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6 October 2020

Ahmad Nana
NANA WALL SYSTEMS, INC.
100 Meadowcreek Dr. #250
Corte Madera, CA 94925

RE: Florida Eval. Report, FBC 2020, SL 70

Dear Ahmad,

The following Nana Wall Systems product SL 70 has been tested, both inswing and outswing units, in accordance with Florida Building Code 2020 Section 1709.5.1 *Exterior windows and doors.* Structural testing was done to ANSI/AAMA/NWWDA 101/I.S.2/A440-08. Testing was done at Architectural Testing, Inc., 2524 E. Jensen Ave., Fresno, CA 93706 and is reported in F1649.02-301-44 with raised also known as (higher weather performance) sill, F1649.08-301-44 with raised sill and F1649.09-301-44 with saddle sill. All 3 units tested were 10'-0" high. Based on these tests, I have done comparative analyses, the results of which are shown in the allowable design wind loading curves on the next 3 pages. SL 70 is a thermally broken, aluminum framed, glazed, folding wall panel system. In order to achieve the wind loading in the curves, there must be a 2" polyamide cap at the end of each aluminum locking rod.

Glazing for the tested units was for use outside the Wind-Borne Debris Region, and it was 15/16" thick insulating glass with both panes 5/32" tempered. I have designed 2 additional glass systems for use in areas outside the Wind-Borne Debris Region. One is a insulated glass unit with two equal panes of 1/8" thick tempered glass. The other is a single pane unit with 3/16" thick tempered glass. I have analyzed the panel size tested and the four extremes of the panel sizes in the wind loading curves, using ASTM E 1300-09, in conformance with FBC Section 2404.1 *Vertical glass.* These 3 systems are adequate for all of the sizes and wind loads in the curves.

Raised sills and recessed sills were installed in the specimen tested. A variety of other sills are available, including flush and surface mounted. These sills would similarly carry windloading to the substrate as the saddle sill. Therefore, any of these other sills for this system will be adequate for the wind loadings in the curves. The set of curves on page 2 are with raised sills negative loads inswing units and positive loads outswing units. The set of curves on page 3 are with saddle and other sills, negative loads inswing units and positive loads outswing units. The set of curves on page 4 are with raised sills positive loads inswing units, are with raised sill negative loads outswing units, and are with saddle and other sills positive loads inswing units, and negative loads outswing units.

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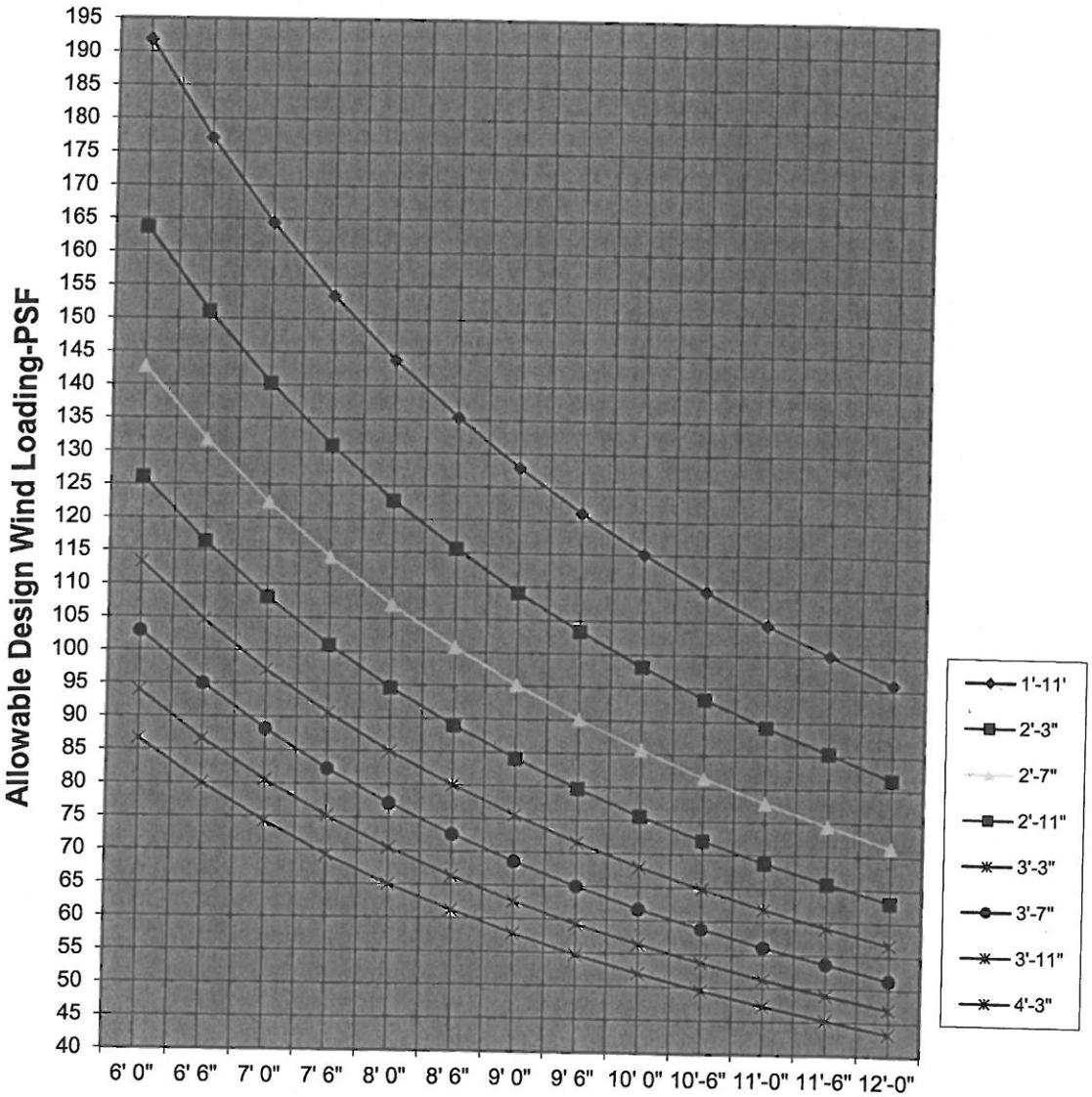
Negative Inswing & Positive Outswing - Raised Sill Only



