January 1 2015

Technical Bulletin

Re: AC-316 Acceptance Criteria for Shrinkage Compensating Devices
Vertical Displacement Limits for Tie-down Systems
Approved June 2013, Section 6.9. Previously approved June 2012, June 2011, February 2011, June 2010, October 2009, June 2008, June 2005, October 2005

Historically there have not been any acceptance criteria for shear wall tie-down systems other than AC-391 but it addresses Wind Uplift only. This is mainly due to the fact that all elements in the shear wall tie-down system are designed per code other than proprietary shrinkage compensating devices evaluated through AC-316.

Guidelines for continuous tie-down design in shear wall systems have been published. There are jurisdictions that currently have prescriptive limits, but the vertical displacement limit as well as the lack of continuity and justification in the prescriptive development left questions unanswered.

Continuous tie-down system for resisting shear wall overturning was discussed at several ICC-ES hearings, and in April of 2012, a revision to AC-316 Section 6.0 was proposed in the ICC-ES Alternate Agenda process to limit their vertical displacement to 0.20 inch for each story. Responses and comments were presented to the ICC-ES Public Hearing in June 2012, in Los Angeles, CA. It was determined that setting a prescriptive total vertical displacement limit between connectors was needed, and that AC-316 was the logical Acceptance Criteria to address it. It was also decided that the Engineer of Record (EOR) should be able to determine if the prescriptive limits could be exceeded. Therefore the ICC-ES agreed to add Section 6.9 as follows:

> *"When the devices are used in continuous rod systems that resist light-frame shear wall overturning forces, calculations shall be submitted to the code official confirming that the total vertical displacement, which would include steel rod elongation and the shrinkage compensating device deflection, is less than or equal to 0.20 inch (5 mm) for each story, or between restraints, whichever is more restrictive, using allowable stress design (ASD). Shear wall drift limit calculations shall consider the 0.20 inch (5 mm) vertical displacement limit.* ***This 0.20-inch (5 mm) vertical displacement limit may be exceeded when it can be demonstrated that the shear wall story drift limit and the deformation compatibility requirements of IBC Section 1604.4 are met when considering all sources of vertical displacement."***

Visit www.icc-es.org for copy of AC 316

The total drift of a shear wall should be determined by the EOR and must be within the limits set by code/standards. This should be the case regardless of any prescriptive limits set by any jurisdiction.
The Seismic Drift limits for shear walls are those in ASCE/SEI 7 Table 12.12-1 and the Wind limit of H/180 has been added to ICC-ES Evaluation reports.

Summary: In order to provide definitive limits for vertical displacement in Tie-Down System and to provide the most economic structural design of for a project;

1) **EOR can apply the 0.2 inch vertical displacement limit on the tie-down rod system then calculate and confirm the corresponding shear wall drift is within the Code allowed drift limit.**

   or

2) **EOR can calculate the lateral drift of the shear wall that includes consideration of the total vertical displacement due to tie-down rod systems as well as lateral loading and all other contributing factors then check that the Code allowed drift limit is not exceeded. If the lateral drift is within the Code allowed shear wall drift limit, then the EOR is allowed to have the 0.2 inch limit removed.**

Please contact us at 1-951-245-9525 for any further assistance.