Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

Report No: 1403-01

Issue Date: December 21, 2015

Revision Date: December 16, 2025

Subject to Renewal: January 1, 2027

BASF Corporation HP+™ Wall E Series

Trade Secret Report Holder:

BASF Corporation

Phone: 888-900-3626 Website: www.spf.basf.com

CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 12 00 - Structural Panels

Section: 06 12 19 - Shear Wall Panels

Section: 06 16 00 - Sheathing06 16 00 - Sheathing06 16 00 - Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 - Thermal Insulation

Section: 07 25 00 - Water-Resistive Barriers/Weather Barriers

1 Innovative Product Evaluated[1]

1.1 BASF HP+ Wall E Series Utilizing WALLTITE® Max™ Spray Polyurethane Foam (SPF) in Combination with NEOPOR® Graphite Polystyrene Foam Plastic Insulating Sheathing (FPIS)

2 Product Description and Materials

2.1 BASF HP+ Wall E Series is a proprietary wall system consisting of BASF WALLTITE Max SPF combined with NEOPOR FPIS.

2.1.1 BASF HP+ Wall E Series contains a combination of the following materials:

2.1.1.1 $1^1/_2$" (min.) WALLTITE Max SPF

2.1.1.2 $^5/_8$" NEOPOR FPIS or $1^1/_8$" NEOPOR FPIS

2.2 The innovative product evaluated in this report is shown in **Figure 1** and **Figure 2**.

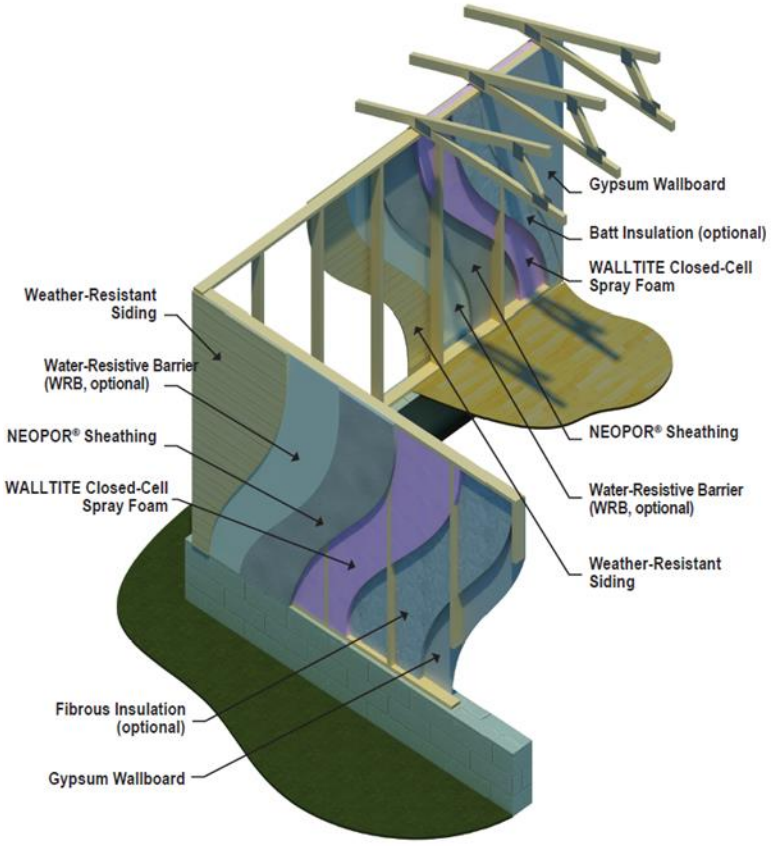


Figure 1. Illustration of BASF HP+ Wall E Series System

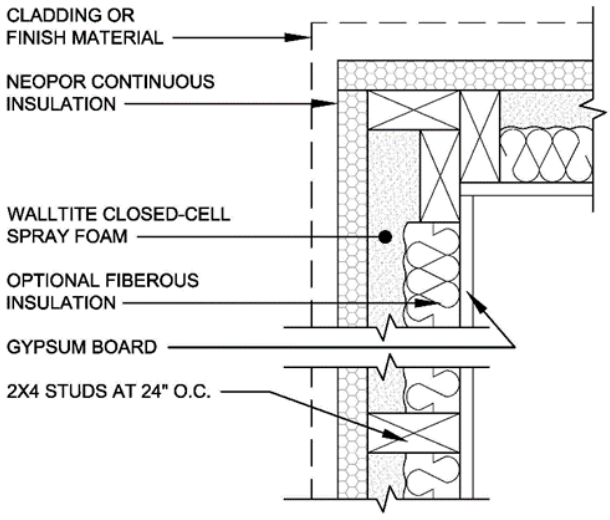


Figure 2. Cross Section of WALLTITE HP+ Wall E Series with $1^{1}/_{8}$" NEOPOR CI

2.3 As needed, review material properties for design in **Section 6** and the regulatory evaluation in **Section 8**.

3 Definitions[2]

3.1 New Materials[3] are defined as building materials, equipment, appliances, systems, or methods of construction, not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[4] The design strength and permissible stresses shall be established by tests[5] and/or engineering analysis.[6]

3.2 Duly authenticated reports[7] and research reports[8] are test reports and related engineering evaluations that are written by an approved agency[9] and/or an approved source.[10]

3.2.1 These reports utilize intellectual property and/or trade secrets to create public domain material properties for commercial end-use.

3.2.1.1 This report protects confidential Intellectual Property and trade secretes under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[11]

3.3 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is accredited and listed in the ANAB directory.

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional, hereinafter RDP) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[12]

3.5 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[13] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[14] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[15] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept duly authenticated reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[16]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory. Therefore, recognition of certificates and validation statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope shall be approved.[17] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[18] and can be used in any country that is an MLA signatory found at this link: https://iaf.nu/en/recognised-abs/

3.9 Approval equity is a fundamental commercial and legal principle.[19]

4 Applicable Local, State, and Federal Approvals; Standards; Regulations[20]

4.1 *Local, State, and Federal*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured local jurisdictions: Austin, Baltimore, Broward County, Chicago, Clark County, Dade County, Dallas, Detroit, Denver, DuPage County, Fort Worth, Houston, Kansas City, King County, Knoxville, Las Vegas, Los Angeles City, Los Angeles County, Miami, Nashville, New York City, Omaha, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Jose, San Francisco, Seattle, Sioux Falls, South Holland, St. Louis County, Texas Department of Insurance, and Wichita.[21]

4.1.2 Approved in all state jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured states: California, Florida, New Jersey, Oregon, New York, Texas, Washington, and Wisconsin.[22]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[23] and Part 3280[24] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.1.4 Approved means complying with the requirements of local, state, or federal legislation.

