Round holes vs. square holes

Figure 1: At the start of the test.

One of the common topics we get calls to the GIB® Helpline for is bracing, and more specific, about holes being cut into a bracing element.

Recently we conducted a test in the Lab using our P21 bracing test rig. The test consisted of 2 oversized holes, one square and one round. The purpose of this test was to demonstrate how the forces that are applied to a bracing element "flow" through the sheet of plasterboard. When the plasterboard has a hole in it, the shape, size and position of that hole makes a big difference to how it will perform.

The test was designed to demonstrate what is likely to happen when the forces hit a corner of a square hole, where a crack is much more likely to propagate, as opposed to a what happens where there is a rounded corner or round hole. This test also highlights the importance of the location of the hole and the proximity of the hole to the perimeter.

Figure 2: Test specimen during racking.

Figure 3: A close up of cracks after racking.

Plasterboard is an ideal structural product, with its balance between rigidity and ductility. In simple terms that means: stiff and strong when you need it but will sacrifice itself when it reaches a "cap", or ultimate limit. When it reaches near the top end of this limit, and the board can no longer absorb the stress, the forces look for the weakest point to release that tension. This is usually where there is a corner, or the thinnest piece to bridge, the energy will take a "shortcut" across the board in the form of a crack. On a side note, as observed in Figure 3, the crack has aligned itself with a screw. This is a correctly seated screw but is the nearest and weakest point in this area, how much more so if this screw was overdriven!

How does this relate to practical use on the building site? When making holes in any bracing elements, if there is an option to round the corners, i.e, with a hole saw, the element will always perform better. Another good example we are seeing more of on site is drilling 2 x 50mm Ø holes to create a flush box opening.

The information on openings in GIB® technical literature remains valid including the use of square openings. This information helps to have insight into the "why" behind the "what" and the added benefits of using round holes.

If you are unsure on how to approach a hole in a bracing element, feel free to call the GIB® Technical Helpline on 0800 100 442.