

# Safety and health alert

## 33/00 Wrong bracing inserts cause tilt-up panel collapse

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### Incident

A 7.2 metre tilt-up wall panel weighing approximately 8 tonnes collapsed on a construction site when the bolts securing the temporary braces to the footings failed without warning. Fortunately, no one was beneath the outside of the panel when it toppled.

### Factors

Preliminary investigations indicate that the wrong type expansion anchors were used to connect the panel's temporary braces to their concrete footings.

The type of expansion anchors specified by the designer were **high-load slip, load controlled anchors** which have a working load of at least 60% of the first slip load. **This type is suitable for structural tensile loads.**

The expansion anchors actually used were **low-load slip, thin-shield anchors** which do not reliably retain more than 20-30% of the initial pre-load and can fail suddenly without warning. For these reasons, **the manufacturer warns against using them for structural tensile loads.**

In addition to the anchors being the wrong type, they were also the wrong length, being approximately 35mm shorter than the minimum embedment depth specified by the design engineer.

Also, a standard mix, rather than an early-age mix of concrete was ordered for the footing pads. Consequently, the footing pads had not cured long enough to achieve the minimum required strength before the panel was erected.

### Recommendations

**Designers** of tilt-up panels are to specify cast-in inserts for brace fixings wherever possible. Expansion anchors should only be specified in situations such as where the braces are to be fixed to a pre-existing concrete slab. Where expansion anchors are required, they must have a rating of at least 0.6 (60% of initial pre-load) and be recommended by the manufacturer for tensile structural loads.

Further reference should be made to AS3850.1-1990 and AS3850.2-1990.

**Contractors** with management and control of the panel erection to ensure that:

- concrete footing pads for braces have attained their specified strength before panel erection commences;
- the inserts provided for the erection are the exact type and the exact size specified by the shop drawings; and



- the person directly supervising the panel erection holds an appropriate certificate of competency for rigging. The minimum nationally uniform certificate class for this type of work is **Intermediate Rigging** (Class Code RI).

The rigger in charge of the panel erection to carry out a physical check of the insert locations, the bolts and anchors before the braces are fixed. Where any of these do not fully conform to the shop drawing, erection of the panel should not proceed without written authority from the design engineer.

Also refer to SIS 13/2000 on the issue of "fake bolts".

## Further Information

Further information can be obtained from the WorkSafe internet site [www.worksafe.wa.gov.au](http://www.worksafe.wa.gov.au), or by contacting customer service on 1300 307 877 or email: [safety@docep.wa.gov.au](mailto:safety@docep.wa.gov.au).

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