The Building Test Centre
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Assessment Number **BTC 20946LC**

A structural test assessment on UltraEMBOSSED™ Gypframe 92S50 'C' Studs and Gypframe 94FEC50 Folded Edge Standard Floor and Ceiling Channels when incorporated into a range of British Gypsum partitions, if tested in accordance with BS 5234: Part 2: 1992.

Assessment Date: 8th May 2019

www.btconline.co.uk

Applicant: **British Gypsum**
East Leake
Loughborough
Leicestershire
LE12 6HX

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DETAILS OF THE REQUEST

It is required to assess the following constructions 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.

UltraEMBOSSED™ Gypframe 92S50 'C' Studs use embossing technology to insert reinforcing ribs into the web-flange and flange-return corners

UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels use embossing technology to insert reinforcing ribs into the web-flange corners.

Systems to be covered in this assessment include British Gypsum GypWall CLASSIC and GypWall Quiet SF partition constructions comprising UltraEMBOSSED™ Gypframe 92S50 'C' Studs and UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor and Ceiling Channels with a range of cladding options as described in Tables 1, 2 and 3.

British Gypsum GypWall CLASSIC partitions (single layer)				
Stud size	Board thickness	Board type	Required Duty rating	Maximum partition height
92mm	15mm	Gyproc FireLine	HEAVY	4700mm
		Gyproc SoundBloc F	HEAVY	4700mm

Table 1. Range of GypWall CLASSIC single layer constructions to be assessed.

British Gypsum GypWall CLASSIC partitions (double layer)				
Stud size	Board thickness	Board type	Required Duty rating	Maximum partition height
92mm	2 x 15mm	Gyproc SoundBloc	SEVERE	5900mm
		Gyproc FireLine	SEVERE	5900mm

Table 2. Range of GypWall CLASSIC double layer constructions to be assessed.

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British Gypsum GypWall QUIET SF partitions				
Stud size	Board thickness	Board type	Required Duty rating	Maximum partition height
92mm & RB1 to one side	2 x 12.5mm	Gyproc SoundBloc	SEVERE	5000mm
92mm & RB1 to both sides	2 x 12.5mm	Gyproc SoundBloc	SEVERE	4000mm

Table 3. Range of GypWall Quiet SF 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.

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Proposed Construction

GypWall Classic Partitions

A 4600mm long test specimen constructed in the test aperture with one end of the partition fixed to the test rig and the other remaining free (see Tables 1 and 2 for maximum heights).

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

Framework

UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels screw fixed to the head and base of the test aperture using two staggered rows of 35mm British Gypsum Drywall Screws spaced at 600mm centres incorporating a 900mm opening for the door set.

UltraEMBOSSED™ Gypframe 92S50 'C' Studs positioned at the fixed end and screw fixed to the side of the test aperture using 35mm British Gypsum Drywall Screws at 600mm centres.

UltraEMBOSSED™ Gypframe 92S50 'C' Studs positioned between the head and base channel at 600mm centres. The stud at the free-end of the partition remains free.

Heavy and Severe Duty Door Aperture

The vertical framework for the door set formed using UltraEMBOSSED™ Gypframe 92S50 'C' Studs.

The UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels fixed to the aperture using two 1¾" No.10 woodscrews at the door opening (10mm away from the web of the stud (non-door side) and 10mm in from flange) and two 1¾" No.10 wood screws 150mm adjacent to the first row of fixings.

UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels extended 300mm beyond the door opening on either side. Each flange of the extended channel cut at the jamb position and the 300mm over run bent up through 90 degrees to cover the bottom of the jamb stud. The channel fixed to the jamb stud twice either side using 13mm British Gypsum Wafer Head Drywall screws.

At the head of the door opening, UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels cut and bent to extend 150mm down the face of the studs. The channel and door jamb studs fixed twice to each side using 13mm British Gypsum Wafer Head Drywall screws.

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The exposed door jamb studs on each side of the opening sleeved to full door height with UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels section fixed both sides of the partition at approximately 400mm centres using 13mm British Gypsum Wafer Head Drywall screws.

A length of UltraEMBOSSED™ Gypframe 92S50 'C' Stud positioned between the door head detail and the head of the partition to maintain 600mm stud centres above the door opening.

Cladding

For single layer partitions, the framework clad with a layer of either 15mm Gyproc FireLine or 15mm Gyproc SoundBloc F on each side.

The boards screw fixed around the perimeter of the board and intermediate stud positions at 300mm centres using 25mm British Gypsum Drywall Screws.

For double layer partitions, the framework clad with a double layer of either 15mm Gyproc SoundBloc or 15mm Gyproc FireLine on each side.

The inner layer of boards screw fixed around the perimeter of the board at 300mm centres using 25mm British Gypsum Drywall Screws.

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

Joints

For single layer partitions, the horizontal joint positioned at 2400mm from the base on both faces of the specimen.

For double layer partitions, the horizontal joint positioned at 2400mm and 4800mm from the base on the outer layer boards and at 1200mm and 3600mm 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 (both single and double layer systems).

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.

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Doorframe, architrave and skirting

For single layer partitions, a doorframe 124mm x 38mm (including stop), fixed into position using 60mm and 90mm British Gypsum Drywall Screws (through the frame and through the stop respectively) at each point 50mm from the bottom of the casing and at 400mm centres thereafter.

For double layer partitions, a doorframe 154mm x 38mm (including stop), fixed into position using 60mm and 90mm British Gypsum Drywall Screws (through the frame and through the stop respectively) at each point 50mm from the bottom of the casing and at 400mm centres thereafter.

A Heavy/Severe Duty door fitted using 1½" No. 10 Countersunk Wood Screws.

A softwood architrave, 45mm x 18mm, fixed to both sides of the partition with 50mm bright oval nails at 300mm 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 40mm British Gypsum Drywall Screws at 600mm centres.

GypWall Quiet SF Partitions

A 4600mm long test specimen constructed in the test aperture with one end of the partition fixed to the test rig and the other remaining free (see Table 3 for maximum heights).

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

Framework

UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels screw fixed to the head and base of the test aperture using two staggered rows of 35mm British Gypsum Drywall Screws spaced at 600mm centres incorporating a 900mm opening for the door set.

UltraEMBOSSED™ Gypframe 92S50 'C' Studs positioned at the fixed end and screw fixed to the side of the test aperture using 35mm British Gypsum Drywall Screws at 600mm centres.

UltraEMBOSSED™ Gypframe 92S50 'C' Studs positioned between the head and base channel at 600mm centres. The stud at the free-end of the partition remains free.

Gypframe RB1 Resilient Bars fixed to one or both sides of the metal framework, as described in Table 3, at 600mm centres using 13mm British Gypsum Wafer Head Screws. Where required, bars joined by nesting them together over a stud, with the base flange fixed to the stud. All the bars fixed with the base flange on the top side with the exception of the uppermost bar and the bar at

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the door head which is fixed with the base flange on the bottom side to provide a board fixing at the partition and door heads.

The first bar from the base of the specimen positioned to allow a 16mm thick x 50mm high timber packer to be fixed at the base of the specimen. The timber packer fixed at 600mm centres using 35mm British Gypsum Drywall Screws.

Short sections of Gypframe RB1 Resilient Bar fixed in between the horizontal bars around the specimen perimeter and around the door opening using 13mm British Gypsum Wafer Head Screws, two per section.

The vertical framework for the door set formed using UltraEMBOSSED™ Gypframe 92S50 'C' Studs.

The UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels fixed to the aperture using two 1¾" No.10 woodscrews at the door opening (10mm away from the web of the stud (non-door side) and 10mm in from flange) and two 1¾" No.10 wood screws 150mm adjacent to the first row of fixings.

UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels extended 300mm beyond the door opening on either side. Each flange of the extended channel cut at the jamb position and the 300mm over run bent up through 90 degrees to cover the bottom of the jamb stud. The channel fixed to the jamb stud twice either side using 13mm British Gypsum Wafer Head Drywall screws.

At the head of the door opening, UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels cut and bent to extend 150mm down the face of the studs. The channel and door jamb studs fixed twice to each side using 13mm British Gypsum Wafer Head Drywall screws.

The exposed door jamb studs on each side of the opening sleeved to full door height with UltraEMBOSSED™ Gypframe 94FEC50 Folded Edge Standard Floor & Ceiling Channels section fixed both sides of the partition at approximately 400mm centres using13mm British Gypsum Wafer Head Drywall screws.

A length of UltraEMBOSSED™ Gypframe 92S50 'C' Stud positioned between the door head detail and the head of the partition to maintain 600mm stud centres above the door opening.

Cladding

The framework clad with a double layer of 12.5mm Gyproc SoundBloc on each side.

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For systems comprising Gypframe RB1 Resilient Bars on both sides of the framework, both layers of board orientated vertically and fixed to all framing members at 300mm centres using 25mm and 35mm British Gypsum Drywall Screws respectively.

For systems with Gypframe RB1 Resilient Bars on one side, the resilient bar side of the partition clad with both inner and outer layers orientated vertically and fixed to all framing members at 300mm centres using 25mm and 35mm British Gypsum Drywall Screws respectively.

The inner layer on the non-resilient bar side of the partition orientated vertically and fixed around the perimeter of the board at 300mm centres using 25mm British Gypsum Drywall Screws. The outer layer of boards was orientated vertically and fixed around the perimeter of the board and intermediate stud positions at 300mm centres using 35mm British Gypsum Drywall Screws.

Joints

A horizontal joint positioned at 2400mm and 4800mm from the base on the outer layer boards and at 600mm and 3000mm from the base on the inner layer boards, on both faces of the specimen.

For frameworks lined with Gypframe RB1 Resilient Bars, all the horizontal board joints coincided with the resilient bars. For frameworks without Gypframe RB1 Resilient Bars, 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

A doorframe, 159mm (Gypframe RB1 Resilient Bars on one side only) or 174mm (Gypframe RB1 Resilient Bars on both sides) x 38mm (including stop), fixed into position using 60mm and 90mm British Gypsum Drywall Screws (through the frame and through the stop respectively) at each point 50mm from the bottom of the casing and at 400mm centres thereafter.

A Severe Duty door fitted using 1½" No. 10 Countersunk Wood Screws.

A softwood architrave, 45mm x 18 mm, fixed to both sides of the partition with 50mm bright oval nails at 300mm 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 40mm British Gypsum Drywall Screws at 600mm centres.

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THE ASSESSORS

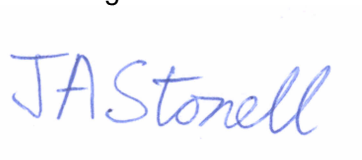
The Building Test Centre operates as an independent accredited test house for the construction industry. The Building Test Centre has unrivalled experience in the development of drywall systems. The Building Test Centre is UKAS accredited under No. 0296 for fire resistance, reaction to fire, acoustic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

ASSESSMENT AUTHORISATION

Assessment Author

Martin Lynch
MIOA
Scientist

Reviewing Assessor



James Stonell
MIOA
Senior Scientist

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 68 & 69). 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 20681S

A structural test report covering laboratory testing to BS 5234:2-1992, Annexes A, B, C, D, E, F and G, on a British Gypsum GypWall Classic partition clad with a single layer of 15mm Gyproc SoundBloc each side

A 4800mm high x 4500mm long 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 94FEC50 Folded Edge Floor and Ceiling Channels were screw fixed to the head and base of the test aperture using two staggered rows of 35mm British Gypsum Drywall Screws spaced at 600mm centres incorporating a 900 mm opening for the door set.

Gypframe 92S50 'C' Studs were extended to full partition height by overlapping by 600mm and fixing together using 13mm British Gypsum Wafer Head Drywall Screws, two fixings per flange.

An extended Gypframe 92S50 ‘C’ Stud was positioned at the fixed end was screw-fixed to the side of the test aperture using 35mm British Gypsum Drywall Screws at 600mm centres.

Extended Gypframe 92S50 ‘C’ Studs were positioned between the head and base channel at 600mm centres; the stud at the free-end remained free

The vertical framework at the door opening was formed using extended Gypframe 92S50 'C' Studs.

The Gypframe 94FEC50 Folded Edge Floor and Ceiling Channel was fixed to the test aperture base with two 1¾” x No10 woodscrews at the door opening (10mm away from the web and 10mm in from the flange) and two 1¾” x No10 woodscrews 150mm adjacent to the first row of fixings. The vertical framework at the door opening was formed using Gypframe 92S50 'C' Studs.

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The Gypframe 94FEC50 Folded Edge 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. One screw fixed through the floor channel, the extended channel and door jamb stud at the base of the framework; and the other screw fixed through the extended channel and door jamb approximately 50mm below the top of the extended channel section.

At the head of the door opening, Gypframe 94FEC50 Folded Edge 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 94FEC50 Folded Edge Floor and Ceiling Channel sections screw fixed both sides of the partition at approximately 400mm centres using 13mm British Gypsum Wafer Head Drywall screws.

A doorframe, 124mm x 38mm (including stop), was fixed into position using 60mm and 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.

A length of Gypframe 92S50 'C' Stud was positioned between the door head detail and the head of the partition to maintain 600mm stud centres above the door opening.

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

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

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, 45 mm x 18 mm, was fixed to both sides of the partition with 50 mm bright oval nails at 300 mm centres into the timber doorframe. Bull nose softwood skirting 100mm x 19mm was attached to the base of the partition using pairs of 45mm British Gypsum Drywall Screws at 600mm centres.

NB: The stud and channel components were manufactured using the UltraEMBOSS process; all other metal framing components were manufactured using the UltraSTEEL 2 process.

