The Building Test Centre

Fire Acoustics Structures

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Report Number **BTC 18395S**

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

Test Dates: 13th & 14th August 2013

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

UKAS TESTING
0296

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FOREWORD

The test sponsor was British Gypsum.

The test specimen was installed by John Gwynne and Karl Negus between the 8th and 9th August 2013.

The Building Test Centre played no role in the design or selection of the materials comprising the test specimen.

REPORT AUTHORISATION

Report Author	Authorised by
Paul Adams Bsc *Scientist*	**Christopher Mutton** M.Phys Dip Math MInstP AMIMA *Supervisor*

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TEST CONSTRUCTION

A 3000mm 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 50FEC50 Folded Edge Standard Floor and Ceiling Channels were screw fixed to the head and base of the test aperture using 32mm Gyproc Drywall Timber Screws spaced at 600mm centres incorporating a 900 mm opening for the door set.

Gypframe 48S50 '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 32mm Gyproc Drywall Timber Screws at 600mm centres and the other end remained free.

Gypframe 48S50 'C' Studs were positioned between the head and base channel at 600mm centres.

The vertical framework at the door opening was formed using Gypframe 48S50 'C' Studs. The Gypframe 50FEC50 Folded Edge Standard Floor and Ceiling Channel was extended 300mm beyond the door opening on either side.

Each flange of the extended channel was cut at the jamb position and the 300mm over run was bent up through 90^{o} to cover the bottom of the jamb stud. The base channel was fixed to the aperture using two No.10 50mm round head 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 Gypframe Wafer Head Drywall screws.

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

A doorframe, 50mm x 38mm (including stop), was fixed into position using two 75mm Gyproc Drywall Screws at each point 150mm from the bottom of the casing and at 600mm centres thereafter.

A Heavy Duty door was fitted using 1½“ No.10 wood screws.

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The framework was clad with a single layer of 15mm Gyproc SoundBloc F each side.

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

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

A softwood architrave, 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.

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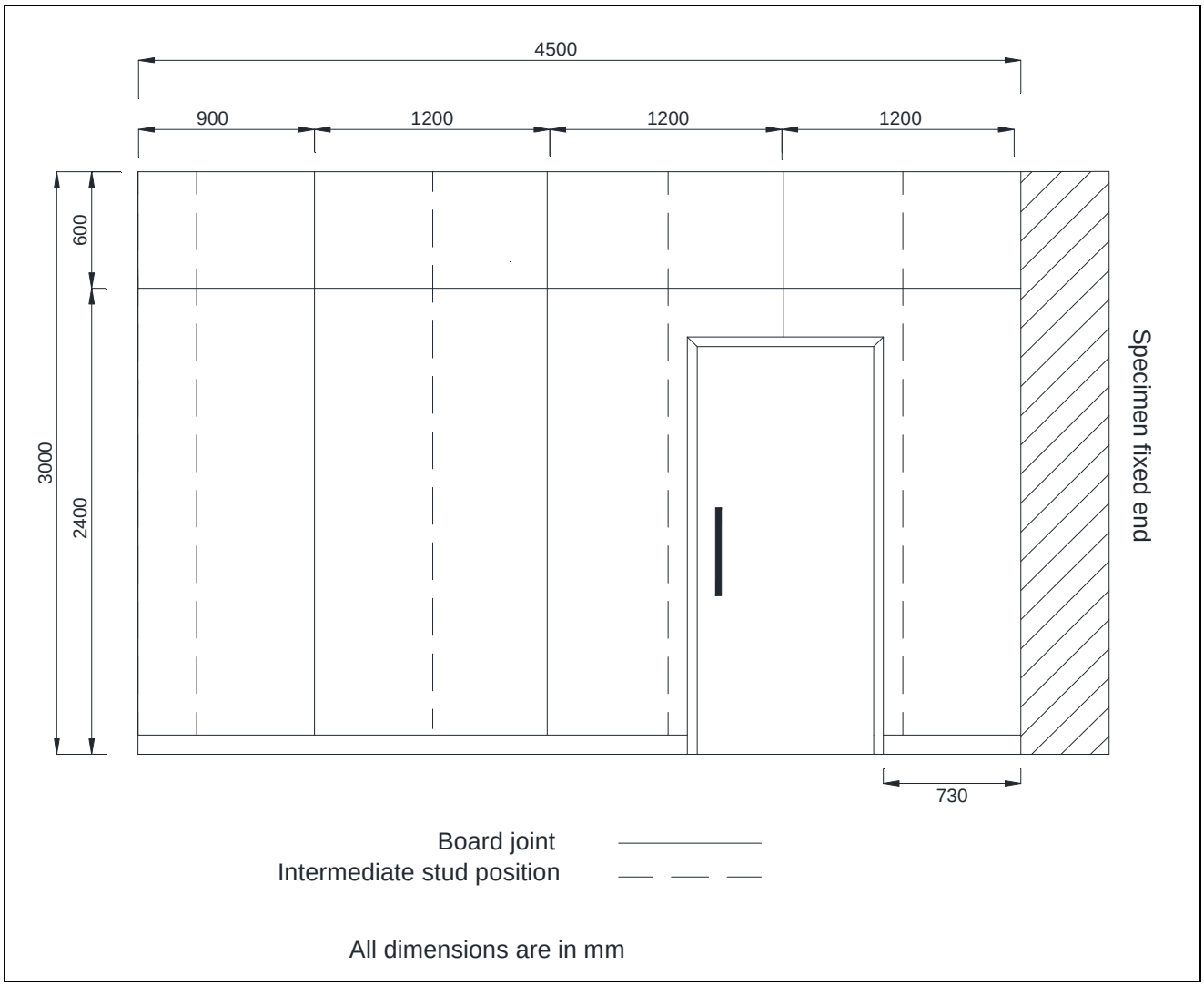

Figure 1. Side A elevation of the partition

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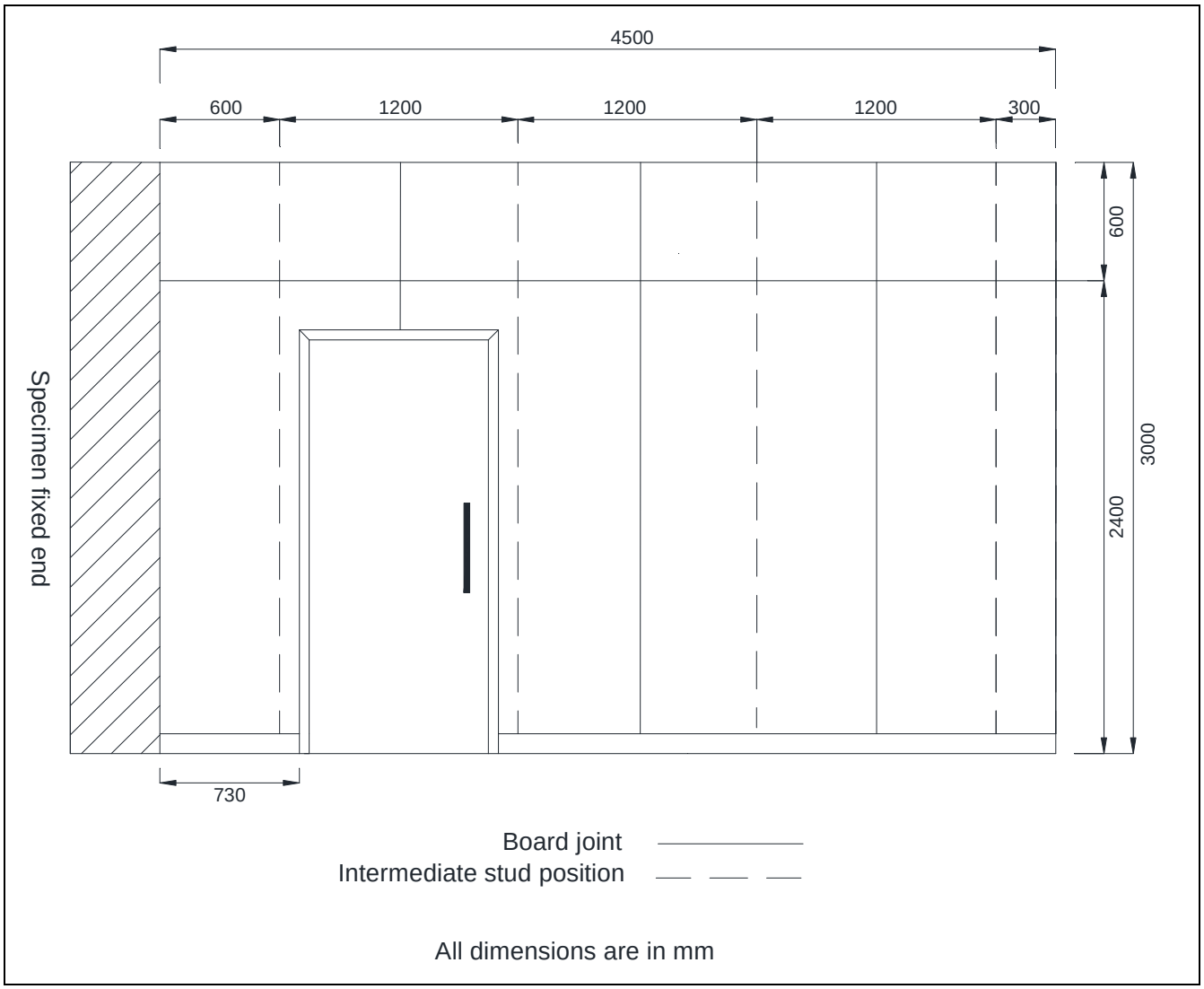