4.2 *Regulations*

4.2.1 *IBC – 18, 21, 24: International Building Code®*

4.2.2 *IRC – 18, 21, 24: International Residential Code®*

4.2.3 *IECC – 18, 21, 24: International Energy Conservation Code®*

4.2.4 *IFC – 14, 17: International Fire Code®*

4.3 *Standards*

4.3.1 *AATCC TM127: Water Resistance: Hydrostatic Pressure Test*

4.3.2 *ACC: Guidance on Best Practices for the Installation of Spray Polyurethane Foam*

4.3.3 *ACC: Ventilation Considerations for Spray Polyurethane Foam*

4.3.4 *ANSI/AWC SDPWS: Special Design Provisions for Wind and Seismic*

4.3.5 *ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*

4.3.6 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*

4.3.7 *ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics*

4.3.8 *ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics*

4.3.9 *ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging*

4.3.10 *ASTM D2842: Standard Test Method for Water Absorption of Rigid Cellular Plastics*

4.3.11 *ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics*

4.3.12 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*

4.3.13 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

4.3.14 *ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials*

4.3.15 *ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*

4.3.16 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference*

4.3.17 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*

4.3.18 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*

4.3.19 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*

4.3.20 *NFPA 286: Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*

4.3.21 SBCA: Guide for Handling, Installing, and Temporary Bracing of Wall Panels

4.4 Structural performance for shear wall assemblies used as lateral force resisting systems in Seismic Design Categories A through F have been tested and evaluated in accordance with the following standards:

4.4.1 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

4.4.2 *ASTM D7989: Standard Practice for Demonstrating Equivalent In-Plane Lateral Seismic Performance to Wood-Frame Shear Walls Sheathed with Wood Structural Panels*

4.4.2.1 ASTM D7989 is accepted engineering practice used to establish Seismic Design Coefficients (SDC).

4.4.2.2 Tested data generated by ISO/IEC 17025 approved agencies and/or professional engineers, which use ASTM D7989 as their basis, are defined as intellectual property and/or trade secrets.

4.4.2.3 All professional engineering evaluations are defined as an independent design review (i.e., listings, certified reports, duly authenticated reports from approved agencies, and/or research reports, are prepared independently by approved agencies and/or approved sources, when signed and sealed by licensed professional engineer pursuant to registration law.

4.4.3 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*

4.4.4 *ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*

5 Listed[25]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), an approved agency (i.e., CBI and DrJ), and/or and approved source (i.e., DrJ), or other organization(s) concerned with product evaluation (i.e., DrJ), that maintains periodic inspection (i.e., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 BASF HP+ Wall E Series is used in buildings constructed in accordance with the IBC requirements for Type V light-frame construction.

6.2 BASF HP+ Wall E Series is used in buildings constructed in accordance with the IRC for light-frame wood construction.

6.3 BASF HP+ Wall E Series is used to provide the following:

6.3.1 Lateral load resistance (wind and seismic) for braced BASF HP+ Wall E Series panels used in light-frame wood construction.

6.3.2 Transverse load resistance (wind pressure) for braced BASF HP+ Wall E Series panels used in light-frame wood construction.

6.3.3 Thermal resistance in the exterior wall component of the building thermal envelope.

6.3.4 Resistance to uplift and compressive loads in single top plate applications for BASF HP+ Wall E Series assemblies used in light-frame wood construction.

6.4 Except as noted below, drilling and notching of studs shall follow the provisions stated in IRC Section R602.6, with the additional requirements for consideration of the foam materials. All drilling and notching of studs and foam materials shall be performed with care to minimize the removal of materials.

6.4.1 Studs may be cut or notched to a depth not exceeding twenty-five percent (25%) of its width. Non load bearing studs may be notched to a depth not to exceed forty percent (40%) of a single stud width.

6.4.2 Studs may be bored or drilled if the diameter of the resulting hole is no more than 60 percent (60%) of the stud width and the edge of the hole is no more than $^5/_8$" (16 mm) to the edge of the stud at the interior side and 1" (25 mm) at the exterior edge. The hole shall not be located in the same section as a cut or notch. Studs located in exterior walls or bearing partitions drilled over forty percent (40%) and up to sixty percent (60%) shall also be doubled with no more than two successive doubled studs bored.

6.4.3 To accommodate the cutting, notching, drilling, and boring of studs, the foam spray within the cavity of the wall may be notched as necessary to allow passage of mechanicals (i.e., plumbing, electrical, HVAC) through the studs. In all cases, a minimum 1" spray foam thickness shall remain intact at the inside face of the NEOPOR, between the NEOPOR and the hole or notch in the stud.

6.4.4 Top and bottom plates may be drilled or notched as piping or ductwork necessitates. If more than fifty percent (50%) of the width of a top plate is cut or notched, a minimum 16-gauge x $1^1/_2$" wide metal tie must be fastened across and to the plate at each side of the opening and must extend a minimum of 6" past the opening. The metal tie must be fastened with eight (8) 10d nails on each side. A minimum 1" spray foam thickness shall remain intact at the inside face of the NEOPOR, between the NEOPOR and the notch in the top or bottom plates.

6.4.5 In no case shall a surface area greater than 100 square inches be removed from any individual wall cavity without investigation into the effect on the bracing requirements for the wall.

6.5 *Through Penetrations*

6.5.1 Where through penetrations are necessary, they shall be limited to a total area of 100 square inches in a single wall cavity without investigation into the effect of the penetrations on the bracing requirements for the wall.

6.6 *Hold-Down and Anchor Bold Locations*

6.6.1 Where it is desired to provide a void in the spray foam for the installation of hold-downs, blocking wrapped in plastic may be placed temporarily at the required locations during the spraying process and removed once the WALLTITE has cured. Blocking size shall be minimized to the size required for the installation of the hold-downs.

6.6.2 Alternately, the WALLTITE may be notched in the field per the requirements above.

6.7 *Structural Applications*

6.7.1 Except as otherwise described in this report, the BASF HP+ Wall E Series shall be installed in accordance with the applicable building codes listed in **Section 4**, using the provisions set forth herein for the design and installation of Wood Structural Panels (WSP).

6.7.1.1 BASF HP+ Wall E Series is permitted to be designed in accordance with SDPWS for the design of shear walls using the methods set forth therein, including the perforated shear wall methodology, and are subject to the SDPWS boundary conditions except as specifically allowed in this report.

6.7.2 Anchorage for in-plane shear shall be provided to transfer the induced shear force into and out of each shear wall.

6.7.2.1 For wind design, anchor bolt spacing shall not exceed 6' o.c. (1829 mm).

6.7.2.2 For seismic design, anchor bolt spacing shall not exceed 4' o.c. (1219 mm).

6.7.3 The maximum aspect ratio for full height BASF HP+ Wall E Series braced wall segments shall be 4:1.

6.7.4 The minimum full height panel width shall be 24" (610 mm).

6.7.5 All NEOPOR panel edges shall be supported with dimensional lumber or blocking a minimum 2" (51 mm) nominal in the least dimension.

