

FS156-09/10, Part I

1404.12, 1405.2, 1405.18 (New), 1405.18.1 (New), Table 1405.18.1 (New), 1405.18.2 (New), 1405.18.2.1 (New), Table 1405.18.2.1 (New), 1405.18.2.2 (New), Table 1405.18.2.2 (New), 1405.14.1, 1405.14.2 (New), 1405.14.2.1 (New), 1405.14.2.2 (New), 1405.14.2.3 (New), 2304.6;

Proposed Change as Submitted

Proponent: Jay H. Crandell, PE, d/b/a ARES Consulting, representing the Foam Sheathing Coalition

PART I – IBC STRUCTURAL

1. Add new text as follows:

1404.12 Foam plastic sheathing. Foam plastic sheathing shall comply with requirements for foam plastic insulation in Section 2603. When used as a water-resistive barrier, the foam plastic sheathing material and installation shall be approved in accordance with Section 1404.2.

2. Revise as follows:

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. Foam plastic sheathing used in exterior wall covering assemblies with approved exterior weather coverings shall comply with Section 1405.18.

3. Add new text as follows:

1405.18 Foam plastic sheathing. Foam plastic sheathing used in exterior wall covering assemblies shall comply with this section, Section 2603, Chapter 13, and the foam sheathing manufacturer's approved installation instructions.

1405.18.1 Minimum thickness. The thickness of foam plastic sheathing shall comply with Table 1405.18.1.

Exception: Where foam plastic sheathing is applied directly over or behind wall sheathing or other solid substrate capable of separately resisting the required wind pressure, the limitations of Table 1405.18.1 shall not apply.

**TABLE 1405.18.1
REQUIREMENTS FOR FOAM PLASTIC SHEATHING
IN EXTERIOR WALL COVERING ASSEMBLIES^{1,2}**

Foam Plastic Sheathing Material ³	Foam Sheathing Thickness (in) ³	Maximum Wind Speed (mph) – Exposure B ⁴			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16”oc framing	24”oc framing	16”oc framing	24”oc framing
Siding Attached Directly Over Foam Plastic Sheathing per Section 1405.18.2.1					
EPS	3/4”	110	NP	90	NP
	1”	130	100	125	NP
	≥1-1/2”	130	130	130	125
Polyiso-cyanurate	1/2” (faced)	130	90	115	NP
	3/4” (faced)	130	120	130	100
	1” (faced)	130	130	130	110
	≥1-1/2” (faced)	130	130	130	115
XPS	1/2” (faced)	125	85	105	NP
	3/4”	110	NP	90	NP
	1”	130	95	120	NP
	≥1-1/2”	130	130	130	115
Siding Offset from Foam Sheathing per Section 1405.18.2.2					
EPS	3/4”	95	NP	NP	NP
	1”	125	85	105	NP
	≥1-1/2”	130	130	130	105
Polyiso-	1/2” (faced)	120	NP	100	NP

<u>cyanurate</u>	<u>3/4" (faced)</u>	<u>130</u>	<u>100</u>	<u>130</u>	<u>85</u>
	<u>1" (faced)</u>	<u>130</u>	<u>110</u>	<u>130</u>	<u>95</u>
	<u>≥1-1/2" (faced)</u>	<u>130</u>	<u>120</u>	<u>130</u>	<u>100</u>
<u>XPS</u>	<u>1/2" (faced)</u>	<u>110</u>	<u>NP</u>	<u>90</u>	<u>NP</u>
	<u>3/4"</u>	<u>95</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
	<u>1"</u>	<u>125</u>	<u>85</u>	<u>105</u>	<u>NP</u>
	<u>≥1-1/2"</u>	<u>130</u>	<u>120</u>	<u>130</u>	<u>100</u>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 1.609 km/h

NP = not permitted

1. Tabulated maximum wind speed values are based on a mean roof height of 30-feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m) or 0.9 for a mean roof height of 60 feet (18.3 m). For greater mean roof heights, an approved design shall be required.
2. Foam plastic sheathing panels shall be permitted to be oriented parallel or perpendicular to framing members.
3. Foam plastic sheathing shall meet or exceed the following material standards: Expanded Polystyrene (EPS) – ASTM C578 (Type II, min. 1.35 lb/ft³ density), Polyisocyanurate – ASTM C1289 (Type 1, min.), and extruded polystyrene (XPS) – ASTM C578 (Type X, min. 1.30 lb/ft³ density). Where a "faced" product is indicated, a facer shall be provided on both faces of the foam plastic sheathing. Where facing is not indicated in the table, faced and unfaced foam plastic sheathing shall be permitted. For all foam plastic sheathing products, approved manufacturer data shall be permitted in lieu of the table requirements.
4. Multiply tabulated maximum wind speed by 0.85 for wind exposure C or by 0.78 for wind exposure D.
5. Interior finish shall be minimum 1/2-inch (12.7 mm) thick gypsum wall board or an approved product with equivalent or greater out-of-plane bending strength and stiffness.

1405.18.2 Siding attachment over foam sheathing. Siding shall be attached over foam sheathing in accordance with Section 1405.18.2.1, Section 1405.18.2.2, or an approved design. In no case shall the siding material be used in a manner that exceeds its application limits.

Exception: Where the siding manufacturer has provided approved installation instructions for application over foam sheathing, those requirements shall apply.

1405.18.2.1 Direct siding attachment. Approved weather coverings installed directly over foam sheathing without separation by an air space shall comply with Table 1405.18.2.1 in regard to nail diameter, penetration, and nail spacing for the applicable foam sheathing thickness and wind speed condition. The siding fastener and siding installation shall otherwise comply with Chapter 14.

Exceptions:

1. For adhered masonry veneer, refer to Section 1405.10
2. For vinyl siding, refer to Section 1405.14.
3. For exterior insulation and finish systems, refer to Section 1408.

**TABLE 1405.18.2.1
FASTENING REQUIREMENTS FOR DIRECT SIDING
ATTACHMENT OVER FOAM PLASTIC SHEATHING^{1,2}**

Minimum Nail Diameter ³ (inches)	Nail Spacing along Stud ⁴ (inches)	Maximum Foam Sheathing Thickness ⁵ (inches)	16"oc WALL FRAMING			24"oc WALL FRAMING		
			Maximum Wind Speed (mph)			Maximum Wind Speed (mph)		
			Exposure B	Exposure C	Exposure D	Exposure B	Exposure C	Exposure D
0.113	6	2	140	120	110	120	100	90
	8	2	130	110	100	100	85	DR
	12	1	100	85	DR	85	DR	DR
0.120	6	3	140	120	110	120	100	90
	8	2	130	110	100	110	90	85
	12	1.5	110	90	85	90	DR	DR
0.135	6	3	140	120	110	130	110	100
	8	3	140	120	110	110	90	85
	12	2	110	90	85	90	DR	DR

For SI: 1 inch = 25.4 mm; 1 mph = 1.609 km/h

DR = design required

1. Maximum wind speed values are based on a minimum 1-1/4 inch (31.8 mm) penetration of a smooth shank nail fastener into wood framing of Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS.

2. Tabulated maximum wind speed values are based on a mean roof height of 30-feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m) or 0.9 for a mean roof height of 60 feet (18.3 m). For greater mean roof heights, an approved design shall be required.
3. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths to provide a minimum 1-1/4 inch (31.8 mm) penetration into wood framing. Specified nails in accordance with Chapter 1405 or the siding manufacturer's approved installation instructions shall meet all other requirements in ASTM F1667 or be otherwise approved for the intended application.
4. 'Nail spacing along stud' refers to spacing of siding fasteners in the vertical direction. A minimum of one fastener shall be applied at each intersection of an individual siding member with a wall stud.
5. Maximum foam sheathing thickness values are based on a maximum 24-inch (0.6 m) stud spacing, a maximum siding dead load of 11 psf (0.53 kPa), and S_{DS} per Section 1613.5.4 not exceeding 0.83g. Siding dead load shall not exceed 8 psf (0.39 kPa) for and S_{DS} of 1.17g, 6 psf (0.29 kPa) for S_{DS} of 1.5g, or 3.0 psf (0.14 kPa) for S_{DS} of 3.0 g.

1405.18.2.2 Offset siding attachment. When an airspace separates the siding from direct contact with the foam plastic sheathing, the approved weather coverings shall be attached in accordance with Chapter 14 to minimum 1x3 wood furring strips placed over the foam sheathing. Furring shall be attached through the foam sheathing to wall framing in accordance with Table 1405.18.2.2. When placed horizontally, wood furring strips shall be preservative treated wood in accordance with Section 2303.1.8 or naturally durable wood and fasteners shall be corrosion resistant in accordance with Section 2304.9.5.

Exception: Furring strips shall not be required over foam plastic sheathing behind anchored stone and masonry veneer installed in accordance with Section 1405.6. Veneer ties shall be installed on the surface of the foam plastic sheathing with fasteners of sufficient length to pass through the thickness of foam plastic sheathing and penetrate framing to provide required pull-out resistance determined in accordance with Chapter 16.

**TABLE 1405.18.2.2
FASTENING REQUIREMENTS FOR WOOD FURRING
OVER FOAM PLASTIC SHEATHING^{1,2,3}**

Fastener Type	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring ⁴ (inches)	Maximum Thickness of Foam Sheathing ⁵ (inches)	16"oc FURRING			24"oc FURRING		
				Maximum Wind Speed (mph)			Maximum Wind Speed (mph)		
				Exposure B	Exposure C	Exposure D	Exposure B	Exposure C	Exposure D
0.120" diameter smooth shank nail	1-1/4	8	2	130	110	100	110	90	85
		12	1.5	110	90	85	90	DR	DR
		16	1	90	DR	DR	DR	DR	DR
0.135" diameter smooth shank nail	1-1/4	8	3	130	110	100	110	90	85
		12	2	110	90	85	90	DR	DR
		16	1.5	100	85	DR	DR	DR	DR
#8 wood screw	1	12	3	140	120	110	140	120	110
		16	2	140	120	110	140	120	110
1/4" lag screw ⁶	1-1/2	24	3	140	120	110	140	120	110

For SI: 1" = 25.4 mm; 1 mph = 1.609 km/h

DR = design required

1. Furring strips shall be spaced a maximum of 24"oc in a vertical or horizontal orientation. Table values are based on minimum 3/4-inch (19.1 mm) thick furring strip and wood studs of Spruce-Pine-Fir or any softwood species with a specific gravity of 0.42 or greater per AFPA/NDS.
2. Tabulated maximum wind speed values are based on a mean roof height of 30-feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m) or 0.9 for a mean roof height of 60 feet (18.3 m). For greater mean roof heights, an approved design shall be required.
3. Where minimum required siding fastener penetration exceeds 3/4 inch (19.1 mm), a minimum 2x furring strip shall be used unless approved deformed shank siding nails or siding screws are used to provide equivalent withdrawal strength.
4. In a vertical orientation, furring strips shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, furring strips shall be fastened at each stud intersection with a number of fasteners equivalent to the required fastener spacing. In no case shall fasteners be spaced more than 24 inches (0.6 m) apart.
5. Maximum foam sheathing thickness values are based on a maximum 24-inch (0.6 m) stud spacing, a maximum siding dead load of 11 psf (0.53 kPa), and S_{DS} per Section 1613.5.4 not exceeding 0.83g. Siding dead load shall not exceed 8 psf (0.39 kPa) for and S_{DS} of 1.17g, 6 psf (0.29 kPa) for S_{DS} of 1.5g, or 3.0 psf (0.14 kPa) for S_{DS} of 3.0 g.
6. Lag screws shall be installed with a standard cut washer and shall be pre-drilled in accordance with AF&PA NDS-05. Approved self-drilling screws of equal or greater shear and withdrawal strength shall be permitted without pre-drilling.

4. Revise as follows:

1405.14.1 Application. The siding shall be applied over sheathing or materials listed in Section 2304.6 or foam plastic sheathing in accordance with Sections 1405.14.2 and 1405.18. Siding shall be applied to conform with the water-resistant barrier requirements in Section 1403. Siding and accessories shall be installed in accordance with approved manufacturer's instructions. Unless otherwise specified in the approved manufacturer's instructions, nails used to fasten the siding and accessories shall have a minimum 0.313-inch (7.9 mm) head diameter and 1/8-inch (3.18 mm)

shank diameter. The nails shall be corrosion resistant and shall be long enough to penetrate the studs or nailing strip at least 3/4 inch (19 mm). Where the siding is installed horizontally, the fastener spacing shall not exceed 16 inches (406 mm) horizontally and 12 inches (305 mm) vertically. Where the siding is installed vertically, the fastener spacing shall not exceed 12 inches (305 mm) horizontally and 12 inches (305 mm) vertically.

5. Add new text as follows:

1405.14.2 Foam Plastic Sheathing. Vinyl siding used with foam plastic sheathing shall be installed in accordance with 1405.14.2.1, 1405.14.2.2., and 1405.14.2.3.

Exception: Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing, or other approved backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with 1405.14.1.

1405.14.2.1 Basic Wind Speed Not Exceeding 90 mph and Exposure Category B. Where the basic wind speed does not exceed 90 mph, the Exposure Category is B and gypsum wall board or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 1-1/4 inches (32 mm) using minimum 0.120-inch diameter nail (shank) with a minimum 0.313-inch diameter head, and fastened 16 inches on center. The foam plastic sheathing shall comply with Section 1405.18.1 and shall not exceed a maximum thickness of 1.5 inches (38 mm) for a 0.120-inch diameter nail or 2.0 inches (51 mm) for a 0.135-inch diameter nail. Vinyl siding shall be permitted to be installed on furring strips in accordance with Section 1405.18.2.2 and the siding manufacturer's installation instructions when foam plastic sheathing thickness complies with Section 1405.18.1.