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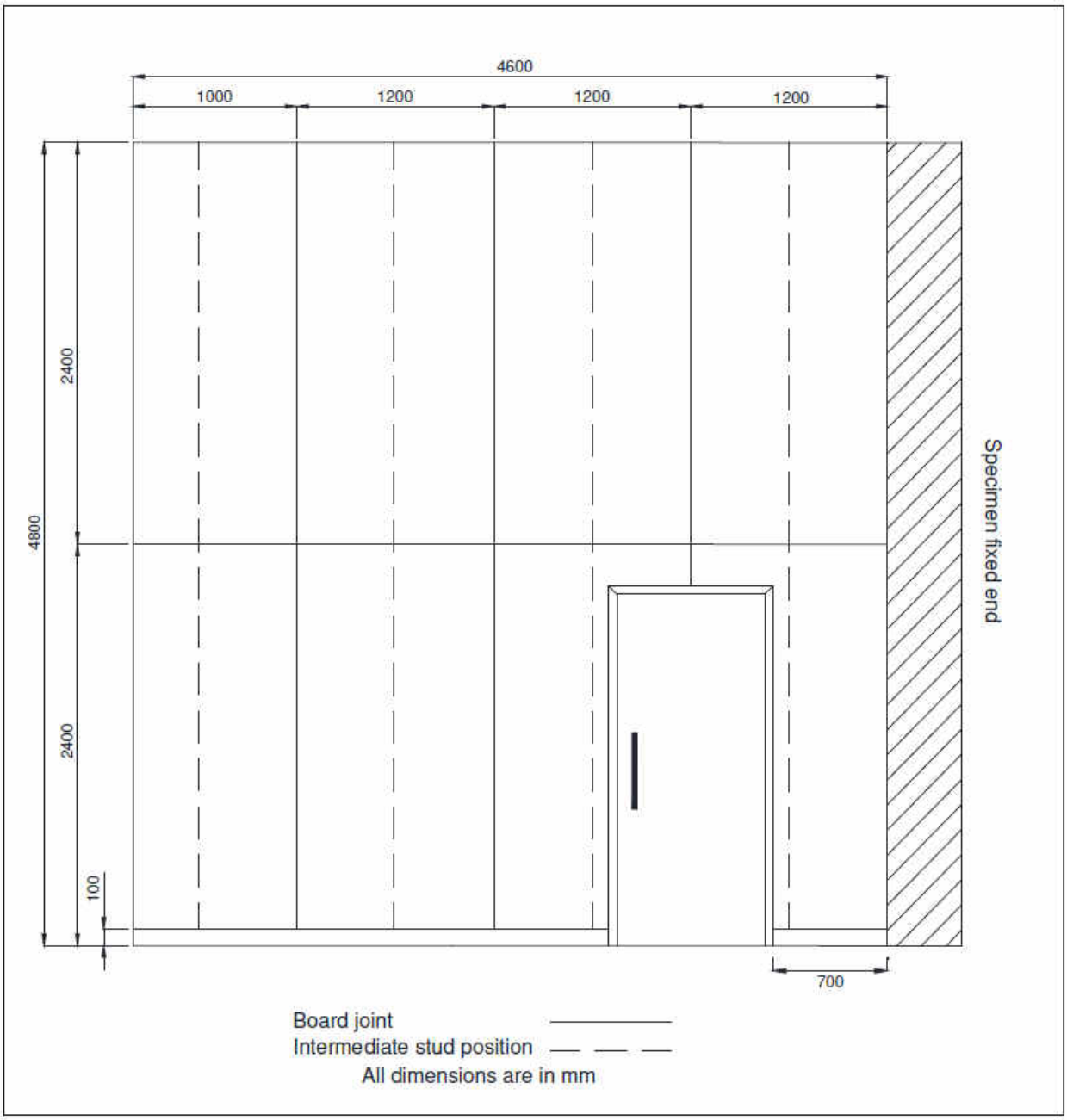

Figure 1. Side A elevation of the partition.

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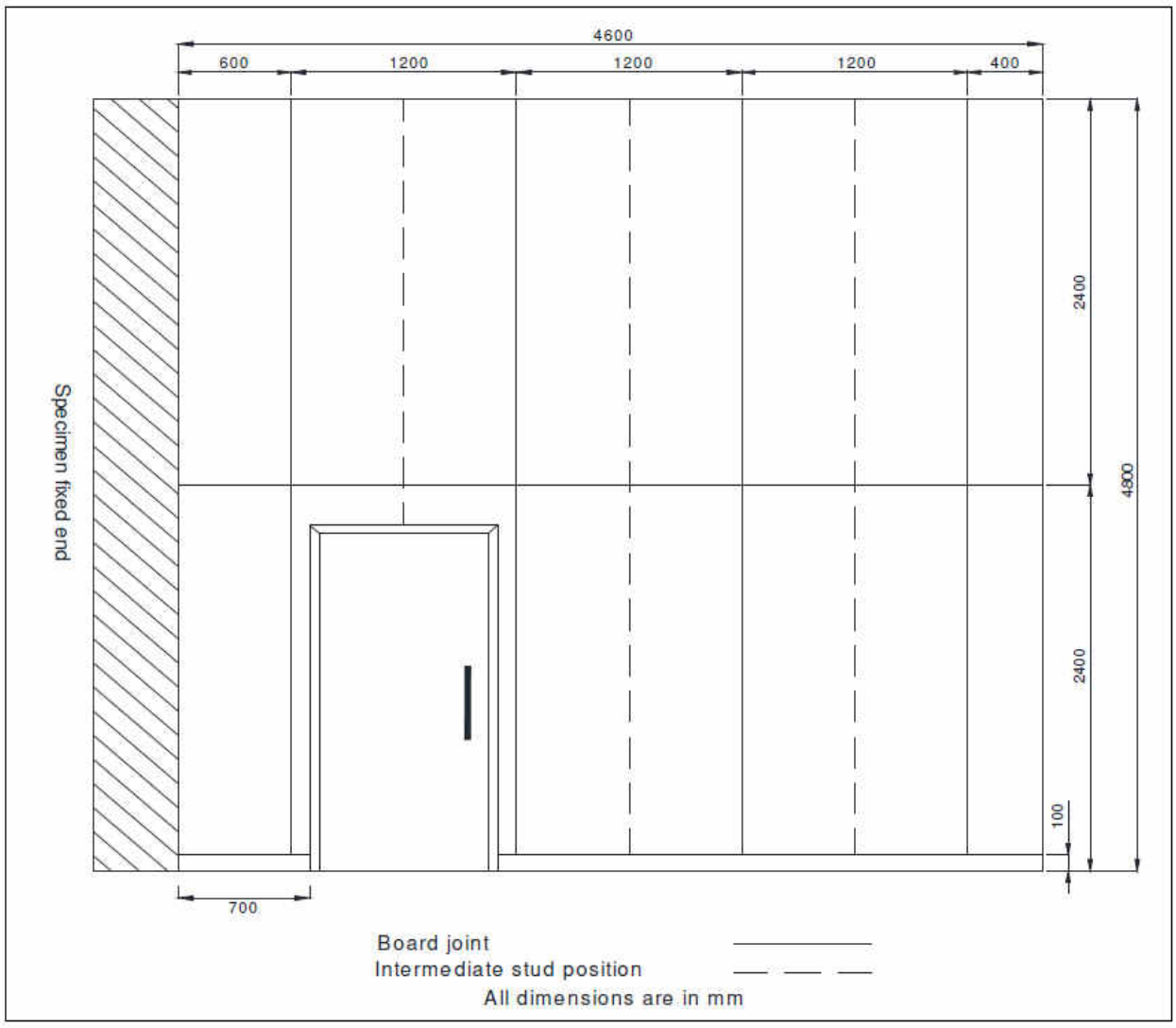

Figure 2. Side B elevation of the partition.

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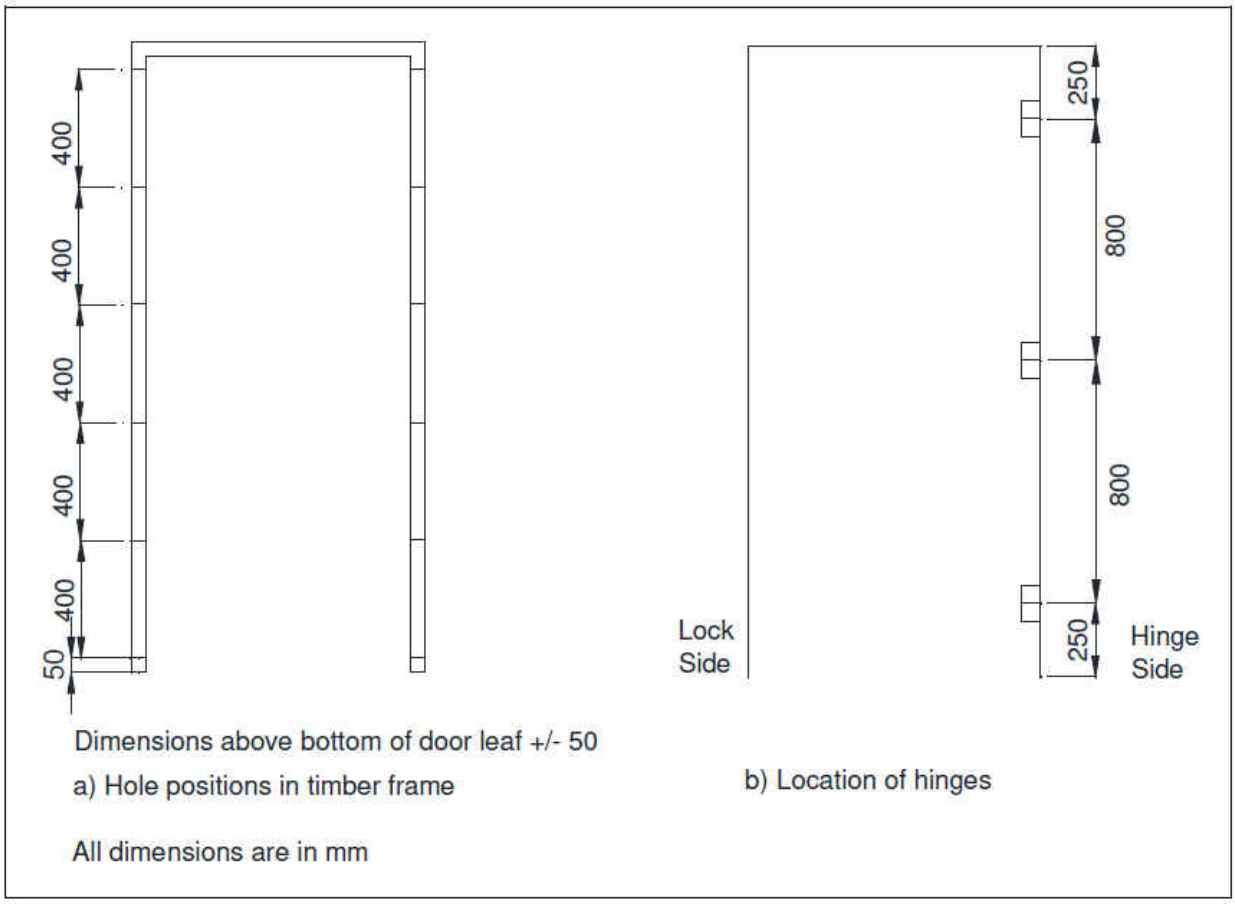

Figure 3. Fixing positions of the door frame.

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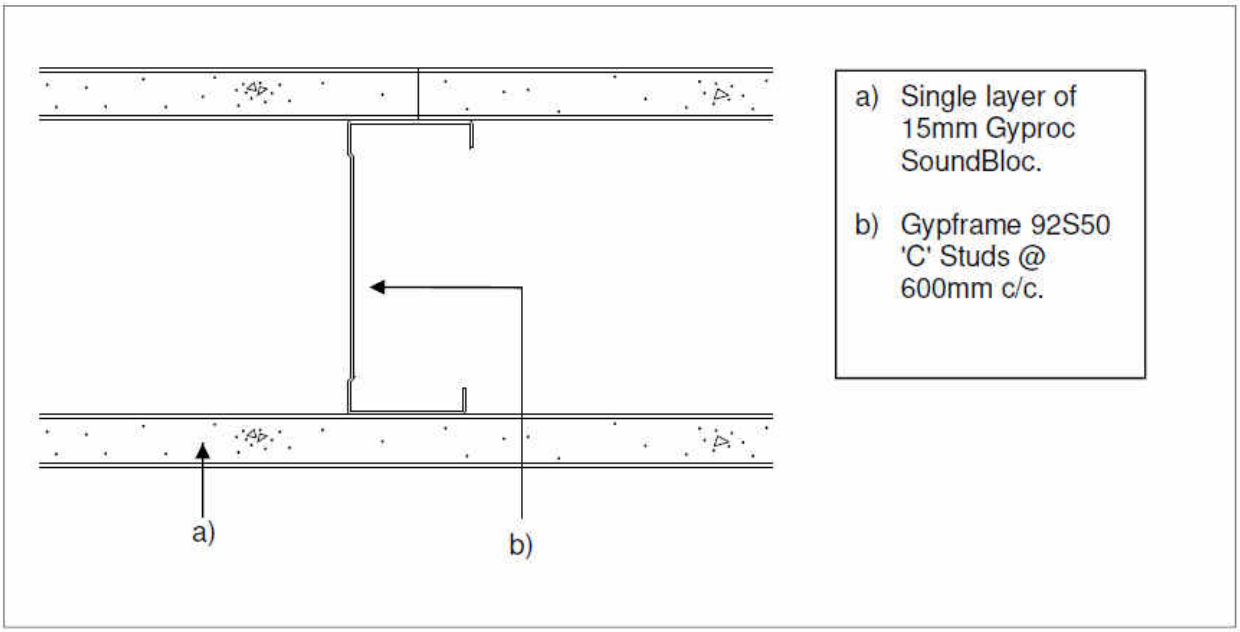

Figure 4. Horizontal cross section view of the partition.

TEST MATERIALS

Plasterboard

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

Surface density:	14.2kg/m^2
Average thickness:	15.1mm
Board Code:	31 247 18 08:41
	31 247 18 08:41
	31 247 18 08:41

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

Material dimensions were supplied by the customer.

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Frame components

i) 0.5mm thick Gypframe 92S50 'C' Studs manufactured from galvanised mild steel using the UltraEMBOSSED™ process.
ii) 0.5mm thick Gypframe 94FEC50 Folded Edge Standard Floor and Ceiling Channels manufactured from galvanised mild steel using the UltraEMBOSSED™ process.
iii) 0.5mm thick Gypframe GFS1 Fixing Strap manufactured from galvanised mild steel using the 'UltraSTEEL' process.

All frame components supplied by British Gypsum.

Fasteners

i) 25mm British Gypsum Drywall Screws.
ii) 35mm British Gypsum Drywall Screws.
iii) 45mm British Gypsum Drywall Screws.
iv) 60mm British Gypsum Drywall Screws.
v) 90mm British Gypsum Drywall Screws.
vi) 13mm Gypframe Wafer Head Drywall Screws.
vii) 1½" No. 10 Countersunk Wood Screws.
viii) 1¾" No. 10 Countersunk Wood Screws.
ix) 50mm bright oval nails.