6.7.6 *Prescriptive IRC Bracing Applications:*

6.7.6.1 For wind design, BASF HP+ Wall E Series may be used to brace walls of buildings as an alternative to the IRC Continuous Wall Bracing provisions, IRC Section R602.10.4 (CS-WSP), in accordance with the bracing amounts shown in **Table 1** or **Table 2**, as adjusted in accordance with IRC Table R602.10.3(2).

6.7.6.2 For seismic design, required braced wall panel lengths for BASF HP+ Wall E Series shall be as shown in **Table 2**, and shall be used in conjunction with IRC Table R602.10.3(4), which provides the required adjustments.

6.7.6.3 Where a building, or portion thereof, does not comply with one or more of the bracing requirements within the prescriptive section of the IRC, those portions shall be designed and constructed in accordance with IRC Section R301.1.

Table 1. IRC Bracing Requirements for BASF HP+ Wall E Series – Wind[1,3,4,5,6]

Condition	Braced Wall Line Spacing (ft)	Minimum Total Length (ft) of Braced Wall Panels Required Along Each Braced Wall Line with Continuous Sheathing									
		BASF HP+ Wall E Series[2]					WSP Structural Sheathing[2]				
		Ultimate Design Wind Speed, V_{ult} (mph)									
		≤ 110	≤ 115	≤ 120	≤ 130	< 140	≤ 110	≤ 115	≤ 120	≤ 130	< 140
One Story or the Top of Two or Three Stories	10	2.3	3.1	3.1	3.8	3.8	1.5	2.0	2.0	2.5	2.5
	20	4.6	5.4	5.4	6.1	7.6	3.0	3.5	3.5	4.0	5.0
	30	6.9	6.9	7.6	9.2	10.7	4.5	4.5	5.0	6.0	7.0
	40	8.4	9.2	9.9	11.5	13.8	5.5	6.0	6.5	7.5	9.0
	50	10.7	11.5	12.2	14.5	16.8	7.0	7.5	8.0	9.5	11.0
	60	12.2	13.8	14.5	16.8	19.9	8.0	9.0	9.5	11.0	13.0
First Story of Two Stories or Second Story of Three Stories	10	4.6	5.4	5.4	6.9	7.6	3.0	3.5	3.5	4.5	5.0
	20	8.4	9.9	10.7	12.2	13.8	5.5	6.5	7.0	8.0	9.0
	30	12.2	13.8	14.5	17.6	19.9	8.0	9.0	9.5	11.5	13.0
	40	16.1	17.6	19.1	23.7	26.0	10.5	11.5	12.5	15.0	17.0
	50	19.9	21.4	23.7	27.5	32.1	13.0	14.0	15.5	18.0	21.0
	60	23.7	26.0	28.3	32.9	38.2	15.5	17.0	18.5	21.5	25.0
First Story of Three Stories	10	6.9	7.6	8.4	9.9	11.5	4.5	5.0	5.5	6.5	7.5
	20	13.0	13.8	15.3	17.6	20.6	8.5	9.0	10.0	11.5	13.5
	30	18.3	19.9	22.2	26.0	29.8	12.0	13.0	14.5	17.0	19.5
	40	23.7	26.0	28.3	33.6	38.2	15.5	17.0	18.5	22.0	25.0
	50	29.1	32.1	35.2	40.5	47.4	19.0	21.0	23.0	26.5	31.0
	60	35.2	38.2	41.3	48.2	55.8	23.0	25.0	27.0	31.5	36.5

SI: 1 in = 25.4 mm, 1 mph = 1.61 km/h

1. Linear interpolation is permitted.
2. BASF HP+ Wall E Series and WSP structural sheathing installed on 2 x 4 or 2 x 6 studs spaced 24" o.c. and fastened with nails spaced 6" o.c. at panel edges and 12" o.c. in the field of the panels.
3. Demonstrates equivalency to IRC Table R602.10.3(1). All adjustment factors from IRC Table R602.10.3(2) shall be applied.
4. Minimum $^1/_2$" gypsum wallboard shall be installed as part of the wall assembly and fastened with a minimum 5d cooler nails or $1^1/_4$" #6 type W or S screws spaced 16" o.c. at panel edges and 16" o.c. in the field of the panels. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 1.3.
5. Bracing lengths are the result of comparative equivalency testing and analysis using both tested and published design values as points of comparison. DrJ relies upon the design values published in the codes and standards listed in Section 4 that are adopted into law and that the manufacturer of those products stand behind. DrJ performs all equivalency analysis based on legally defined design values, the responsibility for which is the manufacturer of those products or the members of the associations that publish those design values.
6. Wind speeds are V_{ult} in accordance with ASCE 7-22. To convert to equivalent V_{asd} wind speed in accordance with IBC Section 1609.3.1, use: $V_{asd} = V_{ult}/\sqrt{0.6}$

Table 2. IRC Bracing Requirements for BASF HP+ Wall E Series – Seismic[1,2,4,5,6,7]

Condition	Braced Wall Line Spacing (ft)	Minimum Total Length (ft) of Braced Wall Panels Required Along Each Braced Wall Line with Continuous Sheathing							
		BASF HP+ Wall E Series[3]				WSP Structural Sheathing[3]			
		Seismic Design Category (SDC)							
		C	D_0	D_1	D_2	C	D_0	D_1	D_2
One Story or the Top of Two or Three Stories	10	2.2	2.5	2.6	3.2	1.4	1.6	1.7	2.1
	20	4.1	4.7	5.2	6.6	2.7	3.1	3.4	4.3
	30	6.3	7.0	7.7	9.7	4.1	4.6	5.1	6.4
	40	8.3	9.4	10.4	13.0	5.4	6.1	6.8	8.5
	50	10.4	11.7	13.0	16.2	6.8	7.7	8.5	10.6
First Story of Two Stories or Second Story of Three Stories	10	4.0	4.9	5.8	7.2	2.6	3.2	3.8	4.7
	20	7.7	9.7	11.7	14.4	5.1	6.4	7.7	9.4
	30	11.7	14.7	17.6	21.4	7.7	9.6	11.5	14.0
	40	15.6	19.6	23.4	28.6	10.2	12.8	15.3	18.7
	50	19.6	24.5	29.2	35.8	12.8	16.0	19.1	23.4
First Story of Three Stories	10	5.8	6.8	7.7	NP	3.8	4.5	5.1	NP
	20	11.7	13.7	15.6	NP	7.7	9.0	10.2	NP
	30	17.6	20.5	23.4	NP	11.5	13.4	15.3	NP
	40	23.4	27.4	31.2	NP	15.3	17.9	20.4	NP
	50	29.2	34.0	39.0	NP	19.1	22.3	25.5	NP

