

PART B

Chapter 3

Robustness

This chapter provides the robustness requirements to ensure that masonry has a basic degree of strength and stiffness in addition to that determined by calculation considering applied loads.

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3.1

BASIS OF DESIGN

Designers are required to design masonry walls to withstand the loads set out in the Australian Standards called up in the National Construction Code (NCC) – Building Code of Australia (BCA). The principal loads (called 'actions' in AS/NZS 1170) are permanent and imposed actions specified in AS/NZS 1170.1, wind actions specified in AS/NZS 1170.2 or AS 4055, snow and ice actions from AS/NZS 1170.3 and earthquake loads given by AS 1170.4. Designers are also required to consider earth pressures and fluid pressures.

Notwithstanding this requirement to consider the loads in the Australian Standards, it is possible for the lateral loads on some walls to be neglected. For example, consider the internal loadbearing masonry walls in the basement of a three-storey regular building in earthquake design category A. These walls may be considered remote from wind loads for design purposes, but may still be prone to some wind pressure when the doors are open. They may not be required to have a fire resistance level although could be subjected to unforeseen fire loads. The earthquake code does not require static or dynamic analysis even though earthquakes could still occur. Such walls could also be subject to vehicle impact, although there is no guidance given in Australian Standards. It is therefore possible for a designer to design very large walls of this type without any consideration of lateral loads.

The robustness provisions are a practical means of providing an upper limit on the size of walls and isolated piers, thus ensuring that unreasonably large spans are not specified. The robustness limits are not a substitute for rational analysis or design for calculated loads, but rather a global limit beyond which even the most lightly loaded walls and piers should not be built.

The robustness provisions of AS 3700 have been derived by giving consideration to the current forms of construction in use (for example, the increasing use of 90 mm masonry units in partition walls and cavity walls), lateral pressures of 0.5 kPa and the engineering judgment of the code writers. The criterion should not be used to justify structures that engineering judgment would otherwise indicate as inappropriate. Careful consideration should also be given to the likelihood of chasing and its effect in reducing support.

Although walls that support concrete slabs have enhanced resistance to lateral loads in some circumstances (compared to those walls that do not support slabs), the robustness capacity of 0.5kPa must be determined neglecting this. In cavity construction, both leaves contribute to lateral resistance and are therefore considered for robustness purposes.



3.2

DESIGN REQUIREMENTS

AS 3700 Clause 4.6 sets out the required robustness limits and has been interpreted as follows in the preparation of design charts.

For isolated piers

$$\frac{H}{t_r} \leq C_v \quad \text{AS 3700 clause 4.6.3}$$

$C_v = 13.5$ for walls unreinforced vertically;
and
 $= 30$ for walls unreinforced vertically or prestressed

For walls

0.5kPa out-of-plane pressure calculated in accordance with Part B6 of this manual

For a wall that incorporates an opening, the length used for robustness calculations L_r is measured from any vertical support to the edge of the opening. This is the same length as the one used to calculate the slenderness for vertical load capacity.