS GYPFRAME METAL STUDS AND GYPROC PLASTERBOARDS

Estimating the effect of different linings

… For different lining materials we make the assumption that plasterboard of all types including Gyproc DuraLine, Gyproc DuraLine ACTIV*fix*, Glasroc Rigidur H and Glasroc Multi-Board provide similar stiffness contributions for the same thickness. This will be a conservative viewpoint where DuraLine, Gyproc DuraLine ACTIV*fix*, Rigidur H and Multi-Board are concerned but we have no data to the contrary.

In the table, the large bold values are the measured values; all other values are interpolated or extrapolated values.

GYPROC BOARD STIFFNESS CONTRIBUTIONS ($X10^9$ Nmm^2)

Gyproc board thickness (mm)	Total thickness each side (mm)	GypFrame Stud size (mm)					
		43	48	60	70	92	146
2 x 15	30		22	38	52	88	188
12.5 + 19	21.5		8.3	16.8	23.7	45	97

In all systems, for heights below 4200mm the appropriate standard (C) GypFrame Floor and Ceiling Channel can be used. It is recommended that for heights between 4200mm and 8000mm, the Deep Flange (DC) GypFrame Floor and Ceiling Channel is used and the Extra Deep Flange (EDC) is used for heights above 8000mm. Deeper flanged GypFrame channels may used to cater for any specific deflection requirements.

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BTC 143461LC

A STRUCTURAL LETTER OF CONFORMITY FOR ESTIMATION OF THE HEIGHTS OF BRITISH GYPSUM GYPWALL AUDIO WALLS

STUD CONTRIBUTION

Bending stiffness (x 10^9 N/mm^2)	C-stud metal gauge (mm)			I-stud metal gauge (mm)		
Partition width (mm)	0.5	0.6	1.0	0.5	0.7	0.9
300	123	157	269	247	314	404
550	514	655	1122	1029	1309	1683
600	625	795	1363	1249	1590	2044

Table 2. Bending stiffness contribution from metal studs at varying partition widths.

MAXIMUM HEIGHTS

0.5mm Gauge 48mm Deep C Stud

The walls are based on a Gypframe 'C' stud located within an appropriate metal channel. The walls are lined with a minimum of two layers of 15mm Gyproc SoundBloc or equivalent.

Partition width = 300 mm

Brace Type	Stud centres (mm)	Brace centres (mm)							
		L/240				L/125			
		1200	2400	3300	3600	1200	2400	3300	3600
Solid	600	7.50	6.00	5.00	5.50	9.00	7.50	7.00	6.50
	400	7.50	6.00	5.50	5.50	9.50	7.50	7.00	7.00
	300	8.00	6.50	6.00	6.00	10.00	8.00	7.50	7.00

LIMITATIONS

The best accuracy that can be expected from this method is 5%. All heights are rounded to the nearest 500mm to reflect the accuracy of the predictions.

It should be noted that the heights derived are only valid at the cavity depths indicated. The effects of bracing are related to the cavity depth and are less effective as the cavity depth increases due to the slenderness of the braces.

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It would seem reasonable to say that the model developed above can be used for partition thicknesses between 800 – 301mm and that the 300mm model can be used for partitions of thickness approximately 300mm or less.

The results given in this assessment relate solely to the ability of the partition to meet the deflection criteria stated for a given uniformly distributed load of 200 Pa.

This Letter of Conformity was last updated 9th June 2010 by the Building Test Centre on behalf of British Gypsum.

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DISCUSSION

With non-loadbearing lightweight steel stud constructions, the structural duty rating performance is governed by the surface density (mass) of the face linings, the number of board layers and the structural properties of the framework.

The system described in the DETAILS OF REQUEST have not been subjected to a partition grade test in accordance with BS 5234: Part 2 : 1992.