All fasteners supplied by British Gypsum.

Door components

i) 60kg Heavy Duty door supplied by The Building Test Centre.
ii) A doorframe, 124mm x 38mm (including stop) supplied by British Gypsum.

Miscellaneous components

i) Gyproc Joint Tape.
ii) Gyproc Joint Filler.
iii) 100mm x 19mm bull nose softwood skirting board.
iv) 45mm x 18mm softwood architrave.

All miscellaneous components supplied by British Gypsum

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TEST RESULT

Classification grade HEAVY DUTY was achieved in accordance with BS 5234:2-1992.

SUMMARY OF TESTS FOR GRADE COMPLIANCE						
Requirement Tested	Test Annex	Load Position	Grade Performance achieved Pass/Fail			
			Light Duty	Medium Duty	Heavy Duty	Severe Duty
Determination of partition stiffness	A	Between Studs				Pass
		On stud				Pass
Determination of surface damage by small hard body impact	B				Tested*	
Resistance to damage by impact from a large soft body	C	Between Studs			Pass	
		On stud			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					HEAVY 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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Annex A – Determination of partition stiffness (between studs)

Test Date: 20th September 2018

Test Code: BTC 20681/A/1/S

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	6	No visible damage
Max. Deflection	6	-
Residual Deformation	0.8	After 5 minutes

Annex A – Determination of partition stiffness (on stud)

Test Date: 20th September 2018

Test Code: BTC 20681/A/2/S

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	0.4	After 5 minutes

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Annex D – Determination of resistance to perforation by small hard body impact

Test Date: 20th September 2018

Test Code: BTC 20681/D/S

Test Procedure: AP074 vs 1.1

Impact Energy: 15Nm

Conditions: Temperature: 17.9°C
Relative Humidity: 65.3%

TEST DATA			
	Positions		
Indent No.	X(mm)	Y(mm)	Damage
1	2950	1100	No perforation
2	3550	1100	No perforation
3	4150	1100	No perforation
4	3050	800	No perforation
5	3650	800	No perforation
6	4250	800	No perforation
7	2950	500	No perforation
8	3550	500	No perforation
9	3900	500	No perforation
10	4150	500	No perforation

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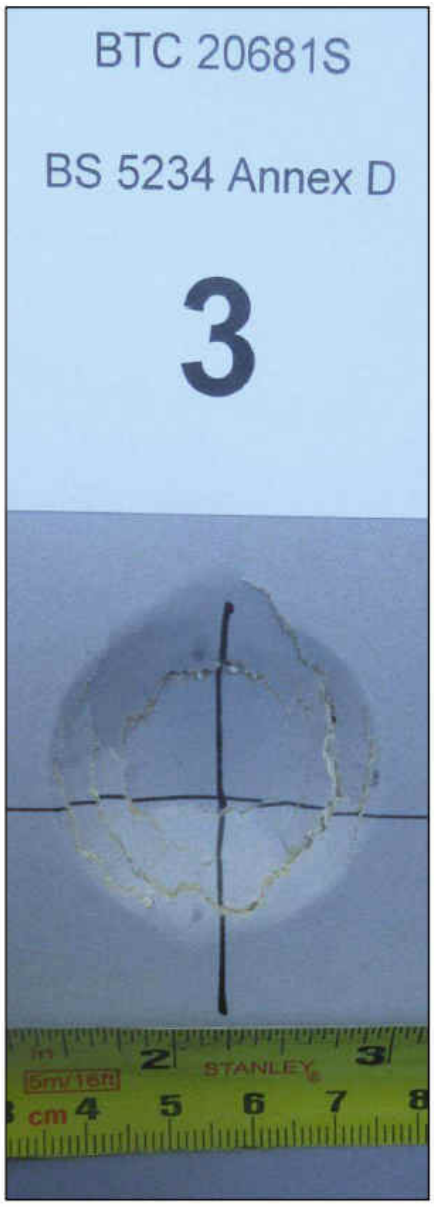

Photograph 1. Example of damage caused by the Annex D – Determination of resistance to perforation by small hard body impact

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Annex F – Determination of the effects of door slamming

Test Date: 20th September 2018

Test Code: BTC 20681/F/S

Test Procedure: AP076 vs 1.1

Weight of door: 60kg

Conditions: Temperature: 17.7°C
Relative Humidity: 66.2%

Number of slams: 3 pre-slams, 100 main test

TEST DATA		
Slams Type	Residual Displacement (mm)	Observations
Pre-slams	1.0 (Taken after 5 minutes)	No visible damage
Main Test	0.9 (Taken after 5 minutes)	No visible damage

The tests were carried out in accordance with BS 5234: Part 2: 1992 between the 20th and 21st September 2018 at the Building Test Centre on behalf of British Gypsum.

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BTC 20833S

A structural test report covering laboratory testing to BS 5234:2-1992, Annexes A, B, C, D, E, F and G, on a British Gypsum GypWall Classic partition clad with a double layer of 12.5mm Gyproc SoundBloc each side

A 4200mm high x 4500mm long 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 94FEC50 Folded Edge Floor and Ceiling Channels were screw fixed to the head and base of the test aperture using two staggered rows of 35mm British Gypsum Drywall Screws spaced at 600mm centres incorporating a 900 mm opening for the door set.

Gypframe 92S50 'C' Studs were positioned at either end of the head and base channels. The fixed end was screw-fixed to the side of the test aperture using 35mm British Gypsum Drywall Screws at 600mm centres and the other remained free.

Gypframe 92S50 'C' Studs were positioned between the head and base channel at 600mm centres.

The Gypframe 94FEC50 Folded Edge Floor and Ceiling Channel was fixed to the test aperture base with two 2" x No10 woodscrews at the door opening (10mm away from the web and 10mm in from the flange) and two 2" x No10 woodscrews 150mm adjacent to the first row of fixings. The vertical framework at the door opening was formed using Gypframe 92S50 'C' Studs.

The Gypframe 94FEC50 Folded Edge 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. One screw fixed through the floor channel, the extended channel and door jamb stud at the base of the framework and the other screw fixed through the extended channel and door jamb approximately 50mm below the top of the extended channel section.

At the head of the door opening, Gypframe 94FEC50 Folded Edge 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 94FEC50 Folded Edge Floor and Ceiling Channel sections screw fixed both sides of the partition at approximately 400mm centres using 13mm British Gypsum Wafer Head Drywall screws.

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A doorframe, 144mm x 38mm, comprised an outer casing frame and a stop frame. The casing frame was fixed into position using 60mm British Gypsum Drywall Screws at each point 50mm from the bottom of the casing and at 400mm centres thereafter. The stop frame abutted the casing frame and was glued and fixed in position using 40mm and 90mm British Gypsum Drywall Screws at each point 50mm from the bottom of the casing and at 400mm centres thereafter. The 35mm long fixings fixed the stop to the door casing and the 90mm long fixings penetrated the stop, door casing and metal door framework.

A Severe Duty door was fitted using 1½" No.10 Countersunk Wood screws.

A length of Gypframe 92S50 'C' Stud was positioned between the door head detail and the head of the partition to maintain 600mm stud centres above the door opening.

The framework was clad with a double layer of 12.5mm Gyproc SoundBloc on each side. The inner layer boards were screw fixed around the perimeter of the board only at 300mm centres using 25mm British Gypsum Drywall Screws. The outer layer boards were screw fixed around the perimeter of the board and the intermediate stud positions, including the door jamb studs, at 300mm centres using 35mm British Gypsum Drywall Screws.

Inner layer horizontal joints were positioned at 1800mm on both faces of the specimen Outer layer horizontal joints were positioned at 2400mm from the base on both faces of the specimen. A Gypframe GFS1 Fixing Strap was used behind the outer layer horizontal board joint.

All vertical joints were staggered between layers. The outer layer 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, 45 mm x 18 mm, was fixed to both sides of the partition with 50 mm bright oval nails at 300 mm centres into the timber doorframe. Bull nose softwood skirting 100mm x 19mm was attached to the base of the partition using pairs of 45mm British Gypsum Drywall Screws at 600mm centres.

NB: The stud and channel components were manufactured using the UltraEMBOSS process; all other metal framing components were manufactured using the UltraSTEEL 2 process.

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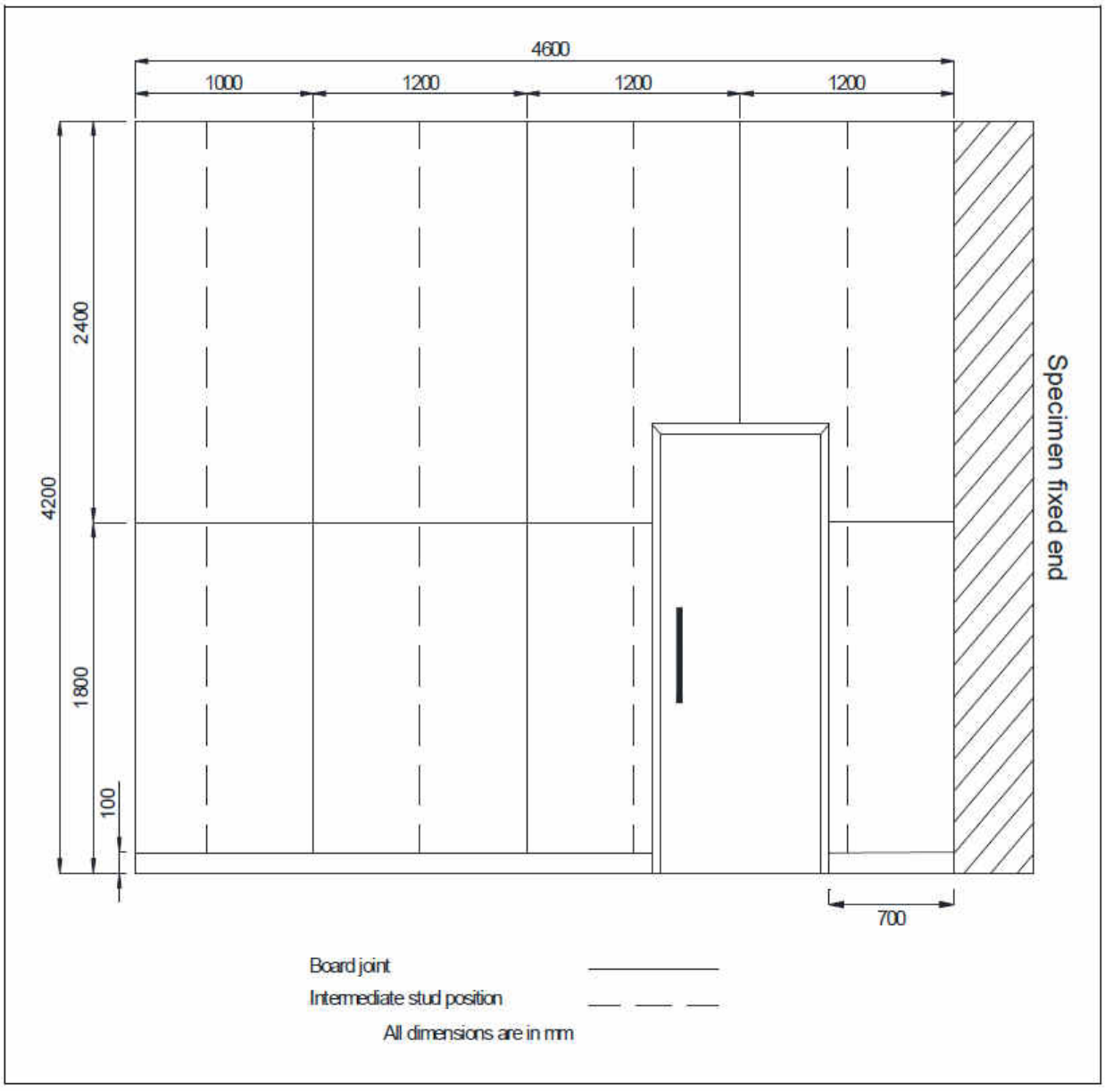

Figure 1. Side A elevation of the partition (inner layer).

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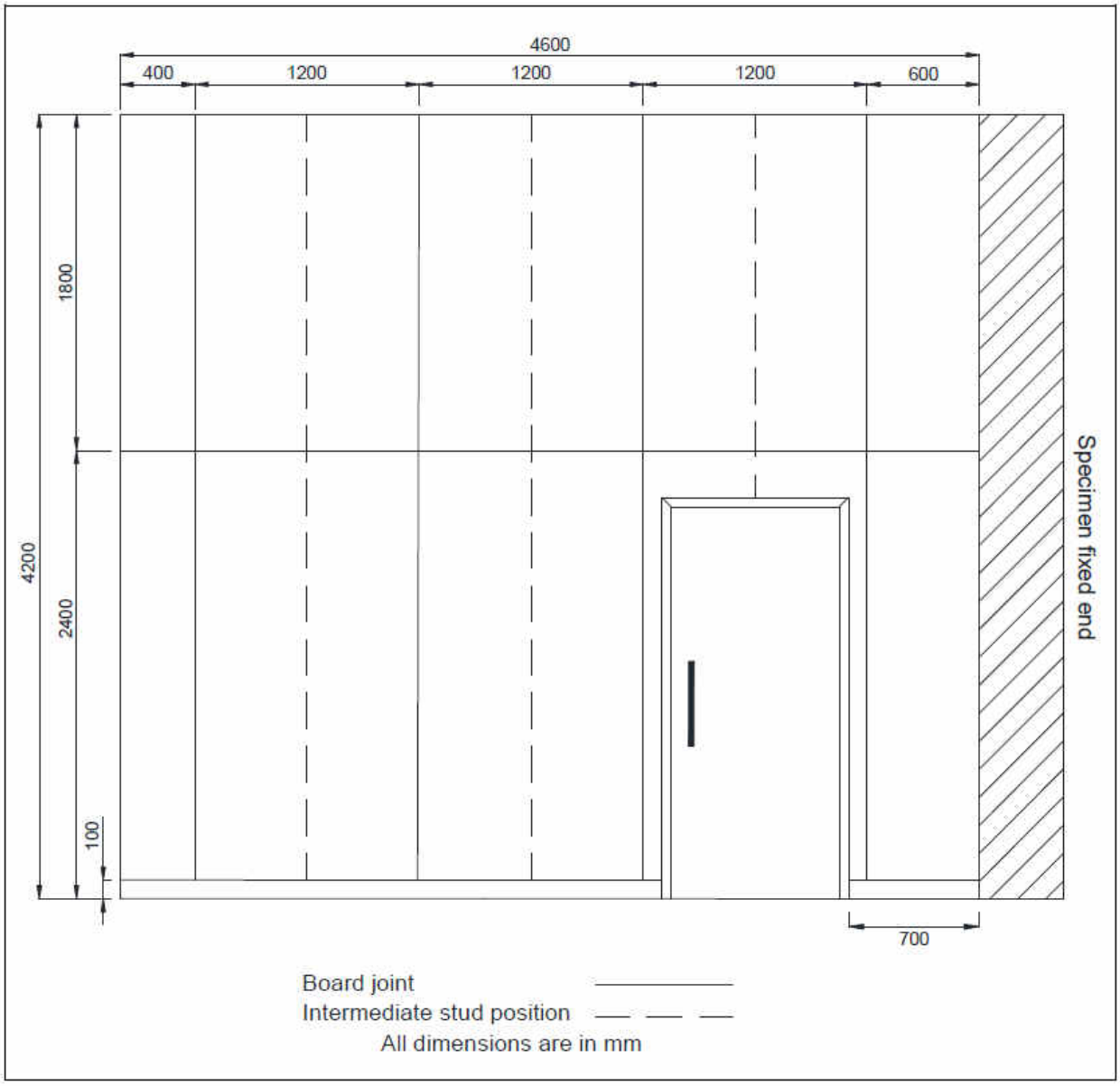

Figure 2. Side A elevation of the partition.