1405.14.2.2 Basic Wind Speed Exceeding 90mph or Exposure Categories C and D. Where the basic wind speed exceeds 90 mph or the Exposure Category is C or D, or all conditions of 1405.14.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the wind loads required by Chapter 16. The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:

1. For wall assemblies with foam plastic sheathing on the exterior side and minimum ½-inch (12.7 mm) thick gypsum wall board or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.
2. For wall assemblies with foam plastic sheathing on the exterior side and no gypsum wall board or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.

Exception: The above adjustments shall not apply when vinyl siding is attached to wood furring strips installed over the foam plastic sheathing in accordance with Section 1405.18.2.2 and such installation is in accordance with the vinyl siding manufacturer's installation instructions.

1405.14.2.3 Manufacturer Specification. Where the vinyl siding manufacturer's product specifications provide an approved design wind pressure rating for installation over foam plastic sheathing, use of this design wind pressure rating shall be permitted and the siding shall be installed in accordance with the manufacturer's installation instructions.

6. Revise as follows:

2304.6 Wall sheathing. Except as provided for in Section 1405 for weatherboarding or where stucco construction that complies with Section 2510 is installed, enclosed buildings shall be sheathed with one of the materials of the nominal thickness specified in Table 2304.6, foam sheathing in accordance with Section 1405.18, or any other approved material of equivalent strength and durability.

Reason:

Part I-As with a related IRC proposal, this proposal is a comprehensive clarification and upgrading of requirements for foam plastic sheathing and siding installation over foam plastic sheathing. It primarily addresses adequate foam sheathing thickness and siding attachment over foam sheathing to resist a range of design wind load conditions, beyond which design is required or installation in accordance with manufacturer instructions specific to application of siding over foam sheathing. It also provides siding connections through foam sheathing that provide adequate support to resist the dead load of siding installed over foam sheathing and limits the siding weight, particularly in higher seismic conditions (beyond which design is required or approved installation guidelines). As a whole, these provisions are necessary to ensure appropriate use of foam sheathing and siding materials together on exterior wall assemblies in a way that best complements existing exterior wall covering provisions in Chapter 14. A detailed explanation of the test data and analysis justifying the proposed requirements can be found at www.foamsheathing.org.

In support of proposed new Section 1405.18.1, the wind pressure resistance of foam sheathing used in this proposal is based on certified full-scale (4'x8' panel) testing conducted at the NAHB Research Center, Inc. Samples included specimens from various manufacturers representing the industry at large. The design wind speed data (without rounding or capping values) is shown in the table below for informational purposes. The

values in the proposed table have been rounded to the nearest 5 mph increment and capped at 130 mph (Exposure B) which corresponds to a maximum wind speed of 110 mph in exposure C or 100 mph Exposure D. This proposal is needed to avoid potential exclusion of foam sheathing products due to the incompleteness of current code requirements which can negatively affect other concerns such as energy conservation code requirements and green building interests. Most importantly, these requirements will ensure that foam sheathing is used appropriately to prevent building envelope damage, particularly in higher wind conditions and with thinner material used on more widely spaced studs (e.g., 24"oc center on gable roof ends which typically have no interior finish). These requirements also agree reasonably well with the generally successful use of foam sheathing on typical wall assemblies (e.g., 16"oc framing or 24"oc framing with interior finish) on many buildings in lower wind regions of the U.S.

TABLE R703.3.1- Part A (Actual design values based on test data – not rounded or capped as in the proposal)
MAXIMUM WIND SPEED (mph – 3 SECOND GUST) PERMITTED
FOR FOAM PLASTIC SHEATHING
WITH DIRECTLY ATTACHED SIDING PER SECTION R703.3.2.1

Foam Sheathing Material ³	Foam Sheathing Nominal Thickness (in)	Maximum Wind Speed (mph) – Exposure B ⁴			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
EPS	¾" (unfaced)	110	73	92	61
	1" (unfaced)	147	98	123	82
	1-1/2" (unfaced)	222	148	186	124
Polyiso-cyanurate	½" (faced)	136	91	114	76
	¾" (faced)	177	118	148	99
	1" (faced)	193	129	162	108
	1-1/2" (faced)	207	138	173	116
XPS	½" (faced)	125	84	105	70
	¾" (unfaced)	109	73	91	61
	1" (unfaced)	145	97	121	81
	1-1/2" (unfaced)	208	139	174	116

Design value based on the minimum tested uniform pressure capacity for each sheathing type and thickness category divided by a safety factor of 1.5 and ASCE 7-05 positive pressure design loads for wall corner zone and a 10 sq ft wind effective area (negative pressure is resisted by the foam sheathing and siding assembly). Because the 1.5 safety factor is applied to a minimum test value (not the average), these requirements are more stringent than safety margins required for other building envelop components such as doors and windows which are also important to envelope integrity. This "minimum test value" basis also serves to better control safety margins with regard to variability in material properties or performance.

TABLE R703.3.1 – Part B (Actual design values based on test data – not rounded or capped as in the proposal)
MAXIMUM WIND SPEED (mph – 3 SECOND GUST) PERMITTED
FOR FOAM PLASTIC SHEATHING
WITH FURRED SIDING PER SECTION R703.3.2.2¹

Foam Plastic Sheathing Material ²	Foam Sheathing Nominal Thickness (in) ²	Maximum Wind Speed (mph) – Exposure B ^{3,4}			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
EPS	¾"	95	63	80	53
	1"	127	85	106	71
	≥1-1/2"	192	128	161	107
Polyiso-cyanurate	½" (faced)	118	78	98	66
	¾" (faced)	153	102	128	85
	1" (faced)	167	112	140	93
	≥1-1/2" (faced)	179	120	150	100
XPS	½" (faced)	108	72	91	61
	¾"	94	63	79	53
	1"	126	84	105	70
	≥1-1/2"	180	120	151	101

Design value based on the minimum tested uniform pressure capacity for each sheathing type and thickness category divided by a safety factor of 1.5 and ASCE 7-05 negative pressure design loads for wall corner zone and a 10 sq ft wind effective area. Because the siding is spaced away from foam sheathing in this wall covering assembly condition, it does not contribute to foam sheathing resistance. Thus, the foam sheathing must independently resist the negative wind pressure load. The furring strips provide adequate bearing at connection to secure the foam sheathing as well as the siding material.

In support of proposed new Section 1405.18.2, the generalized connection requirements for siding over foam sheathing are based on an analysis using the AF&PA NDS-2005 connection design provisions in consideration of withdrawal to resist wind pressure and shear strength to resist siding dead load. To account for the "gap" in the connection caused by the presence of foam sheathing, the provisions of AF&PA TR12 were used to downgrade connection strength based on the thickness of foam sheathing (i.e., width of gap in the connection). The design shear strength was based on calculated ultimate capacity divided by a safety factor of 2 while conservatively ignoring any benefit of the foam material filling the gap in the siding or furring connection to wall framing. Wind loads were based on application of the full ASCE 7-05 components and cladding wind pressure applied to the exterior wall covering while conservatively ignoring any distribution of wind pressure to other wall layers. In addition, the wind pressures were based on the most stringent wall corner zone condition and an effective wind area of 10 sq ft.

Addition of new Section 1405.14.2 provides special requirements and limitations for use of foam plastic sheathing with vinyl siding. The proposed changes are consistent approved changes now included in the 2009 IRC. These changes are needed to ensure appropriate use of vinyl siding wind pressure ratings when foam sheathing is used, thus preventing inadequate performance.

Limited changes to other parts of the code are made in coordination with the above improvements.

Part II- As with a related IBC proposal, this proposal is a comprehensive clarification and upgrading of requirements for foam sheathing and siding installation over foam sheathing. It primarily addresses adequate foam sheathing thickness and siding attachment over foam sheathing to resist design wind loads within the scope of the IRC (e.g., up to 110 mph, Exposure D). It also provides siding connections through foam sheathing that provide adequate support to resist the dead load of siding installed over foam sheathing. As a whole, these provisions are necessary to ensure appropriate use of foam sheathing and siding materials together on exterior wall assemblies in a way that best compliments existing exterior wall covering provisions in Section R703 of the code. A detailed explanation of the test data and analysis justifying the proposed requirements can be found at www.foamsheathing.org.

In support of proposed new Section R703.3.1, the wind pressure resistance of foam sheathing used in this proposal is based on certified full-scale (4'x8' panel) testing conducted at the NAHB Research Center, Inc. Samples included specimens from various manufacturers representing the industry at large. The design wind speed data (without rounding or capping values) is shown in the table below for informational purposes. The values in the proposed table have been rounded to the nearest 5 mph increment and capped at 130 mph (Exposure B) as this corresponds to a maximum wind speed of 110 mph in exposure C, which is essentially the scope limit of the IRC. This proposal is needed to avoid potential exclusion of foam sheathing products due to the incompleteness of current code requirements which can negatively affect other concerns such as energy conservation code requirements and green building interests. Most importantly, these requirements will ensure that foam sheathing is used appropriately to prevent building envelope damage, particularly in higher wind conditions and with thinner material used on more widely spaced studs (e.g., 24"oc center on gable roof ends which typically have no interior finish). These requirements also agree reasonably well with the generally successful use of foam sheathing on typical wall assemblies (e.g., 16"oc framing or 24"oc framing with interior finish) on many homes in lower wind regions of the U.S.

TABLE R703.3.1- Part A (Actual design values based on test data – not rounded or capped as in the proposal)
MAXIMUM WIND SPEED (mph – 3 SECOND GUST) PERMITTED
FOR FOAM PLASTIC SHEATHING
WITH DIRECTLY ATTACHED SIDING PER SECTION R703.3.2.1

Foam Sheathing Material ³	Foam Sheathing Nominal Thickness (in)	Maximum Wind Speed (mph) – Exposure B ⁴			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
EPS	3/4" (unfaced)	110	73	92	61
	1" (unfaced)	147	98	123	82
	1-1/2" (unfaced)	222	148	186	124
Polyiso-cyanurate	1/2" (faced)	136	91	114	76
	3/4" (faced)	177	118	148	99
	1" (faced)	193	129	162	108
	1-1/2" (faced)	207	138	173	116
XPS	1/2" (faced)	125	84	105	70
	3/4" (unfaced)	109	73	91	61
	1" (unfaced)	145	97	121	81
	1-1/2" (unfaced)	208	139	174	116

Design value based on the minimum tested uniform pressure capacity for each sheathing type and thickness category divided by a safety factor of 1.5 and ASCE 7-05 positive pressure design loads for wall corner zone and a 10 sqft wind effective area (negative pressure is resisted by the foam sheathing and siding assembly). Because the 1.5 safety factor is applied to a minimum test value (not the average), these requirements are more stringent than safety margins required for other building envelop components such as doors and windows which are also important to envelope integrity. This "minimum test value" basis also serves to better control safety margins with regard to variability in material properties or performance.

TABLE R703.3.1 – Part B (Actual design values based on test data – not rounded or capped as in the proposal)
MAXIMUM WIND SPEED (mph – 3 SECOND GUST) PERMITTED
FOR FOAM PLASTIC SHEATHING
WITH FURRED SIDING PER SECTION R703.3.2.2¹

Foam Plastic Sheathing Material ²	Foam Sheathing Nominal Thickness (in) ²	Maximum Wind Speed (mph) – Exposure B ^{3,4}			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
EPS	3/4"	95	63	80	53
	1"	127	85	106	71
	≥1-1/2"	192	128	161	107
Polyiso-cyanurate	1/2" (faced)	118	78	98	66
	3/4" (faced)	153	102	128	85
	1" (faced)	167	112	140	93
	≥1-1/2" (faced)	179	120	150	100
XPS	1/2" (faced)	108	72	91	61
	3/4"	94	63	79	53
	1"	126	84	105	70
	≥1-1/2"	180	120	151	101

Design value based on the minimum tested uniform pressure capacity for each sheathing type and thickness category divided by a safety factor of 1.5 and ASCE 7-05 negative pressure design loads for wall corner zone and a 10 sqft wind effective area. Because the siding is spaced away from foam sheathing in this wall covering assembly condition, it does not contribute to foam sheathing resistance. Thus, the foam sheathing must independently resist the negative wind pressure load. The furring strips provide adequate bearing at connection to secure the foam sheathing as well as the siding material.

In support of proposed new Section R703.3.2, the generalized connection requirements for siding over foam sheathing are based on an analysis using the AF&PA NDS-2005 connection design provisions in consideration of withdrawal to resist wind pressure and shear strength to resist siding dead load. To account for the "gap" in the connection caused by the presence of foam sheathing, the provisions of AF&PA TR12 were used to downgrade connection strength based on the thickness of foam sheathing (i.e., width of gap in the connection). The design shear strength was based on calculated ultimate capacity divided by a safety factor of 2 while conservatively ignoring any benefit of the foam material filling the gap in the siding or furring connection to wall framing. Wind loads were based on application of the full ASCE 7-05 components and cladding wind pressure applied to the exterior wall covering while conservatively ignoring any distribution of wind pressure to other wall layers. In addition, the wind pressures were based on the most stringent wall corner zone condition and an effective wind area of 10 sqft.

Changes to other parts of Section R703, including changes to Table R703.4 and various siding attachment requirements, are made in coordination with the above improvements.

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: ASTM standards within this proposed are currently referenced in the I-codes.

Public Hearing Results

**PART I- IBC FIRE SAFETY
Committee Action:**

Disapproved

Committee Reason: The proponent requested disapproval at this time so that the proposal requirements for foam plastic sheathing can be better coordinated with the energy code. This includes the treatment of positive and negative wind pressures, performance of the lateral force system as well as fastener requirements.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay H. Crandell, PE, ARES Consulting, representing Foam Sheathing Coalition; Mark Nowak, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1404.12 Foam plastic sheathing. Foam plastic sheathing shall comply with requirements for foam plastic insulation in Section 2603. When used as a water-resistive barrier, the foam plastic sheathing material and installation shall be approved in accordance with Section 1404.2. When used in exterior wall covering assemblies in accordance with Table 1405.18.1 of Section 1405.18.1, foam sheathing shall be identified by the trademarks of an approved testing and inspection agency in accordance with Section 1703 and 2603.2 indicating compliance with the wind pressure resistance requirements of Table 1405.18.1 where not already addressed in the applicable material standards.

