

AS 3700 (2018) 'MASONRY STRUCTURES'

WHAT BUILDERS AND CONSTRUCTION WORKERS NEED TO KNOW

UPDATE

BACKGROUND

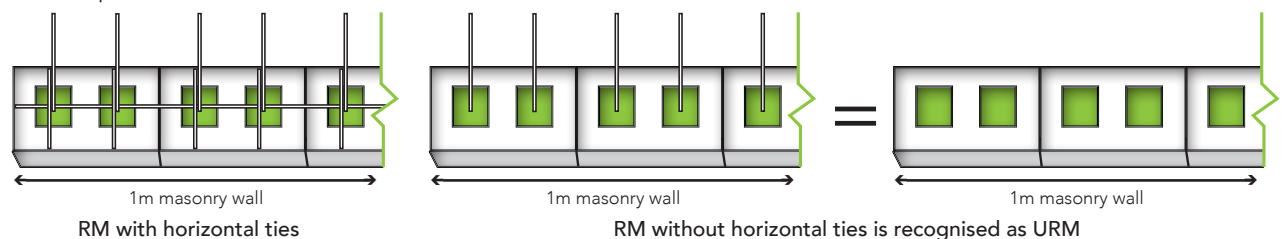
The National Construction Code (NCC) states that all masonry construction within Australia has to conform to the requirements of AS 3700 'Masonry Structures'.

AS 3700 (2011) limits the maximum grout strength that is allowed to be used in grouted unreinforced and reinforced concrete masonry walls to being only 30% greater than the strength of the masonry unit.

This means that for 15MPa concrete masonry units, the grout strength is limited to a maximum of 20MPa.

Furthermore, for compression loads, AS 3700 (2011) requires that in reinforced masonry walls, the vertical steel be restrained in both horizontal directions by steel ties (greater than 6mm diameter), and spaced vertically at centres of a distance less than the walls thickness or unit height (whichever is the lower value).

If this requirement cannot be achieved, then the wall is considered as unreinforced, even if the vertical steel is present.



*Please note, this picture is purely a visual representation of a 1m length of a reinforced concrete masonry wall. The spacing between each vertical reinforcement is subject to the engineers specifications, and may not necessarily be placed in each core. Please see table at the back of this spreadsheet for spacing options.

In consultation with its members, the CMAA found that this requirement is rarely undertaken on site.

This is understandable as the detailing required to laterally restrain the vertical steel is intricate, time consuming and costly, and furthermore, the masonry cores become quite congested with steel, inhibiting grout flow.

Because of this, the majority of reinforced masonry walls, designed for compressive loads, are actually designed as unreinforced, which achieves approximately 40-45% less capacity.

As such, the CMAA funded an extensive research and testing program at the Queensland University of Technology (QUT) addressing the above issues, and amending AS 3700 accordingly.

AS 3700 (2018) has been published and allows for easier construction, and potentially higher capacities

This factsheet explains what the new provisions mean for construction personnel.

AS 3700 (2018) CHANGES

AS 3700 (2018) does not place a limit on the allowable grout strength.

The CMAA strongly recommends that grout strengths no greater than 35MPa greater than the masonry unit strength be used.

This means that 50MPa grout can be used with 15MPa blocks, whereas in the 2011 version, practitioners were limited to 20MPa grout.

The below table contains the recommended maximum allowable grout strengths for different strength masonry units, and compares those to the 2011 version of AS 3700.

Block strength, f'_{uc} (MPa)	Recommended max. allowable grout strength, f_{cg} (Mpa)	
	AS 3700 (2011)	AS 3700 (2018)
<15 MPa	$1.3 f'_{uc}$	$f'_{uc} + 35$
15	19.5	50
20	26	55
32	41.6	67
40	52	75
50	65	85
> 50MPa	$1.3 f'_{uc}$	$f'_{uc} + 35$

This new provision will reduce the need for higher strength (and higher cost) blocks and/or thicker walls to be specified in construction.

RM walls can now achieve their true strength without having to install horizontal ties.

This provision makes for easier construction, improved grout flow through the hollow units, and more competitive walls from a cost, time and compressive strength perspective.

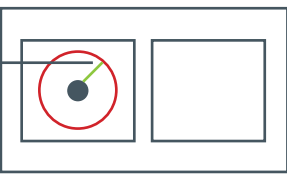
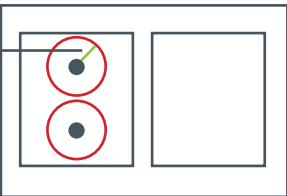
AS 3700 (2018) states that the vertical reinforcement must be surrounded by an annulus of grout of at least two times the diameter of horizontal reinforcement

This provision is extremely important to adhere to the construction practise, and products such as bar chairs, spacers and/or tie wires can assist in achieving this.

This provision ensures the steel is vertical, and that there is enough grout confining the steel to prevent it from buckling when compressed.

Please refer to the Grout Annulus Housing Space Checklist Table below which indicates which concrete masonry units allow enough space within their cores to house different size reinforcement and meet this provision.

GROUT ANNULUS HOUSING SPACE CHECKLIST

Is there enough space within the hollow core of the unit to allow for the grout annulus?			
Configuration	Units	N12	N16
Minimum 2D, where D is the diameter of the steel reinforcing bar 	100-120 series all units	X	X
	150-300 series all units	✓	✓
Minimum 2D, where D is the diameter of the steel reinforcing bar 	100-150 series all units	X	X
	200-300 series all units	✓	✓

NOTE: Extra care must be taken when units with special shapes are used to ensure the min. 2D grout annulus.

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