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The Building Test Centre
Fire Acoustics Structures

Assessment Number **BTC 20231LC**

A structural test assessment on a range of British Gypsum GypWall Quiet SF partitions, incorporating Gypframe RB1 Resilient Bar on one or both sides of partition and with a range of cladding options, if tested in accordance with BS 5234: Part 2: 1992

Assessment Date: 30th August 2017

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 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 GypWall Quiet SF constructions on single frame UltraEMBOSSED Gypframe 70S50 'C' Studs with a range of cladding options and Gypframe RB1 Resilient Bar on one or both sides of the partition as described in Table 1.

British Gypsum GypWall Quiet SF Partitions (double layer)				
Gypframe RB1 Resilient Bar	Board thickness	Board type	Maximum Partition Height (mm)	Unique reference for discussion section
Both sides of partition	15 mm	Gyproc SoundBloc	3200	1
One side of partition	12.5 mm	Gyproc SoundBloc	4000	2
	15 mm	Gyproc SoundBloc	4200	3
		Gyproc FireLine (inner) Gyproc DuraLine (outer)	4200	4
	19 mm (inner) 12.5mm (outer)	Gyproc Plank (inner) Gyproc WallBoard (outer)	3800	5
		Gyproc Plank (inner) Gyproc SoundBloc (outer)	3800	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 72FEC50 Folded Edge Standard 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.

Gypframe 70S50 '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 70S50 'C' Studs positioned between the head and base channel at 600 mm 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 1, at 600 mm centres using 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 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 16 mm thick x 50 mm high timber packer to be fixed at the base of the specimen. The timber packer fixed at 600 mm centres using 35 mm 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 13 mm British Gypsum Wafer Head Screws, two per section.

Door Aperture

The vertical framework at the door opening formed using Gypframe 70S50 'C' Studs. The Gypframe 72FEC50 Folded Edge Standard Floor and Ceiling Channel extended 300 mm beyond the door opening on either side.

Each flange of the extended channel 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 base channel fixed to the aperture using two 1 ¾ “ woodscrews at the door opening and 150 mm adjacent to the first row of fixings. The channel fixed to the jamb stud twice either side using 13 mm British Gypsum Wafer Head Drywall screws.

At the head of the door opening, Gypframe 72FEC50 Folded Edge Standard Floor and Ceiling Channel cut and bent to extend 150 mm down the face of the studs. The channel and door jamb studs 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 sleeved to full door height with Gypframe 72FEC50 Folded Edge Standard Floor and Ceiling Channel section.

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

A doorframe, width dependent on partition type x 38 mm (including stop), fixed into position using two 60 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 fitted using 1 ½" No.10 Countersunk Wood Screws .

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

Cladding

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

Where applicable both layers of board were fixed vertically to the Gypframe RB1 Resilient Bars with joints staggered. For systems comprising Gyproc Plank as the inner layer, the board is positioned vertically and fixed across its width at each bar position using two British Gypsum Screws.

For systems without Gypframe RB1 Resilient Bars on one side, the inner and outer layers are fully fixed vertically to all framing members at 300 mm centres except when the inner layer is 19 mm Gyproc Plank which is fixed horizontally.

Systems comprising double layers of either 12.5 mm or 15 mm thick boards, the inner and outer layers are fixed using 25 mm and 35 mm British Gypsum Drywall Screws respectively.

For systems comprising a 19 mm thick inner layer and a 12.5 mm thick outer layer, fixings are 35 mm and 45 mm British Gypsum Drywall Screws respectively.

Joints

Horizontal joints 3000 mm from the base on the outer layer boards and at 600 mm from the base on the inner layer boards, on both faces of the specimen.

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

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

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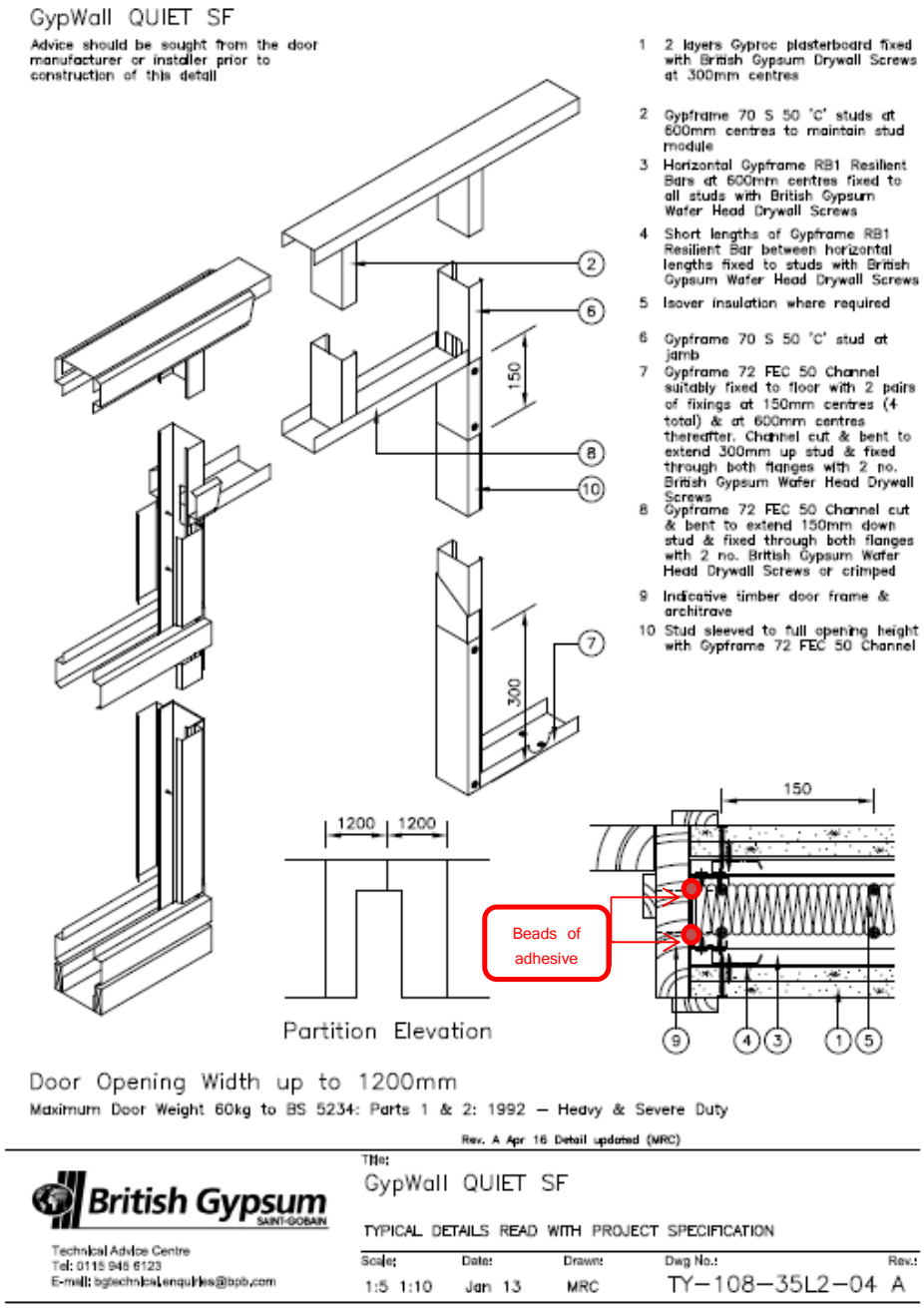