1405.18 Foam plastic sheathing. Foam plastic sheathing used in exterior wall covering assemblies shall comply with this section, Section 2603, Chapter 13, and the foam sheathing manufacturer's approved installation instructions. Wall assemblies with foam plastic sheathing that are intended to serve as part of the lateral force resisting system of a structure shall be braced with approved materials designed to resist the in-plane shear force determined in accordance with Chapter 16. Wall assemblies with foam plastic sheathing attached to gravity load supporting members that require buckling restraint shall have such restraint provided by other approved materials. The use of foam plastic sheathing in accordance with this section shall not be permitted where the basic wind speed exceeds 110 mph.

1405.18.1 Minimum thickness. The thickness of foam plastic sheathing shall comply with Table 1405.18.1.

Exceptions:

1. Where foam plastic sheathing is covered with applied directly over or behind wall sheathing or other solid material substrate capable of separately resisting the required wind pressure, the limitations of Section 1405.18.1 and the basic wind speed limit of 110 mph Table 1405.18.1 shall not apply.
2. Where foam plastic sheathing is covered with cladding and applied directly over wall sheathing or other solid material, all capable of separately resisting the full design wind pressure, the limitations of Section 1405.18.1 and the basic wind speed limit of 110 mph shall not apply.

1405.18.1 Minimum thickness. The thickness of foam plastic sheathing shall comply with Table 1405.18.1. The components and cladding design wind pressure determined in accordance with Section 1609 shall not exceed the allowable wind pressure value in accordance with Table 1405.18.1.

**TABLE 1405.18.1
REQUIREMENTS FOR FOAM PLASTIC SHEATHING
IN EXTERIOR WALL COVERING ASSEMBLIES^{1,2}**

Foam Plastic Sheathing Material ³	Foam Sheathing Thickness (in) ³	Maximum Wind Speed (mph) – Exposure B ⁴			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
Siding Attached Directly Over Foam Plastic Sheathing per Section 1405.18.2.1					
EPS	3/4"	110	NP	90	NP
	1"	130	100	125	NP
	≥1 1/2"	130	130	130	125
Polyiso-cyanurate	1/2" (faced)	130	90	115	NP
	3/4" (faced)	130	120	130	100
	1" (faced)	130	130	130	110
	≥1 1/2" (faced)	130	130	130	115
XPS	1/2" (faced)	125	85	105	NP
	3/4"	110	NP	90	NP
	1"	130	95	120	NP
	≥1 1/2"	130	130	130	115
Siding Offset from Foam Sheathing per Section 1405.18.2.2					
EPS	3/4"	95	NP	NP	NP

	4"	425	85	405	NP
	≥1-1/2"	430	130	130	105
Polyiso-cyanurate	1/2" (faced)	420	NP	400	NP
	3/4" (faced)	430	400	430	85
	1" (faced)	430	410	430	95
	≥1-1/2" (faced)	430	420	430	100
XPS	1/2" (faced)	440	NP	90	NP
	3/4"	95	NP	NP	NP
	1"	125	85	405	NP
	≥1-1/2"	130	120	430	100

For SI: 1 inch = 25.4 mm, 1 mile per hour = 1.609 km/h

NP = not permitted

1. Tabulated maximum wind speed values are based on a mean roof height of 30 feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m) or 0.9 for a mean roof height of 60 feet (18.3 m). For greater mean roof heights, an approved design shall be required.
2. Foam plastic sheathing panels shall be permitted to be oriented parallel or perpendicular to framing members.
3. Foam plastic sheathing shall meet or exceed the following material standards: Expanded Polystyrene (EPS) – ASTM C578 (Type II, min. 1.35 lb/ft³ density), Polyisocyanurate – ASTM C1289 (Type 1, min.), and extruded polystyrene (XPS) – ASTM C578 (Type X, min. 1.30 lb/ft³ density). Where a "faced" product is indicated, a facer shall be provided on both faces of the foam plastic sheathing. Where facing is not indicated in the table, faced and unfaced foam plastic sheathing shall be permitted. For all foam plastic sheathing products, approved manufacturer data shall be permitted in lieu of the table requirements.
4. Multiply tabulated maximum wind speed by 0.85 for wind exposure C or by 0.78 for wind exposure D.
5. Interior finish shall be minimum 1/2-inch (12.7 mm) thick gypsum wall board or an approved product with equivalent or greater out-of-plane bending strength and stiffness.

**TABLE 1405.18.1
ALLOWABLE WIND PRESSURE VALUE (PSF) FOR FOAM PLASTIC SHEATHING
IN EXTERIOR WALL COVERING ASSEMBLIES¹**

Foam Plastic Sheathing Material ²	Foam Sheathing Thickness (in)	Allowable (ASD) Components and Cladding Design Wind Pressure (psf) (basic wind speed not to exceed 110 mph per Section 1405.18)			
		Walls with Interior Finish ³		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
EPS	3/4"	21.8	NP	15.3	NP
	1"	38.8	19.4	27.2	13.6
	≥1-1/2"	89.0	39.5	62.3	27.7
Polyiso-cyanurate	1/2" (faced)	33.3	14.8	23.3	10.4
	3/4" (faced)	56.4	25.1	39.5	17.6
	1" (faced)	67.5	30.0	47.2	21.0
	≥1-1/2" (faced)	77.4	34.4	54.1	24.1
XPS	1/2" (faced)	28.3	12.6	19.8	NP
	3/4"	21.4	NP	15.0	NP
	1"	38.0	29.0	26.6	20.3
	≥1-1/2"	78.2	34.7	54.7	24.3

For SI: 1 inch = 25.4 mm, 1 pound per square foot (psf) = 0.0479 kPa.

NP = not permitted (allowable design wind pressure less than 10 psf)

1. Foam plastic sheathing panels shall be permitted to be oriented parallel or perpendicular to framing members.
2. Foam plastic sheathing shall meet or exceed the following material standards: Expanded Polystyrene (EPS) – ASTM C578 (Type II, min. 1.35 lb/ft³ density), Polyisocyanurate – ASTM C1289 (Type 1, min.), and extruded polystyrene (XPS) – ASTM C578 (Type X, min. 1.30 lb/ft³ density). Where a "faced" product is indicated, a facer shall be provided on both faces of the foam plastic sheathing. Where facing is not indicated in the table, faced and unfaced foam plastic sheathing shall be permitted. For all foam plastic sheathing products, approved manufacturer data shall be permitted in lieu of the table requirements.
3. Interior finish shall be minimum 1/2-inch (12.7 mm) thick gypsum wall board or an approved product with equivalent or greater out-of-plane bending strength and stiffness.

1405.18.2 Siding attachment over foam sheathing. Siding shall be attached over foam sheathing in accordance with Section 1405.18.2.1, Section 1405.18.2.2, or an approved design. In no case shall the siding material be used in a manner that exceeds its application limits. When required by the basic wind speed and wind exposure applicability of Section 1706, wall cladding installation over foam sheathing shall be subject to special inspection in accordance with Section 1706.4.

Exception: Where the siding manufacturer has provided approved installation instructions for application over foam sheathing, those requirements shall apply.

1405.18.2.1 Direct siding attachment. Approved weather coverings installed directly over foam sheathing without separation by an air space shall comply with Table 1405.18.2.1 in regard to minimum fastening requirements, nail diameter, penetration, and nail spacing and maximum foam sheathing thickness limitations to support siding dead load for the applicable foam sheathing thickness and wind speed condition. The siding fastener and siding installation shall otherwise comply with Chapter 14, shall be capable of resisting all other applicable design loads determined in accordance with Chapter 16, and in no case shall result in a less stringent fastening requirement than required by Chapter 14 or the manufacturer's installation instructions for the specific siding material used.

Exceptions:

1. For adhered masonry veneer, refer to Section 1405.10.
2. For vinyl siding, refer to Section 1405.14.
3. For exterior insulation and finish systems, refer to Section 1408.

**TABLE 1405.18.2.1
FASTENING REQUIREMENTS FOR DIRECT SIDING
ATTACHMENT OVER FOAM PLASTIC SHEATHING^{1,2}**

Minimum Nail Diameter ³ (inches)	Nail Spacing along Stud ⁴ (inches)	Maximum Foam Sheathing Thickness ⁵ (inches)	16"oc WALL FRAMING			24"oc WALL FRAMING		
			Maximum Wind Speed (mph)			Maximum Wind Speed (mph)		
			Exposure B	Exposure C	Exposure D	Exposure B	Exposure C	Exposure D
0.113	6	2	140	120	110	120	100	90
	8	2	130	110	100	100	85	DR
	12	1	100	85	DR	85	DR	DR
0.120	6	3	140	120	110	120	100	90
	8	2	130	110	100	110	90	85
	12	1.5	110	90	85	90	DR	DR
0.135	6	3	140	120	110	130	110	100
	8	3	140	120	110	110	90	85
	12	2	110	90	85	90	DR	DR

For SI: 1 inch = 25.4 mm; 1 mph = 1.609 km/h

DR = design required

- Maximum wind speed values are based on a minimum 1-1/4 inch (31.8 mm) penetration of a smooth shank nail fastener into wood framing of Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS.
- Tabulated maximum wind speed values are based on a mean roof height of 30 feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m) or 0.9 for a mean roof height of 60 feet (18.3 m). For greater mean roof heights, an approved design shall be required.
- Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths to provide a minimum 1-1/4 inch (31.8 mm) penetration into wood framing. Specified nails in accordance with Chapter 1405 or the siding manufacturer's approved installation instructions shall meet all other requirements in ASTM F1667 or be otherwise approved for the intended application.
- 'Nail spacing along stud' refers to spacing of siding fasteners in the vertical direction. A minimum of one fastener shall be applied at each intersection of an individual siding member with a wall stud.
- Maximum foam sheathing thickness values are based on a maximum 24 inch (0.6 m) stud spacing, a maximum siding dead load of 11 psf (0.53 kPa), and S_{DS} per Section 1613.5.4 not exceeding 0.83g. Siding dead load shall not exceed 8 psf (0.39 kPa) for and S_{DS} of 1.17g, 6 psf (0.29 kPa) for S_{DS} of 1.5g, or 3.0 psf (0.14 kPa) for S_{DS} of 3.0 g.

**TABLE 1405.18.2.1
SIDING MINIMUM FASTENING REQUIREMENTS
FOR DIRECT SIDING ATTACHMENT OVER FOAM PLASTIC SHEATHING
TO SUPPORT SIDING DEAD LOAD¹**

Siding Fastener Through Foam Sheathing into:	Siding Fastener -Type and Minimum Size ²	Siding Fastener Vertical Spacing (inches)	Maximum Foam Sheathing Thickness (inches)					
			16"oc Fastener Horizontal Spacing			24"oc Fastener Horizontal Spacing		
			Siding Weight:			Siding Weight:		
			3 psf	11 psf	25 psf	3 psf	11 psf	25 psf
Wood Framing (minimum 1-1/4 inch penetration)	0.113" diameter nail	6	4	3	1	4	2	0.75
		8	4	2	0.75	4	1.5	DR
		12	4	1.5	DR	3	0.75	DR
	0.120" diameter nail	6	4	3	1.5	4	2	0.75
		8	4	2	1	4	1.5	0.5
		12	4	1.5	0.5	3	1	DR
	0.131" diameter nail	6	4	4	1.5	4	3	1
		8	4	3	1	4	2	0.75
		12	4	2	0.75	4	1	DR
Steel Framing (minimum penetration of steel thickness + 3 threads)	#8 screw into 33 mil steel or thicker	6	3	3	1.5	3	2	DR
		8	3	2	0.5	3	1.5	DR
		12	3	1.5	DR	3	0.75	DR
	#10 screw into 33 mil steel	6	4	3	2	4	3	0.5
		8	4	3	1	4	2	DR
		12	4	2	DR	3	1	DR
	#10 screw into 43 mil steel or thicker	6	4	4	3	4	4	2
		8	4	4	2	4	3	1.5
		12	4	3	1.5	4	3	DR

For SI: 1 inch = 25.4 mm; 1 pound per square foot (psf) = 0.0479 kPa

DR = design required

- Tabulated requirements are based on wood framing of Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS and minimum 33 ksi steel for 33 mil and 43 mil steel and 50 ksi steel for 54 mil steel or thicker.
- Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Self-drilling tapping screw fasteners for connection of siding to steel framing shall comply with the requirements of AISI S200. Specified fasteners in accordance with Chapter 1405 or the siding manufacturer's approved installation instructions shall meet all other requirements in ASTM F1667, AISI S200 or be otherwise approved for the intended application.

1405.18.2.2 Offset siding attachment. When an airspace separates the siding from direct contact with the foam plastic sheathing, the approved weather coverings shall be attached in accordance with Chapter 14 to minimum 1x3 wood or minimum 33 mil steel hat channel furring strips placed over the foam sheathing. Furring shall be attached through the foam sheathing to wall framing in accordance with Table 1405.18.2.2 in regard to **2010 ICC FINAL ACTION AGENDA**

minimum fastening requirements and maximum foam sheathing thickness limitations to support siding dead load. Furring and connections shall be separately designed to resist all other applicable loads determined in accordance with Chapter 16. When placed horizontally, wood furring strips shall be preservative treated wood in accordance with Section 2303.1.8 or naturally durable wood and fasteners shall be corrosion resistant in accordance with Section 2304.9.5. Steel hat channel furring shall have a minimum G60 galvanized coating.

Exception: Furring strips shall not be required over foam plastic sheathing behind anchored stone and masonry veneer installed in accordance with Section 1405.6. Veneer ties shall be installed on the surface of the foam plastic sheathing with fasteners of sufficient length to pass through the thickness of foam plastic sheathing and penetrate framing to provide required pull-out resistance determined in accordance with Chapter 16.

