

## SECTION 4. COVER TO REINFORCEMENT

A fundamental and most critical aspect of the durability of any reinforced concrete member or any masonry member containing reinforcement is the provision of adequate cover. Adequate cover is also an important aspect of achieving the necessary fire resistance period (FRP) with respect to structural adequacy.

Clause 4.10.1 states that the cover to any bar shall be the greatest of the values determined for proper concrete placement, durability and fire protection.

### 4.1 Cover for concrete placement

Clause 4.10.2 states that the cover shall be adequate to ensure concrete can completely fill the formwork and closely surround the reinforcement. In general this means that cover shall not be less than the larger of the size of the reinforcing bar or the maximum nominal aggregate size.

### 4.2 Cover for durability

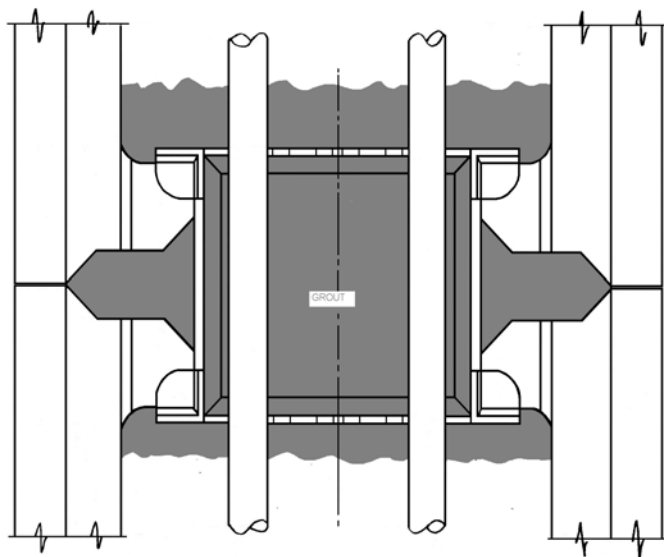
Cover to reinforcement must be adequate to provide corrosion protection to the reinforcement and to afford adequate protection to reinforcement in members that are contact with aggressive soils. (Clauses 4.10.3 and 4.8.1)

The minimum cover for corrosion protection is tabulated in AS 3600 Table 4.10.3.2 and this varies according to the characteristic strength of the concrete and the exposure classification. The minimum cover is 20mm for both 20 and 25MPa concretes and the maximum is 60mm.

It should be noted that 20MPa concrete can only be used for exposure classifications A1 and A2, and 25MPa concrete can only be used for exposure classification A1, A2 and B1.

When designing the blocks for **mortarless** masonry a great deal of attention was paid to achieving satisfactory cover to the embedded reinforcement. This is a most important structural aspect that is overlooked in all similar dry-stack systems.

Most dry-stack systems provide totally inadequate cover in the vicinity of the perpends and many also provide totally inadequate cover in the vicinity of the bed joints but this issue has been addressed in the internal shaping of **mortarless** masonry units.



Plan view on connector joining two 200 mortarless blocks and supporting two horizontal bars, showing the shaping of the ends of the blocks to maximize grout penetration into the perpends

## 4.1 Cover requirements for fire resistance

AS 3600 Clause 5.7 outlines the requirements for walls when assessing the FRP.

### Insulation:

AS 3600 Table 5.7.1 gives the FRP for walls of various effective thicknesses. 140 **mortarless** walls would achieve an FRP of 120 minutes and 200 **mortarless** walls would achieve an FRP of 240 minutes without the addition of suitable insulation material (refer Clause 5.8.1).

### Structural Adequacy:

The values for the full range of FRPs are given in AS 3600 Table 5.7.2 and these are for walls exposed to fire on either one or both sides.

To satisfy the structural adequacy provisions a wall must have an axis distance of 10mm for 30 minutes FRP and 55mm or 60mm for 240 minutes FRP. The axis distance is the cover to the longitudinal steel plus half of the bar diameter. **Mortarless** masonry units are designed to achieve the maximum required axis distance for all reinforcement.

It should be noted that the required thickness of a wall for any particular FRP increases as the ratio of the applied load to the load capacity increases.

For compliance with Table 5.7.2 a 140 **mortarless** wall would not achieve an FRP greater than 180 minutes 90 minutes and a 200 **mortarless** wall would not achieve an FRP greater than 180 minutes.

### Maximum Slenderness:

Clause 5.7.3 states that any wall required to have an FRP must have a slenderness ratio (ratio of effective height to thickness) not exceeding 40.

Clause 5.7.4 outlines the effect that chases have on the FRP of any wall. The design engineer needs to give careful consideration to walls designed as spanning in two directions.