The three Annexes of BS 5234: Part 2: 1992 which are determining factors in the partition duty grade achieved by a metal stud partition system are:

- Annex A – Determination of partition stiffness
- Annex D – Resistance to perforation by a small hard body impact
- Annex F – Determination of the effects of door slamming

The other Annexes B, C and E in BS 5234:Part 2: 1992, are less onerous tests and rarely result in a failure for metal frame plasterboard partitions, and are therefore not taken into account for this assessment.

The DETAILS of request requires GypWall QUIET partitions of various widths and double layer cladding board type. Table 2 summarises these construction differences against the construction in Primary Evidence BTC 20236S

Comparison of BTC 20236S against constructions in DETAILS of REQUEST	Unique construction reference from Table 1 (DETAILS of REQUEST)					
	1	2	3	4	5	6
Replace 50FEC50 channel at head & base with 50DC60 for partitions above 4200 mm	y	y	y	y	y	y
Replace both layers of Gyproc SoundBloc with Gyproc FireLine of same thickness		y				
Increase space between frames – overall width 250 mm				y		
Increase space between frames – overall width 300 mm					y	y
Replace: inner layer with 19 mm Gyproc Plank outer layer with 12.5 mm Gyproc SoundBloc			y			y
Increase in Maximum Partition Height	+ 3.9m	+ 3.9m	+ 2.6m	+ 3.9m	+ 3.9m	+ 2.6m

Table 2. Highlighted differences between construction in Primary Evidence & constructions in DETAIL of REQUEST

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Taking each of the determining factors described above in turn and considering secondary evidence:

Annex A

Primary evidence (BTC 20236S):

The partition stiffness test achieved the desired SEVERE Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in both metalwork and cladding

Comparison of BTC 20236S against constructions in DETAILS of REQUEST	Comment on likely effect on structural performance
Replace 50FEC50 channel at head & base with 50DC60 for partitions above 4200 mm	All of the proposed constructions have Maximum heights over 4200 mm which requires the Deep Flange Channel at head & base. This is standard guidance already given in the current version of the White Book in order to maintain partition stiffness so is not expect to downgrade partition stiffness performance.
Replace both layers of Gyproc SoundBloc with Gyproc FireLine of same thickness	According the BTC 12321LC replacement of boards will not downgrade partition stiffness as both layers are value-added boards and remain the same thickness.
Increase space between frames – overall width 250 mm	According to BTC 14346LC and classical beam bending theory, increasing the distance between the two frames will increase the partition stiffness (limited at larger widths due to reduced effectiveness of braces). In our opinion, in this case, it is unlikely to downgrade partition stiffness performance. BTC 14346LC states the 300 mm prediction model can be used for thinner twin frame partitions.
Increase space between frames – overall width 300 mm	
Replace: inner layer with 19mm Gyproc Plank outer layer with 12.5 mm Gyproc SoundBloc	According to BTC 12321LC, this replacement is estimated to at least halve the board stiffness contribution due to the reduced width & orientation of the Gyproc Plank. The proposed maximum height is within the predicated maximum height using the classical beam bending theory calculations in BTC 12321LC & BTC 14346LC.

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	In our opinion, in this case, it is unlikely to downgrade partition stiffness performance, as the deflections in BTC 20236S are well within the SEVERE duty criteria.
Increase in Maximum Partition Height: *+ 2.6m - inner layer 19 mm Gyproc Plank & outer 12.5 mm Gyproc SoundBloc (constructions 3 & 6)* *+3.9m - all other proposed constructions*	Increasing height has potential to reduce the partition stiffness performance up to a certain height. However, all of the proposed partition heights are within the recommended maximum heights described in BTC 14346LC. The deflections in BTC 20236S are well within the SEVERE duty criteria, so we consider that this will not downgrade the partition stiffness grading achieved.

It is our opinion that the combination of these differences as described in DETAIL of REQUEST and Table 2 would not alter the conclusions.

Therefore it is reasonable to assume that the partition stiffness for the range of constructions in DETAILS of REQUEST should match and or exceed the desired performance achieved in the primary evidence, if tested to BS5234: Part 2 :1992 Annex A.