**TABLE 1405.18.2.2
FASTENING REQUIREMENTS FOR WOOD FURRING
OVER FOAM PLASTIC SHEATHING^{1,2,3}**

Fastener Type	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring ⁴ (inches)	Maximum Thickness of Foam Sheathing ⁵ (inches)	16"oc FURRING			24"oc FURRING		
				Maximum Wind Speed (mph)			Maximum Wind Speed (mph)		
				Exposure B	Exposure C	Exposure D	Exposure B	Exposure C	Exposure D
0.120" diameter smooth shank nail	1-1/4	8	2	130	110	100	110	90	85
		12	1.5	110	90	85	90	DR	DR
		16	1	90	DR	DR	DR	DR	DR
0.135" diameter smooth shank nail	1-1/4	8	3	130	110	100	110	90	85
		12	2	110	90	85	90	DR	DR
		16	1.5	100	85	DR	DR	DR	DR
#8 wood screw	1	12	3	140	120	110	140	120	110
		16	2	140	120	110	140	120	110
1/4" lag screw	1-1/2	24	3	140	120	110	140	120	110

For SI: 1" = 25.4 mm; 1 mph = 1.609 km/h

DR = design required

- Furring strips shall be spaced a maximum of 24"oc in a vertical or horizontal orientation. Table values are based on minimum 3/4 inch (19.1 mm) thick furring strip and wood studs of Spruce Pine Fir or any softwood species with a specific gravity of 0.42 or greater per AFPA/NDS.
- Tabulated maximum wind speed values are based on a mean roof height of 30 feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m) or 0.9 for a mean roof height of 60 feet (18.3 m). For greater mean roof heights, an approved design shall be required.
- Where minimum required siding fastener penetration exceeds 3/4 inch (19.1 mm), a minimum 2x furring strip shall be used unless approved deformed shank siding nails or siding screws are used to provide equivalent withdrawal strength.
- In a vertical orientation, furring strips shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, furring strips shall be fastened at each stud intersection with a number of fasteners equivalent to the required fastener spacing. In no case shall fasteners be spaced more than 24 inches (0.6 m) apart.
- Maximum foam sheathing thickness values are based on a maximum 24 inch (0.6 m) stud spacing, a maximum siding dead load of 11 psf (0.53 kPa), and S_{DS} per Section 1613.5.4 not exceeding 0.83g. Siding dead load shall not exceed 8 psf (0.39 kPa) for and S_{DS} of 1.17g, 6 psf (0.29 kPa) for S_{DS} of 1.5g, or 3.0 psf (0.14 kPa) for S_{DS} of 3.0g.
- Lag screws shall be installed with a standard cut washer and shall be pre-drilled in accordance with AF&PA NDS-05. Approved self-drilling screws of equal or greater shear and withdrawal strength shall be permitted without pre-drilling.

**TABLE 1405.18.2.2
FURRING MINIMUM FASTENING REQUIREMENTS FOR APPLICATION
OVER FOAM PLASTIC SHEATHING TO SUPPORT SIDING DEAD LOAD^{1,2}**

Furring Material	Framing Member	Fastener Type and Minimum Size	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring (inches)	Maximum Thickness of Foam Sheathing (inches)					
					16"oc FURRING ⁴			24"oc FURRING ⁴		
					Siding Weight:			Siding Weight:		
					3 psf	11 psf	25 psf	3 psf	11 psf	25 psf
Minimum 1x Wood Furring ³	Minimum 2x Wood Stud	0.120" diameter nail	1-1/4	8	4	4	1.5	4	2	1
				12	4	2	1	4	1.5	0.5
				16	4	2	0.5	4	1	DR
		0.131" diameter nail	1-1/4	8	4	4	2	4	3	1
				12	4	3	1	4	2	0.75
				16	4	2	0.75	4	1.5	DR
		#8 wood screw ⁵	1	12	4	4	1.5	4	3	1
				16	4	3	1	4	2	0.5
				24	4	2	0.5	4	1	DR
		1/4" lag screw ⁵	1-1/2	12	4	4	3	4	4	1.5
				16	4	4	2	4	3	1
				24	4	3	1	4	2	0.5
Minimum 33mil Steel Hat Channel or Minimum 1x Wood Furring ³	33 mil Steel Stud	#8 screw	Steel thickness + 3 threads	12	3	1.5	DR	3	0.5	DR
				16	3	1	DR	2	DR	DR
				24	2	DR	DR	2	DR	DR
		#10 screw	Steel	12	4	2	DR	4	1	DR

Furring Material	Framing Member	Fastener Type and Minimum Size	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring (inches)	Maximum Thickness of Foam Sheathing (inches)						
					16"oc FURRING ⁴			24"oc FURRING ⁴			
					Siding Weight:			Siding Weight:			
					3 psf	11 psf	25 psf	3 psf	11 psf	25 psf	
43 mil or thicker Steel Stud	#8 Screw	Steel thickness + 3 threads	thickness + 3 threads	16	4	1.5	DR	3	DR	DR	
				24	3	DR	DR	2	DR	DR	
				12	3	1.5	DR	3	0.5	DR	
				16	3	1	DR	2	DR	DR	
				24	2	DR	DR	2	DR	DR	
	#10 screw	Steel thickness + 3 threads	thickness + 3 threads	thickness + 3 threads	12	4	3	1.5	4	3	DR
					16	4	3	0.5	4	2	DR
					24	4	2	DR	4	0.5	DR
					12	4	3	1.5	4	3	DR
					16	4	3	0.5	4	2	DR

For SI: 1" = 25.4 mm; 1 pound per square foot (psf) = 0.0479 kPa.

DR = design required

- Table values are based on: (1) minimum ¼-inch (19.1 mm) thick wood furring and wood studs of Spruce-Pine-Fir or any softwood species with a specific gravity of 0.42 or greater per AFPA/NDS, (2) minimum 33 mil steel hat channel furring of 33 ksi steel, and (3) steel framing of indicated nominal steel thickness and minimum 33 ksi steel for 33mil and 43 mil steel and 50 ksi steel for 54 mil steel or thicker.
- Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Self-drilling tapping screw fasteners for connection of siding to steel framing shall comply with the requirements of AISI S200. Specified fasteners in accordance with Chapter 1405 or the siding manufacturer's approved installation instructions shall meet all other requirements in ASTM F1667 or AISI S200 or be otherwise approved for the intended application.
- Where the required siding fastener penetration into wood material exceeds ¼ inch (19.1 mm) and is not more than 1-1/2 inches (38.1 mm), a minimum 2x wood furring shall be used unless approved deformed shank siding nails or siding screws are used to provide equivalent withdrawal strength allowing connection to 1x wood furring.
- Furring shall be spaced a maximum of 24"oc in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, furring strips shall be fastened at each stud intersection with a number of fasteners equivalent to the required fastener spacing. In no case shall fasteners be spaced more than 24 inches (0.6 m) apart.
- Lag screws shall be installed with a standard cut washer. Lag screws and wood screws shall be pre-drilled in accordance with AF&PA/NDS. Approved self-drilling screws of equal or greater shear and withdrawal strength shall be permitted without pre-drilling.

1405.14.2 Foam Plastic Sheathing. Vinyl siding used with foam plastic sheathing shall be installed in accordance with 1405.14.2.1, 1405.14.2.2 and 1405.14.2.3.

Exception: Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing, or other approved backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with 1405.14.1.

1405.14.2.1 Basic Wind Speed Not Exceeding 90 mph and Exposure Category B. Where the building mean roof height does not exceed 30 feet (9.1 m), the basic wind speed does not exceed 90 mph, the Exposure Category is B and gypsum wall board or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 1-1/4 inches (32 mm) using minimum 0.120-inch diameter nail (shank) with a minimum 0.313-inch diameter head, and fastened 16 inches on center. The foam plastic sheathing shall comply with Section 1405.18.1 and shall not exceed a maximum thickness of 1.5 inches (38 mm) for a 0.120-inch diameter nail or 2.0 inches (51 mm) for a 0.135-inch diameter nail. Vinyl siding shall be permitted to be installed on furring strips in accordance with Section 1405.18.2.2 and the siding manufacturer's installation instructions when foam plastic sheathing thickness complies with Section 1405.18.1.

1405.14.2.2 Basic Wind Speed Exceeding 90mph or Exposure Categories C and D. Where the basic wind speed exceeds 90 mph or the Exposure Category is C or D, or all conditions of 1405.14.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the wind loads required by Chapter 16. The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:

- For wall assemblies with foam plastic sheathing on the exterior side and minimum ½-inch (12.7 mm) thick gypsum wall board or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.
- For wall assemblies with foam plastic sheathing on the exterior side and no gypsum wall board or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.

Exception: The above adjustments shall not apply when vinyl siding is attached to wood furring strips installed over the foam plastic sheathing in accordance with Section 1405.18.2.2 and such installation is in accordance with the vinyl siding manufacturer's installation instructions.

1405.14.2.3 Manufacturer Specification. Where the vinyl siding manufacturer's product specifications provide an approved design wind pressure rating for installation over foam plastic sheathing, use of this design wind pressure rating shall be permitted and the siding shall be installed in accordance with the manufacturer's installation instructions.

(Portions of proposal not shown, remain unchanged).

Commenter's Reason: This public comment responds to constructive criticism and supportive recommendations received at the first hearing. Every effort has been made to follow-up with the various interests and to respond with improvements to the original proposal. These improvements are also coordinated with a complimentary PC on FS156-09/10 Part 2 (IRC) as also requested by the IRC CDC which approved the original proposal with a request for further refinements at Final Action. These refinements are coordinated and comprehensively made in this one PC for reasons addressed separately as follows:

Inclusion of Steel Framing

Tables 1405.18.2.1 and 1405.18.2.2 now include siding connections for use with light-frame cold-formed steel in addition to light-frame wood as requested at the first hearing. These are needed to provide siding connection solutions applicable to light-frame cold-formed steel construction to ensure coordination with IECC energy code requirements for this type of construction (as mentioned in the IBC-S committee's reason for disapproval). The Steel Framing Alliance (SFA), American Iron and Steel Institute (AISI), and the Foam Sheathing Coalition (FSC) have worked together toward this end.

The original proposal included connection solutions for attachment of siding over foam sheathing only for wood framing. But, the scope of the original proposal was not otherwise limited to wood framing (i.e., requirements in Table 1405.18.1 of the original proposal are applicable to both wood and steel framing). The IRC committee approved the original FS156-09/10 proposal, but also expressed concern to "work with industry and bring the needed improvement back to the Final Action."

Steel framing was not addressed in the original proposal only because test data was not available at that time to justify appropriate solutions. Subsequently, the steel industry together with New York State Research and Energy Development Authority (NYSERDA) has conducted a testing program to provide justification to the solutions proposed in this PC. A report on this testing will be made available at the Final Action hearing and, as soon as available, by request to the proponent (Mark Nowak, SFA, mnowak@steel framing.org). These tests provide the necessary performance data for appropriately designing siding connections to steel framing that span through a thickness of foam sheathing.

These proposed provisions for light-frame cold-formed steel construction are not only coordinated with ICC energy code requirements, but they are necessary to ensure that foam insulation requirements as required by the ICC energy code are implemented in a structurally sound manner. Support of this PC is urged.

Inclusion of Additional Siding Weight Categories:

The original proposal was based on a minimum 11 psf siding dead load (for siding attachment requirements over foam sheathing). While various siding manufacturers supported the original proposal (or remained neutral), several expressed the desire to be included, such as the Masonry Veneer Manufacturers Association. Thus, a 25 psf siding weight category and connection requirements have been included in this PC. This also required inclusion of a 3 psf siding weight category such that the lighter weight sidings would not be unduly penalized by basing the table only on heavier siding types.

Simplification, Clarification and Editorial Improvements:

Content from table footnotes moved into tables for visual clarity and ease of access.

Removed confusing wind speed requirements from siding attachment table otherwise intending to address connection requirements for support of siding dead load and limit foam thickness. The text is clarified to more explicitly require that the siding attachment be separately designed to resist other loading conditions, including wind.

Adjusted fastener sizes to be compatible with pneumatic fasteners at request of ISANTA

Various editorial improvements to language, table headings, etc.

Additional technical justification for siding connections over foam sheathing

The FSC has also done additional testing of siding over foam sheathing connection assemblies for attachments to wood framing. These tests add further confirmation of the adequacy of the proposed siding attachment requirements for wood framing and support of siding weight. It also confirms that siding deflections will be limited to less than 0.015" as commonly used as a design basis for wood connections. A report documenting this testing will also be made available at the final action hearing and will be posted at www.foam sheathing.org as soon as available.

Strengthened QC requirements for foam sheathing wind pressure resistance properties

One of the concerns raised at the first code development hearing on FS156 was related to having assurance that foam sheathing products meet the wind pressure performance requirements upon which the proposal (namely Table 1405.18.1) is based. This public comment addresses that concern by clarifying implementation a code-recognized "approved agency" approach that already exists and is commonly used for foam sheathing and other products.

First, 2009 IBC Section 2603.2 gives foam plastic insulation requirements for use of an approved agency and labeling to ensure end use complies with code requirements as follows:

2603.2 Labeling and identification. Packages and containers of foam plastic insulation and foam plastic insulation components delivered to the job site shall bear the *label* of an *approved agency* showing the manufacturer's name, product listing, product identification and information sufficient to determine that the end use will comply with the code requirements.

Second, 2009 IBC Section 2603.5.4 provides an example of product performance criteria (test method and minimum performance indices) which the "approved agency" must consider in meeting the requirements of Section 2603.2:

2603.5.4 Flame spread and smoke-developed indexes. Foam plastic insulation, exterior coatings and facings shall be tested separately in the thickness intended for use, but not to exceed 4 inches (102 mm), and shall each have a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723.

Third, the Approved Agency is defined in Sections 202 and 1702.1 of the 2009 IBC as follows:

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved*.

