Subject: Fw: Ply Gem-FL15087, FL15108, FL15138, FL15147
From: Alan.Hoying@plygem.com
Date: 4/27/2012 7:43 AM
To: areeves@hreng.com, Regina Hoover <rhoover@hreng.com>

Allen/Gina,
FYI.

Alan Hoying
Code & Regulatory Manager
Ply Gem Siding Group

2615 Campbell Road, Sidney, OH 45365 | p: 937-498-6720 | f: 937-498-6127
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----- Forwarded by Alan Hoying/SOMA/SIDING/PLYGEM on 04/27/2012 07:45 AM -----

From: "Ted Berman, P.E." <ted@tedbermanllc.com>
To: Alan.Hoying@plygem.com
Cc: "P.E. Simon Segal" <simon@tedbermanllc.com>, TBA <rana@tedbermanllc.com>
Date: 04/26/2012 08:47 PM
Subject: Re: Ply Gem-FL15087, FL15108, FL15138, FL15147

Mr. Hoying,

The disagreement between us and your evaluator has reached the point of no further discussion. We disagree on all of Mr. Reeves points. We are placing your subject Florida Product Approval applications on the May/June 2012 POC Agenda as a discussion item to be heard by the POC. You will be noticed by us and posted on the BCIS website the date, time and place of the discussion for you to participate.

717-846-3747

Fax 717-846-0355

HR Engineering, Inc.

1541 E. Market St.
York, PA 17403

23 April 2012

Alan F. Hoying, Manager- Code & Regulatory
Plygem Siding Group
2405 Campbell Road
Sidney, Ohio 45365-9529

RE: Soffits without Pressure Equalizaton

Dear Alan;

This letter is in response to the Comment 2., dated 19 April 2012 of Simon Segal, P.E. review to FL15087 Plygem/Mastic, FL15147 Plygem/Georgia-Pacific, FL15138 Plygem/Napco, and FL15108 Plygem/Variform vinyl soffits concerning use of the pressure equalization factor. The pressure equalization factor was developed in recognition of the fact that porous cladding materials, such as vinyl siding, do not receive the total wind load if sheathing is placed directly behind them. Some of the wind loading passes through the porous siding and is resisted directly by the sheathing. If there is no sheathing directly behind vinyl siding, the vinyl siding is required to resist the entire wind load.

Annex A1. of ASTM D 3679 provides for installations with and without sheathing, along with design formulas for each. Paragraph A1.2.1 says in part; "a certain amount of pressure equalization occurs through residential siding products installed with sheathing under high dynamic pressures. In light of this pressure equalization, the design pressure in ASCE 7-02 windload standards is reduced by a factor of 0.36." Paragraph A1.2.3 says in part; "For applications where the siding is installed over open studding, rapid pressure equalization does not occur. In these applications, the load the siding will see is equal to the total design pressure."

The first pressure equalization factor for vinyl siding was developed in 1980 from a test program at Pittsburgh Testing Laboratory. This was incorporated into Annex A1. of ASTM D 3679. In 2002, a research project was done at Architectural Testing's main laboratory at 130 Derry Court, York, PA 17402 for the Vinyl Siding Institute. This test program included 24 wall assemblies, each subjected to 9 pressure equalization tests. From the results of these tests, and including a factor of safety of 2.0, the new pressure equalization factor of 0.36 was established. The results of this work are reported in ATI 01-40776.01 with test dates from 25 March 2002 until 16 July 2002. The new pressure equalization factor of 0.36 was then placed in Annex A1. of ASTM D 3679.

Since the soffit work we have done for this Florida application does not have sheathing behind the soffits, no pressure equalization factor was included. If sheathing is placed behind the soffits, then use of the pressure equalization factor would be appropriate. However the installations shown on your installation drawing and described in your Evaluation Reports are the standard used in the soffit industry. All modern building codes require soffits to be vented, so that air will flow through them into the attic space. Sheathing would prevent this air flow. So, all soffit manufacturers advertise and sell only vented installations.

Structural testing of vinyl soffits and siding to ASTM D 5206 forces all the load on the soffit and siding. If sheathing is present during testing, holes are cut in it so that all the load passes through. Plastic film is placed behind, and in contact with, the siding or soffit, so that all the load must be resisted by the vinyl product. The tests are always taken to 1.5 times the design load, the factor of safety required in Section 1715.9 of the 2010 Florida Building Code.

In summary, the pressure equalization factor is just a method to take into account the load sharing effects of vinyl siding, or soffits, and the sheathing behind. None of the Plygem/Mastic, Plygem/Georgia-Pacific, Plygem/Napco, or Plygem/Variform soffit installations have sheathing behind. So, pressure equalization factor should not be used in calculating the allowable design wind pressure on Plygem/Mastic, Plygem/Georgia-Pacific, Plygem/Napco, or Plygem/Variform soffits.

I trust that this response is adequate for the review. If there are any questions about this response, or if anything additional is required for the project, please advise us.

Sincerely yours;
HR Engineering, Inc.