Annex D

The hard body impact performance of a metal stud partition is a function of the board lining and in extreme cases the stiffness of the stud section, whereby the partition restrains the board lining, resulting in more of the impact energy being absorbed by the board itself.

Primary evidence (BTC 20236S):

The partition resistance to perforation test achieved the desired SEVERE Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in both metalwork and cladding

Comparison of BTC 20236S against constructions in DETAILS of REQUEST	Comment on likely effect on structural performance
Replace 50FEC50 channel at head & base with 50DC60 for partitions above 4200 mm	In our opinion, this is unlikely to significantly affect the resistance to perforation performance as this guidance is given to maintain partition stiffness at increased heights and Annex D performance of BTC 20236S comfortably passed SEVERE duty criteria.

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Replace both layers of Gyproc SoundBloc with Gyproc FireLine of same thickness	Replacement of boards will not downgrade resistance to perforation as both layers are value-added boards and remain the same thickness. Also Annex D performance of BTC 20236S comfortably passed SEVERE duty criteria
Increase space between frames – overall width 250 mm	According to BTC 14346LC and classical beam bending theory, increasing the distance between the two frames will increase the partition stiffness (limited at larger widths due to reduced effectiveness of braces). In our opinion, in this case, an increase in partition stiffness is unlikely to be excessive and unlikely to significantly downgrade resistance to perforation performance as Annex D performance of BTC 20236S comfortably passed SEVERE duty criteria.
Increase space between frames – overall width 300 mm	
Replace: inner layer with 19mm Gyproc Plank outer layer with 12.5 mm Gyproc SoundBloc	Overall thickness of cladding would be marginally increased from 30 mm to 31.5 mm. Although the thickness of the outer layer is reduced, it does remain a value-added board with increased density. It also has a thick dense board as an inner layer. In our opinion this is unlikely to downgrade resistance to perforation as Annex D performance of BTC 20236S comfortably passed SEVERE duty criteria.
Increase in Maximum Partition Height: *+ 2.6m - inner layer 19mm Gyproc Plank & outer 12.5mm Gyproc SoundBloc (constructions 3 & 6)* *+3.9m - all other proposed constructions*	Increasing height has potential to reduce the partition stiffness performance up to a certain height. All of the proposed partition heights are within the recommended maximum heights described in BTC 14346LC and it is our opinion that SEVERE duty would be maintained for partition stiffness. Therefore it is reasonable to assume that, in these cases, the proposed height increases would not significantly affect the partition stiffness enough to adversely affect the resistance to perforation performance.

It is our opinion that the combination of these differences as described in DETAIL of REQUEST and Table 2 would not alter these conclusions.

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Therefore it is reasonable to assume that for the range of constructions in DETAILS of REQUEST the resistance to perforation performance would not be downgraded from the desired performance achieved in the primary evidence, if tested to BS5234: Part 2: 1992 Annex D.

Annex F

The door slam test is mainly dependent on the detail of the framework around the door aperture. The requirements of the DETAILS of REQUEST are taken from the current specification given by British Gypsum.

Primary evidence (BTC 20236S):

The door slam test achieved the desired SEVERE Duty performance.

The range of constructions in DETAILS of REQUEST does not propose making any changes to the details of the framework around the door aperture given in the Primary Evidence. However there are changes required in both metal work and cladding as shown below.

Comparison of BTC 20236S against constructions in DETAILS of REQUEST	Comment on likely effect on structural performance
Replace 50FEC50 channel at head & base with 50DC60 for partitions above 4200 mm	In our opinion, this is unlikely to significantly affect the door slam performance as this guidance is given to maintain partition stiffness at increased heights This is not likely to downgrade maximum or residual deflections, and is not considered significant enough to affect damage if built correctly.
Replace both layers of Gyproc SoundBloc with Gyproc FireLine of same thickness	Replacement of boards is unlikely to downgrade door slam performance as both layers remain 15 mm thick value-added boards. Partition stiffness not likely to change significantly so maximum & residual deflections unlikely to be downgraded and unlikely to affect damage if built correctly.
Increase space between frames – overall width 250 mm	According to BTC 14346LC and classical beam bending theory, increasing the distance between the two frames will increase the partition stiffness (limited at larger widths due to reduced effectiveness of braces). Any slight increase in partition stiffness is unlikely to downgrade maximum or residual deflections during door slam test, and is not considered significant enough to affect damage if built correctly.
Increase space between frames – overall width 300 mm	