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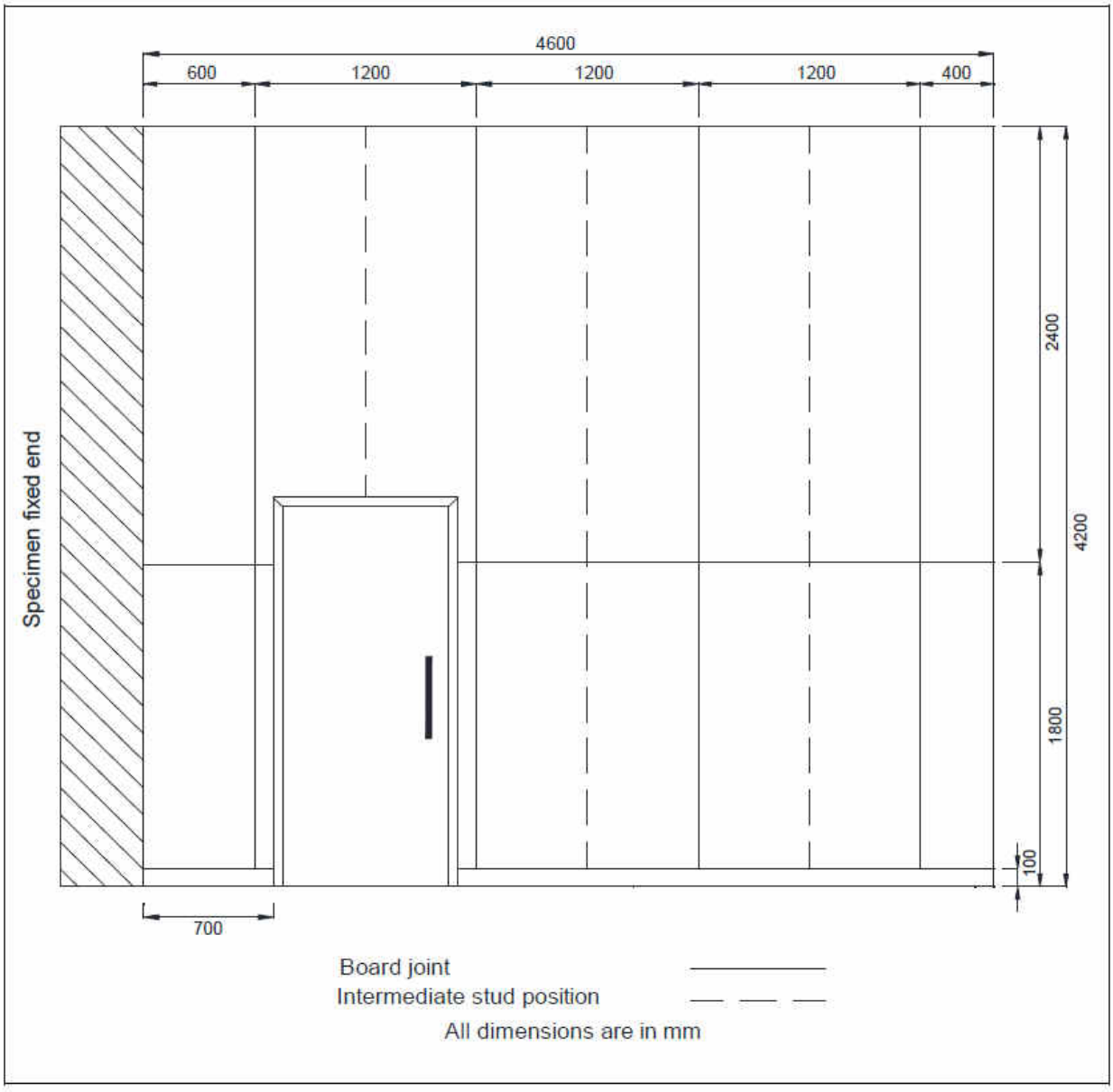

Figure 3. Side B elevation of the partition.

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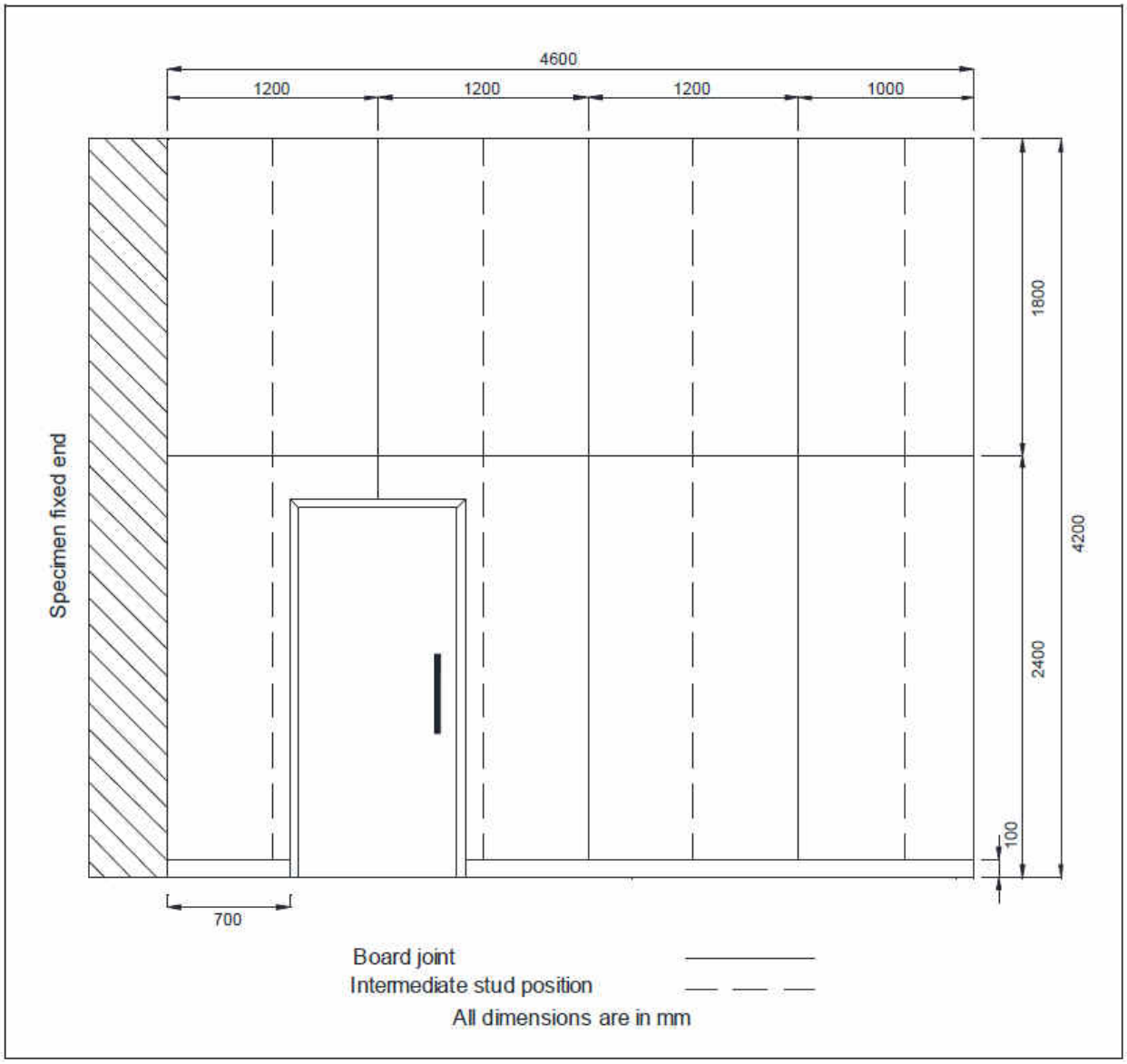

Figure 4. Side B elevation of the partition.

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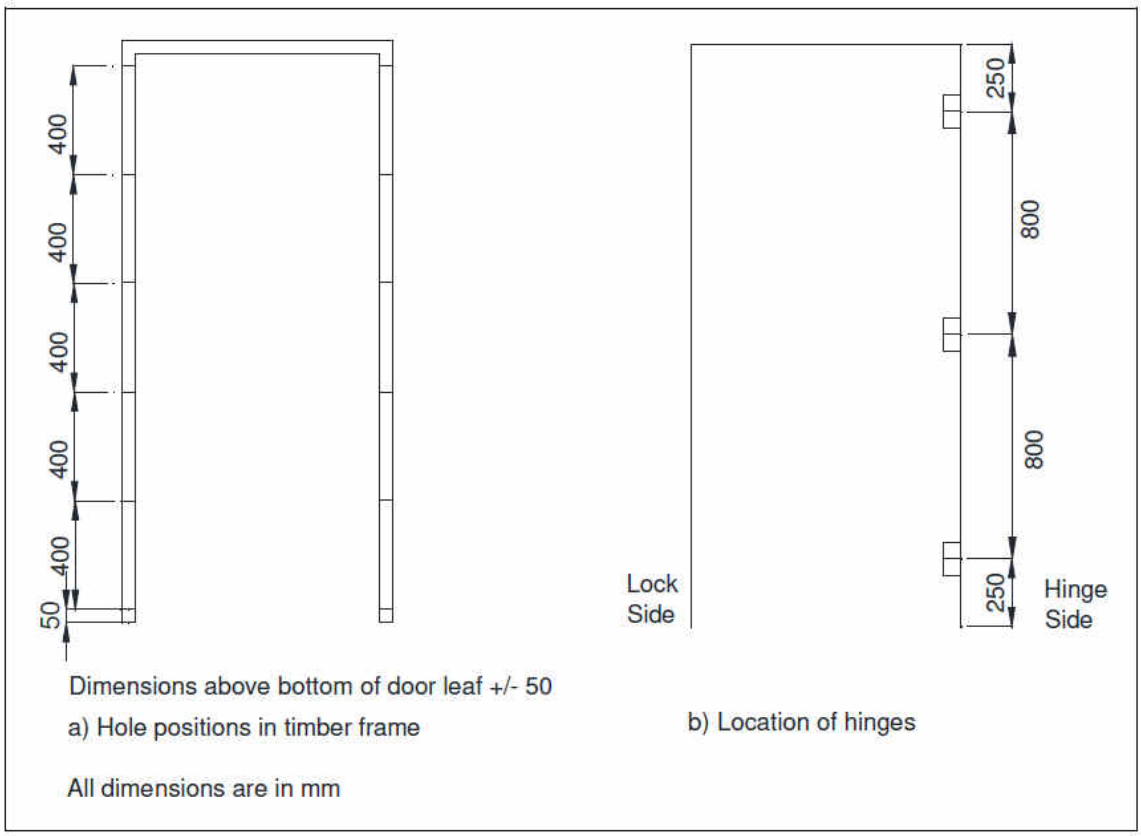

Figure 5. Fixing positions of the door frame.

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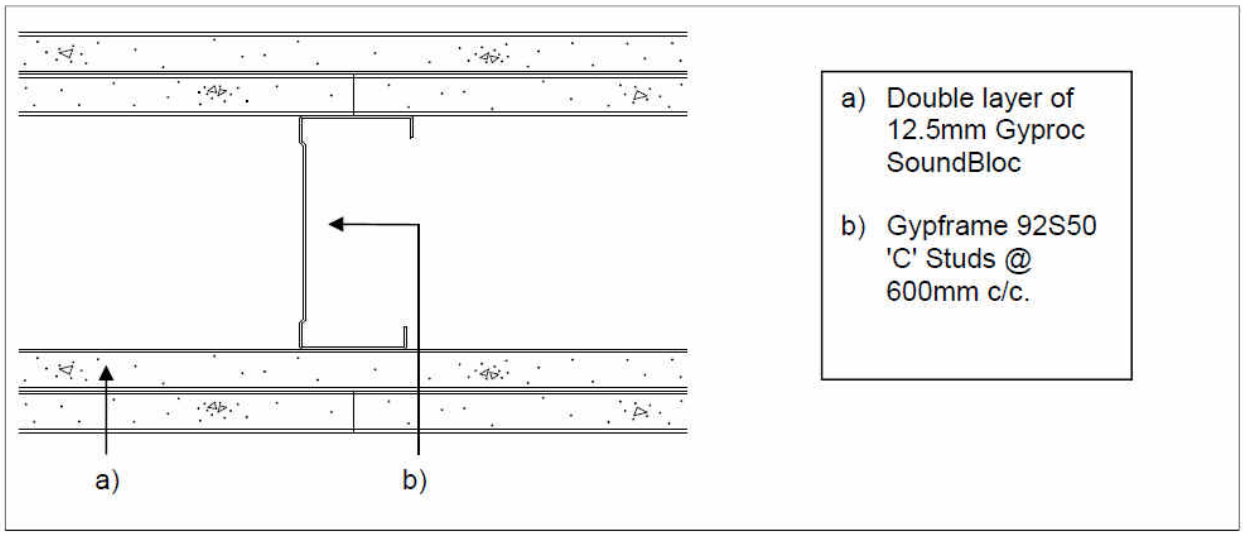

Figure 6. Horizontal cross section view of the partition.