Figure 2. Side B elevation of the partition

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Figure 3 Fixing positions of the door frame

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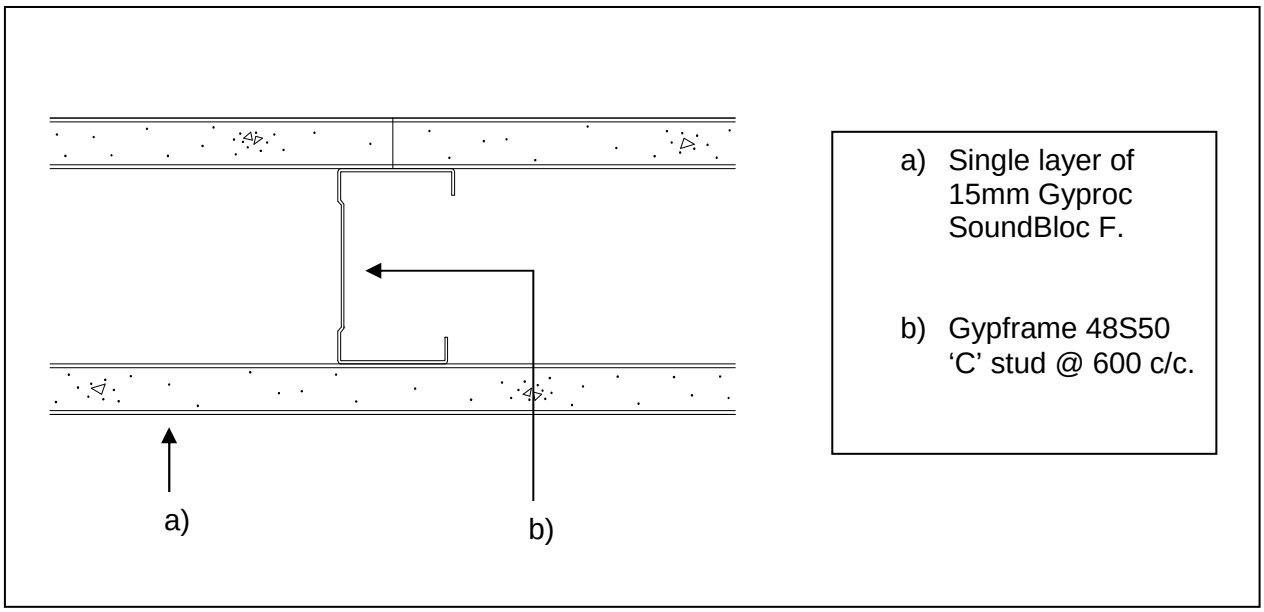

Figure 4. Horizontal cross section view of the partition.

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

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TEST MATERIALS

Plasterboard

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

Surface density:	13.4 kg/m^2
Average thickness:	15.3 mm
Board Code:	26 207 13 11:41

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

All material dimensions supplied by British Gypsum.

Frame components

i) Gypframe 48S50 'C' Studs
ii) Gypframe 50FEC50 Folded edge standard floor & ceiling channel

All Frame components supplied by British Gypsum.

Fasteners

i) 13mm Gyproc wafer head screws
ii) 32mm Gyproc drywall timber screws
iii) 25mm Gyproc drywall Drywall screws
iv) 75mm Gyproc drywall screws
v) 50 mm bright oval nails
vi) 1½" No.10 wood screws
vii) No.10 50mm round head wood screws

All fasteners supplied by The Building Test Centre.

Door components

i) 60kg Heavy duty door
ii) Doorframe, 50mm x 38mm (including stop)
iii) Softwood architrave, 45mm x 18mm

All door components supplied by The Building Test Centre.

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Miscellaneous components

i) Gyproc Joint Tape
ii) Gyproc Joint Filler
iii) 45mm x 18mm bull nose softwood skirting board

All Miscellaneous components supplied by British Gypsum.

Where measurements could not be taken, then weight and dimensions were provided by the customer or the manufacturer e.g. from material labelling. Material information was recorded according to procedure MAT/1.

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ENVIRONMENTAL CONDITIONS

Environmental conditions during installation and testing:

Date range	8th – 14th July 2013
Temperature range	19.4 – 19.9 °C
Relative Humidity range	54.4 – 67.4 %

The specimen should be installed, conditioned and tested in an atmosphere between 10°C and 30°C and between 30% and 75% relative humidity.

TEST RESULT

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

LIMITATIONS

The results only relate to the behaviour of the specimen of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential structural performance of the element in use.

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TEST SEQUENCE AND SUMMARY SHEET

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	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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OPTIONAL TESTS ON PARTITION SYSTEM		
Requirement Tested	Test Annex	Performance achieved
Determination of resistance to crowd pressure	G	1.5 kN/m

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APPENDIX A - TEST DATA

Annex A – Determination of partition stiffness (between studs)

Test Date: 13th August 2013

Test Code: BTC 18395/A/1/S

Test Procedure: AP071 vs 1.0

Conditions: Temperature: 19.8°C
Relative Humidity: 61.5%

TEST DATA		
Load (N)	Deflection (mm)	Observations
0	0	No visible damage
100	1.20	No visible damage
200	2.92	No visible damage
300	4.95	No visible damage
400	7.22	No visible damage
500	9.54	No visible damage
Max. Deflection	9.54	-
Residual Deformation	1.32	After 5 minutes

Further details are available from The Building Test Centre.

For details of load positions refer to figure A.1.

For details of the test apparatus used refer to figure A.2.

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Annex A – Determination of partition stiffness (on stud)

Test Date: 13th August 2013

Test Code: BTC 18395/A/2/S

Test Procedure: AP071 vs 1.0

Conditions: Temperature: 19.8°C
Relative Humidity: 61.5%

TEST DATA		
Load (N)	Deflection (mm)	Observations
0	0	No visible damage
100	1.37	No visible damage
200	2.91	No visible damage
300	4.84	No visible damage
400	7.55	No visible damage
500	9.59	No visible damage
Max. Deflection	9.59	-
Residual Deformation	0.55	After 5 minutes

Further details are available from The Building Test Centre.

For details of load positions refer to figure A.1.

For details of the test apparatus used refer to figure A.2.

