

## Erection of concrete panels on low-strength slabs

### Precautions to be taken when installing brace footings on concrete slabs at an early age.

This advice relates to the design of brace footings where concrete panel braces are to be fixed to floor slabs or independent pad footings of 150mm or greater thickness.

If the concrete footing thickness is less than 150mm thick, other safety factors must be considered by an engineer.

Concrete strength at any time is greatly influenced by its age and method of curing. For example, after 24 hours air-cured concrete, without admixtures, may only achieve about 10 per cent of its specified characteristic strength.

The anchors used for fixing brace footings consist of a cast-in ferrule into which the brace is later bolted. When anchors are installed in concrete slabs that have not achieved the required strength, they may fail by pulling out under moderate loads. This may lead to catastrophic failure of the wall panel, resulting in death or serious crush injuries to workers.

### Control measures

Under the Pre-Cast and Tilt-Up Concrete for Buildings industry standard, the minimum concrete

strength required for brace footings at the time of installation, must be at least 20MPa, unless specifically designated otherwise. This must be verified in writing.

Projects specifically designed and documented by the designer may use a lower strength of concrete for erection of braces.

Where a specific design is undertaken for a brace footing to be fixed into concrete at low strength, the designer – in conjunction with the builder, formwork company and panel erector – need to consider the following variables that may reduce safety of the designed brace footing:

- how the required minimum concrete strength can be achieved prior to the erection of the panels
- concrete curing method to be used onsite
- ferrule placement tolerances
- dislodgement/misalignment of ferrules during concrete placement.

In addition, the designer needs to give consideration to:

- ensuring that panel braces, fixings and footings are designed to have a minimum capacity of 10kN

- ensuring that any modifications to ferrules, (including welding), are approved in writing by the ferrule manufacturer

- designing the ferrule inserts to have a minimum embedment depth of 150mm.

**Note:** Ferrules should also be designed and manufactured to ensure that their designed failure mode is via cone failure of the concrete, not via direct pullout. This will usually require some form of enlarged base of the ferrule.

The builder, formwork company and panel erector should:

- implement and maintain a documented sign-off system by a competent person on all slab and anchor details before each pour [see checklist overleaf]
- verify the minimum concrete strength required before panel erection has been achieved under site conditions.

**Contact your organiser or the CFMEU OHS Unit for assistance.**

# Cast-in Ferrule checklist

## Placement of precast elements to early-age concrete slabs

This checklist applies to concrete which has achieved less than 20MPa compressive strength at time of precast installation.

Project: \_\_\_\_\_

Principal/Head Contractor: \_\_\_\_\_

Subcontractor/s Responsible: \_\_\_\_\_

Designing Engineer: \_\_\_\_\_

Designated Pour Area Inspected: \_\_\_\_\_

Item	Detail	Yes	No	N/A
1	Project-specific engineered design in place			
2	Cast-in ferrule assembly embedment depth in concrete: minimum 150mm			
3	Any alteration to cast-in ferrules agreed to by ferrule manufacturer and meet engineer's specifications and Australian Standards			
4	Cast-in ferrules in correct position for bracing arrangement			
5(a)	Cast-in ferrule reinforcement steel configuration to design			
5(b)	Confirm reinforcement, e.g. N12 through-bar, mesh, base plate etc., or combinations (as per design drawings)			
<b>HOLD POINT</b>	<b>Above details have been checked &amp; verified by competent person:</b> Sign: ..... Date: ..... /..... /.....			
6	Concrete testing conducted			
<b>HOLD POINT</b>	<b>Testing laboratory has verified that minimum concrete strength (as per design) has been achieved:</b> Actual MPa achieved Footing/Slab: ..... .....Actual MPa achieved Panel: ..... ..... Subcontractor Sign: ..... Date: ..... /..... /.....			
7	This checklist made available to all relevant parties (e.g. HSR, Panel Erector, other)			
<b>HOLD POINT</b>	<b>Principal/Head Contractor has verified all above details:</b> Sign: ..... Date: ..... /..... /.....			

**NB: All items on this checklist are to be completed and verified as compliant prior to precast placement to designated pour area.**

### Representative of Subcontractor Responsible:

Name (Print): \_\_\_\_\_

Signature: \_\_\_\_\_ Date:        /        /