TEST MATERIALS

Plasterboard

i) Nominally 2400mm (long) x 1200mm (wide) x 12.5mm (thick) Gyproc SoundBloc manufactured by British Gypsum, ex Sherburn.

Surface density:	11.5kg/m^2
Average thickness:	12.5mm
Board Code:	16 022 19 03:20
	16 022 19 03:20
	16 022 19 03:20

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

Material dimensions were supplied by the customer.

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Frame components

i) 0.5mm thick Gypframe 92S50 'C' Studs manufactured from galvanised mild steel using the UltraEMBOSSED™ process.
ii) 0.5mm thick Gypframe 94FEC50 Folded Edge Standard Floor and Ceiling Channels manufactured from galvanised mild steel using the UltraEMBOSSED™ process.
iii) 0.5mm thick Gypframe GFS1 Fixing Strap manufactured from galvanised mild steel using the 'UltraSTEEL' process.

All frame components supplied by British Gypsum.

Fasteners

i) 25mm British Gypsum Drywall Screws.
ii) 35mm British Gypsum Drywall Screws.
iii) 45mm British Gypsum Drywall Screws.
iv) 60mm British Gypsum Drywall Screws.
v) 90mm British Gypsum Drywall Screws.
vi) 13mm Gypframe Wafer Head Drywall Screws.
vii) 1½" No. 10 Countersunk Wood Screws.
viii) 2" No. 10 Countersunk Wood Screws.
ix) 50mm bright oval nails.

All fasteners supplied by British Gypsum.

Door components

i) 60kg Severe Duty door supplied by The Building Test Centre.
ii) A doorframe, 144mm x 38mm (including stop) supplied by British Gypsum.

Miscellaneous components

i) Gyproc Joint Tape.
ii) Gyproc Joint Filler.
iii) 100mm x 19mm bull nose softwood skirting board.
iv) 45mm x 18mm softwood architrave.

All miscellaneous components supplied by British Gypsum.

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TEST RESULT

Classification grade SEVERE DUTY was achieved in accordance with BS 5234:2-1992.

SUMMARY OF TESTS FOR GRADE COMPLIANCE						
Requirement Tested	Test Annex	Load Position	Grade Performance achieved Pass/Fail			
			Light Duty	Medium Duty	Heavy Duty	Severe Duty
Determination of partition stiffness	A	Between Studs				Pass
		On stud				Pass
Determination of surface damage by small hard body impact	B					Tested*
Resistance to damage by impact from a large soft body	C	Between Studs				Pass
		On stud				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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Annex A – Determination of partition stiffness (between studs)

Test Date: 21st February 2019

Test Code: BTC 20833/A/1/S

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	0.7	After 5 minutes

Annex A – Determination of partition stiffness (on stud)

Test Date: 21st February 2019

Test Code: BTC 20833/A/2/S

TEST DATA		
Load (N)	Deflection (mm)	Observations
0	0	-
100	0	No visible damage
200	1	No visible damage
300	1	No visible damage
400	2	No visible damage
500	3	No visible damage
Max. Deflection	3	-
Residual Deformation	0.4	After 5 minutes

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Annex D – Determination of resistance to perforation by small hard body impact

Test Date: 21st February 2019

Test Code: BTC 20833/D/S

Test Procedure: AP074 vs 1.1

Impact Energy: 30Nm

Conditions: Temperature: 17.5°C
Relative Humidity: 59.3%

TEST DATA			
	Positions		
Indent No.	X(mm)	Y(mm)	Damage
1	2950	1100	No perforation
2	3550	1100	No perforation
3	4150	1100	No perforation
4	3050	800	No perforation
5	3650	800	No perforation
6	4250	800	No perforation
7	2950	500	No perforation
8	3550	500	No perforation
9	3900	500	No perforation
10	4150	500	No perforation

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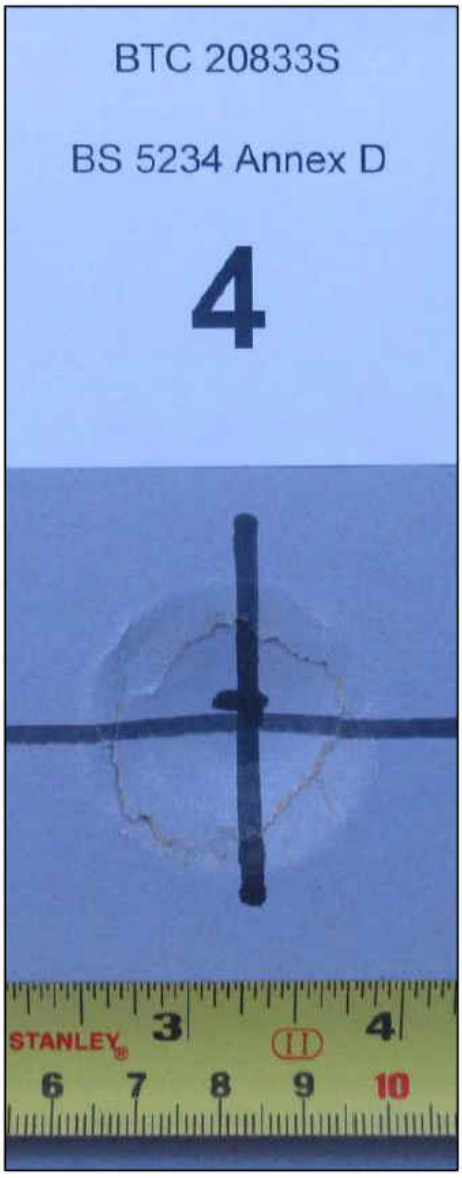

Photograph 1. Example of damage caused by the Annex D – Determination of resistance to perforation by small hard body impact – to partition tested in BTC 20833S

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Annex F – Determination of the effects of door slamming

Test Date: 21st February 2019

Test Code: BTC 20833/F/S

Test Procedure: AP076 vs 1.1

Weight of door: 60kg

Conditions: Temperature: 18.3°C
Relative Humidity: 57.3%

Number of slams: 3 pre-slams, 100 main test

TEST DATA		
Slams Type	Residual Displacement (mm)	Observations
Pre-slams	1.3 (Taken after 5 minutes)	No visible damage
Main Test	0.7 (Taken after 5 minutes)	No visible damage

The tests were carried out in accordance with BS 5234: Part 2: 1992 between the 21st and 22nd February 2019 at the Building Test Centre on behalf of British Gypsum.

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BTC 20201S

A structural test report covering laboratory testing to BS 5234:2-1992, Annexes A, B, C, D, E, F and G, on a British Gypsum GypWall QUIET SF partition clad with a double layer of 12.5mm Gyproc SoundBloc (UltraEMBOSSED™ profiles)

A 3300mm high x 4600mm long 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 72FEC50 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 900 mm opening for the door set.

Gypframe 70S50 '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.

The studs were positioned between the head and base channel at 600mm centres and the stud at the free-end of the partition remained free.

The vertical framework at the door opening was formed using Gypframe 70S50 'C' Studs. The Gypframe 72FEC50 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 base channel was fixed to the aperture using two 1 ¾" wood screws at the door opening and 150mm adjacent to the first row of fixings. 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 72FEC50 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.

Two beads of Unibond Mega Grip Adhesive were applied to the web of each door jamb in line with the web ribs.

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A doorframe, 152mm x 38mm (including stop), was fixed into position using two 60mm 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.

A length of Gypframe 70S50 'C' Stud was positioned between the door head detail and the head of the partition to maintain 600mm stud centres above the door opening.

Gypframe RB1 Resilient Bars were fixed to both sides of the metal framework at 600mm centres using 13mm British Gypsum Wafer Head Screws. Where required, bars are joined by nesting them together over a stud, with the base flange fixed to the stud. All the bars were fixed with the base flange on the top side with the exception of the uppermost bar and the bar at the door head which were fixed with the base flange on the bottom side to provide a board fixing at the partition and door heads.

The first bar from the base of the specimen was positioned to allow a 16mm thick x 50mm high timber packer to be fixed at the base of the specimen. The timber packer was fixed at 600mm centres using 35mm British Gypsum Drywall Screws.

Short sections of Gypframe RB1 Resilient Bar were fixed in between the horizontal bars around the specimen perimeter and around the door opening using 13mm British Gypsum Wafer Head Screws, two per section.

The framework was clad with a double layer of 3000mm long x 12.5mm Gyproc SoundBloc on each side.

Both layers of boards were screw fixed to all framing members at 300mm centres using 25mm and 35mm British Gypsum Drywall Screws for the inner layer and outer layer respectively.

A horizontal joint was positioned at 3000mm from the base on the outer layer boards and at 600mm from the base on the inner layer, on both faces of the specimen.

All vertical joints were staggered 600mm 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, 45 mm x 18 mm, was fixed to both sides of the partition with 50 mm bright oval nails at 300 mm centres into the timber doorframe.

Bull nose softwood skirting 100mm x 19mm was attached to the base of the partition using pairs of 40mm British Gypsum Drywall Screws at 600mm centres.

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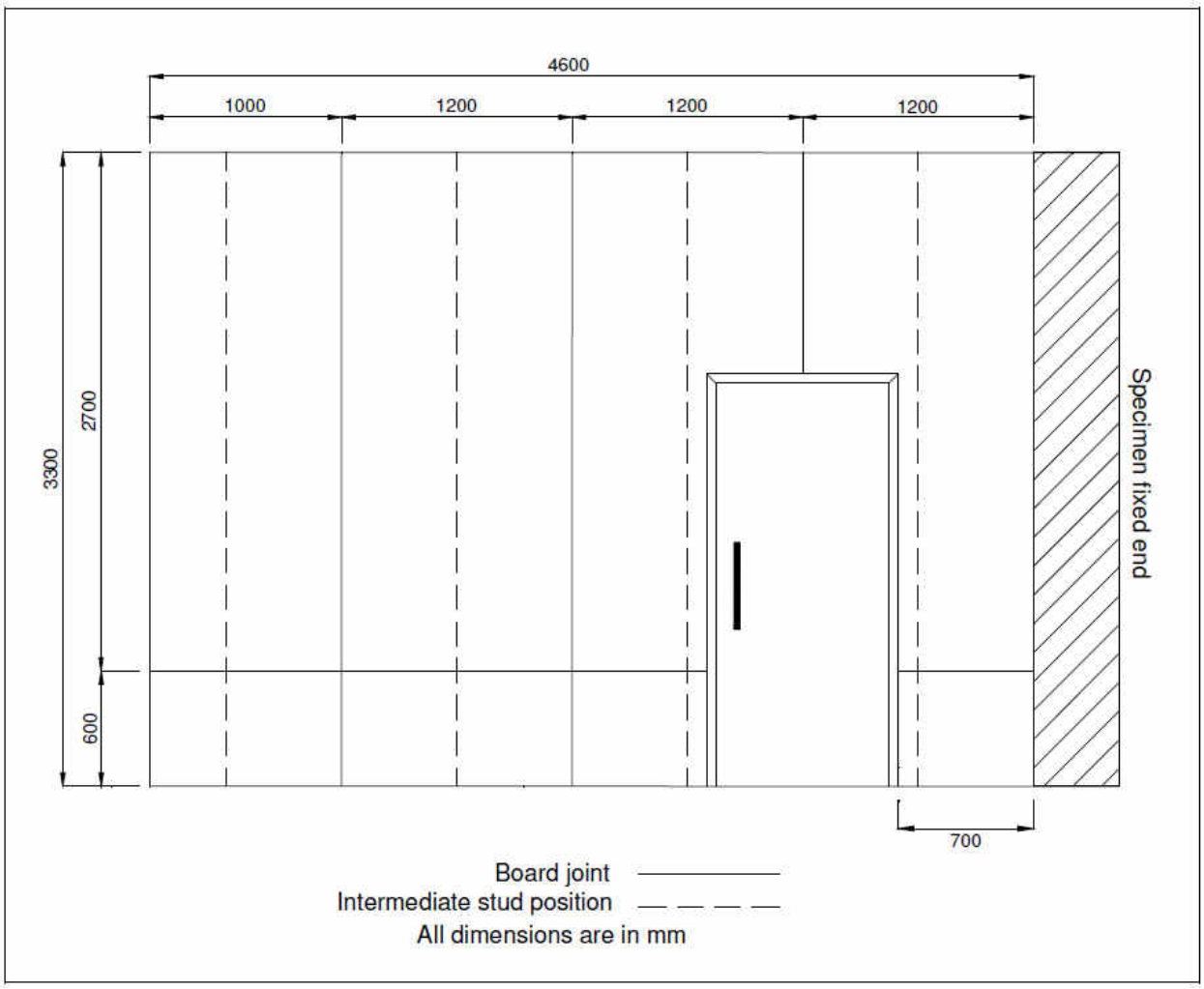

Figure 1. Side A elevation of the partition (inner layer).