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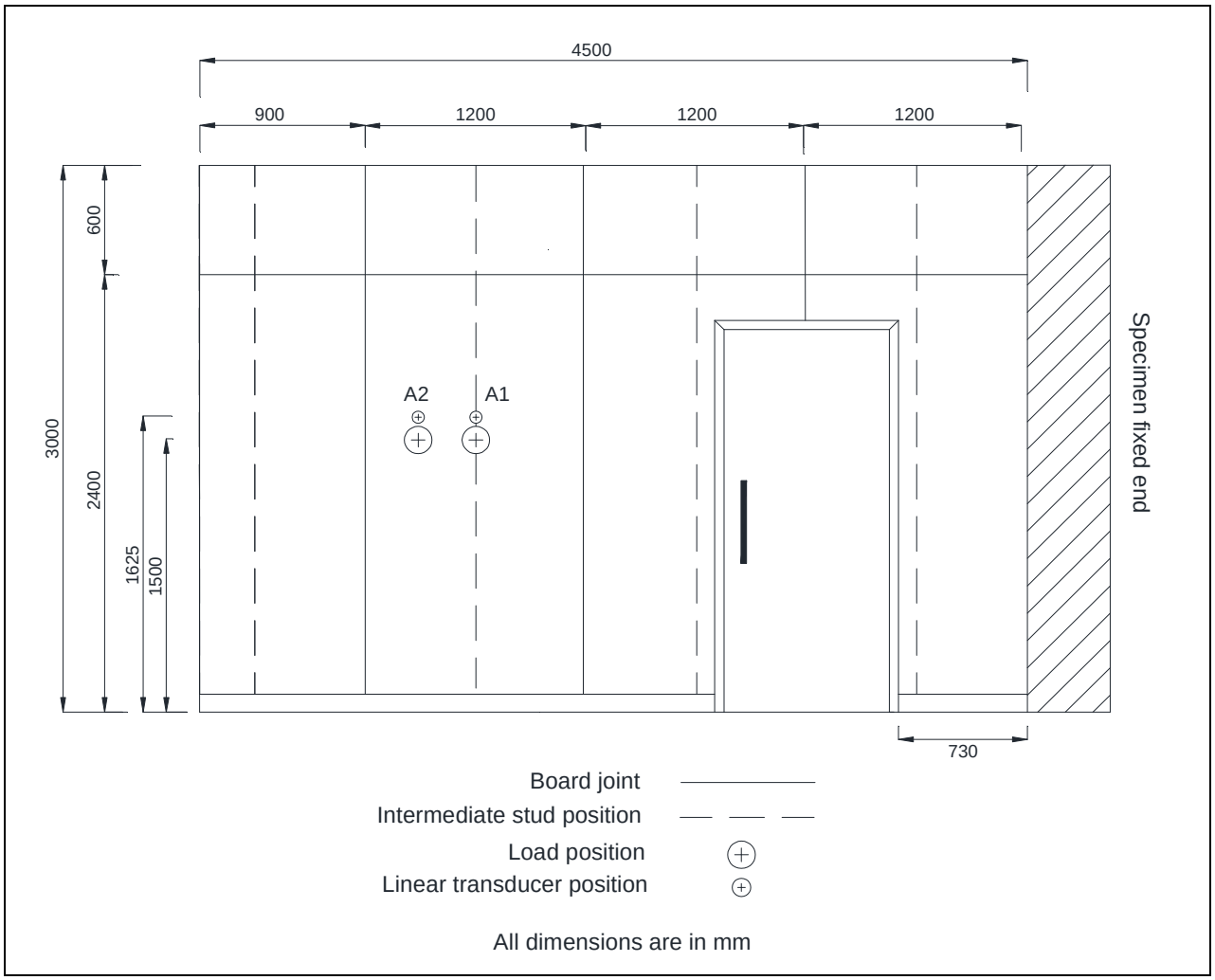

Figure A.1. Load positions for Annex A – Determination of partition stiffness (Side A)

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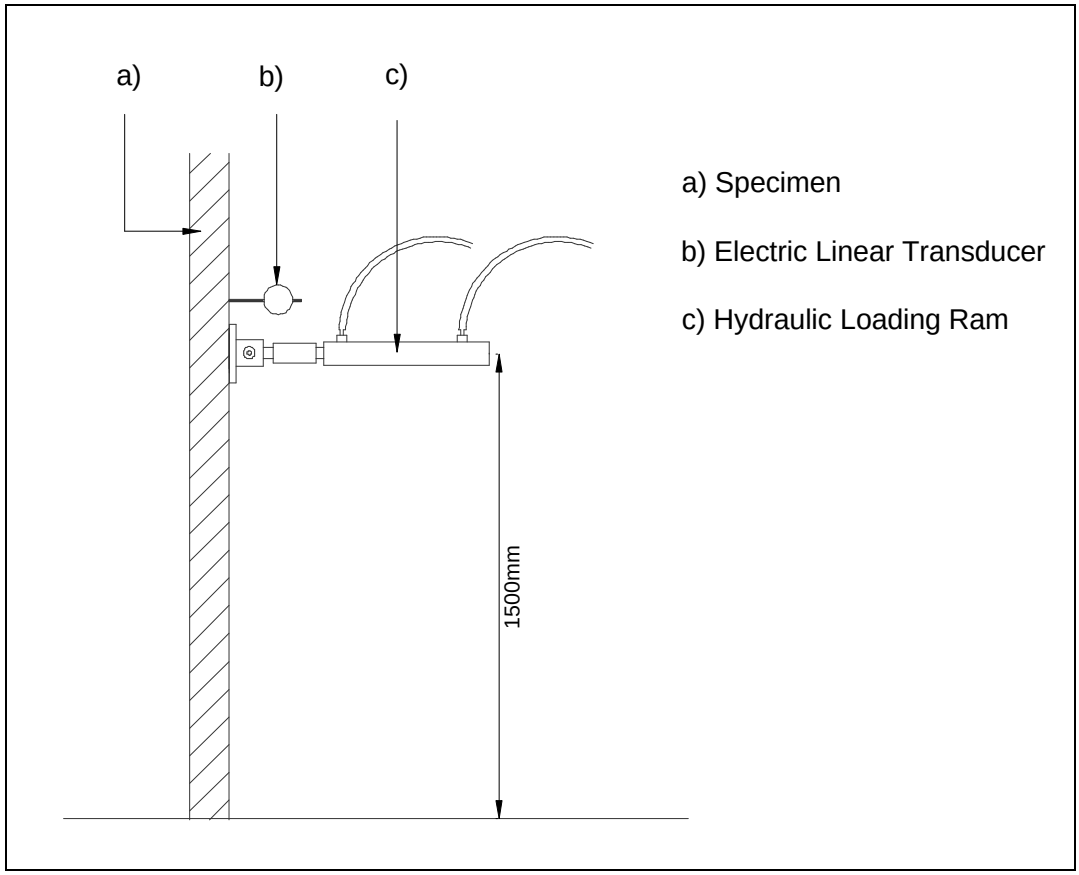

Figure A.2. Apparatus for Annex A - Determination of partition stiffness

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Annex B – Determination of surface damage by small hard body impact

Test Date: 13th August 2013

Test Code: BTC 18395/B/S

Test Procedure: AP072 vs 1.0

Impact Energy: 6Nm

Conditions: Temperature: 19.6°C
Relative Humidity: 62.9%

TEST DATA				
	Positions			
Indent No.	X (mm)	Y (mm)	Indent Depth (mm)	Damage
1	1750	800	2.06	Small indent
2	1800	800	0.78	Small indent
3	1850	800	0.42	Small indent
4	1900	800	0.10	Small indent
5	2000	800	0.18	Small indent
6	2100	800	0.21	Small indent
7	2200	800	0.30	Small indent
8	2350	800	1.12	Small indent
9	2400	800	0.67	Small indent
10	2450	800	0.95	Small indent

Further details are available from The Building Test Centre.

For details of impact positions refer to figure B.1 and photograph B.1.

For details of the damage caused by the test refer to photograph B.2.

For details of the test apparatus used refer to figure B.2.

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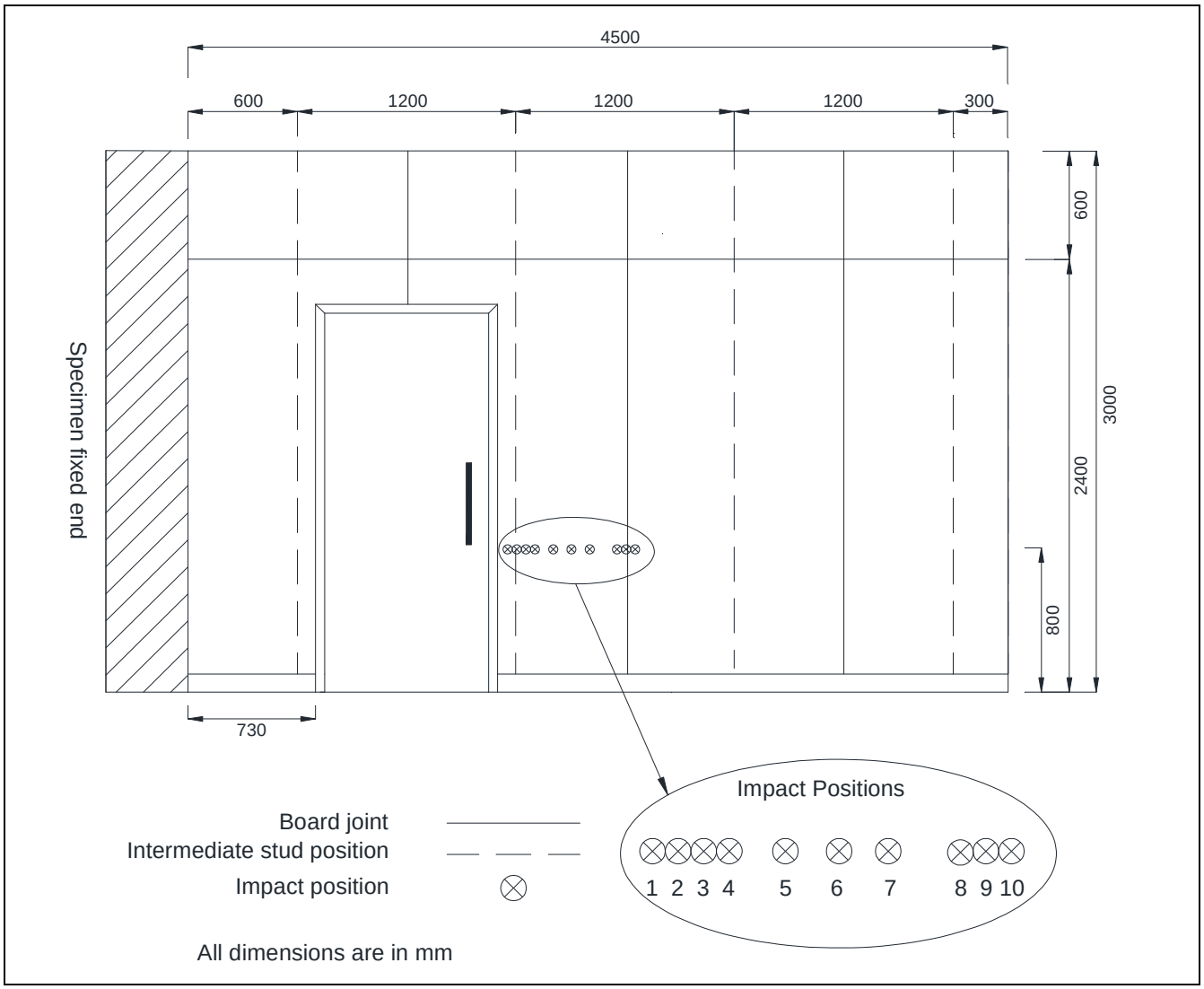