Allen N. Reeves

Allen N. Reeves, P.E., SECB
Structural Engineer
Florida License #19354
23 APRIL 2012
ANR:anr
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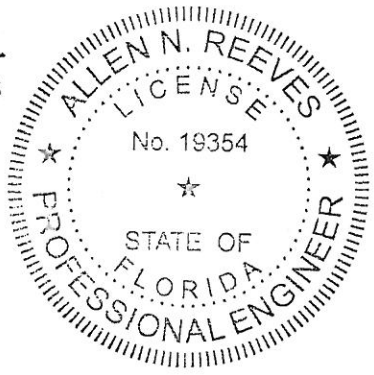

Subject: Fw: FL15087
From: Alan.Hoying@plygem.com
Date: Fri, 20 Apr 2012 09:20:22 -0400
To: areeves@hreng.com, Regina Hoover <rhoover@hreng.com>

Allen/Gina,
FYI

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----- Forwarded by Alan Hoying/SOMA/SIDING/PLYGEM on 04/20/2012 09:22 AM -----

From: "Ted Berman, P.E." <ted@tedbermanllc.com>

To: alan.hoying@plygem.com, Roberto Lomas <rllomas@lrlomaspe.com>

Cc: "Ted Berman, P.E." <ted@tedbermanllc.com>, TBA <rana@tedbermanllc.com>, Simon Segal <simon@tedbermanllc.com>

Date: 04/19/2012 12:35 AM

Subject: FL15087 PLYGEM/MASTIC 11100020-6 SOFFITS

Dear Product Approval Applicant,

A review of your Florida Product Approval Application has the following comment(s):
2. 1. Missing hardcopy of Validation Checklist signed and sealed by Validator after revision.
2. Evaluation report indicates the use of ASTM D3679 Annex A1. This annex allows a 0.36 pressure equalization factor that increases the design pressure above tested values and if used is contrary to the required safety factor of 1.5 on Sect. 1715.9 of the 2010 FBC. In addition, Annex A is based on installation with sheating. The details show self supporting PVC.

Designation: D 3679 – 06a

An American National Standard

Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Siding[1]

This standard is issued under the fixed designation D 3679; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification establishes requirements and test methods for the materials, dimensions, warp, shrinkage, impact strength, expansion, appearance, and windload resistance of extruded single-wall siding manufactured from rigid (unplasticized) PVC compound. Methods of indicating compliance with this specification are also provided.

1.2 The use PVC recycled plastic in this product shall be in accordance with the requirements in Section 4.

1.3 Rigid (unplasticized) PVC soffit is covered in Specification D 4477.

1.4 Siding produced to this specification shall be installed in accordance with Practice D 4756. Reference shall also be made to the manufacturer's installation instructions for the specific product to be installed.

NOTE 1—Information with regard to siding maintenance shall be obtained from the manufacturer.

1.5 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information purposes only.

1.6 The following precautionary caveat pertains to the test method portion only, Section 6, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 2—There is no known ISO equivalent to this standard.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 374 Test Methods for Thickness of Solid Electrical Insulation

D 618 Practice for Conditioning Plastics for Testing

D 635 Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer

D 883 Terminology Relating to Plastics

D 1042 Test Method for Linear Dimensional Changes of Plastics Under Accelerated Service Conditions

D 1435 Practice for Outdoor Weathering of Plastics

D 1600 Terminology for Abbreviated Terms Relating to Plastics

D 2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

D 2457 Test Method for Specular Gloss of Plastic Films and Solid Plastics

D 3892 Practice for Packaging/Packing of Plastics

D 4226 Test Methods for Impact Resistance of Rigid Poly-(Vinyl Chloride) (PVC) Building Products

D 4477 Specification for Rigid (Unplasticized) Poly(Vinyl Chloride) (PVC) Soffit

D 4756 Practice for Installation of Rigid Poly(Vinyl Chloride) (PVC) Siding and Soffit

D 5033 Guide for Development of ASTM Standards Relating to Recycling and Use of Recycled Plastics

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.24 on Plastic Building Products.

Current edition approved Sept. 1, 2006. Published October 2006. Originally approved in 1979. Last previous edition approved in 2006 as D 3679 – 06.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard.**

D 5206 Test Method for Windload Resistance of Rigid Plastic Siding
E 631 Terminology of Building Constructions
E 1753 Practice for Use of Qualitative Chemical Spot Test Kits for Detection of Lead in Dry Paint Films
G 147 Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests

2.2 *ASCE Standard:*

ASCE 7-02 Minimum Design Loads for Buildings and Other Structures[3]

3. Terminology

3.1 Definitions are in accordance with Terminologies D 883, E 631, and D 1600, unless otherwise specified.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *center-pinning*—an installation technique in which the siding panel is fastened tightly through the nail slot at the center length of the panel, in order to cause thermal expansion and contraction to occur equally in both directions from the center.

3.2.2 *nominal*—the value that a manufacturer consistently uses to represent a specific property or dimension of a vinyl siding product in public claims including, but not limited to, product literature, advertisements, quotations, and certificates of conformance.

3.2.3 *process average thickness*—the rolling, arithmetic mean of average specimen thicknesses measured according to 6.5 for a specific product during all productions runs for the most recent six month period.

3.2.4 *temperate northern climate— in weather testing*, a North American metropolitan area testing site located within 73 to 100°W longitude and 37 to 45°N latitude.

3.2.5 *vinyl siding*—a shaped material, made principally from rigid poly(vinyl chloride) (PVC), that is used to clad exterior walls of buildings.

3.2.5.1 *Discussion*—Any exception to a homogeneous rigid PVC compound is present in a coextruded or laminated capstock.