Figure 1. View of partition metal framework and doorframe detail

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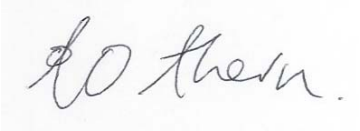
THE ASSESSORS

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 34 & 35). 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 20201S

A STRUCTURAL TEST REPORT COVERING LABORATORY TESTING TO BS 5234 PART 2: 1992, ANNEXES A, B, C, D, E, F & G ON A BRITISH GYPSUM GYPWALL QUIET SF PARTITION CLAD WITH A DOUBLE LAYER OF 12.5MM GYPROC SOUNDBLOC (ULTRAEMBOSSED PROFILES).

TEST CONSTRUCTION

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 900mm 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.

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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 72FEC50 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.

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 72S50 '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 sided 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 boards, on both faces of the specimen.

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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, 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.

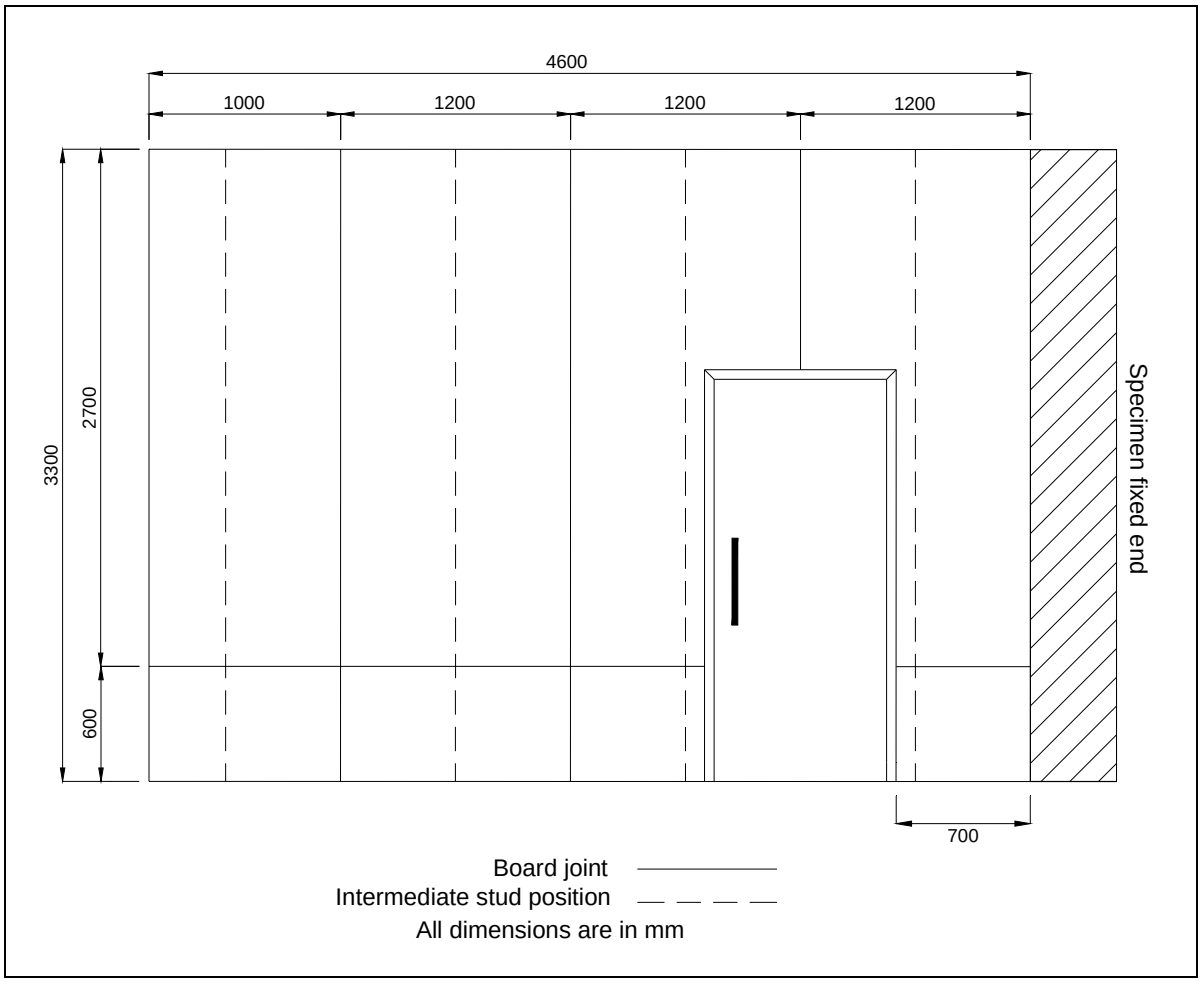

Figure 1. Side A elevation of the partition (inner layer)