Figure B.1. Impact positions for Annex B - Determination of surface damage by small hard body impact (Side B)

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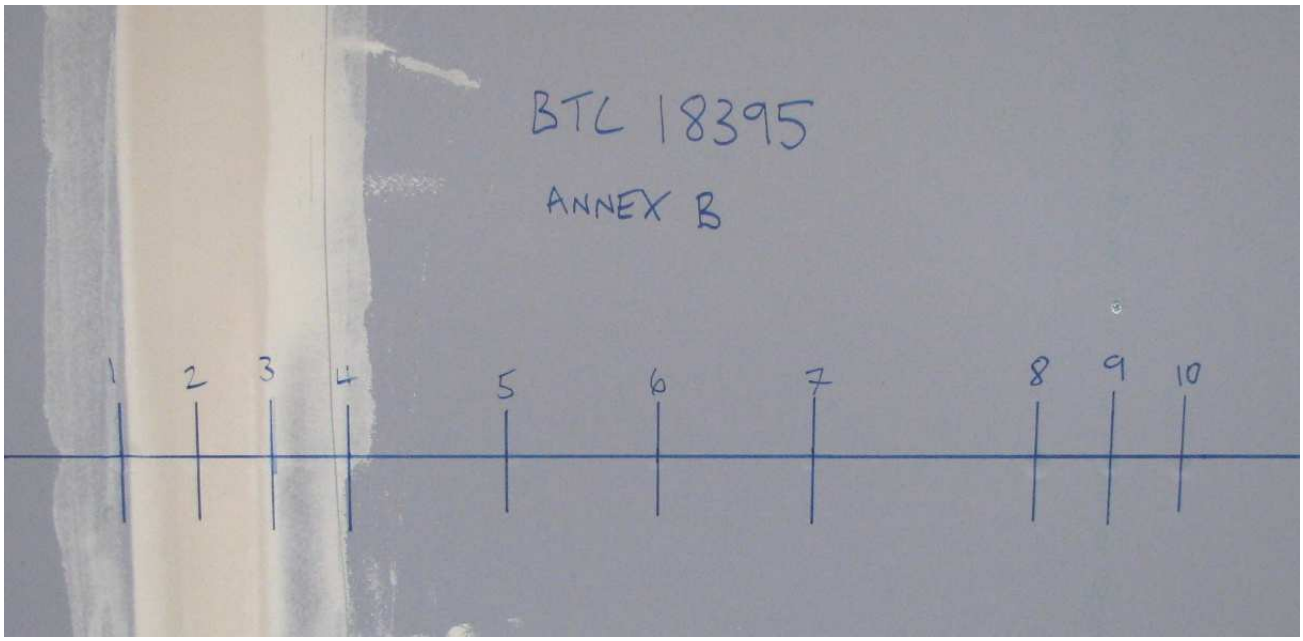

Photograph B.1. Specimen at the end of Annex B - Determination of surface damage by small hard body impact

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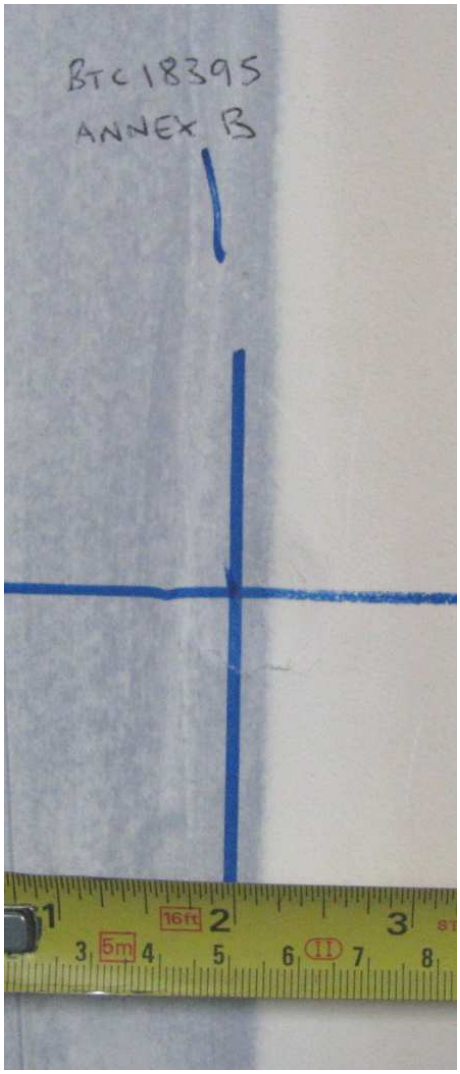

Photograph B.2. Example of damage caused by the Annex B Determination of surface damage by small hard body impact

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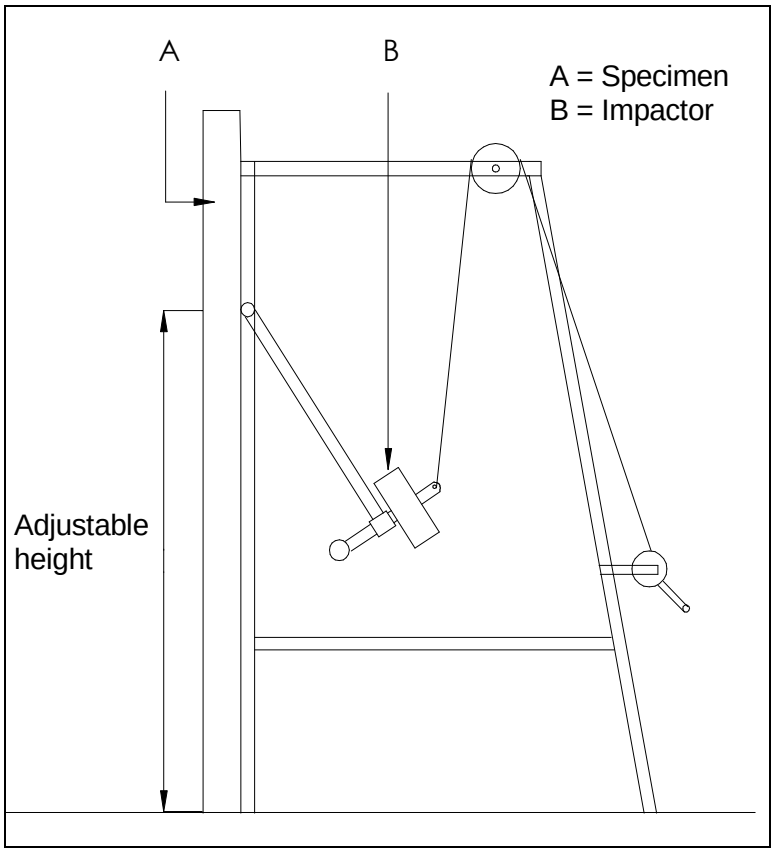

Figure B.2. Apparatus used for small hard body impact test.

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Annex C – Resistance to damage by impact from a large soft body (between studs)

Test Date: 13th August 2013

Test Code: BTC 18395/C/1/S

Test Procedure: AP073 vs 5.0

Impact Energy: 40Nm

Conditions: Temperature: 19.6°C
Relative Humidity: 67.4%

Impact Energy (Nm)	Permanent Deformation (mm)	Damage
40	0.14	No visible damage

Further details are available from The Building Test Centre.