And, the responsibilities of the Approved Agency include:

1703.1 Approved agency. An *approved agency* shall provide all information as necessary for the *building official* to determine that the agency meets the applicable requirements.

1703.1.1 Independence. An *approved agency* shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed.

1703.5 Labeling. Where materials or assemblies are required by this code to be *labeled*, such materials and assemblies shall be *labeled* by an *approved agency* in accordance with Section 1703. Products and materials required to be labeled shall be labeled in accordance with the procedures set forth in Sections 1703.5.1 through 1703.5.3.

This approach is also used for other materials such as:

2303.1.4 Wood structural panels. Wood structural panels, when used structurally (including those used for siding, roof and wall sheathing, subflooring, diaphragms and built-up members), shall conform to the requirements for their type in DOC PS 1 or PS 2. Each panel or member shall be identified for grade and glue type by the trademarks of an *approved* testing and grading agency. Wood structural panel components shall be designed and fabricated in accordance with the applicable standards listed in Section 2306.1 and identified by the trademarks of an *approved* testing and inspection agency indicating conformance with the applicable standard. In addition, wood structural panels when permanently exposed in outdoor applications shall be of exterior type, except that wood structural panel roof sheathing exposed to the outdoors on the underside is permitted to be interior type bonded with exterior glue, Exposure 1.

Additionally, a Fabricated Item is defined as follows:

FABRICATED ITEM. Structural, load-bearing or lateral load-resisting assemblies consisting of materials assembled prior to installation in a building or structure, or subjected to operations such as heat treatment, thermal cutting, cold working or reforming after manufacture and prior to installation in a building or structure. Materials produced in accordance with standard specifications referenced by this code, such as rolled structural steel shapes, steel-reinforcing bars, masonry units, and wood structural panels or in accordance with a standard, listed in Chapter 35, which provides requirements for quality control done under the supervision of a third-party quality control agency shall not be considered "fabricated items."

The above described "approved agency" process has shown itself effective and this public comment merely clarifies the application of this process to assure the structural properties (wind pressure resistance) of foam sheathing align with the basis of the proposed end-use requirements and limitations. The minimum performance requirements are based on a representative sample of currently manufactured products of each type as reported by the NAHB Research Center, Inc. (report available at www.foamsheathing.org). Support for this PC is urged.

Strengthened Scope Limitations on Foam Sheathing Applications

At the request of the insurance industry, a 110 mph wind speed limit has also been implemented in this proposal for foam sheathing. In addition, wind pressure requirements have been strengthened to require use of negative pressure values in all cases, even when siding is placed over foam sheathing and the siding is separately capable of resisting the full negative design wind pressure.

These provisions are needed for the above reasons, provide improvements for appropriate use of foam sheathing, and provide needed solutions for coordination with the energy code requirements. Again, your approval as modified is urged.

Final Action: AS AM AMPC____ D

FS156-09/10, Part II

IRC R703.3 (New), R703.3.1 (New), Table R703.3.1 (New), R703.3.2 (New), R703.3.2.1 (New), Table R703.3.2.1 (New), R703.3.2.2 (New), Table R703.3.2.2 (New), R703.4, Table R703.4, R703.5.1, R703.6.1, R703.7.4.1, R703.11.2, R703.11.2.1, R703.11.2.2, R703.11.2.3

Proposed Change as Submitted

Proponent: Jay H. Crandell, PE, d/b/a ARES Consulting, representing the Foam Sheathing Coalition

PART II – IRC BUILDING/ENERGY

1. Add new text as follows:

R703.3 Foam plastic sheathing. Foam plastic sheathing used in exterior wall covering assemblies shall comply with this section, Section R316, Chapter 11 and the manufacturer's installation instructions.

R703.3.1 Minimum thickness. The thickness of foam plastic sheathing shall comply with Table R703.3.1.

Exception: Where foam plastic sheathing is applied directly over or behind wall sheathing or other solid substrate capable of separately resisting the required wind pressure, the limitations of Table R703.3.1 shall not apply.

TABLE R703.3.1
REQUIREMENTS FOR FOAM PLASTIC SHEATHING
IN EXTERIOR WALL COVERING ASSEMBLIES^{1,2}

Foam Plastic	Foam Sheathing	Maximum Wind Speed (mph) – Exposure B⁴
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Sheathing Material ³	Thickness (in) ³	Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
Siding Attached Directly Over Foam Plastic Sheathing per Section R703.3.2.1					
EPS	3/4"	110	NP	90	NP
	1"	130	100	125	NP
	≥1-1/2"	130	130	130	125
Polyiso-cyanurate	1/2" (faced)	130	90	115	NP
	3/4" (faced)	130	120	130	100
	1" (faced)	130	130	130	110
	≥1-1/2" (faced)	130	130	130	115
XPS	1/2" (faced)	125	85	105	NP
	3/4"	110	NP	90	NP
	1"	130	95	120	NP
	≥1-1/2"	130	130	130	115

Siding Offset from Foam Sheathing per Section R703.3.2.2

	3/4"	EPS	NP	NP	NP
	1"		85	105	NP
	≥1-1/2"		130	130	105
Polyiso-cyanurate	1/2" (faced)	120	NP	100	NP
	3/4" (faced)	130	100	130	85
	1" (faced)	130	110	130	95
	≥1-1/2" (faced)	130	120	130	100
XPS	1/2" (faced)	110	NP	90	NP
	3/4"	95	NP	NP	NP
	1"	125	85	105	NP
	≥1-1/2"	130	120	130	100
EPS	3/4"	95	NP	NP	NP
	1"	125	85	105	NP
	≥1-1/2"	130	130	130	105

For SI: 1 inch = 25.4 mm, 1 mile per hour = 1.609 km/h

NP = not permitted

1. Tabulated maximum wind speed values are based on a mean roof height of 30-feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m).
2. Foam plastic sheathing panels shall be permitted to be oriented parallel or perpendicular to framing members.
3. Foam plastic sheathing shall meet or exceed the following material standards: Expanded Polystyrene (EPS) – ASTM C578 (Type II, min. 1.35 lb/ft³ density), Polyisocyanurate – ASTM C1289 (Type 1, min.), and extruded polystyrene (XPS) – ASTM C578 (Type X, min. 1.30 lb/ft³ density). Where a "faced" product is indicated, a facer shall be provided on both faces of the foam plastic sheathing. Where facing is not indicated in the table, faced and unfaced foam plastic sheathing shall be permitted. For all foam plastic sheathing products, approved manufacturer data shall be permitted in lieu of the table requirements.
4. Multiply tabulated maximum wind speed by 0.85 for wind exposure C or by 0.78 for wind exposure D.
5. Interior finish shall be minimum 1/2-inch (12.7 mm) thick gypsum wall board or an approved product with equivalent or greater out-of-plane bending strength and stiffness.

R703.3.2 Siding attachment over foam sheathing. Siding shall be attached over foam sheathing in accordance with Section R703.3.2.1, Section R703.3.2.2, or an approved design. In no case shall the siding material be used in a manner that exceeds its application limits.

Exception: Where the siding manufacturer has provided installation instructions for application over foam sheathing, those requirements shall apply.

R703.3.2.1 Direct siding attachment. Siding installed directly over foam sheathing without separation by an air space shall comply with Table R703.3.2.1 in regard to nail diameter, penetration, and nail spacing for the applicable foam sheathing thickness and wind speed condition. The siding fastener and siding installation shall otherwise comply with Section R703.4 and Table R703.4.

Exceptions:

1. For vinyl siding, refer to Section R703.11.2.
2. For exterior insulation and finish systems, refer to Section R703.9.
3. For adhered veneer, refer to Section R703.12.

**TABLE R703.3.2.1
FASTENING REQUIREMENTS FOR DIRECT SIDING
ATTACHMENT OVER FOAM PLASTIC SHEATHING^{1,2}**

Minimum Nail Diameter ³ (inches)	Nail Spacing along Stud ⁴ (inches)	Maximum Foam Sheathing Thickness ⁵ (inches)	16"oc WALL FRAMING			24"oc WALL FRAMING		
			Maximum Wind Speed (mph)			Maximum Wind Speed (mph)		
			Exposure B	Exposure C	Exposure D	Exposure B	Exposure C	Exposure D
0.113	6	2	140	120	110	120	100	90
	8	2	130	110	100	100	85	DR
	12	1	100	85	DR	85	DR	DR
0.120	6	3	140	120	110	120	100	90
	8	2	130	110	100	110	90	85
	12	1.5	110	90	85	90	DR	DR
0.135	6	3	140	120	110	130	110	100
	8	3	140	120	110	110	90	85
	12	2	110	90	85	90	DR	DR

For SI: 1 inch = 25.4 mm; 1 mph = 1.609 km/h

DR = design required

- Maximum wind speed values are based on a minimum 1-1/4 inch (31.8 mm) penetration of a smooth shank nail fastener into wood framing of Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS.
- Tabulated maximum wind speed values are based on a mean roof height of 30-feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m).
- Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths to provide a minimum 1-1/4 inch (31.8 mm) penetration into wood framing. Specified nails in accordance with Section R703.4 or the siding manufacturer's installation instructions shall meet all other requirements in ASTM F1667 or be otherwise approved for the intended application.
- 'Nail spacing along stud' refers to spacing of siding fasteners in the vertical direction. A minimum of one fastener shall be applied at each intersection of an individual siding member with a wall stud.
- Maximum foam sheathing thickness values are based on a maximum 24-inch (0.6 m) stud spacing and a maximum siding dead load of 11 psf (0.53 kPa) based on 7/8-inch (22 mm) thick Portland cement plaster. For Seismic Design Category D2, the maximum siding dead load shall be 8 psf.

Fastener Type	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring ⁴ (inches)	Maximum Thickness of Foam Sheathing ⁵ (inches)	16"oc FURRING			24"oc FURRING		
				Maximum Wind Speed (mph)			Maximum Wind Speed (mph)		
				Exposure B	Exposure C	Exposure D	Exposure B	Exposure C	Exposure D
0.120" diameter smooth shank nail	1-1/4	8	2	130	110	100	110	90	85
		12	1.5	110	90	85	90	DR	DR
		16	1	90	DR	DR	DR	DR	DR
0.135" diameter smooth shank nail	1-1/4	8	3	130	110	100	110	90	85
		12	2	110	90	85	90	DR	DR
		16	1.5	100	85	DR	DR	DR	DR
#8 wood screw	1	12	3	140	120	110	140	120	110
		16	2	140	120	110	140	120	110
1/4" lag screw ⁶	1-1/2	24	3	140	120	110	140	120	110

R703.3.2.2 Offset siding attachment. When an airspace separates the siding from direct contact with the foam plastic sheathing, the siding shall be attached in accordance with Section R703.4 and Table R703.4 to minimum 1x3 wood furring strips placed over the foam sheathing. Furring shall be attached through the foam sheathing to wall framing in accordance with Table R703.3.2.2. When placed horizontally, wood furring strips shall be preservative treated wood or naturally durable wood and fasteners shall be corrosion resistant in accordance with Section R317.

Exception: Furring strips shall not be required over foam plastic sheathing located behind anchored stone and masonry veneer installed in accordance with Section R703.7. Veneer ties shall be installed in accordance with Section R703.7.4.1.

**TABLE R703.3.2.2
FASTENING REQUIREMENTS FOR WOOD FURRING
OVER FOAM PLASTIC SHEATHING^{1,2,3}**

For SI: 1" = 25.4 mm; 1 mph = 1.609 km/h

DR = design required

- Furring strips shall be spaced a maximum of 24"oc in a vertical or horizontal orientation. Table values are based on minimum 3/4-inch (19.1 mm) thick furring strip and wood studs of Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater per AFPA/NDS.
- Tabulated maximum wind speed values are based on a mean roof height of 30-feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m).

3. Where minimum required siding fastener penetration exceeds ¾ inch (19.1 mm), a minimum 2x furring strip shall be used unless approved deformed shank siding nails or siding screws are used to provide equivalent withdrawal strength.
4. In a vertical orientation, furring strips shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, furring strips shall be fastened at each stud intersection with a number of fasteners equivalent to the required fastener spacing. In no case shall fasteners be spaced more than 24 inches (0.6 m) apart.
5. Maximum foam sheathing thickness values are based on a maximum 24-inch (0.6 m) stud spacing and a maximum siding dead load of 11 psf (0.53 kPa) based on 7/8-inch (22 mm) thick Portland cement plaster. For Seismic Design Category D2, the maximum siding dead load shall be 8 psf.
6. Lag screws shall be installed with a standard cut washer and shall be pre-drilled in accordance with AF&PA NDS-05. Approved self-drilling screws of equal or greater shear and withdrawal strength shall be permitted without pre-drilling.