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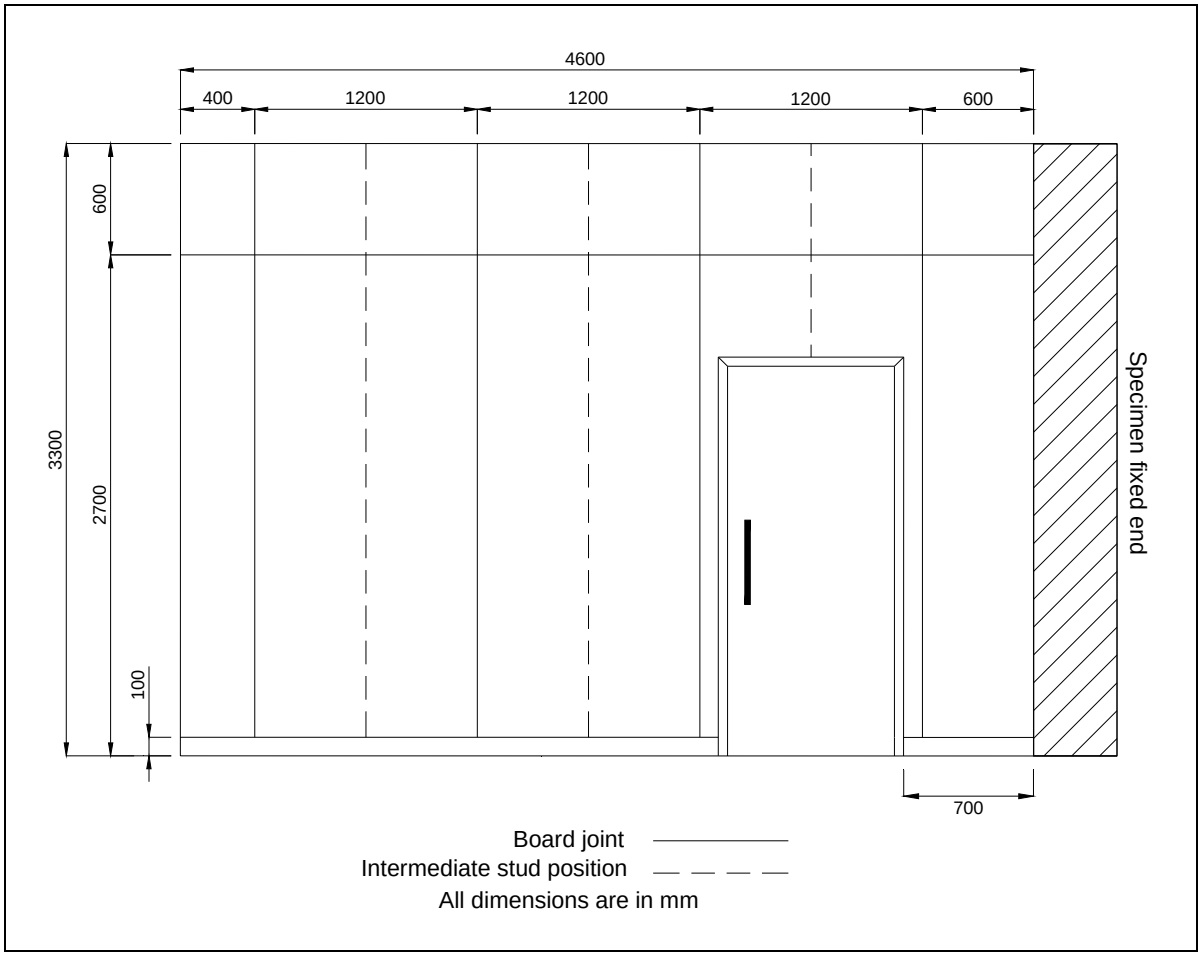

Figure 2. Side A elevation of the partition (outer layer)

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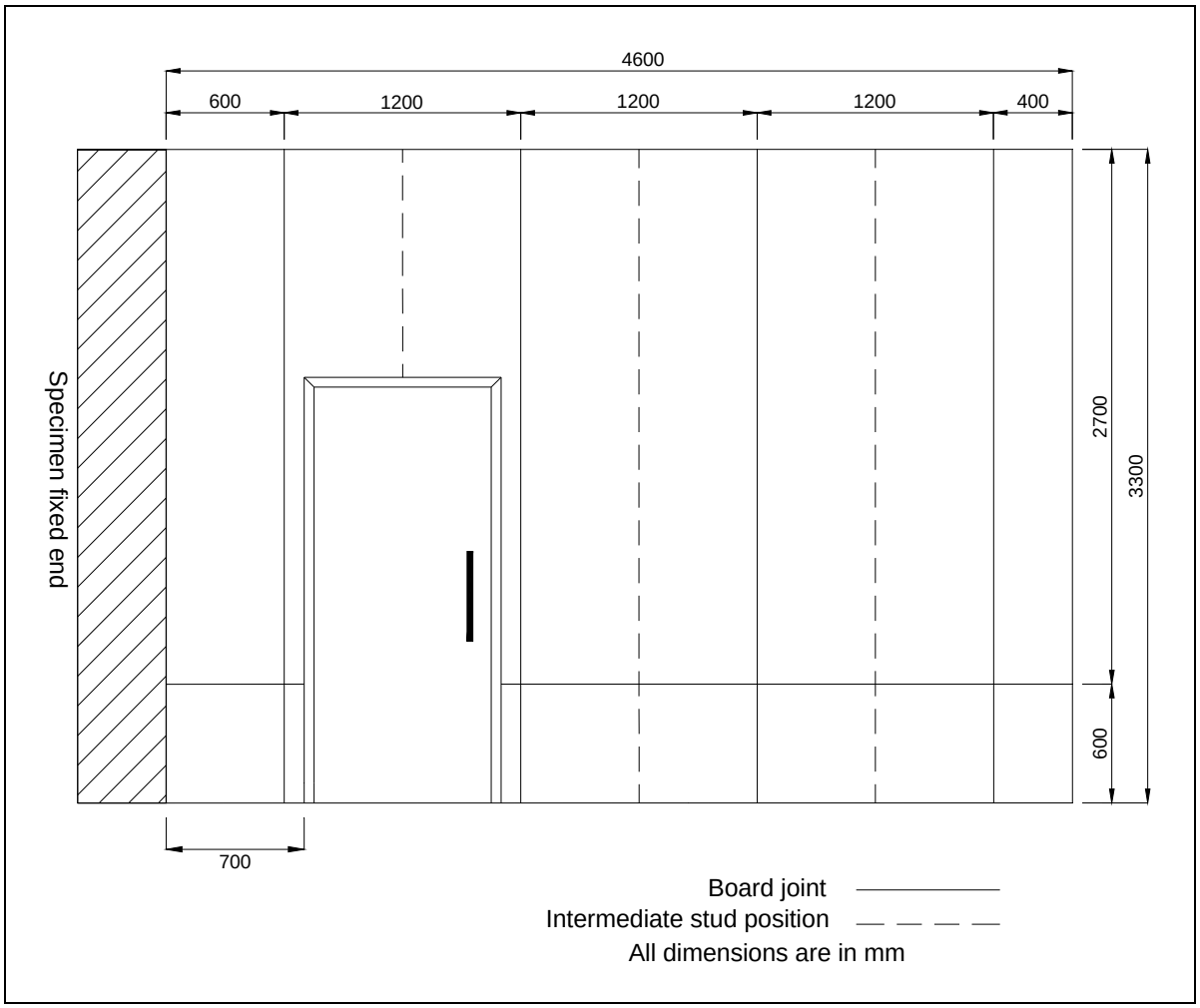

Figure 3. Side B elevation of the partition (inner layer)

