

292 MASONRY: COMPONENTS TO ASSEMBLAGES

DISCUSSION

ANCHOR CONNECTIONS OF STONE SLABS; J.E.Amrhein, R.H.Hatch and M.W. Merrigan.

Question: (Edward O. Benovengo, Skidmore, Owings & Merrill, New York, NY)

Though it appears that the code requirement for lateral loads applied to a stone panel, it is also a requirement for the stone to resist a sustained lateral wind pressure. Pending on stone face size and quantity of anchors, this load stress can exceed the twice gravity load values.

Answer:

Amrhein - Chapter 30 of the Uniform Building Code requires that "anchored veneer and its attachments shall be designed to resist a horizontal force equal to twice the weight of the veneer" as a minimum force. If the actual forces are greater than this due to wind suction at peaks and corners of a building, the actual forces must be used in the design. Information provided in the paper provides this opportunity.

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Stresses in stone anchor pockets and cutouts can change due to the profile of the cut cross section, radiused transitions have lower stress build-up than sharp corners. Did the stone specimens have all radiused or all sharp edged cutouts? If both were used, did the test results vary between these two types?

Answer:

Amrhein - There were no slots with radius ends. The kerfs were continuous across the specimen, the specimens were either one inch wide or three inches wide. If the kerf slot was a circular cut this would be stronger than a continuous horizontal cut in the stone.

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Do the tests described follow a specific standardized testing method? If so, please identify. If not, then it would be desirable to describe the procedure more completely.

Answer:

Amrhein - We are not aware of any specific ASTM test procedures for this connection test. What the test consisted of was uniform application of load as per ASTM load application, and loaded to failure. Tests set ups were arranged so that there would be direct tension or shear on the connection.

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It would be desirable to state the tolerance or oversize dimensions for the anchor holes and/or cutouts. Were the anchors all snug fit, or where were the anchors loose versus snug fitting.

Answer:

Amrhein - The revised paper provides the information on tolerances. All anchors has a loose fit or may have been wedged in after they have been placed in the slot or hole.

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The stones used in the testing are identified by the common trade names, it would be more informative (and accurate) to also identify the quarry source for all stones. Only then would the actual results have full meaning and accuracy. It is a common practice in the stone industry to use a single name for many different sources of a given stone, and it has been shown that different quarries will have stone of varying properties.

Answer:

Amrhein - To identify the quarry source would not provide much additional information as stones from different locations in a quarry may have significant variation in properties. In the revised paper we included the mineralogical names and classified the specimens by group. All specimens were Group A which would be marble and stones unimpaired by weakened planes with very little variation in fabrication quality. Stone are selected based upon their quality and thus are grouped.

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Question : (Edward A. Benovengo, Skidmore, Owings & Merrill,
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Is "Monotonically" used in the proper context? How can a load be applied incrementally and simultaneously be a constant or "Monotonically".

Answer:

Amrhein - The load was applied in increments and in one direction only. No reversal and no dynamic forces were applied.

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Question: (Edward A. Benovengo, Skidmore, Owings & Merrill, New York, NY)

Where the bent bar (dowel) type anchor bolts set in a cement or epoxy? If so please indicate. By using the term "Bolt" do you mean to say that the anchors were threaded?

Answer:

Amrhein - The bent bar is actually a bent threaded rod. And it was set in epoxy. We have changed reference from Bent Bar to Bent Bolt in the paper.