For details of impact positions refer to figure C.1.

For details of the test apparatus used refer to figure C.2.

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Annex C – Resistance to damage by impact from a large soft body (on stud)

Test Date: 13th August 2013

Test Code: BTC 18395/C/2/S

Test Procedure: AP073 vs 5.0

Impact Energy: 40Nm

Conditions: Temperature: 19.6°C
Relative Humidity: 67.4%

Impact Energy (Nm)	Permanent Deformation (mm)	Damage
40	0.21	No visible damage

Further details are available from The Building Test Centre.

For details of impact positions refer to figure C.1.

For details of the test apparatus used refer to figure C.2.

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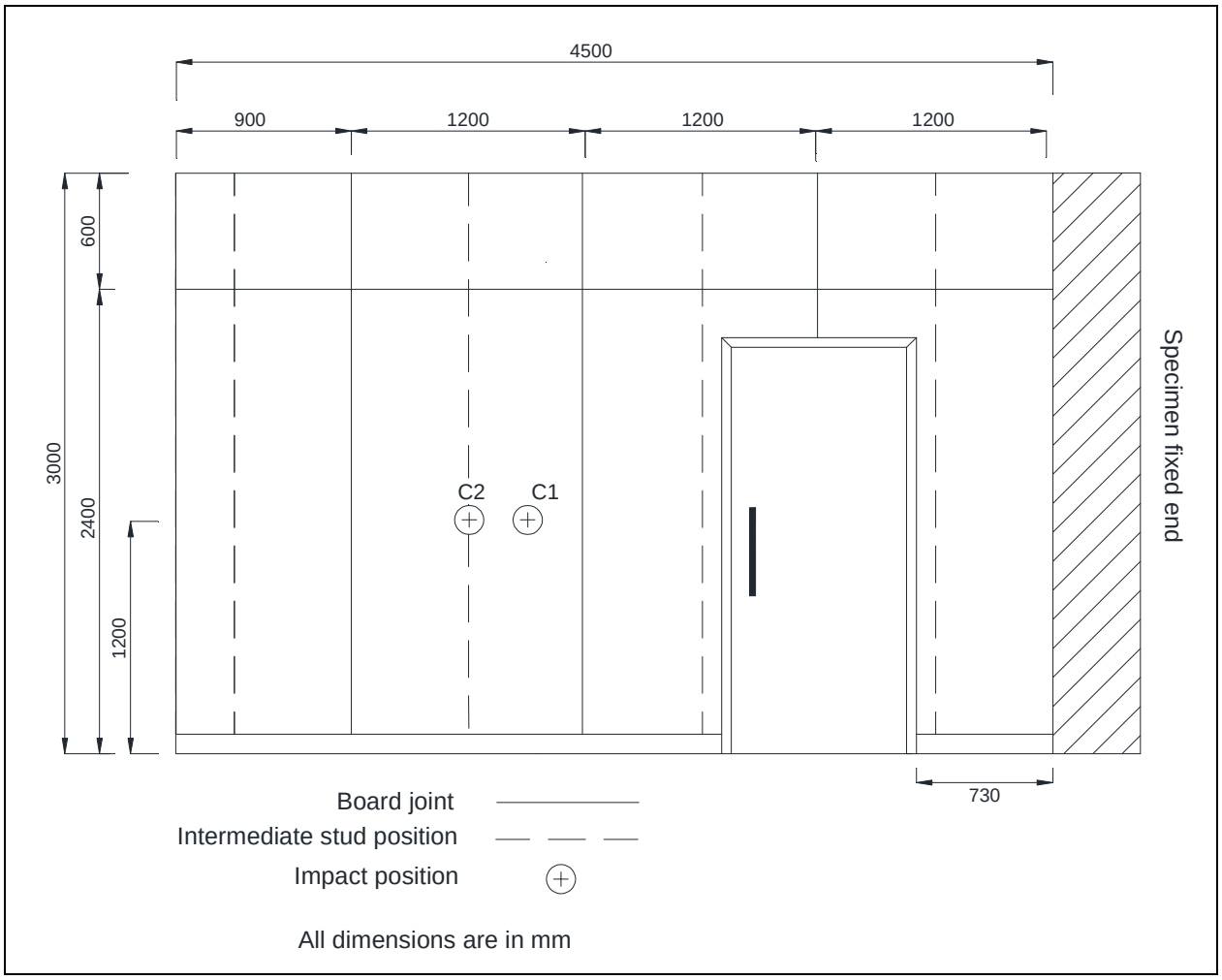

Figure C.1. Impact positions of Annex C - Resistance to damage by impact from a large soft Body (Side A)

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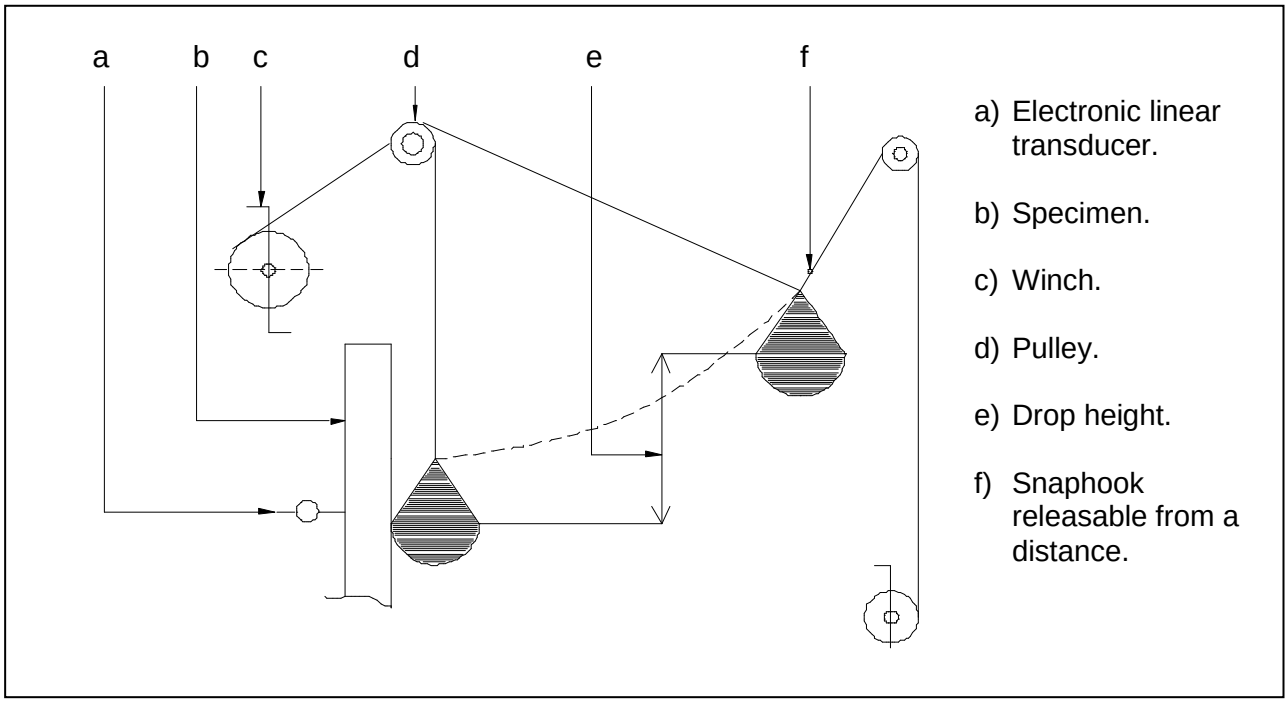

Figure C.2 Apparatus for large soft body impact test

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

Test Date: 13th August 2013

Test Code: BTC 18395/D/S

Test Procedure: AP074 vs 1.0

Impact Energy: 15Nm

Conditions: Temperature: 19.9°C
Relative Humidity: 66.3%

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

Further details are available from The Building Test Centre.

For details of impact positions refer to figure D.1 and photograph D.1.

For details of the damage caused by the test refer to photograph D.2.

For details of the test apparatus used refer to figure B.2.