4. Materials and Manufacture

4.1 The siding shall be made of one or more layers of poly(vinyl chloride) (PVC) compound. Any layers of materials other than poly (vinyl chloride) (PVC) compound shall be kept to less than 20% by volume.

4.2 Where rigid PVC recycled plastic as defined in Guide D 5033 is used, the siding containing the PVC recycled plastic shall meet all of the requirements of Section 3, Terminology; Section 4, Materials and Manufacture; and Section 5, Physical Requirements.

4.3 The poly(vinyl chloride) siding material, when tested in accordance with Test Method D 635, shall not exceed an average extent of burn of 4 in. (100 mm), with an average time of burn not to exceed 10 s. A minimum sample thickness of 0.035 in. (0.9 mm) is required. **Warning—** The flammability testing data, conclusions, and recommendations of Test Method D 635 related solely to the measurement and description of properties for classification of the poly(vinyl chloride) siding material in response to flame under controlled laboratory conditions and shall not be used for the description or appraisal of the fire hazard of vinyl siding under actual fire conditions.

4.4 The PVC compound when extruded into siding shall maintain uniform color and be free of any visual surface or structural changes, such as peeling, chipping, cracking, flaking, or pitting.

4.5 The PVC compound shall be compounded so as to provide the heat stability and weather exposure stability required for the siding market application.

4.6 PVC siding shall not contain elemental lead (Pb) or compounds of that material other than traces incidental to raw materials or the manufacturing process. This limitation applies to both PVC substrate and to any cap or film material. Compliance with this requirement shall be demonstrated by one of the methods in 6.16

5. Physical Requirements

5.1 *Length and Width*—The nominal length and width of the siding shall be as agreed upon between the purchaser and the seller. The actual length shall not be less than ¼ in. (6.4 mm) of the nominal length and the actual width shall be within ±1/16 in. (1.6 mm) of the nominal width when measured in accordance with 6.3 and 6.4.

5.2 *Thickness*—These requirements pertain only to measurements of the portions of the siding that are exposed after installation of the panel, measured in accordance with the procedure in 6.5. The average thickness of each specimen shall be no less than 0.035 in. No individual measurement shall be thinner than 0.003 in. below the nominal thickness. The process average thickness as defined in 3.2.3 shall be no thinner than 0.001 in. below the nominal thickness.

5.3 *Camber*—A full length of siding (typically 10 or 12 ft (3.05 or 3.61 m)) shall not have a camber greater than ⅛ in. (3.2 mm) when measured in accordance with 6.6.

5.4 *Heat Shrinkage*—The average heat shrinkage shall not exceed 3.0 % when determined by the method described in 6.7.

5.5 *Impact Resistance*—Siding shall have a minimum impact strength of 60 in.·lbf (6.78 J) when tested in accordance with 6.8.

5.6 *Coefficient of Linear Expansion*— The siding shall have a coefficient of linear expansion not greater than 4.5 by 10^{-5} in./in./°F (8.1 by 10^{-5} mm/mm/°C) when tested in accordance with 6.9.

5.7 *Gloss*—The gloss of smooth and embossed siding shall be uniform across the exposed surface. Variations in the glossmeter readings for smooth siding shall not be more than ±10 % or ±5.0 points (whichever is greater). Variations for embossed siding shall not be more than ±20 % or ±10.0 points (whichever is greater). Gloss of smooth and embossed siding shall be tested in accordance with 6.11.

5.8 *Surface Distortion*—The siding shall be free of bulges, waves, and ripples when tested to a minimum temperature of 120°F (49°C) in accordance with the procedure in 6.12. This distortion is called "oil-canning."

5.9 *Color*—The color of the siding shall be within the defined color space parameters for the specific color agreed

[3] Available from the American Society of Civil Engineers, 1801 Alexander Bell Dr., Reston, VA 20191–4400.

L_f = Longest length in which the panel is produced
L_t = Actual length of the panel as tested

6.15.6 *Acceptable Performance*—When tested according to this procedure, the result of ($E_t \times 2$) + 0.25 in. for each of the 3 samples for each profile shall not be greater than the width of the nail slot. If the manufacturer's installation instructions require the panel to be center-pinned, the result of E_t+ 0.25 in. for each of the 3 samples for each profile shall not be greater than the width of the nail slot.

6.16 *Lead Content*:

6.16.1 Testing for lead content shall be conducted on extruded siding using a rhodizinate-type lead swab test kit conforming to Practice E 1753. Testing shall be performed in accordance with the test kit manufacturer's instructions. The siding shall be deemed to comply with 4.6 if the test shows a negative or not-detected result; that is, the test does not indicate the presence of lead. The test shall be conducted separately on the substrate and on any cap or film material.

6.16.2 As an alternative to the method in 6.16.1, and as a means of resolving any ambiguous results from that method, an analytical method capable of detecting lead at least as low as 0.02 percent by sample weight shall be employed. Under this alternative, neither the substrate nor any cap or film shall contain a concentration of lead in excess of 0.02 percent by weight.

7. Product Marking

7.1 In order that purchasers may identify siding conforming to all requirements of this specification, producers and distributors shall include a statement of compliance in conjunction with their name and address on product labels, invoices, sales literature, and the like. The following statement is suggested when sufficient space is available:

This PVC siding conforms to all the requirements established in ASTM Specification D 3679, developed cooperatively with the industry and published by ASTM.

Full responsibility for the conformance of this product to the specification is assumed by (name and address of producer or distributor).