SI: 1 in = 25.4 mm, 1 mph = 1.61 km/h

1. NP = Not Provided
2. Linear interpolation is permitted.
3. BASF HP+ Wall E Series and WSP structural sheathing installed on 2 x 4 or 2 x 6 studs spaced 24" o.c. and fastened with nails spaced 6" o.c. at panel edges and 12" o.c. in the field of the panels.
4. Demonstrates equivalency to IRC Table R602.10.3(3). All adjustment factors from IRC Table R602.10.3(4) shall be applied.
5. Tabulate bracing lengths are based on the following:
   a. Soil class = D
   b. Wall height = 10 ft
   c. Floor dead load = 10 psf
   d. Roof/ceiling dead load = 15 psf
   e. Braced wall line spacing ≤ 25'
6. Minimum $^1/_2$" gypsum wallboard shall be installed as part of the wall assembly and fastened with a minimum 5d cooler nails or $1^1/_4$" #6 type W or S screws spaced 16" o.c. at panel edges and 16" o.c. in the field of the panels. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 1.3.
7. Bracing lengths are the result of comparative equivalency testing and analysis using both tested and published design values as points of comparison. DrJ relies upon the design values published in the codes and standards listed in Section 4 that are adopted into law and that the manufacturer of those products stand behind. DrJ performs all equivalency analysis based on legally defined design values, the responsibility for which is the manufacturer of those products or the members of the associations that publish those design values.

6.7.7 *Alternative Prescriptive IRC Bracing Applications*

6.7.7.1 As an alternative to **Section 6.7.6**, the following provisions are permitted:

6.7.7.1.1 BASF HP+ Wall E Series may be used to brace walls of buildings as an alternative to the Continuous Wall Bracing provisions of IRC Section R602.10.4, when installed in accordance with this report.

6.7.7.1.2 Required braced wall panel lengths for BASF HP+ Wall E Series shall be as determined by the equivalency factor shown in **Table 3** and IRC Table R602.10.3(1) or IRC Table 602.10.3(3), including all adjustments as required by IRC Table R602.10.3(2) or IRC Table 602.10.3(4), respectively.

6.7.7.1.2.1 Bracing lengths in these tables for Method CS-WSP shall be multiplied by the equivalency factor listed in **Table 3**.

Table 3. Braced Wall Line Length Equivalency Factor

Wall Assembly	Gypsum Sheathing[1]	Maximum Stud Spacing[2] (in)	Fastener	Fastener Spacing	Equivalency Factor to IRC CS-WSP[3,4]
BASF HP+ Wall E Series with 5/8" or 1 1/8" NEOPOR	None	24 o.c.	8d Galvanized Box Nails	48:48	1.53
	1/2" GWB			48:48	1.65

SI: 1 in = 25.4 mm

1. Gypsum sheathing installed with Type W screws at 16":16" spacing. Where gypsum wallboard is not applied to the interior side of the BASF HP+ Wall E Series assembly, bracing lengths shall be multiplied by a factor of 1.3.
2. SPF framing.
3. Multiply the bracing lengths in IRC Table R602.10.3(1) and IRC Table R602.10.3(3), Method WSP or CS-WSP as applicable, including all footnotes, by the factors shown here to establish the required bracing length.
4. Valid for single and double top plate BASF HP+ Wall E Series installations.
5. For factory-built applications only. Wall panels to be spray foamed in the horizontal position only.

6.7.7.1.2.2 These braced wall line length equivalency factors are based on equivalency testing and are used to comply with Method CS-WSP of the IRC.

6.7.7.1.2.3 BASF HP+ Wall E Series tested equivalency factors in **Table 3** allow the user to determine the length of bracing required by multiplying the factor from **Table 2** by the length shown in the CS column in IRC Table R602.10.3(1) or IRC Table 602.10.3(3), as modified by all applicable factors in IRC Table R602.10.3(2) or IRC Table R602.10.3(4), respectively.

6.7.7.1.3 All IRC prescriptive bracing minimums, spacing requirements and rules must still be met.

6.7.8 *Prescriptive IBC Conventional Light-Frame Wood Construction:*

6.7.8.1 BASF HP+ Wall E Series may be used to brace exterior walls of buildings as an equivalent alternative to Method WSP of the IBC when installed continuously along the length of the braced wall line with 1/2" (12.7 mm) gypsum on the interior, fastened with a minimum 5d cooler nail or #6 type W or S screw spaced a maximum of 16" o.c. (203 mm) at panel edges and 16" o.c. in the field. Bracing shall be in accordance with the conventional light-frame construction method of IBC Section 2308.10.3 and this report.

6.7.9 *Performance Based Wood-Framed Construction:*

6.7.9.1 BASF HP+ Wall E Series designed as shear walls are permitted to be designed in accordance with the methodology used in SDPWS for WSP using the capacities shown in **Table 4**, **Table 5**, **Table 5**, and **Table 7**.

6.7.9.2 BASF HP+ Wall E Series shear walls are permitted to resist horizontal wind load forces using the allowable shear loads (in pounds per linear foot) set forth in **Table 4**.

Table 4. Allowable Stress Design (ASD) Capacity for Wind

Wall Assembly	Fastener	Maximum Stud Spacing (in)	Fastener Spacing[1,3] (edge:field) (in)	Gypsum Wallboard (GWB)	GWB Fastener Spacing (edge:field) (in)	Allowable Unit Shear Capacity (plf)
BASF HP+ Wall E Series[2] with 5/8" or 1 1/8" NEOPOR	8d Galvanized Box Nails	24 o.c.	6:12	None	N/A	260
OSB[4]	8d Galvanized Box Nails	16 o.c.	6:12	None	N/A	335

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. Minimum fastener size and spacing are as shown above with a minimum panel edge distance of 3/8".
2. Sheathing used in BASF HP+ Wall E Series shall have joints butted at framing members, and a single row of fasteners must be applied to each panel edge into the stud below.
3. Fasteners may be spaced at 48:48, when applied in a factory setting with the panels spray foamed in the horizontal position.
4. OSB assembly is listed for reference only. Design value come from SDPWS.

6.7.9.3 BASF HP+ Wall E Series shear walls that require seismic design in accordance with IBC Section 1613, shall use the seismic allowable unit shear capacities set forth in **Table 5**.

6.7.9.3.1 The response modification coefficient, R, system overstrength factor, Ω_0, and deflection amplification factor, C_d, as indicated in **Table 5**, shall be used to determine the base shear, element design forces, and design story drift in accordance with ASCE 7 Chapter 12 and Section 14.5.

