CONSTRUCTION FIXINGS association

CI/Sfb	
	Xt6
May 1995	

CFA Guidance note:

Fixings For Plasterboard

1 INTRODUCTION

There is now a bewildering array of fixings available for attaching objects to plasterboard. The wide range of features includes high strength, ease of fixing, low cost, vibration resistance, choice of screw type and many more. Thus a wide range of fixing problems can be solved.

This Guidance Note aims to clarify the use of these fixings by discussing their different features and limitations, shown for all the popular types over leaf. It does not cover uses in other partition materials or cavity situations nor does it deal with the fixing of plasterboard itself to the structure.

The fixing of objects through plasterboard into supporting structures is referred to briefly. More specific guidance on individual fixing applications can be obtained from manufacturers listed in **Construction Fixings Association - An Introduction** and from plasterboard manufacturers (see back page).

2 PLASTERBOARD

Plasterboard - *a gypsum plaster bonded between two liner boards.*

Most common board thickness is 12.5mm. 9.5 and 15mm are used for special applications. 2 or 3 boards may be laminated together to form partition / lining constructions with the benefit of improved noise and fire attenuation. They may also be supplied bonded to other materials, such as expanded or extruded polystyrene foam and phenolic foams, for improved thermal insulation, usually using 9.5mm board.

3 FIXING SELECTION

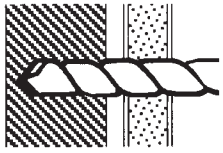
Key aspects include: board thickness, cavity depth, strength, fixture thickness, screw type, demountability and ease of installation.

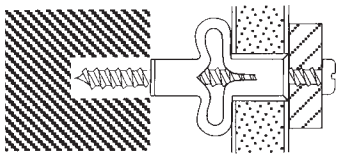
Board thickness and cavity depth are dependent on the application of the plasterboard.

Plasterboard has three main applications :
Dry lining, Partitions and Ceilings

For most of these the standard ***board thickness*** of 12.5mm is catered for by the standard sizes of the products shown over leaf. ***Cavity depth*** will be shallowest for dry lining, typically up to 10mm for construction using adhesive dabs and around 25mm when fixed to battens or metal frames. Cavities in partitions vary from 32mm for cellular core panels to 38mm or more for metal and timber based stud partitions.

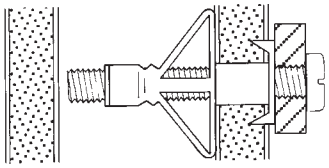
Some plasterboard fixings will work in "Dab" fixed dry lining applications but only if the installation hole is continued into the wall to allow space for the fixing, shown thus in the chart over leaf.





Nylon Expanding type in dry lining application. Hole drilled into wall behind to accommodate fixing.

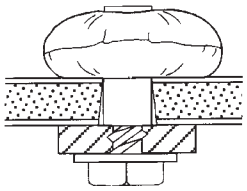
Several types need the space of the cavity for insertion of the fixing before it is set. Standard sizes usually work in the cavity depth of normal partitions. Manufacturer's literature will state board thickness limits and the minimum cavity depth required.



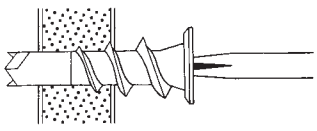
Steel Expanding plasterboard fixing in partition

Strength. The strongest fixings are those which grip the largest area of the board. Thus the **Steel Expanding** types with their 4 or 5 expanding legs are among the strongest metal fixings. **Spring** and **Gravity Toggles**, the earliest cavity fixings, are even stronger but score a low ***ease of use*** rating in that they require large holes, need to be assembled to the fixture before installation and will lose the toggle if the screw is removed. Modern versions of the gravity toggle, the **Captive Toggle**, include plastic devices to retain them in the wall making fixtures ***demountable*** without losing the toggle. The **Adhesive Foam** type which sets a special sack behind the board is also strong but is relatively complex and needs time to cure. Among the easiest to install are the new generation of **Self Drilling** plasterboard fixings. These drill their own hole while a broad spiral cuts a deep thread to grip the board. A toggling version is available for higher loads.