(Renumber subsequent sections)

2. Revise as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. Additional requirements in accordance with Section R703.3.2 shall apply when siding is installed over foam sheathing. Where the basic wind speed per Figure R301.2(4) is 110 miles per hour (49 m/s) or higher, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL		NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b,c,d}					
					Wood or wood structural panel sheathing	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud ^{aa}	Direct to studs	Number or spacing of fasteners
Horizontal aluminum ^e	Without insulation	0.019 ^f	Lap	Yes	0.120 nail 1½" long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^v	Not allowed	Same as stud spacing
		0.024	Yes	Yes	0.120 nail 1½" long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^v	Not allowed	
	With insulation	0.019	Yes	Yes	0.120 nail 1½" long	0.120 nail 2½" long	0.120 nail 2½" long	0.120 nail ^v	0.120 nail 1½" long	
Anchored veneer; brick, concrete, masonry or stone		2	Section R703	Yes	See Section R703 and Figure R703.7 ^g					
Adhered veneer; concrete, stone or masonry ^w		–	Section R703	Yes Note w	See Section R703.6.1 ^g or in accordance with the manufacturer's instructions					
Hardboard ^k Panel siding-vertical		7/16	–	Yes	Note m	Note m	Note m	Note m	Note m	6" Panel edges 12" inter. Sup."
Hardboard ^k Lap-siding horizontal		7/16	Note p	Yes	Note o	Note o	Note o	Note o	Note o	Same as stud spacing 2 per bearing
Steel ^h		29 ga.	Lap	Yes	0.113 nail and 1¼" Staple-1¼"	0.113 nail and 2¼" Staple 2½"	0.113 nail and 2½" Staple-2¼"	0.113 nail ^v Staple ^v	Not allowed	Same as stud spacing
Particleboard panels		3/8-1/2	–	Yes	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	box nail ^v	6d box nail (2"x0.099), 3/8 not allowed	6" panel edge, 12"inter. sup.
		3/8	–	Yes	6d box nail (2" x 0.099")	8d box nail (2" x 0.099")	8d box nail (2" x 0.099")	box nail ^v	6d box nail (2" x 0.099")	
Wood structural panel siding ^l (exterior grade)		3/8	Note p	Yes	0.099 nail-2"	0.113 nail-2½"	0.113 nail-2½"	0.113 nail ^v	0.099 nail-2"	6" panel edge. 12" inter.sup.
Wood structural panel lapsiding		3/8-1/2	Note p Note x	Yes	0.099 nail-2"	0.113 nail-2½"	0.113 nail-2½"	0.113 nail ^x	0.099 nail-2"	8" along bottom edge
Vinyl siding ^l		0.035	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16 gauge	0.120 nail (shank) with a 0.313 head or 16 gauge staple with	0.120 nail (shank) with a 0.313 head or 16 gauge	0.120 nail (shank) with a 0.313 head per Section	Not allowed	16 inches on center or specified by the manufacturer instructions

SIDING MATERIAL	NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b,c,d}					
				Wood or wood structural panel sheathing	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud ^{aa}	Direct to studs	Number or spacing of fasteners
				staple with 3/8 to 1/2-inch crown ^{y,z}	3/8 to 1/2-inch crown ^y	staple with 3/8 to 1/2-inch crown ^y	R ^{203.11.2}		or test report
Wood ^l rustic, drop	3/8 Min	Lap	Yes	Fastener penetration into stud-1"				0.113 nail-2 1/2" Staple-2"	Face nailing up to 6" widths, 1 nail per bearing, 8" widths and over, 2 nails per bearing
Shiplap	19/32 Average	Lap	Yes						
Bevel	7/16	Lap	Yes						
Butt tip	3/16	Lap	Yes						
Fiber cement panel siding ^q	5/16	Note q	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant (12" x 0.113") nail ^f	6d common corrosion-resistant nail ^f	6" o.c. on edges, 12" o.c. on intermed. Studs
Fiber cement lap siding ^s	5/16	Note s	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant (12" x 0.113") nail ^f	6d common corrosion-resistant nail or 11 gage roofing nail ^f	Note t

For SI: 1 inch = 25.4 mm.

- a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- c. Staples shall have a minimum crown width of 7/16-inch outside diameter and be manufactured of minimum 16 gage wire.
- d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where for fiberboard, or gypsum, or foam plastic sheathing backing is used
- e. Aluminum nails shall be used to attach aluminum siding.
- f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- g. All attachments shall be coated with a corrosion-resistant coating.
- h. Shall be of approved type.
- i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood 1/2-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate 1 1/2 inches into studs, studs and wood sheathing combined or blocking. For application over foam sheathing, refer to Section R703.3.2.2.
- k. Hardboard siding shall comply with CPA/ANSI A135.6.
- l. Vinyl siding shall comply with ASTM D 3679.
- m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing 1 1/2 inches. For application over foam sheathing, minimum shank diameter and penetration into framing shall comply with Section R703.3.2.
- n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing 1 1/2 inches. For application over foam sheathing, minimum shank diameter and penetration into framing shall comply with Section R703.3.2.
- p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- q. See Section R703.10.1.
- r. Fasteners shall comply with the nominal dimensions in ASTM F 1667. For application over foam sheathing, refer to Section R703.3.2
- s. See Section R703.10.2.
- t. Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one 11 gage 1 1/2 inch long galv. roofing nail through the top edge of each plank at each stud.
- u. See Section R703.2 exceptions.
- v. Minimum nail length must accommodate sheathing and penetrate framing 1 1/2 inches. For application over foam sheathing, refer to Section R703.3.2
- w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of ACI 530/ASCE 5/TMS-402.
- x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y. Minimum fastener length must accommodate sheathing and penetrate framing .75 inches or in accordance with the manufacturer's installation instructions. For application over foam sheathing, fastener penetration into framing shall comply with Section R703.3.2.

- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than .75 inches through wood or wood structural sheathing with or without penetration into the framing.
- aa. Refer to Section R703.3 for additional requirements.
- bb. For siding application over foam sheathing, fastener spacing shall comply with the more stringent requirement of this table or Section R703.3.2.

R703.5.1 Application. Wood shakes or shingles shall be applied either single-course or double-course over nominal 1/2-inch (13 mm) wood-based sheathing or to furring strips over nominal 1/2-inch (13 mm) nonwood sheathing.

Exception: Wood shakes or shingles over foam plastic sheathing, shall be applied to wood furring strips in accordance with Section R703.3.2.2.

A permeable water-resistive barrier shall be provided in accordance with Section R703.2 ~~over all sheathing, with horizontal overlaps in the membrane of not less than 2 inches (51mm) and vertical overlaps of not less than 6 inches (152 mm).~~ Where furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25mm by 76 mm or 25mm by 102 mm), and shall be fastened horizontally to the studs with 7d or 8d box nails. For application over foam plastic sheathing, furring strips shall be fastened in accordance with Section R703.3.2.2, and Furring strips shall be spaced a distance on center equal to the actual weather exposure of the shakes or shingles, not to exceed the maximum exposure specified in Table R703.5.2. The spacing between adjacent shingles to allow for expansion shall not exceed 1/4 inch (6 mm), and between adjacent shakes, it shall not exceed 1/2 inch (13 mm). The offset spacing between joints in adjacent courses shall be a minimum of 1 1/2 inches (38 mm).

R703.6.1 Lath. All lath and lath attachments shall be of corrosion-resistant materials. Expanded metal or woven wire lath shall be attached with 1 1/2-inch-long (38 mm), 11 gage nails having a 7/16-inch (11.1 mm) head, or 7/8-inch-long (22.2 mm), 16 gage staples, spaced at no more than 6 inches (152 mm), or as otherwise *approved*. For application of maximum 7/8-inch-thick Portland cement plaster over foam plastic sheathing, nail length and shank diameter shall comply with Section R703.3.2.

R703.7.4.1 Size and spacing. Veneer ties, if strand wire, shall not be less in thickness than No. 9 U.S. gage [(0.148 in.) (4 mm)] wire and shall have a hook embedded in the mortar joint, or if sheet metal, shall be not less than No. 22 U.S. gage by [(0.0299 in.) (0.76 mm)] 7/8 inch (22 mm) corrugated. Each tie shall be spaced not more than 24 inches (610 mm) on center horizontally and vertically and shall support not more than 2.67 square feet (0.25 m²) of wall area. For application over foam plastic sheathing, corrugated metal ties shall be fastened through the foam plastic sheathing using a 10d common nail with a minimum penetration of 1 1/2 inches (38 mm) into wood framing for a maximum wind condition of 90 miles per hour (40 m/s) in wind exposure B. For a basic wind speed not exceeding 110 miles per hour (49 m/s) in any wind exposure and in Seismic Design Categories C, D₀, D₁, and D₂, a #8 wood screw with a minimum 1 inch (25.4 mm) penetration into wood wall framing shall be used in each tie. Alternatively, an approved fastener with equivalent withdrawal strength shall be permitted.

Exception: In Seismic Design Category D₀, D₁ or D₂ or townhouses in Seismic Design Category C or in wind areas of more than 30 pounds per square foot pressure (1.44 kPa), each tie shall support not more than 2 square feet (0.2 m²) of wall area.

R703.11.2 Foam plastic sheathing. Vinyl siding used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

Exception: Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other *approved* backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with Section R703.11.1.

R703.11.2.1 Basic wind speed not exceeding 90 miles per hour and Exposure Category B. Where the basic wind speed does not exceed 90 miles per hour (40 m/s), the Exposure Category is B and gypsum wall board or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 1 1/4 inches (32 mm) using minimum 0.120-inch diameter nail (shank) with a minimum 0.313-inch diameter head, 16 inches on center. The foam plastic sheathing minimum thickness shall comply with Section R703.3.1 and shall not exceed a maximum thickness of 1.5 inches (38mm) for a 0.120-inch diameter nail or 2.0 inches (51 mm) for a 0.135-inch diameter nail. ~~shall be 1/2 inch thick (12.7 mm) (nominal) extruded polystyrene per ASTM C578, 1/2-inch-thick (12.7 mm) (nominal) polyisocyanurate per ASTM C1289, or 1-inch-thick (25 mm)(nominal) expanded polystyrene per ASTM C578.~~ Vinyl siding shall be permitted to be installed on furring strips in accordance with Section R703.2.2 using the siding manufacturer's installation instructions when foam plastic sheathing thickness complies with Section R703.3.1.

R703.11.2.2 Basic wind speed exceeding 90 miles per hour or Exposure Categories C and D. Where the basic wind speed exceeds 90 miles per hour (40 m/s) or the Exposure Category is C or D, or all conditions of Section R703.11.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the loads listed in Tables R301.2(2) adjusted for height and exposure using Section R301.2(3). The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:

1. For wall assemblies with foam plastic sheathing on the exterior side and minimum 1/2-inch-thick gypsum wall board or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.
2. For wall assemblies with foam plastic sheathing on the exterior side and no gypsum wall board or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.

Exception: The above adjustments shall not apply when vinyl siding is attached to wood furring strips installed over the foam plastic sheathing in accordance with Section R703.3.2.2 and such installation is in accordance with the vinyl siding manufacturer's installation instructions.

R703.11.2.3 Manufacturer specification. Where the vinyl siding manufacturer's product specifications provide an *approved* design wind pressure rating for installation over foam plastic sheathing, use of this design wind pressure rating shall be permitted and the siding shall be installed in accordance with the manufacturer's installation instructions.

Reason:

Part II- As with a related IBC proposal, this proposal is a comprehensive clarification and upgrading of requirements for foam sheathing and siding installation over foam sheathing. It primarily addresses adequate foam sheathing thickness and siding attachment over foam sheathing to resist design wind loads within the scope of the IRC (e.g., up to 110 mph, Exposure D). It also provides siding connections through foam sheathing that provide adequate support to resist the dead load of siding installed over foam sheathing. As a whole, these provisions are necessary to ensure appropriate use of foam sheathing and siding materials together on exterior wall assemblies in a way that best compliments existing exterior wall covering provisions in Section R703 of the code. A detailed explanation of the test data and analysis justifying the proposed requirements can be found at www.foamsheathing.org.

In support of proposed new Section R703.3.1, the wind pressure resistance of foam sheathing used in this proposal is based on certified full-scale (4'x8' panel) testing conducted at the NAHB Research Center, Inc. Samples included specimens from various manufacturers representing the industry at large. The design wind speed data (without rounding or capping values) is shown in the table below for informational purposes. The values in the proposed table have been rounded to the nearest 5 mph increment and capped at 130 mph (Exposure B) as this corresponds to a maximum wind speed of 110 mph in exposure C, which is essentially the scope limit of the IRC. This proposal is needed to avoid potential exclusion of foam sheathing products due to the incompleteness of current code requirements which can negatively affect other concerns such as energy conservation code requirements and green building interests. Most importantly, these requirements will ensure that foam sheathing is used appropriately to prevent building envelope damage, particularly in higher wind conditions and with thinner material used on more widely spaced studs (e.g., 24"oc center on gable roof ends which typically have no interior finish). These requirements also agree reasonably well with the generally successful use of foam sheathing on typical wall assemblies (e.g., 16"oc framing or 24"oc framing with interior finish) on many homes in lower wind regions of the U.S.

**TABLE R703.3.1- Part A (Actual design values based on test data – not rounded or capped as in the proposal)
 MAXIMUM WIND SPEED (mph – 3 SECOND GUST) PERMITTED
 FOR FOAM PLASTIC SHEATHING
 WITH DIRECTLY ATTACHED SIDING PER SECTION R703.3.2.1**

Foam Sheathing Material ³	Foam Sheathing Nominal Thickness (in)	Maximum Wind Speed (mph) – Exposure B ⁴			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
EPS	¾" (unfaced)	110	73	92	61
	1" (unfaced)	147	98	123	82
	1-1/2" (unfaced)	222	148	186	124
Polyiso-cyanurate	½" (faced)	136	91	114	76
	¾" (faced)	177	118	148	99
	1" (faced)	193	129	162	108
	1-1/2" (faced)	207	138	173	116
XPS	½" (faced)	125	84	105	70
	¾" (unfaced)	109	73	91	61
	1" (unfaced)	145	97	121	81
	1-1/2" (unfaced)	208	139	174	116

Design value based on the minimum tested uniform pressure capacity for each sheathing type and thickness category divided by a safety factor of 1.5 and ASCE 7-05 positive pressure design loads for wall corner zone and a 10 sqft wind effective area (negative pressure is resisted by the foam sheathing and siding assembly). Because the 1.5 safety factor is applied to a minimum test value (not the average), these requirements are more stringent than safety margins required for other building envelop components such as doors and windows which are also important to envelope integrity. This "minimum test value" basis also serves to better control safety margins with regard to variability in material properties or performance.