Table 5. Seismic Allowable Unit Shear and Design Coefficients

Seismic Force Resisting System[1]	Maximum Stud Spacing (in)	GWB[6]	Seismic Allowable Unit Shear Capacity (plf)	Apparent Shear Stiffness, G_a (kips/in)	Response Modification Factor,[2] R	System Overstrength Factor,[3] Ω_0	Deflection Amplification Coefficient,[4] Cd	Structural System Limitations and Building Height Limit (ft)				
								Seismic Design Category				
								B	C	D	E	F
BASF HP+ Wall E Series with 5/8" or 1 1/8" NEOPOR	24 o.c.	1/2"	220	5.2	6.5	3	4	NL[5]	NL[5]	65	65	65

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. NEOPOR fastened to studs using minimum 8d galvanized box nails spaced 6":12" (edge:field) with a minimum panel edge distance of 3/8".
2. Response modification coefficient, R, for use throughout ASCE 7. Note: R reduces forces to a strength level, not an allowable stress level.
3. The tabulated value of the overstrength factor, Ω_0, is permitted to be reduced by subtracting 0.5 for structures with flexible diaphragms.
4. Deflection amplification factor, C_d, for use with ASCE 7 Section 12.8.6, 12.8.7, and 12.9.1.2
5. NL = Not Limited. Heights are measured from the base of the structure as defined in ASCE 7 Section 11.2.
6. Gypsum attached with minimum #6 type W or S screws 1 1/4" long spaced 16" o.c. at panel edges and in the field. Maximum stud spacing is 24" o.c.

6.8 *Axial Loading*

6.8.1 BASF HP+ Wall E Series has been tested for both uplift and compression on single top plate applications.

6.8.2 **Table 6** shows the maximum allowable uplift and compression forces allowed in this application.

6.8.2.1 Designs using the allowable loads in **Table 6** shall have a load path capable of transferring loads from their point of origin to their final point of resistance, in accordance with IRC Section R301.1.

6.8.2.2 Installation is permitted for single top plate (advanced framing method) or double top plate applications.

Table 6. Allowable Floor or Roof Framing Reactions on BASF HP+ Wall E Series Top Plate[2,3,4]

Wall Assembly	Interior Sheathing Material	Maximum Floor/Roof Framing Reactions[1] (lb)	
		Uplift	Compression
BASF HP+ Wall E Series with 5/8" or 1 1/8" NEOPOR	None	885	1350
	1/2" GWB	1035	

SI: 1 in = 25.4 mm, 1 lb. = 4.45 N

1. Applies to placement anywhere along the wall top plate.
2. Maximum allowable load assumes load is concentrated at the mid-span of the top plate between studs.
3. BASF HP+ Wall E Series assemblies are a maximum 24" o.c. stud spacing utilizing a single top plate. All stud cavities are filled with 1 1/2" BASF SPF.
4. All other framing connections are in accordance with the applicable building code.

6.8.2.3 *Double Top Plate:*

6.8.2.3.1 Where truss reactions are less than or equal to the values in **Table 6**, trusses can be set anywhere along the double top plate as needed to frame the floor or roof system.

6.8.2.4 *Single Top Plate:*

6.8.2.4.1 Where a single top plate of No. 3 standard or stud grade dimensional lumber is used, studs below are spaced 24" o.c. and floor or roof framing members are spaced a maximum of 24" o.c. Such members shall be located within 3" of the center of the studs below.

6.8.2.4.2 Where a single top plate of No. 2 SPF dimensional lumber or equivalent is used, studs below are spaced 24" o.c. and floor or roof framing members are spaced a maximum of 24" o.c. Such members shall be located within 5" of the center of the studs below.

6.8.2.5 Uplift capacities are permitted to be increased through the use of mechanical connectors of the top plate to stud and sole plate to stud connections.

6.8.2.6 All other framing conditions shall be in accordance with the applicable code.

6.9 *Perforated Shear Walls*

6.9.1 BASF HP+ Wall E Series shear walls are permitted to be designed in accordance with the methodology found in SDPWS Section 4.3.3.5 with the following exceptions:

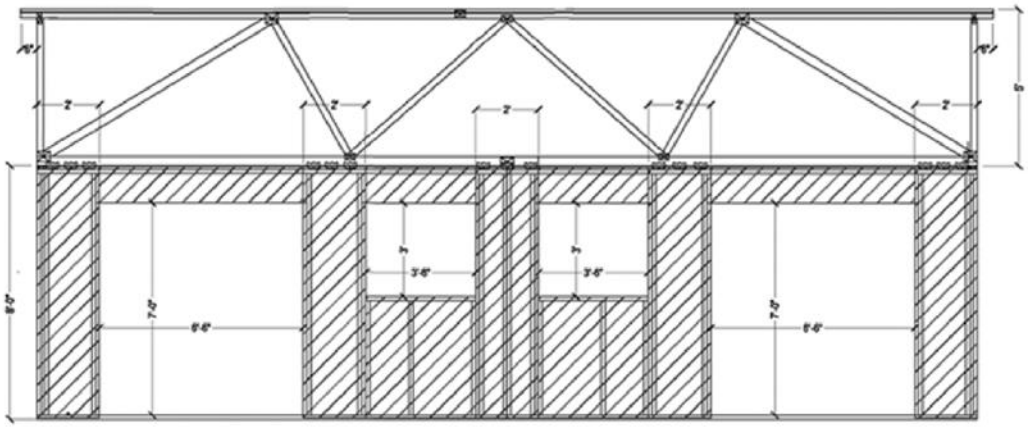
6.9.1.1 SDPWS Equation 4.3-5 for Co shall be replaced with the equation from **Table 7**.

Table 7. C_o for Use with the SDPWS Perforated Shear Wall Methodology

Wall Assembly	Replace SDPWS Eq. 4.3-5 with the Following:
BASF HP+ Wall E Series with 5/8" or 1 1/8" NEOPOR	$C_o = \frac{r}{(1.15 - 0.15 * r)} * \frac{L_{tot}}{\sum L_i}$

6.9.1.2 The maximum aspect ratio for full height BASF HP+ Wall E Series braced wall segments shall be 4:1, instead of 3.5:1 as listed in SDPWS Section 4.3.4.3. The other requirements of SDPWS Section 4.3.4.3 shall be followed, including the adjustment factor for aspect ratio of perforated shear wall segments greater than 2:1.

6.9.1.3 **Figure 3** shows how to calculate the capacity of a perforated shear wall with the BASF HP+ Wall E Series system using the shear capacity adjustment factor in **Table 7**.



$L_{tot} := 30\ ft$	Total length of the perforated shear wall
$h := 8\ ft$	Height of the perforated shear wall
$b_s := 2\ ft$	Length of base of shear wall segment
$L_i := 2\ ft \cdot \left(\frac{2 \cdot b_s}{h}\right) = 1\ ft$	Length of shear wall segment with aspect ratios greater than 2:1 adjusted in accordance with SDPWS Section 4.3.4.3
$\Sigma L_i := L_i \cdot 5 = 5\ ft$	Summation of the five perforated shear wall segments
$A_o := \left(2 \cdot \left(7\ ft \cdot 6.5\ ft\right)\right) + \left(2 \cdot \left(3\ ft \cdot 3.5\ ft\right)\right) = 112\ ft^2$	Total area of all four openings
$r := \frac{1}{\left(1 + \frac{A_o}{h \cdot \Sigma L_i}\right)} = 0.263$	Sheathing area ratio, SDPWS Eq. 4.3-6
$C_o := \left(\frac{r}{1.15 - 0.15 \cdot r}\right) \cdot \frac{L_{tot}}{\Sigma L_i} = 1.42$	Shear capacity adjustment factor (replaces SDPWS Eq. 4.3-5)
$v := 260\ \frac{lb}{ft}$	Allowable unit shear capacity for wind
$V_{perforated} := v \cdot \Sigma L_i \cdot C_o = 1848\ lb$	Shear capacity of perforated shear wall, SDPWS Section 4.3.3.5