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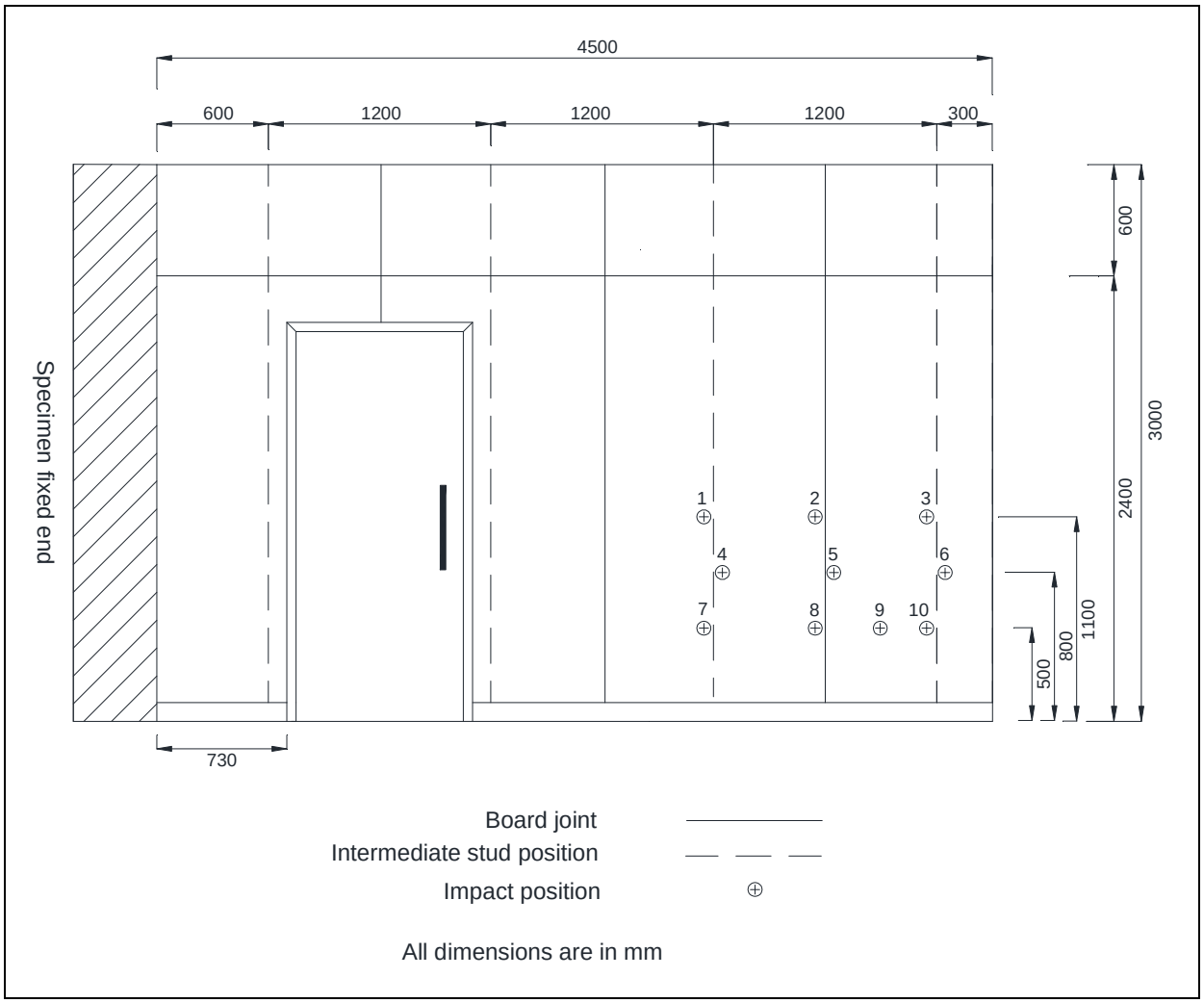

Figure D.1 Impact positions of Annex D – Determination of resistance to perforation by small hard body impact (Side B)

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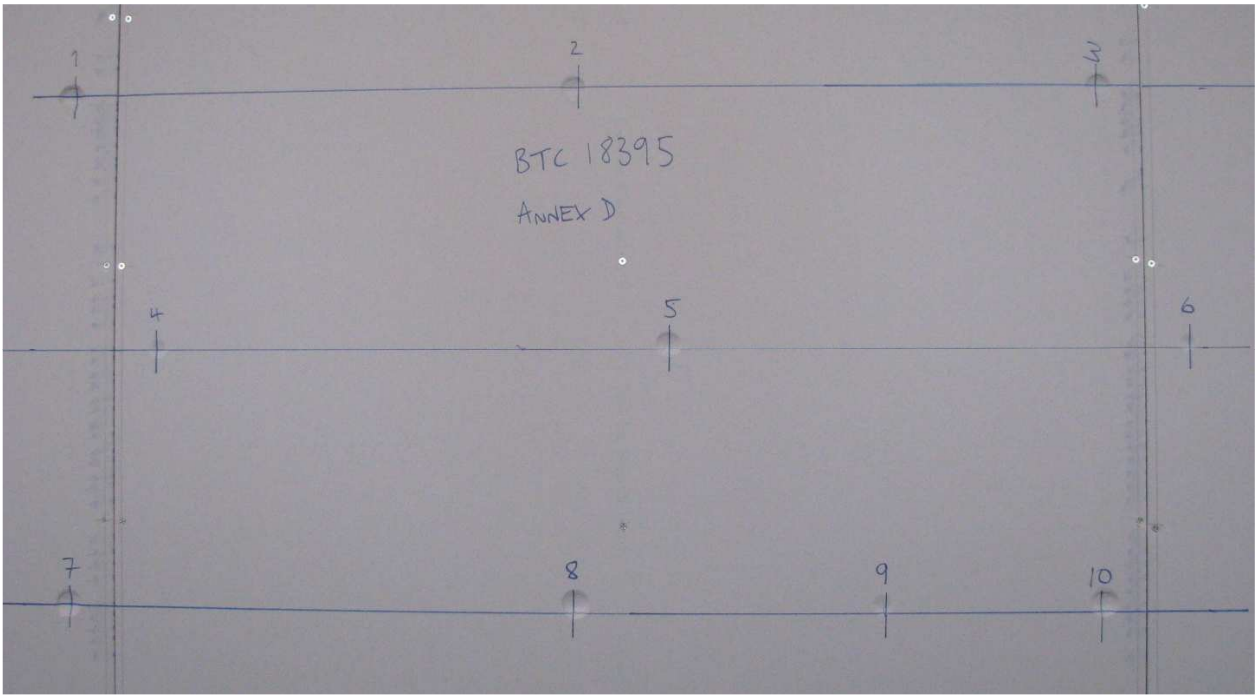

Photograph D.1. Specimen at the end of Annex D – Determination of resistance to perforation by small hard body impact

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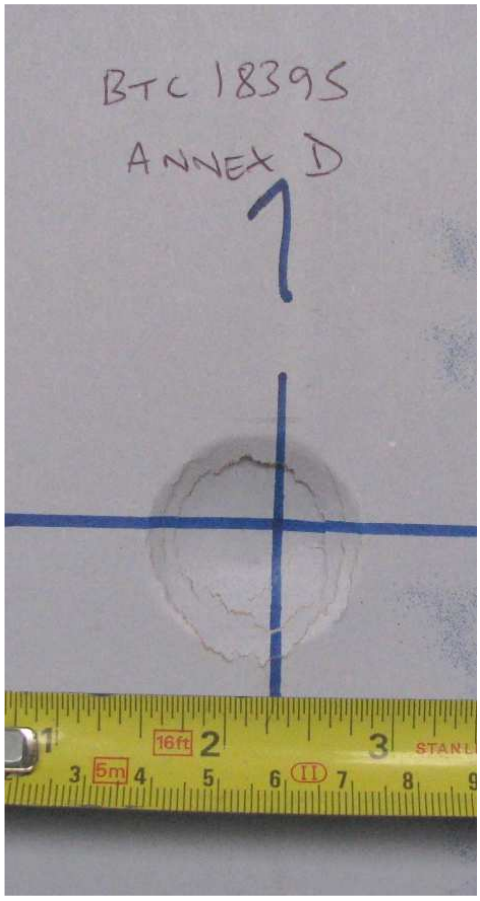

Photograph D.2. Example of damage caused by the Annex D – Determination of resistance to perforation by small hard body impact

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Annex E – Determination of resistance to structural damage by multiple impacts from a large soft body (between studs)

Test Date: 13th August 2013

Test Code: BTC 18395/E/1/S

Test Procedure: AP075 vs 4.0

Impact Energy: 120Nm

Conditions: Temperature: 19.7°C
Relative Humidity: 65.3%

TEST DATA	
Impact Number	Damage
1	No visible damage
2	No visible damage
3	No visible damage

Further details are available from The Building Test Centre.

For details of impact positions refer to figure E.1.

For details of the test apparatus used refer to figure C.2.

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Annex E – Determination of resistance to structural damage by multiple impacts from a large soft body (on stud)

Test Date: 13th August 2013

Test Code: BTC 18395/E/2/S

Test Procedure: AP075 vs 4.0

Impact Energy: 120Nm

Conditions: Temperature: 19.7°C
Relative Humidity: 65.3%

TEST DATA	
Impact Number	Damage
1	No damage
2	No damage
3	No damage

Further details are available from The Building Test Centre.

