NATIONAL PRECAST
CONCRETE ASSOCIATION AUSTRALIA

Guidance Note
In-situ to precast connections

A common way to connect in-situ concrete members to precast elements (or sometimes to connect two precast elements) is to anchor the reinforcement bars of the in-situ member in the precast element using headed inserts. The most common application for this detail is the connection of in-situ slabs to precast-wall-panels.

It has been brought to our attention that some engineers are detailing a possible non-compliant use of threaded inserts (also referred to as ferrules) for this application. We recommend you pass this information on to your engineers.

As members will know, threaded inserts are designed for fixing steel or other architectural elements to precast concrete or temporary bracing and propping. In general, these inserts have a short embedment depth, which is not designed to anchor the tension capacity of a reinforcement bar.

When engineers use standard threaded inserts to anchor reinforcing as starter bars, the failure load of the concrete surrounding the anchor will be lower than the tensile capacity of the bar.

This would not comply with the design intent of AS 3600 and AS 5100, both of which require a ductile failure mode (AS 3600 19.3.1 (c): “Fixings shall be designed to ield before ultimate failure in the event of overload”)

It has been reported to us that there have been several failures around Australia - particularly with post-tensioned floors - because of the large stresses that can be developed. The following issues are of concern:

1. Cast-in headed anchors must develop the design capacity of the bar they are anchoring, and the connection must fail in a ductile manner;

2. To be code compliant the area of the anchor head must be greater than or equal to 4 times the cross section of the bar (AS 3600 – section 13.1.4); and

3. Published data suggests that cutting a metric thread into N-grade reinforcing bars downrates them to the equivalent of 2 bar-sizes smaller, e.g. N24 threaded to M20 is equivalent to N16.

The following detail does not develop the full capacity of the connected reinforcement bar and therefore does not comply with AS3600 – section 19.3.1 (c).

Both Leviat and Reid Construction Systems supply headed anchors that can comply with the design intend of AS 3600. Reidbar inserts in conjunction with Reidbar and Leviat KSN Anchors in conjunction.

Concrete design strength, centre-to-centre spacings, edge distances and embedment depth of the anchor have an influence on the design capacity of the connection, thus these connections should be designed by an engineer with relevant experience.

For the correct design and detailing of headed anchors refer to your supplier's technical information or contact their technical support.