

Beyond Blocks and Bricks

Number Seventeen

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Rebar Hygiene

The design of reinforced masonry—clay or concrete—follows much of the design methodology for poured-in-place reinforced concrete. Many of the design requirements found in the Building Code Requirements for Masonry Structures (The “530 Code”) were modeled after requirements found in ACI-318, “Building Code Requirements for Reinforced Concrete.” The requirements are similar because poured-in-place, reinforced, Portland cement concrete is very similar to reinforced clay or concrete masonry.

In both types of construction, reinforcing bars are in almost identical environments; a deformed steel bar is wrapped in a concrete or a grout formed of Portland cement and aggregates. A difference is that the maximum size of the aggregates in reinforced masonry is generally smaller than those found in poured-in-place concrete. Aggregates are smaller in reinforced masonry because there is less room between the bars and their forms—the walls of the cells of the bricks or concrete blocks—and grout with larger aggregates cannot flow between the rebar and the walls to fill the cells.

Because the conditions of use are similar, requirements for rebar hygiene are similar for poured-in-place concrete and reinforced masonry. Bars must be free of “...mud, oil, or other materials that will adversely affect or reduce bond...” Rust and mill scale are allowed if the underlying bar dimensions meet the requirements of the ASTM standards. Essentially, this means that the deformations on the bars must be intact. (The loads that a system can carry depend upon the bond between the concrete or grout and the reinforcing bars. The bond between concrete or grout and smooth bars is far less than the bond between concrete or grout and deformed bars. The design of reinforced systems assumes the use of deformed bars.)

The requirements for maintaining the deformations are clear, and any mud, oil, and other stuff must be removed. Is there, though, an amount of mud, oil, or other stuff that does not “adversely affect or reduce bond”? Squeaky clean is expensive, but poor bond affects the strength of the structure. Acting in a properly conservative manner, architects and engineers often require squeaky clean.

Back in 1998, The Aberdeen Group tested contaminated rebar and came to some surprising conclusions: rust, cement spatter, oil, form-release agents and bond breakers do not affect bond. The Magazine of Concrete Construction recently established a link to that research at

http://www.concreteconstruction.net/Images/How%20Clean%20Must%20Rebar%20Be_tcm45-348356.pdf

Why might you be interested? Because a seller of reinforcing bars may help a customer convince an engineer that the bars do not require cleaning. (And, because the bars, which had been rejected by the engineer, will not be returned to the seller's yard for credit.)