

March 8, 2009

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Subject: Comment Responses to “Proposed Acceptance Criteria for Fiber-reinforced Polymer (FRP) Composite Systems Used to Strengthen Use to form Wood- or Cold-formed Steel Framed Shear Walls, Subject AC416-0210-R2 (BG/BNH)”

Dear Mr. Gerber:

I have attached a line item response to the comments posted February 8, 2010 regarding the acceptance criteria AC416. The comments are to be discussed June 12-15, at the Evaluation Committee Hearing. Please see below.

1) Section 1.2: Should the systems be evaluated for out-of-plane loads as well as in-plane loads?

Evaluation for out-of-plane bending is not required. The intention of this criteria is to address in-plane performance .

2) Section 2.2.5: For material properties, AC416 defers to the ICC-ES Acceptance Criteria for Concrete and Reinforced And Unreinforced Masonry Strengthening Using Externally Bonded Fiber-reinforced Polymer (FRP) Composite Systems (AC125). Concerning the extents of the material properties, which include bond or adhesion of the FRP composite material to concrete or masonry, the staff assumes all mandatory properties set forth in AC125 will be investigated in accepting the FRP composite material. In AC416, the substrates intended for rehabilitation may be wood- or gypsum-based, which may have degraded or have contaminants present. Therefore, AC416 should include specific provisions for verifying of bond of the FRP composite material to the unique substrates for conditions beyond the scope of AC125.

The FRP composite material to be used in accordance with AC 416 should meet the material properties as defined in the following AC 125 sections:

5.8, 5.9, 5.10, 5.11, 5.12, 5.14, 5.15, and 5.16.

AC416 is intended as a bond critical application. Proper mechanical anchorage, such as nails and screws should be considered to develop the forces in the FRP composite material. Therefore specific provisions for verifying the bond of FRP composite material to a unique substrate will not be required.

3) Section 3.3: How are effects of aging of the wall materials, which may be subject to differences in construction techniques such as taping of joints, represented in the prototype

assemblies shown in Table 1? Also, certain details such as fastener type and size should be described for the prototype assemblies.

The aging of the wall materials is structurally insignificant. However, the plaster and drywall products will be left at least 48 hours to complete most of their curing. The primary shear resisting elements of the retrofitted panel includes the FRP composite working with the framing elements; the former cures within 36 hours and testing will occur after such time has elapsed..

4) Section 3.4: This section was revised to indicate that the reference deformation Δ should be taken from monotonic tests in accordance with ASTM E 564. The staff questions whether preliminary cyclic tests conducted per ASTM E 2126 could also be used to estimate Δ .

Preliminary cycles conducted per ASTM E2126 would not be used to estimate the reference Δ . ASTM E2126 does however suggest methods to estimate the reference deformation. Therefore monotonic test procedures as prescribed in ASTM E 564 or the methods suggested in ASTM E2126 should be adequate in finding the reference deformation.

5) Section 3.6.1: A question is raised on the amount of data, such as the number of tests that are needed to develop an idealized force-deformation pushover curve.

The number of tests that are needed to develop an idealized force-deformation pushover curve should be done in accordance with Section 3.4, item a, of the proposed AC416.

6) Section 4.2: Detailed information on rehabilitation, including repair of existing building elements and on-site testing, should be included in the evaluation report, and provisions addressing the need for such information should be included in AC416. The details should include substrate preparation, use of primers, climatic conditions, setting time, and installation of anchorage.

Holes or damaged surfaces should be left as is. The primary shear resisting elements will include the FRP composite for tension and the Framing elements for compression.

7) Section 4.3: This section refers to AC178 for inspection and testing during installation of the FRP composite system. AC178 pertains to FRP composite systems applied to concrete or masonry. More details may be needed, either in AC416 or AC178, to address use on framed walls.

The following sections from AC178 should be referenced in AC 416.

Section 2

Section 3 with the exemption of 3.2 and 3.12

Section 4

Section 6 with the exemption of 6.4

Section 7

Section 8

Section 9 with the exemption of 9.3

Section 10

8) Section 5.0 c and d: It is not clear how the m-factors to be added to Tables 2 and 3 are applied in design. For example, are the factors intended to be multipliers for the existing shear wall capacities as defined in ASCE/SEI 41?

The M-factors would not be multipliers to the existing shear wall capacities as defined in ASCE/SEI 41-06. They will be multipliers to the expected strengths as defined in Section 8.3.2.2 of the ASCE/SEI 41-06

If you should have any questions regarding these comments, please do not hesitate to contact me at your convenience.

Best Regards,



Project Engineer
Fyfe Company LLC