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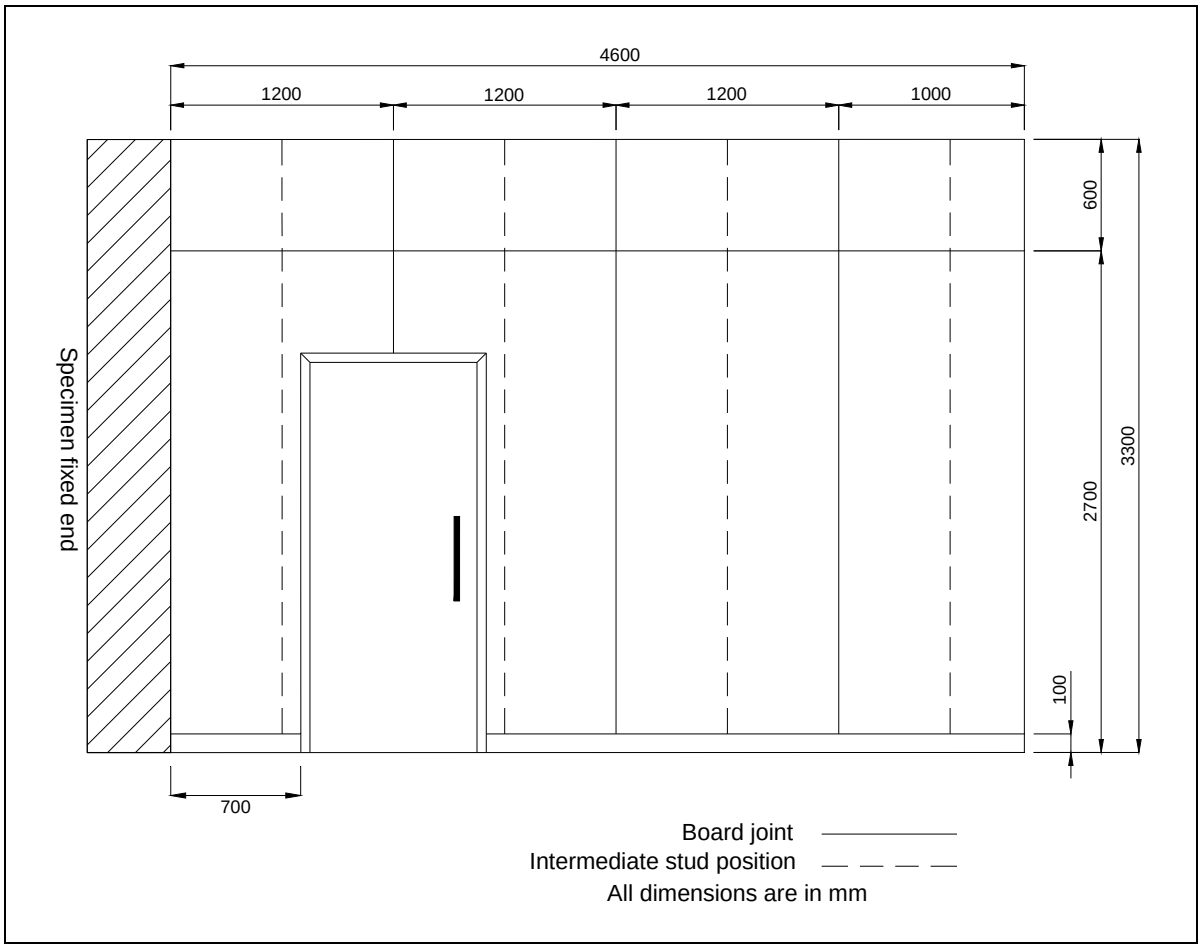

Figure 4. Side B elevation of the partition (outer layer)

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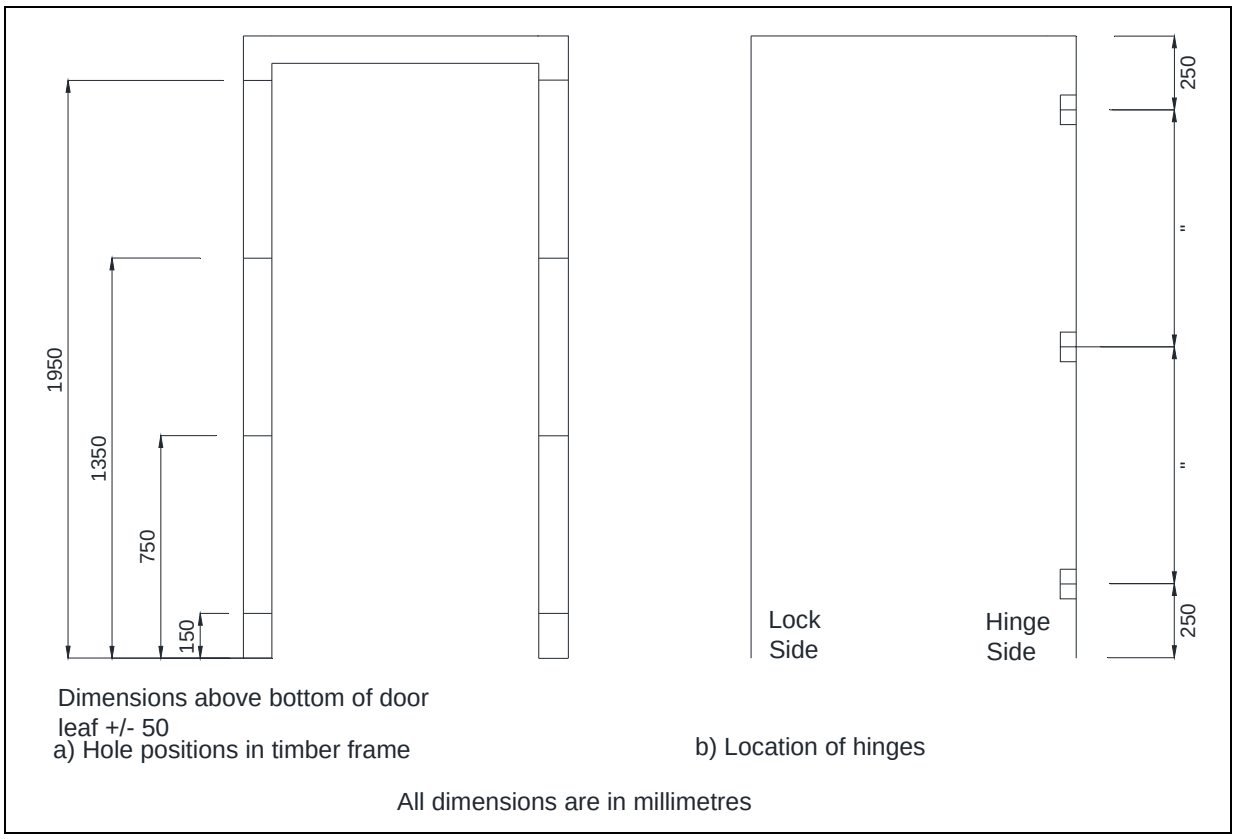

