Clark County Department of Building & Fire Prevention

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Division:	Plans Exam, Engineering, & Inspection	**Code Interpretation**	BD-CI-038
Subject:	ANCHOR BOLTS IN LIGHT-FRAME CONSTRUCTION	**Effective Date:**	09/13/2011
Code:	2009 IBC 1908.1.9 ACI 318-08 sections D.3.3.4, D.3.3.5, D.3.3.6	**Revised Date:**	

A. CODE REQUIREMENT

IBC Section 1911.1 requires that the capacity in tension and shear of anchor bolt cast in concrete due to seismic force shall be determined in accordance with ACI Appendix D.

ACI D.3.3.4 and D.3.3.5 require the attachment that the anchor is connecting to the structure shall be designed so that the attachment will undergo ductile yielding at a force level corresponding to anchor forces no greater than the design strength associated with concrete failure modes.

ACI D.3.3.6 allows an alternative to D.3.3.4 and D.3.3.5 if the design strength of the anchors reduces to 0.5 times of the design strength determined in accordance with D.3.3.3 for anchor of stud bearing wall.

B. INTERPRETATION

The design professional may assume that the attachment will undergo ductile yielding which complies with D.3.3.4 and D.3.3.5 for the cast-in-place anchorage of wood-frame sill plates on structural walls in light-frame construction with small edge distance. The design shear values from table 1 may be used when the following conditions are met.

- Typical cast-in-place "L-bolt," minimum 7-inch embedment.
- Bolt diameter of nominal ½ inch or ⅝ inch.
- Standard or 3-inch square plate washer with standard nut.
- Bolts assumed to act in pure shear, loaded parallel to wood grain and free edge of concrete, min edge distance of 1.75 inches.
- Bolt corner distance minimum 8 inches.
- Preservative-treated wood sill plate (2x4, 2x6, 3x4, 3x6, etc.).
- Foundation minimum f'_c=2500 psi, conventional or pre-stressed concrete.

Table 1. Anchor Bolt Shear Values, Parallel to Grain (C_D =1.6)

	Bolt Diameter	
Sill Plate	½"	⅝"
2x	1040	1488
3x	1232	1515

1. Values are shown in lbs. (ASD basis)
2. The values are shown for seismic; no additional increase in value is allowed.

For other conditions, the shear value shall be determined in accordance with ACI appendix D and NDS 11.3.

C. RATIONALE

Based upon the SEAOC Report on Laboratory Testing of Anchor Bolts Connecting Wood Sill Plates to Concrete with Minimum Edge Distances, the connection will yield at the wood sill plate prior to the formation of a concrete limit state when loaded parallel to a concrete edge. In other words, the strength of the concrete exceeds the strength of the wood.

Related Policies and Procedures - BP-CI-039 Sill Anchorage – Plate Washers

Revision History:

POLICY #	TITLE	Effective Date	Revised	Reviewed
BD-CI-038	Anchor Bolts In Light-Frame Construction	September 13, 2011		
BD-CI-038	Anchor Bolts In Light-Frame Construction			November 5, 2012
BD-CI-038	Anchor Bolts In Light-Frame Construction			September 4, 2013

Approved by:	Concurred by:
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