Panel Height

SL 70 Reinforced Aluminum Framed Panel System

Curves represent some typical panel widths

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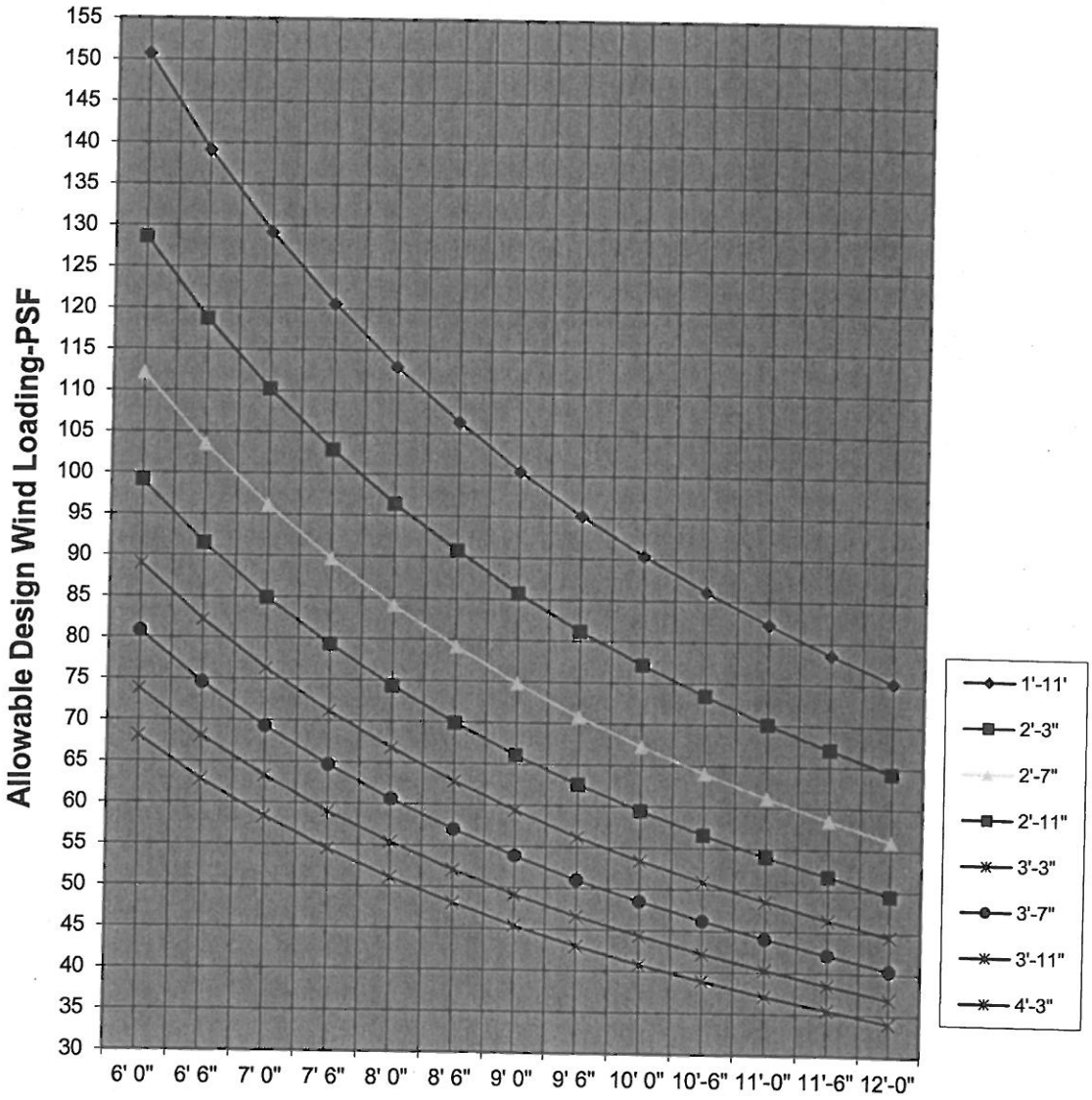
Negative Inswing and Positive Outswing with Saddle and Other Sills