For details of impact positions refer to figure E.1.

For details of the test apparatus used refer to figure C.2.

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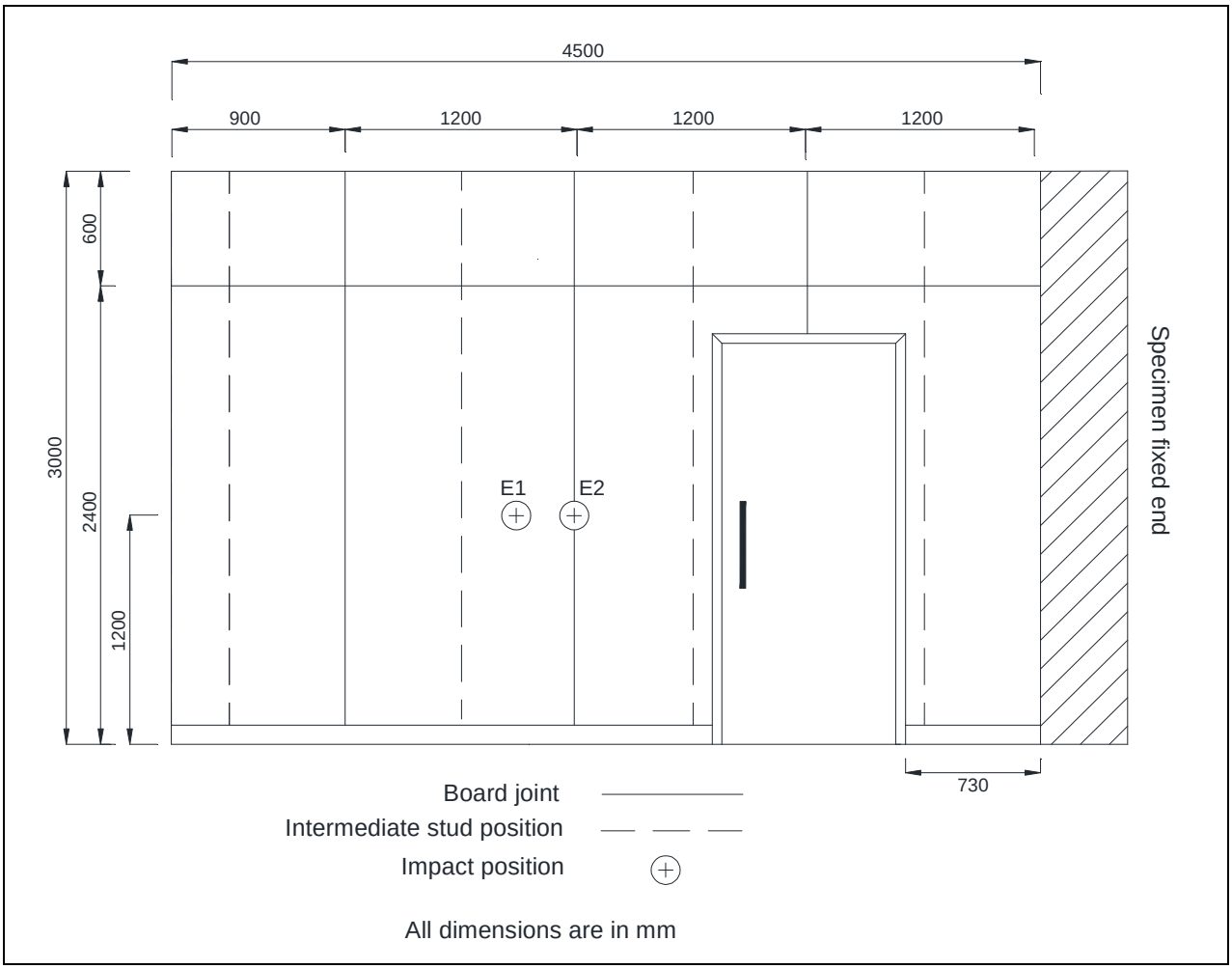

Figure E.1 Impact positions of Annex E – Determination of resistance to structural damage by multiple impacts from a large soft body (Side A)

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Annex F – Determination of the effects of door slamming

Test Date: 14th August 2013

Test Code: BTC 18395/F/S

Test Procedure: AP076 vs1.0

Weight of door: 60kg

Conditions: Temperature: 19.3°C
Relative Humidity: 58.7%

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

TEST DATA		
Slams Type	Residual Displacement (mm)	Observations
Pre-slams	0.75 (Taken after 5 minutes)	No visible damage
Main Test	0.61 (Taken after 5 minutes)	No visible damage

Further details are available from The Building Test Centre.

For a schematic diagram illustrating the arrangement used for the door slamming test refer to figure F.1.

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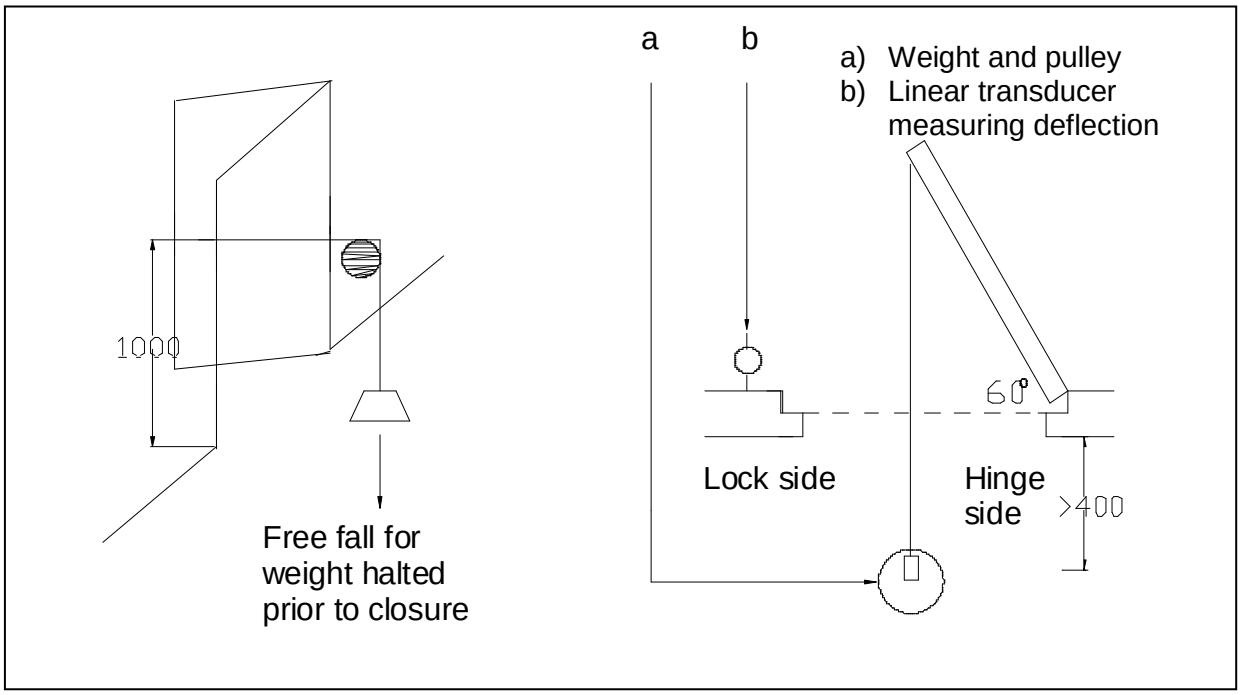

Figure F.1 Arrangement for Annex F - Determination of the effects of door slamming

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Annex G – Determination of resistance to crowd pressure

Test Date: 14th August 2013

Test Code: BTC18395/G/S

Test Procedure: AP077 vs 1.0

Conditions: Temperature: 19.8°C
Relative Humidity: 56.7%

Max. Load Attained: 3750N

TEST DATA		
Load (N)	Deflection (mm)	Damage
0	0	No Visible Damage
500	3.27	No Visible Damage
1000	7.62	No Visible Damage
1500	12.22	No Visible Damage
1875	15.71	No Visible Damage
2000	17.01	No Visible Damage
2500	22.99	No Visible Damage
3000	29.00	No Visible Damage
3500	34.91	No Visible Damage
3750	41.53	No Visible Damage
Residual Deformation	6.42 (Taken after 5 minutes)	-

Further details are available from The Building Test Centre.

For details of the load position refer to figure G.1.

For details of the test apparatus used refer to figure G.2.