7.2 The following abbreviated statement is suggested when available space on labels is insufficient for the full statement: Conforms to ASTM Specification D 3679 (name and address of producer or distributor).

8. Packing, Packaging, and Package Marking

8.1 The siding shall be packed in such a manner as to provide reasonable protection against damage in ordinary handling, transportation, and storage.

8.2 Provisions of Practice D 3892 shall apply to this specification.

9. Keywords

9.1 plastic building products; plastic weatherability; recycled plastic; rigid PVC siding; specification

ANNEX

(Mandatory Information)

A1. WINDLOAD RESISTANCE TEST DESIGN FACTORS

A1.1 *Windload Criteria:*

A1.1.1 ASCE 7-02 is the basis for determining the design pressures used in this test method. The velocity pressures, q, used in this test method have been computed using the following equation:

$$q = 0.00256\, K_z K_d V^2 I \ (lb/sq\,ft)$$
$$= 0.613\, K_z\, K_d\, V^2 I \ (N/m^2)$$

where:

V = wind velocity, mph (km/h). The basic wind speed corresponds to a 3–s gust speed at 33 ft (10.1 m) above ground in exposure category C, as described in ASCE 7–02. A velocity of 110 mph (177 km/h) was used in this specification. (See Note A1.1)

I = "importance factor" as described in ASCE 7-02. A value of 1.0 was used.

K_z = "velocity pressure coefficient" as described in ASCE 7-02. A "K_z" of 0.70 was used in the wind pressure calculations, which is the value from ASCE 7-02 for an elevation of 30 ft (9.1 m) above ground level and Exposure Category B.

K_d = "wind directionality factor" as described in ASCE 7–02. A "K_d" of 0.85 is used.

The velocity pressure = −18.43 lbf/ft^2 (882 Pa).

NOTE A1.1—In ASCE 7-02 the default wind speeds are given for exposure category C, and a table is provided to adjust this wind speed for other exposure categories. Since most vinyl siding is installed on buildings located in exposure category B, the velocity pressure coefficient, K_z is included in the equation to make this adjustment

A1.1.2 ASCE 7-02 recommends various internal and external pressure coefficients, which include gust response factors. These coefficients vary with the effective area of the cladding component, the location of the cladding component relative to

building corners, and the configuration of the building (open versus enclosed). The internal and external pressure coefficients are taken from Figure 6–5 and Figure 6–11A of ASCE 7–02. The effective area is taken as 10 square ft (the area of one piece of siding), an enclosed building is assumed, and factors for the building corners are used. The pressure coefficients are as follows:

$$\text{Internal Pressure Coefficient} = \pm 0.18$$

$$\text{External Pressure Coefficient} = +1.00 \text{ and } -1.40$$

The design pressure is calculated by multiplying the velocity pressures by the algebraic sum of the internal and external pressure coefficients.

A1.2 *Design Pressure:*

$$\text{Positive Design Pressure} = (18.43)(1.00 + 0.18) = 21.74 \text{ psf}$$

$$\text{Negative Design Pressure} = (18.43)(-1.40 - 0.18) = -29.12 \text{ psf}$$

A1.2.1 The negative values (suction loads) are the largest in magnitude and are the design values used in this test method. Based on research conducted by Architectural Testing, Inc. for the Vinyl Siding Institute[4] a certain amount of pressure equalization occurs through residential siding products installed with sheathing under high dynamic pressures. In light of this pressure equalization, the design pressure in the ASCE 7-02 windload standards is reduced by a factor of 0.36.

A1.2.2 Therefore, the required test pressures are calculated as follows:

$$P_t = D_P \times 0.36 \times 1.5$$

where:

P_t = test pressure, lbf/ft^2 (Pa),
D_P = design pressure, lbf/ft^2 (Pa),
0.36 = pressure equalization factor, and
1.5 = safety factor.

A1.2.3 In a 110 mph (177 km/h) wind zone area specifying a design pressure of –29.12 lbf/ft^2 (1394 Pa) for a building 30 ft (9.1m) in height or less, the required siding uniform load test pressure is 15.73 lbf/ft^2 (753 Pa). For applications where the effective design pressure is greater than -29.12 lbf/ft^2 (1394 Pa) (for example, wind zone areas greater than 110 mph (177 km/h), elevations over 30 ft (9.1 m), or exposure conditions other than Exposure B), refer to ASCE 7-02 for the effective design pressure. The product shall be subjected to a static test pressure determined by the formula in A1.2.2. These loading conditions apply only to siding installed to solid walls, with internal or external sheathing. For applications where the siding is installed over open studding, rapid pressure equalization does not occur. In these applications, the load the siding will see is equal to the total design pressure. The static test pressure required for products used under these conditions is as follows:

$$P_t = 1.5 \times DP$$

where:

P_t = static test pressure, lbf/ft ^{2} (Pa),
D_P = design pressure, lbf/ft^2 (Pa), and
1.5 = safety factor.

A1.3 *Wind Design Pressures:*

A1.3.1 The wind velocity maps in ASCE 7–02 provide one source of design wind pressures for particular geographic regions.

[4] Vinyl Siding Pressure Equalization Factor, Architectural Testing, Inc., Report No. 01-40776.01, September, 2002.

BIBLIOGRPHY

(1) *ASHRAE Handbook of Fundamentals*, American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. Chapter 26, 1977.

