Kettle Correction

A typographical error appears in our advertisement in the April issue of *Modern Steel Construction* and in the 2005 NASCC final program. In the hot dip galvanizing industry, we often refer to our individual plants as "kettles." In our advertisement, we were trying to let the industry know that presently we have the largest facility in the galvanizing industry. Our ad agency mistakenly stated this in our ad as "the largest kettle in the United States." This statement was incorrect, and we apologize for any misunderstanding it may have caused. Everyone in the steel industry knows about the "Super Kettle" that A+ Galvanizing operates in Kansas. We regret that they may have been slighted, and we certainly have not come close to the size of galvanizing kettle that they offer. We thank the many *MSC* readers who brought this issue to our attention.

—Terry Wolfe, National Vice President, Sales and Marketing
Voigt and Schweitzer, Inc.

Anchor Rod Dilemmas

A reader sent in this response to December 2004's SteelWise article on anchor rods, which listed solutions to common anchor rod and base plate dilemmas:

Two of the 17 solutions do not appear to be in accordance with ACI 318-02, Appendix D (Anchorage to Concrete). Solution 9 says you shouldn't transfer shear with anchor rods, but ACI 318-02, App. D specifically addresses several shear-related limit states (none of which include a shear key or embedded plate).

Solution 13 contends that straight-headed rods have a larger shear cone for pull-out strength than hooked rods, but ACI 318-02, App. D makes no such distinction in their equation for pull-out strength.

—via e-mail

Kurt Gustafson, S.E., P.E., AISC's Director of Technical Assistance, responds:

Solution 9: The AISC approach looks at how the shear load is introduced into the anchor rod and the consequences of the eccentric shear load as causing bending in the rod. The AISC reasoning is that with base plate hole diameters (see Table 14-2 in the *LRFD Manual of Steel Construction*, Third Edition) being much larger than the anchor rod, it is unlikely that many of the rods, if any, in a base connection will ever bear against the side of the hole.

If the base plate has a grout pad of any substantial thickness and a rod does bear against the base plate, then bending will be introduced in the rod in addition to the shear. The bending capacity of the rods is limited and thus the shear that can be safely applied will also likely be very limited. This is discussed in Appendix B of AISC's *Design Guide 1—Column Base Plates*.

I do not believe that ACI 318 Appendix D addresses how the shear load is introduced into the anchor rod or the consequences of any induced eccentricity. I believe Appendix D simply gives the limit states to be checked in the anchorage, including the steel strength of the anchor in shear, as well as the various concrete limit states.

Solution 13: The explanation for the condition in Solution 13 does not mention the shear cone developed as being different for headed bolts than for hooked rods. It is not the shear cone that is the underlying factor in this recommendation. The pullout strength in tension is based on the crushing under the embedded head (or hook) of the anchor, not on the embedment depth. The two anchor types are treated differently by ACI 318 Appendix D as can be seen in Equations (D-13) and (D-14) of that document.

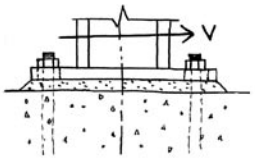
Another factor of the rod pullout may also relate to the surface coating of the anchor. Does ACI 318 explicitly contemplate that the embedded item may be a rod that has been threaded and has a coating of the threading oil remaining on the surface? This is a fairly standard condition for the anchor rod case. The oil can exacerbate the pullout of the rod from the concrete in a combination mechanism of a little crushing of the concrete at the corner of the bend, and the progressive bending and slipping of the rod out of the concrete. Hence, our recommendation that hooked rods not be relied upon to resist a calculated tensile force. ★

To read the rest of the SteelWise on anchor rods, visit ***www.modernsteel.com****, and browse to "Back Issues," December 2004.*

Solution 9

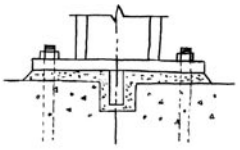
Common Mistake

Using anchor rods to transfer substantial shear. Anchor rods cannot be expected to transfer shear forces due to their larger holes and the use of grout.



Easy Solution

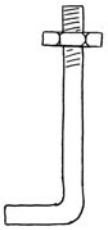
Consider a shear key or an embedded plate. A shear key or embedded plate with welded side plates can be used to transfer a large horizontal shear force from the column base to the foundation.



Solution 13

Common Mistake

Specifying hooked anchor rods for axial loads. Because a hook can straighten and pull out, hooked rods should not be used for axial loads. Exceptions include using them to prevent overturning caused by erection loads or collisions during erection.



Easy Solution

Use anchor rods that are headed or threaded at the end for axial loads. Use rods that are headed or threaded at the end with a nut for anchorage. Because of the bigger shear cone, these have a greater pullout strength.