

ASPECT RATIO – THE EFFECT ON THE STRENGTH OF BRICKS WHEN LAID ON EDGE OR ON END

For many years now, architects and specifiers have been looking at building design and how a brick could be applied to a structure in fresh, aesthetically pleasing ways. Much as grand old Victorian buildings had beautiful brick features applied, the desire for brick detailing is still popular. However, bricks and building design on the whole, has changed greatly from the decorative solid wall constructions of yesteryear.

Today, bricks can be produced with perforations through the laying bed, or contain indentations known as 'frogs.' Where designs call for bricks to be laid in orientations other than the intended bed, if solid bricks are not specified, using standard bricks with voids is likely to impact on the loadbearing capacity. Even with their heavy, solid constructions, Victorian designers saw the importance of special shapes and made-for-purpose clay units in areas where a standard brick could be compromised and these should be considered in the first instance.

WHAT IS 'ASPECT RATIO'

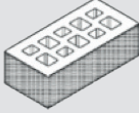
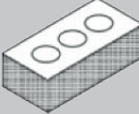
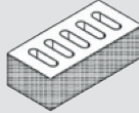
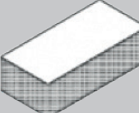

The aspect ratio, is defined as the ratio between the thickness of a specimen and the smallest characteristic length of its surface.

Fired clay bricks are tested for compressive strength to ascertain how much pressure the brick can withstand before it begins to fail. This is measured in Newtons per square mm (N/mm²). These tests involve the brick placed on its bed, (as in normal masonry) and force bearing upon it, until failure.

When we apply this principle to fired clay bricks and lay them on their side or end in load-bearing masonry, in the majority of cases the compressive strength falls. This is very much determined by the volume of voids in the brick. A solid, unperforated brick will, of course, have greater resistance to failure, however the fall in strength can be surprising and therefore is a critical aspect to consider, especially in load-bearing applications.

This difference (in percentage) of compressive strength, is illustrated in the diagram. The table illustrates the range of void types currently manufactured and indicates the percentage decline in compressive strength, compared to the standard on bed orientation, when bricks were tested on their edge and on end (soldier coursing).

When specifying a product for orientations other than laid on bed, check with Ibstock what the void pattern and compressive strength is for that particular product to ensure loadbearing capacity is not compromised. Ibstock produce a vast array of special bricks and shapes for architectural detailing, come with full warranty and are strongly recommended.

Void type	Brick laid on edge	Brick laid on end (Soldier)
% Reduction in compressive strength		
	35%	80%
	60%	70%
	54%	92%
	0%	10%
	18%	31%