(2) "Wind Forces on Structures," *Transactions of the American Society of Civil Engineers*, Vol 126, Part II, 1961, pp. 1124–1198.

(3) AAMA, TIR-A2, American Architectural Manufacturers Assn., Design Wind Loads for Aluminum Curtain Walls, American Architectural Manufacturers Assn., 2700 River Rd., Palatine, IL.

(4) Thom, H. C. S., *New Distribution of Extreme Winds in the United States*, American Society of Civil Engineers, Environmental Engineering Conference Preprint 431, Dallas, TX, Feb. 6, 1967.

(5) Sachs, Peter, *Wind Forces in Engineering*, Pergamon Press, Elmsford, NY 1972.

(6) MacDonald, A. J., *Wind Loading on Buildings*, Applied Sciences Publishers, Ltd., Essex, England, 1975.

(7) Houghton, E., and Carruthers, N., *Wind Forces on Buildings and Structures*, John Wiley & Sons, New York, NY, 1976.

Conclusions:

1. The results of the 216 tests have a wide range of Pressure Equalization Factors: varying from 0.18 to 0.03. a factor of 6.
2. There is much less variation within the 3 trials at the same pressure for each test wall sample, varying from 0.11 to 0.04 in one case. All others vary by a factor of 2 or less.
3. There are no general patterns evident that would suggest different Pressure Equalization Factors for different configurations.
4. One Pressure Equalization Factor should be developed to cover all cases of vinyl siding over sheathing.
5. There should be a safety factor applied to the Pressure Equalization Factor to cover unknown conditions; such as the wind may be applied differently than the pressures in the tests, not all configurations were tested, and not all locations on the siding samples were measured (only 5).
6. The normal factor of safety for building products varies from 1.5 to 2.0.

   Use Factor of Safety = 2.0.
7. The maximum tested Pressure Equalization Factor over plywood was 0.16 and over polystyrene was 0.18.

   These are close, so use maximum tested Pressure Equalization Factor = 0.18.
8. The required Pressure Equalization Factor is the maximum tested Pressure Equalization Factor times the required factor of safety.

   Required Pressure Equalization Factor = 2.0 x 0.18 = 0.36.

For ARCHITECTURAL TESTING, INC.:

Benjamin E. Myers
Project Manager - Certification Services

Allen Reeves, PE
Director - Engineering Services
6 SEPTEMBER 2002

BEM:bem/ksk
01-40776.01

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ALLEN N. REEVES
ENGINEER NO. 032607-E

Number (NOA), such numbers shall be included on the label.

1715.8.3 Location of label. The location of the label on the impact resistant covering shall be as follows:

1. Accordions: Bottom of the locking bar or center mate facing the exterior or outside.
2. Rollup: On the bottom of the hood facing the exterior or outside or on the bottom slat facing the exterior or outside.
3. Bahama Awning or Colonial Hinged: On the bottom, placed on the back of the shutter.
4. Panels: For metal and plastic panels the label may be embossed or printed spaced not more than every three (3) lineal feet on each panel. The label shall be applied by the holder of the product approval and shall face the exterior or outside.
5. Framed products: The label shall be on the side or bottom facing the exterior or outside.
6. Labels on all other products shall face the exterior or outside.

1715.8.4 Installation. All impact resistant coverings shall be installed in accordance with the manufacturer's installation instructions and in accordance with the product approval. Installation instructions shall be provided and shall be available to inspection personnel on the job site. Opening protection components, fasteners, and other parts evaluated by an approved product evaluation entity, certification agency, testing laboratory, architect, or engineer and approved by the holder of the product approval may be interchangeable in opening protection assemblies provided that the opening protection component(s) provide equal or greater structural performance and durability as demonstrated by testing in accordance with approved test standards.

1715.9 Soffit.

1715.9.1 Product Approval. Manufactured soffit materials and systems shall be subject to statewide or local product approval as specified in FAC Rule 9N-3. The net free area of the manufactured soffit material or system shall be included in the product approval submittal documents.

1715.9.2 Labels. Individual manufactured soffit pieces shall be permanently marked at not more than four feet on center with a number or marking that ties the product back to the manufacturer.

1715.9.3 The following information shall be included on the manufactured soffit material packaging or on the individual manufactured soffit material or system pieces:

1. Product approval holder and/or manufacturer name and city and state of manufacturing plant.
2. Product model number or name.
3. Method of approval and approval numbers as applicable. Methods of approval include, but are not limited to: Florida Building Commission FL #; Miami-Dade NOA; TDI Product Evaluation; and ICC-ES.
4. The test standard or standards specified in Chapter 14 used to demonstrate code compliance.
5. The net free area shall be included on the packaging or label.

1715.9.4 Installation. All manufactured soffit materials shall be installed in accordance with the manufacturer's installation instructions and in accordance with the product approval. Installation instructions shall be provided and shall be available to inspection personnel on the job site. Soffit pieces, components, fasteners, and other parts evaluated by an approved product evaluation entity, certification agency, testing laboratory, architect, or engineer and approved by the holder of the product approval may be interchangeable in manufactured soffit systems provided that the soffit system component or components provide equal or greater structural performance and durability as demonstrated by testing in accordance with approved test standards.

All exterior wall coverings and soffits shall be capable of resisting the design pressures specified for walls for components and cladding loads in accordance with Section 1609.1. Manufactured soffits shall be tested at 1.5 times the design pressure. The design pressures, as determined from ASCE 7, are permitted to be multiplied by 0.6.