Figure 5. Fixing positions of the door frame

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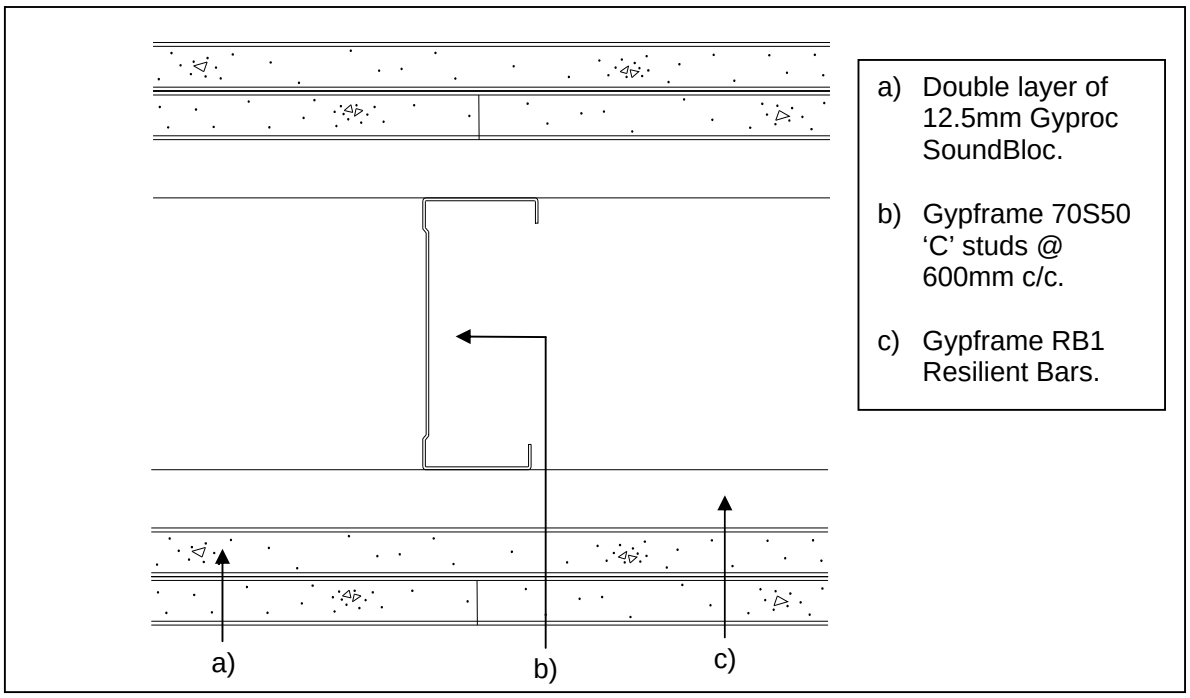

Figure 6. Horizontal cross section view of the partition

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

TEST MATERIALS

Plasterboard

i) Nominally 3000mm (long) x 1200mm (wide) x 12.5mm (thick) Gyproc SoundBloc manufactured by British Gypsum, ex East 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

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

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

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	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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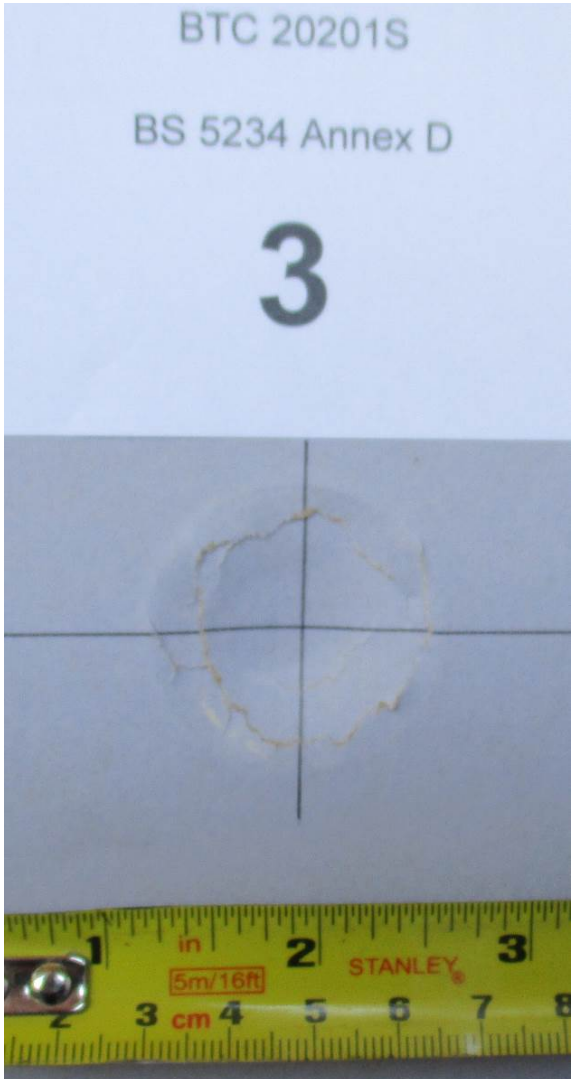

Photograph D.2. Example of damage caused by the Annex D – Determination of resistance to perforation by small hard body impact

The test was carried out in accordance with BS 5234: Part 2: 1992 on the 25th August 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 12.5	25		**15.8**	29	**39.7**	**74**	**157**
2 x 15	30		22	38	52	88	188
12.5 + 19	21.5		8.3	16.8	23.7	45	97

GYPFRAME STUD STIFFNESS CONTRIBUTIONS x 10^9 Nmm^2

GypFrame Stud code	GypFrame Stud spacing (mm)					
	600	600 Boxed	400	400 Boxed	300	300 Boxed
70 S 50	21.20*	29.0	31.8	43.6	42.4	58.0

* Based on test measurements

RESILIENT BAR (GypWall RESILIENT)

…. Using test evidence …., it can be seen that there is very little board contribution to the stiffness when resilient bar is used both sides so consequently the recommended maximum heights are calculated from the frame stiffness alone. When resilient bar is used on one side only it can be seen that the board contribution to stiffness is more evident as the boards are directly fixed to one

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side of the framework. Therefore the recommended maximum heights are calculated from the frame stiffness and half the board stiffness contribution.

BRITISH GYPSUM METAL STUD PARTITIONS/LININGS 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
70 S 50	3200	4000	4200	3800

This Letter of Conformity was last updated 9th August 2017 by the Building Test Centre on behalf of British Gypsum.