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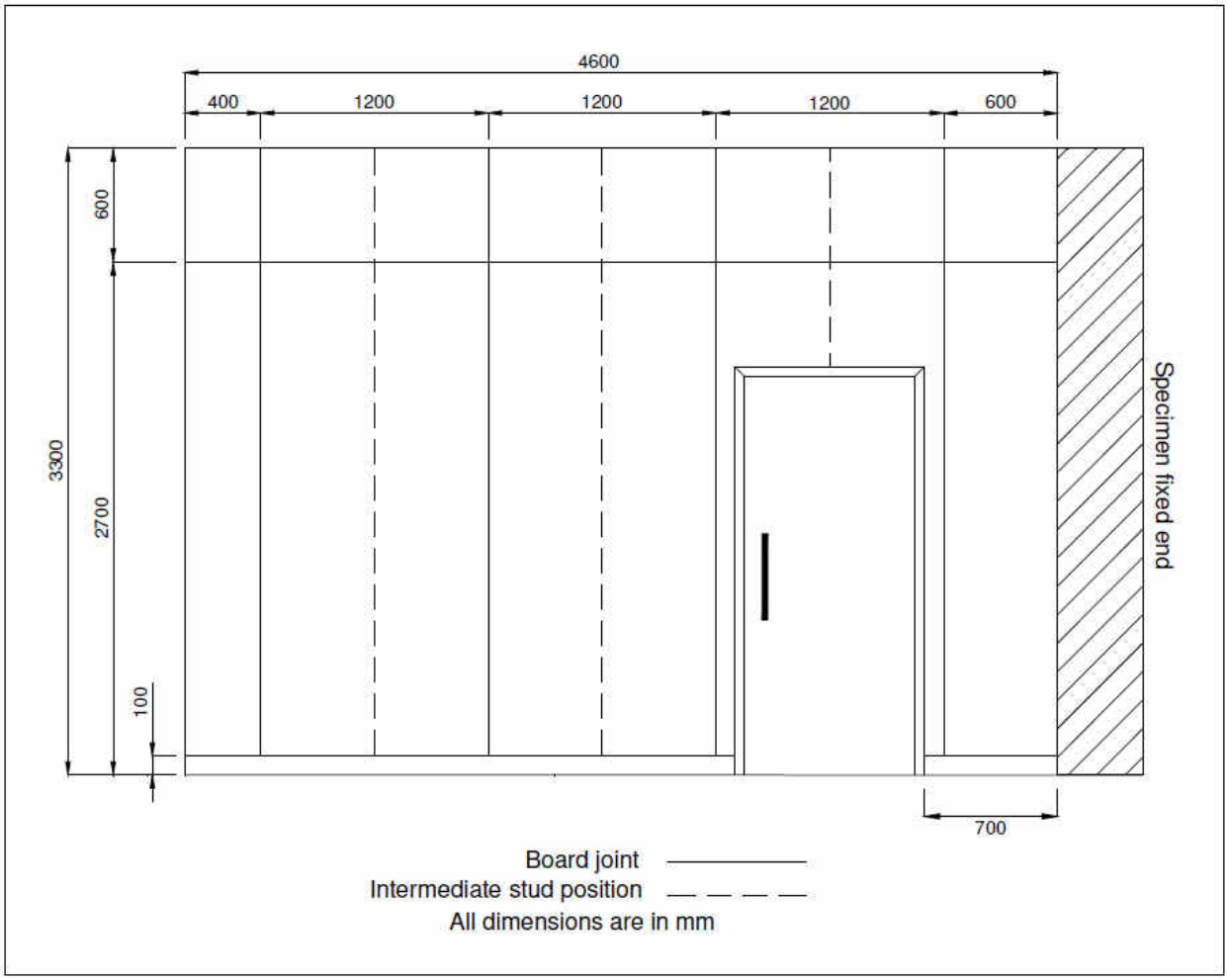

Figure 2. Side A elevation of the partition (outer layer).

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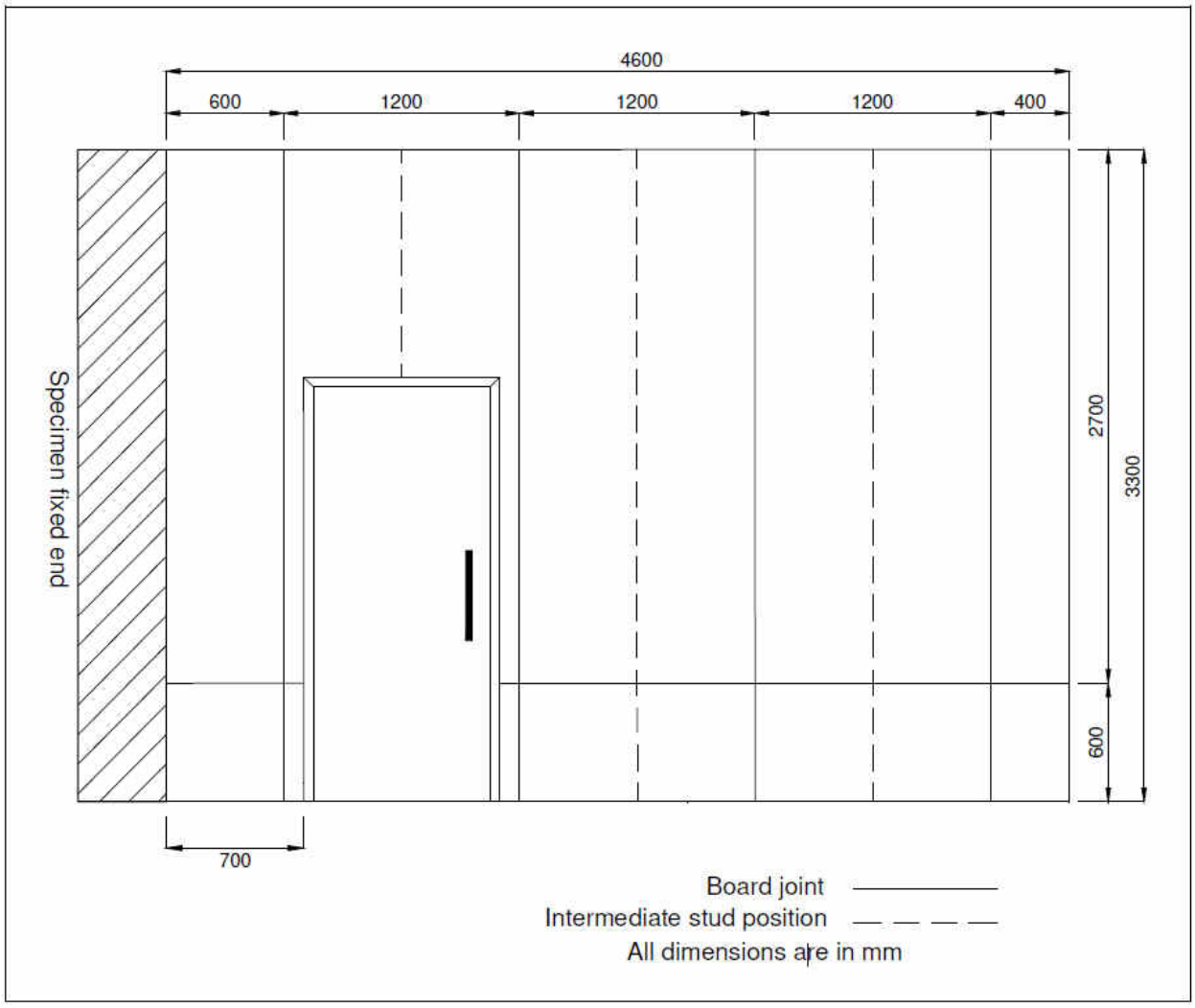

Figure 3. Side B elevation of the partition (inner layer).

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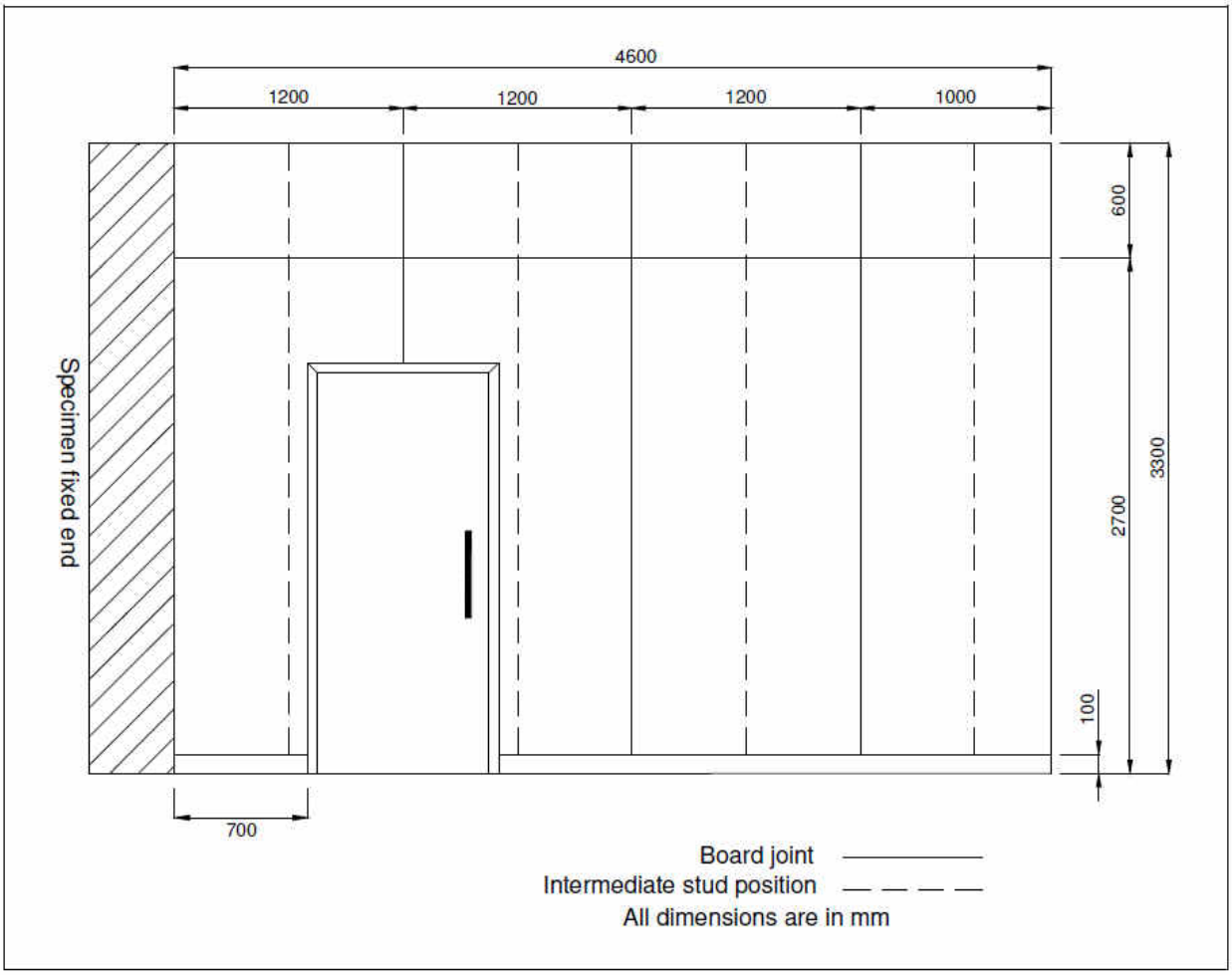

Figure 4. Side B elevation of the partition (outer layer).

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Figure 5. Fixing positions of the door frame

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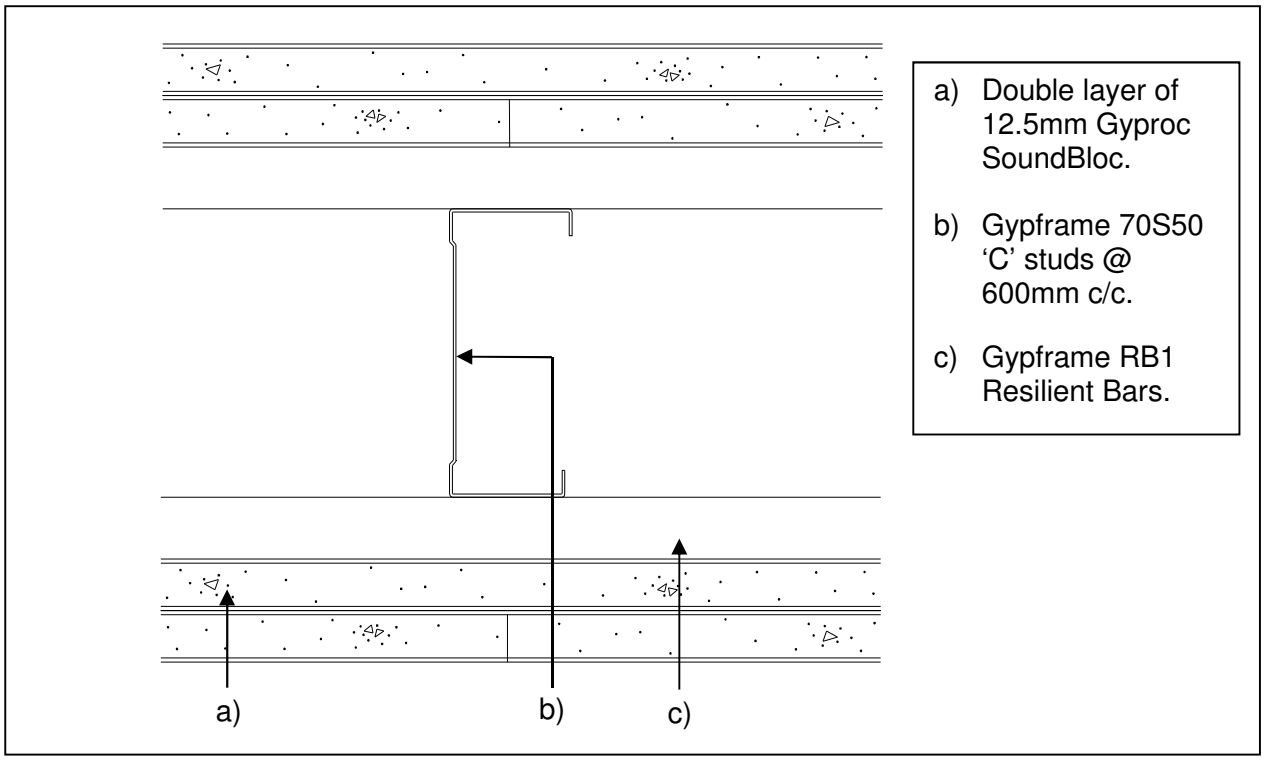

Figure 6. Horizontal cross section view of the partition

TEST MATERIALS

Plasterboard

i) Nominally 2400mm (long) x 1200mm (wide) x 12.5mm (thick) Gyproc SoundBloc manufactured by British Gypsum, ex Eat Leake.

Surface density:	11.5kg/m^2
Average thickness:	12.3mm
Board Code:	16 204 17 18:26
	16 204 17 18:25
	16 204 17 18:25

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

Material dimensions were supplied by the customer.

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Frame components

i) 0.5mm thick Gypframe 70S50 'C' Studs.
ii) 0.5mm thick Gypframe 72FEC50 Folded Edge Standard Floor and Ceiling Channels.
iii) Gypframe RB1 Resilient Bar

All metal components are manufactured from galvanised mild steel using the 'UltraEMBOSSED™' process and supplied by British Gypsum.