SECTION 1716
MATERIAL AND TEST STANDARDS

1716.1 Test standards for joist hangers and connectors. The vertical load-bearing capacity, torsional moment capacity and deflection characteristics of joist hangers and similar connectors shall be determined in accordance with either Section 1716.1.1 or 1716.1.2

1716.1.1 Test procedure using ASTM D 7147. The load capacity of joist hangers and similar connectors shall be permitted to be determined using ASTM D 7147.

1716.1.2 Test procedure using ASTM D 1761. The load-bearing capacity, of joist hangers and similar connectors shall be permitted to be determined in accordance with ASTM D 1761 using lumber having a specific gravity of 0.49 or greater, but not greater than 0.55, as determined in accordance with AF&PA NDS for the joist and headers.

Exception: The joist length shall not be required to exceed 24 inches (610 mm).

1716.1.2.1 Vertical load capacity for joist hangers. The vertical load capacity for the joist hanger shall be determined by testing a minimum of three joist hanger assemblies as specified in ASTM D 1761. If the ultimate vertical load for any one of the tests varies more than 20 percent from the average ultimate vertical load, at least three additional tests shall be conducted. The allowable vertical load of the joist hanger shall be the lowest value determined from the following:

1. The lowest ultimate vertical load for a single hanger from any test divided by three (where three tests are conducted and each ultimate vertical load does not

CHAPTER 12
INTERIOR ENVIRONMENT

SECTION 1201
GENERAL

1201.1 Scope. The provisions of this chapter shall govern ventilation, temperature control, lighting, *yards* and *courts*, sound transmission, room dimensions, surrounding materials and rodent proofing associated with the interior spaces of buildings.

SECTION 1202
DEFINITIONS

1202.1 General. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

SUNROOM.

1. A room with roof panels that include sloped glazing that is a one-story structure added to an existing dwelling with an open or glazed area in excess of 40 percent of the gross area of the sunroom structure's exterior walls and roof.
2. A one-story structure added to a dwelling with solid roof panels without sloped glazing. The sunroom walls may have any configuration, provided the open areas with operable or fixed glass or windows or side hinged or sliding glass doors of the longer wall and one additional wall is equal to at least 65 percent of the area below 6 foot 8 inches (2032 mm) of each wall, measured from the floor. For the purposes of this code the term sunroom as used herein shall include conservatories, sunspaces, solariums, and porch or patio covers or enclosures.

THERMAL ISOLATION. A separation of conditioned spaces, between a sunroom addition and a *dwelling unit*, consisting of existing or new wall(s), doors and/or windows.

SECTION 1203
VENTILATION

1203.1 General. Buildings shall be provided with natural ventilation in accordance with Section 1203.4, or mechanical ventilation in accordance with the *Florida Building Code, Mechanical.*

1203.2 Attic spaces. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof framing members shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and snow. Blocking and bridging shall be arranged so as not to interfere with the movement of air. A minimum of 1 inch (25 mm) of airspace shall be provided between the insulation and the roof sheathing. The net free ventilating area shall not be less than $^1/_{300}$ of the area of the space ventilated, with 50 percent of the required ventilating area provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents.

Exception: Attic spaces, designed by a Florida licensed engineer or registered architect to eliminate the attic venting.

1203.2.1 Openings into attic. Exterior openings into the *attic* space of any building intended for human occupancy shall be protected to prevent the entry of birds, squirrels, rodents, snakes and other similar creatures. Openings for ventilation having a least dimension of $^1/_{16}$ inch (1.6 mm) minimum and $^1/_4$ inch (6.4 mm) maximum shall be permitted. Openings for ventilation having a least dimension larger than $^1/_4$ inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material with openings having a least dimension of $^1/_{16}$ inch (1.6 mm) minimum and $^1/_4$ inch (6.4 mm) maximum. Where combustion air is obtained from an *attic* area, it shall be in accordance with Chapter 7 of the *Florida Building Code, Mechanical.*

1203.3 Under-floor ventilation. The space between the bottom of the floor joists and the earth under any building except spaces occupied by basements or cellars shall be provided with ventilation openings through foundation walls or *exterior walls*. Such openings shall be placed so as to provide cross ventilation of the under-floor space.

1203.3.1 Openings for under-floor ventilation. The minimum net area of ventilation openings shall not be less than 1 square foot for each 150 square feet (0.67 m^2 for each 100 m^2) of crawl-space area. Ventilation openings shall be covered for their height and width with any of the following materials, provided that the least dimension of the covering shall not exceed $^1/_4$ inch (6 mm):

1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
3. Cast-iron grilles or gratings.
4. Extruded load-bearing vents.
5. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension not exceeding $^1/_8$ inch (3.2 mm).

1203.3.2 Exceptions. The following are exceptions to Sections 1203.3 and 1203.3.1:

1. Where warranted by climatic conditions, ventilation openings to the outdoors are not required if ventilation openings to the interior are provided.
2. The total area of ventilation openings is permitted to be reduced to $^1/_{1,500}$ of the under-floor area where the

or equal to 100 mph in accordance with Figure R803.2.3.1.

4. Where roof diaphragm requirements necessitate a closer fastener spacing.

SECTION R804
STEEL ROOF FRAMING
RESERVED

SECTION R805
CEILING FINISHES

R805.1 Ceiling installation. Ceilings shall be installed in accordance with the requirements for interior wall finishes as provided in Section R702.