BTC 16099S

A STRUCTURAL TEST REPORT COVERING TESTS IN ACCORDANCE WITH BS 5234: PART 2: 1992 ANNEX D ON A 2400mm HIGH BRITISH GYPSUM GYPFRAME 70S50 PARTITION CLAD WITH A DOUBLE LAYER OF 12.5mm GYPROC WALLBOARD.

TEST CONSTRUCTION

A 2400mm high x 2400mm long test specimen constructed with one end of partition fixed to the test rig, and the other remaining free.

Gypframe 72C50 Standard Floor & Ceiling Channels were screw fixed to the head and base of the test aperture using 25mm Gyproc drywall screws spaced at 300mm centres.

Gypframe 70S50 '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 25mm Gyproc drywall screws at 300mm centres and the other end remained free.

Gyproc 70S50 'C' Studs were positioned between the head and base channel at 600mm centres.

The framework was clad both sides with a double layer of 12.5mm Gyproc Wallboard.

The inner layer of boards were screw fixed around the perimeter of the board at 300mm centres using 25mm Gyproc drywall screws.

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The outer layer of boards were screw fixed around the perimeter of the board and the intermediate stud positions at 300mm centres using 36mm Gyproc drywall screws.

All vertical joints were staggered between layers.

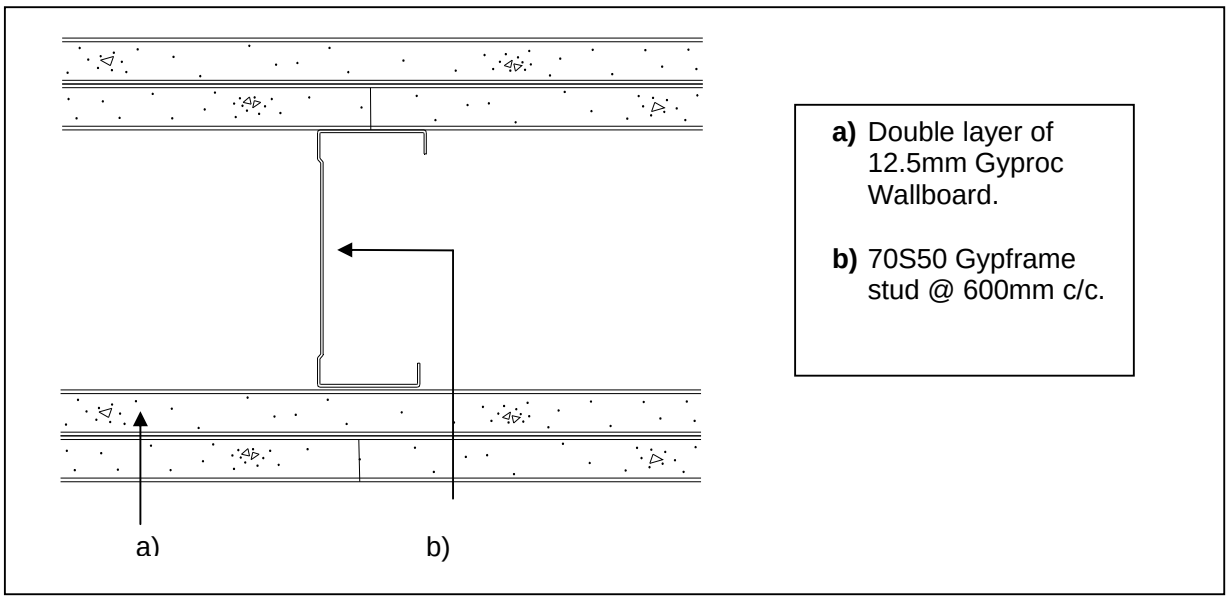

Figure 2. Horizontal cross section view of partition for BTC 16099S.

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

TEST MATERIALS

Plasterboard

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

Actual surface density:	8.54kg/m^2
Actual thickness:	12.57mm
Board identification numbers:	24 305 8 16:36

The surface density and thickness was calculated using the actual weight and size of a selection of the boards used in the test specimen.

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Metal components

i) Gypframe 70S50 'C' Studs.
ii) Gypframe 72C50 Standard floor & ceiling channel

SUMMARY SHEET

SUMMARY OF TESTS ON PARTITION SYSTEM					
Requirement Tested	Test Annex	Performance achieved or Pass/Fail			
		LD	MD	HD	SD
Resistance to Perforation by small hard body impact	D				Pass

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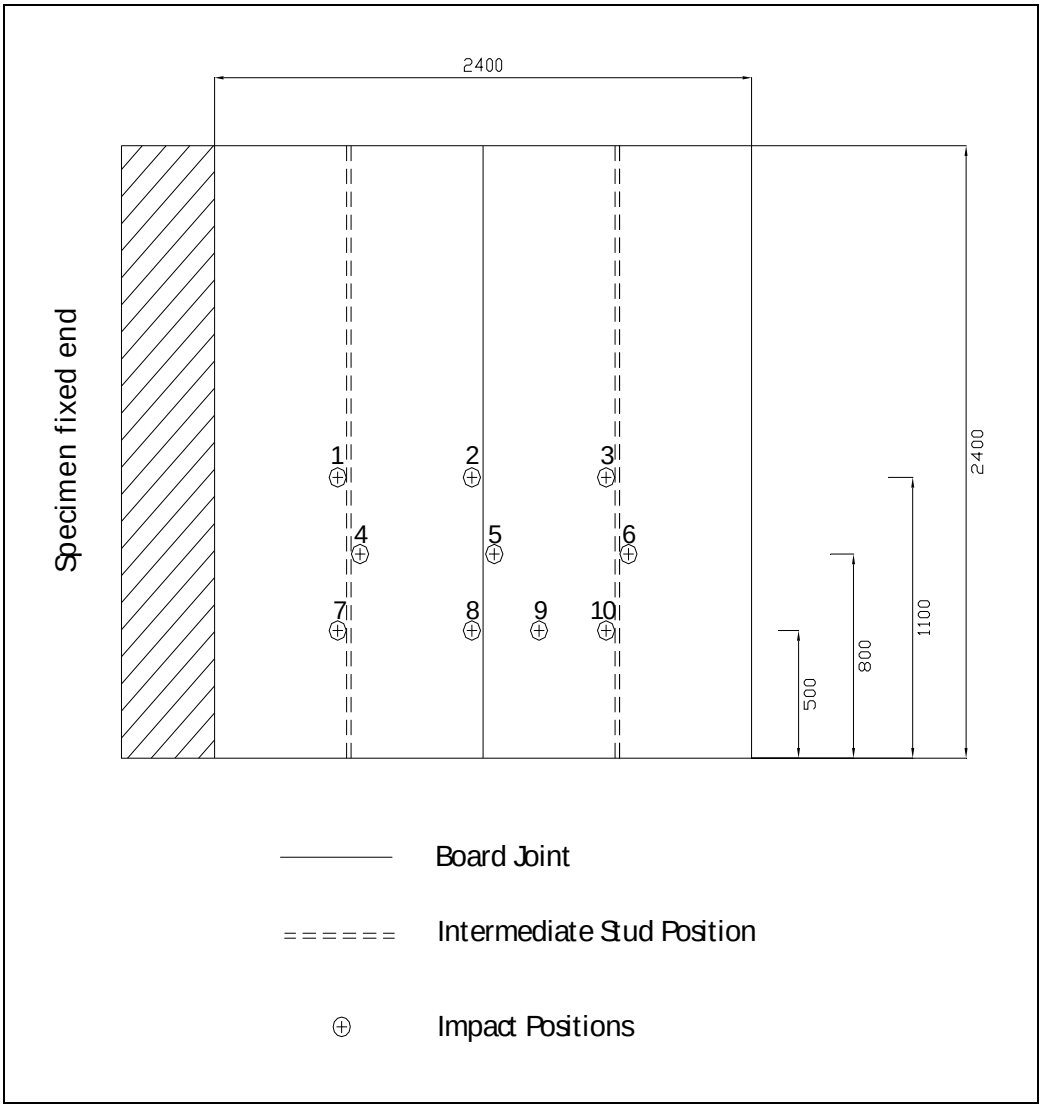