Fasteners

i) 25mm British Gypsum Drywall Screws.
ii) 35mm British Gypsum Drywall Screws.
iii) 40mm British Gypsum Drywall Screws.
iv) 60mm British Gypsum Drywall Screws.
v) 13mm Gypframe Wafer Head Drywall Screws.
vi) 1½" No. 10 Countersunk Wood Screws.
vii) 1¾" No. 10 Countersunk Wood Screws.
viii) 50mm bright oval nails.

All fasteners supplied by British Gypsum.

Door components

i) 60kg Severe Duty door supplied by The Building Test Centre.
ii) A doorframe, 152mm x 38mm (including stop) supplied by British Gypsum.

Miscellaneous components

i) Gyproc Joint Tape.
ii) Gyproc Joint Filler.
iii) 100mm x 19mm bull nose softwood skirting board.
iv) 45mm x 18mm softwood architrave.
v) 16mm x 50mm timber packer.

All miscellaneous components supplied by British Gypsum

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TEST RESULT

Classification grade SEVERE DUTY was achieved in accordance with BS 5234:2-1992.

SUMMARY OF TESTS FOR GRADE COMPLIANCE						
Requirement Tested	Test Annex	Load Position	Grade Performance achieved Pass/Fail			
			Light Duty	Medium Duty	Heavy Duty	Severe Duty
Determination of partition stiffness	A	Between Studs				Pass
		On stud				Pass
Determination of surface damage by small hard body impact	B					Tested*
Resistance to damage by impact from a large soft body	C	Between Studs				Pass
		On stud				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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Annex A – Determination of partition stiffness (on studs)

Test Date: 25th August 2017

Test Code: BTC 20201/A/1/S

TEST DATA		
Load (N)	Deflection (mm)	Observations
0	0	-
100	2	No visible damage
200	3	No visible damage
300	5	No visible damage
400	7	No visible damage
500	9	No visible damage
Max. Deflection	9	-
Residual Deformation	0.7	After 5 minutes

Annex A – Determination of partition stiffness (between stud)

Test Date: 25th August 2017

Test Code: BTC 20201/A/2/S

TEST DATA		
Load (N)	Deflection (mm)	Observations
0	0	-
100	2	No visible damage
200	3	No visible damage
300	5	No visible damage
400	7	No visible damage
500	9	No visible damage
Max. Deflection	9	-
Residual Deformation	0.4	After 5 minutes

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Annex D – Determination of resistance to perforation by small hard body impact

Test Date: 25th August 2017

Test Code: BTC 20201/D/S

Test Procedure: AP074 vs 1.1

Impact Energy: 30Nm

Conditions: Temperature: 20.7°C
Relative Humidity: 60.8%

TEST DATA			
	Positions		
Indent No.	X(mm)	Y(mm)	Damage
1	2950	1100	No perforation
2	3550	1100	No perforation
3	4150	1100	No perforation
4	3050	800	No perforation
5	3650	800	No perforation
6	4250	800	No perforation
7	2950	500	No perforation
8	3550	500	No perforation
9	3900	500	No perforation
10	4150	500	No perforation

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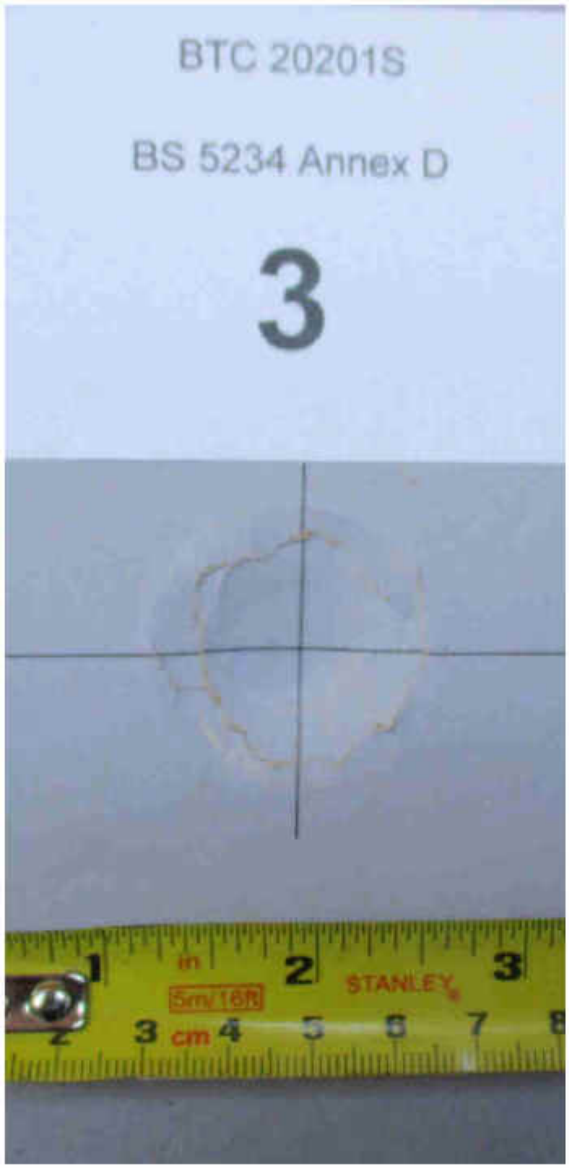

Photograph 1. Example of damage caused by the Annex D – Determination of resistance to perforation by small hard body impact – to partition tested in BTC 20201S

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Annex F – Determination of the effects of door slamming

Test Date: 25th August 2017

Test Code: BTC 20201/F/S

Test Procedure: AP076 vs 1.1

Weight of door: 60kg

Conditions: Temperature: 20.6°C
Relative Humidity: 61.3%

Number of slams: 3 pre-slams, 100 main test

TEST DATA		
Slams Type	Residual Displacement (mm)	Observations
Pre-slams	0.8 (Taken after 5 minutes)	No visible damage
Main Test	0.6 (Taken after 5 minutes)	No visible damage

The tests were carried out in accordance with BS 5234: Part 2: 1992 on the 25th August 2017 at the Building Test Centre on behalf of 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

Sectional Properties of Gypframe Metal Studs

Gypframe Product	*Area* cm^2	*Gauge* mm	*Mass* $kg\ m^{-1}$	*Ixx* cm^4
48 S 50	0.62	0.5	0.49	2.53
60 S 50	0.68	0.5	0.53	4.17
70 S 50	0.71	0.5	0.56	5.59
70 S 60	0.87	0.6	0.69	7.07
92 S 50	0.85	0.5	0.67	11.22
92 S 60	1.02	0.6	0.81	13.46
92 S 10	1.7	1.0	1.34	22.43
146 S 50	1.11	0.5	0.87	33.15
48 I 50	0.91	0.5	0.72	4.22
60 I 50	0.97	0.5	0.77	6.83
60 I 70	1.35	0.7	1.06	9.41
70 I 50	1.02	0.5	0.8	9.54
70 I 70	1.42	0.7	1.12	13.17
92 I 90	2.02	0.9	1.58	30.52
146 I 80	2.23	0.8	1.75	77.15
146 TI 90	2.5	0.9	1.96	86.43
43 AS 50	0.82	0.5	0.6	2.49
70 AS 50	0.95	0.5	0.75	7.48
92 AS 50	1.06	0.5	0.83	14.05
146 AS 50	1.38	0.5	1.93	40.17
Ixx = Second moment of area in the major axis				

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BRITISH GYPSUM METAL STUD PARTITION MAXIMUM HEIGHTS (mm)
(Based on a limiting deflection of L/240 at 200Pa)

Including Gyproc GypWall, Gyproc GypWall dB PLUS, Gyproc GypWall RAPID, Gyproc Rapid dB PLUS, GypWall ROBUST and GypWall EXTREME

Gypframe stud	Boarding each side	600mm	600mm Boxed	400mm	400mm Boxed	300mm	300mm Boxed
48 S 50	1 x 12.5mm	2500	2800	2900	3200	3100	3500
	1 x 15mm	2800	3000	3100	3300	3300	3600
	2 x 12.5mm	3400	3600	3600	3800	3800	4000
	2 x 15mm	3700	3800	3900	4000	4000	4200
48 I 50	1 x 12.5mm	2900		3400		3700	
	1 x 15mm	3100		3500		3800	
	2 x 12.5mm	3700		3900		4200	
	2 x 15mm	3900		4200		4400	
60 S 50	1 x 12.5mm	3200	3400	3500	3800	3800	4200
	1 x 15mm	3400	3600	3700	4000	4000	4300
	2 x 12.5mm	4100	4300	4300	4600	4600	4800
	2 x 15mm	4400	4500	4600	4800	4800	5000
60 I 50	1 x 12.5mm	3600		4000		4400	
	1 x 15mm	3800		4200		4500	
	2 x 12.5mm	4400		4700		5000	
	2 x 15mm	4600		4900		5200	
60 I 70	1 x 12.5mm	4100		4600		5000	
	1 x 15mm	4200		4700		5100	
	2 x 12.5mm	4700		5100		5500	
	2 x 15mm	4900		5300		5600	

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Gypframe stud	Boarding each side	600mm	600mm Boxed	400mm	400mm Boxed	300mm	300mm Boxed
70 S 50	1 x 12.5mm	3600	3900	4000	4300	4300	4700
	1 x 15mm	3800*	4100	4200	4500	4500	4900
	2 x 12.5mm	4600	4800	4900	5100	5100	5400
	2 x 15mm	4900	5100	5100	5300	5300	5600
70 AS 50	1 x 12.5mm	3800	4200	4300	4700	4600	5100
	1 x 15mm	4000*	4400	4500	4800	4700*	5200
	2 x 12.5mm	4700	5000	5000	5300	5300	5700
	2 x 15mm	5000	5200	5300	5600	5500	5900
70 S 60	1 x 12.5mm	3800	4100	4200	4600	4500	5000
	1 x 15mm	4000	4300	4400	4700	4700	5100
	2 x 12.5mm	4700	4900	5000	5300	5200	5600
	2 x 15mm	5000	5200	5200	5500	5500	5800
70 I 50	1 x 12.5mm	4100		4600		5000	
	1 x 15mm	4300		4700		5100	
	2 x 12.5mm	4900		5300		5600	
	2 x 15mm	5200		5500		5800	
70 I 70	1 x 12.5mm	4600		5100		5600	
	1 x 15mm	4700		5300		5700	
	2 x 12.5mm	5300		5700		6100	
	2 x 15mm	5500		5900		6300	

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Gypframe stud	Boarding each side	600mm	600mm Boxed	400mm	400mm Boxed	300mm	300mm Boxed
92 S 50	1 x 12.5mm	4500	4800	4900	5400	5300	5800
	1 x 15mm	4700	5100	5200	5600	5500	6000
	2 x 12.5mm	5700	5900	6000	6300	6200	6600
	2 x 15mm	5900	6100	6200	6500	6400	6800
92 AS 50	1 x 12.5mm	4700	5100	5200	5700	5700	6200
	1 x 15mm	4900*	5300	5400	5900	5800	6400
	2 x 12.5mm	5800	6100	6200	6500	6500	6900
	2 x 15mm	6000	6300	6400	6700	6700	7000*
92 S 60	1 x 12.5mm	4700	5000	5200	5600	5600	6100
	1 x 15mm	4900	5300	5400	5800	5800	6300
	2 x 12.5mm	5800	6000	6100	6500	6500	6900
	2 x 15mm	6000	6200	6300	6700	6600	7000
92 S 10	1 x 12.5mm	5300	5800	6000	6600	6500	7200
	1 x 15mm	5500	6000	6100	6700	6600	7300
	2 x 12.5mm	6200	6600	6700	7200	7200	7700
	2 x 15mm	6400	6800	6900	7400	7300	7800
92 I 90	1 x 12.5mm	6000		6800		7400	
	1 x 15mm	6200		6900		7500	
	2 x 12.5mm	6800		7400		7900	
	2 x 15mm	6900		7500		8000	

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Gypframe stud	Boarding each side	600mm	600mm Boxed	400mm	400mm Boxed	300mm	300mm Boxed
146 S 50	1 x 12.5mm	6200	6800	6900	7600	7500	8300
	1 x 15mm	6500	7000	7200	7800	7700	8400
	2 x 12.5mm	7600	8000	8100	8600	8500	9100
	2 x 15mm	7900	8200	8300	8800	8700	9300
146 AS 50	1 x 12.5mm	6600	7100	7300	8000	8000	8800
	1 x 15mm	6800	7400	7600	8200	8200	8900
	2 x 12.5mm	7800	8200	8400	8900	8900	9500
	2 x 15mm	8100	8500	8600	9100	9100	9700
146 I 80	1 x 12.5mm	7900		8900		9700	
	1 x 15mm	8100		9000		9800	
	2 x 12.5mm	8800		9600		10400	
	2 x 15mm	9000		9800		10500	
146 TI 90	1 x 12.5mm	8300*		9400*		10300*	
	1 x 15mm	8400*		9500*		10400*	
	2 x 12.5mm	9200		10100		10900	
	2 x 15mm	9400		10300		11100	

* Height claim has been rounded down to nearest 100mm

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BRITISH GYPSUM METAL STUD PARTITION MAXIMUM HEIGHTS (mm)
(Based on a limiting deflection of L/240 at 200Pa)

GypWall QUIET SF

Gypframe stud (600mm cc)	Resilient Bar both sides	Res. Bar one side, 2 x 12.5mm board each side	Res. Bar one side, 2 x 15mm board each side	Res. Bar one side, 19mm & 12.5mm board each side
48 S 50	2500	3000	3200	2800
48 I 50	2800	3300	3500	3100
60 S 50	2900	3600	3800	3300
60 I 50	3300	4000	4100	3700
60 I 70	3900	4400	4500	4200
70 S 50	3200	4000	4200	3800
70 S 60	3400	4200	4300	3900
70 I 50	3700	4400	4600	4200
70 I 70	4300	4800	5000	4700
92 S 50	4000	5000	5100	4600
92 S 60	4200	5100	5300	4800
92 S 10	5000	5700	5800	6100
92 I 90	5800	6300	6400	6100
146 S 50	5700	6800	6900	6400
146 I 80	7500	8200	8300	8000
146 TI 90	8100	8700	8800	8500

The assessment was carried out on the 21st February 1996 by The Building Test Centre on behalf of British Gypsum. It was last amended on the 9th August 2017.