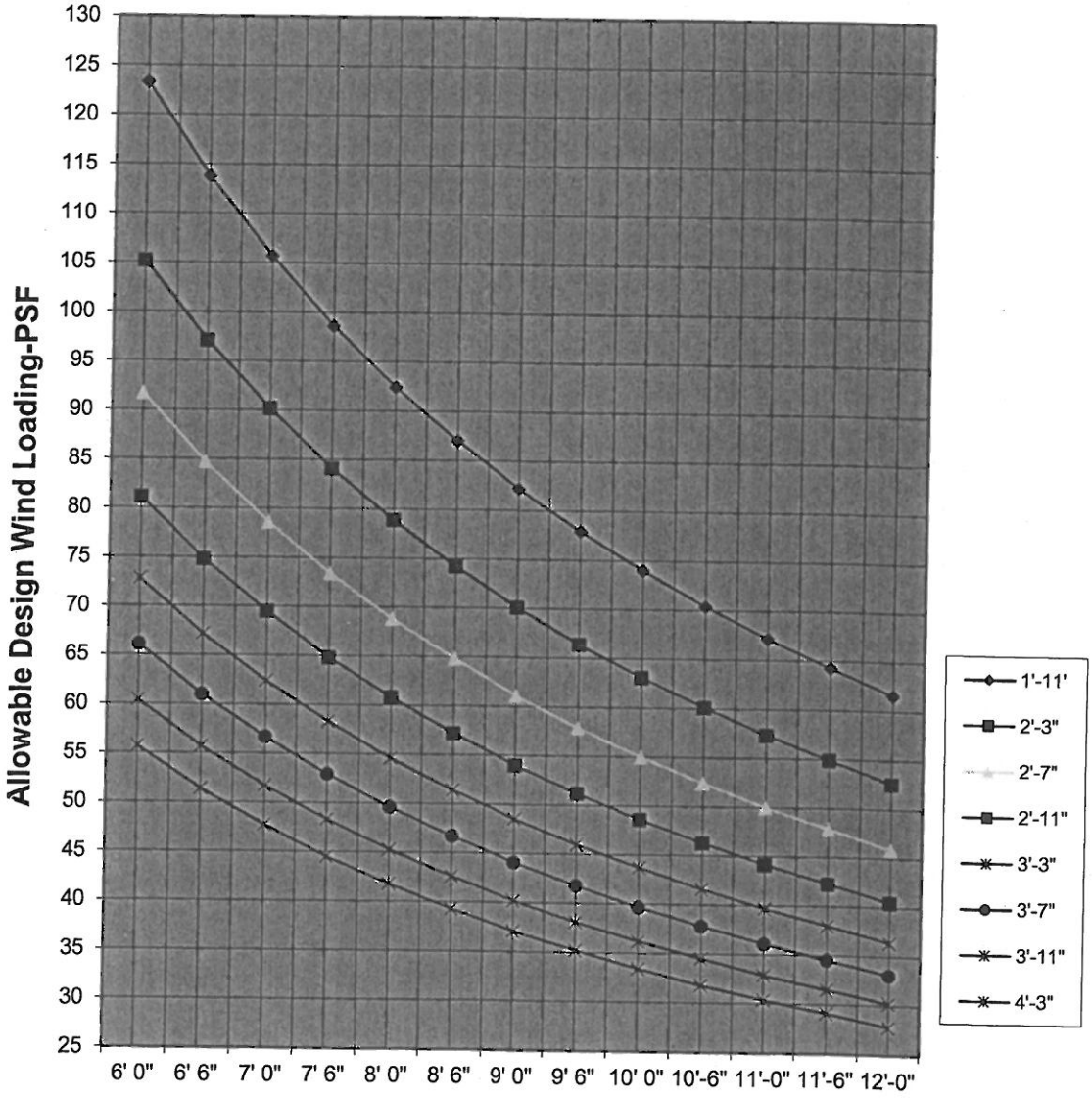
Panel Height

SL 70 Aluminum Framed Panel System

Curves represent some typical panel widths

NANA WALL SYSTEMS, Inc.

