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THE USE OF VERY SMALL UNDERCUT CONCEALED ANCHORS ON GRC/FC BUILDING FACADES

The use of these anchors has proved to be very popular and successful all over the world for the attachment of various types of thin face sheet material to a supporting metal frame facade system. However, I do think there is significant risk associated with the system. There is definitely potential safety in the large number of fixings involved for any, say, 1.2 m square panel but I suggest that the risk significantly increases as the panel size reduces. I certainly do not recommend them for attaching "facade features" added to the outside of the face sheeting e.g., tiles or brick slips. There is no chance of adequate redundancy in safety due the limited no of anchors possible in such a small item.

There is limited formal guidance available in Australia or Europe (none for GRC) but BS 5385 does advise that any facade system that attaches face materials to a building must have appropriate mechanical fixings to prevent separation. There is nothing wrong with undercut anchors as a general rule but I consider fixings as illustrated in *Figure 1* to be far too dangerous and not in accordance with good building practice (for more details, see the British Standard 5385-1: 2018). A flying facade sheet say 1.2 m square is still definitely dangerous but a flying brick slip or tile would be extremely dangerous, falling from say 2 m let alone 3 m for any person of any age, also causing significate damage to parked vehicles.



A. Ready to be inserted undercut fixing into a façade sheeting prior to tightening the nut to thrust the "grip ring" into the hole in the façade sheeting.



B. Based on the information available and testing witnessed by me, I suggest that the rigidity of the "grip ring" makes it inefficient to allow proper bonding (skin friction) to the surrounding sheet material to a satisfactory level of safety.

Figure 1. A Typical and Very Small Undercut Concealed Anchor

In 1985, I worked for GFRC Texas in the USA and they introduced me to a fixing system that they had developed for the attachment of tiles to the face of their GRC panels. Ten years later, I used the same American fixing system for the attachment of tiles in the late 1990s at 140 Sussex Street, Sydney, see *Figure 2*.

In 2003, the building changed ownership and structural/façade alterations were made to the building. During those alterations I was able to examine the condition of the fixings for the tiles and they were in perfect condition. That detail I subsequently included in the NPCAA Manual for the Design, Manufacture and Installation of GRC in Australia for which I was Technical Editor in 1999, see *Figure 3*.



Figure 2. GRC Façade with Face Tiling at 140 Sussex Street, Sydney in 1998



Figure 3. Extract from NPCAA – Design Manufacture and Installation of GRC

I refer to an article presented in the Geelong Advertiser dated 28 June 2024 which lacks clear explanation but certainly relates to brick tiles attached to the face of a building which the article declares are delaminating and will require total replacement. The article is confusing but whatever system was used obviously lacked the appropriate mechanical bonding to the structure behind, as presented. There was no reference made to undercut concealed anchors in the article.

One of my clients in Victoria recently informed me that the undercut anchors in *Figure 1* (or similar) were recently recommended to them to attach brick slips to GRC panels which they themselves were to build. They refused. I confirm that under no circumstance would I consider the detail to be safe and in accordance with good building practice. Further, I do not recommend any fixing which is simply embedded within the depth of a 12 - 23 mm GRC/FC skin without a washer plate and nut set behind the face skin. Once again the danger of poor adhesion between the bolt and GRC/FC skin is too high even when the work is done with care. Epoxy setting is also not acceptable. I respectfully suggest that none of them are a true mechanical fixing.



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