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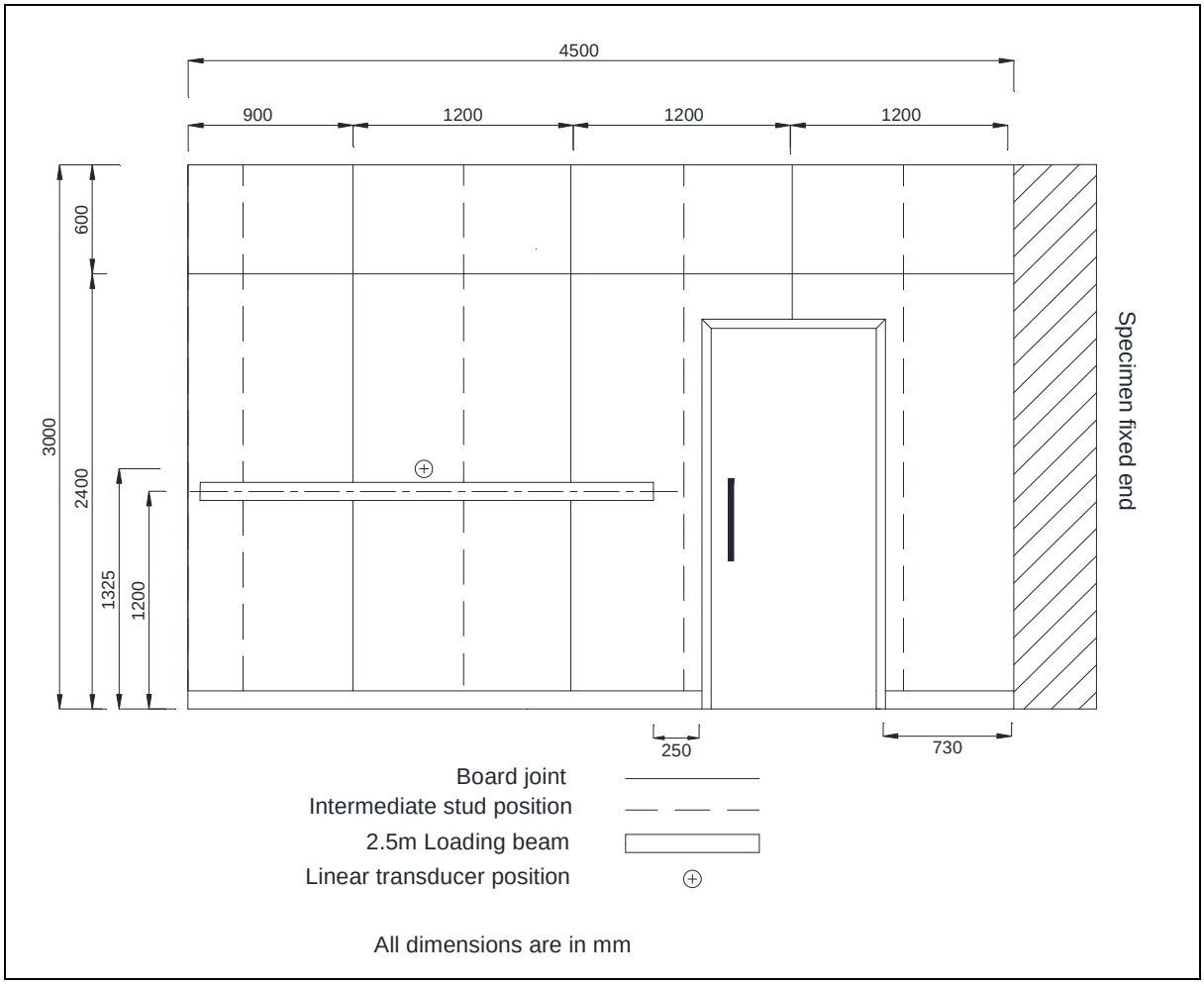

Figure G.1. Load position of Annex G – Determination of resistance to crowd pressure (Side A)

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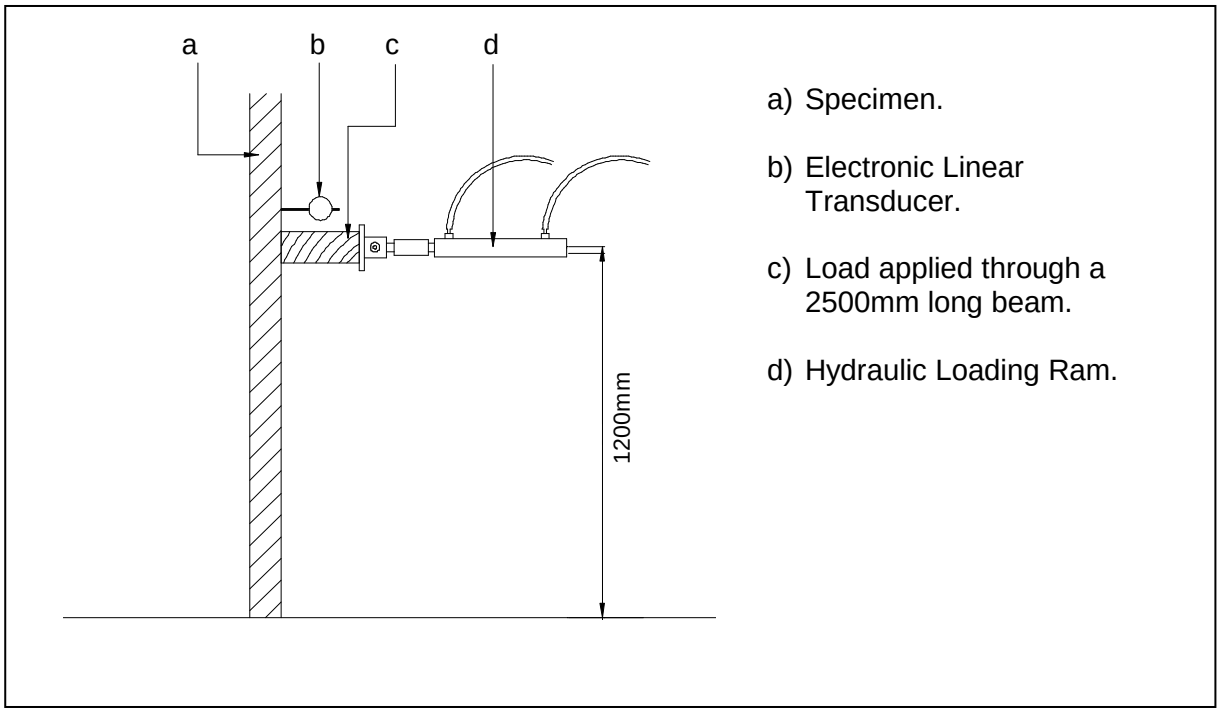

Figure G.2. Apparatus for Annex G **–** Determination of resistance to crowd pressure

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APPENDIX B – CRITERIA FOR ACCEPTANCE

Annex A - Determination of partition stiffness

The maximum deflection and residual deformation shall not exceed the limits for the grade being tested given in the table below.

Note. Only superficial cracks which represent aesthetic damage are acceptable.

Stiffness: applied loads and deflection.			
Grade	**Applied Load** N	**Maximum deflection** mm	**Maximum residual deformation** mm
LIGHT DUTY	500	25	5
MEDIUM DUTY	500	20	3
HEAVY DUTY	500	15	2
SEVERE DUTY	500	10	1

Annex B - Determination of surface damage by small hard body impact

Judgment made on whether the damage is acceptable by the user of the partition based on the description of damage along with photographic evidence held by the laboratory.

Note. No specific criteria for acceptance is given because the impact damage will vary with different materials and forms of construction; some surface damage may be acceptable because it can be easily repaired.

Annex C - Resistance to damage by impact from a large soft body

Partition should be capable of withstanding the impact energies without sustaining either permanent deformation in excess of 2 mm or any damage. Any local damage that can easily be repaired to regain the partitions original properties shall be permitted.

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

No perforation of the partition allowable. We take perforation to mean exposure of the partition cavity. No requirement for this test for a light duty partition.

Annex E – Determination of resistance to structural damage by multiple impacts from a large Soft body

Capable of withstanding the impact energies without collapsing or dislocating the partition or its fixings.

Annex F - Determination of the effects of door slamming

The partition shall not be damage nor shall door frame fittings and architrave become detached or loose after the door leaf has been slammed.

The closing jamb of the doorframe shall not be permanently displaced by more than 3 mm as a result of the pre slam test and by more than 1 mm as a result of the main test, from its position at the start of the test.

Annex G – Determination of resistance to crowd pressure.

No collapse or damage that would render the partition dangerous, due to any of its parts becoming dislodged or shattered, in a manner that could cause injury.

Note. For partitions that do not collapse and where the damage is not dangerous, any deflection and any damage reported in the test report is for information only.