

CONSIDERATIONS FOR DESIGN OF WALL PARTITIONS

GRADE

- **Light duty (LD)** Minimal stiffness required. Small chance of impact load
- **Medium duty (MD)** Moderate stiffness required. Some chance of accident occurring.
- **Heavy duty (HD)** High stiffness required. Chances of impact loads.
- **Severe duty (SD)** Prone to vandalism and abnormally rough use.

Functional Performance

- Fire protection
- Thermal insulation
- Moisture resistance
- Water vapour resistance
- Sound insulation
- Acoustical soundness
- Access
 - door openings
 - access panels, hatches
- Services
 - loadings from fitting
 - access for services
- Durability
 - effect of solar or environmental heating
 - contamination from dirt, fumes, chemicals, humidity
- Cleaning
- Maintenance

Structural Performance

- Load imposed by partitions
- Load imposed by adjacent structure
- Structural support and functional areas
- Wind loads and air pressure
- Strength and robustness
- Crowd pressure
- Fixtures and fitting

Appearance

- Quality
- Finishes
- Glazing
- Trimming
- Accessories

CONSIDERATIONS FOR THE INSTALLATION OF WALL PARTITIONS

Installation

- Lighting
- Storage and handling
- Setting out
- Construction
- Accuracy of finished partition and openings
- Protection during construction
- Fixtures and fitting

Designers are advised to request for test report from the suppliers on strength test, fire rating test, combustibility test and sound insulation test.

1.	Stiffness :	Partition Wall is subjected to a horizontal force of 500 N applied at a height of 1.5 m. Maximum deflection and residual deformation should be within specified limits. Test simulates bending caused by people leaning on, or person on ladder leaning against the partition wall.	
2.	Small Hard Body Impact :	Partition Wall is subjected to a 3 kg impactor with a 50 mm diameter steel sphere head, swung perpendicularly against the wall. Extent of damage is assessed. Test simulates impact caused by sharp or pointed objects, such as trolleys and wheelchairs.	
3.	Large Soft Body Impact :	Partition Wall is subjected to a 50 kg load in the form of a spheroconical bag swung against the wall. Permanent deformation should not exceed 2 mm, with no structural damage. Test simulates impact caused by people falling against the partition wall.	
4.	Door Slam :	Depending on level of test to which the partition wall is to be tested, a 35 kg or 60 kg door is slammed with a force of 15 kg. No damage should be observed. Test simulates door slams caused by wind, or people closing a door energetically.	
5.	Crowd Pressure :	Partition Wall is subjected to a sustained load transmitted through a 2.5 m horizontal beam, at a height of 1.5 m. No damage or collapse should be observed. Test simulates loads caused by a crowd leaning against the partition wall.	
6.	Lightweight Anchorages :	Partition Wall is subjected to a force transmitted through a bracket, with a shim plate positioned between the bracket and the surface of the partition wall. No damage should be observed and shim plate should not be dislodged. Test simulates loadings from lightweight fixtures such as wall pictures, clothing hooks, basic wall shelving.	
7.	Heavyweight Anchorages :	Similar to that for Lightweight Anchorages, except that configuration of brackets resembles that of heavyweight installations. Test simulates loadings from heavyweight fittings such as wall cupboards, wash basins, water closets.	
Grade		Description	Acceptable Usage
LD	Light Duty	Minimal Stiffness. Is suitable for use in areas where there is a small chance of impact loads.	Domestic accommodation
MD	Medium Duty	Moderate Stiffness. Is suitable for use in areas where there is some chance of accident occurring.	Office accommodation
HD	Heavy Duty	High Stiffness. Is suitable for use in areas where there is chance of impact loads.	Public circulation areas; Industrial areas
SD	Severe Duty	Is suitable for use in areas prone to vandalism and rough use.	Major circulation areas; Heavy industrial areas