The strongest - *Adhesive Foam*



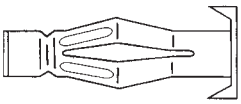
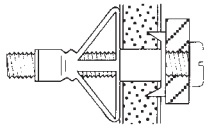
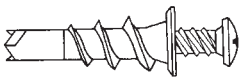
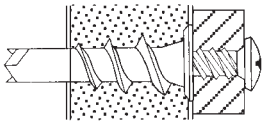
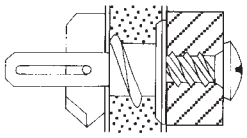
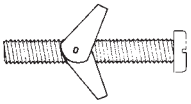
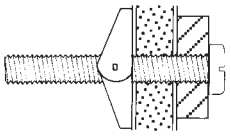
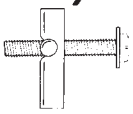
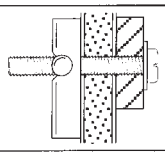
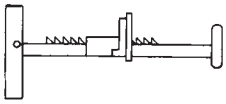
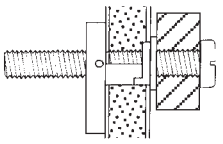
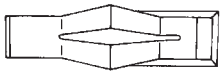
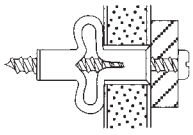
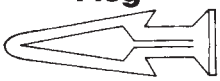
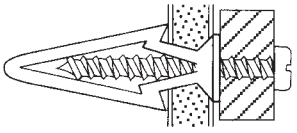
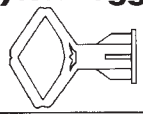
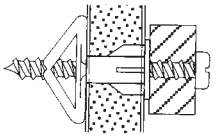
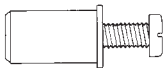
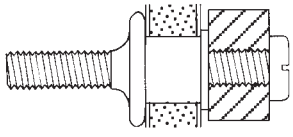
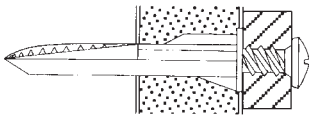
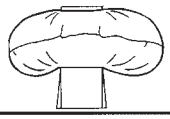
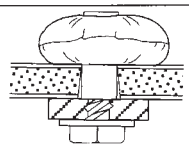
The easiest - *Self Drilling*



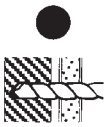
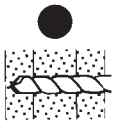
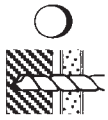
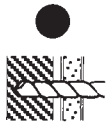
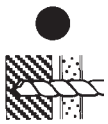
Fixture thickness is catered for by screw length but as some fixings are set by full insertion of the screw before applying the fixture, and screw length may be limited by cavity depth, the fixture thickness for a given screw length may be limited. The manufacturer will state the appropriate limits. ***Screw types*** available include both wood screws and machined screws, generally with pan or round head styles. Some fixings are supplied complete with screws. When choosing screws ensure the correct type and size are specified and take the manufacturer's advice on how to select screw length.

CFA Guidance note:

Fixings For Plasterboard

Fixing Type	Description	Installed Condition
Steel Expanding 	Set before applying the fixture either with a special setting tool or by means of the screw. The screw is fully inserted then further tightening causes the 4 or 5 steel legs to expand over a wide area behind the board. Anti-rotation fins in the flange dig into the soft face to assist setting.	
Self Drilling 	In plastic or metal. Special drill point cuts its own hole when turned into the board using a manual or electric cross head screwdriver. Broad spiral taps thread and grips board. Supplied with special screws. Drill pilot hole for laminated board.	
Self Drilling Toggle 	Similar initial installation and operating principle to self drilling anchor. Toggle increases holding power and is set while screw is inserted. Fixture must be applied while screw is inserted. Metal only.	
Spring Toggle 	2 wings fold to enter board and spring back to grip over a wide area behind. Must be installed with fixture. Popular for ceilings. Fixing is lost if screw removed. Requires deep cavity and relatively large hole. Strong. Metal only.	
Gravity Toggle 	Toggle inserted through board horizontally and falls into position when turned. Must be installed with fixture. Fixing is lost if screw removed. Requires deep cavity and relatively large hole. Strong. Metal only.	
Captive Toggle 	Modern version of Gravity Toggle. Toggle inserted independently of fixture by means of straps which are snapped off after fixing. Flange retains toggle. Large hole. Nylon.	
Nylon Expanding 	Similar in operation to Steel Expanding but generally with only two opposing legs. Anti-rotation fins behind the flange hold the fixing while wood screw is fully inserted. Further screwing pulls the legs down expanding them out behind the board.	
Plasterboard Plug 	Shape of plug holds it in place in board. Insertion of screw expands to provide modest grip. Plastic.	
Nylon Toggle 	Insertion of screw forces wings out to grip over a wide area of remote face of board. May also be used in solid materials as a conventional plug. Nylon.	
Rubber Expanding 	Rubber sleeve is expanded by tightening of machined screw causing rubber to form a bulbous shape behind the board. Equally effective in solid materials or partial voids. Also in neoprene.	
Hammer-in 	Needs no hole drilling (except when fixed into solid materials or dry lining). Anchor simply hammered through board. Light loads only. Adaptable to take cable ties. Plastic.	
Adhesive Foam 	A special sack is inserted through the board into the cavity and foam is injected into the sack causing it to spread out over a large area behind the board. A bolt may be screwed into a protected internal thread. Strongest plasterboard fixing.	

