

**HR Engineering, Inc.**

1418 E. Market St., Suite B
York, PA 17403

15 December 2008

Dennis Lowman
Town & Country Industries
400 West McNabb Road
Ft. Lauderdale, Florida 33309

RE: Florida Evaluation Report, 12" Storm Panels, 2007 FBC

Dear Mr. Lowman;

The following Town & Country Industries product, 12" Effective Width, Storm-Loc Galvanized Shutter System has been tested in accordance with the 2007 Florida Building Code, Section 1609.1.2 *Protection of Openings*. The testing was done at Architectural Testing, Inc., and the results are in their report 66919.02-401-44. Structural testing in accordance with ASTM E 330-02 was performed on 6 different specimens with varying spans and end support conditions. Allowable pressure results varied with the span lengths and end support conditions. Then impact and cycling testing in accordance with ASTM E 1886-02 and E1996-02 was performed on each of 7 specimens with similar spans and end support conditions to those in the structural tests. All specimens, with the exception of one, achieved Missile Level D and Wind Zone 3 (50 fps and 9# 2x4) in the impact and cycling testing.

Panel material is roll formed steel sheet, 24 gage (0.024" thick), with 2" deep profiles, and 12" effective width. Panels function as single span, one way, bending members, usually installed vertically, but can be installed to span horizontally. Panels attached directly to the walls around an opening are referred to as "Wall Mount". Panels that are inserted into end connections that are then attached to walls are referred to as "Build Out". A special installation condition "Egress Panel" has a bottom plate that is easy to remove. Additional details of the panel and mountings are shown on the installation drawings.

Based on the above test results, I have performed comparative analyses to determine the allowable design wind pressures for spans ranging from 4'-0" to 12'-0". From a review of the testing, I determined that the mounting, which is the support condition, is the critical factor. So, the analyses are based on not exceeding the support condition reactions in the tests, and allowable design pressures vary with the inverse of the span length. The "Wall Mount" condition is the strongest, and the single test was used to

determine allowable loadings for each span. Four different "Build Out" specimens were tested with three of them having different end conditions at head and sill. The weakest of the four were actually two types with the same results, 3" extended "H" at the head plus build out angle with studded angle at the sill, and 3" extended "F" at the head plus build out angle with studded angle at the sill. All of the "Build Outs" were grouped together using these lowest test results. Two different "Egress Panel" specimens were tested. The weakest, "U" track at the head plus "E" track at the sill, was used in the analyses. The results of the comparative analyses are in a load/span table on the installation drawings.

Using rational analyses, I have developed installation fastener spacing for a variety of anchors into substrates of concrete, hollow masonry block, and wood. Since the panel load/span table was developed using constant end reactions for each of the 3 installation types, "Wall Mount", "Build Out", and "Egress Panel", the fastener spacing remains constant for all spans. The allowable loads for each fastener type are based on test results supplied by the fastener manufacturers. The allowable loads are then divided by the end reactions per unit width to obtain fastener spacing. A practical maximum spacing of 18" was used in the anchor schedules. The 3 anchor spacing schedules for concrete, hollow masonry block, and wood are included on the installation drawings.

A limiting factor for these panels is that they are not qualified for the High-Velocity Hurricane Zones. These storm panels are not air permeable, so do not have a minimum required spacing between panel and glazing. The installation drawing load/span table allowable design wind pressures are in conformance with the 2007 Florida Building Code, Section 1609, *Wind Loads*. I trust that this information is sufficient for your needs. If there are any questions about this evaluation report, or if anything additional is required, please contact me.

Sincerely yours;

Allen N. Reeves

Allen N. Reeves, P.E.

Structural Engineer

Florida License No. 19354

16 DECEMBER 2008

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