SECTION R806
ROOF VENTILATION

R806.1 Ventilation required. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain. Ventilation openings shall have a least dimension of $^1/_{16}$ inch (1.6 mm) minimum and $^1/_4$ inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than $^1/_4$ inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of $^1/_{16}$ inch (1.6 mm) minimum and $^1/_4$ inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7.

Exception: Attic spaces, designed by a professional engineer or architect licensed to practice in the state, designed to eliminate the attic venting.

R806.2 Minimum area. The total net free ventilating area shall not be less than $^1/_{150}$ of the area of the space ventilated except that reduction of the total area to $^1/_{300}$ is permitted provided that at least 50 percent and not more than 80 percent of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above the eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents. As an alternative, the net free cross-ventilation area may be reduced to $^1/_{300}$ when a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.

R806.3 Vent and insulation clearance. Where eave or cornice vents are installed, insulation shall not block the free flow of air. A minimum of a 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.

R806.4 Unvented attic assemblies. Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) shall be permitted if all the following conditions are met:

1. The unvented attic space is completely contained within the building thermal envelope.
2. No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
3. Where wood shingles or shakes are used, a minimum $^1/_4$ inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.

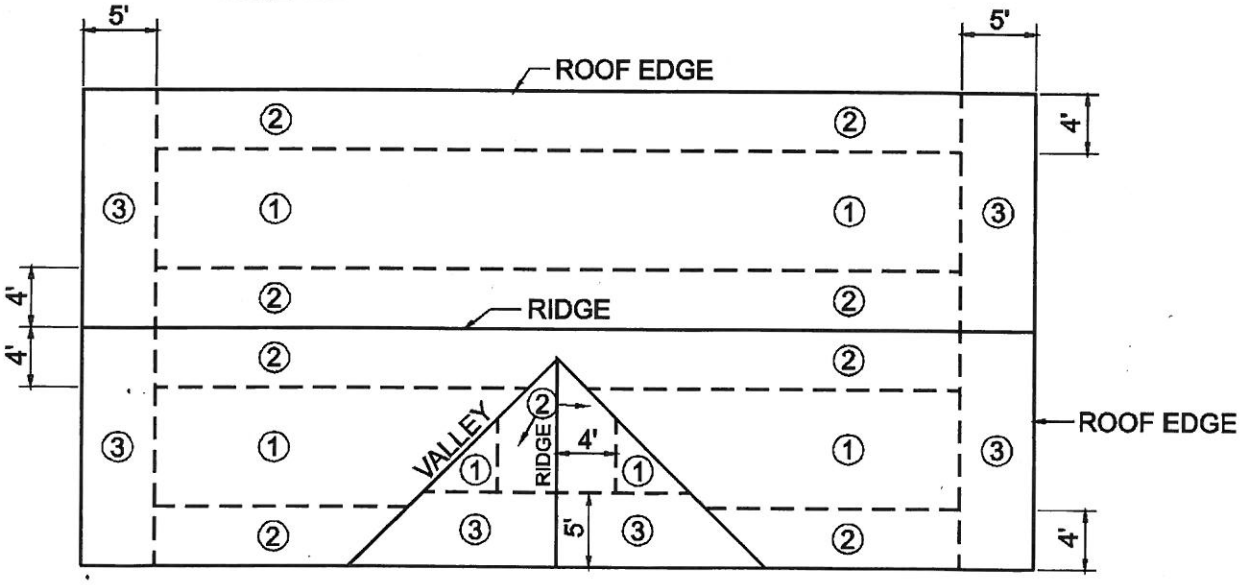

FIGURE R803.2.3.1
ROOF SHEATHING NAILING ZONES

seeks conformance when tested in accordance with Test Method #4, "Standard for Testing of Soffits and Windload Resistance."

The static test pressure shall be as required to demonstrate compliance with the provisions of Section 1609.1.

3.2.1.1.2 For applications where the effective design pressure as specified in Section 1609.1.1 is greater than 1040 Pa (21.7 psf) [e.g. wind zone areas greater than (80 mph) 36 m/s or elevations above (33 ft) 10 m] the product shall be tested in accordance with Test Method #4 under a static test pressure determined by the formula:

$P_T = \times 1.5 \times DP_p$

Where:

P_T = Static Test Pressure [Pa (psf)]

DP_p = Design Pressure [Pa (psf)]

1.5 = Safety Factor

Section 3, Appendix, Windload Criteria is deleted in its entirety.

1404.5.2 Cold-rolled copper. Copper shall conform to the requirements of ASTM B 370.

1404.5.3 Lead-coated copper. Lead-coated copper shall conform to the requirements of ASTM B 101.

1404.6 Concrete. Exterior walls of concrete construction shall be designed and constructed in accordance with Chapter 19.

1404.7 Glass-unit masonry. Exterior walls of glass-unit masonry shall be designed and constructed in accordance with Chapter 21.

1404.8 Plastics. Plastic panel, apron or spandrel walls as defined in this code shall not be limited in thickness, provided that such plastics and their assemblies conform to the requirements of Chapter 26 and are constructed of *approved* weather-resistant materials of adequate strength to resist the wind loads for cladding specified in Chapter 16.