Figure 3. Example of a Perforated Shear Wall

6.10 *Transverse Wind Loading*

6.10.1 BASF HP+ Wall E Series installed over exterior framing spaced a maximum of 24" o.c. without an interior covering can resist allowable wind loads (see **Table 8**) and wind speeds (see **Table 9**). Required components and cladding loads to be resisted are found in IBC Section 1609.1.1, IRC Table R301.2.1(1),[26] and IRC Table R301.2.1(2).[27]

Table 8. Transverse (Out-Of-Plane) Wind Load Resistance

Wall Assembly	Maximum Stud Spacing (in)	Fastener Schedule[2]	Allowable Design Value (psf)
BASF HP+ Wall E Series with 5/8" or 1 1/8" NEOPOR	24 o.c.	0.113" x 21/4" galvanized nail, 48":48" o.c. to edge:field	100

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m²

1. Applies to both the positive and negative direction.
2. The attachment of the sheathing to the framing is primarily through the adhesion of the SPF to the framing and NEOPOR. Average depth is 1 1/2".

Table 9. Basic Wind Speed for Use in Exterior Wall Covering Assemblies[2,3]

Wall Assembly	Allowable Components and Cladding Basic Wind Speed[1] (mph)	
	ASCE 7-05 (V_{asd})	ASCE 7-16, 7-22 (V_{ult})
BASF HP+ Wall E Series with 5/8" or 1 1/8" NEOPOR	155	200

SI: 1 mph = 1.61 km/h

1. Allowable wind speeds are based on the following: Mean roof height 30', Exposure B, 10 sq. ft. effective wind area, corner zone 5.
2. 24" o.c. framing
3. BASF HP+ Wall E Series fastened with 0.099" x 2 3/8" galvanized nail, 48":48" o.c. to edge:field.

6.11 *Water-Resistive Barrier (WRB)*

6.11.1 BASF HP+ Wall E Series shall be covered with a code-compliant WRB in accordance with IBC Section 1404.2[28] and IRC Section R703.2.

6.11.2 Flashing shall be installed at all sheathing penetrations and shall comply with the applicable code sections.

6.12 *Thermal Resistance (R-Value)*

6.12.1 BASF HP+ Wall E Series meets the continuous insulated sheathing requirements complying with the provisions of IRC Section N1102 and IECC Section C402.

6.12.2 BASF HP+ Wall E Series has the thermal resistance as shown in **Table 10**.

Table 10. Thermal Resistance Properties

Product	Thickness (in)	R-Value (°F•ft²•hr/Btu)
NEOPOR	1 1/8	5.0
BASF WALLTITE Max	1 1/2	11.1

SI: 1 in = 25.4 mm

1. Tested at a mean temperature of 75° F.

6.13 *Air Barrier*

6.13.1 BASF HP+ Wall E Series meets the requirements of IECC Section C402 for use as a component of the air barrier when installed in accordance with the manufacturer installation instructions and this report. See **Table 11**.

Table 11. Air Barrier Properties

Product	Air Permeance [L/(s•m²)]
BASF WALLTITE Max	< 0.02
1. Tested in accordance with ASTM E2178. 2. Testing conducted on SPF material only.	

6.14 *Surface Burning Characteristics*

6.14.1 BASF HP+ Wall E Series panels have the surface burning characteristics shown in **Table 12**.

Table 12. Surface Burning Characteristics

Product	Flame Spread Index	Smoke Developed Index	Classification
NEOPOR	< 25	< 450	Class A
BASF WALLTITE Max			
1. Tested in accordance with ASTM E84.			

6.15 *Thermal Barrier Requirements – Attic, Crawlspace, or Other Uninhabitable Space Applications*

6.15.1 Installation shall be fully protected from the interior of the building by an approved 15-minute thermal barrier or ignition barrier as required by IBC Section 2603.4 and IRC Section R303.4.

6.16 Where the application falls outside of the performance evaluation, conditions of use, and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

7 Certified Performance[29]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[30]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[31]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 BASF HP+ Wall E Series complies with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Structural performance for shear wall assemblies used as lateral force resisting systems in Seismic Design Categories A through F, have been tested and evaluated in accordance with the standards listed in **Section 4**.

8.1.2 Lateral force resisting systems for use in both wind and seismic applications follow the performance-based provisions of IBC Section 2306.1, IBC Section 2306.3, and/or SDPWS Section 4.3 for light-frame wood wall assemblies.

8.1.2.1 **Table 5** provides SDC that conform to the requirements in ASCE 7 Section 12.2.1, 12.2.1.1, and Table 12.2-1 for design of wall assemblies in buildings that require seismic design.

8.2 BASF HP+ Wall E Series was evaluated to determine the following:

8.2.1 Structural performance under uplift and gravity loads for use with single top plates in accordance with IBC Section 1604 and IRC Section R301.1.

8.2.2 Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with IBC Section 1609.1.1 and IRC Section R301.2.1.

8.2.3 Continuous insulated sheathing requirements for thermal resistance (R-value) complying with the provisions of IRC Section N1102 and IECC Section C402.

8.2.4 Performance for use as a component of the air barrier in accordance with IRC Section N1102.5.1, IECC Section R402.5.1.1,[32] and IECC Section C402.6.1.

8.2.5 Surface burning characteristics complying with the provisions of IBC Section 2603.3 and IRC Section R303.3.

8.3 Performance of BASF HP+ Wall E Series, or any of its component materials for use as a WRB assembly or WRB material, is outside the scope of this report.

8.4 Performance of BASF HP+ Wall E Series, or any of its component materials as used in the normal construction process, is outside the scope of this report.

8.4.1 This includes storage, weather conditions, durability considerations, handling, installing, restraining, and bracing of the BASF HP+ Wall E Series system through the shipping, storing, and construction means and methods process.

8.5 Any building code, regulation and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ, which is an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP or approved sources. DrJ is qualified[33] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[34] respectively.

8.6 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which is also its areas of professional engineering competence.

8.7 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report, and the applicable building code.

9.2 In the event of a conflict between the manufacturer installation instructions and this report, contact the manufacturer for counsel on the proper installation method.

9.3 *Installation Procedure*

9.3.1 BASF HP+ Wall E Series shall be installed in a professional manner, subject to industry-accepted tolerances.

9.3.2 Frame walls in accordance with the construction documents and the applicable building codes.

9.3.2.1 Wall panel/section shall be square and true prior to sheathing with NEOPOR.

9.3.2.2 The building designer is responsible for all temporary bracing. Please consult the SBCA Guide for Handling, Installing & Temporary Bracing of Wall Panels for further information.

