T-31 Anchors in 2 cm Stone ◄ ► My Opinion

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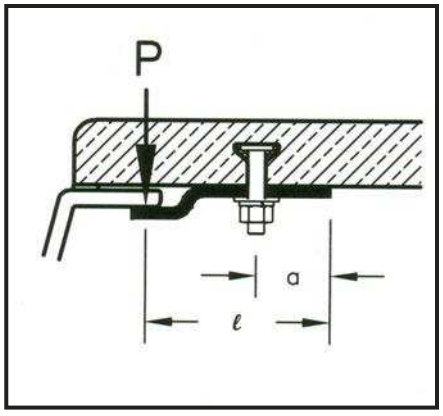
Q. We are using some T-31 anchors in 2 cm stone to anchor our sink clips. What kind of strength do these have?

A. The capacity of an anchor in stone is almost always governed by the stone, and not the anchor. I've seen that particular anchor produce ultimate capacities of as little as 100 lbs, and as great as 800 lbs, depending on the stone in which it is installed. There is no way of accurately predicting it without testing some in the actual stone material. Once you have a known value for the anchor in the stone (divided by an appropriate factor of safety), you also need to factor in your clip design to determine carrying capacity. Often overlooked is the load increase at the anchor due to the leverage of the clip. In the accompanying sketch, there is a given load on the



clip (referenced as "P"), but the load on the anchor is greater than that due to the leverage of the clip. The load on the anchor in this case would actually be $(P \cdot \ell) \div a$.

Q. I'm looking through the design manual trying to find a description of the processes used to create various finishes and I'm not finding them. Where are these defined?

A. In most cases, we don't attempt to define the processes in the Dimension Stone Design Manual. The intent is to describe the resultant finish, but leave the details of the process up to the manufacturer. Depending on the finish, there may be more than one way to create it, and we don't feel it is the place of the trade association to dictate how the finish is created, only to define it to the extent that the consumer can understand the product that they are purchasing. The manufacturer should be allowed to develop and use the most efficient and economical means of creating that finish.

Q. I'm the architect of record on a project with some granite cladding bands. The subcontractor submitted shop drawings showing the dead load of the granite being carried by anchors near the top of the panels, with the anchors at the bottom carrying wind loads only. This is ridiculous – this means the stone is hanging in tension – and it's only 1¼" thick! Everyone knows that masonry materials shouldn't be in tension! I need a letter from the Institute clarifying that this is an unacceptable practice.

A. No, I would not call the practice unacceptable, nor would I consider it to be all that uncommon. When we think of the traditional, load bearing masonry construction practices in use for centuries, there does seem to be something intuitively illogical about placing a quasi-brittle material such as stone in a constant tensile stress state. Yet today we use natural stone in much different configurations than the traditional, specifically in the case of thin-stone cladding. Let's take a look at the stresses experienced by this panel – if it's 4'-0" high x 2'-0" wide, with the top, deadload bearing anchors 6" from the top edge, the bottom anchors carrying lateral loads only at the bottom edge. Let's assume a 1¼" panel thickness and a 30 lbs/ft² (which is relatively mild) windload.

The portion of the stone hanging below the deadload anchors is 42", and density of a granite is roughly $1/10^{th}$ of a pound per cubic inch, so the tensile stress due to the stone hanging from the support anchors is just over 4 lbs/in².

If we are to look at the flexural stress due to windload, it calculates to about 170 lbs/in², or more than 40 times the stress due to gravity loads! If there would be a crack, open vein, or any other feature in this panel that would reduce its soundness, it would fail due to windload long before it would fail due to gravity load. As long as this is a properly selected, sound panel, the tensile stress resulting from its self-weight is negligible.