Figure 2. Impact positions for Annex D for BTC 16099S.

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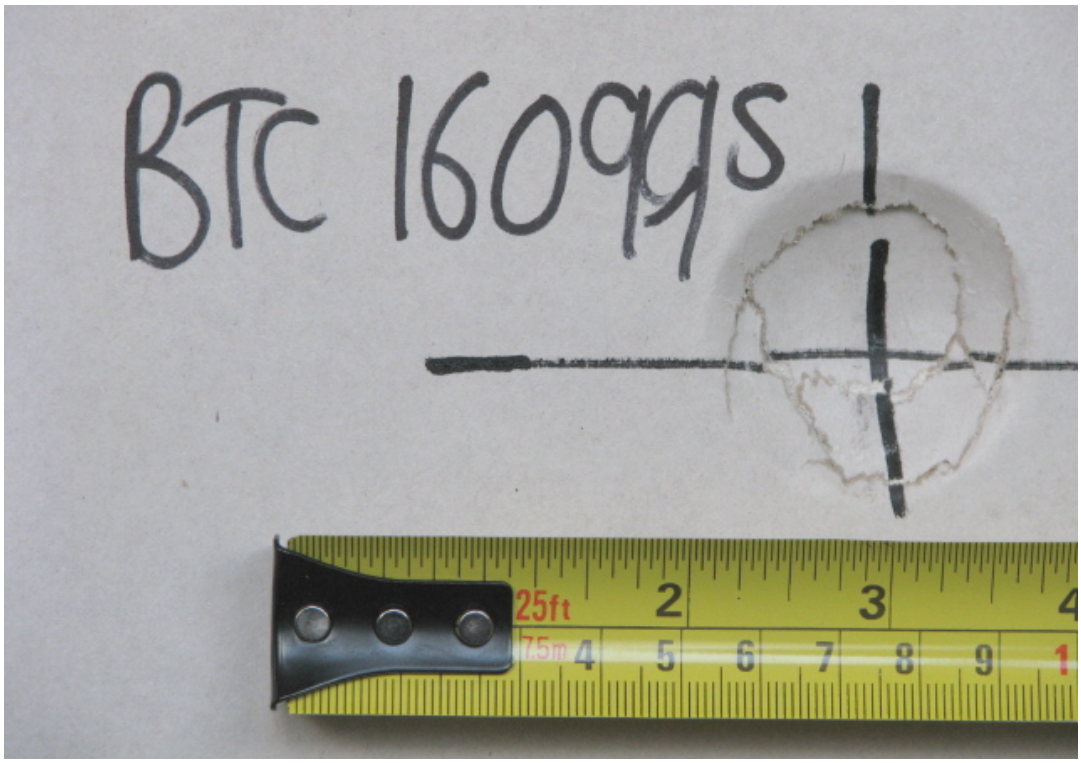

Photograph 2. Example of damage caused by the Annex D test for BTC 16099S.

The test was carried out in accordance with BS 5234: Part 2: 1992 on the 18th November 2008 at the Building Test Centre. The test was carried out 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 SF partitions with Gypframe RB1 Resilient Bar on one or both sides of the partition with a combination of different cladding board type and thickness. Table 2 summarises these construction differences against the construction in Primary Evidence BTC 20201S

Comparison of BTC 20201S against constructions in DETAILS of REQUEST	Unique construction reference from Table 1 (DETAILS of REQUEST)					
	1	2	3	4	5	6
Increase board thickness 12.5 mm to 15 mm	y		y			y
Gypframe RB1 Resilient Bar only on one side		y	y	y	y	y
Replace inner board layer with 19 mm Gyproc Plank				y	y	
Replace outer board layer with Gyproc WallBoard of same thickness				y		
Replace inner board layer with Gyproc FireLine & outer board layer with Gyproc DuraLine						y
Increase in Maximum Partition Height		+0.7m	+0.9m	+0.5m	+0.5m	+0.9m

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 20201S):

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 20201S against constructions in DETAILS of REQUEST	Comment on likely effect on structural performance
Increase board thickness 12.5 mm to 15 mm	According to BTC 12321LC increasing board thickness will not downgrade partition stiffness.
Gypframe RB1 Resilient Bar only on one side	According to BTC 12321LC, removing Gypframe RB1 Resilient Bar from one side of the partition is likely to increase the partition stiffness due to boards being able to direct fix to the studwork.
Replace inner board layer with 19 mm Gyproc Plank	According to BTC 12321LC, replacing an inner layer of 12.5 mm board with 19 mm Gyproc Plank is likely to decrease the board stiffness contribution due to the reduce width & orientation of the board. In BTC 12321LC this reduction is estimated to be approx. 16 x 10^9 Nmm^2 when replaced inner layer is 12.5 mm Gyproc WallBoard. In this case the replaced board is 12.5 mm Gyproc SoundBloc, which has increased density. So the reduction in board stiffness contribution may be slightly more than stated above. It is our opinion that, in this case, replacement of inner board layer is unlikely to significantly downgrade partition stiffness as it only occurs when partition stiffness has been improved by removing Gypframe RB1 Resilient Bar from one side of the partition and this has been considered in the proposed maximum height.