9.3.2.3 Where required, gypsum wallboard shall be a minimum $^{1}/_{2}$" (12.7 mm) thickness.

9.3.3 Refer to the BASF HP+ Wall E Series Quality Assurance (QA) procedures and installation manual for construction means and methods support.

9.3.3.1 Storage, weather conditions, durability considerations, handling, installing, restraining, and bracing of the panels are defined in the QA procedures and installation process to support proper construction means and methods.

9.4 *NEOPOR Installation*

9.4.1 NEOPOR must be installed over studs having a nominal thickness of not less than 2" (51 mm) in the least dimension and spaced a maximum of 24" (610 mm) o.c. (see **Figure 4**).

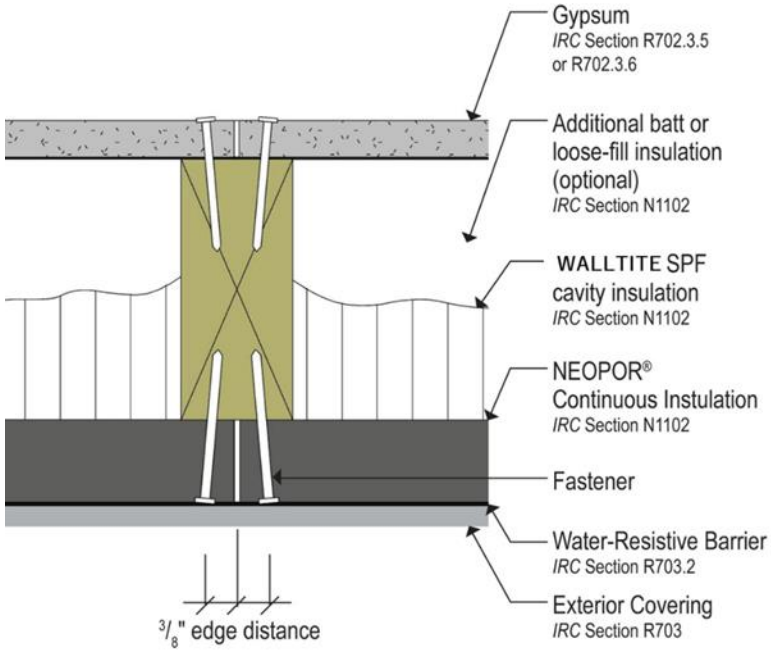


Figure 4. Fastening of NEOPOR and Gypsum Sheathing

9.4.2 NEOPOR must be installed vertically with the length dimension of the panels parallel to the framing behind and all panel edges supported by framing or blocking.

9.4.3 NEOPOR shall be installed with minimum 0.099" shank diameter galvanized nail with a minimum $^{3}/_{8}$" diameter head.

9.4.4 Fasteners shall be of sufficient length to penetrate the framing a minimum of $^{3}/_{4}$" and shall be installed with the head flush with the surface of the sheathing.

9.4.5 Fasteners shall be spaced a minimum of 12" o.c. (305 mm) at panel edges and 16" o.c. (406 mm) in the field.

9.4.6 Fasteners are intended to provide a temporary connection until the SPF is cured. Ensure tight connection between the NEOPOR and framing. Alternate methods of providing this restraint are acceptable.

9.5 *SPF Installation*

9.5.1 SPF shall be installed only by persons trained in accordance with the BASF Corporation Quality Assurance and Training Program (QATP).

9.5.2 SPF sets almost immediately. Ensure wall is square and true prior to SPF application.

9.5.3 Ensure NEOPOR is fastened tightly to the stud to prevent spray foam from entering and expanding between the stud and NEOPOR.

9.5.4 Take care to protect area and personnel from overspray.

9.5.5 Refer to the WALLTITE Technical Data Sheet to understand how to properly process WALLTITE Max at various conditions.

9.5.6 Use properly functioning, high pressure proportioning spray equipment to process WALLTITE Max. All parts of the spray gun need to function as intended and be clean and free of debris.

9.5.7 Substrate shall be clear of debris and dry to the touch before applying WALLTITE Max.

9.5.8 Measure the temperature of the NEOPOR surface with an infrared gun. Substrate temperature shall be a minimum of 30° F and maximum of 105° F.

9.5.9 For proper processing of SPF components, refer to the WALLTITE Max Technical Data Sheet.

9.5.9.1 Spray the initial pass of WALLTITE Max to the NEOPOR so that enough material is laid down to wet the surface without running or sagging.

9.5.9.2 WALLTITE Max first pass should not exceed $^1/_2$" thickness.

9.5.9.3 Allow wetted surface to foam completely and cool before subsequent $1^1/_2$" thick applications.

9.5.9.4 Lapse time between passes will be dependent on the NEOPOR or foam substrate layer temperature.

9.5.10 Panels may be handled immediately after spraying. Full strength develops after 24 hours.

9.5.11 For more detailed installation guidelines, see Guidance on Best Practices for the Installation of Spray Polyurethane Foam and Ventilation Considerations for Spray Polyurethane Foam.

9.5.12 For enhanced automation processes, contact BASF Corporation.

9.5.13 Contractor must be BASF Corporation Quality Assurance Training Program certified.

9.6 *Gypsum Wallboard Installation*

9.6.1 Where required, gypsum wallboard shall be a minimum $^1/_2$" (12.7 mm) thickness and shall be installed with a minimum of either of the following:

9.6.1.1 #6 x $1^1/_4$" (32 mm) type W or S screws

9.6.1.2 5d cooler nails

9.6.2 For IBC and IRC prescriptive applications, gypsum fasteners shall be spaced a maximum of 16" (406 mm) o.c. at panel edges and 16" o.c. at intermediate framing. For engineered design, see **Table 3**.

9.6.3 Fastener edge distance is a minimum of $^3/_8$" (10 mm).

10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

10.1.1 Lateral load testing in accordance with ASTM E2126

10.1.2 Transverse wind load testing in accordance with ASTM E330

10.1.3 Uplift load testing in accordance with ASTM E72

10.1.4 Gravity load testing for single top plate applications in accordance with ASTM E72

10.1.5 Strength testing for NEOPOR with BASF SPF in accordance with ASTM E72

10.1.6 Strength testing for OSB with BASF SPF in accordance with ASTM E72

10.1.7 Strength testing for OSB in accordance with ASTM E72

10.1.8 Surface burning testing for NEOPOR in accordance with ASTM E84

10.1.9 Material property testing for NEOPOR in accordance with ASTM C578

10.1.10 Uniform static air testing for NEOPOR in accordance with ASTM E330

10.1.11 Material property testing for BASF SPF in accordance with ASTM D1623, D1622, D2842, D2126, D6226, E2178, C518, and E96

10.1.12 Water resistance properties of BASF SPF in accordance with AATCC TM 127

10.1.13 Air leakage properties of BASF SPF in accordance with ASTM E283

10.1.14 Thermal transmission properties of BASF SPF in accordance with ASTM C518

10.1.15 Water penetration properties of BASF SPF in accordance with ASTM E331

10.1.16 Surface burning testing of BASF SPF in accordance with ASTM E84

10.1.17 Heat release and flame spread testing of BASF SPF in accordance with NFPA 286

10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or an RDP. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where applicable, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

10.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.5 *Testing and Engineering Analysis*

10.5.1 The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[35]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for BASF HP+ Wall E Series on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, BASF HP+ Wall E Series has performance characteristics that were tested and/or meet applicable regulations. In addition, they are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, BASF HP+ Wall E Series shall be approved for the following applications:

11.2.1 Lateral load resistance due to wind and seismic loads carried by shear walls in accordance with **Table 1**, **Table 2**, **Table 3**, **Table 4**, and **Table 7**.