**TABLE R703.3.1 – Part B (Actual design values based on test data – not rounded or capped as in the proposal)
 MAXIMUM WIND SPEED (mph – 3 SECOND GUST) PERMITTED
 FOR FOAM PLASTIC SHEATHING
 WITH FURRED SIDING PER SECTION R703.3.2.2¹**

Foam Plastic Sheathing Material ²	Foam Sheathing Nominal Thickness (in) ²	Maximum Wind Speed (mph) – Exposure B ^{3,4}			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
EPS	¾"	95	63	80	53
	1"	127	85	106	71
	≥1-1/2"	192	128	161	107
Polyiso-cyanurate	½" (faced)	118	78	98	66
	¾" (faced)	153	102	128	85
	1" (faced)	167	112	140	93
	≥1-1/2" (faced)	179	120	150	100
XPS	½" (faced)	108	72	91	61
	¾"	94	63	79	53
	1"	126	84	105	70
	≥1-1/2"	180	120	151	101

Design value based on the minimum tested uniform pressure capacity for each sheathing type and thickness category divided by a safety factor of 1.5 and ASCE 7-05 negative pressure design loads for wall corner zone and a 10 sqft wind effective area. Because the siding is spaced away from foam sheathing in this wall covering assembly condition, it does not contribute to foam sheathing resistance. Thus, the foam sheathing must independently resist the negative wind pressure load. The furring strips provide adequate bearing at connection to secure the foam sheathing as well as the siding material.

In support of proposed new Section R703.3.2, the generalized connection requirements for siding over foam sheathing are based on an analysis using the AF&PA NDS-2005 connection design provisions in consideration of withdrawal to resist wind pressure and shear strength to resist siding dead load. To account for the "gap" in the connection caused by the presence of foam sheathing, the provisions of AF&PA TR12 were used to downgrade connection strength based on the thickness of foam sheathing (i.e., width of gap in the connection). The design shear strength was based on calculated ultimate capacity divided by a safety factor of 2 while conservatively ignoring any benefit of the foam material filling the gap in the siding or furring connection to wall framing. Wind loads were based on application of the full ASCE 7-05 components and cladding wind pressure applied to the exterior wall covering while conservatively ignoring any distribution of wind pressure to other wall layers. In addition, the wind pressures were based on the most stringent wall corner zone condition and an effective wind area of 10 sqft.

Changes to other parts of Section R703, including changes to Table R703.4 and various siding attachment requirements, are made in coordination with the above improvements.

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: ASTM standards within this proposed are currently referenced in the I-codes.

ICCFILENAME: CRANDELL-FS1-1404.12

Public Hearing Results

PART II- IRC B/E

Committee Action:

Approved as Submitted

Committee Reason: This is a needed addition to the code and will provide an efficient method to provide energy savings. The committee is concerned that this needs improvement but this is a good start. The proponent should work with industry and bring the needed improvement back to the Final Action.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jay H. Crandell, PE, ARES Consulting, representing Foam Sheathing Coalition; Mark Nowak, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.3 Foam plastic sheathing. Foam plastic sheathing used in exterior wall covering assemblies shall comply with this section, Section R316, Chapter 11 and the manufacturer's installation instructions. Light frame wood and cold-formed steel braced wall lines including foam plastic sheathing shall be braced with approved materials in accordance with Chapter 6. Where lateral buckling restraint of light-frame wood and cold-formed steel studs also is required in Chapter 6, foam sheathing shall not be permitted to provide the required lateral buckling restraint. When used in exterior wall covering assemblies in accordance with Table 703.3.1 of Section R703.3.1, foam sheathing shall be identified by the trademarks of an approved testing and inspection agency in accordance with Section 316.2 indicating compliance with the wind pressure resistance requirements of Table R703.3.1 where not already addressed in the applicable material standards. The use of foam plastic sheathing in accordance with this section shall not be permitted where the basic wind speed exceeds 110 mph.

R703.3.1 Minimum thickness. The thickness of foam plastic sheathing shall comply with Table R703.3.1.

Exceptions:

1. Where foam plastic sheathing is covered with applied directly over or behind wall sheathing or other solid material substrate capable of separately resisting the required wind pressure, the limitations of Section R703.3.1 and the basic wind speed limit of 110 mph Table 703.3.1 shall not apply.
2. Where foam plastic sheathing is covered with cladding and applied directly over wall sheathing or other solid material, all capable of separately resisting the full design wind pressure, the limitations of Section R703.3.1 and the basic wind speed limit of 110 mph shall not apply.

R703.3.1 Minimum thickness. The thickness of foam plastic sheathing shall comply with Table R703.3.1. The components and cladding design wind pressure determined in accordance with Table R301.2(2) shall not exceed the allowable wind pressure value in accordance with Table R703.3.1.

**TABLE R703.3.1
REQUIREMENTS FOR FOAM PLASTIC SHEATHING
IN EXTERIOR WALL COVERING ASSEMBLIES^{1,2}**

Foam Plastic Sheathing Material ³	Foam Sheathing Thickness (in) ³	Maximum Wind Speed (mph) — Exposure B ⁴			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16" oc framing	24" oc framing	16" oc framing	24" oc framing
Siding Attached Directly Over Foam Plastic Sheathing per Section R703.3.2.1					
EPS	¾"	110	NP	90	NP
	1"	130	100	125	NP
	≥1 1/2"	130	130	130	125
Polyiso cyanurate	½" (faced)	130	90	115	NP
	¾" (faced)	130	120	130	100
	1" (faced)	130	130	130	110
	≥1 1/2" (faced)	130	130	130	115
XPS	½" (faced)	125	85	105	NP
	¾"	110	NP	90	NP
	1"	130	95	120	NP
	≥1 1/2"	130	130	130	115
Siding Offset from Foam Sheathing per Section R703.3.2.2					
	¾"	EPS	NP	NP	NP
	1"		85	105	NP
	≥1 1/2"		130	130	105

Foam Plastic Sheathing Material ³	Foam Sheathing Thickness (in) ³	Maximum Wind Speed (mph) — Exposure B ⁴			
		Walls with Interior Finish ⁵		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
Polyiso-cyanurate	1/2" (faced)	120	NP	100	NP
	3/4" (faced)	130	100	130	85
	1" (faced)	130	110	130	95
	≥1-1/2" (faced)	130	120	130	100
XPS	1/2" (faced)	110	NP	90	NP
	3/4"	95	NP	NP	NP
	1"	125	85	105	NP
	≥1-1/2"	130	120	130	100
EPS	3/4"	95	NP	NP	NP
	1"	125	85	105	NP
	≥1-1/2"	130	130	130	105

For SI: 1 inch = 25.4 mm, 1 mile per hour = 1.609 km/h

NP = not permitted

1. Tabulated maximum wind speed values are based on a mean roof height of 30 feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m).
2. Foam plastic sheathing panels shall be permitted to be oriented parallel or perpendicular to framing members.
3. Foam plastic sheathing shall meet or exceed the following material standards: Expanded Polystyrene (EPS) — ASTM C578 (Type II, min. 1.35 lb/ft³ density), Polyisocyanurate — ASTM C1289 (Type 1, min.), and extruded polystyrene (XPS) — ASTM C578 (Type X, min. 1.30 lb/ft³ density). Where a "faced" product is indicated, a facer shall be provided on both faces of the foam plastic sheathing. Where facing is not indicated in the table, faced and unfaced foam plastic sheathing shall be permitted. For all foam plastic sheathing products, approved manufacturer data shall be permitted in lieu of the table requirements.
4. Multiply tabulated maximum wind speed by 0.85 for wind exposure C or by 0.78 for wind exposure D.
5. Interior finish shall be minimum 1/2-inch (12.7 mm) thick gypsum wall board or an approved product with equivalent or greater out-of-plane bending strength and stiffness.

**TABLE R703.3.1
ALLOWABLE WIND PRESSURE VALUE (PSF) FOR FOAM PLASTIC SHEATHING
IN EXTERIOR WALL COVERING ASSEMBLIES¹**

Foam Plastic Sheathing Material ²	Foam Sheathing Thickness (in)	Allowable (ASD) Components and Cladding Design Wind Pressure (psf) (basic wind speed not to exceed 110 mph per Section R703.3)			
		Walls with Interior Finish ³		Walls without Interior Finish	
		16"oc framing	24"oc framing	16"oc framing	24"oc framing
EPS	3/4"	21.8	NP	15.3	NP
	1"	38.8	19.4	27.2	13.6
	≥1-1/2"	89.0	39.5	62.3	27.7
Polyiso-cyanurate	1/2" (faced)	33.3	14.8	23.3	10.4
	3/4" (faced)	56.4	25.1	39.5	17.6
	1" (faced)	67.5	30.0	47.2	21.0
	≥1-1/2" (faced)	77.4	34.4	54.1	24.1
XPS	1/2" (faced)	28.3	12.6	19.8	NP
	3/4"	21.4	NP	15.0	NP
	1"	38.0	29.0	26.6	20.3
	≥1-1/2"	78.2	34.7	54.7	24.3

For SI: 1 inch = 25.4 mm, 1 pound per square foot (psf) = 0.0479 kPa.

NP = not permitted (allowable design wind pressure less than 10 psf)

1. Foam plastic sheathing panels shall be permitted to be oriented parallel or perpendicular to framing members.
2. Foam plastic sheathing shall meet or exceed the following material standards: Expanded Polystyrene (EPS) — ASTM C578 (Type II, min. 1.35 lb/ft³ density), Polyisocyanurate — ASTM C1289 (Type 1, min.), and extruded polystyrene (XPS) — ASTM C578 (Type X, min. 1.30 lb/ft³ density). Where a "faced" product is indicated, a facer shall be provided on both faces of the foam plastic sheathing. Where facing is not indicated in the table, faced and unfaced foam plastic sheathing shall be permitted. For all foam plastic sheathing products, approved manufacturer data shall be permitted in lieu of the table requirements.
3. Interior finish shall be minimum 1/2-inch (12.7 mm) thick gypsum wall board or an approved product with equivalent or greater out-of-plane bending strength and stiffness.

R703.3.2 Siding attachment over foam sheathing. Siding shall be attached over foam sheathing in accordance with Section R703.3.2.1, Section R703.3.2.2, or an approved design. In no case shall the siding material be used in a manner that exceeds its application limits.

Exception: Where the siding manufacturer has provided installation instructions for application over foam sheathing, those requirements shall apply.

R703.3.2.1 Direct siding attachment. Siding installed directly over foam sheathing without separation by an air space shall comply with Table R703.3.2.1 in regard to minimum fastening requirements nail diameter, penetration, and nail spacing and maximum foam sheathing thickness limitations to support siding dead load for the applicable foam sheathing thickness and wind speed condition. The siding fastener and siding installation shall otherwise comply with Section 703.4 and Table R703.4 and in no case shall result in a less stringent fastening requirement than required by Section R703.4 or the manufacturer's installation instructions for the specific siding material used.

Exceptions:

1. For adhered masonry veneer, refer to Section 1405.10.
2. For vinyl siding, refer to Section 1405.14.
3. For exterior insulation and finish systems, refer to Section 1408.

TABLE R703.3.2.1

FASTENING REQUIREMENTS FOR DIRECT SIDING ATTACHMENT OVER FOAM PLASTIC SHEATHING^{1,2}

Minimum Nail Diameter ³ (inches)	Nail Spacing along Stud ⁴ (inches)	Maximum Foam Sheathing Thickness ⁵ (inches)	16"oc WALL FRAMING			24"oc WALL FRAMING		
			Maximum Wind Speed (mph)			Maximum Wind Speed (mph)		
			Exposure B	Exposure C	Exposure D	Exposure B	Exposure C	Exposure D
0.113	6	2	140	120	110	120	100	90
	8	2	130	110	100	100	85	DR
	12	4	100	85	DR	85	DR	DR
0.120	6	3	140	120	110	120	100	90
	8	2	130	110	100	110	90	85
	12	1.5	110	90	85	90	DR	DR
0.135	6	3	140	120	110	130	110	100
	8	3	140	120	110	110	90	85
	12	2	110	90	85	90	DR	DR

For SI: 1 inch = 25.4 mm; 1 mph = 1.609 km/h

DR = design required

- Maximum wind speed values are based on a minimum 1 1/4 inch (31.8 mm) penetration of a smooth shank nail fastener into wood framing of Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS.
- Tabulated maximum wind speed values are based on a mean roof height of 30 feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m).
- Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths to provide a minimum 1 1/4 inch (31.8 mm) penetration into wood framing. Specified nails in accordance with Section R703.4 or the siding manufacturer's installation instructions shall meet all other requirements in ASTM F1667 or be otherwise approved for the intended application.
- 'Nail spacing along stud' refers to spacing of siding fasteners in the vertical direction. A minimum of one fastener shall be applied at each intersection of an individual siding member with a wall stud.
- Maximum foam sheathing thickness values are based on a maximum 24 inch (0.6 m) stud spacing and a maximum siding dead load of 11 psf (0.53 kPa) based on 7/8 inch (22 mm) thick Portland cement plaster. For Seismic Design Category D2, the maximum siding dead load shall be 8 psf.

**TABLE R703.3.2.1
SIDING MINIMUM FASTENING REQUIREMENTS
FOR DIRECT SIDING ATTACHMENT OVER FOAM PLASTIC SHEATHING
TO SUPPORT SIDING WEIGHT¹**

Siding Fastener Through Foam Sheathing into:	Siding Fastener Type and Minimum Size ²	Siding Fastener Vertical Spacing (inches)	Maximum Foam Sheathing Thickness (inches)					
			16"oc Fastener Horizontal Spacing			24"oc Fastener Horizontal Spacing		
			Siding Weight:			Siding Weight:		
			3 psf	11 psf	25 psf	3 psf	11 psf	25 psf
Wood Framing (minimum 1-1/4 inch penetration)	0.113" diameter nail	6	4	3	1	4	2	0.75
		8	4	2	0.75	4	1.5	DR
		12	4	1.5	DR	3	0.75	DR
	0.120" diameter nail	6	4	3	1.5	4	2	0.75
		8	4	2	1	4	1.5	0.5
		12	4	1.5	0.5	3	1	DR
	0.131" diameter nail	6	4	4	1.5	4	3	1
		8	4	3	1	4	2	0.75
		12	4	2	0.75	4	1	DR
Steel Framing (minimum penetration of steel thickness + 3 threads)	#8 screw into 33 mil steel or thicker	6	3	3	1.5	3	2	DR
		8	3	2	0.5	3	1.5	DR
		12	3	1.5	DR	3	0.75	DR
	#10 screw into 33 mil steel	6	4	3	2	4	3	0.5
		8	4	3	1	4	2	DR
		12	4	2	DR	3	1	DR
	#10 screw into 43 mil steel or thicker	6	4	4	3	4	4	2
		8	4	4	2	4	3	1.5
		12	4	3	1.5	4	3	DR

For SI: 1 inch = 25.4 mm; 1 pound per square foot (psf) = 0.0479 kPa.