1404.9 Vinyl siding and soffit. Vinyl siding and soffit shall be certified and labeled as conforming to the requirements of ASTM D 3679, ASTM D 4477 and the manufacturer's installation instructions.

1404.9.1 Labeling. Vinyl siding shall be labeled as conforming to the requirements of ASTM D 3679.

1404.9.2 Manufactured soffit materials and systems shall be labeled in accordance with the provisions of Section 1715.9 of this code.

1404.10 Fiber-cement siding. Fiber-cement siding shall conform to the requirements of ASTM C 1186, Type A, and shall be so identified on labeling listing an approved quality control agency.

1404.11 Exterior insulation and finish systems. Exterior insulation and finish systems (EIFS) and exterior insulation and finish systems (EIFS) with drainage shall comply with Section 1408.

SECTION 1405
INSTALLATION OF WALL COVERINGS

1405.1 General. *Exterior wall coverings* shall be designed and constructed in accordance with the applicable provisions of this section.

1405.2 Weather protection. *Exterior walls* shall provide weather protection for the building. The materials of the minimum nominal thickness specified in Table 1405.2 shall be acceptable as *approved* weather coverings.

1405.3 Vapor retarders. Class I or II vapor retarders shall be provided on the interior side of frame walls in Zones 5, 6, 7, 8 and Marine 4.

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

1405.3.1 Class III vapor retarders. Class III vapor retarders shall be permitted where any one of the conditions in Table 1405.3.1 is met.

TABLE 1405.3.1
CLASS III VAPOR RETARDERS

ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a]
Marine 4	Vented cladding over OSB Vented cladding over plywood Vented cladding over fiberboard Vented cladding over gypsum Insulated sheathing with *R*-value ≥ R2.5 over 2×4 wall Insulated sheathing with *R*-value ≥ R3.75 over 2×6 wall
5	Vented cladding over OSB Vented cladding over plywood Vented cladding over fiberboard Vented cladding over gypsum Insulated sheathing with *R*-value ≥ R5 over 2×4 wall Insulated sheathing with *R*-value ≥ R7.5 over 2×6 wall
6	Vented cladding over fiberboard Vented cladding over gypsum Insulated sheathing with *R*-value ≥ R7.5 over 2×4 wall Insulated sheathing with *R*-value ≥ R11.25 over 2×6 wall
7 and 8	Insulated sheathing with *R*-value ≥ R10 over 2×4 wall Insulated sheathing with *R*-value ≥ R15 over 2×6 wall

For SI: 1 pound per cubic foot = 16.02 kg/m^3.

a. Spray foam with a minimum density of 2 pounds per cubic feet applied to the interior cavity side of OSB, plywood, fiberboard, insulating sheathing or gypsum is deemed to meet the insulating sheathing requirement where the spray foam *R*-value meets or exceeds the specified insulating sheathing *R*-value.

1405.3.2 Material vapor retarder class. The *vapor retarder class* shall be based on the manufacturer's certified testing or a tested assembly.

Designation: D 4477 – 04a

An American National Standard

Standard Specification for Rigid (Unplasticized) Poly(Vinyl Chloride) (PVC) Soffit[1]

This standard is issued under the fixed designation D 4477; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification establishes requirements and test methods for the materials, dimensions, camber, impact strength, expansion, and appearance of extruded single-wall soffit manufactured from rigid (unplasticized) PVC compound. Methods of indicating compliance with this specification are also provided.

1.2 The use of PVC recycled plastic in this product shall be in accordance with the requirements in Section 4.

1.3 Rigid (unplasticized) poly(vinyl chloride) (PVC) siding is covered in Specification D 3679.

1.4 Soffit produced to this specification shall be installed in accordance with Practice D 4756. Reference shall also be made to the manufacturer's installation instructions for the specific product to be installed.

NOTE 1—Information with regard to soffit maintenance shall be obtained from the manufacturer.

1.5 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 The following precautionary caveat pertains to the test method portion only, Section 6 of this specification. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 2—There is no known ISO equivalent to this standard.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing

D 635 Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30°C and 30°C with a Vitreous Silica Dialtometer

D 883 Terminology Relating to Plastics

D 1600 Terminology Relating to Abbreviations, Acronyms, and Codes for Terms Relating to Plastics

D 2244 Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates

D 2457 Test Method for Specular Gloss of Plastic Films and Solid Plastics

D 3679 Specification for Rigid (Unplasticized) Poly(Vinyl Chloride) (PVC) Siding

D 3892 Practice for Packaging/Packing of Plastics

D 4226 Test Methods for Impact Resistance of Rigid Poly-(Vinyl Chloride) (PVC) Building Products

D 4756 Practice for the Installation of Poly(Vinyl Chloride) (PVC) Siding and Soffit

D 5033 Guide for the Development of Standards Relating to the proper Use of Recycled Plastics

D 5947 Test Method of Physical Dimensions of Solid Plastic Specimens

E 631 Terminology of Building Constructions

E 805 Practice for Identification of Instrumental Methods of Color or Color-Difference Measurement of Materials

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminologies D 883, D 1600, and E 631, unless otherwise specified.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *vinyl soffit, n*—a shaped material, made principally from rigid poly(vinyl chloride) (PVC) that is used to clad the underside of a roof overhang.

3.2.2 *Discussion*—Any exception to a homogeneous rigid PVC compound is present in a coextruded or laminated capstock.

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.24 on Plastic Building Products.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard.**