Positive Inswing, Negative Outswing - Raised Sill, Positive Inswing, Negative Outswing Saddle and Other Sills



SL 70 Aluminum Framed Panel System

Curves represent some typical panel widths

The SL 70 System is composed of repetitive panels, all the same size. Each panel transfers wind loading to the frame through the locking rods or rollers located at all panel corners. The locking rod is the critical structural member. So, once the allowable wind loading is determined for a panel, this same allowable wind loading would apply to any number of equal sized panels installed side by side in the system. For a unit with different panel sizes the allowable wind loading of the largest panel will govern, The 3 tested units all had the same panel sizes, 3' 2-7/8" wide by 9' 8-3/4" high. All units had 4 panels, 1L3R. Each unit had 2 swing panels and 2 bi-fold panels. Two units had raised sills, and 1 unit had a saddle sill. Two units opened inward, and one unit opened outward.

This system can be installed as either straight or segmented. The segmentation can be anywhere in the range from 90 degrees (a square corner), to 180 degrees (a straight line). Experience has shown that segmented installations are somewhat stronger than straight, due to arch action in compression ad tensile field action in tension.

I have calculated the required installation fasteners for four different substrates to meet the wind loadings in the curves. These fasteners are installed through the sill, jamb, and head frames so that they are loaded in shear. The installation fastener designs include consideration of each substrate strength and bending of the fasteners in the air gaps. AT the head and sills there are 3 fasteners at each panel corner, starting 3" from the corner and spaced 3" from each other. At the jambs, there are 6 fasteners, evenly spaced. This design produces more installation fasteners than were used in the structural tests.

Wood substrate installation must be of Southern Pine, or wood of equivalent specific gravity. Installation fasteners are to be #14 (0.242" diameter), cut thread, wood screws with a minimum embedment of 2-1/2". This penetration will allow for full shank thickness through the air gaps. Fastener material must be Series 300 stainless steel with a minimum bending yield stress of 70,000 psi.

Steel substrates must be a minimum of 4/1" thick structural steel. Installation fasteners must be ¼" diameter self drilling screws. Fastener material must be Series 300 stainless steel with a minimum bending yield stress of 100,000 psi.

Masonry block substrates can be light weight or medium weight block, but must have cells grouted full around system openings. Installation fasteners must be ¼" diameter ITW Buildex Scots Tapcons with series300 stainless steel heads, built in washer, rubber EPDM sealing washer, and carbon steel shank. The shank must have a minmum yield stress of 100,000 psi. Fastener minimum embedment must be 1" and minimum edge distance must be 4".

Concrete substrates must have a minimum 28 day compressive strength of 2,000 psi. Installation fasteners are to be ¼" diameter ITW Buildex Scots Tapcons with a minimum embedment of 1-1/2" and a minimum edge distance must be 1-1/2".

Installation fasteners go through the struts and thermal barrier at the sill, jambs, and head. This installation procedure is recommended in the Nana Wall installation instructions and suggested installation drawing, and was used in the structural test specimen. For details of this, see sill, jamb, and head details, plus note 5 on the installation drawing. Additional details are shown on an 11" x 17" installation drawing by HR Engineering, latest revision 3 October 2017.

All structural analyses mentioned in this evaluation report was done by myself in a separate 24 page report titled *SL 70 Thermally Broken, Aluminum Framed, Glazed, Folding Wall Panel System; 2020 Florida Evaluation.* The structural analyses included earthquake loads in conformance with 2020 FBC Section 1613. Wind loads governed over earthquake loads for all aspects.

A limiting factor for this product as described in this evaluation report is that it does not qualify for use in the Wind-Borne Debris Region. I trust that this evaluation report is sufficient for your needs. If there are any questions about this report, or if anything additional is required, please contact me.

Sincerely yours,
HR Engineering, Inc.

Allen N. Reeves

Allen N. Reeves, P.E.
Structural Engineer
Florida License No. 19354
12 Oct. 2020

ANR:anr Cc:20090001