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Replace: inner layer with 19mm Gyproc Plank outer layer with 12.5 mm Gyproc SoundBloc	According to BTC 12321LC, this replacement is estimated to approximately halve the board stiffness contribution due to the reduced width & orientation of the Gyproc. In our opinion, in this case, it is unlikely to downgrade the door slam performance due to the significant stiffness contribution from the framework and details around the door aperture if built correctly.
Increase in Maximum Partition Height: *+ 2.6m - inner layer 19mm Gyproc Plank & outer 12.5mm Gyproc SoundBloc (constructions 3 & 6)* *+3.9m - all other proposed constructions*	Increasing height has potential to reduce the partition stiffness performance up to a certain height before increased mass of the board cladding takes effect. However, all of the proposed partition heights are within the recommended maximum heights described in BTC 14346LC and include use of 50DC50 Deep Flange Channel. Sometimes a taller partition can allow some of the door slam impact energy to dissipate along its height instead of affecting the maximum & residual deflections. Stiffness around the door aperture will be assisted by the use of deeper flange channel for heights above 4200mm. We consider that in this case, any changes in the partition stiffness are unlikely to significantly downgrade door slam performance if door detail is construction correctly.

It is our opinion that the combination of these differences as described in DETAIL of REQUEST and Table 2 would not alter these conclusions. It is not considered likely that changes in stiffness of the framework would downgrade the maximum and residual deflection measurements significantly

Therefore if the correct door detail is specified and built correctly it is reasonable to assume that for the range of constructions in DETAILS of REQUEST the door slam performance would not be downgraded from the desired performance achieved in the primary evidence, if tested to BS5234: Part 2 :1992 Annex F.

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CONCLUSION

In view of the foregoing evidence, it is our opinion that if the constructions described under DETAILS OF THE REQUEST were subjected to a structural test, in accordance with BS 5234: Part 2: 1992 Annexes A, B, C, D, E & F:

British Gypsum GypWall QUIET partitions, incorporating twin frames (of various widths) of Gypframe 48S50 'C' Studs and with current range of double layer cladding options would be expected to achieve SEVERE Duty Rating performance.

LIMITATIONS

This assessment addresses itself solely to the ability of the partition system described to satisfy the criteria of the structural test and does not imply any suitability for use with respect to other unspecified criteria.

This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available to the assessing authority the assessment will be unconditionally withdrawn and the applicant will be notified in writing. Similarly the assessment is invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. The opinions and interpretations expressed in this assessment are outside the scope of UKAS accreditation.

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DECLARATION BY THE APPLICANT

We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a structural test to the Standard against which this assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be subjected to a structural test to the Standard against which this assessment is being made.

We are not aware of any information that could adversely affect the conclusion of this assessment.

If we subsequently become aware of any such information we agree to ask the assessing authority to withdraw the assessment.

Signed: .....Print Name .....ROB EVANS.....

For and behalf of British Gypsum.

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AUTHORITY FOR USE OF TEST EVIDENCE

Test Report Numbers: BTC 20236S, BTC 12321LC, BTC 14346LC

We the undersigned agree to the above Test Reports being used as supporting evidence for the following assessment:

A structural test assessment on a range of British Gypsum QUIET partitions, incorporating twin frames (of various widths) of British Gypsum Gypframe 48S50 'C' Studs and with a range of double layer cladding options, if tested in accordance with BS 5234: Part 2: 1992

Assessment client: British Gypsum

Signed:  Print Name: …ROB EVANS.....

Job Title: …PRINCIPLE SCIENTIST.

Department: ....TECHNICAL.....

For and behalf of **British Gypsum**