STACKBONDING

**EXTERNAL OR INTERNAL**
**NON-STRUCTURAL / STRUCTURAL**

**TRADE SKILL LEVEL:**

**LINEAR PATTERN**
**DECORATIVE**

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**SOME RULES OF THUMB**

- Most concrete masonry types are suitable for stack bond, including hollow blocks and faced brick.
- Example of a concrete hollow block.
- Example of a concrete face brick.

Bedding reinforcement should be placed in accordance to the detailing requirements set out in this flyer.

Masonry should be identical in size to ensure that the vertical alignment desirable in stack bond is achieved.

A continuous vertical joint is the key characteristic of stack bond, requiring careful set-out of masonry.

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**SOME OTHER STACKBONDING WE LOVE**

- Hollowed concrete blocks are turned to expose their webbing, creating a decorative screen.
- Breeze blocks are stack bonded to create a highly patterned geometric screen with superior durability and ventilation properties.
- Concrete masonry is indented to accentuate a shape in the wall.
- The decorative screen transitions to a conventional stack bond pattern.
- The deeper horizontal mortar joints couple with the stack bond to accentuate both the verticality and horizontal joints in the wall.

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Seek advice and input from a Structural Engineer.

- Stack bond is a bold use of masonry with a strong visual impact expressed through the verticality of this laying method.
- Various block sizes and textures may be used to create different visual effects.
- The loadbearing capacity of stackbonded walls is effected due to the decrease in mortar bonding strength compared to stretcher bonded walls.
- The vertical mortar joint is the most likely location of cracking and added structural support or tie-backs should be used to increase the loadbearing capacity of stackbonded walls.
- Unreinforced masonry stack-bonded walls are ideal for non-structural use, for example as an interior veneer or landscape wall.
- If a stackbonded wall is required to be loadbearing or have high compressive strength, prestressed reinforcing tendons can be used to achieve the required properties.
- Take steps to ensure the skill level and qualification of the blocklayer is appropriate for the project.
This flyer raises some of the issues that an engineer may need to consider when advising on the design of a 'stack bonded’ masonry wall.

Stack bonded masonry is becoming increasingly popular as an architectural effect in veneer construction and structural features.

This type of masonry is currently covered in section 4.12 'Stack Bonded Masonry' of AS 3700 'Masonry Structures' (2018) in conformity with the research from the University of Newcastle.

BACKGROUND

Unlike stretcher bonded masonry, unreinforced stack bonded masonry has a comparatively low horizontal bending strength, and is deemed to have zero horizontal bending capacity when calculated in accordance with section 7.4.3 ‘Design for Horizontal Bending’ of AS 3700 (2018).

This is because the stack bonded pattern provides no unit overlap, meaning the perpend spacing factor (according to section 7.4.3.4) is set to zero.

However, testing showed that although the horizontal bending capacity of a stack bonded wall is less than a stretcher bonded wall, it does provide some degree of bending resistance. This is because its horizontal bending capacity is similar to its vertical bending capacity (according to section 7.4.2) where in both cases; the failure mode runs along the perpend and bedding joints respectively.

The 2018 version of AS 3700 provides detailing requirements and a structural design methodology that accounts for the true structural strength of stack bonded masonry walls.

DETAILING REQUIREMENTS

The following detailing approaches are highly effective at improving the horizontal bending strength of stack bonded masonry and this is included in section 4.12 'Stack Bonded Masonry' of AS 3700 (2018).

If hollow unit masonry is used, the stackbonded units have to be reinforced or prestressed and designed accordingly with Sections 8 or 9 of AS 3700.

For solid or unreinforced masonry, anchored bed joint reinforcing complying with sections 4.12, 5.9 and 11.8 of AS 3700 have to be inserted at the following locations:

• the first bed joint above or below an unrestrained horizontal edge of the masonry
• at least one bed joint within 300 mm above and below any horizontal lines of lateral support
• the reinforcing should be vertically spaced at centres not exceeding six times the thickness of the stack bonded leaf.

Please note that for the purposes of a stack-bonded wall, these detailing requirements shall take precedence over the reinforcement requirements (for bending) set by sections 8.6 (a) and 8.6 (b).

DESIGN REQUIREMENTS

Stack bonded members should be designed as:

• The design requirements under AS 3700 (2018) Clause 4.12 shall take precedence over the requirements of Clause 8.6, Item (a) and (b).
• Unreinforced masonry for compression, shear and vertical bending, complying with sections 7.3, 7.5 and 7.4.2 accordingly.
• Reinforced masonry for horizontal and two-way bending in accordance with section 8.6, provided that the detailing requirements elaborated within this fact sheet have been adhered to.