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Replace outer board layer with Gyproc WallBoard of same thickness	As stated above, Gyproc WallBoard is likely to have reduced board stiffness contribution compared to Gyproc SoundBloc of same thickness. It is our opinion that, in this case, replacement of outer board layer is unlikely to significantly downgrade partition stiffness as it only occurs when partition stiffness has been improved by removing Gypframe RB1 Resilient Bar from one side of the partition and this has been considered in the proposed maximum height.
Replace inner board layer with Gyproc FireLine & outer board layer with DuraLine	Replacement of boards will not downgrade partition stiffness as both layers are increased to 15 mm thick and are value-added boards with glass fibres within the core.
Increase in Maximum Partition Height: *+0.7m - remove res bar from one side (construction 2)* *+ 0.5m - include inner layer plank & res bar on one side only (constructions 4 & 5)* *+0.9m - increase board thickness & res bar on one side only (constructions 3 & 6)*	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 12321LC , so we consider that this will not downgrade performance. All height increases proposed occur when Gypframe RB1 Resilient Bar is only installed on one side of the partition, so direct fix cladding on one side of the partition would improve partition stiffness. Partition stiffness would be further improved when board stiffness contribution is increased due to board thickness. The improvement from removing the Gypframe RB1 Resilient Bar is estimated to be reduced slightly when inner layer of board is replaced with 19 mm Gyproc Plank as the board width is reduced to 600 mm and boards are placed in horizontal orientation.

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.

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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.

Primary evidence (BTC 20201S):

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 20201S against constructions in DETAILS of REQUEST	Comment on likely effect on structural performance
Increase board thickness 12.5 mm to 15 mm	Increasing board thickness will not downgrade resistance to perforation
Gypframe RB1 Resilient Bar only on one side	According to BTC 12321LC, removing Gypframe RB1 Resilient Bar from one side of the partition is likely to increase the partition stiffness due to boards being able to direct fix to the studwork, if extreme this has a potential to reduce the resistance to perforation performance. From inspection of BTC 16099S we are of the opinion that a double layer of 12.5 mm Gyproc WallBoard direct fixed on both sides to 70 mm UltraSTEEL 'C' studs comfortably pass the Annex D test with no borderline results. Similarly for BTC 20201S where Gypframe RB1 Resilient Bar is used on both sides of the partition. Partition stiffness of proposed construction would be reduced from BTC 16099S due to Resilient Bar installed on one side of the partition, but would also be increased by changing to 12.5 mm Gyproc SoundBloc, which has higher density, and use of UltraEMBOSSED studs with increased moment of inertia. In our opinion, given the comfortable performance in both BTC 16099S & 20201S, we believe the changes in partition stiffness are unlikely to result in full perforation.

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Replace inner board layer with 19 mm Gyproc Plank	Replacement of inner board layer will not downgrade resistance to perforation as increased board thickness.
Replace outer board layer with Gyproc WallBoard of same thickness	Replacement of outer board layer is unlikely to downgrade resistance to perforation as it only occurs with inner layer of 19 mm Gyproc Plank
Replace inner board layer with Gyproc FireLine & outer board layer with DuraLine	Replacement of boards will not downgrade resistance to perforation as both layers are increased to 15 mm thick and are value-added boards with glass fibres within the core.
Increase in Maximum Partition Height: *+0.7m - remove res bar from one side (construction 2)* *+ 0.5m - include inner layer plank & res bar on one side only (constructions 4 & 5)* *+0.9m - increase board thickness & res bar on one side only (constructions 3 & 6)*	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 12321LC and only occur when Gypframe RB1 Resilient Bar is only installed to one side of the partition, improving partition stiffness. It is reasonable to assume that in these cases the proposed height increases would not 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.

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 20201S):

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.

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Comparison of BTC 20201S against constructions in DETAILS of REQUEST	Comment on likely effect on structural performance
Increase board thickness 12.5 mm to 15 mm	According to BTC 12321LC increasing board thickness is likely to improve the partition stiffness slightly. This would not downgrade maximum or residual deflections, and is not considered significant enough to affect damage if built correctly.
Gypframe RB1 Resilient Bar only on one side	According to BTC 12321LC, removing Gypframe RB1 Resilient Bar from one side of the partition is likely to increase the partition stiffness due to boards being able to direct fix to the studwork. This would not downgrade maximum or residual deflections, and is not considered significant enough to affect damage if built correctly.
Replace inner board layer with 19 mm Gyproc Plank	While replacement of inner layer is likely to downgrade partition stiffness slightly, it only occurs when partition stiffness is increased by removing Gypframe RB1 Resilient Bar from one side of partition so in our opinion could be considered negligible and unlikely to significantly affect the maximum & residual deflections
Replace outer board layer with Gyproc WallBoard of same thickness	Gyproc WallBoard is likely to have reduced board stiffness contribution compared to Gyproc SoundBloc of same thickness which has increased density. It is our opinion that, in this case, replacement of outer board layer is unlikely to significantly downgrade door slam performance as it only occurs when partition stiffness has been improved by removing Gypframe RB1 Resilient Bar from one side of the partition, and in our opinion could be considered negligible and unlikely to significantly affect the maximum & residual deflections
Replace inner board layer with Gyproc FireLine & outer board layer with DuraLine	Replacement of boards will not downgrade door slam performance as both layers are increased to 15 mm thick and are value-added boards, so partition stiffness not likely to change significantly

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Increase in Maximum Partition Height: *+0.7m - remove res bar from one side (construction 2)* *+ 0.5m - include inner layer plank & res bar on one side only (constructions 4 & 5)* *+0.9m - increase board thickness & res bar on one side only (constructions 3 & 6)*	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 12321LC, so we consider that this will not downgrade partition stiffness performance. All height increases proposed occur when Gypframe RB1 Resilient Bar is only installed on one side of the partition, so direct fix cladding on one side of the partition would improve partition stiffness. Partition stiffness would be further improved when board stiffness contribution is increased due to board thickness. The improvement from removing the Gypframe RB1 Resilient Bar is estimated to be reduced slightly when inner layer of board is replaced with 19 mm Gyproc Plank as the board width is reduced to 600 mm and boards are placed in horizontal orientation. While there may be an overall increase in partition stiffness for some of the proposed constructions; in our opinion this would not downgrade maximum or residual deflections, and is not considered significant enough to affect damage if built 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 SF double layer partitions with Gypframe RB1 Resilient Bar on one or both sides and with current range of 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.

The Building Test Centre
Fire Acoustics Structures

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AUTHORITY FOR USE OF TEST EVIDENCE

Test Report Numbers: BTC 20201S, BTC 12321LC, BTC 16099S

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 GypWall Quiet SF partitions, incorporating Gypframe RB1 Resilient Bar on one or both sides of partition and with a range of 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**