

SECTION 7. DESIGN FOR BENDING

AS 3700 only permits the design of unreinforced **mortarless** masonry walls for bending if the out-of-plane forces causing bending are of a transient nature (e.g. wind and earthquake loads). Note that **mortarless** masonry with less than the minimum reinforcement for bending must be considered unreinforced for design purposes.

7.1 Design of unreinforced **mortarless** for bending:

As all **mortarless** walls and piers are fully grouted and at least lightly reinforced it makes sense to capitalise on the situation and install sufficient reinforcement to design them as reinforced masonry members for flexure. For this reason the design manual will not deal with bending in unreinforced walls.

7.2 Design of reinforced **mortarless** for bending:

All **mortarless** masonry walls and piers must be fully grouted and therefore it is only logical that at least the minimum reinforcement for bending should be installed and the masonry designed as reinforced for bending, and in this case AS 3700 Clause 8.6 applies.

The design bending moment acting on the cross section of the member must be not greater than the bending moment capacity of a **mortarless** masonry element, and this is represented in the following equation:

$$M_d \leq 0.75 f_{sy} A_{sd} d [1 - (0.6 f_{sy} A_{sd}) / (1.3 f'_m b d)]$$

Where: M_d = the design bending moment acting on the cross-section of the member

f_{sy} = the design yield strength of the reinforcement

A_{sd} = the portion of the cross sectional area of the main tensile reinforcement used for design purposes in the reinforced **mortarless** masonry member
= the lesser of $(0.377 f'_m b d) / f_{sy}$ and A_{st}

f'_m = the characteristic compressive strength of the masonry

A_{st} = the cross-sectional area of fully anchored longitudinal reinforcement in the tension zone of the cross section under consideration

The use of A_{sd} in the calculation of bending moment capacity safeguards against the design of over-reinforced members.

The reinforcement positions in **mortarless** masonry construction are controlled by the plastic connectors. These hold the blocks together end to end, locate the overlying blocks in the subsequent course to align all cores and perpend, and support the horizontal reinforcement in pre-determined locations. The positioning and firm support of the horizontal reinforcement then accurately controls the positioning of vertical reinforcement.