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Attn.: Mr. Michael Petersen

FROM : T.M. Shingler, P.E.
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President
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DATE : February 3, 2005

SUBJECT : 2" TITE-LOC Plus Roof Panel @ 18" wide
x 0.032" Aluminum
ASTM E-1592 Procedure for the Determination of
Wind Uplift Capacity @ 2.0 ft & 5.0 ft o/c clips

TEST PROCEDURE : ASTM E-1592
STANDARD TEST METHOD FOR THE STRUCTURAL PERFORMANCE OF SHEET METAL ROOF AND SIDING SYSTEMS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE

PURPOSE : To determine the Ultimate Wind Uplift Capacity of the submitted metal roof system when fastened at various panel clip spacings.

TEST DATE : July 9, 2002, (3 spans @ 5.0 ft o/c)
June 7, 2002, (7 spans @ 2.0 ft o/c)

TEST SPECIMEN : 2" TITE-LOC Plus Roof Panel @ 18" wide
x 0.032" Aluminum

TEST CHAMBER : Composed of a floor mounted reinforced aluminum frame capped with simulated purlins consisting of 16 gage steel hat sections in combination with steel wide flange beams designed to support the test specimen. The test pressures were applied to the specimen via a 4 mil plastic film designed to accurately configure to the panel profile and give both the panel shape and the sidejoint elements full degree of freedom during the loading process.

PURLIN MEMBERS : 16 gage steel hat-sections bolted to the top flange of W6 x 15 wide flange beams, placed at 5.0 ft or 2.0 ft centers to represent the maximum and minimum purlin spacing extremes for the roof panel being tested.

PRESSURE INDICATOR : Two (2) Digital Pressure Indicators manufactured by Micro-Pneumatic Logic, Inc. with a full-range accuracy of 1/10" H2O and traceable to the National Bureau of Standards

DIGIMATIC CALIPER : Mitutoyo Series Model No. CD-12" CP with a full-range accuracy of 0.001 in.

INSTALLATION : The system was inverted and panels were installed with two (2) piece sliding clips which were screw-attached to the top flanges of the 16 gage steel hat sections using two (2) 1/4-14 x 1 1/4" long self-drilling screws with a #2 drill point.
Side joints consisted of mating male/female interlocking ribs via electric power seamer.
Continuity fasteners were located at the extreme ends of panels and consisted of single self-drilling screws driven into the panel flanges.
One end of the mock-up had panel fastening to simulate a "fixed" end, with the opposite end "free".
A transparent/flexible plastic film (Visqueen @ 4 mils thick) was applied over panels at the edges and ends of the panels and sealed with duct tape to every configuration to create a vacuum seal. Lateral joints were also taped the entire length of the panel to ensure vacuum seal.

PROCEDURE : The individual panels were installed into the test chamber as a six (6) panel wide array per standard field techniques. Specific deflection measurement targets were established on key panels.
These targets and their locations are illustrated on an enclosed sketch.
Two (2) identical pressure gages were installed onto the test chamber for cross checking of test pressures and insuring accuracy of pressure data.

Initially the system was preloaded to (-) 5 psf to insure proper seating of the panels, clips and plastic film.
After the preloading process, initial deflection measurements were taken at the six (6) key panel locations. These initial deflection readings represented the zero position/zero load specimen status from which all readings were referenced.
Individual data sheets and graphic plots of the deflection readings are enclosed with this report.

A "step loading" procedure was used with pressure increments as indicated on enclosed data sheets.

At each incremental pressure level, the test pressure was maintained for an excess of sixty (60) seconds.

After the sixty (60) second pressure "hold" period, measurements were recorded at each of the six (6) critical panel locations.

Also during this time period....broad-flat areas of the panels, sidejoints and clips were visually checked for signs of localized distress.

At the end of each pressure "hold" phase, the test chamber was returned to a zero pressure status and deflection measurements were once again recorded to check for meaningful "set" in the system.

Ever-increasing pressure values were applied and deflection values recorded both at the pressure as well as at zero.

This procedure continued until the Ultimate Uplift Pressure of the panel or a panel system component demonstrated "distress".

The Allowable Uplift Capacity for the tested panel system is the Ultimate Uplift Pressure divided by a Factor-of-Safety of 2.00.

The Allowable Uplift Pressure for the panel system was established at 2.0 ft & 5.0 ft, with intermediate Allowable Uplift Pressures being determined via linear interpolation between the two (2) test-established extremes.

E-1592 TEST RESULTS :

Span, ft.	Ultimate Pressure, psf	Allowable Pressure, psf
2.0	104.5	52.2
5.0	42.1	21.0

ALLOWABLE WIND UPLIFT LOAD/SPAN CHART :

Panel Span, feet	Allowable Wind Uplift Pressure, psf
2.0	52.2
2.5	47.0
3.0	41.8
3.5	36.6
4.0	31.4
4.5	26.2
5.0	21.0

General Notes :

1. The Allowable Pressure is the Ultimate Test Pressure divided by a Factor-of-Safety (Load Factor) of 2.00

2. The published Allowable Wind Uplift Pressure considers panel buckling strength, sidejoint disengagement resistance and clip/sidejoint interactive strength only.

3. The clip-to-substrate fastener capacity must be investigated by a Florida-registered structural engineer and consider the clip pry coefficient where applicable.

4. Tests were conducted by Farabaugh Engineering & Testing, Inc. in strict accordance with the ASTM E-1592 procedure.

******** END OF REPORT ********