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Young's Modulus Stiffness Data

Table 1 Determination of E-Modulus			
Product	Thickness (mm)	Average Young's Modulus (N/mm^2)	Average Bending Stiffness ($N.mm^2$)
WallBoard	12.5	2132	1.02E+08
SoundBloc	12.5	3244	1.54E+08
FireLine	12.5	3301	1.81E+08
Habito	12.5	4396	2.25E+08
WallBoard	15	2025	1.71E+08
SoundBloc	15	2876	2.41E+08
FireLine	15	3460	3.15E+08
SoundBloc F	15	3185	2.77E+08

Table 4. Stiffness data of Gyproc plasterboards.

Evidence provided by British Gypsum on the 30th November 2017.

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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 systems described in the DETAILS OF REQUEST have not all 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.

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

Annex A

GypWall CLASSIC Single Layer Systems

Primary evidence: BTC 20681S.

The partition stiffness tests conducted in BTC 20681S achieved the desired HEAVY Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in cladding and the maximum cold state height.

- Change in cladding from 15mm Gyproc SoundBloc to 15mm Gyproc SoundBloc F or 15mm Gyproc FireLine
- Change in height of partition from 4800mm to 4700mm.

Secondary evidence: Young's Modulus Stiffness Data

From inspection of the Young's Modulus stiffness data given in Table 2, we can see that 15mm Gyproc SoundBloc F (2.41E+08 N.mm^2) and 15mm Gyproc FireLine (3.15E+08 N.mm^2) achieves a greater average bending stiffness value compared to 15mm Gyproc SoundBloc (2.41E+08 N.mm^2) and would therefore not downgrade performance.

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The decrease in height of the partition by 100mm is minimal, so we would consider that this will not downgrade the stiffness performance.

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

GypWall CLASSIC Double Layer Systems

Primary evidence BTC 20833S:

The partition stiffness tests conducted in BTC 20833S achieved the desired SEVERE Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in cladding and the maximum cold state height.

- Change in cladding from 12.5mm Gyproc SoundBloc to 15mm Gyproc SoundBloc or 15mm Gyproc FireLine
- Change in height of partition from 4200mm to 5900mm

Secondary evidence: Young's Modulus Stiffness Data, BTC 12321LC.

From inspection of the Young's Modulus stiffness data given in Table 2, we can see that 15mm Gyproc FireLine (3.15E+08 $N.mm^2$) achieves a greater average bending stiffness value compared to 12.5mm Gyproc SoundBloc (1.54E+08 $N.mm^2$). Together with the increase in thickness of Gyproc SoundBloc from 12.5mm to 15mm as required by the DETAILS of REQUEST, these changes would therefore not downgrade performance.

The increase in height has potential to reduce the partition stiffness performance up to a certain height. However, the proposed partition height is within the recommended maximum heights described in BTC 12321LC, so we consider that this will not downgrade the stiffness performance.

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

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GypWall Quiet SF Double Layer Systems

Primary evidence: BTC 20201S

The partition stiffness tests conducted in BTC 20201S achieved the desired SEVERE Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in the framework details, cladding material and an increase in the maximum cold state height

- Inclusion of Gypframe RB1 Resilient Bar to one side of the metal framework only
- Change in framework from Gypframe 70S50 'C' studs and 72FEC50 folded edge channel to Gypframe 92S50 'C' studs and 94FEC50 folded edge channel
- Change in cladding from 12.5mm Gyproc SoundBloc to 15mm Gyproc SoundBloc
- Change in height of partition from 3300mm to 5000mm (Gypframe RB1 Resilient Bar to one side) and 4000mm (Gypframe RB1 Resilient Bar to both sides).

Secondary evidence: BTC 20833S, BTC 12321LC, Gypframe Sectional properties.

From inspection of BTC 20833S and BTC 20201S it can be seen that both systems achieved SEVERE duty rating performance with respect to Annex A Stiffness when tested with and without Gypframe RB1 Resilient Bars fixed to the metal framework.

It is reasonable to assume that when Gypframe RB1 Resilient Bar is fixed to only one side of the metal framework the partition system will still achieve SEVERE duty rating performance provided the system is built not above the cold state height given in BTC 12321LC.

From inspection of the sectional properties of Gypframe metal studs of the secondary evidence on page 51 it can be seen that Gypframe 92S50 'C' Studs (39.10×10^9 Nmm^2) have a higher sectional stiffness value than Gypframe 70S50 'C' studs (21.20×10^9 Nmm^2). We would therefore consider the change in studs would not downgrade the stiffness performance.

The increase in thickness of Gyproc SoundBloc from 12.5mm to 15mm as required by the DETAILS of REQUEST would be considered to not downgrade performance.

This increase in height has potential to reduce the partition stiffness performance up to a certain height. However, the proposed partition height is within the recommended maximum heights described in BTC 12321LC, so we consider that this will not downgrade the stiffness performance.

It is our opinion that the combination of these differences as described in DETAILS of REQUEST and the aforementioned 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 achieve the required Duty level, if tested to BS5234: Part 2:1992 Annex A.

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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.

GypWall CLASSIC Single Layer Systems

Primary evidence BTC 20681S:

The hard body impact tests conducted in BTC 20681S achieved the desired HEAVY Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in cladding and the maximum cold state height.

- Change in cladding from 15mm Gyproc SoundBloc to 15mm Gyproc SoundBloc F or 15mm Gyproc FireLine
- Change in height of partition from 4800mm to 4700mm.

Secondary evidence: Young's Modulus Stiffness Data

From inspection of the Young's Modulus stiffness data given in Table 2, we can see that 15mm Gyproc SoundBloc F (2.77E+08 N.mm^2) and 15mm Gyproc FireLine (3.15E+08 N.mm^2) achieves a greater average bending stiffness value compared to 15mm Gyproc SoundBloc,(2.41E+08 N.mm^2) and would therefore not downgrade performance.

The decrease in height of the partition by 100mm is minimal, so we would consider that this will not downgrade the hard body impact performance.

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

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GypWall CLASSIC Double Layer Systems

Primary evidence BTC 20833S:

The hard body impact tests conducted in BTC 20833S achieved the desired SEVERE Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in cladding and the maximum cold state height.

- Change in cladding from 12.5mm Gyproc SoundBloc to 15mm Gyproc SoundBloc or 15mm Gyproc FireLine
- Change in height of partition from 4200mm to 5900mm

Secondary evidence: Young's Modulus Stiffness Data, BTC 12321LC

From inspection of the Young's Modulus stiffness data given in Table 2, we can see that 15mm Gyproc FireLine (3.15E+08 $N.mm^2$) achieves a greater average bending stiffness value compared to 12.5mm Gyproc SoundBloc.(1.54E+08 $N.mm^2$). Together with the increase in thickness of Gyproc SoundBloc from 12.5mm to 15mm as required by the DETAILS of REQUEST, these changes would therefore not downgrade performance.

The increase in height has potential to reduce the partition stiffness performance up to a certain height. However, the proposed partition height is within the recommended maximum heights described in BTC 12321LC, so we consider that this will not downgrade the hard body impact performance.

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

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GypWall Quiet SF Double Layer Systems

Primary evidence: BTC 20201S

The hard body impact tests conducted in BTC 20201S achieved the desired SEVERE Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in the framework details, cladding material and an increase in the maximum cold state height

- Inclusion of Gypframe RB1 Resilient Bar to one side of the metal framework only
- Change in framework from Gypframe 70S50 'C' studs and 50FEC50 folded edge channel to Gypframe 92S50 'C' studs and 94FEC50 folded edge channel
- Change in cladding from 12.5mm Gyproc SoundBloc to 15mm Gyproc SoundBloc
- Change in height of partition from 3300mm to 5000mm (Gypframe RB1 Resilient Bar to one side) and 4000mm (Gypframe RB1 Resilient Bar to both sides).

Secondary evidence: BTC 20833S, BTC 12321LC, Gypframe Sectional properties

From inspection of BTC 20833S and BTC 20201S it can be seen that both systems achieved SEVERE duty rating performance with respect to Annex A Stiffness when tested with and without Gypframe RB1 Resilient Bars fixed to the metal framework.

It is reasonable to assume that when Gypframe RB1 Resilient Bar is fixed to only one side of the metal framework the partition system will still achieve SEVERE duty rating performance provided the system is built not above the cold state height given in BTC 12321LC.

From inspection of the sectional properties of Gypframe metal studs of the secondary evidence on page 51 it can be seen that Gypframe 92S50 'C' Studs (39.10×10^9 Nmm^2) have a higher sectional stiffness value than Gypframe 70S50 'C' studs (21.20×10^9 Nmm^2). We would therefore consider the change in studs would not downgrade the hard body impact performance.

The increase in thickness of Gyproc SoundBloc from 12.5mm to 15mm as required by the DETAILS of REQUEST would be considered to not downgrade performance.

This increase in height has potential to reduce the partition stiffness performance up to a certain height. However, the proposed partition height is within the recommended maximum heights described in BTC 12321LC, so we consider that this will not downgrade the hard body impact performance.

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

Therefore it is reasonable to assume that the hard body impact performance for the range of constructions in DETAILS of REQUEST should achieve the required Duty level, if tested to BS5234: Part 2:1992 Annex D.

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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.

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.

GypWall CLASSIC Single Layer Systems

Primary evidence BTC 20681S:

The partition stiffness tests conducted in BTC 20681S achieved the desired HEAVY Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in cladding and the maximum cold state height.

- Change in cladding from 15mm Gyproc SoundBloc to 15mm Gyproc SoundBloc F or 15mm Gyproc FireLine
- Change in height of partition from 4800mm to 4700mm.

Secondary evidence: Young's Modulus Stiffness Data

From inspection of the Young's Modulus stiffness data given in Table 2, we can see that 15mm Gyproc SoundBloc F (2.77E+08 N.mm^2) and 15mm Gyproc FireLine (3.15E+08 N.mm^2) achieves a greater average bending stiffness value compared to 15mm Gyproc SoundBloc (2.41E+08 N.mm^2).

This increase in stiffness is unlikely to have an effect on structural damage or maximum and residual deflections significant enough to downgrade the door slam performance.

The decrease in height of the partition by 100mm is minimal, so we would consider that this will not downgrade the door slam performance.

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

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GypWall CLASSIC Double Layer Systems

Primary evidence BTC 20833S:

The door slam test conducted in BTC 20833S achieved the desired SEVERE Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in cladding and the maximum cold state height.

- Change in cladding from 12.5mm Gyproc SoundBloc to 15mm Gyproc SoundBloc or 15mm Gyproc FireLine
- Change in height of partition from 4200mm to 5900mm

Secondary evidence: Young's Modulus Stiffness Data, BTC 12321LC

From inspection of the Young's Modulus stiffness data given in Table 2, we can see that 15mm Gyproc FireLine (3.15E+08 $N.mm^2$) achieves a greater average bending stiffness value compared to 12.5mm Gyproc SoundBloc (1.54E+08 $N.mm^2$). Together with the increase in thickness of Gyproc SoundBloc from 12.5mm to 15mm as required by the DETAILS of REQUEST, this increase in stiffness is unlikely to have an effect on structural damage or maximum and residual deflections significant enough to downgrade the door slam performance.

The increase in height has potential to reduce the partition stiffness performance up to a certain height. However, the proposed partition height is within the recommended maximum heights described in BTC 12321LC, so we consider that this will not downgrade the door slam performance.

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

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GypWall Quiet SF Double Layer Systems

Primary evidence: BTC 20201S

The door slam test conducted in BTC 20201S achieved the desired SEVERE Duty performance. However for the constructions in DETAILS of REQUEST there are changes required in the framework details, cladding material and an increase in the maximum cold state height

- Inclusion of Gypframe RB1 Resilient Bar to one side of the metal framework only
- Change in framework from Gypframe 70S50 'C' studs and 50FEC50 folded edge channel to Gypframe 92S50 'C' studs and 94FEC50 folded edge channel
- Change in cladding from 12.5mm Gyproc SoundBloc to 15mm Gyproc SoundBloc
- Change in height of partition from 3300mm to 5000mm (Gypframe RB1 Resilient Bar to one side) and 4000mm (Gypframe RB1 Resilient Bar to both sides).

Secondary evidence: BTC 20833S, BTC 12321LC, Gypframe Sectional properties

From inspection of BTC 20833S and BTC 20201S it can be seen that both systems achieved SEVERE duty rating performance with respect to Annex A Stiffness when tested with and without Gypframe RB1 Resilient Bars fixed to the metal framework.

It is reasonable to assume that when Gypframe RB1 Resilient Bar is fixed to only one side of the metal framework, the partition system will still achieve SEVERE duty rating performance provided the system is built not above the cold state height given in BTC 12321LC.

From inspection of the sectional properties of Gypframe metal studs of the secondary evidence on page 51 it can be seen that Gypframe 92S50 'C' Studs (39.10×10^9 Nmm^2) have a higher sectional stiffness value than Gypframe 70S50 'C' studs (21.20×10^9 Nmm^2). Although increasing partition stiffness can potentially affect performance, we would consider this would not downgrade the door slam performance.

The increase in thickness of Gyproc SoundBloc from 12.5mm to 15mm as required by the DETAILS of REQUEST would be considered to not downgrade performance.

This increase in height has potential to reduce the partition stiffness performance up to a certain height. However, the proposed partition height is within the recommended maximum heights described in BTC 12321LC, so we consider that this will not downgrade the door slam performance.

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

Therefore it is reasonable to assume that the hard body impact performance for the range of constructions in DETAILS of REQUEST should achieve the required Duty level, 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 Classic and GypWall QUIET SF partitions would achieve the Duty Rating performance as stated in the DETAILS of REQUEST.

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 on behalf of Applicant Limited.

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AUTHORITY FOR USE OF TEST EVIDENCE

Test Report Numbers: BTC 20681S, BTC 20833S, BTC 20201S and BTC 12321LC

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

A structural test assessment on UltraEMBOSSED™ Gypframe 92S50 'C' Studs and Gypframe 94FEC50 Folded Edge Standard Floor and Ceiling Channels when incorporated into a range of British Gypsum partitions, if tested in accordance with BS 5234: Part 2: 1992.

Assessment client: British Gypsum

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

Job Title: PRINCIPAL SCIENTIST

Department: TECHNICAL

For and on behalf of British Gypsum.