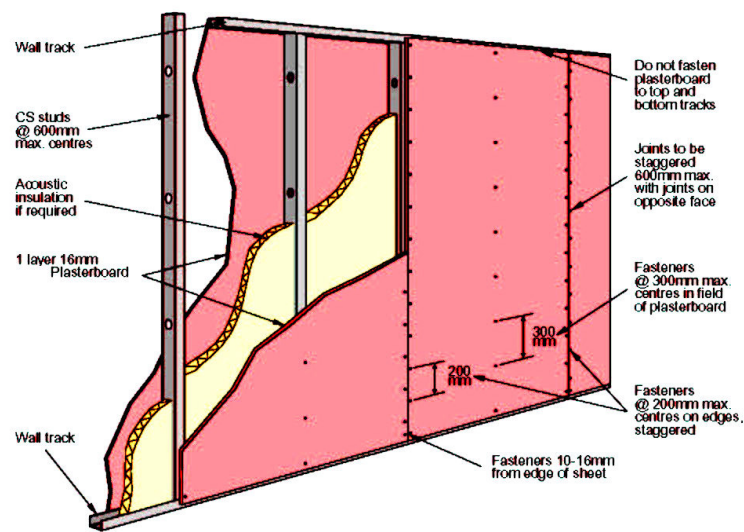
WALL COMPARISON BY FUNCTIONAL REQUIREMENTS

Requirements	Conventional Brickwall (100mm thk)	Dry partition wall (90 - 102mm thk)
Weight	900 kg/ m	113 kg/ m
Productivity ¹	4-7 m ² / man-day (installation & plastering)	20-25 m ² / man-day
Non-Combustibility BS 476 : Pt 4	Pass	Pass
Fire Rating BS 476 : Pt 20	120 mins	60 mins
Sound Insulation ¹	35 dB – 40 dB	35 dB – 40 dB
Usage in Wet Areas	Yes	Yes
On-Site Installation of Concealed Wiring, Ducting & Pipework	By surface hacking.	By fitting services before closing up.
Surface Appearance	Smooth only with skilled plasterers.	Smooth
Applied Finishes : Tiling	Yes	Yes
Joint Treatment	-	Paper tape is used to seal joint, followed by application of joint compound.
Fastener Types	<ul style="list-style-type: none"> • Plastic Plugs • Chemical Anchors • Impact Anchors 	<ul style="list-style-type: none"> • Cavity Anchors • Gypsum Screws
Flexibility of Relocation	Removal & replacement very messy	Removal and replacement fast and easy

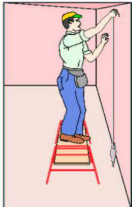
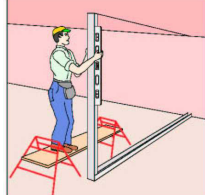
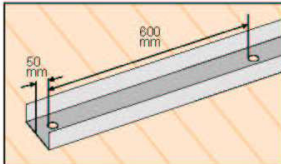
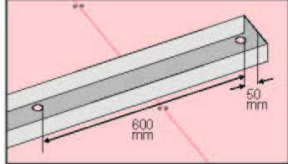





¹ Indicative Values Only ² Test reports to be obtained from wall suppliers

Weight :	Based on floor-to-floor height of 3.0m
Non-Combustibility :	Non-combustible materials are materials which neither burn nor give off flammable vapour in sufficient quantity to ignite when subjected to the test for combustibility as prescribed in BS 476 : Part 4. All walls in buildings shall be constructed of non-combustible materials throughout.
Fire-Rating :	The minimum period of time during which an element of structure or building element may be expected to resist fire penetration. Compartment walls, which divide a building into compartments, are required to have the appropriate fire resistance. Walls separating bedrooms in a residential unit, for example, usually do not require fire rating.
Sound Insulation :	Sound Insulation value is an acoustic rating derived from sound transmission loss measurements over a range of test frequency bands. The higher the sound insulation value, the better the wall will be at reducing noise transmission. It should be noted that penetrations or imperfections in the wall can affect its acoustic performance.