Fixings For Plasterboard

Application suitability					Duty in single board	Screw type	Fixture applied independent of fixing	Fixture demountable without loss of fixing	Fixing type
Dry lining*	Partition	Ceiling	P'board laminate	Foam laminate					
✗	●	●	○	○	M/H	m	✓	✓	**Steel Expanding**
	●	●		●	L	sp	✓	✓	**Self Drilling**
✗	●	●	✗	✗	M	sp	✓	✓	**Self Drilling Toggle**
✗	●	●	○	✗	H	m	✗	✗	**Spring Toggle**
✗	●	●	○	✗	M	m	✗	✗	**Gravity Toggle**
✗	●	●	○	✗	M	m	✓	✓	**Captive Toggle**
	●	●	✗	○	L	w	✓	✓	**Nylon Expanding**
	●	●	●	○	L	w	✓	✓	**Plasterboard Plug**
✗	●	●	○	○	L/M	w	✓	✓	**Nylon Toggle**
	●	●	●	●	L/M	m	✓	✓	**Rubber Expanding**
	●	✗	●	●	L	w	✓	✓	**Hammer-in**
✗	●	●	✗	✗	H	m	✓	✓	**Adhesive Foam**

*Dry lining refers to dab fixed construction. For batten fixed or metal framed lining constructions see suitability under the heading "Partition" - check cavity depth.
L,M,H = Light, Medium, Heavy - see page 4. Suitability : ● = suitable, ○ = limited suitability, ✗ = unsuitable. Screws : m = machined, w = wood, sp = special.

CFA Guidance note:
Fixings For Plasterboard

FIXING STRENGTH

With such a relatively weak material as Plasterboard fixing strength is inevitably limited. An indicative guide to fixing strength is shown in the chart on page 3. Although many applications involve shear loads most manufacturers quote only tensile performance so the references **L**, **M** and **H** are based on the following very approximate split of Recommended Tensile Loads in single (12.5mm) board thickness. (10kgf = approx. 100N = .1kN)

L - Light Duty	Loads below 10kgf
M - Medium Duty	Loads between 10 and 20kgf
H - Heavy Duty	Loads between 20 and 50kgf

Individual manufacturers' products may not conform to these loadings. In practice applications can be assessed as follows :

Light Duty	Pictures, wall mirrors, coat hooks, light fixings
Medium Duty	Shelves, floor supported cupboards and heaters, radiators, lighting tracks.
Heavy Duty	Wall mounted cupboards and heaters, hand rails

For precise loading details, or where the shear loading is more important, refer to the manufacturer's literature.

For particularly heavy applications fixings made into the plasterboard itself may have insufficient strength. In these cases the fixing capacity may be increased by using several fixings to mount a wooden batten over a wide area. Alternatively fixings may be made directly into the timber studs or horizontal rails supporting the plasterboard. When using this technique care must be taken to accurately identify the width of the stud and fix into its centre.

For further advice on fixing directly to the structure refer to plasterboard manufacturers, see reference to members of the **Gypsum Product Development Association** opposite.

INSTALLING CAVITY FIXINGS

Drilling Holes

The strongest and neatest installations are achieved by drilling neat holes. Use Rotary Only drilling action and drill bits with a cutting edge such as wood bits, HSS steel bits or Rotary Only masonry bits. Don't be tempted to use a screwdriver to force a hole through the board as this will damage the remote face of the board and weaken the fixing.

Inserting Screws

Cavity fixings which use wood screws or similar can be damaged if over tightened by heavy handed installers. Some nylon and plastic fixings are expanded simply by fully inserting the screw in the manner of a wall plug. Others need extra turns to set the fixing. The point of full setting must be felt and turning stopped at this point to avoid stripping the internal thread. Make sure it is clear which type is being used.

The following Manufacturers of Plasterboard, all members of the Gypsum Product Development Association, may be referred to for fixing performance in their own materials and for guidance on fixing to supporting structures.

British Gypsum Limited
Technical Service Department
East Leake, Loughborough, Leics. LE12 6JT
Tel: 0115 9456 123
Fax: 0115 9456 356

Knauf
Technical Services Department
P O Box 133, Sittingbourne, Kent. ME10 3HW
Tel: Freephone 0800 521050
Fax: Freefax 0800 521205

Lafarge Plasterboard Limited
Drywall Enquiryline
Technical Advisory Service
Portbury, Bristol, Avon. BS20 0NF
Tel: 01275 375 281
Fax: 01275 372 018

For guidance relating to proprietary relocatable Partitions refer to:

Partitioning and Interiors Association
Jago House, 692 Warwick Road, Solihull,
West Midlands. B91 3DX
Tel: 0121 705 9270
Fax: 0121 711 2892

For more information or
details of other Guidance Notes
contact:
The Secretary
Construction Fixings Association
C/O Institute of Spring Technology
Henry Street
Sheffield
S3 7EQ
e-mail: info@fixingscfa.co.uk
Tel 0114 2789143
Fax 0114 2755573