11.2.2 Resistance to axial and uplift loads in single top plate applications in accordance with **Table 6**.

11.2.3 Transverse wind load resistance in accordance with **Table 8** and **Table 9**.

11.2.4 Thermal resistance properties in accordance with **Table 10**.

11.2.5 Air barrier properties in accordance with **Table 11**.

11.2.6 Surface burning characteristics in accordance with **Table 12**.

11.3 Unless exempt by state statute, when BASF HP+ Wall E Series is to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.

11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from BASF Corporation.

11.5 IBC Section 104.2.3[36] (IRC Section R104.2.2[37] and IFC Section 104.2.3[38] are similar) in pertinent part state:

> **104.2.3 Alternative Materials, Design and Methods of Construction and Equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative is not specifically prohibited by this code and has been approved.

11.6 **Approved:**[39] Building regulations require that the building official shall accept duly authenticated reports.[40]

11.6.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce.

11.6.3 Federal law, Title 18 US Code Section 242, requires that, where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Arrangement (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[41]

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.

12.2 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

12.3 As listed herein, BASF HP+ Wall E Series shall be used:

12.3.1 With other bracing, unless installed as wall bracing as noted in this report.

12.4 When used in accordance with the IBC in Seismic Design Categories C, D, E, or F, special inspections shall comply with IBC Section 1705.13.[42]

12.5 When used in accordance with the IBC in high wind areas, special inspections shall comply with IBC Section 1705.13.[43]

12.6 All panel edges shall be supported by wall framing or solid blocking a minimum of 2" (51 mm) nominal thickness in the least dimension.

12.7 The manufacturer installation instructions shall be available on the jobsite for inspection.

12.8 Refer to the BASF HP+ Wall E Series Quality Assurance (QA) procedures and installation manual for construction means and methods support.

12.8.1 Storage, weather conditions, durability considerations, handling, installing, restraining, and bracing of the panels are defined in the QA procedures and installation process to support proper construction means and methods.

12.8.2 The contractor or wall installer is responsible for following the BASF HP+ Wall E Series QA procedures, installation instructions and all means and methods of construction.

12.9 Contact BASF Corporation for additional information regarding means and methods.

12.10 When required by adopted legislation and enforced by the building official, also known as the Authority Having Jurisdiction (AHJ) in which the project is to be constructed:

12.10.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

12.10.2 This report and the installation instructions shall be submitted at the time of permit application.

12.10.3 This innovative product has an internal quality control program and a third-party quality assurance program.

12.10.4 At a minimum, this innovative product shall be installed per **Section 9**.

12.10.5 The review of this report by the AHJ shall comply with IBC Section 104.2.3.2 and IBC Section 105.3.1.

12.10.6 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.7.2, IBC Section 110.4, IBC Section 1703, IRC Section R104.7.2, and IRC Section R109.2.

12.10.7 The application of this innovative product in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.

12.11 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *"the building official shall make, or cause to be made, the necessary tests and investigations; or the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.2.3"*, all of IBC Section 104, and IBC Section 105.3.

12.12 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.13 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

13.1 BASF HP+ Wall E Series, as listed in **Section 1.1**, is identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.

13.2 Additional technical information can be found at www.spf.basf.com.

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit www.drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

Notes

1 For more information, visit drjcertification.org or call us at 608-310-6748.

2 Capitalized terms and responsibilities are defined pursuant to the applicable building code, applicable reference standards, the latest edition of TPI 1, the NDS, AISI S202, US professional engineering law, Canadian building code, Canada professional engineering law, Qualtim External Appendix A: Definitions/Commentary, Qualtim External Appendix B: Project/Deliverables, Qualtim External Appendix C: Intellectual Property and Trade Secrets, definitions created within Design Drawings and/or definitions within Reference Sheets. Beyond this, terms not defined shall have ordinarily accepted meanings as the context implies. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

3 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1702

4 Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3

5 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.2:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests

6 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.1:~:text=Conformance%20to%20Standards-,The%20design%20strengths%20and%20permissible%20stresses,-of%20any%20structural

7 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20make%2C%20or%20cause%20to%20be%20made%2C%20the%20necessary%20tests%20and%20investigations%3B%20or%20the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.2.3.

8 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4.2

9 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_agency

10 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_source

11 https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

12 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

13 https://www.cbitest.com/accreditation/

14 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.1:~:text=directed%20to%20enforce%20the%20provisions%20of%20this%20code

15 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3 AND https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#105.3.1

16 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

17 https://iaf.nu/en/about-iaf-mla/#:~:text=Once%20an%20accreditation%20body%20is%20a%20signatory%20of%20the%20IAF%20MLA%2C%20it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

18 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

19 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

20 Unless otherwise noted, the links referenced herein use un-amended versions of the 2024 International Code Council (ICC) 2024 International Code Council (ICC) model codes as foundation references. Mississippi versions of the IBC 2024 and the IRC 2024 are un-amended. This material, product, design, service and/or method of construction also complies with the 2000-2012 versions of the referenced codes and the standards referenced therein. As pertinent to this technical and code compliance evaluation, CBI and/or DrJ staff have reviewed any state or local regulatory amendments to assure this report is in compliance.

21 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by the local jurisdiction. https://up.codes/codes/general

22 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by state. https://up.codes/codes/general

23 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

24 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

25 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#listed AND https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#labeled

26 2018 IRC Table R301.2(2)

27 2018 IRC Table R301.2(3)

28 2015 IBC Section 1405.2

29 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4

30 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

[31] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

[32] 2021 IECC Section R402.4.1.1

[33] Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

[34] https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?prgID=1&orgID=2125&statusID=4#:~:text=Bill%20Payment%20Date-,Accredited%20Scopes,-13%20ENVIRONMENT.%20HEALTH

[35] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

[36] 2021 IBC Section 104.11

[37] 2021 IRC Section R104.11

[38] 2018: https://up.codes/viewer/wyoming/ifc-2018/chapter/1/scope-and-administration#104.9 AND 2021: https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11

[39] Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 (https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[40] https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

[41] Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[42] 2018 IBC Section 1705.12

[43] 2018 IBC Section 1705.11