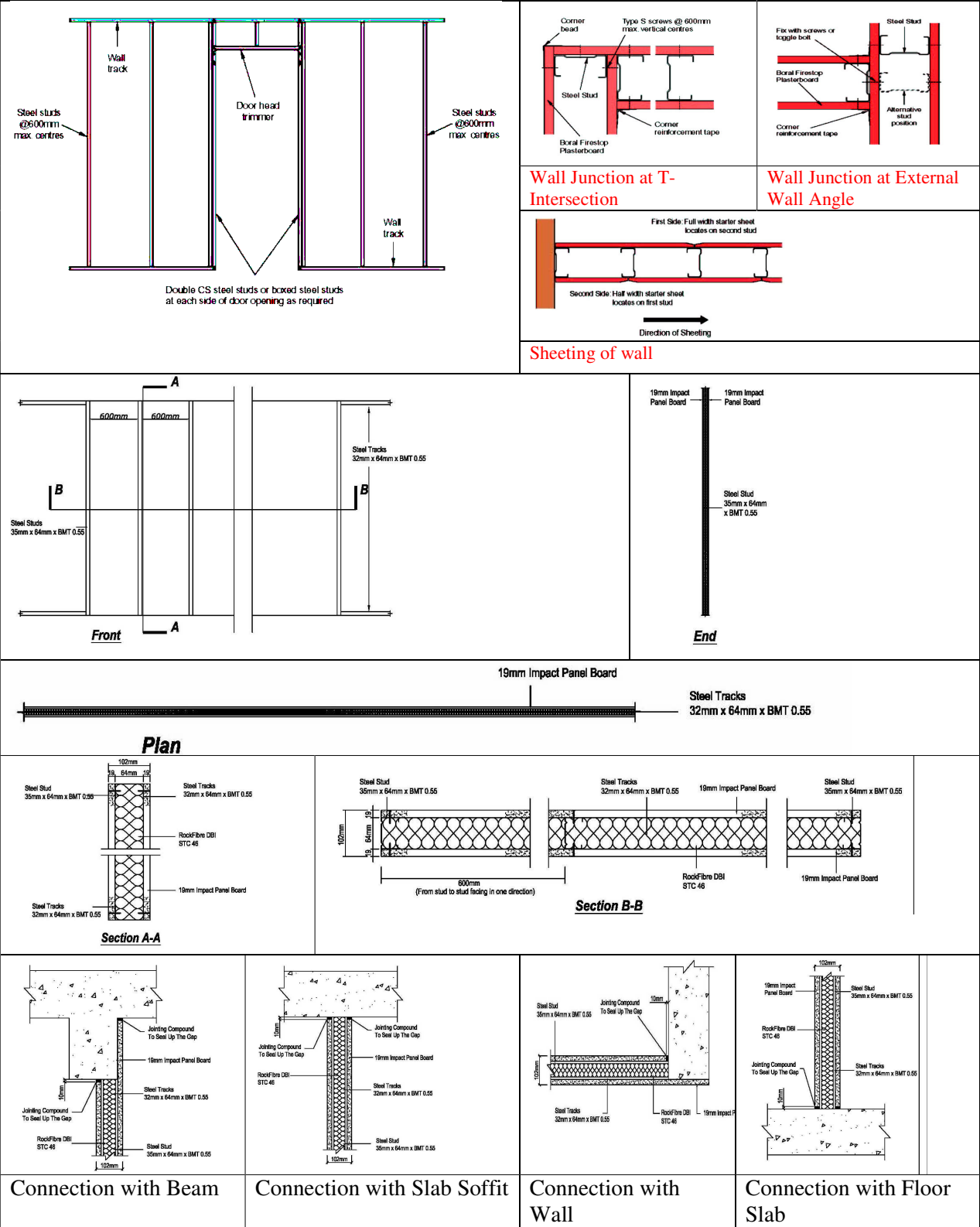
Installation Guide for Dry Partition Walls



Typical 102mm 1-hour Fire Rated Impact Resistance Drywall Partition System

				
Partitions are set out according to layout plan. Set-out points should be first marked on the floor then transferred to the ceiling		Once all partitions have been set-out, wall track is installed.		
				
Install studs into the track vertically.	Apply plasterboard to one side of a wall	Install rockwool for acoustic insulation if necessary. Install M&E services.	Sheet the second side of the wall with plasterboard	Complete with paint finish.
Install studs into the track vertically. The first stud is to be fixed against the existing wall. Door studs and the first stud on each side of the door must be fixed into the wall track.				
Wall studs should be cut 16mm shorter than the floor to ceiling height. This will allow for at least 16mm expansion gap and allow for possible deflection of ceiling track fixing.				
Care must be taken when installing studs to ensure that studs are all facing the same direction, and that service holes are lined up.				
Cut board sheet to suit the length of the floor to ceiling. Allow for a gap of 10mm at the floor and ceiling				
Sheeting must be in the direction of the open stud when screw fixing board sheeting to metal studs. This allows for the board recessed joint to sit flush.				

Detailing for Dry Partition Walls



FUNCTIONAL REQUIREMENT FOR WALL SYSTEMS

a. Acceptance Criteria

Partition walls may be graded according to the level of performance expected of them during their service life. The criterion for acceptance into the various grades of performance is determined by the results of individual tests. For a partition wall to be described as having a particular grade, it shall pass all tests for that grade.

b. Stiffness

The partition wall is subjected to a static horizontal load, sustained for 2 min, at a height of 1.4 m from the bottom of the specimen. When tested, there shall be no damage or detachment, loosening or dislodgement of a partition wall's parts or fixing, other than superficial cracking of the surface. The maximum deflection and residual deformation shall not exceed the limits for the grade being tested.

