



Ceiling Diaphragms – let's start with the basics

by Russell Pedersen



Talking Trade: Here at the GIB® Helpline, we get a tonne of confused calls about ceiling diaphragms.

The first question we always ask is, “is it a GIB® ceiling diaphragm?”. Why? Because under NZS 3604:2011 there can be many different types of ceiling diaphragms. And while some of them have GIB® plasterboard as the lining, they're not necessarily a GIB® ceiling diaphragm cut and pasted from our GIB® EzyBrace Systems Manual.

So, let's start with the basics. Ceiling diaphragms under light and heavy roofs are required to comply with NZS 3604:2011.

Foundationally it helps to understand how bracing lines work – bracing lines are the imaginary lines running along and across the full length or width of a timber framed building plan (they're usually a maximum of 6m apart). While these lines have no physical significance, they're needed to control the positioning of bracing elements and allow even distribution of bracing and stiffness to the structure as a whole. By understanding the bracing line concept and not being restricted by exact placement of physical walls, designers have more freedom with room sizes.

Ceiling diaphragm confusion usually stems from the tight rules to comply with the GIB® solution to diaphragm requirements, which makes the full list of requirements essential reading before plans go to Council or the first sheet of plasterboard is cut.

Whilst not a bracing element itself, a GIB® plasterboard ceiling diaphragm is a stiff and strong horizontal component which transfers loads to connected bracing walls/lines exceeding 6m separation (or 7.5m with dragon ties) to a maximum of 12m (if you have a double top plate).

Any 10mm or 13mm GIB® plasterboard can be used for a GIB® ceiling diaphragm and both timber and steel battens can be used for the structure of the diaphragm (timber

battens for when there are three or more tapered edge joints in a ceiling area, and metal battens for when there are six or more).

The basic shape of a ceiling diaphragm is square or rectangular (1:1 to 1:2). Protrusions (like a cupboard) are allowed, but cut-outs for walls or sky lights are not. If a larger opening is unavoidable it must be in the middle third of the diaphragm*. Where fireplace flues or range hood openings are required to penetrate the diaphragm (outside the middle third), a galvanised metal backing plate can be used as shown in the image on page 2.

* For guidance on openings in the middle third, please see page 20 of our GIB EzyBrace® Systems Book.

The length of a ceiling diaphragm (measured between supporting bracing lines, not physical walls) cannot be more than twice its width. The supporting bracing lines need a bracing capacity no less than the greater of: 100 bracing units or 15 bracing units per metre of diaphragm dimension. These supporting walls are measured at right angles to the line being considered.

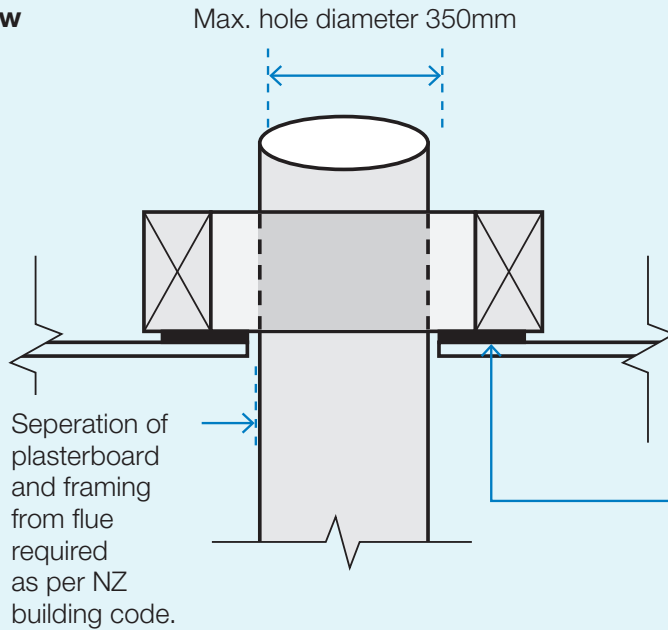
Linings have to be installed over the entire area of the diaphragm. Fasteners are placed at specific centres around the perimeter of the ceiling diaphragm using the GIB EzyBrace® fastener pattern. For GIB® Rondo® Metal Battens, a metal channel or metal angle is required at the perimeter of the diaphragm. When planning your sheet set out, use full width sheets where possible. Minimum sheet size of 600mm x 1800mm provided all adjacent sheets are back blocked.

If a Level 5 finish is required, or for larger areas, other back blocking requirements may apply. Head to page 47 of the GIB® Site Guide for details.



Figure 1: Fireplace Flues and Range Hood Openings

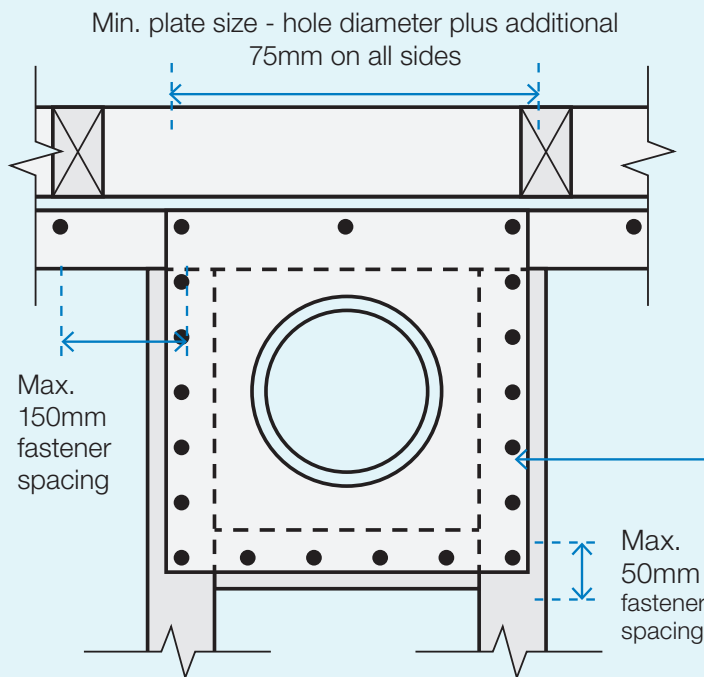
Section view



Steel plate
 0.55 BMT
 Galvanised sheet
 Max. opening
 350mm diameter.
 Installed prior to
 GIB® plasterboard.

Framing
 90 x 45mm framing
 trimmed to provide
 extra fixing.

Plan view



GIB® plasterboard ceiling
 Installed over the
 steel plate and into
 framing using a
 minimum of 32mm
 x 6g GIB® Grabber®
 High Thread or
 32mm x 7g GIB®
 Grabber® Dual
 Thread screws at
 50mm max centre
 spacing.

Plasterboard ceiling not shown in plan view

Still confused? For more information about GIB® ceiling diaphragms, download the 'Best Practice Series No 6 and 7' from gib.co.nz or call the GIB® Helpline on 0800 100 442.