ICC EVALUATION SERVICE

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To: ICC-ES Evaluation Committee

From: Brian Gerber

Date: June 10, 2010

Subject: Proposed revisions to the ICC-ES Acceptance Criteria for Shrinkage Compensating Devices, Subject AC316-0610-R1 (BG/JS)

MEMO

In response to the request for public comments in our May 13, 2010, staff letter on the subject criteria, the following correspondence was received:

1. Letter from Commins Manufacturing, Inc., dated June 1, 2010.
2. Letter from Simpson Strong-Tie, Inc., dated June 1, 2010.

After reviewing the comments received, staff offers the following observations:

Commins Manufacturing: When tested in accordance with AC316, tension-controlled shrinkage compensating devices, unlike compression-controlled shrinkage compensating devices, often exhibit failure in the connected steel rod rather than the device itself. The proposed proof tests are intended to verify that the interface between the rod and the TCSCD adequately exceeds the peak strength, not allowable tensile strength, of the rod, based on procedures currently used to establish compatibility of steel nuts with rods or bolts. By confirming the proof load performance, the probability of failure of the connection is controlled by the more ductile strength of the rod.

Responding to the comment from Commins that the allowable design loads resulting from the proposed revisions are greater than needed, the inverse appears to be occurring under the current version of AC316, where a relatively large factor of safety (three) is applied to steel threaded rods which, as mentioned previously, are typically the limiting factor in the testing. On the other hand, Section J.6 of AISC 360 specifies a safety factor, Ω, of 2.00 for tensile rupture in the net cross-section of the threaded rod.

Simpson Strong Tie: Section 1.4.5: As explained in references such as ASTM A 563 for steel nuts, the proof stresses are understood to be at least 140 percent of the ultimate tensile strength of the connected steel rod, not the allowable tensile strength.

Section 3.1.1: The 1.4 factor denominator of Eq-1 provides a factor of safety more closely in line with value of three assigned to compression-controlled shrinkage compensating devices and tension-controlled shrinkage compensating coupling devices. One could argue for a reduction in

the factor, since a 140 percent margin against failure must be maintained during the proof tests in accordance with ASTM F 606. The reason for this observation is that global factor of safety against failure of the device is 3.92, which is the factor of safety against failure of the connected steel rod shown in proposed Eq-1, 2.8, multiplied by the 1.4 margin against failure taken from the proof tests.

Slippage: It has been observed in recent tests of devices that localized slippage occurred prior to attainment of the peak load. It was also noted that if the slippage occurred at low levels less than the allowable strength, the load-deflection relationship is nonlinear, and proportionately reducing deflection based on the ratio of the applied load to the maximum allowable load may not be accurate. Staff is requesting input on whether such performance should be considered unacceptable; or should the practice of reducing the deflection to design load levels be discouraged by utilizing the maximum published value in design without reduction?

Other: It was observed that the term “proof load” has two different meanings in the current proposal. Therefore, it is suggested that Sections 4.1.2.1 and 4.1.2.3 be revised to change the term “proof load” to “reference load.”