Stiffness Test			
Grade	Applied Load (N)	Maximum Deflection (mm)	Maximum Residual Deformation (mm)
LD	500	25	5
MD	500	20	3
HD	500	15	2
SD	500	10	1

c. Small Hard Body Impact

A 3 kg impactor, with its head being a 50mm diameter steel sphere, is swung to impact approximately perpendicularly the face of the partition wall. For each of the tests, 10 impacts are made, and the nature and extent of any damage to the specimen is recorded.

For surface damage test, evidence, including photographs showing the nature and extent of surface damage shall be provided to enable judgement to be made as to whether the damage is acceptable. No specific criterion for acceptance is given because the impact damage will vary with different materials and forms of construction.

Small Hard Body Impact : Surface Damage Test			
Grade	Impact Energy (Nm)	Pendulum Head Drop Height (m)	Angle of swing (°)
LD, MD	3	0.1	33.6
HD	6	0.2	48.2
SD	10	0.33	63.6

For perforation test, there shall be no perforation of the partition wall, corner junction, or panel of a hollow partition wall, after being subject to the impact energy for the grade tested.

Small Hard Body Impact : Perforation Test			
Grade	Impact Energy (Nm)	Pendulum Head Drop Height (m)	Angle of swing (°)
LD	No Requirement		
MD	5	0.17	43.8
HD	15	0.5	80.4
SD	30	1.0	131.8

d. Large Soft Body Impact

In this test, the partition wall is subjected to impacts from a soft body impactor in the form of a 50 kg sphericoconical bag suspended from a test rig. For resistance to damage, the partition wall is subjected to 2 impacts at separate locations. The permanent deformation and any damage are recorded after each impact.

Large Soft Body Impact : Resistance to Damage		
Grade	Impact Energy (Nm)	Maximum Residual Deformation (mm)
LD, MD	20	2
HD	40	2
SD	100	2

For resistance to structural damage, 3 consecutive impacts are applied at 2 separate locations. The partition wall shall be capable of withstanding the impact without collapsing or dislocating any fixing.

Large Soft Body Impact : Resistance to Structural Damage	
Grade	Impact Energy (Nm)
LD, MD	60
HD, SD	120

e. Door Slam

This test subjects the partition wall to the impact of door slamming, transmitted through the door frame. A slamming force of 15 kg, generated by a falling mass, is applied to the door leaf. When tested, the partition wall shall not be damaged, nor shall door frame fittings and architraves become detached or loose after the test. The residual displacement of the door frame shall also not exceed 1 mm.

Door Slam Test		
Grade	Mass of Test Door Leaf (kg)	Number of Slams
LD, MD	35	20
HD, SD	60	100

f. Crowd Pressure

The partition wall is subjected to a continuous load transmitted through a 2.5 m horizontal beam at a height of 1.2 m. There shall be 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. The sustained load applied to the timber beam shall be 0.75 kN/m, 1.5 kN/m or 3.0 kN/m.

g. Lightweight Anchorages

This test establishes the ability of the partition wall to sustain a load transmitted through a test bracket using a single anchorages, without dislodging a shim plate, positioned between the bracket and the surface of the partition wall.

For the pull-out test, the partition wall is subjected to an axial load of 100 N. The load shall be sustained for 1 min without releasing the shim late or damaging the partition wall, other that superficial cracking.

For the pull-down test, a transverse load of 250 N is applied to the partition wall and sustained for 1 min. The shim plate shall not be released, neither shall the partition wall sustain damage, other than superficial cracking. The maximum movement of the pull-down bracket shall also not exceed 2mm.

h. Heavyweight Anchorages

This test establishes the ability of a partition wall to sustain a load applied through a pair of linked brackets designed to support a wash basin, high level wall cupboard or similar fixture. The anchorages shall be capable of withstanding the selected load for a period of 5 min without releasing the shim plates, exceeding the deflection or residual deformation limits and without loosening, detaching or damaging the partition wall.

Heavyweight Anchorage : Wash Basin Test		
Applied Load (N)	Maximum Deflection (mm)	Maximum Residual Deformation (mm)
500	5	1
1000 or 1250 or 1500	20	1

Heavyweight Anchorage : Wall Cupboard Test		
Applied Load (N) (in 500N increment)	Maximum Deflection (mm)	Maximum Residual Deformation (mm)
2000 or 4000	15	1