DR = design required

- Tabulated requirements are based on wood framing of Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS and minimum 33 ksi steel for 33mil and 43 mil steel and 50 ksi steel for 54 mil steel or thicker.
- Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Self-drilling tapping screw fasteners for connection of siding to steel framing shall comply with the requirements of AISI S230. Specified fasteners in accordance with Section R703.4 or the siding manufacturer's approved installation instructions shall meet all other requirements in ASTM F1667, AISI S230 or be otherwise approved for the intended application.

R703.3.2.2 Offset siding attachment. When an airspace separates the siding from direct contact with the foam plastic sheathing, the siding shall be attached in accordance with Section R703.4 and Table R703.4 to minimum 1x3 wood or minimum 33 mil steel hat channel furring strips placed over the foam sheathing. Furring shall be attached through the foam sheathing to wall framing in accordance with Table R703.3.2.2 in regard to minimum fastening requirements and maximum foam sheathing thickness limitations to support siding dead load. The components and cladding design wind pressure determined in accordance with Table R301.2(2) shall not exceed the allowable design wind pressure value in accordance with Table R703.3.2.2. For 25 psf siding weight in accordance with Table R703.3.2.2, the Seismic Design Category shall not exceed D₀ for 16"oc furring

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or C for 24"oc furring. When placed horizontally, wood furring strips shall be preservative treated wood or naturally durable wood and fasteners shall be corrosion resistant in accordance with Section R317. Steel hat channel furring shall have a minimum G60 galvanized coating.

Exception: Furring strips shall not be required over foam plastic sheathing located behind anchored stone and masonry veneer installed in accordance with Section R703.7. Veneer ties shall be installed in accordance with Section R703.7.4.1.

**TABLE R703.3.2.2
FASTENING REQUIREMENTS FOR WOOD FURRING
OVER FOAM PLASTIC SHEATHING^{1,2,3}**

Fastener Type	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring ⁴ (inches)	Maximum Thickness of Foam Sheathing ⁵ (inches)	16"oc FURRING			24"oc FURRING		
				Maximum Wind Speed (mph)			Maximum Wind Speed (mph)		
				Exposure B	Exposure C	Exposure D	Exposure B	Exposure C	Exposure D
0.120" diameter smooth shank nail	1-1/4	8	2	130	110	100	110	90	85
		12	1.5	110	90	85	90	DR	DR
		16	1	90	DR	DR	DR	DR	DR
0.135" diameter smooth shank nail	1-1/4	8	3	130	110	100	110	90	85
		12	2	110	90	85	90	DR	DR
		16	1.5	100	85	DR	DR	DR	DR
#8 wood screw	1	12	3	140	120	110	140	120	110
		16	2	140	120	110	140	120	110
1/4" lag screw ⁶	1-1/2	24	3	140	120	110	140	120	110

For SI: 1" = 25.4 mm; 1 mph = 1.609 km/h
DR = design required

- Furring strips shall be spaced a maximum of 24"oc in a vertical or horizontal orientation. Table values are based on minimum 3/4 inch (19.1 mm) thick furring strip and wood studs of Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater per AFPA/NDS.
- Tabulated maximum wind speed values are based on a mean roof height of 30 feet (9.1 m). Multiply maximum wind speed by 0.95 for a mean roof height of 45 feet (13.7 m).
- Where minimum required siding fastener penetration exceeds 3/4 inch (19.1 mm), a minimum 2x furring strip shall be used unless approved deformed shank siding nails or siding screws are used to provide equivalent withdrawal strength.
- In a vertical orientation, furring strips shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, furring strips shall be fastened at each stud intersection with a number of fasteners equivalent to the required fastener spacing. In no case shall fasteners be spaced more than 24 inches (0.6 m) apart.
- Maximum foam sheathing thickness values are based on a maximum 24 inch (0.6 m) stud spacing and a maximum siding dead load of 11 psf (0.53 kPa) based on 7/8 inch (22 mm) thick Portland cement plaster. For Seismic Design Category D2, the maximum siding dead load shall be 8 psf.
- Lag screws shall be installed with a standard cut washer and shall be pre drilled in accordance with AF&PA NDS-05. Approved self drilling screws of equal or greater shear and withdrawal strength shall be permitted without pre drilling.

**TABLE R703.3.2.2
FURRING MINIMUM FASTENING REQUIREMENTS
FOR APPLICATION OVER FOAM PLASTIC SHEATHING
TO SUPPORT SIDING WEIGHT^{1,2}**

Furring Material	Framing Member	Fastener Type and Minimum Size	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring (inches)	Maximum Thickness of Foam Sheathing (inches)						Allowable Design Wind Pressure (psf)	
					16"oc Furring ⁴			24"oc Furring ⁴			16"oc Furring	24"oc Furring
					Siding Weight:			Siding Weight:				
					3 psf	11 psf	25 psf	3 psf	11 psf	25 psf	16"oc Furring	24"oc Furring
Minimum 1x Wood Furring ³	Minimum 2x Wood Stud	Nail (0.120" shank; 0.271" head)	1-1/4	8	4	4	1.5	4	2	1	42.6	28.4
				12	4	2	1	4	1.5	0.5	28.4	18.9
				16	4	2	0.5	4	1	DR	21.3	14.2
		Nail (0.131" shank; 0.281" head)	1-1/4	8	4	4	2	4	3	1	46.5	31.0
				12	4	3	1	4	2	0.75	31.0	20.7
				16	4	2	0.75	4	1.5	DR	23.3	15.5
	#8 wood screw ⁵	1	12	4	4	1.5	4	3	1	98.9	66.0	
			16	4	3	1	4	2	0.5	74.2	49.5	
			24	4	2	0.5	4	1	DR	35.1	23.4	
	1/4" lag screw ⁵	1-1/2	12	4	4	3	4	4	1.5	140.4	93.6	
			16	4	4	2	4	3	1	79.0	52.7	
			24	4	3	1	4	2	0.5	35.1	23.4	
Minimum 33mil Steel Hat Channel	33 mil Steel Stud	#8 screw (0.285" head)	Steel thickness +3 threads	12	3	1.5	DR	3	0.5	DR	52.9	35.3
				16	3	1	DR	2	DR	DR	39.7	26.5
				24	2	DR	DR	2	DR	DR	26.5	17.6
		#10 screw	Steel	12	4	2	DR	4	1	DR	62.9	41.9

or Minimum 1x Wood Furring ³		(0.333" head)	thickness +3 threads	16	4	1.5	DR	3	DR	DR	47.1	31.4
				24	3	DR	DR	2	DR	DR	31.4	21.0
43 mil or thicker Steel Stud		#8 screw (0.285" head)	Steel thickness +3 threads	12	3	1.5	DR	3	0.5	DR	69.0	46.0
				16	3	1	DR	2	DR	DR	51.8	34.5
				24	2	DR	DR	2	DR	DR	34.5	23.0
		#10 screw (0.333" head)	Steel thickness +3 threads	12	4	3	1.5	4	3	DR	81.9	54.6
				16	4	3	0.5	4	2	DR	61.5	41.0
				24	4	2	DR	4	0.5	DR	35.1	23.4

For SI: 1" = 25.4 mm; 1 pound per square foot (psf) = 0.0479 kPa. DR = design required

1. Table values are based on: (1) minimum ¼-inch (19.1 mm) thick wood furring and wood studs of Spruce-Pine-Fir or any softwood species with a specific gravity of 0.42 or greater per AFPA/NDS, (2) minimum 33 mil steel hat channel furring of 33 ksi steel, and (3) steel framing of indicated nominal steel thickness and minimum 33 ksi steel for 33mil and 43 mil steel and 50 ksi steel for 54 mil steel or thicker. Steel hat channel shall have a minimum 7/8-inch (22.2 mm) depth.
2. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Self-drilling tapping screw fasteners for connection of siding to steel framing shall comply with the requirements of AISI S230. Specified fasteners in accordance with Section R703.4 or the siding manufacturer's approved installation instructions shall meet all other requirements in ASTM F1667 or AISI S230 or be otherwise approved for the intended application.
3. Where the required siding fastener penetration into wood material exceeds ¼ inch (19.1 mm) and is not more than 1-1/2 inches (38.1 mm), a minimum 2x wood furring shall be used unless approved deformed shank siding nails or siding screws are used to provide equivalent withdrawal strength allowing connection to 1x wood furring.
4. Furring shall be spaced a maximum of 24"oc in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, furring strips shall be fastened at each stud intersection with a number of fasteners equivalent to the required fastener spacing. In no case shall fasteners be spaced more than 24 inches (0.6 m) apart.
5. Lag screws shall be installed with a standard cut washer. Lag screws and wood screws shall be pre-drilled in accordance with AF&PA/NDS. Approved self-drilling screws of equal or greater shear and withdrawal strength shall be permitted without pre-drilling.

(Portion of proposal not shown, remain unchanged.)

Commenter's Reason: While the original proposal was approved as submitted, IRC CDC recommended further refinements at Final Action. Every effort has been made to follow-up with the various interests and to respond with improvements to the original proposal, even though approved as submitted. The improvements in this PC are also coordinated with a complimentary PC on FS156-09/10 Part1 (IBC). These refinements are coordinated in this one PC for reasons addressed separately as follows:

Inclusion of Steel Framing

Tables R703.2.1 and R703.2.2 now include siding connections for use with light-frame cold-formed steel siding in addition to light-frame wood as requested at the first hearing. These are needed to provide siding connection solutions applicable to light-frame cold-formed steel construction to ensure coordination with IRC Ch11 and IECC energy code requirements for this type of construction. The Steel Framing Alliance (SFA), American Iron and Steel Institute (AISI), and the Foam Sheathing Coalition (FSC) have worked together toward this end.

The original proposal included connection solutions for attachment of siding over foam sheathing only for wood framing. But, the scope of the original proposal was not otherwise limited to wood framing (i.e., requirements in Table 1405.18.1 of the original proposal are applicable to both wood and steel framing). The IRC committee approved the original FS156-09/10 proposal, but also expressed concern to "work with industry and bring the needed improvement back to the Final Action."

Steel framing was not addressed in the original proposal only because test data was not available at that time to justify appropriate solutions. Subsequently, the steel industry together with New York State Research and Energy Development Authority (NYSERDA) has conducted a testing program to provide justification to the solutions proposed in this PC. A report on this testing will be made available at the Final Action hearing and, as soon as available, by request to the proponent (Mark Nowak, SFA, mnowak@steel framing.org). These tests provide the necessary performance data for appropriately designing siding connections to steel framing that span through a thickness of foam sheathing.

These proposed provisions for light-frame cold-formed steel construction are not only coordinated with ICC energy code requirements, but they are necessary to ensure that foam insulation requirements as required by the ICC energy code are implemented in a structurally sound manner. Support of this PC is urged.

Inclusion of Additional Siding Weight Categories:

The original proposal was based on a minimum 11 psf siding dead load (for siding attachment requirements over foam sheathing). While various siding manufacturers supported the original proposal (or remained neutral), several expressed the desire to be included, such as the Masonry Veneer Manufacturers Association. Thus, a 25 psf siding weight category and connection requirements have been included in this PC. This also required inclusion of a 3 psf siding weight category such that the lighter weight sidings would not be unduly penalized by basing the table only on heavier siding types.

Simplification, Clarification and Editorial Improvements:

Content from table footnotes moved into tables for visual clarity and ease of access.

Removed confusing wind speed requirements from siding attachment table otherwise intending to provide minimum connections for support of siding dead load only and limit foam thickness accordingly. The text is clarified to more explicitly require that the siding attachment be separately designed to resist wind loads.

Adjusted fastener sizes to be compatible with pneumatic fasteners at request of ISANTA

Various editorial improvements to language, table headings, etc.

Additional technical justification for siding and furring connections over foam sheathing

The FSC has also funded additional testing of siding over foam sheathing connection assemblies for attachments to wood framing. These tests add further confirmation of the adequacy of the proposed siding attachment requirements for wood framing. It also confirms that siding deflections

will be limited to less than 0.015” as commonly used as a design basis for wood connections. A report documenting this testing will also be made available at the final action hearing and will be posted at www.foamsheathing.org as soon as available.

Strengthened QC requirements for foam sheathing wind pressure resistance properties

One of the concerns raised at the first code development hearing on FS156 was related to having assurance that foam sheathing products meet the wind pressure performance requirements upon which the proposal (namely Table R703.3.1) is based. This public comment addresses that concern by clarifying implementation a code-recognized “approved agency” approach that already exists and is commonly used for foam sheathing and other products. The “approved agency” process has shown itself effective and this public comment merely clarifies the application of this process to assure the structural properties (wind pressure resistance) of foam sheathing align with the basis of the proposed end-use requirements and limitations. The minimum performance requirements are based on a representative sample of currently manufactured products of each type as reported by the NAHB Research Center, Inc. (report available at www.foamsheathing.org).

Strengthened Scope Limitations on Foam Sheathing Applications

At the request of the insurance industry, a 110 mph wind speed limit has also been implemented in this proposal for foam sheathing. In addition, wind pressure requirements have been strengthened to require use of negative pressure values in all cases, even when siding is placed over foam sheathing and the siding is separately capable of resisting the full negative design wind pressure.

These provisions are needed for the above reasons, provide improvements for appropriate use of foam sheathing, and provide needed solutions for coordination with the energy code requirements. Again, your approval as modified is urged.